



Lenovo ThinkSystem ST650 V2 Server

Product Guide (withdrawn product)

The Lenovo ThinkSystem ST650 V2 is an ideal 2-socket 4U tower server for small businesses up to large enterprises that need industry-leading reliability, management, and security, as well as maximizing performance and flexibility for future growth. The ST650 V2 is based on the 3rd generation Intel Xeon Scalable processor family and the Intel Optane Persistent Memory 200 Series.

The ST650 V2 is designed to handle a wide range of workloads, such as databases, virtualization and cloud computing, virtual desktop infrastructure (VDI), infrastructure security, systems management, enterprise applications, collaboration/email, streaming media, web, and HPC.



Figure 1. Lenovo ThinkSystem ST650 V2

Did you know?

The ThinkSystem ST650 V2 is an enterprise-grade tower server with support for hot-swap power supplies, fans, and drives. It also offers full support of Lenovo XClarity Administrator for comprehensive systems management and includes the UEFI-based Lenovo XClarity Provisioning Manager for system setup and diagnosis, and the Lenovo XClarity Controller management processor for ongoing systems management and alerting. These tools make the ST650 V2 easy to deploy, integrate, service, and manage.

The ST650 V2 is a very storage-rich tower offering, supporting up to 32x 2.5-inch drives or up to 16x 3.5-inch drives. The tower server can also be converted to a 4U rack server if needed.

Key features

The ThinkSystem ST650 V2 is a high-performance dual-socket tower server based on the third-generation Intel Xeon Scalable processors, supporting a wide range of processors to suit a wide range of budgets and application requirements.

Scalability and performance

The ST650 V2 offers numerous features to boost performance, improve scalability and reduce costs:

- Supports one or two third-generation Intel Xeon Processor Scalable processors
 - Up to 36 cores and 72 threads
 - Core speeds of up to 3.6 GHz
 - TDP ratings of up to 250W
- Support for up to 32 TruDDR4 memory DIMMs operating at up to 3200 MHz means you have the fastest available memory subsystem.
- Supports configurations of 2 DIMMs per channel to operate at the 3200 MHz rated speed of the memory DIMMs.
- Using 128GB 3DS RDIMMs, the server supports up to 4TB of system memory.
- Supports the new Intel Optane Persistent Memory 200 Series for advanced in-memory database applications, dense-virtualization; up to 16 PMem Modules can be installed in conjunction with regular system memory.
- Supports up to eight single-width GPUs or four double-wide GPUs, for substantial processing power in a tower system.
- Supports a variety of front-accessible drive bays:
 - Up to 32x 2.5-inch hot-swap drive bays with two 5.25-inch media bays
 - Up to 12x 3.5-inch hot-swap drive bays with two 5.25-inch media bays
 - Up to 16x 3.5-inch hot-swap drive bays without the media bays
 - Up to 12x 3.5-inch simple-swap drive bays with two 5.25-inch media bays
- Supports up to 16x NVMe drives to maximize drive I/O performance, in terms of throughput, bandwidth, and latency.
- Supports up to 12x SATA drives using the onboard SATA controller (no additional adapter needed), enabling lower cost, high capacity storage solution.
- Supports high-speed RAID controllers from Broadcom providing 12 Gb SAS connectivity to the drive backplanes. A variety of PCIe 3.0 and PCIe 4.0 RAID adapters are available, including compact form factor adapters that are cabled and don't occupy a PCIe slot.
- Supports M.2 drives for convenient operating system boot functions or data storage. Available M.2 adapters support either one M.2 drive or two M.2 drives in a RAID 1 configuration for performance and reliability.
- The server has two integrated 10 GbE 10GBASE-T ports with support for additional networking using adapter cards.
- The server offers PCI Express 4.0 I/O expansion capabilities that doubles the theoretical maximum bandwidth of PCIe 3.0 (16GT/s in each direction for PCIe 4.0, compared to 8 GT/s with PCIe 3.0). A PCIe 4.0 x16 slot provides 64 GB/s bandwidth, enough to support a 200GbE network connection.
- Up to nine PCIe slots, eight of which are PCIe 4.0 and are standard.

Availability and serviceability

The ST650 V2 provides many features to simplify serviceability and increase system uptime:

- Designed to run 24 hours a day, 7 days a week
- 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 RAID redundancy for data protection and greater system uptime.
- Available M.2 RAID Boot Adapters support RAID-1 which can enable two SATA or two NVMe M.2 drives to be configured as a redundant pair.
- The server has up to two hot-swap redundant power supplies and up to four large hot-swap redundant fans to provide availability for business-critical applications.
- The power-source-independent light path diagnostics uses LEDs to lead the technician to failed (or failing) components, which simplifies servicing, speeds up problem resolution, and helps improve system availability.
- Solid-state drives (SSDs) offer more reliability than traditional mechanical HDDs for greater uptime.
- Proactive Platform Alerts (including PFA and SMART alerts): Processors, voltage regulators, memory, internal storage (SAS/SATA HDDs and SSDs, NVMe SSDs, M.2 storage, flash storage adapters), 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 located at the rear 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 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, 9 x 5 next business day. Optional service upgrades are available.

Manageability and security

Systems management features simplify local and remote management of the ST650 V2:

- Toolless cover removal provides easy access to upgrades and serviceable parts, such as CPU, memory, and adapter cards.
- 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.
- 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
- Available physical security features include a lockable front door and a chassis intrusion switch to help prevent unauthorized access and notify administrators when the server cover has been removed.
- 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.

Energy efficiency

The ST650 V2 offers the following energy-efficiency features to save energy, reduce operational costs, and increase energy availability:

- Energy-efficient planar 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.
- The server uses hexagonal ventilation holes, which can be grouped more densely than round holes, providing more efficient airflow through the system and thus keeping your system cooler.
- 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.

Comparing the ST650 V2 to the ST550

The ThinkSystem ST650 V2 is the new mainstream 2S tower server that is positioned above ST550, the value 2S tower. ST650 V2 with the industry's latest technologies supports higher TDP CPUs, a larger memory footprint, more storage capabilities, a larger number of I/O slots, and supports more GPU adapters. Details are summarized in following table.

Table 1. Comparing the ThinkSystem ST650 V2 to the previous generation ST550

| Feature | ST550 | ST650 V2 | Benefits |
|-------------|--|--|--|
| Form Factor | <ul style="list-style-type: none">• 4U Tower with rack convertible | <ul style="list-style-type: none">• 4U Tower with rack convertible | <ul style="list-style-type: none">• More features and capacities with same chassis |

| Feature | ST550 | ST650 V2 | Benefits |
|------------|--|--|--|
| Processor | <ul style="list-style-type: none"> 2x 2nd Gen Intel Xeon Scalable Processor up to 22 cores & 125W per CPU | <ul style="list-style-type: none"> 2x 3rd Gen Intel Xeon Scalable Processor up to 36 cores & 250W per CPU | <ul style="list-style-type: none"> The latest high-performance processors from Intel Greater computing performance with top bin CPUs |
| Memory | <ul style="list-style-type: none"> 6 channels per CPU 12x TruDDR4 (R/LR/3DS) 2933MHz DIMMs Up to 2933MHz, Max 768GB | <ul style="list-style-type: none"> 8 channels per CPU 32x TruDDR4 (R/3DS) 3200MHz DIMMs Up to 1DPC & 2DPC @ 3200MHz, Max 4TB 2nd Gen Intel Optane Persistent Memory | <ul style="list-style-type: none"> 5X increase in memory capacity Faster memory Support for PMem for even greater memory capacity and application performance |
| Disk | <ul style="list-style-type: none"> Internal M.2 with optional RAID 0/1 Up to 8x 3.5" SS or HS SAS/SATA Up to 20x 2.5" HS SAS/SATA (optional 4x NVMe SSDs) Hybrid support for 8x 3.5" and 4x 2.5" HS SAS/SATA Optional 2x 5.25" drive bays for optical/backup drives | <ul style="list-style-type: none"> Internal M.2 with optional RAID 0/1 Up to 16x 3.5" HS SAS/SATA (up to 8x optional NVMe SSDs) Up to 32x 2.5" HS SAS/SATA (up to 16x optional NVMe SSDs) Optional 2x 5.25" drive bays for optical/backup drives | <ul style="list-style-type: none"> Double the number of 3.5" drive bays 1.6X more 2.5" drive bays. 4X the number of NVMe SSDs supported |
| RAID | <ul style="list-style-type: none"> 12Gb SAS/SATA/RAID support PCIe 3.0 adapters Onboard SATA support with RAID Range of 8-, 16- and 24-port RAID adapters 8- and 16-port HBAs NVMe Switch for 4x NVMe | <ul style="list-style-type: none"> 12Gb SAS/SATA/RAID support PCIe 3.0 and PCIe 4.0 adapters Onboard SATA support with RAID Onboard VROC NVMe support with RAID Wider range of 8-, 16- and 32-port RAID adapters 8- and 16-port HBAs NVMe Retimer adapters for 16x NVMe | <ul style="list-style-type: none"> New with Intel VROC for onboard SATA RAID and NVMe RAID Featuring industry's latest PCIe Gen4 based RAID adapters NVMe Retimers lower the cost of NVMe support |
| Networking | <ul style="list-style-type: none"> 2x 1GbE embedded 1GbE dedicated Management port | <ul style="list-style-type: none"> 2x 10GbE embedded 1GbE dedicated Management port | <ul style="list-style-type: none"> Moved from embedded 1GbE to 10GbE for faster data transfer |
| PCIe | <ul style="list-style-type: none"> 6 slots total 3x PCIe 3.0 x16 slots 2x PCIe 3.0 x8 slots 1x PCIe 3.0 x4 slot Separate M.2 adapter support | <ul style="list-style-type: none"> Up to 9 slots total (1 is optional) 4x PCIe 4.0 x16 slots Up to 4x PCIe x8 (3x Gen4, 1x Gen3) 1x PCIe 4.0 x4 slot Separate M.2 adapter support | <ul style="list-style-type: none"> New PCIe 4.0 support Additional slots to support more I/O Extra x16 slot for high-performance networking |

| Feature | ST550 | ST650 V2 | Benefits |
|-------------------------|---|--|--|
| GPU | <ul style="list-style-type: none"> Up to 2x DW/SW GPU adapters | <ul style="list-style-type: none"> Up to 4x active DW or 8x SW GPU adapters | <ul style="list-style-type: none"> 2X more the double-width GPU support and 4X more the single-width GPU support |
| Management and Security | <ul style="list-style-type: none"> XClarity Controller with upgrades Full XClarity software suite including XClarity Administrator Optional intrusion switch and lockable door | <ul style="list-style-type: none"> XClarity Controller with upgrades Full XClarity software suite including XClarity Administrator Optional intrusion switch and lockable door Support for External Diagnostics Handset Platform Firmware Resiliency (PFR) hardware Root of Trust | <ul style="list-style-type: none"> Common management tools with prior generation External Diagnostics Handset with LCD panel offers quick access to system status, firmware, network, and health information Platform Firmware Resiliency is an advanced security solution with a silicon-based to guard against corruption and unauthorized firmware updates |
| Power Supply | <ul style="list-style-type: none"> 1x 450W Fixed PSU, Gold 2x Hot-swap PSUs up to 1100W, Platinum 750W Hot-swap Titanium PSU | <ul style="list-style-type: none"> 2x Hot-swap PSUs up to 2400W, Platinum 750W Hot-swap Titanium PSU 1100W -48V DC PSU (planned) | <ul style="list-style-type: none"> Expanded power supply portfolio for exact configuration required and sharing with rest of the 2-socket/4-socket ThinkSystem V2 servers |

Components and connectors

The following figure shows the front of the server.

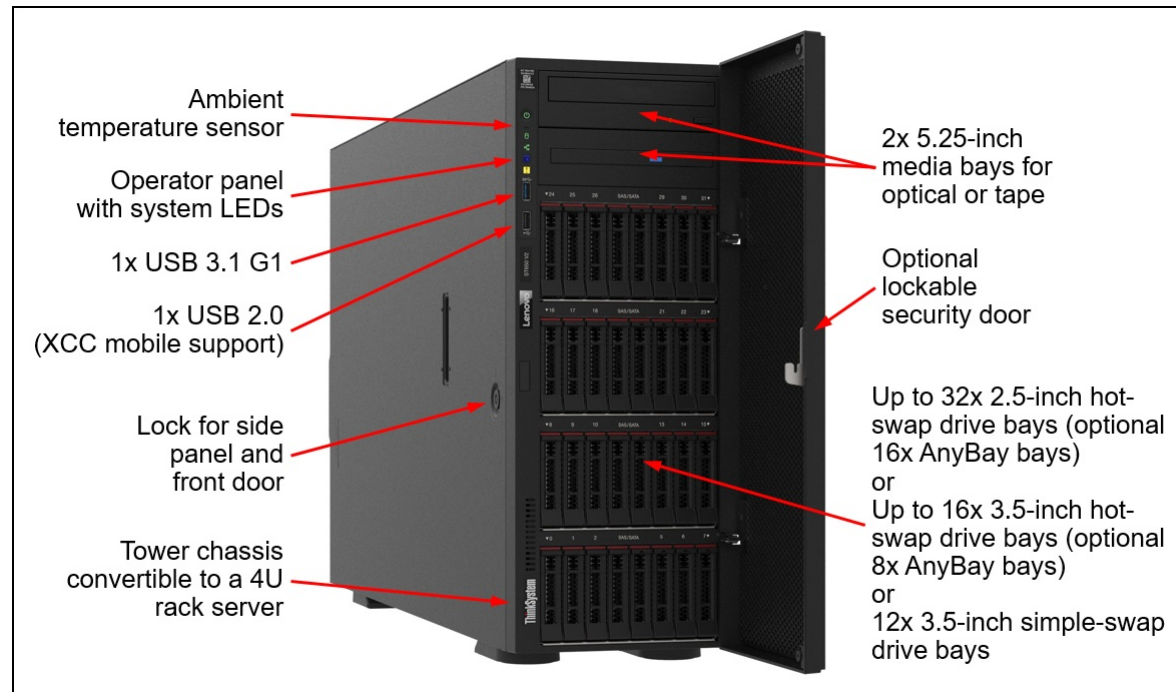


Figure 2. Front view of the ThinkSystem ST650 V2

The following figure shows the four drive bay combinations that the server supports.

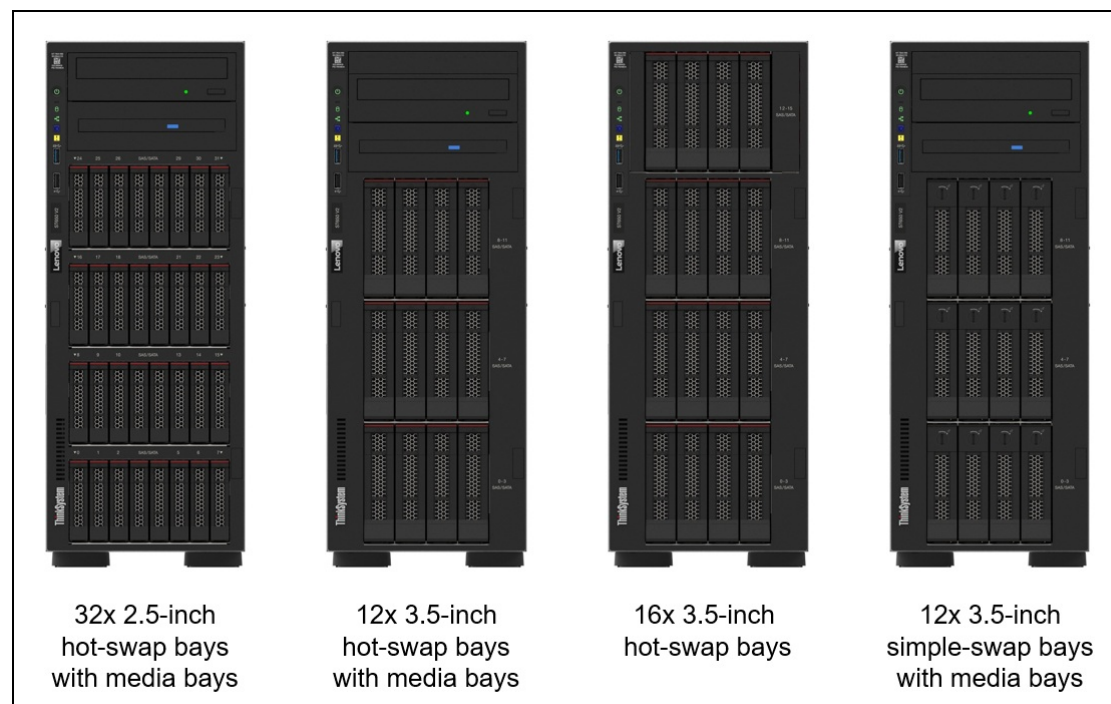


Figure 3. Drive bay combinations of the ThinkSystem ST650 V2

The following figure shows the components visible from the rear of the server.

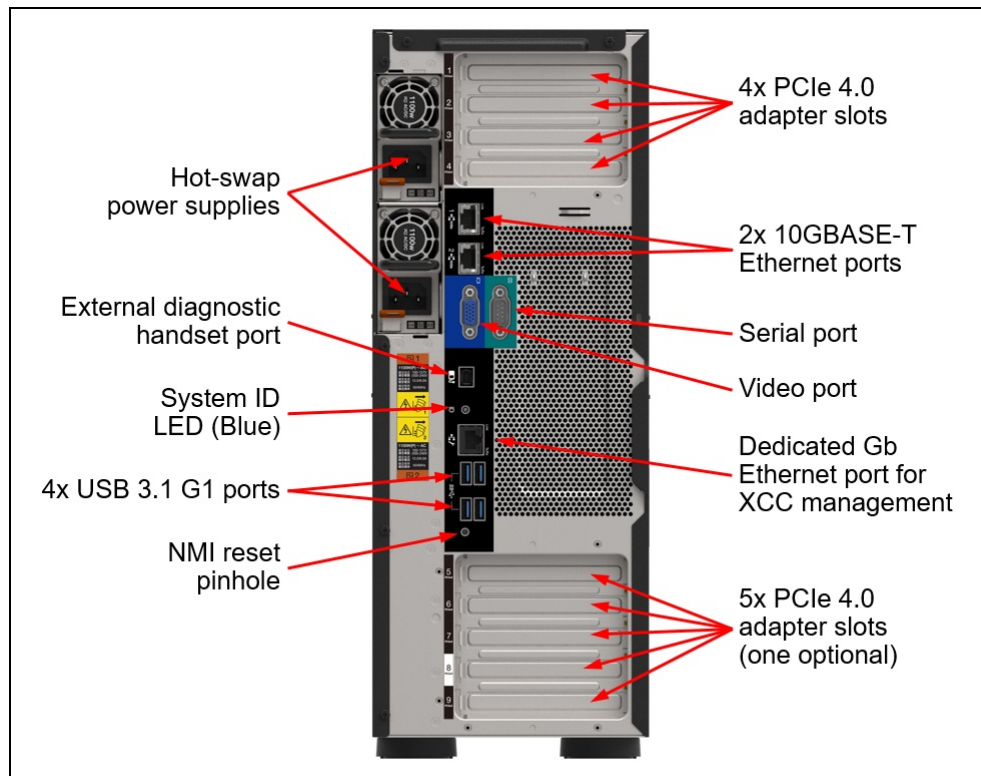


Figure 4. Rear view of the ThinkSystem ST650 V2

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

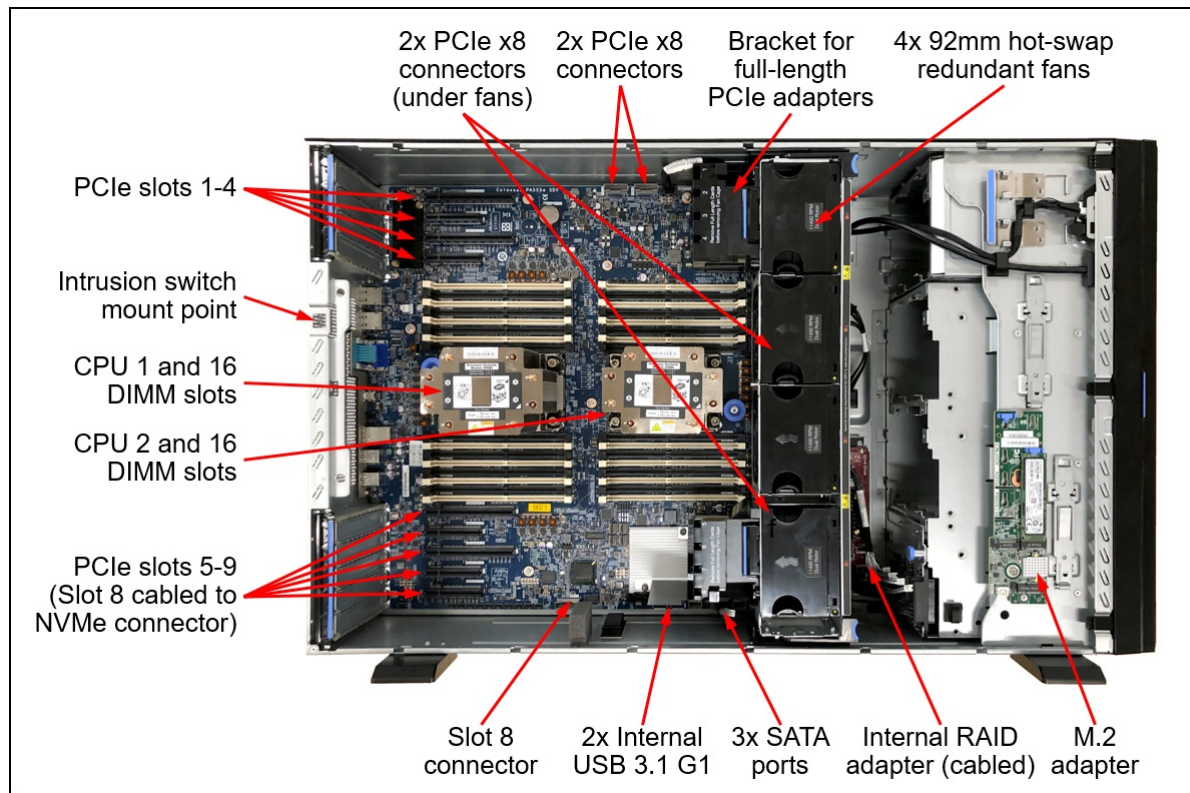


Figure 5. Internal view of the ThinkSystem ST650 V2

System architecture

The following figure shows the architectural block diagram of the ST650 V2, showing the major components and their connections.

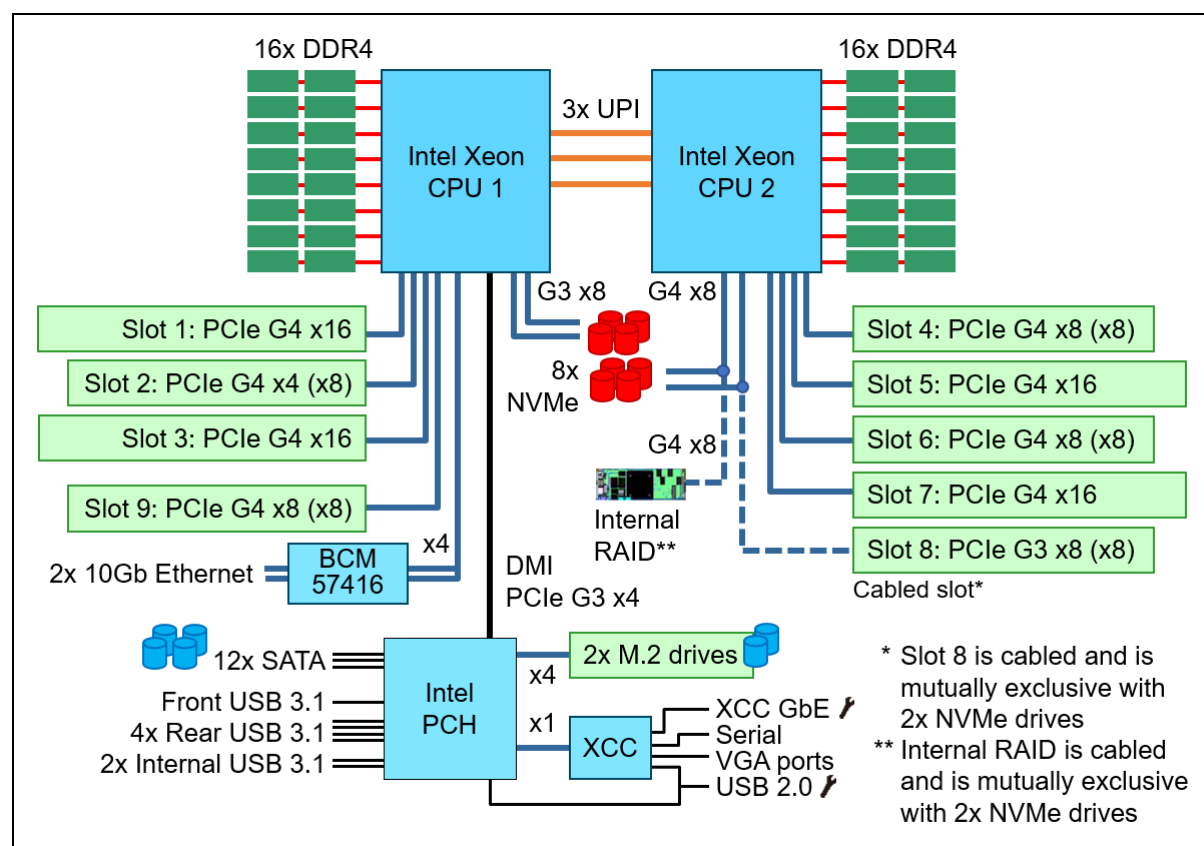


Figure 6. ST650 V2 system architectural block diagram

Standard specifications

The following table lists the standard specifications.

Table 2. Standard specifications

| Components | Specification |
|-------------------|--|
| Machine types | 7Z75 - 1 year warranty 7Z74 - 3 year warranty |
| Form factor | Tower or 4U Rack |
| Processor | One or two third-generation Intel Xeon Scalable processor (formerly codenamed "Ice Lake"). Supports processors up to 36 cores, core speeds of up to 3.6 GHz, and TDP ratings of up to 250W. |
| Chipset | Intel C621A "Lewisburg" chipset, part of the platform codenamed "Whitley" |
| Memory | 32 DIMM slots with two processors (16 DIMM slots per processor). Each processor has 8 memory channels, with 2 DIMMs per channel (DPC). Lenovo TruDDR4 RDIMMs and 3DS RDIMMs are supported. DIMM slots are shared between standard system memory and persistent memory. DIMMs operate at up to 3200 MHz at 2 DPC. |
| Persistent memory | Supports up to 16x Intel Optane Persistent Memory 200 Series modules (8 per processor) installed in the DIMM slots. Persistent memory (Pmem) is installed in combination with system memory DIMMs. |

| Components | Specification |
|-----------------------------------|--|
| Memory maximum | With RDIMMs: Up to 4TB by using 32x 128GB 3DS RDIMMs With Persistent Memory: Up to 5TB by using 16x 64GB 3DS RDIMMs and 16x 256GB Pmem modules (2.5TB per processor) |
| Memory protection | ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs, requires Platinum or Gold processors), and memory mirroring. |
| Disk drive bays | 2.5-inch drive bays: <ul style="list-style-type: none"> Up to 32x 2.5-inch hot-swap bays (16x NVMe) plus 2x 5.25-inch media bays 3.5-inch drive bays: <ul style="list-style-type: none"> Up to 16x 3.5-inch hot-swap bays (8x NVMe) (no media bays) Up to 12x 3.5-inch hot-swap bays (8x NVMe) plus 2x 5.25-inch media bays Up to 12x 3.5-inch simple-swap bays plus 2x 5.25-inch media bays Internal drives for OS boot or drive storage: <ul style="list-style-type: none"> Internal M.2 module supporting up to two M.2 drives |
| Maximum internal storage | <ul style="list-style-type: none"> 2.5-inch drives: <ul style="list-style-type: none"> 983.04TB using 32x 30.72TB 2.5-inch SAS/SATA SSDs 491.52TB using 16x 30.72TB 2.5-inch NVMe SSDs 76.8TB using 32x 2.4TB 2.5-inch HDDs 3.5-inch drives: <ul style="list-style-type: none"> 352TB using 16x 22TB 3.5-inch HDDs 245.76TB using 16x 15.36TB 3.5-inch SAS/SATA SSDs 102.4TB using 8x 12.8TB 3.5-inch NVMe SSDs |
| Storage controller | <ul style="list-style-type: none"> 12x onboard SATA ports (Intel VROC SATA RAID, formerly known as Intel RSTe RAID) Up to 8x onboard NVMe ports (includes Intel VROC NVMe RAID, with optional license for non-Intel NVMe SSDs) NVMe Retimer Adapter (supports Intel VROC NVMe RAID) 12 Gb SAS/SATA RAID adapters <ul style="list-style-type: none"> 8, 16 or 32 ports Up to 8GB flash-backed cache PCIe 4.0 or PCIe 3.0 host interface 12 Gb SAS/SATA HBA (non-RAID) <ul style="list-style-type: none"> 8-port and 16-port PCIe 4.0 or PCIe 3.0 host interface |
| Optical drive and tape drive bays | Two half-height 5.25-inch media bays, available in most configurations. Supports two of LTO tape drive, RDX drive, or slim DVD-RW optical drive. |
| Network interfaces | Two onboard 10GBASE-T Ethernet RJ45 ports based on a Broadcom BCM57416 controller. Additional dedicated Gigabit port for remote management via the XClarity Controller (XCC) management processor. |

| Components | Specification |
|-----------------------------|--|
| PCI Expansion slots | <p>Up to 9x PCIe slots - 8x PCIe 4.0 slots standard, 1x PCIe 3.0 slot optional (slot 8) All slots are full height, full length (FHFL) with rear access. Slots 4-8 require CPU 2 installed.</p> <ul style="list-style-type: none"> Slot 1: PCIe 4.0 x16 (CPU 1) Slot 2: PCIe 4.0 x4 (x8 physical slot) (CPU 1) Slot 3: PCIe 4.0 x16 (CPU 1) Slot 4: PCIe 4.0 x8 (x8 physical slot) (CPU 2) Slot 5: PCIe 4.0 x16 (CPU 2) Slot 6: PCIe 4.0 x8 (x8 physical slot) (CPU 2) Slot 7: PCIe 4.0 x16 (CPU 2) Slot 8: PCIe 3.0 x8 (x8 physical slot) (CPU 2) (optional, cabled to PCIe connector) Slot 9: PCIe 4.0 x8 (x8 physical slot) (CPU 1) <p>The server also supports the installation of a RAID adapter or HBA in a dedicated area that does not consume any of the PCIe slots. See the location of the Internal RAID adapter (cabled) in the Internal view of the server.</p> <p>All nine slots are mounted on the system board. The optional slot, Slot 8, is enabled through a cable, routed from one of the PCIe NVMe onboard connectors. See the I/O expansion section for details.</p> |
| GPU support | Supports up to 8x single-wide GPUs or up to 4x double-wide GPUs |
| Ports | <p>Front: 1x USB 3.2 G1 (5 Gb/s) port, 1x USB 2.0 port (also for XCC local management)</p> <p>Rear: 2x 10GBASE-T RJ45 Ethernet ports, 4x USB 3.2 G1 (5 Gb/s) ports, 1x VGA video port, 1x DB-9 COM serial port, 1x 1GbE RJ-45 systems management port for XCC remote management, External diagnostics port</p> <p>Internal: 1x USB 3.2 G1 connector for operating system or license key purposes</p> |
| Cooling | Up to 4x single-rotor or dual-rotor hot swap 92 mm fans, configuration dependent. Fans are N+1 redundant. One additional fan integrated in each power supply. |
| Power supply | Up to two hot-swap redundant AC power supplies, 80 PLUS Platinum or 80 PLUS Titanium certification. 750 W, 1100 W, 1800 W and 2400 W AC options, supporting 220 V AC. 750 W and 1100 W options also support 110V input supply. In China only, all power supply options support 240 V DC. |
| 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, power supplies, and fans. |
| Systems management | Operator panel with status LEDs. Optional External Diagnostics Handset with LCD display. XClarity Controller (XCC) embedded management, 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. |
| Security features | Power-on password, administrator's password, Trusted Platform Module (TPM), supporting TPM 2.0. In China only, optional Nationz TPM 2.0. Optional lockable front security door and optional chassis intrusion switch. |
| Operating systems supported | Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware ESXi. See the Operating system support section for specifics. |
| Limited warranty | Three-year or one-year (model dependent) 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 | Width: 175 mm (6.9 in.), height: 462 mm (18.2 in.), depth: 734 mm (28.9 in.). See Physical and electrical specifications for details. |
| Weight | 2.5-inch configuration: 39.28 kg (86.60 lb) maximum 3.5-inch configuration: 46.23 kg (101.92 lb) maximum |

Models

ThinkSystem ST650 V2 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 ST650 V2, 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 ThinkSystem ST650 V2 server.

Table 3. Base CTO models

| Machine Type/Model | Description |
|--------------------|---|
| 7Z74CTO1WW | ThinkSystem ST650 V2 3yr Warranty |
| 7Z74CTOAWW | ThinkSystem ST650 V2 3yr Warranty with Controlled GPU |
| 7Z75CTO1WW | ThinkSystem ST650 V2 1yr Warranty |

Models of the ST650 V2 are defined based on whether the server has 2.5-inch drive bays at the front (called the 2.5-inch chassis) or whether it has 3.5-inch drive bays at the front (called the 3.5-inch chassis). For models, the feature codes for these chassis bases are as listed in the following table.

Table 4. Chassis base feature codes

| Feature code | Description |
|--------------|--------------------------------------|
| BA64 | ThinkSystem ST650 V2 32x2.5" Chassis |
| BA63 | ThinkSystem ST650 V2 16x3.5" Chassis |

Preconfigured models

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

- [Models for Asia Pacific region](#)
- [Models for Australia and New Zealand](#)
- [Models for Brazil](#)
- [Models for EMEA region](#)
- [Models for India](#)
- [Models for Japan](#)
- [Models for Latin American countries \(except Brazil\)](#)
- [Models for USA and Canada](#)

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

Common to all models:

- All models indicated as having the 750W power supply are using the Platinum power supply.

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 5. Models for Asia Pacific markets

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|--|--------------------------------|---------|--------|----------------------|--------------------|-----|------------|---------|----------------|-------------|
| Standard models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A00TAP | 1x Silver 4309Y 8C 105W 2.8G | 1x 16GB | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 1x750W | No |
| 7Z74A01BAP | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 1x750W | No |
| 7Z74A01KAP | 1x Silver 4314 16C 135W 2.4G | 1x 16GB | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 1x750W | No |
| 7Z74A01CAP | 1x Silver 4316 20C 150W 2.3G | 1x 16GB | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 1x750W | No |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Models for Australia and New Zealand

AP models: Customers in Australia and New Zealand also have access to the [Asia Pacific region](#) models.

Table 6. Models for Australia and New Zealand

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|---|--------------------------------|--------------|---------|----------------------|--------------------|-----|------------|--------|----------------|-------------|
| TopSeller models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A03GAU | 1x Silver 4309Y 8C 105W 2.8G | 1x 16GB | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 4x Std | 1x750W | Yes |
| 7Z74A03EAU | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 4x Std | 1x750W | Yes |
| 7Z74A03FAU | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 4x Std | 1x750W | Yes |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Models for Brazil

Table 7. Models for Brazil

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|--|--------------------------------|--------------|-------------|-----------------------|--------------------|-----|------------|---------|----------------|-------------|
| Standard models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A04EBR | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 9350-8i | 8x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | No | 3x Perf | 2x750W | Yes |
| 7Z74A027BR | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 930-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Std | Yes | 4x Std | 1x750W | Yes |
| 7Z74A025BR | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 930-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Std | Yes | 4x Std | 1x750W | Yes |
| 7Z74A028BR | 1x Silver 4316 20C 150W 2.3G | 1x 32GB 2Rx4 | 930-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Std | Yes | 4x Std | 1x750W | Yes |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Models for EMEA region

Table 8. Models for EMEA region

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|--|--------------------------------|--------------|--------------|------------------------------|--------------------|-----|------------|---------|------------------|-------------|
| Standard models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A00REA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A00VEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A011EA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A020EA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A02TEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A030EA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A036EA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A03AEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 5350-8i | 8x 2.5" SAS 1x 2.4TB 10K HDD | 2x Media; Open bay | Ent | No | 3x Std | 1x750W | Yes |
| 7Z74A03HEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 64GB | 9350-8i | 8x 2.5" SAS 2x 960GB MV SSD | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A03MEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A03QEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A03REA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 530-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A03WEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A03ZEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A045EA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A048EA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04BEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 64GB | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04LEA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A00HEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A00PEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | 930-8i | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A00SEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A010EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A018EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | 940-16i | 16x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | Yes | 4x Perf | 1x1100W | Yes |

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|------------|--------------------------------|--------------|--------------|-----------------------|--------------------|-----|------------|---------|------------------|-------------|
| 7Z74A01LEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A02SEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A031EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A032EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A03LEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A03SEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 530-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A03TEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A040EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A041EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A046EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A047EA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04AEA | 1x Silver 4310 12C 120W 2.1G | 1x 64GB | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04KEA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A00GEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A00JEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | 940-16i | 16x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A00XEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A014EA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A016EA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A01AEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | 940-16i | 16x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A01JEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | 930-8i | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A033EA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A038EA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A03KEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A03PEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A03XEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 530-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A03YEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|------------|--------------------------------|--------------|--------------|--|--------------------|-----|------------|---------|------------------|-------------|
| 7Z74A044EA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04CEA | 1x Silver 4314 16C 135W 2.4G | 1x 64GB | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04MEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04YEA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A04JEA | 1x Silver 4316 20C 150W 2.3G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A00ZEA | 1x Gold 5315Y 8C 140W 3.2G | 1x 32GB 2Rx8 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A022EA | 1x Gold 5315Y 8C 140W 3.2G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A02REA | 1x Gold 5315Y 8C 140W 3.2G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A034EA | 1x Gold 5315Y 8C 140W 3.2G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A037EA | 1x Gold 5315Y 8C 140W 3.2G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W Titanium | Yes |
| 7Z74A043EA | 1x Gold 5315Y 8C 140W 3.2G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A00FEA | 1x Gold 5317 12C 150W 3.0G | 1x 32GB 2Rx8 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A021EA | 1x Gold 5317 12C 150W 3.0G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A03BEA | 1x Gold 5317 12C 150W 3.0G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay 1x 2.4TB 10K HDD | 2x Media; Open bay | Ent | No | 3x Std | 1x750W | Yes |
| 7Z74A00NEA | 1x Gold 5318Y 24C 165W 2.1G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A00WEA | 1x Gold 5318Y 24C 165W 2.1G | 1x 32GB 2Rx8 | 940-16i | 16x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A01FEA | 1x Gold 5318Y 24C 165W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A00KEA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A00YEA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx8 | 940-16i | 16x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A019EA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx8 | 940-16i | 16x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A01DEA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx8 | 930-8i | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A01EEA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A02QEA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A035EA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x750W | Yes |
| 7Z74A03CEA | 2x Gold 6326 16C 185W 2.9G | 2x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay 2x 2.4TB 10K HDD | 2x Media; Open bay | Ent | No | 4x Std | 2x750W | Yes |

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|------------|--------------------------------|--------------|------------|-----------------------|--------------------|-----|------------|---------|------------------|-------------|
| 7Z74A03UEA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A042EA | 1x Gold 6326 16C 185W 2.9G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Std | 1x1100W Titanium | Yes |
| 7Z74A012EA | 1x Gold 6342 24C 230W 2.8G | 1x 32GB 2Rx8 | 940-16i | 16x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A017EA | 1x Gold 6342 24C 230W 2.8G | 1x 32GB 2Rx8 | 940-16i | 16x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A01GEA | 1x Gold 6342 24C 230W 2.8G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 4x Perf | 1x750W | Yes |
| 7Z74A013EA | 1x Gold 6346 16C 205W 3.1G | 1x 32GB 2Rx8 | 940-16i | 16x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 4x Perf | 1x1100W | Yes |
| 7Z74A015EA | 1x Gold 6346 16C 205W 3.1G | 1x 32GB 2Rx8 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 4x Perf | 1x750W | Yes |
| 7Z74A02PEA | 1x Gold 6346 16C 205W 3.1G | 1x 32GB 2Rx4 | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Perf | 1x750W | Yes |
| 7Z74A039EA | 1x Gold 6346 16C 205W 3.1G | 1x 32GB 2Rx4 | 9350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Perf | 1x750W | Yes |
| 7Z74A03VEA | 1x Gold 6346 16C 205W 3.1G | 1x 32GB 2Rx4 | 930-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | Yes | 3x Perf | 1x1100W Titanium | Yes |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Models for India

Table 9. Models for India

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|---|--------------------------------|--------------|------------|----------------------|--------------------|-----|------------|---------|-----------------|-------------|
| TopSeller models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A02ESG | 1x Silver 4309Y 8C 105W 2.8G | 1x 16GB | 540-8i | 8x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02FSG | 1x Silver 4309Y 8C 105W 2.8G | 1x 16GB | 540-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02BSG | 1x Silver 4310 12C 120W 2.1G | 2x 16GB | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02DSG | 1x Silver 4310 12C 120W 2.1G | 2x 16GB | 540-8i | 8x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A04QSG | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 530-8i | 8x 3.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 2x750W Titanium | No |
| 7Z74A04RSG | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 5350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 2x750W | No |
| 7Z74A04SSG | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 5350-8i | 4x 3.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 2x750W | No |
| 7Z74A04TSG | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 530-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 2x750W | No |
| 7Z74A04VSG | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx4 | 530-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 2x750W | No |
| 7Z74A02ASG | 1x Silver 4310T 10C 105W 2.3G | 1x 16GB | 540-8i | 8x 3.5" SAS Open bay | 4x 3.5"; No media | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02CSG | 1x Silver 4310T 10C 105W 2.3G | 1x 16GB | 540-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A04PSG | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 5350-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 2x750W | No |
| 7Z74A04WSG | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 530-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 3x Perf | 2x750W | No |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Models for Japan

AP models: Customers in Japan also have access to the [Asia Pacific region](#) models.

All models for Japan have the following features:

- Japanese keyboard
- Optical Wheel Mouse
- Security Door

Table 10. Models for Japan

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|--|--------------------------------|---------|------------|----------------------|--------------------|-----|------------|---------|----------------|-------------|
| Standard models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z741001JP | 1x Silver 4309Y 8C 105W 2.8G | 1x 16GB | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Adv | No | 3x Perf | 1x750W | Yes |
| 7Z741002JP | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Adv | No | 3x Perf | 1x750W | Yes |
| 7Z741003JP | 1x Silver 4310T 10C 105W 2.3G | 1x 16GB | 940-8i 4GB | 8x 2.5" SAS Open bay | 2x Media; Open bay | Adv | No | 3x Perf | 1x750W | Yes |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Models for Latin American countries (except Brazil)

Table 11. Models for Latin American countries (except Brazil)

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|---|--------------------------------|--------------|--------------|-----------------------------|--------------------|-----|------------|---------|----------------|-------------|
| Standard models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A026LA | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 930-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Std | Yes | 4x Std | 1x750W | Yes |
| 7Z74A02WLA | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 540-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 4x Std | 1x750W | Yes |
| 7Z74A02XLA | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 540-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Std | No | 4x Std | 1x750W | Yes |
| 7Z74A04GLA | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 930-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Std | Yes | 4x Std | 1x750W | Yes |
| 7Z74A023LA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx4 | 930-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Std | Yes | 4x Std | 1x750W | Yes |
| 7Z74A02VLA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | 940-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 4x Std | 1x1100W | Yes |
| 7Z74A024LA | 1x Silver 4316 20C 150W 2.3G | 1x 32GB 2Rx4 | 930-16i 4GB | 16x 2.5" SAS Open bay | 2x Media; Open bay | Std | Yes | 4x Std | 1x750W | Yes |
| 7Z74A02ZLA | 1x Gold 5318Y 24C 165W 2.1G | 1x 64GB | 940-16i | 16x 2.5" SAS Open bay | 2x Media; Open bay | Adv | No | 4x Std | 1x1100W | Yes |
| TopSeller models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A04DLA | 1x Silver 4310T 10C 105W 2.3G | 1x 32GB 2Rx4 | Onboard SATA | 4x 3.5" SAS 2x 4TB SATA HDD | 4x 3.5"; No media | Ent | Yes | 3x Perf | 2x750W | No |
| Standard models with a 1-year warranty (machine type 7Z75) | | | | | | | | | | |
| 7Z751000LA | 1x Silver 4310 12C 120W 2.1G | 1x 16GB | 540-8i | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 4x Std | 1x750W | Yes |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Models for USA and Canada

Table 12. Models for USA and Canada

| Model | Intel Xeon Scalable processor† | Memory | RAID | Drive bays | Top bay | XCC | Intru. sw. | Fans | Power supplies | Power cords |
|--|--------------------------------|--------------|--------------|----------------------|--------------------|-----|------------|---------|----------------|-------------|
| Standard models with a 3-year warranty (machine type 7Z74) | | | | | | | | | | |
| 7Z74A01QNA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A01UNA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02GNA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02HNA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A01VNA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A01YNA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02JNA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02MNA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A01SNA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A01WNA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02LNA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z74A02NNA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | Onboard SATA | 8x 3.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| Standard models with a 1-year warranty (machine type 7Z75) | | | | | | | | | | |
| 7Z75A002NA | 1x Silver 4309Y 8C 105W 2.8G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z75A000NA | 1x Silver 4310 12C 120W 2.1G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |
| 7Z75A001NA | 1x Silver 4314 16C 135W 2.4G | 1x 32GB 2Rx8 | Onboard SATA | 8x 2.5" SAS Open bay | 2x Media; Open bay | Ent | No | 3x Perf | 1x750W | Yes |

† Processor description: Processor model, number of cores, thermal design power (TDP), core frequency

Processors

The ST650 V2 supports processors in the third-generation Intel Xeon Scalable Processor family. The server supports one or two processors.

Topics in this section:

- [Processor options](#)
- [Processor features](#)
- [One-processor configurations](#)
- [Thermal restrictions by processor](#)
- [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

Memory tiers: All processors support up to 6TB of memory. There are no L or M suffix processors.

Options part numbers only for second processor : The option part numbers listed in the table are only for use when adding a second processor. It is not supported to upgrade any processors already installed.

Table 13. Processor options

| Part number | Feature code | Description | Maximum quantity† |
|-------------|--------------|---|-------------------|
| 4XG7A72930 | BB2N | ST650 V2 Intel Xeon Silver 4309Y 8C 105W 2.8GHz Option Kit w/o Fan | 2 |
| 4XG7A72949 | BB3C | ST650 V2 Intel Xeon Silver 4310 12C 120W 2.1GHz Option Kit w/o Fan | 2 |
| 4XG7A72943 | BB34 | ST650 V2 Intel Xeon Silver 4310T 10C 105W 2.3GHz Option Kit w/o Fan | 2 |
| 4XG7A72939 | BB2Z | ST650 V2 Intel Xeon Silver 4314 16C 135W 2.4GHz Option Kit w/o Fan | 2 |
| 4XG7A72946 | BB39 | ST650 V2 Intel Xeon Silver 4316 20C 150W 2.3GHz Option Kit w/o Fan | 2 |
| 4XG7A72954 | BB3M | ST650 V2 Intel Xeon Gold 5315Y 8C 140W 3.2GHz Option Kit w/o Fan | 2 |
| 4XG7A72940 | BB30 | ST650 V2 Intel Xeon Gold 5317 12C 150W 3.0GHz Option Kit w/o Fan | 2 |
| 4XG7A72951 | BB3E | ST650 V2 Intel Xeon Gold 5318N 24C 150W 2.1GHz Option Kit w/o Fan | 2 |
| 4XG7A72929 | BB2M | ST650 V2 Intel Xeon Gold 5318S 24C 165W 2.1GHz Option Kit w/o Fan | 2 |
| 4XG7A72944 | BB35 | ST650 V2 Intel Xeon Gold 5318Y 24C 165W 2.1GHz Option Kit w/o Fan | 2 |
| 4XG7A72933 | BB2R | ST650 V2 Intel Xeon Gold 5320 26C 185W 2.2GHz Option Kit w/o Fan | 2 |
| 4XG7A72938 | BB2Y | ST650 V2 Intel Xeon Gold 5320T 20C 150W 2.3GHz Option Kit w/o Fan | 2 |
| 4XG7A72927 | BB2K | Intel Xeon Gold 6312U 24C 185W 2.4GHz Processor | 1* |
| 4XG7A72945 | BB38 | Intel Xeon Gold 6314U 32C 205W 2.3GHz Processor | 1* |
| 4XG7A72932 | BB4E | ST650 V2 Intel Xeon Gold 6326 16C 185W 2.9GHz Option Kit w/o Fan | 2 |

| Part number | Feature code | Description | Maximum quantity† |
|-------------|--------------|--|-------------------|
| 4XG7A72952 | BB3H | ST650 V2 Intel Xeon Gold 6330 28C 205W 2.0GHz Option Kit w/o Fan | 2 |
| 4XG7A72955 | BB3N | ST650 V2 Intel Xeon Gold 6330N 28C 165W 2.2GHz Option Kit w/o Fan | 2 |
| 4XG7A72950 | BB3D | ST650 V2 Intel Xeon Gold 6334 8C 165W 3.6GHz Option Kit w/o Fan | 2 |
| 4XG7A72959 | BB3S | ST650 V2 Intel Xeon Gold 6336Y 24C 185W 2.4GHz Option Kit w/o Fan | 2 |
| 4XG7A72956 | BB3P | ST650 V2 Intel Xeon Gold 6338 32C 205W 2.0GHz Option Kit w/o Fan | 2 |
| 4XG7A72941 | BB31 | ST650 V2 Intel Xeon Gold 6338N 32C 185W 2.2GHz Option Kit w/o Fan | 2 |
| 4XG7A72942 | BB33 | ST650 V2 Intel Xeon Gold 6338T 24C 165W 2.1GHz Option Kit w/o Fan | 2 |
| 4XG7A72948 | BB3B | ST650 V2 Intel Xeon Gold 6342 24C 230W 2.8GHz Option Kit w/o Fan | 2 |
| 4XG7A72937 | BB2W | ST650 V2 Intel Xeon Gold 6346 16C 205W 3.1GHz Option Kit w/o Fan | 2 |
| 4XG7A72928 | BB2L | ST650 V2 Intel Xeon Gold 6348 28C 235W 2.6GHz Option Kit w/o Fan | 2 |
| 4XG7A72935 | BB2U | ST650 V2 Intel Xeon Gold 6354 18C 205W 3.0GHz Option Kit w/o Fan | 2 |
| CTO only | BB3J | Intel Xeon Platinum 8351N 36C 225W 2.4GHz Processor | 1* |
| 4XG7A63659 | BKDB | ST650 V2 Intel Xeon Platinum 8352M 32C 185W 2.3GHz Option Kit w/o Fan | 2 |
| 4XG7A72957 | BB3Q | ST650 V2 Intel Xeon Platinum 8352S 32C 205W 2.2GHz Option Kit w/o Fan | 2 |
| 4XG7A72934 | BB2S | ST650 V2 Intel Xeon Platinum 8352V 36C 195W 2.1G/3.5GHz Option Kit w/o Fan | 2 |
| 4XG7A72936 | BB2V | ST650 V2 Intel Xeon Platinum 8352Y 32C 205W 2.2GHz Option Kit w/o Fan | 2 |
| 4XG7A72958 | BB3R | ST650 V2 Intel Xeon Platinum 8358 32C 250W 2.6GHz Option Kit w/o Fan | 2 |
| 4XG7A72947 | BB3A | ST650 V2 Intel Xeon Platinum 8358P 32C 240W 2.6GHz Option Kit w/o Fan | 2 |
| 4XG7A72931 | BB2P | ST650 V2 Intel Xeon Platinum 8360Y 36C 250W 2.4GHz Option Kit w/o Fan | 2 |

* Processors with a U suffix and the 8351N processor are only supported one processor per server; as a result, there is no option part number for a second processor.

† The server supports two processors. In the configurator, you can select 1 or 2 processor feature codes. However for option part numbers, only 1 is supported per server. The option part numbers are only for use when adding a second processor. It is not supported to use the option part numbers to upgrade any processors already installed.

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
- Two or three Intel Ultra Path Interconnect (UPI) links at up to 11.2 GT/s, to maximize inter-processor communication

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 14. Processor features

| CPU model | Cores/ threads | Core speed (Base / TB max) | L3 cache* | Max memory speed | UPI links & speed | TDP | SGX Enclave Size | Pmem |
|-----------|----------------|----------------------------|-----------|------------------|-------------------|------|------------------|------|
| 4309Y | 8 / 16 | 2.8 GHz / 3.6 GHz | 12 MB | 2667 MHz | 2 / 10.4 GT/s | 105W | 8 GB | No |
| 4310 | 12 / 24 | 2.1 GHz / 3.3 GHz | 18 MB | 2667 MHz | 2 / 10.4 GT/s | 120W | 8 GB | No |
| 4310T | 10 / 20 | 2.3 GHz / 3.4 GHz | 15 MB | 2667 MHz | 2 / 10.4 GT/s | 105W | 8 GB | No |
| 4314 | 16 / 32 | 2.4 GHz / 3.4 GHz | 24 MB | 2667 MHz | 2 / 10.4 GT/s | 135W | 8 GB | Yes |
| 4316 | 20 / 40 | 2.3 GHz / 3.4 GHz | 30 MB | 2667 MHz | 2 / 10.4 GT/s | 150W | 8 GB | No |
| 5315Y | 8 / 16 | 3.2 GHz / 3.6 GHz | 12 MB | 2933 MHz | 3 / 11.2 GT/s | 140W | 64 GB | Yes |
| 5317 | 12 / 24 | 3.0 GHz / 3.6 GHz | 18 MB | 2933 MHz | 3 / 11.2 GT/s | 150W | 64 GB | Yes |
| 5318N | 24 / 48 | 2.1 GHz / 3.4 GHz | 36 MB | 2667 MHz | 3 / 11.2 GT/s | 150W | 64 GB | Yes |
| 5318S | 24 / 48 | 2.1 GHz / 3.4 GHz | 36 MB | 2933 MHz | 3 / 11.2 GT/s | 165W | 512 GB | Yes |
| 5318Y | 24 / 48 | 2.1 GHz / 3.4 GHz | 36 MB | 2933 MHz | 3 / 11.2 GT/s | 165W | 64 GB | Yes |
| 5320 | 26 / 52 | 2.2 GHz / 3.4 GHz | 39 MB | 2933 MHz | 3 / 11.2 GT/s | 185W | 64 GB | Yes |
| 5320T | 20 / 40 | 2.3 GHz / 3.5 GHz | 30 MB | 2933 MHz | 3 / 11.2 GT/s | 150W | 64 GB | Yes |
| 6312U | 24 / 48 | 2.4 GHz / 3.6 GHz | 36 MB | 3200 MHz | None | 185W | 64 GB | Yes |
| 6314U | 32 / 64 | 2.3 GHz / 3.4 GHz | 48 MB | 3200 MHz | None | 205W | 64 GB | Yes |
| 6326 | 16 / 32 | 2.9 GHz / 3.5 GHz | 24 MB | 3200 MHz | 3 / 11.2 GT/s | 185W | 64 GB | Yes |
| 6330 | 28 / 56 | 2.0 GHz / 3.1 GHz | 42 MB | 2933 MHz | 3 / 11.2 GT/s | 205W | 64 GB | Yes |
| 6330N | 28 / 56 | 2.2 GHz / 3.4 GHz | 42 MB | 2667 MHz | 3 / 11.2 GT/s | 165W | 64 GB | Yes |
| 6334 | 8 / 16 | 3.6 GHz / 3.7 GHz | 18 MB* | 3200 MHz | 3 / 11.2 GT/s | 165W | 64 GB | Yes |
| 6336Y | 24 / 48 | 2.4 GHz / 3.6 GHz | 36 MB | 3200 MHz | 3 / 11.2 GT/s | 185W | 64 GB | Yes |
| 6338 | 32 / 64 | 2.0 GHz / 3.2 GHz | 48 MB | 3200 MHz | 3 / 11.2 GT/s | 205W | 64 GB | Yes |
| 6338N | 32 / 64 | 2.2 GHz / 3.5 GHz | 48 MB | 2667 MHz | 3 / 11.2 GT/s | 185W | 64 GB | Yes |
| 6338T | 24 / 48 | 2.1 GHz / 3.4 GHz | 36 MB | 3200 MHz | 3 / 11.2 GT/s | 165W | 64 GB | Yes |
| 6342 | 24 / 48 | 2.8 GHz / 3.5 GHz | 36 MB | 3200 MHz | 3 / 11.2 GT/s | 230W | 64 GB | Yes |
| 6346 | 16 / 32 | 3.1 GHz / 3.6 GHz | 36 MB* | 3200 MHz | 3 / 11.2 GT/s | 205W | 64 GB | Yes |

| CPU model | Cores/ threads | Core speed (Base / TB max) | L3 cache* | Max memory speed | UPI links & speed | TDP | SGX Enclave Size | Pmem |
|-----------|----------------|----------------------------|-----------|------------------|-------------------|------|------------------|------|
| 6348 | 28 / 56 | 2.6 GHz / 3.5 GHz | 42 MB | 3200 MHz | 3 / 11.2 GT/s | 235W | 64 GB | Yes |
| 6354 | 18 / 36 | 3.0 GHz / 3.6 GHz | 39 MB* | 3200 MHz | 3 / 11.2 GT/s | 205W | 64 GB | Yes |
| 8351N | 36 / 72 | 2.4 GHz / 3.5 GHz | 54 MB | 2933 MHz | None | 225W | 64 GB | Yes |
| 8352M | 32 / 64 | 2.3 GHz / 3.5 GHz | 48 MB | 3200 MHz | 3 / 11.2 GT/s | 185W | 64 GB | Yes |
| 8352S | 32 / 64 | 2.2 GHz / 3.4 GHz | 48 MB | 3200 MHz | 3 / 11.2 GT/s | 205W | 512 GB | Yes |
| 8352V | 36 / 72 | 2.1 GHz / 3.5 GHz | 54 MB | 2933 MHz | 3 / 11.2 GT/s | 195W | 8 GB | Yes |
| 8352Y | 32 / 64 | 2.2 GHz / 3.4 GHz | 48 MB | 3200 MHz | 3 / 11.2 GT/s | 205W | 64 GB | Yes |
| 8358 | 32 / 64 | 2.6 GHz / 3.4 GHz | 48 MB | 3200 MHz | 3 / 11.2 GT/s | 250W | 64 GB | Yes |
| 8358P | 32 / 64 | 2.6 GHz / 3.4 GHz | 48 MB | 3200 MHz | 3 / 11.2 GT/s | 240W | 8 GB | Yes |
| 8360Y | 36 / 72 | 2.4 GHz / 3.5 GHz | 54 MB | 3200 MHz | 3 / 11.2 GT/s | 250W | 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 *

One-processor configurations

The ST650 V2 can be used with only one processor installed. Most core functions of the server (including the XClarity Controller) are connected to processor 1 as shown in the [System architecture](#) section.

With only one processor, the server has the following capabilities:

- 16 memory DIMMs for a 2TB maximum
- Slots 1-3 and slot 9 are available; Slot 4-8 are not available

Drive support is as follows:

- SAS/SATA drives are supported - 8, 16, 24 drives (2.5-inch) or 8, 12 drives (3.5-inch)
- NVMe drives are supported, up to 4 drives (3.5-inch only)
- M.2 drives are supported

Controller support is as follows:

- 8x onboard SATA
- 4x onboard NVMe
- RAID adapters/HBAs installed in slots 1-3
- Internal RAID controller and HBA are *not* supported

Thermal restrictions by processor

Processors with a high TDP value require a lower ambient temperature. See the [Operating environment](#) section for details.

UEFI operating modes

The ST650 V2 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 15. 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 ST650 V2 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 ST650 V2, 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 ST650 V2 uses Lenovo TruDDR4 memory and supports 16 DIMMs per processor or 32 DIMMs with two processors installed. Each processor has eight memory channels with two DIMMs per channel. With 256 GB 3DS RDIMMs installed, the ST650 V2 supports a total of 8 TB of system memory.

The ST650 V2 also supports Intel Optane Persistent Memory 200 Series, as described in the [Persistent Memory](#) section.

Memory operates at up to 3200 MHz at two DIMMs per channel, depending on the memory DIMMs and processor model selected. If the processor selected has a lower memory bus speed, then all DIMMs will operate at that lower speed.

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

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.

Table 16. Memory options

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

The following rules apply when selecting the memory configuration:

- The following DIMM quantities are supported per processor: 1, 2, 4, 6, 8, 12, and 16. Other quantities per processor 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:

- Populate memory DIMMs in quantities of 8 or 16 per processor, 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.
- All processor sockets on the same physical server should 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 per processor), 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. Memory rank sparing is not supported.

Persistent memory

The ST650 V2 server supports Intel Optane Persistent Memory 200 Series, a new class of memory and storage technology explicitly architected for data center 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 17. Persistent memory module part numbers

| Part number | Feature code | Description | Maximum supported |
|-------------|--------------|---|----------------------|
| 4ZC7A08732 | B98B | ThinkSystem 128GB TruDDR4 3200MHz (1.2V) Intel Optane Persistent Memory | 16 (8 per processor) |
| 4ZC7A08734 | B98A | ThinkSystem 256GB TruDDR4 3200MHz (1.2V) Intel Optane Persistent Memory | 16 (8 per processor) |

The following are the requirements when installing persistent memory (PMem) modules when installed in a two-socket server with third-generation Intel Xeon Scalable processors ("Ice Lake" processors):

- App Direct Mode and Memory Mode are supported. Mixed Mode is not supported.
- All PMem modules operate at 3200 MHz when the installed processor runs the memory bus at 3200 MHz.
- All installed PMem modules must be the same size. Mixing PMem modules of different capacities is not supported.
- Maximum 8 PMem modules per processor (install 1 in each memory channel).
- For each memory channel with both a PMem module and a memory DIMM installed, the PMem module is installed in channel slot 1 (DIMM1, closer to the processor) and the DIMM is installed in channel slot 0 (DIMM0).
- To maximize performance, balance all memory channels
- Both interleaved and non-interleaved modes are supported.
- Memory mirroring is not supported with PMem modules installed

For details, including App Direct Mode and Memory Mode configuration requirements, see the Intel Optane Persistent Memory 200 Series product guide, <https://lenovopress.com/LP1380>

Internal storage

The ST650 V2 supports 2.5-inch hot-swap, 3.5-inch hot-swap, and 3.5-inch simple-swap drives at the front of the server in a variety of drive bay configurations. Some drive bay configurations are supported with two 5.25-inch media bays for tape, RDX or optical drives.

The server also supports one or two M.2 drives, installed in an M.2 adapter internal to the server.

In this section:

- [Drive bays](#)
- [Backplanes](#)
- [NVMe drive support](#)
- [Supported drive bay combinations](#)
- [Controller selections](#)
- [Field upgrades](#)
- [M.2 drives](#)

Drive bays

The ST650 V2 supports four main drive bay configurations as shown in the following figure.

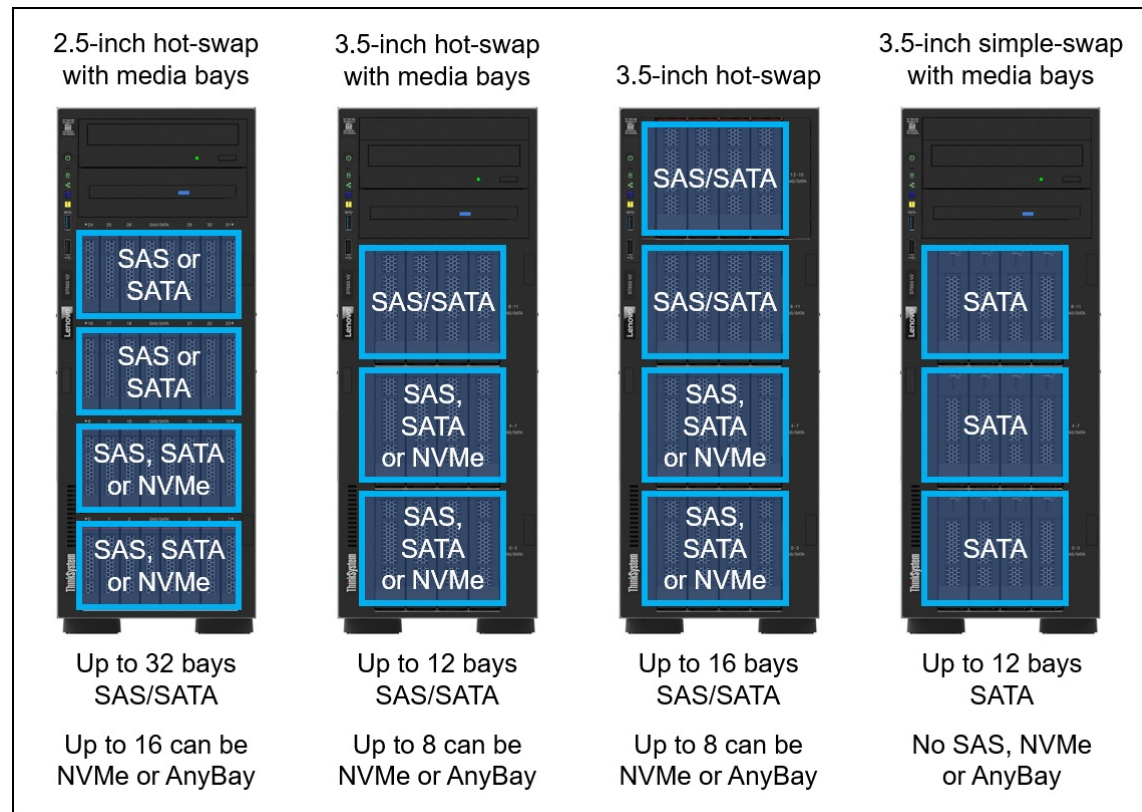


Figure 7. ST650 V2 drive bays

The four configurations are as follows:

- 2.5-inch hot-swap drive bays
 - Up to 32 drive bays, 8 drives per backplane
 - All 32 drives can be SAS or SATA
 - 16 drives can be AnyBay drive bays or NVMe drive bays
 - Optional support for 2 media bays

- 12x 3.5-inch hot-swap drive bays
 - Up to 12 drive bays, 4 drives per backplane
 - All 12 drives can be SAS or SATA
 - 8 drives can be AnyBay drive bays or NVMe drive bays
 - Optional support for 2 media bays
 - Can be upgraded to 16x 3.5-inch drive bays by removing the media bays and installing 4XF7A79787.
- 16x 3.5-inch hot-swap drive bays
 - Up to 16 drive bays, 4 drives per backplane
 - All 16 drives can be SAS or SATA
 - 8 drives can be AnyBay drive bays or NVMe drive bays
 - No support for 2 media bays
- 12x 3.5-inch simple-swap drive bays
 - Up to 12 drive bays supporting SATA drives, 4 drives per backplane
 - No support for SAS, AnyBay or NVMe drives
 - Optional support for 2 media bays

It is also possible to configure a server without any drives or backplanes. Drives and backplanes can be added in the field as described in the [field upgrades](#) section.

Backplanes

The backplanes used to provide the drive bays are listed in the following table.

The table also lists the ordering information for the media bay that provides two 5.25-inch drive bays at the top of the server for a tape drive or optical drive. The media bays are not available when 16x 3.5-inch drive bays are configured.

Field upgrades: All backplanes are available as part numbers for field upgrades complete with the necessary cables, as listed in the table and described in the [Field upgrades](#) section below.

Table 18. Backplanes for drive bays

| Part number* | Feature code | Description | Maximum supported |
|----------------------|--------------|--|-------------------|
| 2.5-inch hot-swap | | | |
| 4B27A60845 | B8LU | ThinkSystem ST650 V2 2.5" SAS/SATA 8-Bay Backplane Kit | 4 |
| 4B27A60846 | BH8B | ThinkSystem ST650 V2 2.5" AnyBay 8-Bay Backplane Kit | 2 |
| 4B27A09322 | BH8D | ThinkSystem ST650 V2 2.5" NVMe 8-Bay Backplane Kit | 2 |
| 3.5-inch hot-swap | | | |
| 4B27A60843 | BA5Q | ThinkSystem ST650 V2 3.5" SAS/SATA 4-Bay Backplane Kit | 4 |
| 4B27A60844 | BA5R | ThinkSystem ST650 V2 3.5" AnyBay 4-Bay Backplane Kit | 2 |
| 4B27A09320 | BCQS | ThinkSystem ST650 V2 3.5" NVMe 4-Bay Backplane Kit | 2 |
| 3.5-inch simple-swap | | | |
| 4M17A11753 | BA5Y | ThinkSystem ST650 V2 3.5" Simple-Swap SATA 4-Bay Backplate Kit | 3 |
| Media bay | | | |
| 4M27A60829 | BA5W | ThinkSystem ST650 V2/V3 3.5" Chassis Media Bay Enablement Kit | 1 |

* Part numbers include cables and other components as described in the [Field upgrades](#) section.

Common backplanes: Two of the 2.5-inch backplanes listed in the above table use the same physical circuit board. Feature codes BH8B and BH8D use a backplane with eight bays where each bay has both a SAS/SATA connection and an NVMe connection. The difference is which connectors on the backplane are cabled: NVMe and SAS/SATA or just NVMe. Both feature codes use backplane SBB7A29600. Similarly 3.5-inch backplanes BA5R (AnyBay) and BCQS (NVMe) share a common backplane, SBB7A17369.

NVMe drive support

The ST650 V2 supports NVMe drives to maximize storage performance.

Depending on the configuration, NVMe drives are connected either to onboard NVMe ports or to retimer adapters installed in PCIe slots.

- 2.5-inch drive configurations:
 - Up to 16 NVMe drives without oversubscription (that is, each x4 drive has a full x4 (4 lanes) connection to the processor)
 - Up to 8 drives can be connected to onboard NVMe ports
 - Other drives in the configuration are connected via retimer adapters
- 3.5-inch hot-swap drive configurations:
 - Up to 8 NVMe drives without oversubscription (that is, each x4 drive has a full x4 (4 lanes) connection to the processor)
 - All 8 drives can be connected to onboard NVMe ports
 - Alternatively, drives can be configured using retimer adapters

PCIe 4.0 NVMe support: The onboard NVMe ports connected to CPU 1 (NVMe ports 1 & 2) operate at PCIe 3.0 speeds in the ST650 V2 as shown in the following figure. That means any PCIe 4.0 drives installed in backplanes connected to those ports will operate at PCIe 3.0 speeds. NVMe drives connected to the NVMe ports connected to CPU 2 (NVMe ports 3 & 4) or connected to retimer adapters operate at PCIe 4.0 (Gen 4) speeds if the drives themselves support that speed. See the *ST650 V2 Backplane/Backplate Cable Routing Guide* for details about what connections are used in each configuration, <http://thinksystem.lenovofiles.com/help/index.jsp>.

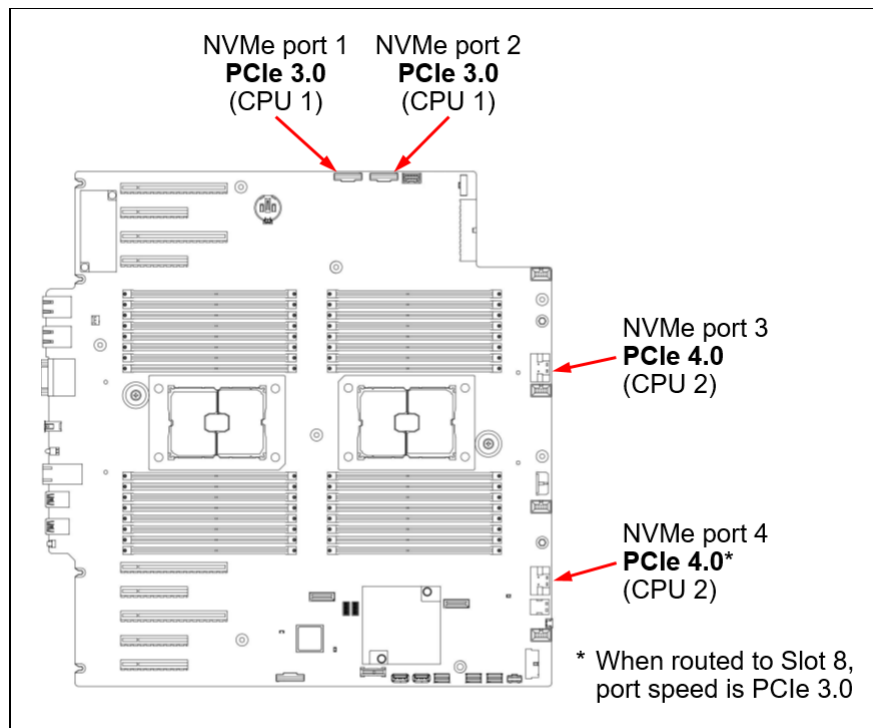


Figure 8. Onboard NVMe port speeds

The specifics of the drive bay configurations are covered in the [Supported drive bay combinations](#) and [Controller selections](#) sections.

The tables in those sections indicate the number of NVMe drives in each configuration plus the subscription ratio. The subscription ratio is the number of PCIe lanes from the processor compared to the number of lanes to the drives. A ratio of 1:1 means all drives get the full number of lanes they need to maximize drive performance (currently 4 lanes per drive). A ratio of 1:2 means each drive only gets the half the bandwidth from the processor.

Supported drive bay combinations

This section describes the various combinations of 3.5-inch and 2.5-inch drives that the server supports. The combinations are based on whether the drives are 3.5-inch or 2.5-inch. The drives are connected using backplanes (hot-swap drives) or backplates (simple-swap drives). Up to four backplanes/backplates are installed, numbered 1-4 from the bottom as shown in the following figure.

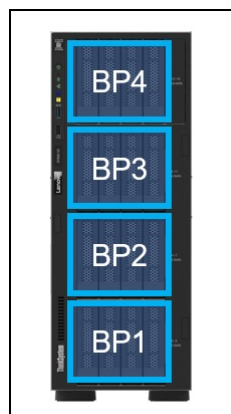


Figure 9. Backplane numbering

3.5-inch drive bay chassis

The following table shows the supported combinations when the server is configured with 3.5-inch drives. The choice of storage controller for each configuration is listed in the [Controller selections](#) section.

Table 19. Drive bay and backplane combinations with 3.5-inch chassis (Blue cells = SAS/SATA, Purple cells = AnyBay, Red cells = NVMe) (SS = Simple swap)

| Config | Total drives | NVMe drives§ | BP1 | BP2 | BP3 | BP4 | Slot 8 support |
|--------|--------------|--------------|-------------|-------------|-------------|-------------|----------------|
| 1 | 4 | 0 | 4x SS SATA | Open | Open | Open* | Yes |
| 2 | 8 | 0 | 4x SS SATA | 4x SS SATA | Open | Open* | Yes |
| 3 | 12 | 0 | 4x SS SATA | 4x SS SATA | 4x SS SATA | Open* | Yes |
| 4 | 4 | 0 | 4x SAS/SATA | Open | Open | Open | Yes |
| 5 | 4 | 0 | 4x SAS/SATA | Open | Open | Open | Yes |
| 6 | 8 | 0 | 4x SAS/SATA | 4x SAS/SATA | Open | Open | Yes |
| 7 | 8 | 0 | 4x SAS/SATA | 4x SAS/SATA | Open | Open | Yes |
| 8 | 8 | 4 (1:1) | 4x NVMe | 4x SAS/SATA | Open | Open | Yes |
| 9 | 8 | 4 (1:1) | 4x AnyBay | 4x SAS/SATA | Open | Open | Yes |
| 10 | 12 | 0 | 4x SAS/SATA | 4x SAS/SATA | 4x SAS/SATA | Open | Yes |
| 11 | 12 | 8 (1:1) | 4x NVMe | 4x NVMe | 4x SAS/SATA | Open | Yes** |
| 12 | 12 | 4 (1:1) | 4x NVMe | 4x SAS/SATA | 4x SAS/SATA | Open | Yes |
| 13 | 12 | 8 (1:1) | 4x AnyBay | 4x AnyBay | 4x SAS/SATA | Open | Yes** |
| 14 | 12 | 4 (1:1) | 4x AnyBay | 4x SAS/SATA | 4x SAS/SATA | Open | Yes |
| 15 | 16 | 0 | 4x SAS/SATA | 4x SAS/SATA | 4x SAS/SATA | 4x SAS/SATA | Yes |
| 16 | 16 | 8 (1:1) | 4x AnyBay | 4x AnyBay | 4x SAS/SATA | 4x SAS/SATA | Yes** |
| 17 | 16 | 8 (1:1) | 4x NVMe | 4x NVMe | 4x SAS/SATA | 4x SAS/SATA | Yes** |

§ The text in parenthesis refers to the subscription ratio. See the [NVMe support](#) section for details.

* In configurations with simple-swap drives, the BP4 zone can only be occupied by media bays (optical/tape drives)

** Depending on the controllers used in this configuration, Slot 8 may not be available. See Controller selections section for details.

2.5-inch drive bay chassis

The following table shows the supported combinations when the server is configured with a 2.5-inch chassis (where the front drive bays are 2.5-inch). The table lists the front, middle and rear backplanes required for each drive bay combination. The choice of storage controller for each configuration is listed in the [Controller selections](#) section.

Table 20. Drive bay and backplane combinations with 2.5-inch chassis (Blue cells = SAS/SATA, Purple cells = AnyBay, Red cells = NVMe) (SS = Simple swap)

| Config | Total drives | NVMe drives§ | BP1 | BP2 | BP3 | BP4 | Slot 8 support |
|--------|--------------|--------------|-------------|-------------|-------------|-------------|----------------|
| 18 | 8 | 0 | 8x SAS/SATA | Open | Open | Open | Yes |
| 19 | 8 | 0 | 8x SAS/SATA | Open | Open | Open | Yes |
| 20 | 16 | 0 | 8x SAS/SATA | 8x SAS/SATA | Open | Open | Yes |
| 21 | 16 | 8 (1:1) | 8x AnyBay | 8x SAS/SATA | Open | Open | Yes** |
| 22 | 16 | 8 (1:1) | 8x NVMe | 8x SAS/SATA | Open | Open | Yes** |
| 23 | 24 | 0 | 8x SAS/SATA | 8x SAS/SATA | 8x SAS/SATA | Open | Yes |
| 24 | 24 | 16 (1:1) | 8x AnyBay | 8x AnyBay | 8x SAS/SATA | Open | Yes** |
| 25 | 24 | 8 (1:1) | 8x AnyBay | 8x SAS/SATA | 8x SAS/SATA | Open | Yes** |
| 26 | 24 | 16 (1:1) | 8x NVMe | 8x NVMe | 8x SAS/SATA | Open | Yes** |
| 27 | 24 | 8 (1:1) | 8x NVMe | 8x SAS/SATA | 8x SAS/SATA | Open | Yes** |
| 28 | 32 | 0 | 8x SAS/SATA | 8x SAS/SATA | 8x SAS/SATA | 8x SAS/SATA | Yes |
| 29 | 32 | 16 (1:1) | 8x AnyBay | 8x AnyBay | 8x SAS/SATA | 8x SAS/SATA | Yes** |
| 30 | 32 | 16 (1:1) | 8x NVMe | 8x NVMe | 8x SAS/SATA | 8x SAS/SATA | Yes** |

§ The text in parenthesis refers to the subscription ratio. See the [NVMe support](#) section for details.

** Depending on the controllers used in this configuration, Slot 8 may not be available. See Controller selections section for details.

Controller selections

The ST650 V2 has the following requirements regarding the selection of storage controllers:

- The use of 8x Onboard NVMe requires 2 processors
- The use of a RAID/HBA 16i Internal (CFF) adapter requires 2 processors since the adapter is cabled to CPU 2
- The use of 5 or more adapter slots requires 2 processors
- The use of 3 or 4 Retimer adapters requires 2 processors (these adapters require PCIe x16 slots)
- The use of RAID/HBA 16i Internal and 8x Onboard NVMe ports are mutually exclusive
- The use of PCIe Slot 8 and 8x Onboard NVMe ports are mutually exclusive
- It is supported to use PCIe Slot 8 or RAID/HBA 16i Internal or both with only 4x Onboard NVMe ports
- NVMe drives connected to Onboard NVMe ports 1 & 2 will operate only at PCIe Gen3 speed. NVMe Onboard ports 3 & 4 will operate at Gen4 speed if the attached drives are PCIe Gen4 capable. See the [NVMe drive support](#) section for details.

This section helps you determine with storage adapter are supported for your desired drive bay configuration.

For additional information, consult the ThinkSystem ST650 V2 Backplane/Backplate Cable Routing Guide, available from:

<http://thinksystem.lenovofiles.com/help/index.jsp>

In the tables, the controllers are grouped as follows:

- RAID/HBA 8i corresponds to any of the following:
 - ThinkSystem RAID 530-8i PCIe 12Gb Adapter, 7Y37A01082
 - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter, 4Y37A72482
 - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter, 4Y37A78834

- ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter, 7Y37A01084
 - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter, 4Y37A72483
 - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter, 4Y37A09728
 - ThinkSystem RAID 940-8i 8GB Flash PCIe Gen4 12Gb Adapter, 4Y37A09729
 - ThinkSystem 430-8i SAS/SATA 12Gb HBA, 7Y37A01088
 - ThinkSystem 4350-8i SAS/SATA 12Gb HBA, 4Y37A72480
 - ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA, 4Y37A78601
- RAID/HBA 16i corresponds to any of the following:
 - ThinkSystem RAID 530-16i PCIe 12Gb Adapter, 4Y37A09727
 - ThinkSystem RAID 540-16i PCIe Gen4 12Gb Adapter, 4Y37A78835
 - ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter, 7Y37A01085
 - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter, 4Y37A72485
 - ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter, 4Y37A78600
 - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter, 4Y37A09730
 - ThinkSystem 430-16i SAS/SATA 12Gb HBA, 7Y37A01089
 - ThinkSystem 4350-16i SAS/SATA 12Gb HBA, 4Y37A72481
 - ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA, 4Y37A78602
- RAID/HBA 8i Int (also referred to as RAID 8i CFF, compact form factor) corresponds to the following:
 - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Internal Adapter, 4Y37A72484
- RAID/HBA 16i Int (also referred to as RAID 16i CFF, compact form factor) corresponds to the following:
 - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Internal Adapter, 4Y37A72486
 - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter, 4Y37A09735
 - ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA, 4Y37A09725
- RAID 32i corresponds to the following:
 - ThinkSystem RAID 940-32i 8GB Flash PCIe Gen4 12Gb Adapter, 4Y37A09733
- OB SATA (onboard SATA) corresponds to the following in CTO orders:
 - On Board SATA Software RAID Mode, feature AVV0
- OB NVMe (onboard NVMe) corresponds to the following in CTO orders:
 - Non RAID NVMe, feature BC4V
 - Intel VROC (VMD NVMe RAID) Intel SSD Only, feature B9X7
 - Intel VROC (VMD NVMe RAID) Premium, feature B96G

Many of the configurations also support the installation of the optional cable to enable PCIe Slot 8 as indicated in the table.

3.5-inch chassis configurations

The following table lists the supported drive bay combinations for configurations with 3.5-inch front drive bays, plus the list of supported controller combinations supported by each of those drive bay combinations. Information about the controllers can be found in the [Controllers for internal storage](#) section.

Table 21. Drive bay combinations with 3.5-inch chassis (Dark blue cells = SATA, Blue = SAS/SATA, Purple = AnyBay, Red cells = NVMe)

| Cfg | BP1 | BP2 | BP3 | BP4 | CPUs | Slot 8 support | Controller combinations (drive count) (OB = Onboard) |
|-----|------------|------------|------------|-------|--------|----------------|--|
| 1 | SS SATA | Open | Open | Open* | 1 or 2 | Yes | OB SATA (4) |
| 2 | SS SATA | SS SATA | Open | Open* | 1 or 2 | Yes | OB SATA (8) |
| 3 | SS SATA | SS SATA | SS SATA | Open* | 1 or 2 | Yes | OB SATA (12)** |
| 4 | SAS | Open | Open | Open | 1 or 2 | Yes | OB SATA (4) |
| 5 | SAS | Open | Open | Open | 1 or 2 | Yes | 1x RAID/HBA 8i (4) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (4) |

| Cfg | BP1 | BP2 | BP3 | BP4 | CPUs | Slot 8 support | Controller combinations (drive count) (OB = Onboard) |
|-----|--------|--------|------|------|--------|----------------|---|
| 6 | SAS | SAS | Open | Open | 1 or 2 | Yes | OB SATA (8) |
| 7 | SAS | SAS | Open | Open | 1 or 2 | Yes | 1x RAID/HBA 8i (8) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (8) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) |
| 8 | NVMe | SAS | Open | Open | 1 or 2 | Yes | 1x RAID/HBA 8i (4) + OB NVMe (4) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (4) + OB NVMe (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (4) + OB NVMe (4) |
| 9 | AnyBay | SAS | Open | Open | 1 or 2 | Yes | 1x RAID/HBA 8i (8) + OB NVMe (4) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (8) + OB NVMe (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) + OB NVMe (4) |
| 10 | SAS | SAS | SAS | Open | 1 or 2 | Yes | 2x RAID/HBA 8i (8+4) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (12) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (12) |
| 11 | NVMe | NVMe | SAS | Open | 2 | No | OB SATA (4) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 8i (4) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 16i (4) + OB NVMe (8) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (4) + OB NVMe (4) + 1x Retimer (4) |
| 12 | NVMe | SAS | SAS | Open | 1 or 2 | Yes | OB SATA (8) + OB NVMe (4) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 8i (8) + OB NVMe (4) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (8) + OB NVMe (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) + OB NVMe (4) |
| 13 | AnyBay | AnyBay | SAS | Open | 2 | No | OB SATA (8) + 1x RAID/HBA 8i (4) + OB NVMe (8) |
| | | | | | 2 | No | 2x RAID/HBA 8i (8+4) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 16i (12) + OB NVMe (8) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (12) + OB NVMe (4) + 1x Retimer (4) |
| 14 | AnyBay | SAS | SAS | Open | 1 or 2 | Yes | OB SATA (8) + 1x RAID/HBA 8i (4) + OB NVMe (4) |
| | | | | | 1 or 2 | Yes | 2x RAID/HBA 8i (8+4) + OB NVMe (4) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (12) + OB NVMe (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (12) + OB NVMe (4) |
| 15 | SAS | SAS | SAS | SAS | 1 or 2 | Yes | 2x RAID/HBA 8i (8+8) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (16) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (16) |
| 16 | AnyBay | AnyBay | SAS | SAS | 2 | No | OB SATA (8) + 1x RAID/HBA 8i (8) + OB NVMe (8) |
| | | | | | 2 | No | 2x RAID/HBA 8i (8+8) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 16i (16) + OB NVMe (8) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA 8i (8) + OB NVMe (4) + 1x Retimer (4) |
| | | | | | 2 | Yes | 2x RAID/HBA 8i (8+8) + OB NVMe (4) + 1x Retimer (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i (16) + OB NVMe (4) + 1x Retimer (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (16) + OB NVMe (4) + 1x Retimer (4) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA 8i (8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 2x RAID/HBA 8i (8+8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i (16) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (16) + 2x Retimer (4+4) |
| 17 | NVMe | NVMe | SAS | SAS | 2 | No | 1x RAID/HBA 8i (8) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 16i (8) + OB NVMe (8) |

| Cfg | BP1 | BP2 | BP3 | BP4 | CPU | Slot 8 support | Controller combinations (drive count) (OB = Onboard) |
|-----|-----|-----|-----|-----|-----|----------------|--|
| | | | | | 2 | Yes | 1x RAID/HBA 8i (8) + OB NVMe (4) + 1x Retimer (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i (8) + OB NVMe (4) + 1x Retimer (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) + OB NVMe (4) + 1x Retimer (4) |
| | | | | | 2 | Yes | 1x RAID/HBA 8i (8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i (8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) + 2x Retimer (4+4) |

* In configurations with simple-swap drives, the BP4 zone can only be occupied by media bays (optical/tape drives)

** The OB SATA controller supports up to 12 SATA drives, however only the first 8 drives can be configured using RAID. The remaining drives are JBOD only.

2.5-inch chassis configurations

The following table lists the supported drive bay combinations for configurations with 2.5-inch front drive bays, plus the list of supported controller combinations supported by each of those drive bay combinations. Information about the controllers can be found in the [Controllers for internal storage](#) section.

Table 22. Drive bay combinations with 2.5-inch chassis (Blue = SAS/SATA, Purple = AnyBay, Red = NVMe)

| Cfg | BP1 | BP2 | BP3 | BP4 | CPU | Slot 8 support | Controller combinations (drive count) (OB = Onboard) |
|-----|--------|--------|------|------|--------|----------------|--|
| 18 | SAS | Open | Open | Open | 1 or 2 | Yes | OB SATA (8) |
| 19 | SAS | Open | Open | Open | 1 or 2 | Yes | 1x RAID/HBA 8i (8) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (8) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) |
| | | | | | 1 or 2 | Yes | 1x RAID 32i (8) |
| 20 | SAS | SAS | Open | Open | 1 or 2 | Yes | 2x RAID/HBA 8i (8+8) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 16i (16) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (16) |
| | | | | | 1 or 2 | Yes | 1x RAID 32i (16) |
| 21 | AnyBay | SAS | Open | Open | 2 | No | 2x RAID/HBA 8i (8+8) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 16i (16) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID 32i (16) + OB NVMe (8) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (16) + 2x Retimer (4+4) |
| 22 | NVMe | SAS | Open | Open | 2 | No | 1x RAID/HBA 8i (8) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 16i (8) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID 32i (8) + OB NVMe (8) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) + 2x Retimer (4+4) |
| 23 | SAS | SAS | SAS | Open | 2 | Yes | OB SATA (8) + 1x RAID/HBA 16i Int (16) |
| | | | | | 1 or 2 | Yes | 3x RAID/HBA 8i (8+8+8) |
| | | | | | 1 or 2 | Yes | 1x RAID/HBA 8i (8) + 1x RAID/HBA 16i (16) |
| | | | | | 1 or 2 | Yes | 1x RAID 32i (24) |
| 24 | AnyBay | AnyBay | SAS | Open | 2 | No | OB SATA (8) + 2x RAID/HBA 8i (8+8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | OB SATA (8) + 1x RAID/HBA 16i (16) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID/HBA 8i (8) + 1x RAID/HBA 16i (16) + OB NVMe (8) + 2x Retimer (4+4) |

| Cfg | BP1 | BP2 | BP3 | BP4 | CPU | Slot 8 support | Controller combinations (drive count) (OB = Onboard) |
|-----|--------|--------|-----|------|--------|----------------|--|
| | | | | | 2 | No | 3x RAID/HBA 8i (8+8+8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID 32i (24) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 2x RAID/HBA 8i (8+8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA 16i (16) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA Int 16i (16) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 8i (8) + 1x RAID/HBA 16i (16) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 3x RAID/HBA 8i (8+8+8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID 32i (24) + 4x Retimer (4+4+4+4) |
| 25 | AnyBay | SAS | SAS | Open | 2 | No | OB SATA (8) + 2x RAID/HBA 8i (8+8) + OB NVMe (8) |
| | | | | | 2 | No | OB SATA (8) + 1x RAID/HBA 16i (16) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 8i (8) + 1x RAID/HBA 16i (16) + OB NVMe (8) |
| | | | | | 2 | No | 3x RAID/HBA 8i (8+8+8) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID 32i (24) + OB NVMe (8) |
| | | | | | 2 | Yes | OB SATA (8) + 2x RAID/HBA 8i (8+8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA 16i (16) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA Int 16i (16) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 8i (8) + 1x RAID/HBA 16i (16) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 3x RAID/HBA 8i (8+8+8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID 32i (24) + 2x Retimer (4+4) |
| | | | | | | | |
| 26 | NVMe | NVMe | SAS | Open | 2 | No | OB SATA (8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID/HBA 8i (8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID/HBA 16i (8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID 32i (8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 8i (8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i (8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID 32i (8) + 4x Retimer (4+4+4+4) |
| | | | | | | | |
| 27 | NVMe | SAS | SAS | Open | 2 | No | 2x RAID/HBA 8i (8+8) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID/HBA 16i (16) + OB NVMe (8) |
| | | | | | 2 | No | 1x RAID 32i (16) + OB NVMe (8) |
| | | | | | 2 | Yes | 2x RAID/HBA 8i (8+8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i (16) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (16) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | 1x RAID 32i (16) + 2x Retimer (4+4) |
| | | | | | | | |
| 28 | SAS | SAS | SAS | SAS | 1 or 2 | Yes | 4x RAID/HBA 8i (8+8+8+8) |
| | | | | | 1 or 2 | Yes | 2x RAID/HBA 8i (8+8) + 1x RAID/HBA 16i (16) |
| | | | | | 1 or 2 | Yes | 2x RAID/HBA 16i (16+16) |
| | | | | | 1 or 2 | Yes | 1x RAID 32i (24) |
| 29 | AnyBay | AnyBay | SAS | SAS | 2 | No | OB SATA (8) + 3x RAID/HBA 8i (8+8+8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | OB SATA (8) + 1x RAID/HBA 8i (8) + 1x RAID/HBA 16i (16) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 4x RAID/HBA 8i (8+8+8+8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 2x RAID/HBA 8i (8+8) + 1x RAID/HBA 16i (16) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID 32i (24) + OB NVMe (8) + 2x Retimer (4+4) |

| Cfg | BP1 | BP2 | BP3 | BP4 | CPUs | Slot 8 support | Controller combinations (drive count) (OB = Onboard) |
|-----|------|------|-----|-----|------|----------------|--|
| | | | | | 2 | Yes | OB SATA (8) + 3x RAID/HBA 8i (8+8+8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA 8i (8) + 1x RAID/HBA 16i (16) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 4x RAID/HBA 8i (8+8+8+8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 2x RAID/HBA 8i (8+8) + 1x RAID/HBA 16i (16) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID 32i (24) + 4x Retimer (4+4+4+4) |
| 30 | NVMe | NVMe | SAS | SAS | 2 | No | OB SATA (8) + 1x RAID/HBA 8i (8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 2x RAID/HBA 8i (8+8) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID/HBA 16i (16) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | No | 1x RAID 32i (16) + OB NVMe (8) + 2x Retimer (4+4) |
| | | | | | 2 | Yes | OB SATA (8) + 1x RAID/HBA 8i (8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 2x RAID/HBA 8i (8+8) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i (16) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID/HBA 16i Int (16) + 4x Retimer (4+4+4+4) |
| | | | | | 2 | Yes | 1x RAID 32i (16) + 4x Retimer (4+4+4+4) |

Field upgrades

The ST650 V2 is orderable without drive bays, allowing you to add a backplane, cabling and controllers as field upgrades. The server also supports upgrading some configurations by adding additional drive bay backplanes (for example, upgrading from 8 to 16x 2.5-inch drive bays).

Upgrade path: The key criteria for upgrade support is to ensure that the target configuration is one of the supported drive bay configurations as listed in the [Supported drive bay combinations](#) section.

To add drive bays you will need to order the appropriate backplane kit(s). ST650 V2 backplane kits include the necessary cables.

The following table lists the part numbers for drive backplanes and the media bay cage. For the use of these cables to add drives, see the Backplane/Backplate Cable Routing section of the Users Guide, available from: https://pubs.lenovo.com/st650-v2/backplane_backplate_ic_topic

Table 23. Field upgrades for drives bay backplanes

| Part number | Description and contents |
|-------------------|--|
| 2.5-inch hot-swap | |
| 4B27A60845 | ThinkSystem ST650 V2 2.5" SAS/SATA 8-Bay Backplane Kit <ul style="list-style-type: none"> • 1x SBB7A06905 - SAS/SATA 8-Bay Backplane • 1x SBB7A15200 - SAS/SATA cable (miniSASx4*2 to BP Slimline x8, 470mm) • 1x SBB7A15217 - SAS/SATA cable (Slimline x4*2 to 2.5" BP Slimline x8), 700mm • 1x SBB7A15221 - SAS/SATA cable (RAID adapter Slimline x8 to BP Slimline x8), 415mm • 1x SBB7A15222 - SAS/SATA cable (RAID adapter Slimline x8 to BP Slimline x8), 535mm • 1x SBB7A15189 - Power cable PDB to 2.5" BP, 355mm • 1x SBB7A15188 - Power cable PDB to 2.5" BP, 455mm • 1x SBB7A20450 - SAS/SATA Label |

| Part number | Description and contents |
|-------------------|---|
| 4B27A60846 | ThinkSystem ST650 V2 2.5" AnyBay 8-Bay Backplane Kit <ul style="list-style-type: none"> • 1x SBB7A29600 - Anybay 8-Bay Backplane • 1x SBB7A15200 - SAS/SATA cable (MiniSASx4*2 to BP Slimline x8), 470mm • 1x SBB7A15217 - SAS/SATA cable (Slimline x4*2 to 2.5" BP Slimline x8), 700mm • 1x SBB7A15221 - SAS/SATA cable (RAID adapter Slimline x8 to BP Slimline x8), 415mm • 1x SBB7A15222 - SAS/SATA cable (RAID adapter Slimline x8 to BP Slimline x8), 535mm • 1x SBB7A34213 - NVMe cable (MB Slimline x8 to BP Slimline x8 for NVMe), pair of cables, 325 & 240mm • 1x SBB7A34214 - NVMe cable (MB Slimline x8 to BP Slimline x8 for NVMe), pair of cables 820 & 780mm • 1x SBB7A15188 - Power cable PDB to 2.5" BP, 455mm • 1x SBB7A20451 - AnyBay Label |
| 4B27A09322 | ThinkSystem ST650 V2 2.5" NVMe 8-Bay Backplane Kit <ul style="list-style-type: none"> • 1x SBB7A29600 - AnyBay 8-Bay Backplane • 1x SBB7A15217 - NVMe cable (Slimline x4*2 to 2.5" BP Slimline x8), 700mm • 1x SBB7A34213 - NVMe cable (MB Slimline x8 to BP Slimline x8 for NVMe), pair of cables, 325 & 240mm • 1x SBB7A34214 - NVMe cable (MB Slimline x8 to BP Slimline x8 for NVMe), pair of cables 820 & 780mm • 1x SBB7A15188 - Power cable PDB to 2.5" BP power, 455mm • 1x SBB7A28752 - NVMe Label |
| 3.5-inch hot-swap | |
| 4B27A60843 | ThinkSystem ST650 V2 3.5" SAS/SATA 4-Bay Backplane Kit <ul style="list-style-type: none"> • 1x SBB7A17368 - 3.5" SAS/SATA 4-Bay Backplane • 1x SBB7A15198 - SAS/SATA cable (RAID card mini-SAS x4*2 C0/C1 to BP slimline x4*2 cable), 627mm • 1x SBB7A15199 - SAS/SATA cable (RAID card mini-SAS x4*2 C2/C3 to BP slimline x4*2 cable), 627mm • 1x SBB7A15219 - SAS/SATA cable (RAID card slimline x8 to BP Slimline x4*2), 240mm • 1x SBB7A15220 - SAS/SATA cable (RAID card slimline x8 to BP Slimline x4*2), 325mm • 1x SBB7A20290 - SATA cable (Slim SAS x4 TO Slim SAS x4 (BP1) 3.5"), 500mm • 1x SBB7A15225 - Power cable, PDB to 3.5" BP power, 455mm • 1x SBB7A20450 - SAS/SATA Label |
| 4B27A60844 | ThinkSystem ST650 V2 3.5" AnyBay 4-Bay Backplane Kit <ul style="list-style-type: none"> • 1x SBB7A17369 - 3.5" AnyBay 4-Bay Backplane • 1x SBB7A15198 - SAS/SATA cable (RAID card mini-SAS x4*2 C0/C1 to BP slimline x4*2 cable), 627mm • 1x SBB7A15199 - SAS/SATA cable (RAID card mini-SAS x4*2 C2/C3 to BP slimline x4*2 cable), 627mm • 1x SBB7A15202 - NVMe cable (MB Slimline x8 to BP MCIOx8), 240mm • 1x SBB7A15207 - NVMe cable (MB Slimline x8 to BP MCIOx8), 415mm • 1x SBB7A15219 - SAS/SATA cable (RAID card slimline x8 to BP Slimline x4*2), 240mm • 1x SBB7A15220 - SAS/SATA cable (RAID card slimline x8 to BP Slimline x4*2), 325mm • 1x SBB7A20290 - SATA cable (Slim SAS x4 TO Slim SAS x4 (BP1) 3.5"), 500mm • 1x SBB7A15225 - Power cable, PDB to 3.5" BP power, 455mm • 1x SBB7A20451 - Anybay Label |

| Part number | Description and contents |
|---|--|
| 4B27A09320 | ThinkSystem ST650 V2 3.5" NVMe 4-Bay Backplane Kit <ul style="list-style-type: none"> • 1x SBB7A17369 - 3.5" Anybay 4-Bay Backplane • 1x SBB7A15202 - NVMe cable (MB Slimline x8 to BP MCIOx8) pair of cables, 240mm • 1x SBB7A15207 - NVMe cable (MB Slimline x8 to BP MCIOx8) pair of cables, 415mm • 1x SBB7A20290 - Cable (Slim SAS x4 TO Slim SAS x4 (BP1) 3.5"), 500mm • 1x SBB7A15225 - Power cable, PDB to 3.5" BP power, 455mm • 1x SBB7A28752 - NVMe Label |
| 4Z57A16098 | ThinkSystem ST650 V2 Retimer Cable Kit for 3.5" HDD |
| 3.5-inch simple-swap | |
| 4M17A11753 | ThinkSystem ST650 V2 3.5" Simple-Swap SATA 4-Bay Backplate Kit <ul style="list-style-type: none"> • 1x SBB7A17402 - ST650 v2 4x3.5" HDD backplate with SATA and power cables attached |
| Replace media bay with 4x 3.5-inch drive bays | |
| 4XF7A79787 | ThinkSystem ST650 V2/V3 3.5" SAS/SATA 4-Bay Drive Bay 4 Cage Kit <ul style="list-style-type: none"> • 1x Cage for 4x 3.5-inch drive bays • 4x 3.5-inch drive bay fillers |

When adding drive bays, you will also need to add the appropriate storage controller(s). Consult the tables in the [Controller selections](#) section to determine what controller sections are supported and what additional controllers you will need. Controllers are described in the [Controllers for internal storage](#) section.

Some field upgrades require additional cable kits, as described in the following table.

Table 24. Cable kits for field upgrades related to drive bays

| Part number | Description | Purpose |
|-------------|--|--|
| 4Z57A60818 | ThinkSystem ST650 V2 Internal HBA/RAID Adapter Cable Kit <ul style="list-style-type: none"> • 2x SBB7A15212 - Slim SAS x4 to Slim SAS x4 BP3/4 • 2x SBB7A15214 - Slim SAS x4 to Slim SAS x4 BP1/2 • 2x SBB7A15216 - Slimline x4*2 C0/C1 to 2.5" BP Slimline x8, 700mm • 1x SBB7A15217 - Slimline x4*2 C2/C3 to 2.5" BP Slimline x8, 700mm • 1x SBB7A15218 - MB Slimline x8 to Slimline x8, 930mm • 1x SBB7A15196 - CFF RAID Power Cable | Your existing configuration has an HBA or RAID adapter in one of the rear PCIe slots, and you wish to upgrade to one of the internal storage adapters (RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter or 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA) |
| 4Z57A16098 | ThinkSystem ST650 V2 Retimer Cable Kit for 3.5" HDD <ul style="list-style-type: none"> • 1x SBB7A15223 - Slimline x8 to BP MCIO x8, 990mm | NVMe cable required when you add a 3.5-inch AnyBay or NVMe backplane and want to connect it to an NVMe retimer adapter. |
| 4Z57A16104* | ThinkSystem ST650 V2 Retimer Cable Kit for 2.5" HDD <ul style="list-style-type: none"> • 1x SBB7A34215 - Slimline x8 cable to BP Slimline x8 | NVMe cable required when you add a 2.5-inch AnyBay or NVMe backplane and want to connect it to an NVMe retimer adapter. |
| 4Z57A16102 | ThinkSystem ST650 V2 HW RAID/HBA Adapter Cable Kit <ul style="list-style-type: none"> • 1x SBB7A15198 - Mini-SASx4*2 C0/C1 to BP Slimline x4*2 cable, 627mm • 1x SBB7A15199 - Mini-SASx4*2 C2/C3 to BP Slimline x4*2 cable, 627mm • 1x SBB7A15200 - Mini-SASx4*2 C0/C1 to BP Slimline x8 cable, 470mm • 1x SBB7A15219 - Slimline x8 to BP Slimline x4*2, 240mm • 1x SBB7A15220 - Slimline x8 to BP Slimline x4*2, 325mm • 1x SBB7A15221 - Slimline x8 to BP Slimline x8, 415mm • 1x SBB7A15222 - Slimline x8 to BP Slimline x8, 535mm | Your existing configuration uses the onboard SATA ports and you wish to upgrade to a RAID adapter or HBA installed in one of the rear PCIe slots. |

* Also available as part number 4Z57A16106. The two part numbers have the same physical cable just different labeling.

2.5-inch drive bay fillers

Backplane option kits include the necessary drive bay fillers, however if needed, additional blanks can be ordered as listed in the following table.

Table 25. Drive bay fillers for 2.5-inch bays

| Part number | Description |
|-------------|---|
| 4XH7A99569 | ThinkSystem 2.5" 1x1 HDD Filler by 8 units (contains 8x single drive-bay fillers) |

M.2 drives

The ST650 V2 supports one or two M.2 form-factor SATA or NVMe drives for use as an operating system boot solution or as additional storage. The M.2 drives install into an M.2 module which is mounted on the side of the drive bays.

There are three different M.2 modules supported, as listed in the following table.

Table 26. M.2 modules

| Part number | Feature code | Description | SATA drives | NVMe drives | RAID | Maximum supported |
|-------------|--------------|--|-------------|-------------|------|-------------------|
| 4Y37A09739 | B5XH | ThinkSystem M.2 SATA 2-Bay RAID Adapter | Yes | No | Yes | 1 |
| 4Y37A09750 | B8P9 | ThinkSystem M.2 NVMe 2-Bay RAID Enablement Kit | No | Yes | Yes | 1 |
| 4Y37A09738 | B5XJ | ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit | Yes | Yes | VROC | 1 |

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

Configuration rules:

- The use of NVMe M.2 drives requires performance (dual-rotor) cooling fans

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

- Supports one or two SATA M.2 drives
- Support 42mm, 60mm, 80mm and 110mm drive form factors (2242, 2260, 2280 and 22110)
- RAID support via an onboard Marvell 88SE9230 SATA RAID Controller
- Support JBOD, RAID-0 and RAID-1 (RAID support requires two M.2 drives)
- PCIe 2.0 x2 host interface; 6Gbps SATA connection to the drives
- Management and configuration support via UEFI and OS-based tools
- Supports monitoring and reporting of events and temperature through I2C
- Firmware update via Lenovo firmware update tools

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

- Supports one or two NVMe M.2 drives
- Support 42mm, 60mm, 80mm and 110mm drive form factors (2242, 2260, 2280 and 22110)
- RAID support via an onboard Marvell 88NR2241 NVMe RAID Controller
- With 1 drive, supports single-drive RAID-0
- With 2 drives, supports 2-drive RAID-0, 2-drive RAID-1, or two single-drive RAID-0 arrays
- PCIe 3.0 x2 host interface; PCIe 3.0 x1 connection to each drive
- Management and configuration support via UEFI and OS-based tools
- Supports monitoring and reporting of events and temperature through I2C
- Firmware update via Lenovo firmware update tools

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; no built-in RAID 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

For field upgrades, the ST650 V2 also requires an additional M.2 cable kit. Ordering information is listed in the following table.

Table 27. M.2 Cable for field upgrades

| Part number | Description |
|-------------|--|
| 4Z57A16099 | ThinkSystem ST650 V2/V3 M.2 Cable Kit for VROC/NVMe RAID <ul style="list-style-type: none"> M.2 Signal & Power Cable, 280mm |

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 ST650 V2 offers a variety of controller options for internal drives:

- For 2.5-inch and 3.5-inch drives:
 - 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)
 - RAID adapters and HBAs for SAS/SATA drives (PCIe slot-based)
 - RAID adapters and HBAs for SAS/SATA drives (cabled in a dedicated space)
- For M.2 drives internal to the server (see [M.2 drives](#) section)
 - SATA controller integrated on the M.2 SATA 2-Bay RAID Enablement Kit

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

As well as supporting RAID adapters and HBAs that install in a PCIe slot, the ST650 V2 supports a custom adapter (also known as CFF or compact form factor adapter) that is mounted in the server and cabled to one of the onboard NVMe ports. The adapter is mounted adjacent to the drive bays and in front of the fans, and does not occupy a standard PCIe slot. See the [Internal view](#) for the location.

Table 28. Internal Storage adapter support

| Part number | Feature code | Description | Power module (supercap) | Maximum supported | Slots supported |
|--|--------------|---|-------------------------|-------------------|-----------------|
| Onboard SATA - up to 14 drives - Intel VROC SATA RAID (Intel RSTe) | | | | | |
| None | AVV0 | On Board SATA Software RAID Mode | No | 1 | Not applicable |
| Onboard NVMe - up to 12 drives - Intel VROC NVMe RAID | | | | | |
| None | B9X7 | Intel VROC (VMD NVMe RAID) Intel SSD Only (Standard) | No | 1 | Not applicable |
| 4L47A39164 | B96G | Intel VROC (VMD NVMe RAID) Premium (license upgrade - to enable RAID support for non-Intel NVMe SSDs) | No | 1 | Not applicable |
| SAS/SATA RAID - PCIe 3.0 - 8-port | | | | | |
| 7Y37A01082 | AUNG | ThinkSystem RAID 530-8i PCIe 12Gb Adapter | No | 4 | Any slot |
| 4Y37A72482 | BJHK | ThinkSystem RAID 5350-8i PCIe 12Gb Adapter | No | 4 | Any slot |
| 4Y37A84028 | BRQV | ThinkSystem RAID 5350-8i PCIe 12Gb Internal Adapter | No | 1 | Internal |
| 7Y37A01084 | AUNJ | ThinkSystem RAID 930-8i 2GB Flash PCIe 12Gb Adapter | Included | 4 | Any slot |
| 4Y37A72483 | BJHL | ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter | Included | 4 | Any slot |

| Part number | Feature code | Description | Power module (supercap) | Maximum supported | Slots supported |
|--|--------------|--|-------------------------|-------------------|-----------------|
| 4Y37A72484 | BJHM | ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Internal Adapter | Included | 1 | Internal |
| SAS/SATA RAID - PCIe 3.0 - 16-port and 24-port | | | | | |
| 4Y37A09727 | BFY5 | ThinkSystem RAID 530-16i PCIe 12Gb Adapter | No | 2 | Any slot |
| 7Y37A01085 | AUNK | ThinkSystem RAID 930-16i 4GB Flash PCIe 12Gb Adapter | Included | 2 | Any slot |
| 4Y37A72485 | BJHN | ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter | Included | 2 | Any slot |
| 4Y37A72486 | BJHP | ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Internal Adapter | Included | 1 | Internal |
| 7Y37A01086 | AUV1 | ThinkSystem RAID 930-24i 4GB Flash PCIe 12Gb Adapter | Included | 1 | 5,6,7,8,9 |
| SAS/SATA RAID - PCIe 4.0 - 8-port | | | | | |
| 4Y37A78834 | BMFT | ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter | No | 4 | Any slot |
| 4Y37A09728 | B8NY | ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter | Included | 4 | Any slot |
| 4Y37A09729 | B8NW | ThinkSystem RAID 940-8i 8GB Flash PCIe Gen4 12Gb Adapter | Included | 4 | Any slot |
| SAS/SATA RAID - PCIe 4.0 - 16-port and 32-port | | | | | |
| 4Y37A78835 | BNAX | ThinkSystem RAID 540-16i PCIe Gen4 12Gb Adapter | No | 2 | Any slot |
| 4Y37A09730 | B8NZ | ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter | Included | 2 | Any slot |
| 4Y37A78600 | BM35 | ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter | Included | 2 | Any slot |
| 4Y37A09735 | B8P0 | ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter | Included | 1 | Internal |
| 4Y37A09733 | B8P8 | ThinkSystem RAID 940-32i 8GB Flash PCIe Gen4 12Gb Adapter | Included | 1 | 5,6,7,8,9 |
| SAS/SATA HBA - PCIe 3.0 | | | | | |
| 7Y37A01088 | AUNL | ThinkSystem 430-8i SAS/SATA 12Gb HBA | No | 5 | 1,2,3,4 |
| 4Y37A72480 | BJHH | ThinkSystem 4350-8i SAS/SATA 12Gb HBA | No | 4 | 1,2,3,4 |
| 7Y37A01089 | AUNM | ThinkSystem 430-16i SAS/SATA 12Gb HBA | No | 2 | Any slot |
| 4Y37A72481 | BJHJ | ThinkSystem 4350-16i SAS/SATA 12Gb HBA | No | 2 | Any slot |
| SAS/SATA HBA - PCIe 4.0 | | | | | |
| 4Y37A78601 | BM51 | ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA | No | 5 | Any slot |
| 4Y37A78602 | BM50 | ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA | No | 2 | Any slot |
| 4Y37A09725 | B8P1 | ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA | No | 1 | Internal |
| NVMe adapters | | | | | |
| 4C57A65446 | B98C | ThinkSystem 4-Port PCIe Gen4 NVMe Retimer Adapter | No | 4 | 1,3,5,7 |

Configuration requirements:

- **E810 Ethernet and X350 RAID/HBAs**: The use of both an Intel E810 network adapter and an X350 HBA/RAID adapter (9350, 5350 and 4350) is supported, however E810 firmware CVL4.3 or later is required. For details, see [Support Tip HT513226](#).

The onboard SATA controller has the following features:

- Controller integrated into the Intel PCH
- Supports up to 12 SATA drives
- 6 Gbps SATA host interface
- Supports RAID-0, 1, 5, 10 only on 8 drives (Intel VROC SATA RAID, previously known as RSTe)
- Supports JBOD
- Supports HDDs and SSDs; can be mixed

RAID support limited to 8 drives: With three 3.5-inch simple-swap backplates, the ST650 V2 supports 12 SATA drives connected to the onboard SATA controller, however only the first 8 drives can be configured in RAID arrays. The remaining 4 drives can only be configured as JBOD.

The onboard NVMe support has the following features:

- Controller integrated into the Intel processor
- Supports up to 16 NVMe drives
- Each drive has PCIe 3.0 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 also extends to any drives connected via an NVMe Adapter (switch or retimer)

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 ST650 V2:

- 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 ST650 V2 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 or via adapters such as NVMe retimers or NVMe switch adapters. On the ST650 V2, 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.

Performance tip: For best performance with VROC NVMe RAID, the drives in an array should all be connected to the same processor. Spanning processors is possible however performance will be unpredictable and should be evaluated based on your workload.

The ST650 V2 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 29. 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:

- Intel VROC (VMD NVMe RAID) Intel SSD Only (feature B9X7) is only supported on Intel-branded SSDs; it is not supported with Solidigm or any other brand of SSDs. Consult the specific drive product guides for details.
- 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.
- Intel VROC NVMe is supported on all Intel Xeon Scalable processors

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.

For specifications about the RAID adapters and HBAs supported by the ST650 V2, see the ThinkSystem RAID Adapter and HBA Comparison, available from:

<https://lenovopress.com/lp1288-lenovo-thinksystem-raid-adapter-and-hba-reference#st650-v2-support=ST650%2520V2>

For details about these adapters, see the relevant product guide:

- SAS HBAs: <https://lenovopress.com/servers/options/hba>
- RAID adapters: <https://lenovopress.com/servers/options/raid>

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 12 Gb SAS HDDs](#)
- [2.5-inch hot-swap 6 Gb SATA HDDs](#)
- [2.5-inch hot-swap 24 Gb SAS SSDs](#)
- [2.5-inch hot-swap 12 Gb SAS SSDs](#)
- [2.5-inch hot-swap 6 Gb SATA SSDs](#)
- [2.5-inch hot-swap PCIe 4.0 NVMe SSDs](#)
- [2.5-inch hot-swap PCIe 3.0 NVMe SSDs](#)

3.5-inch hot-swap drives:

- [3.5-inch hot-swap 12 Gb SAS HDDs](#)
- [3.5-inch hot-swap 6 Gb SATA HDDs](#)
- [3.5-inch hot-swap 24 Gb SAS SSDs](#)
- [3.5-inch hot-swap 12 Gb SAS SSDs](#)
- [3.5-inch hot-swap 6 Gb SATA SSDs](#)
- [3.5-inch hot-swap PCIe 4.0 NVMe SSDs](#)
- [3.5-inch hot-swap PCIe 3.0 NVMe SSDs](#)

Simple-swap drives:

- [3.5-inch simple-swap 6 Gb SATA HDDs](#)

M.2 drives:

- [M.2 SATA drives](#)
- [M.2 PCIe 4.0 NVMe drives](#)
- [M.2 PCIe 3.0 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 tables include a column to indicate which drives support SED encryption. The encryption functionality can be disabled if needed. Note: Not all SED-enabled drives have "SED" in the description.

PCIe 4.0 NVMe drive support: When installed in the ST650 V2 server and connected to onboard NVMe ports 1 or 2, PCIe 4.0 NVMe drives will operate at PCIe 3.0 speeds.

Table 30. 2.5-inch hot-swap 12 Gb SAS HDDs

| Part number | Feature code | Description | SED support | Max Qty |
|---|--------------|---|-------------|---------|
| 2.5-inch hot-swap HDDs - 12 Gb SAS 15K | | | | |
| 7XB7A00021 | AULV | ThinkSystem 2.5" 300GB 15K SAS 12Gb Hot Swap 512n HDD | No | 32 |
| 7XB7A00022 | AULW | ThinkSystem 2.5" 600GB 15K SAS 12Gb Hot Swap 512n HDD | No | 32 |
| 7XB7A00023 | AULX | ThinkSystem 2.5" 900GB 15K SAS 12Gb Hot Swap 512e HDD | No | 32 |
| 2.5-inch hot-swap HDDs - 12 Gb SAS 10K | | | | |
| 7XB7A00024 | AULY | ThinkSystem 2.5" 300GB 10K SAS 12Gb Hot Swap 512n HDD | No | 32 |
| 7XB7A00025 | AULZ | ThinkSystem 2.5" 600GB 10K SAS 12Gb Hot Swap 512n HDD | No | 32 |
| 7XB7A00027 | AUM1 | ThinkSystem 2.5" 1.2TB 10K SAS 12Gb Hot Swap 512n HDD | No | 32 |
| 7XB7A00028 | AUM2 | ThinkSystem 2.5" 1.8TB 10K SAS 12Gb Hot Swap 512e HDD | No | 32 |
| 4XB7A83970 | BRG7 | ThinkSystem 2.5" 2.4TB 10K SAS 12Gb Hot Swap 512e HDD v2 | No | 32 |
| 2.5-inch hot-swap HDDs - 12 Gb NL SAS | | | | |
| 7XB7A00034 | AUM6 | ThinkSystem 2.5" 1TB 7.2K SAS 12Gb Hot Swap 512n HDD | No | 32 |
| 7XB7A00035 | AUM7 | ThinkSystem 2.5" 2TB 7.2K SAS 12Gb Hot Swap 512n HDD | No | 32 |
| 2.5-inch hot-swap SED HDDs - 12 Gb SAS 10K | | | | |
| 7XB7A00031 | AUM5 | ThinkSystem 2.5" 600GB 10K SAS 12Gb Hot Swap 512n HDD SED | Support | 32 |
| 7XB7A00033 | B0YX | ThinkSystem 2.5" 1.2TB 10K SAS 12Gb Hot Swap 512n HDD SED | Support | 32 |
| 4XB7A84038 | BRG8 | ThinkSystem 2.5" 2.4TB 10K SAS 12Gb Hot Swap 512e HDD FIPS v2 | Support | 32 |

Table 31. 2.5-inch hot-swap 6 Gb SATA HDDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|--|-------------|---------|
| 2.5-inch hot-swap HDDs - 6 Gb NL SATA | | | | |
| 7XB7A00036 | AUUE | ThinkSystem 2.5" 1TB 7.2K SATA 6Gb Hot Swap 512n HDD | No | 32 |
| 7XB7A00037 | AUUJ | ThinkSystem 2.5" 2TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 32 |

Table 32. 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 - Mixed Use/Mainstream (3-5 DWPD) | | | | |
| 4XB7A80340 | BNW8 | ThinkSystem 2.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80341 | BNW9 | ThinkSystem 2.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80342 | BNW6 | ThinkSystem 2.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80343 | BP3K | ThinkSystem 2.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD | Support | 32 |
| 2.5-inch hot-swap SSDs - 24 Gb SAS - Read Intensive/Entry/Capacity (<3 DWPD) | | | | |
| 4XB7A80318 | BNWC | ThinkSystem 2.5" PM1653 960GB Read Intensive SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80319 | BNWE | ThinkSystem 2.5" PM1653 1.92TB Read Intensive SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80320 | BNWF | ThinkSystem 2.5" PM1653 3.84TB Read Intensive SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80321 | BP3E | ThinkSystem 2.5" PM1653 7.68TB Read Intensive SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80322 | BP3J | ThinkSystem 2.5" PM1653 15.36TB Read Intensive SAS 24Gb HS SSD | Support | 32 |
| 4XB7A80323 | BP3D | ThinkSystem 2.5" PM1653 30.72TB Read Intensive SAS 24Gb HS SSD | Support | 32 |

Table 33. 2.5-inch hot-swap 12 Gb SAS SSDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|---|-------------|---------|
| 2.5-inch hot-swap SSDs - 12 Gb SAS - Mixed Use/Mainstream (3-5 DWPD) | | | | |
| 4XB7A17062 | B8HU | ThinkSystem 2.5" PM1645a 800GB Mainstream SAS 12Gb Hot Swap SSD | No | 32 |
| 4XB7A17063 | B8J4 | ThinkSystem 2.5" PM1645a 1.6TB Mainstream SAS 12Gb Hot Swap SSD | No | 32 |
| 4XB7A17065 | B8JA | ThinkSystem 2.5" PM1645a 6.4TB Mainstream SAS 12Gb Hot Swap SSD | No | 32 |
| 2.5-inch hot-swap SSDs - 12 Gb SAS - Read Intensive/Entry/Capacity (<3 DWPD) | | | | |
| 4XB7A38175 | B91A | ThinkSystem 2.5" PM1643a 960GB Entry SAS 12Gb Hot Swap SSD | No | 32 |
| 4XB7A38176 | B91B | ThinkSystem 2.5" PM1643a 1.92TB Entry SAS 12Gb Hot Swap SSD | No | 32 |
| 4XB7A17054 | B91C | ThinkSystem 2.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD | No | 32 |
| 4XB7A17055 | B91D | ThinkSystem 2.5" PM1643a 7.68TB Entry SAS 12Gb Hot Swap SSD | No | 32 |
| 4XB7A17056 | BC4R | ThinkSystem 2.5" PM1643a 15.36TB Entry SAS 12Gb Hot Swap SSD | No | 32 |

Table 34. 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 DWPD) | | | | |
| 4XB7A90884 | BYM2 | ThinkSystem 2.5" VA 480GB Mixed Use SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90885 | BYM4 | ThinkSystem 2.5" VA 960GB Mixed Use SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90886 | BYM5 | ThinkSystem 2.5" VA 1.92TB Mixed Use SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90887 | BYM6 | ThinkSystem 2.5" VA 3.84TB Mixed Use SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A82289 | BQ21 | ThinkSystem 2.5" 5400 MAX 480GB Mixed Use SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82290 | BQ24 | ThinkSystem 2.5" 5400 MAX 960GB Mixed Use SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82291 | BQ22 | ThinkSystem 2.5" 5400 MAX 1.92TB Mixed Use SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82292 | BQ23 | ThinkSystem 2.5" 5400 MAX 3.84TB Mixed Use SATA 6Gb HS SSD | Support | 32 |
| 4XB7A17125 | BA7Q | ThinkSystem 2.5" S4620 480GB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 4XB7A17126 | BA4T | ThinkSystem 2.5" S4620 960GB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 4XB7A17127 | BA4U | ThinkSystem 2.5" S4620 1.92TB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 4XB7A17128 | BK7L | ThinkSystem 2.5" S4620 3.84TB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 4XB7A17087 | B8J1 | ThinkSystem 2.5" 5300 240GB Mainstream SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17089 | B8J6 | ThinkSystem 2.5" 5300 960GB Mainstream SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17090 | B8JE | ThinkSystem 2.5" 5300 1.92TB Mainstream SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17091 | B8J7 | ThinkSystem 2.5" 5300 3.84TB Mainstream SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A13633 | B49L | ThinkSystem 2.5" S4610 240GB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 4XB7A13634 | B49M | ThinkSystem 2.5" S4610 480GB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 4XB7A13635 | B49N | ThinkSystem 2.5" S4610 960GB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 4XB7A13636 | B49P | ThinkSystem 2.5" S4610 1.92TB Mixed Use SATA 6Gb HS SSD | No | 32 |
| 2.5-inch hot-swap SSDs - 6 Gb SATA - Read Intensive/Entry (<3 DWPD) | | | | |
| 4XB7A90872 | BYLQ | ThinkSystem 2.5" VA 240GB Read Intensive SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90873 | BYLR | ThinkSystem 2.5" VA 480GB Read Intensive SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90874 | BYLS | ThinkSystem 2.5" VA 960GB Read Intensive SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90875 | BYLT | ThinkSystem 2.5" VA 1.92TB Read Intensive SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90876 | BYLU | ThinkSystem 2.5" VA 3.84TB Read Intensive SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A90877 | BYLV | ThinkSystem 2.5" VA 7.68TB Read Intensive SATA 6Gb HS SSD v2 | No | 32 |
| 4XB7A89423 | BXDY | ThinkSystem 2.5" CM893a 1.92TB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A87524 | BWKN | ThinkSystem 2.5" PM893a 480GB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A87525 | BWKM | ThinkSystem 2.5" PM893a 960GB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A87526 | BWKL | ThinkSystem 2.5" PM893a 1.92TB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A87527 | BWKK | ThinkSystem 2.5" PM893a 3.84TB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82258 | BQ1Q | ThinkSystem 2.5" 5400 PRO 240GB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82259 | BQ1P | ThinkSystem 2.5" 5400 PRO 480GB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82260 | BQ1R | ThinkSystem 2.5" 5400 PRO 960GB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82261 | BQ1X | ThinkSystem 2.5" 5400 PRO 1.92TB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82262 | BQ1S | ThinkSystem 2.5" 5400 PRO 3.84TB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A82263 | BQ1T | ThinkSystem 2.5" 5400 PRO 7.68TB Read Intensive SATA 6Gb HS SSD | Support | 32 |
| 4XB7A72438 | BM8B | ThinkSystem 2.5" PM893 480GB Read Intensive SATA 6Gb HS SSD | No | 32 |

| Part number | Feature code | Description | SED support | Max Qty |
|-------------|--------------|--|-------------|---------|
| 4XB7A72439 | BM8A | ThinkSystem 2.5" PM893 960GB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A72440 | BM89 | ThinkSystem 2.5" PM893 1.92TB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A72441 | BM88 | ThinkSystem 2.5" PM893 3.84TB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A72442 | BM87 | ThinkSystem 2.5" PM893 7.68TB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A17072 | B99D | ThinkSystem 2.5" S4520 240GB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A17101 | BA7G | ThinkSystem 2.5" S4520 480GB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A17102 | BA7H | ThinkSystem 2.5" S4520 960GB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A17103 | BA7J | ThinkSystem 2.5" S4520 1.92TB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A17104 | BK77 | ThinkSystem 2.5" S4520 3.84TB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A17105 | BK78 | ThinkSystem 2.5" S4520 7.68TB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A38271 | BCTC | ThinkSystem 2.5" Multi Vendor 240GB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A38272 | BCTD | ThinkSystem 2.5" Multi Vendor 480GB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A38273 | BCTE | ThinkSystem 2.5" Multi Vendor 960GB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A38274 | BCTF | ThinkSystem 2.5" Multi Vendor 1.92TB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A38275 | BCTG | ThinkSystem 2.5" Multi Vendor 3.84TB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17075 | B8HV | ThinkSystem 2.5" 5300 240GB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17076 | B8JM | ThinkSystem 2.5" 5300 480GB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17077 | B8HP | ThinkSystem 2.5" 5300 960GB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17078 | B8J5 | ThinkSystem 2.5" 5300 1.92TB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17079 | B8JP | ThinkSystem 2.5" 5300 3.84TB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A17080 | B8J2 | ThinkSystem 2.5" 5300 7.68TB Entry SATA 6Gb Hot Swap SSD | No | 32 |
| 4XB7A10247 | B498 | ThinkSystem 2.5" S4510 240GB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A10248 | B499 | ThinkSystem 2.5" S4510 480GB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A10249 | B49A | ThinkSystem 2.5" S4510 960GB Read Intensive SATA 6Gb HS SSD | No | 32 |
| 4XB7A13622 | B49B | ThinkSystem 2.5" S4510 1.92TB Read Intensive SATA 6Gb HS SSD | No | 32 |

Table 35. 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 DWPD) | | | | |
| 4XB7B01879 | C6M2 | ThinkSystem 2.5" U.2 Solidigm P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7B01880 | C6M3 | ThinkSystem 2.5" U.2 Solidigm P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7B01881 | C6M4 | ThinkSystem 2.5" U.2 Solidigm P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7B01882 | C6M5 | ThinkSystem 2.5" U.2 Solidigm P5620 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93896 | C18J | ThinkSystem 2.5" U.2 VA 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93897 | C18H | ThinkSystem 2.5" U.2 VA 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93898 | C18G | ThinkSystem 2.5" U.2 VA 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93899 | C18F | ThinkSystem 2.5" U.2 VA 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|--|-------------|---------|
| 4XB7A17129 | BNEG | ThinkSystem 2.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A17130 | BNEH | ThinkSystem 2.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A17133 | BNEZ | ThinkSystem 2.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A17136 | BA4V | ThinkSystem 2.5" U.2 P5620 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A17152 | BCFV | ThinkSystem 2.5" U.2 P5600 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | No | 16 |
| 4XB7A17153 | BCFR | ThinkSystem 2.5" U.2 P5600 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | No | 16 |
| 2.5-inch SSDs - U.3 PCIe 4.0 NVMe - Mixed Use/Mainstream (3-5 DWPD) | | | | |
| 4XB7A95054 | C2BG | ThinkSystem 2.5" U.3 7500 MAX 800GB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A95055 | C2BV | ThinkSystem 2.5" U.3 7500 MAX 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A95056 | C2BW | ThinkSystem 2.5" U.3 7500 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A95057 | C2BF | ThinkSystem 2.5" U.3 7500 MAX 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A95058 | C2BX | ThinkSystem 2.5" U.3 7500 MAX 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 2.5-inch SSDs - U.2 PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD) | | | | |
| 4XB7B01867 | C6MA | ThinkSystem 2.5" U.2 Solidigm P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7B01868 | C6MB | ThinkSystem 2.5" U.2 Solidigm P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7B01869 | C6MC | ThinkSystem 2.5" U.2 Solidigm P5520 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7B01870 | C7NZ | ThinkSystem 2.5" U.2 Solidigm P5520 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93892 | C18N | ThinkSystem 2.5" U.2 VA 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93893 | C18M | ThinkSystem 2.5" U.2 VA 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93894 | C18L | ThinkSystem 2.5" U.2 VA 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A93895 | C18K | ThinkSystem 2.5" U.2 VA 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A90099 | BXMB | ThinkSystem 2.5" U.2 PM9A3 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A90100 | BXMA | ThinkSystem 2.5" U.2 PM9A3 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A90101 | BXM9 | ThinkSystem 2.5" U.2 PM9A3 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|--|-------------|---------|
| 4XB7A13941 | BMGD | ThinkSystem 2.5" U.2 P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A13942 | BMGE | ThinkSystem 2.5" U.2 P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A13943 | BNEF | ThinkSystem 2.5" U.2 P5520 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A13631 | BNEQ | ThinkSystem 2.5" U.2 P5520 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A17145 | BCFT | ThinkSystem 2.5" U.2 P5500 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | No | 16 |
| 4XB7A17146 | BCFW | ThinkSystem 2.5" U.2 P5500 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | No | 16 |
| 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 | Support | 16 |
| 4XB7A95050 | C2BR | ThinkSystem 2.5" U.3 7500 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A95051 | C2BS | ThinkSystem 2.5" U.3 7500 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A95052 | C2BT | ThinkSystem 2.5" U.3 7500 PRO 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A95053 | C2BU | ThinkSystem 2.5" U.3 7500 PRO 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A81951 | BPKX | ThinkSystem 2.5" U.3 PM1733a 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A81952 | BPKY | ThinkSystem 2.5" U.3 PM1733a 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A81953 | BPKZ | ThinkSystem 2.5" U.3 PM1733a 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A81954 | BPL0 | ThinkSystem 2.5" U.3 PM1733a 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |
| 4XB7A81999 | BPL1 | ThinkSystem 2.5" U.3 PM1733a 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 16 |

Table 36. 2.5-inch hot-swap PCIe 3.0 NVMe SSDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|--|-------------|---------|
| 2.5-inch SSDs - U.2 PCIe 3.0 NVMe - Read Intensive/Entry (<3 DWPD) | | | | |
| 4XB7A10175 | B34N | ThinkSystem U.2 PM983 1.92TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD | No | 16 |
| 4XB7A10176 | B34P | ThinkSystem U.2 PM983 3.84TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD | No | 16 |

Table 37. 3.5-inch hot-swap 12 Gb SAS HDDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|---|-------------|---------|
| 3.5-inch hot-swap HDDs - 12 Gb SAS 15K | | | | |
| 7XB7A00038 | AUU2 | ThinkSystem 3.5" 300GB 15K SAS 12Gb Hot Swap 512n HDD | No | 16 |
| 7XB7A00039 | AUU3 | ThinkSystem 3.5" 600GB 15K SAS 12Gb Hot Swap 512n HDD | No | 16 |
| 7XB7A00040 | AUUC | ThinkSystem 3.5" 900GB 15K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 3.5-inch hot-swap HDDs - 12 Gb NL SAS | | | | |
| 7XB7A00042 | AUU5 | ThinkSystem 3.5" 2TB 7.2K SAS 12Gb Hot Swap 512n HDD | No | 16 |
| 7XB7A00043 | AUU6 | ThinkSystem 3.5" 4TB 7.2K SAS 12Gb Hot Swap 512n HDD | No | 16 |
| 7XB7A00044 | AUU7 | ThinkSystem 3.5" 6TB 7.2K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 7XB7A00045 | B0YR | ThinkSystem 3.5" 8TB 7.2K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 7XB7A00046 | AUUG | ThinkSystem 3.5" 10TB 7.2K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A93788 | C4DA | ThinkSystem 3.5" 12TB 7.2K SAS 12Gb Hot Swap 512e HDD v2 | Support | 16 |
| 4XB7A13906 | B496 | ThinkSystem 3.5" 14TB 7.2K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A13911 | B7EZ | ThinkSystem 3.5" 16TB 7.2K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A93786 | C4D8 | ThinkSystem 3.5" 16TB 7.2K SAS 12Gb Hot Swap 512e HDD v2 | Support | 16 |
| 4XB7A38266 | BCFP | ThinkSystem 3.5" 18TB 7.2K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A80353 | BPKU | ThinkSystem 3.5" 20TB 7.2K SAS 12Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A93784 | C4D6 | ThinkSystem 3.5" 20TB 7.2K SAS 12Gb Hot Swap 512e HDD v2 | Support | 16 |
| 4XB7A83766 | BTR7 | ThinkSystem 3.5" 22TB 7.2K SAS 12Gb Hot Swap 512e HDD | Support | 16 |
| 3.5-inch hot-swap SED HDDs - 12 Gb NL SAS | | | | |
| 7XB7A00066 | B0YQ | ThinkSystem 3.5" 8TB 7.2K SAS 12Gb Hot Swap 512e HDD FIPS | Support | 16 |

Table 38. 3.5-inch hot-swap 6 Gb SATA HDDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|--|-------------|---------|
| 3.5-inch hot-swap HDDs - 6 Gb NL SATA | | | | |
| 4XB7A97045 | C5X6 | ThinkSystem 3.5" 1TB 7.2K SATA 6Gb Hot Swap 512n HDD v2 | Support | 16 |
| 7XB7A00049 | AUUF | ThinkSystem 3.5" 1TB 7.2K SATA 6Gb Hot Swap 512n HDD | No | 16 |
| 4XB7B01234 | C5X8 | ThinkSystem 3.5" 2TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 7XB7A00050 | AUUD | ThinkSystem 3.5" 2TB 7.2K SATA 6Gb Hot Swap 512n HDD | No | 16 |
| 4XB7B01236 | C5XA | ThinkSystem 3.5" 4TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 7XB7A00051 | AUU8 | ThinkSystem 3.5" 4TB 7.2K SATA 6Gb Hot Swap 512n HDD | No | 16 |
| 4XB7B01238 | C5XC | ThinkSystem 3.5" 6TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 7XB7A00052 | AUUA | ThinkSystem 3.5" 6TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 4XB7B01240 | C5XE | ThinkSystem 3.5" 8TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 7XB7A00053 | AUU9 | ThinkSystem 3.5" 8TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 4XB7B01242 | C5X7 | ThinkSystem 3.5" 10TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 7XB7A00054 | AUUB | ThinkSystem 3.5" 10TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 7XB7A00068 | B118 | ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A93787 | C4D9 | ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 4XB7A13907 | B497 | ThinkSystem 3.5" 14TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A13914 | B7F0 | ThinkSystem 3.5" 16TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A93785 | C4D7 | ThinkSystem 3.5" 16TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 4XB7A38130 | BCFH | ThinkSystem 3.5" 18TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A80354 | BPKV | ThinkSystem 3.5" 20TB 7.2K SATA 6Gb Hot Swap 512e HDD | No | 16 |
| 4XB7A93783 | C4D5 | ThinkSystem 3.5" 20TB 7.2K SATA 6Gb Hot Swap 512e HDD v2 | Support | 16 |
| 4XB7A83765 | BTR8 | ThinkSystem 3.5" 22TB 7.2K SATA 6Gb Hot Swap 512e HDD | Support | 16 |

Table 39. 3.5-inch hot-swap 24 Gb SAS SSDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|--|-------------|---------|
| 3.5-inch hot-swap SSDs - 24 Gb SAS - Mixed Use/Mainstream (3-5 DWPD) | | | | |
| 4XB7A80344 | BNW7 | ThinkSystem 3.5" PM1655 800GB Mixed Use SAS 24Gb HS SSD | Support | 16 |
| 4XB7A80345 | BNWA | ThinkSystem 3.5" PM1655 1.6TB Mixed Use SAS 24Gb HS SSD | Support | 16 |
| 4XB7A80346 | BNWB | ThinkSystem 3.5" PM1655 3.2TB Mixed Use SAS 24Gb HS SSD | Support | 16 |
| 4XB7A80347 | BP3G | ThinkSystem 3.5" PM1655 6.4TB Mixed Use SAS 24Gb HS SSD | Support | 16 |
| 3.5-inch hot-swap SSDs - 24 Gb SAS - Read Intensive/Entry/Capacity (<3 DWPD) | | | | |
| 4XB7A80324 | BNWD | ThinkSystem 3.5" PM1653 960GB Read Intensive SAS 24Gb HS SSD | Support | 16 |
| 4XB7A80325 | BNWG | ThinkSystem 3.5" PM1653 1.92TB Read Intensive SAS 24Gb HS SSD | Support | 16 |
| 4XB7A80326 | BNWH | ThinkSystem 3.5" PM1653 3.84TB Read Intensive SAS 24Gb HS SSD | Support | 16 |
| 4XB7A80327 | BP3F | ThinkSystem 3.5" PM1653 7.68TB Read Intensive SAS 24Gb HS SSD | Support | 16 |
| 4XB7A80328 | BP3H | ThinkSystem 3.5" PM1653 15.36TB Read Intensive SAS 24Gb HS SSD | Support | 16 |

Table 40. 3.5-inch hot-swap 12 Gb SAS SSDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|---|-------------|---------|
| 3.5-inch hot-swap SSDs - 12 Gb SAS - Mixed Use/Mainstream (3-5 DWPD) | | | | |
| 4XB7A17066 | B8HT | ThinkSystem 3.5" PM1645a 800GB Mainstream SAS 12Gb Hot Swap SSD | No | 16 |
| 4XB7A17043 | B8JN | ThinkSystem 3.5" PM1645a 1.6TB Mainstream SAS 12Gb Hot Swap SSD | No | 16 |
| 4XB7A17067 | B8JK | ThinkSystem 3.5" PM1645a 3.2TB Mainstream SAS 12Gb Hot Swap SSD | No | 16 |
| 4XB7A17068 | B8JG | ThinkSystem 3.5" PM1645a 6.4TB Mainstream SAS 12Gb Hot Swap SSD | No | 16 |
| 3.5-inch hot-swap SSDs - 12 Gb SAS - Read Intensive/Entry/Capacity (<3 DWPD) | | | | |
| 4XB7A17058 | B91E | ThinkSystem 3.5" PM1643a 3.84TB Entry SAS 12Gb Hot Swap SSD | No | 16 |
| 4XB7A17059 | BEVK | ThinkSystem 3.5" PM1643a 7.68TB Entry SAS 12Gb Hot Swap SSD | No | 16 |

Table 41. 3.5-inch hot-swap 6 Gb SATA SSDs

| Part number | Feature code | Description | SED support | Max Qty |
|---|--------------|--|-------------|---------|
| 3.5-inch hot-swap SSDs - 6 Gb SATA - Mixed Use/Mainstream (3-5 DWPD) | | | | |
| 4XB7A90888 | BYM3 | ThinkSystem 3.5" VA 480GB Mixed Use SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90889 | BYM7 | ThinkSystem 3.5" VA 960GB Mixed Use SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90890 | BYM8 | ThinkSystem 3.5" VA 1.92TB Mixed Use SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90891 | BYLX | ThinkSystem 3.5" VA 3.84TB Mixed Use SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A17137 | BA4W | ThinkSystem 3.5" S4620 480GB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 4XB7A17138 | BA4X | ThinkSystem 3.5" S4620 960GB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 4XB7A17139 | BA4Y | ThinkSystem 3.5" S4620 1.92TB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 4XB7A17140 | BK7P | ThinkSystem 3.5" S4620 3.84TB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 4XB7A13639 | B49R | ThinkSystem 3.5" S4610 240GB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 4XB7A13640 | B49S | ThinkSystem 3.5" S4610 480GB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 4XB7A13641 | B49T | ThinkSystem 3.5" S4610 960GB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 4XB7A13642 | B49U | ThinkSystem 3.5" S4610 1.92TB Mixed Use SATA 6Gb HS SSD | No | 16 |
| 3.5-inch hot-swap SSDs - 6 Gb SATA - Read Intensive/Entry (<3 DWPD) | | | | |
| 4XB7A90878 | BYLW | ThinkSystem 3.5" VA 240GB Read Intensive SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90879 | BYLJ | ThinkSystem 3.5" VA 480GB Read Intensive SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90880 | BYLY | ThinkSystem 3.5" VA 960GB Read Intensive SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90881 | BYLZ | ThinkSystem 3.5" VA 1.92TB Read Intensive SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90882 | BYM0 | ThinkSystem 3.5" VA 3.84TB Read Intensive SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A90883 | BYM1 | ThinkSystem 3.5" VA 7.68TB Read Intensive SATA 6Gb HS SSD v2 | No | 16 |
| 4XB7A17118 | BA7K | ThinkSystem 3.5" S4520 240GB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A17119 | BA7L | ThinkSystem 3.5" S4520 480GB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A17120 | BA7M | ThinkSystem 3.5" S4520 960GB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A17121 | BA7N | ThinkSystem 3.5" S4520 1.92TB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A17122 | BK7F | ThinkSystem 3.5" S4520 3.84TB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A17123 | BK7G | ThinkSystem 3.5" S4520 7.68TB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A38276 | BCTH | ThinkSystem 3.5" Multi Vendor 240GB Entry SATA 6Gb Hot Swap SSD | No | 16 |
| 4XB7A38277 | BCTJ | ThinkSystem 3.5" Multi Vendor 480GB Entry SATA 6Gb Hot Swap SSD | No | 16 |
| 4XB7A38278 | BCTK | ThinkSystem 3.5" Multi Vendor 960GB Entry SATA 6Gb Hot Swap SSD | No | 16 |
| 4XB7A38279 | BCTL | ThinkSystem 3.5" Multi Vendor 1.92TB Entry SATA 6Gb Hot Swap SSD | No | 16 |
| 4XB7A38281 | BCTM | ThinkSystem 3.5" Multi Vendor 3.84TB Entry SATA 6Gb Hot Swap SSD | No | 16 |
| 4XB7A13625 | B49D | ThinkSystem 3.5" S4510 240GB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A13626 | B49E | ThinkSystem 3.5" S4510 480GB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A13627 | B49F | ThinkSystem 3.5" S4510 960GB Read Intensive SATA 6Gb HS SSD | No | 16 |
| 4XB7A13628 | B49G | ThinkSystem 3.5" S4510 1.92TB Read Intensive SATA 6Gb HS SSD | No | 16 |

Table 42. 3.5-inch hot-swap PCIe 4.0 NVMe SSDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|--|-------------|---------|
| 3.5-inch SSDs - U.2 PCIe 4.0 NVMe - Mixed Use/Mainstream (3-5 DWPD) | | | | |
| 4XB7B01883 | C6M6 | ThinkSystem 3.5" U.2 Solidigm P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7B01884 | C6M7 | ThinkSystem 3.5" U.2 Solidigm P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7B01885 | C6M8 | ThinkSystem 3.5" U.2 Solidigm P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7B01886 | C6M9 | ThinkSystem 3.5" U.2 Solidigm P5620 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A17141 | BNEK | ThinkSystem 3.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A17143 | BNEM | ThinkSystem 3.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A17144 | BNEN | ThinkSystem 3.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A17148 | BNEP | ThinkSystem 3.5" U.2 P5620 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A17155 | BCFM | ThinkSystem 3.5" U.2 P5600 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | No | 8 |
| 4XB7A17156 | BCFJ | ThinkSystem 3.5" U.2 P5600 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD | No | 8 |
| 3.5-inch SSDs - U.2 PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD) | | | | |
| 4XB7B01871 | C6MD | ThinkSystem 3.5" U.2 Solidigm P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7B01872 | C6ME | ThinkSystem 3.5" U.2 Solidigm P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7B01873 | C6MF | ThinkSystem 3.5" U.2 Solidigm P5520 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7B01874 | C7P0 | ThinkSystem 3.5" U.2 Solidigm P5520 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A13632 | BNES | ThinkSystem 3.5" U.2 P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A76777 | BNET | ThinkSystem 3.5" U.2 P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A76778 | BNEU | ThinkSystem 3.5" U.2 P5520 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A76779 | BNF0 | ThinkSystem 3.5" U.2 P5520 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | Support | 8 |
| 4XB7A17149 | BCFN | ThinkSystem 3.5" U.2 P5500 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | No | 8 |
| 4XB7A17150 | BCFL | ThinkSystem 3.5" U.2 P5500 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD | No | 8 |

Table 43. 3.5-inch hot-swap PCIe 3.0 NVMe SSDs

| Part number | Feature code | Description | SED support | Max Qty |
|--|--------------|---|-------------|---------|
| 3.5-inch SSDs - U.2 PCIe 3.0 NVMe - Read Intensive/Entry (<3 DWPD) | | | | |
| 4XB7A10178 | B34Q | ThinkSystem 3.5" PM983 1.92TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD | No | 8 |
| 4XB7A10179 | B34R | ThinkSystem 3.5" PM983 3.84TB Entry NVMe PCIe 3.0 x4 Hot Swap SSD | No | 8 |

Table 44. 3.5-inch simple-swap 6 Gb SATA HDDs

| Part number | Feature code | Description | SED support | Max Qty |
|---|--------------|---|-------------|---------|
| 3.5-inch simple-swap HDDs - 6 Gb NL SATA | | | | |
| 7XB7A00055 | AUZS | ThinkSystem 1TB 7.2K 6Gbps SATA 3.5" Simple Swap 512n HDD | No | 12 |
| 7XB7A00056 | AUZT | ThinkSystem 2TB 7.2K 6Gbps SATA 3.5" Simple Swap 512n HDD | No | 12 |
| 7XB7A00057 | AUZU | ThinkSystem 4TB 7.2K 6Gbps SATA 3.5" Simple Swap 512n HDD | No | 12 |
| 7XB7A00058 | AXC7 | ThinkSystem 6TB 7.2K 6Gbps SATA 3.5" Simple Swap 512e HDD | No | 12 |
| 7XB7A00059 | AXC6 | ThinkSystem 8TB 7.2K 6Gbps SATA 3.5" Simple Swap 512e HDD | No | 12 |
| 7XB7A00060 | AXC8 | ThinkSystem 3.5" 10TB 7.2K SATA 6Gb Simple Swap 512e HDD | No | 12 |
| 4XB7A08584 | BA7D | ThinkSystem 3.5" 12TB 7.2K SATA 6Gb Simple Swap 512e HDD | No | 12 |

Table 45. 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 |
| 4XB7A90105 | BXMK | ThinkSystem M.2 ER2 240GB Read Intensive SATA 6Gb NHS SSD | Support | 2 |
| 4XB7A90106 | BXMJ | ThinkSystem M.2 ER2 480GB 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 |
| 7N47A00129 | AUUL | ThinkSystem M.2 32GB SATA 6Gbps Non-Hot Swap SSD | No | 2 |
| 7N47A00130 | AUUV | ThinkSystem M.2 128GB SATA 6Gbps Non-Hot Swap SSD | No | 2 |
| 4XB7A17071 | B8HS | ThinkSystem M.2 5300 240GB SATA 6Gbps Non-Hot Swap SSD | No | 2 |
| 4XB7A17073 | B919 | ThinkSystem M.2 5300 480GB SATA 6Gbps Non-Hot Swap SSD | No | 2 |
| 4XB7A17074 | B8JJ | ThinkSystem M.2 5300 960GB SATA 6Gbps Non-Hot Swap SSD | No | 2 |

Table 46. 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 | Support | 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 | Support | 2 |
| 4XB7A90103 | BXMG | ThinkSystem M.2 PM9A3 1.92TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD | Support | 2 |
| 4XB7A90104 | BXMF | ThinkSystem M.2 PM9A3 3.84TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD | Support | 2 |
| 4XB7A82636 | BS2P | ThinkSystem M.2 7450 PRO 480GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD | Support | 2 |
| 4XB7A13999 | BKSR | ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD | Support | 2 |
| 4XB7A14000 | BKSS | ThinkSystem M.2 7450 PRO 1.92TB Read Intensive Entry NVMe PCIe 4.0 x4 NHS SSD | Support | 2 |
| 4XB7A84604 | BS2R | ThinkSystem M.2 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD | Support | 2 |

Table 47. M.2 PCIe 3.0 NVMe drives

| Part number | Feature code | Description | SED support | Max Qty |
|---|--------------|---|-------------|---------|
| M.2 SSDs - PCIe 3.0 NVMe - Read Intensive/Entry (<3 DWPD) | | | | |
| 4XB7A38177 | B8JR | ThinkSystem M.2 PM983 960GB NVMe PCIe 3.0 x4 Non-Hot Swap SSD | No | 2 |

USB flash drive

For general portable storage needs, the server also supports the USB flash drive option that is listed in the following table.

Table 48. USB memory key

| Part number | Feature | Description |
|-------------|---------|----------------------------------|
| 4X77A08621 | B8NV | ThinkSystem 32GB USB Flash Drive |

Optical drives and backup units

For most configurations, the ST650 V2 has two 5.25-inch half-height drive bays for internal optical drives or backup units. The only configuration that does not support these media bays is the configuration with 4x 2.5-inch backplanes as described in the [Internal storage](#) section.

The drives and media supported by the server are listed in the following table.

LTO tape drive in a rack conversion kit : The ST650 V2 is supported installed on its side in a rack mount kit, however the use of an LTO tape drive in this configuration is supported but not recommended.

Table 49. Internal optical drives and backup units

| Part number | Feature code | Description | Maximum supported |
|--------------------------|--------------|---|-------------------|
| Optical drives | | | |
| 4XA7A81755 | B36S | ThinkSystem 9.5mm Ultra-Slim USB DVD-RW v2 | 1 |
| 4XA7A08377 | B36S | 9.5mm Ultra-Slim USB DVD-RW | 1 |
| LTO tape drives | | | |
| 4T27A80487 | B4BM | ThinkSystem Internal Half High LTO Gen8 SAS Tape Drive v2 | 1 |
| 4T27A10727 | B4BM | ThinkSystem Internal Half High LTO Gen8 SAS Tape Drive | 1 |
| 7T27A01503 | AVF5 | ThinkSystem Internal Half High LTO Gen7 SAS Tape Drive | 1 |
| LTO media | | | |
| 4TP7A09619 | B4BN | ThinkSystem LTO Gen8 12TB Tape | Not applicable |
| 7TP7A01606 | AVF7 | ThinkSystem LTO G7 6TB Tape | Not applicable |
| RDX drive and cartridges | | | |
| 4T27A80485 | AVF6 | ThinkSystem Internal RDX USB 3.0 Dock | 1 |
| 7T27A01501 | AVF6 | ThinkSystem Internal RDX USB 3.0 Dock | 1 |
| 7TP7A01601 | AVF8 | ThinkSystem RDX 500GB Cartridge | Not applicable |
| 7TP7A01602 | AVF1 | ThinkSystem RDX 1TB Cartridge | Not applicable |
| 7TP7A04318 | AXD1 | ThinkSystem RDX 4TB Cartridge | Not applicable |
| 7TP7A01603 | AVF0 | ThinkSystem RDX 2TB Cartridge | Not applicable |

For field upgrades, the kits listed in the following table are available.

Table 50. Internal optical drives and backup units

| Part number | Description | Purpose |
|-------------|---|--|
| 4M27A60829 | ThinkSystem ST650 V2 3.5" Chassis Media Bay Enablement Kit <ul style="list-style-type: none"> 2-bay 5.25" ODD/Tape Cage Cage for 1x Slim ODD ODD filler/bezel Tape filler/bezel | Provides the cage necessary to house two 5.25-inch drives, plus an inner cage for the slim optical drive. Also include blank bezels when a bay is not in use. Order tape drives and cables separately. |
| 4Z57A16101 | ThinkSystem ST650 V2 Optical Disk Drive Cable Kit <ul style="list-style-type: none"> Slim ODD Bezel USB Cable for Slim ODD | Provides the USB cable needed to connect the optical drive |
| 4Z57A80565 | ThinkSystem ST650 V2 Tape Drive Cable Kit v2 | Provides the power cable and SAS cable to connect the tape drive. Order the SAS HBA separately. |
| 4Z57A16100 | ThinkSystem ST650 V2 Tape Drive Cable Kit <ul style="list-style-type: none"> ODD/Tape Power Cable Tape SAS Cable | Provides the power cable and SAS cable to connect the tape drive. Order the SAS HBA separately. |

The ST650 V2 also supports external drives. External tape and RDX drives are described in the [External backup units](#) section.

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

Table 51. 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 ST650 V2 supports a total of up to 9 PCIe slots, all full-height and all with rear access. Slots 1-7 and 9 are PCIe 4.0 slots and Slot 8 is optional and is a PCIe 3.0 slot. Slots 4-8 require CPU 2 installed.

- Slot 1: PCIe 4.0 x16 (CPU 1)
- Slot 2: PCIe 4.0 x4 (x8 physical slot) (CPU 1)
- Slot 3: PCIe 4.0 x16 (CPU 1)
- Slot 4: PCIe 4.0 x8 (x8 physical slot) (CPU 2)
- Slot 5: PCIe 4.0 x16 (CPU 2)
- Slot 6: PCIe 4.0 x8 (x8 physical slot) (CPU 2)
- Slot 7: PCIe 4.0 x16 (CPU 2)
- Slot 8: PCIe 3.0 x8 (x8 physical slot) (CPU 2) (optional, cabled to PCIe connector)
- Slot 9: PCIe 4.0 x8 (x8 physical slot) (CPU 1)

The slots are shown in the following figure.

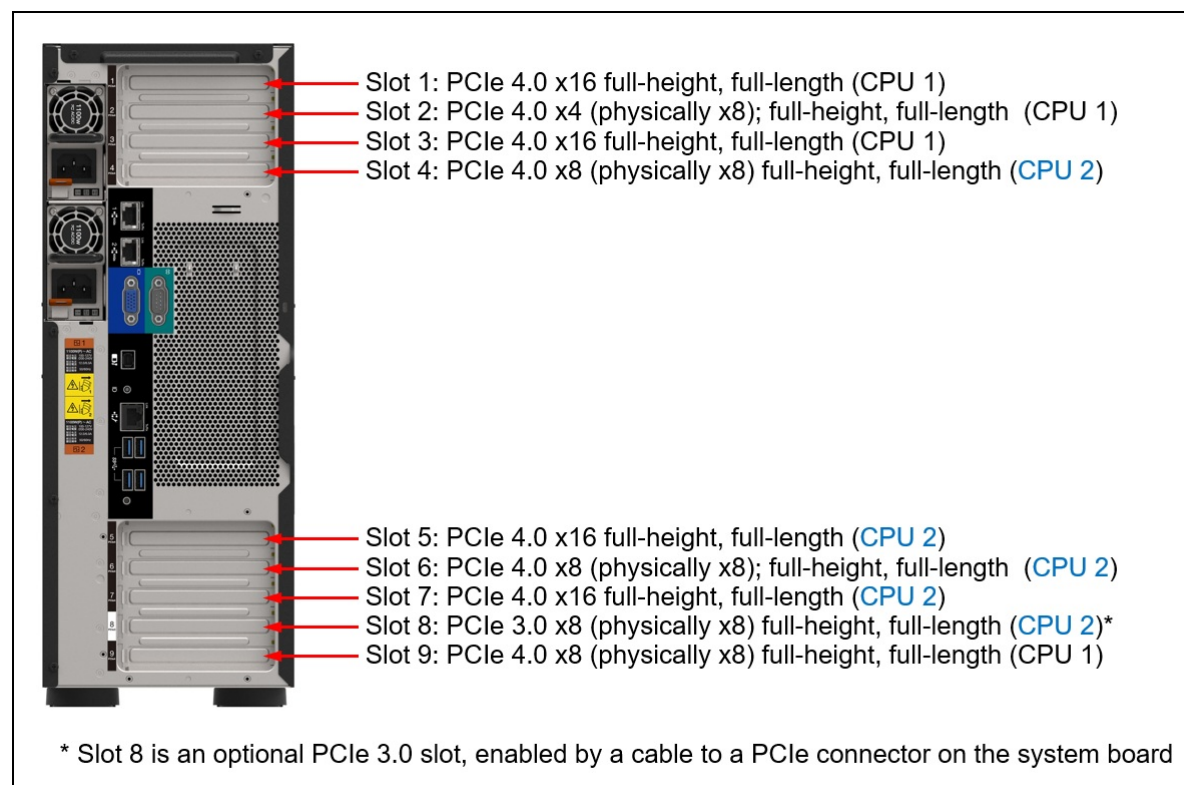


Figure 10. ST650 V2 PCIe slots

Slot 8 is optional and is enabled through the use of the cable listed in the following table. As shown in the [System architecture](#) section, Slot 8 is connected to CPU 2 and is mutually exclusive with four onboard NVMe ports. This means that to use Slot 8, only configurations with 4x 3.5-inch NVMe drives can be connected to the onboard NVMe controller. For any other NVMe configurations, retimer adapters will be required.

Table 52. Slot 8 cable kit

| Part number | Feature code | Description | Purpose |
|-------------|--------------|---|----------------|
| 4Z57A60819 | BA6Q | ThinkSystem ST650 V2 PCIe Slot 8 Enablement Kit <ul style="list-style-type: none"> • SBB7A15218 - MB Slimline x8 to Slimline x8 to enable slot8, 930mm | Enables Slot 8 |

For GPUs, additional components may be required. See the [GPU adapters](#) section for details.

Network adapters

The ST650 V2 has two integrated 10GBASE-T ports for 1/10Gb Ethernet connectivity, based on the Broadcom BCM57416 controller.

The controller has the following features:

- General features
 - PCIe 3.0 x4 host interface
 - Supports 10GbE and 1GbE
 - 10GBASE-T IEEE 802.3an support
 - 1000BASE-T IEEE 802.3ab support
 - Supports IPv4 and IPv6
 - Broadcom TruFlow flow processing engine
- Virtualization features
 - SR-IOV support with up to 128 VFs
 - VXLAN, NVGRE, Geneve, GRE encapsulation and decapsulation
 - vSwitch acceleration
 - Multiqueue, NetQueue, and VMQ
 - Tunnel-aware stateless offloads
 - Message Signal Interrupts (MSI-X) support
- Ethernet features:
 - IPv4 and IPv6 offloads
 - TCP, UDP, and IP checksum offloads
 - Large Send Offload (LSO)
 - Large Receive Offload (LRO)
 - TCP Segmentation Offload (TSO)
 - Receive-side Scaling (RSS)
 - Transmit-side Scaling (TSS)
 - VLAN insertion/removal
 - Interrupt coalescing
 - Jumbo frames up to 9 KB
 - Network boot-PXE, UEFI
 - iSCSI boot
 - Data Plane Development Kit (DPDK) support
- Remote Direct Memory Access (RDMA):
 - Supports RDMA over converged Ethernet (RoCE) specifications
- Data Center Bridging / Converged Enhanced Ethernet (DCB/CEE):
 - Hardware Offloads of Ethernet TCP/IP
 - 802.1Qbb Priority Flow Control (PFC)
 - 802.1Qaz Enhanced Transmission Selection (ETS)
 - 802.1Qaz Data Center Bridging Exchange (DCBX)
- Management:
 - SMBus 2.0
 - MCTP over SMBus
 - NC-SI support

The ST650 V2 also supports network adapters that can be installed in the regular PCIe slots.

Table 53. Supported PCIe Network Adapters

| Part number | Feature code | Description | Maximum supported | Slots supported |
|---------------------|--------------|--|-------------------|-----------------|
| Gigabit Ethernet | | | | |
| 7ZT7A00484 | AUZV | ThinkSystem Broadcom 5719 1GbE RJ45 4-Port PCIe Ethernet Adapter | 9 | All slots |
| 7ZT7A00482 | AUZX | ThinkSystem Broadcom 5720 1GbE RJ45 2-Port PCIe Ethernet Adapter | 9 | All slots |
| 7ZT7A00533 | AUZZ | ThinkSystem I350-F1 PCIe 1Gb 1-Port SFP Ethernet Adapter | 9 | All slots |
| 7ZT7A00534 | AUZY | ThinkSystem I350-T2 PCIe 1Gb 2-Port RJ45 Ethernet Adapter | 9 | All slots |
| 7ZT7A00535 | AUZW | ThinkSystem I350-T4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter | 9 | All slots |
| 10GBASE-T Ethernet | | | | |
| 00MM860 | ATPX | Intel X550-T2 Dual Port 10GBase-T Adapter | 9 | All slots |
| 7ZT7A00496 | AUKP | ThinkSystem Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter | 9 | All slots |
| 4XC7A80266 | BNWL | ThinkSystem Intel X710-T2L 10GBase-T 2-Port PCIe Ethernet Adapter | 7 | 2-4, 6-9 |
| 4XC7A79699 | BMXB | ThinkSystem Intel X710-T4L 10GBase-T 4-Port PCIe Ethernet Adapter | 7 | 2-4, 6-9 |
| 4XC7A08245 | B5SU | ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter | 9 | All slots |
| 10 Gb Ethernet SFP+ | | | | |
| 7ZT7A00537 | AUKX | ThinkSystem Intel X710-DA2 PCIe 10Gb 2-Port SFP+ Ethernet Adapter | 9 | All slots |
| 25 Gb Ethernet | | | | |
| 4XC7A08238 | B5T0 | ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter | 9 | All slots |
| 4XC7A08241 | B5T3 | ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter | 9 | All slots |
| 4XC7A08295 | BCD6 | ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter | 9 | All slots |
| 4XC7A80267 | BP8M | ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port PCIe Ethernet Adapter | 4 | 1,3,5,7 |
| 4XC7A08270 | B652 | ThinkSystem Marvell QL41232 10/25GbE SFP28 2-Port PCIe Ethernet Adapter | 9 | All slots |
| 4XC7A62580 | BE4U | ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter | 9 | All slots |
| 100 Gb Ethernet | | | | |
| 4XC7A08248 | B8PP | ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter | 4 | 1,3,5,7 |

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>

Configuration requirements:

- **E810 Ethernet and X350 RAID/HBAs**: The use of both an Intel E810 network adapter and an X350 HBA/RAID adapter (9350, 5350 and 4350) is supported, however E810 firmware CVL4.3 or later is

required. For details, see [Support Tip HT513226](#).

Fibre Channel host bus adapters

The following table lists the Fibre Channel HBAs supported by the ST650 V2.

Table 54. Fibre Channel HBAs

| Part number | Feature code | Description | Maximum supported | Slots supported |
|--------------------------|--------------|---|-------------------|-----------------|
| 32 Gb Fibre Channel HBAs | | | | |
| 4XC7A76498 | BJ3G | ThinkSystem Emulex LPe35000 32Gb 1-port PCIe Fibre Channel Adapter V2 | 9 | All slots |
| 4XC7A76525 | BJ3H | ThinkSystem Emulex LPe35002 32Gb 2-port PCIe Fibre Channel Adapter V2 | 9 | All slots |
| 4XC7A08279 | BA1G | ThinkSystem QLogic QLE2770 32Gb 1-Port PCIe Fibre Channel Adapter | 9 | All slots |
| 4XC7A08276 | BA1F | ThinkSystem QLogic QLE2772 32Gb 2-Port PCIe Fibre Channel Adapter | 9 | All slots |
| 16 Gb Fibre Channel HBAs | | | | |
| 01CV830 | ATZU | Emulex 16Gb Gen6 FC Single-port HBA | 9 | All slots |
| 01CV840 | ATZV | Emulex 16Gb Gen6 FC Dual-port HBA | 9 | All slots |
| 01CV750 | ATZB | QLogic 16Gb Enhanced Gen5 FC Single-port HBA | 9 | All slots |
| 01CV760 | ATZC | QLogic 16Gb Enhanced Gen5 FC Dual-port HBA | 9 | All slots |

For more information, see the list of Lenovo Press Product Guides in the Host bus adapters category:
<https://lenovopress.com/servers/options/hba>

SAS adapters for external storage

The following table lists SAS HBAs and RAID adapters supported by ST650 V2 server for use with external storage.

Table 55. Adapters for external storage

| Part number | Feature code | Description | Maximum supported | Slots supported |
|------------------------|--------------|--|-------------------|-----------------|
| SAS HBAs | | | | |
| 7Y37A01090 | AUNR | ThinkSystem 430-8e SAS/SATA 12Gb HBA | 9 | All slots |
| 7Y37A01091 | AUNN | ThinkSystem 430-16e SAS/SATA 12Gb HBA | 9 | All slots |
| 4Y37A78837 | BNWK | ThinkSystem 440-8e SAS/SATA PCIe Gen4 12Gb HBA | 9 | All slots |
| 4Y37A09724 | B8P7 | ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA | 9 | All slots |
| External RAID adapters | | | | |
| 7Y37A01087 | AUNQ | ThinkSystem RAID 930-8e 4GB Flash PCIe 12Gb Adapter | 4* | Any 4 slots |
| 4Y37A78836 | BNWJ | ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter | 4* | Any 4 slots |

* See below regarding supercap requirements

For a comparison of the functions of the supported external storage adapters, see the ThinkSystem RAID Adapter and HBA Reference:

<https://lenovopress.com/lp1288#st650-v2-support=ST650%20V2&internal-or-external-ports=External>

Mixing storage adapter families: The following HBA/RAID adapter combinations are supported:

- X30 external adapters with other X30 adapters (internal or external)
- X40 external adapters with other X40 adapters (internal or external)
- X40 external adapters with X350 internal adapters

The following HBA/RAID adapter combinations are *not* supported:

- X30 adapters (internal or external) with X40 adapters (internal or external)
- X30 adapters (internal or external) with X350 internal adapters

The RAID 930-8e and RAID 940-8e use a flash power module (supercap), which can be installed in one of four locations on the air baffle in the server. The number of 930/940-8e RAID adapters supported is based on how many supercaps can be installed in the server. If an internal 930i or 940i or 9350i RAID adapter with flash power modules is installed, the maximum number of 930/940-8e adapters supported is reduced by 1.

For more information, see the list of Lenovo Press Product Guides in the Host bus adapters and RAID adapters categories:

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

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

Flash storage adapters

The ST650 V2 currently does not support flash storage adapters.

GPU adapters

The ST650 V2 supports the following graphics processing units (GPUs).

Table 56. Supported GPUs

| Part number | Feature code | Description | TDP | Maximum supported | Slots supported | Controlled GPU |
|-------------------------|--------------|--|------|-------------------|-----------------|----------------|
| Double-wide GPUs | | | | | | |
| 4X67A71310 | BFT0 | ThinkSystem NVIDIA RTX A6000 48GB PCIe Active GPU | 300W | 4 | 1,3,5,7* | No |
| 4X67A76720 | BMT9 | ThinkSystem NVIDIA RTX A2000 12GB PCIe Active GPU | 70W | 4 | 1,3,5,7 | No |
| NVLink bridge connector | | | | | | |
| 4X67A71309 | BG3F | ThinkSystem NVIDIA Ampere NVLink 2-Slot Bridge | - | 2 | Not applicable | - |
| Single-wide GPUs | | | | | | |
| 4X67A84824 | BS2C | ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU | 72W | 8 | 1-8 | Controlled |
| 4X67A81547 | BQZT | ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC | 60W | 8 | 1-8 | No |
| CTO only | BP05 | ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU | 60W | 8 | 1-8 | No |
| 4X67A14934 | B6CG | ThinkSystem NVIDIA Quadro RTX 4000 8GB PCIe Active GP | 160W | 8 | 1-8 | No |
| 4X67A14926 | B4YB | ThinkSystem NVIDIA T4 16GB PCIe Passive GPU | 70W | 8 | 1-8 | No |
| 4X67A11584 | B31D | ThinkSystem NVIDIA Quadro P620 2GB PCIe Active GPU | 40W | 8 | 1-8 | No |

* When a double-wide GPU is installed in slot 1, 3, 5 or 7, the adjacent slot 2, 4, 6 or 8 respectively is not available

Configuration rules:

- The table includes a Controlled GPU column. If a GPU is listed as Controlled, that means the GPU is not offered in certain markets, as determined by the US Government. If a GPU is listed as No, that means the GPU is not controlled and is available in all markets.
- GPUs can be configured in CTO orders as follows:
 - A Controlled GPU can only be configured using one of the Base CTO models for Controlled GPUs, such as , as listed in the [Models](#) section.
 - A GPU that is not controlled can only be configured using one of the Base CTO models that is *not* for Controlled GPUs, such as 7Z74CTO1WW, as listed in the [Models](#) section.
- All GPUs installed in a zone must be identical
- Dual-rotor cooling fans are required
- When any GPUs are installed, only two backplanes are supported and no optical drive or tape drive can be installed.
- The following rules apply to all GPUs except the RTX A2000:
 - When a GPU is installed in Zone 1 (upper slots, slots 1-4), a RAID card, HBA or Retimer cannot also be installed in that zone
 - When a GPU is installed in Zone 2 (lower slots, slots 5-9), a RAID card, HBA or Retimer cannot be installed in slots 5-8. Slot 9 can, however, be used to install the storage adapter

- 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.

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

The following table lists the field upgrades for GPUs.

Zones: PCIe slots in the server are grouped into zones:

- Zone 1 = slots 1, 2, 3, 4 (upper slots)
- Zone 2 = slots 5, 6, 7, 8, 9 (lower slots)

Table 57. GPU field upgrades

| Part number | Feature code | Description | Purpose |
|-------------|--------------|---|---|
| 4M27A60836 | BA7B | ThinkSystem ST650 V2/V3 Full Length PCIe Holder Kit <ul style="list-style-type: none"> • 2x adapter brackets • 1x GPU filler | 1 kit needed per server. The two brackets mount on the fan cage to secure the ends of full-length adapters that are installed. The left bracket is for slots in zone 1 and the right bracket is for zone 2. The GPU filler is needed for proper airflow if you have 1x double-wide GPU in slot 1, or 3x double-wide GPU adapters in slots 1, 3, and 7. Not needed for any combinations. |
| 4M27A11843 | BF58 | ThinkSystem ST650 V2/V3 Low Profile GPU Thermal Kit <ul style="list-style-type: none"> • 1x T4 filler sponge | 1 kit needed for each zone, if a T4 is installed in that zone. The kit contains a sponge that is mounted to the underside of the server cover and is needed for proper cooling when T4 GPUs are installed. Note: Once a sponge is installed in a zone, only low profile adapters can be installed in that zone. Full-height adapters are not supported. |
| 4Z57A60815 | BB41 | ThinkSystem ST650 V2 RTX 4000 GPU Power Cable Kit <ul style="list-style-type: none"> • 320mm power cable for slots 1-4 • 660 mm power cable for slots 5-8 | Auxiliary power cable for NVIDIA RTX 4000. Use the cable that matches the slot where the GPU is installed. |
| 4Z57A60816 | BB42 | ThinkSystem ST650 V2/V3 RTX A6000 GPU Power Cable Kit <ul style="list-style-type: none"> • 320mm power cable for slots 1-4 • 660 mm power cable for slots 5-8 | Auxiliary power cable for NVIDIA RTX A6000. Use the cable that matches the slot where the GPU is installed. |

Cooling

The ST650 V2 server has up to 4x hot-swap variable-speed 92 mm fans, either Performance or Standard fans, depending on the configuration. Performance fans are dual-rotor counter-rotating units that have two separate spinning fan rotors, one in front of the other, which rotate in opposite directions. Standard fans are single-rotor units.

Performance fans are N+1 rotor redundant and in the event of a rotor failure, the system will continue with no loss of performance provided the ambient temperature is 27 °C or lower. If the ambient temperature is above 27 °C, performance may be degraded. Standard fans are not redundant, and in the event of a fan failure, the server will continue however performance will be degraded.

The server also has one or two additional fans integrated in each of the two power supplies.

Depending on the configuration, Standard fans will be sufficient to provide the necessary air flow, however for CTO orders it will be possible in the DCSC configurator to override the default selection and select Performance fans. Fan types cannot be mixed. Ordering information is listed in the following table.

Table 58. Cooling fan options

| Part number | Feature code | Description | Quantity required | |
|-------------|--------------|--|-------------------|--------|
| | | | 1 CPU | 2 CPUs |
| 4M27A60831 | BA5S | ThinkSystem ST650 V2 Standard Fan Kit (single-rotor fans) | 3 or 4 | 4 |
| 4M27A60832 | BA5T | ThinkSystem ST650 V2 Performance Fan Kit (dual-rotor fans) | 3 or 4 | 4 |

The use of 4x dual-rotor fans supports all configurations, however the use of 3x fans or the use of single-rotor fans is supported under the following conditions:

- 3x single-rotor fans can be used in the following conditions
 - Processor: 1x CPU, TDP < 205W
 - No Persistent Memory installed
 - No GPUs installed
 - Drives: only 2 backplanes installed (8x 3.5-inch or 16x 2.5-inch)
 - PCIe slots: No restriction
 - M.2 drives: No NVMe M.2 drives
 - Ambient temperature: 35 °C
- 3x double-rotor fans can be used in the following conditions (all must apply):
 - Processor: 1x CPU (no TDP restriction)
 - Persistent memory: No restriction
 - GPUs: up to 2 double-wide or 3 single-wide
 - Drives: only 2 backplanes installed (8x 3.5-inch or 16x 2.5-inch)
 - PCIe slots: No restriction
 - Ambient temperature: 30 °C
- 4x single-rotor fans can be used in the following conditions (all must apply):
 - Processor: TDP < 205W
 - Persistent memory: No support
 - GPUs: No support
 - Drives: No restriction
 - PCIe slots: No restriction
 - M.2 drives: No NVMe M.2 drives
 - Ambient temperature: 35 °C

Power supplies

The ST650 V2 supports up to two redundant hot-swap power supplies.

The power supply choices are listed in the following table. Both power supplies used in server must be identical.

Tip: When configuring a server in the DCSC configurator, power consumption is calculated precisely by interfacing with Lenovo Capacity Planner. You can therefore select the appropriate power supply for your configuration. However, do consider future upgrades that may require additional power needs.

Table 37. Power supply options

| Part number | Feature | Description | Connector | Max supported | 110V AC | 220V AC | 240V DC China only |
|--------------------------------|---------|--|-----------|---------------|---------|---------|--------------------|
| Platinum power supplies | | | | | | | |
| 4P57A75972 | BHTU | ThinkSystem 750W 230V/115V Platinum Hot-Swap Gen2 Power Supply v2 | C13 | 2 | Yes | Yes | Yes |
| 4P57A75974 | BHS9 | ThinkSystem 1100W 230V/115V Platinum Hot-Swap Gen2 Power Supply v2 | C13 | 2 | Yes | Yes | Yes |
| 4P57A26294 | B8QB | ThinkSystem 1800W 230V Platinum Hot-Swap Gen2 Power Supply | C13 | 2 | No | Yes | Yes |
| 4P57A78362 | BMUF | ThinkSystem 1800W 230V Platinum Hot-Swap Gen2 Power Supply | C13 | 2 | No | Yes | Yes |
| 4P57A26295 | B962 | ThinkSystem 2400W 230V Platinum Hot-Swap Gen2 Power Supply | C19 | 2 | No | Yes | Yes |
| Titanium power supplies | | | | | | | |
| 4P57A75973 | BHS8 | ThinkSystem 750W 230V Titanium Hot-Swap Gen2 Power Supply v2 | C13 | 2 | No | Yes | Yes |
| 4P57A82019 | BR1X | ThinkSystem 750W 230V Titanium Hot-Swap Gen2 Power Supply v3 | C13 | 2 | No | Yes | Yes |
| 4P57A72666 | BLKH | ThinkSystem 1100W 230V Titanium Hot-Swap Gen2 Power Supply | C13 | 2 | No | Yes | Yes |
| 4P57A78359 | BPK9* | ThinkSystem 1800W 230V Titanium Hot-Swap Gen2 Power Supply | C13 | 2 | No | Yes | Yes |

* BPK9 is initially only configurable in PRC and certain countries in the EET and WE markets. Worldwide support is planned in 2Q/2023.

Dual-voltage power supplies are auto-sensing and support both 110V AC (100-127V 50/60 Hz) and 220V AC (200-240V 50/60 Hz) power. For China customers, all power supplies support 240V DC.

Power supply options do not include a line cord. For server configurations, the inclusion of a power cord is model dependent. Configure-to-order models can be configured without power cords if desired. Note that the 2400W power supply has a [C19 connector](#).

Power cords

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

115V customers: If you plan to use the 1100W power supply with a low-range (100-127V) power source, select a power cable that is rated above 10A. Power cables that are rated at 10A or below are not supported with low-range power.

Table 59. 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 |

| Part number | Feature code | Description |
|------------------------------------|--------------|--|
| 4L67A08368 | B0N6 | 1.5m, 13A/100-250V, C13 to C14 Jumper Cord |
| 4L67A08365 | B0N4 | 2.0m, 10A/100-250V, C13 to C14 Jumper Cord |
| 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 C14 Jumper Cord |
| 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, 10A/220V, 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 |
| 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 |

| Part number | Feature code | Description |
|-------------|--------------|--|
| 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 |

Power cords (C19 connectors)

Line cords and rack power cables with C19 connectors can be ordered as listed in the following table.

Table 60. Power cords (C19 connectors)

| Part number | Feature code | Description |
|-------------|--------------|--|
| Rack cables | | |
| 4L67A86677 | BPJ0 | 0.5m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable |
| 4L67A86678 | B4L0 | 1.0m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable |
| 4L67A86679 | B4L1 | 1.5m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable |
| 4L67A86680 | B4L2 | 2.0m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable |
| 39Y7916 | 6252 | 2.5m, 16A/100-240V, C19 to IEC 320-C20 Rack Power Cable |
| 4L67A86681 | B4L3 | 4.3m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable |
| Line cords | | |
| 40K9777 | 6276 | 4.3m, 220-240V, C19 to IRAM 2073 (Argentina) Line cord |
| 40K9773 | 6284 | 4.3m, 220-240V, C19 to AS/NZS 3112 (Aus/NZ) Line cord |
| 40K9775 | 6277 | 4.3m, 250V, C19 to NBR 14136 (Brazil) Line Cord |
| 40K9774 | 6288 | 4.3m, 220-240V, C19 to GB2099.1 (China) Line cord |
| 40K9769 | 6283 | 4.3m, 16A/230V, C19 to IEC 309-P+N+G (Den/Sws) Line Cord |
| 40K9766 | 6279 | 4.3m, 220-240V, C19 to CEE7-VII (European) Line cord |
| 40K9776 | 6285 | 4.3m, 220-240V, C19 to IS6538 (India) Line cord |
| 40K9771 | 6282 | 4.3m, 220-240V, C19 to SI 32 (Israel) Line cord |
| 40K9768 | 6281 | 4.3m, 220-240V, C19 to CEI 23-16 (Italy) Line cord |
| 40K9770 | 6280 | 4.3m, 220-240V, C19 to SABS 164 (South Africa) Line cord |
| 41Y9231 | 6289 | 4.3m, 15A/250V, C19 to KSC 8305 (S. Korea) Line Cord |

| Part number | Feature code | Description |
|-------------|--------------|--|
| 81Y2391 | 6549 | 4.3m, 16A/230V, C19 to SEV 1011 (Sws) Line Cord |
| 41Y9230 | 6287 | 4.3m, 16A/250V, C19 to CNS 10917-3 (Taiwan) Line Cord |
| 40K9767 | 6278 | 4.3m, 220-240V, C19 to BS 1363/A w/13A fuse (UK) Line Cord |
| 40K9772 | 6275 | 4.3m, 16A/208V, C19 to NEMA L6-20P (US) Line Cord |
| 00D7197 | A1NV | 4.3m, 15A/250V, C19 to NEMA 6-15P (US) Line Cord |

Systems management

The server contains an integrated service processor, XClarity Controller (XCC), which provides advanced control, monitoring, and alerting functions. The XCC is based on the Pilot4 XE401 baseboard management controller (BMC) using a dual-core ARM Cortex A9 service processor.

Topics in this section:

- [Local management](#)
- [System status with XClarity Mobile](#)
- [Remote management](#)
- [Lenovo XClarity Provisioning Manager](#)
- [Lenovo XClarity Administrator](#)
- [Lenovo XClarity Essentials](#)
- [Lenovo XClarity Energy Manager](#)
- [Lenovo Capacity Planner](#)

Local management

The ST650 V2 offers a front operator panel with key LED status indicators, as shown in the following figure.

Tip: The Network LED only shows network activity of the two 10GBASE-T ports. The Drive LED is only for the simple-swap drive bay configuration, not for hot-swap drives.

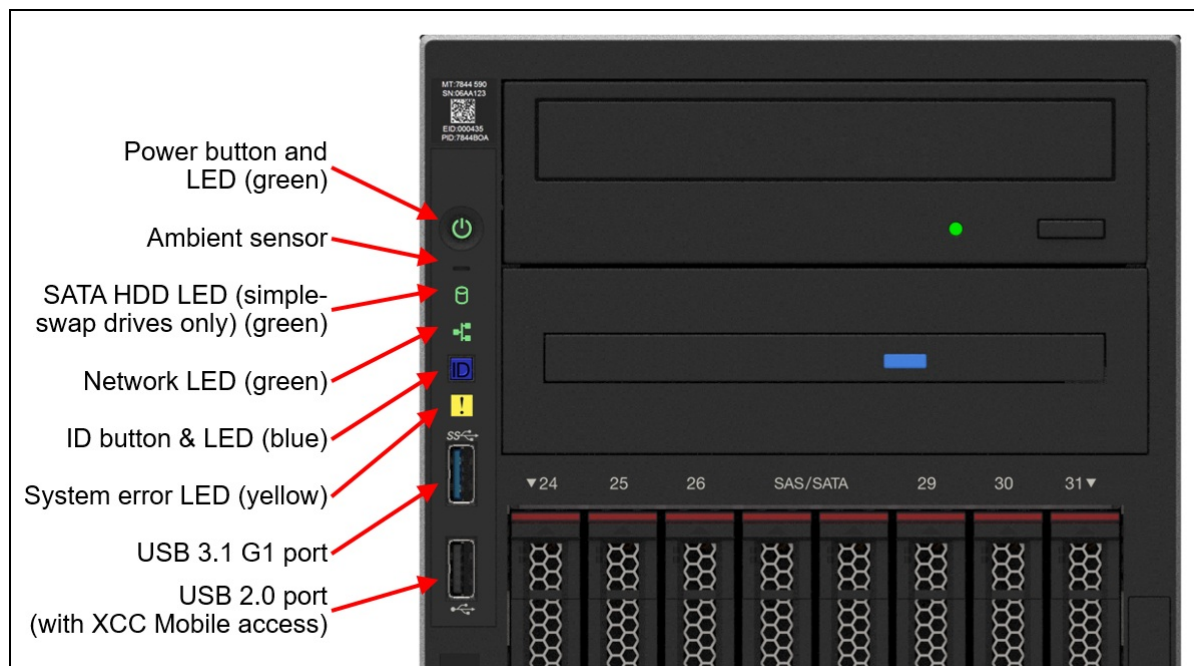


Figure 11. ST650 V2 front operator panel

When you press the ID button on the front panel, the blue system ID LEDs on both the front and rear of the server are lit to help you locate the server among other servers. You also can turn on the system ID LEDs using a remote management program for server presence detection.

External Diagnostics Handset

The ST650 V2 also has a port at the rear of the server to connect an External Diagnostics Handset as shown in the following figure.

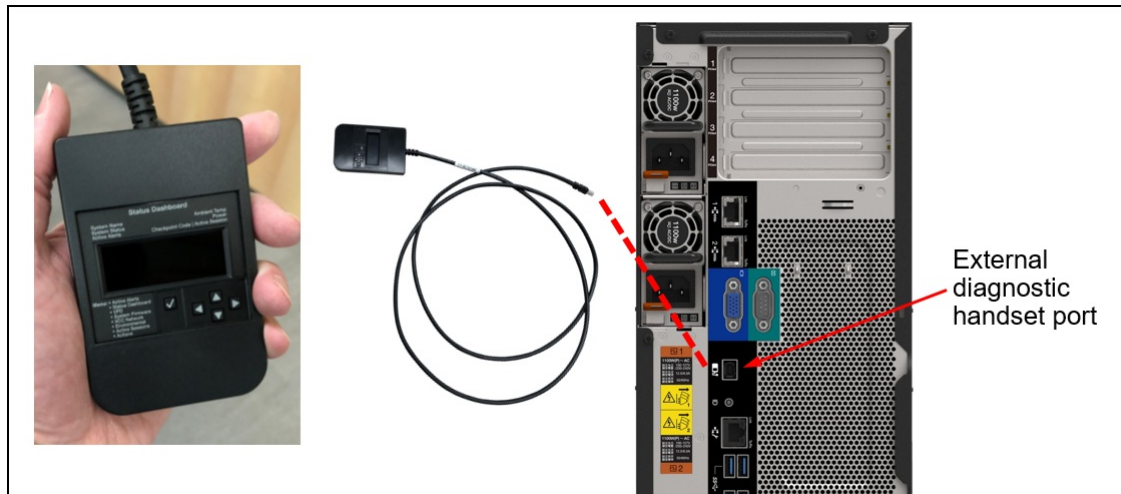


Figure 12. ST650 V2 External Diagnostics Handset

The External Diagnostics Handset allows quick access to system status, firmware, network, and health information. The LCD display on the panel and the function buttons give you access to the following information:

- Active alerts
- Status Dashboard
- System VPD: machine type & mode, serial number, UUID string
- System firmware levels: UEFI and XCC firmware
- XCC network information: hostname, MAC address, IP address, DNS addresses
- Environmental data: Ambient temperature, CPU temperature, AC input voltage, estimated power consumption
- Active XCC sessions
- System reset action

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. Many other ThinkSystem servers including the SR650 V2 and SR630 V2 also support the External Diagnostics Handset allowing you to share a handset amongst multiple systems.

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

Table 61. 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

The server offers a dedicated RJ45 port at the rear of the server for remote management via the XClarity Controller management processor. The port supports 10/100/1000 Mbps speeds.

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

IPMI via the Ethernet port (IPMI over LAN) is supported, however it is disabled by default. For CTO orders you can specify whether you want the feature enabled or disabled in the factory, using the feature codes listed in the following table.

Table 62. IPMI-over-LAN settings

| Feature code | Description |
|--------------|---------------------------------|
| B7XZ | Disable IPMI-over-LAN (default) |
| B7Y0 | Enable IPMI-over-LAN |

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 63. 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 64. 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) |

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. 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 ST650 V2. The software can be downloaded and used at no charge to discover and monitor the ST650 V2 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 65. 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 140-3 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 66. 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/lxvo-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/lxvo-lcp>

Security

The ST650 V2 offers the following electronic security features:

- Administrator and power-on password
- Trusted Platform Module (TPM) supporting TPM 2.0 (no support for TPM 1.2)
- Optional Nationz TPM 2.0, available only in China (CTO only)
- Self-encrypting drives with support for IBM Security Key Lifecycle Manager

The ST650 V2 offers the following mechanical security features:

- Lockable side cover to help prevent access to internal components
- Optional chassis intrusion switch
- Optional lockable front security door (not supported with the tower is converted to a 4U rack server)

The server is NIST SP 800-147B compliant.

The following table lists the security options for the ST650 V2.

Table 67. Security features

| Part number | Feature code | Description |
|-------------|--------------|---|
| 4M27A60834 | BA5U | ThinkSystem ST650 V2 Security Door |
| 4Z57A60817 | BB4F | ThinkSystem ST650 V2 Chassis Intrusion Cable Kit |
| CTO only* | B8LE | ThinkSystem Nationz Trusted Platform Module v2.0 (China customers only) |

* Not available as a field upgrade. The component is CTO or on pre-configured models only.

Platform Firmware Resiliency - Lenovo ThinkShield

Lenovo's ThinkShield Security is a transparent and comprehensive approach to security that extends to all dimensions of our data center products: from development, to supply chain, and through the entire product lifecycle.

The ThinkSystem ST650 V2 includes Platform Firmware Resiliency (PFR) hardware Root of Trust (RoT) which enables the system to be NIST SP800-193 compliant. This offering further enhances key platform subsystem protections against unauthorized firmware updates and corruption, to restore firmware to an integral state, and to closely monitor firmware for possible compromise from cyber-attacks.

PFR operates upon the following server components:

- UEFI image – the low-level server firmware that connects the operating system to the server hardware

- XCC image – the management “engine” software that controls and reports on the server status separate from the server operating system
- FPGA image – the code that runs the server’s lowest level hardware controller on the motherboard

The Lenovo Platform Root of Trust Hardware performs the following three main functions:

- Detection – Measures the firmware and updates for authenticity
- Recovery – Recovers a corrupted image to a known-safe image
- Protection – Monitors the system to ensure the known-good firmware is not maliciously written

These enhanced protection capabilities are implemented using a dedicated, discrete security processor whose implementation has been rigorously validated by leading third-party security firms. Security evaluation results and design details are available for customer review – providing unprecedented transparency and assurance.

The ST650 V2 includes support for Secure Boot, a UEFI firmware security feature developed by the UEFI Consortium that ensures only immutable and signed software are loaded during the boot time. The use of Secure Boot helps prevent malicious code from being loaded and helps prevent attacks, such as the installation of rootkits. Lenovo offers the capability to enable secure boot in the factory, to ensure end-to-end protection. Alternatively, Secure Boot can be left disabled in the factory, allowing the customer to enable it themselves at a later point, if desired.

The following table lists the relevant feature code(s).

Table 68. Secure Boot options

| Part number | Feature code | Description | Purpose |
|-------------|--------------|-------------------------|--|
| CTO only | AUK7 | TPM 2.0 and Secure Boot | Configure the system in the factory with Secure Boot enabled. |
| CTO only | B0MK | Enable TPM 2.0 | Configure the system without Secure Boot enabled. Customers can enable Secure Boot later if desired. |
| CTO only | C1GD | ST45 V3 TPM 2.0 for WW | |

Tip: If Secure Boot is not enabled in the factory, it can be enabled later by the customer. However once Secure Boot is enabled, it cannot be disabled.

Intel Transparent Supply Chain

Add a layer of protection in your data center and have peace of mind that the server hardware you bring into it is safe authentic and with documented, testable, and provable origin.

Lenovo has one of the world’s best supply chains, as ranked by Gartner Group, backed by extensive and mature supply chain security programs that exceed industry norms and US Government standards. Now we are the first Tier 1 manufacturer to offer Intel® Transparent Supply Chain in partnership with Intel, offering you an unprecedented degree of supply chain transparency and assurance.

To enable Intel Transparent Supply Chain for the Intel-based servers in your order, add the following feature code in the [DCSC configurator](#), under the Security tab.

Table 69. Intel Transparent Supply Chain ordering information

| Feature code | Description |
|--------------|--------------------------------|
| BB0P | Intel Transparent Supply Chain |

For more information on this offering, see the paper *Introduction to Intel Transparent Supply Chain on Lenovo ThinkSystem Servers*, available from <https://lenovopress.com/lp1434-introduction-to-intel-transparent-supply-chain-on-thinksystem-servers>.

Security standards

The ST650 V2 supports the following security standards and capabilities:

- **Industry Standard Security Capabilities**

- Intel CPU Enablement
 - AES-NI (Advanced Encryption Standard New Instructions)
 - CBnT (Converged Boot Guard and Trusted Execution Technology)
 - CET (Control flow Enforcement Technology)
 - Hardware-based side channel attack resilience enhancements
 - MKTME/TME (Multi-Key Total Memory Encryption)
 - SGX (Software Guard eXtensions)
 - SGX-TEM (Trusted Environment Mode)
 - TDX (Trust Domain Extensions)
 - TXT (Trusted eXecution Technology)
 - VT (Virtualization Technology)
 - XD (eXecute Disable)
- Microsoft Windows Security Enablement
 - Credential Guard
 - Device Guard
 - Host Guardian Service
- TCG (Trusted Computing Group) TPM (Trusted Platform Module) 2.0
- UEFI (Unified Extensible Firmware Interface) Forum Secure Boot

- **Hardware Root of Trust and Security**

- Independent security subsystem providing platform-wide NIST SP800-193 compliant Platform Firmware Resilience (PFR)
- Management domain RoT supplemented by the Secure Boot features of XCC

- **Platform Security**

- Boot and run-time firmware integrity monitoring with rollback to known-good firmware (e.g., “self-healing”)
- Non-volatile storage bus security monitoring and filtering
- Resilient firmware implementation, such as to detect and defeat unauthorized flash writes or SMM (System Management Mode) memory incursions
- Patented IPMI KCS channel privileged access authorization (USPTO Patent# 11,256,810)
- Host and management domain authorization, including integration with CyberArk for enterprise password management
- KMIP (Key Management Interoperability Protocol) compliant, including support for IBM SKLM and Thales KeySecure
- Reduced “out of box” attack surface

- Configurable network services

For more information on platform security, see the paper “How to Harden the Security of your ThinkSystem Server and Management Applications” available from <https://lenovopress.com/lp1260-how-to-harden-the-security-of-your-thinksystem-server>.

- **Standards Compliance and/or Support**

- NIST SP800-131A rev 2 “Transitioning the Use of Cryptographic Algorithms and Key Lengths”
- NIST SP800-147B “BIOS Protection Guidelines for Servers”
- NIST SP800-193 “Platform Firmware Resiliency Guidelines”
- ISO/IEC 11889 “Trusted Platform Module Library”
- Common Criteria TCG Protection Profile for “PC Client Specific TPM 2.0”
- European Union Commission Regulation 2019/424 (“ErP Lot 9”) “Ecodesign Requirements for Servers and Data Storage Products” Secure Data Deletion
- Optional FIPS 140-2 validated Self-Encrypting Disks (SEDs) with external KMIP-based key management

- **Product and Supply Chain Security**

- Suppliers validated through Lenovo’s Trusted Supplier Program
- Developed in accordance with Lenovo’s Secure Development Lifecycle (LSDL)
- Continuous firmware security validation through automated testing, including static code analysis, dynamic network and web vulnerability testing, software composition analysis, and subsystem-specific testing, such as UEFI security configuration validation
- Ongoing security reviews by US-based security experts, with attestation letters available from our third-party security partners
- Digitally signed firmware, stored and built on US-based infrastructure and signed on US-based Hardware Security Modules (HSMs)
- Manufacturing transparency via Intel Transparent Supply Chain (for details, see <https://lenovopress.com/lp1434-introduction-to-intel-transparent-supply-chain-on-lenovo-thinksystem-servers>)
- TAA (Trade Agreements Act) compliant manufacturing, by default in Mexico for North American markets with additional US and EU manufacturing options
- US 2019 NDAA (National Defense Authorization Act) Section 889 compliant

Keyboards and Mice

The following table lists the supported full-sized USB keyboards and mice available for Lenovo ThinkSystem servers.

The keyboards have the following features:

- Full-sized 104-key keyboard with 3 special Windows keys
- 3 LEDs for caps lock, scroll lock and num lock
- Wired USB connection with 1.8m cable
- Adjustable feet at the rear of the keyboard

Tip: For keyboards that fit in the rack-mounted console kit, see the [KVM console options](#) section, or the [ThinkSystem 18.5-inch LCD Console](#) product guide

Table 70. Lenovo Preferred Pro USB Full-sized keyboards - ThinkSystem

| Part number | Feature code | Description |
|-------------|--------------|-------------|
| Mice | | |

| Part number | Feature code | Description |
|-------------|--------------|--|
| 7M57A04698 | B0LN | ThinkSystem Optical Wheel Mouse - USB |
| Keyboards | | |
| 7ZB7A05521 | AXTM | ThinkSystem Pref. Pro II USB Keyboard - Arabic |
| 7ZB7A05520 | AXTN | ThinkSystem Pref. Pro II USB Keyboard - Arabic/French |
| 7ZB7A05519 | AXTP | ThinkSystem Pref. Pro II USB Keyboard - Belgium/French |
| 7ZB7A05518 | AXTQ | ThinkSystem Pref. Pro II USB Keyboard - Belgium/UK |
| 7ZB7A05517 | AXTR | ThinkSystem Pref. Pro II USB Keyboard - Brazil/Portuguese |
| 7ZB7A05515 | AXTS | ThinkSystem Pref. Pro II USB Keyboard - Bulgarian |
| 7ZB7A05511 | AXTU | ThinkSystem Pref. Pro II USB Keyboard - Czech |
| 7ZB7A05509 | AXTV | ThinkSystem Pref. Pro II USB Keyboard - Danish |
| 7ZB7A05508 | AXTW | ThinkSystem Pref. Pro II USB Keyboard - Dutch |
| 7ZB7A05506 | AXTX | ThinkSystem Pref. Pro II USB Keyboard - French |
| 7ZB7A05496 | AXTZ | ThinkSystem Pref. Pro II USB Keyboard - French Canadian French |
| 7ZB7A05504 | AXTY | ThinkSystem Pref. Pro II USB Keyboard - French Canadian Multilingual |
| 7ZB7A05495 | AXU0 | ThinkSystem Pref. Pro II USB Keyboard - German |
| 7ZB7A05494 | AXU1 | ThinkSystem Pref. Pro II USB Keyboard - Greek |
| 7ZB7A05493 | AXU2 | ThinkSystem Pref. Pro II USB Keyboard - Hebrew |
| 7ZB7A05492 | AXU3 | ThinkSystem Pref. Pro II USB Keyboard - Hungarian |
| 7ZB7A05491 | AXU4 | ThinkSystem Pref. Pro II USB Keyboard - Iceland |
| 7ZB7A05490 | AXU5 | ThinkSystem Pref. Pro II USB Keyboard - Italy |
| 7ZB7A05489 | AXU6 | ThinkSystem Pref. Pro II USB Keyboard -Japanese |
| 7ZB7A05488 | AXU7 | ThinkSystem Pref. Pro II USB Keyboard - Korean |
| 7ZB7A05487 | AXU8 | ThinkSystem Pref. Pro II USB Keyboard - LA Spanish |
| 7ZB7A05486 | AXU9 | ThinkSystem Pref. Pro II USB Keyboard - Norwegian |
| 7ZB7A05485 | AXUA | ThinkSystem Pref. Pro II USB Keyboard - Polish |
| 7ZB7A05484 | AXUB | ThinkSystem Pref. Pro II USB Keyboard- Portugese |
| 7ZB7A05483 | AXUC | ThinkSystem Pref. Pro II USB Keyboard - Romanian |
| 7ZB7A05482 | AXUD | ThinkSystem Pref. Pro II USB Keyboard - Russian/Cy |
| 7ZB7A05481 | AXUE | ThinkSystem Pref. Pro II USB Keyboard - Serbian/Cyrillic |
| 7ZB7A05480 | AXUF | ThinkSystem Pref. Pro II USB Keyboard - Slovak |
| 7ZB7A05471 | AXUQ | ThinkSystem Pref. Pro II USB Keyboard - Slovenian |
| 7ZB7A05479 | AXUG | ThinkSystem Pref. Pro II USB Keyboard - Spanish |
| 7ZB7A05478 | AXUH | ThinkSystem Pref. Pro II USB Keyboard- Swedish/Finn |
| 7ZB7A05477 | AXUJ | ThinkSystem Pref. Pro II USB Keyboard - Swiss, F/G |
| 7ZB7A05476 | AXUK | ThinkSystem Pref. Pro II USB Keyboard - Thailand |
| 7ZB7A05513 | AXTT | ThinkSystem Pref. Pro II USB Keyboard - Trad Chinese/US |
| 7ZB7A05474 | AXUM | ThinkSystem Pref. Pro II USB Keyboard - Turkish 179 |
| 7ZB7A05475 | AXUL | ThinkSystem Pref. Pro II USB Keyboard - Turkish 440 |
| 7ZB7A05473 | AXUN | ThinkSystem Pref. Pro II USB Keyboard - UK English |
| 7ZB7A05522 | AXTL | ThinkSystem Pref. Pro II USB Keyboard - US English |
| 7ZB7A05472 | AXUP | ThinkSystem Pref. Pro II USB Keyboard - US Euro |

Rack installation

The ST650 V2 can also be installed in the rack with the Rack Enablement Kit. The resulting server is a 4U rack-mountable server, as shown in the following figure.

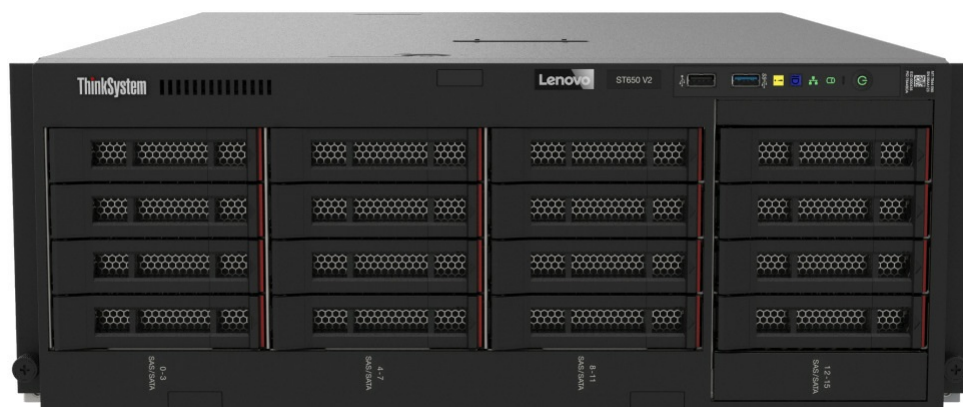


Figure 13. ThinkSystem ST650 V2 with Rack Conversion Kit installed

The part numbers are summarized in the following table.

No CMA support: The ST650 V2 does not support the use of a cable management arm.

Table 71. Rack installation options

| Part number | Feature code | Description and contents |
|-------------|--------------|---|
| 4M27A60835 | BA5Z | ThinkSystem ST650 V2 Tower to Rack Conversion Kit <ul style="list-style-type: none"> ST650 V2 Tower to Rack Conversion Kit (EIA brackets, labels) ST650 V2 Static Rail ST650 V2 Rail Mylar (affix to rails to reduce friction) |

The rail kit has the specifications listed in the following table.

Table 72. Rail kit specifications

| Feature | ThinkSystem ST650 V2 Static Rail |
|------------------------------------|---|
| Part number | Part of 4M27A60835 (Feature code BA5V) |
| Rail type | Static (fixed, no slide) |
| Toolless installation | Yes |
| Cable Management Arm (CMA) support | No support |
| In-rack server maintenance | No |
| 1U PDU support | Yes |
| 0U PDU support | Limited* |
| Rack type | Lenovo and IBM 4-post, IEC standard-compliant |
| Mounting holes | Square or round |
| Mounting flange thickness | 2 mm - 3.3 mm (0.08 - 0.13 in.) |
| Supported rack range | 559 mm - 914 mm (22 - 36 in.) |
| Rail length*** | 600 mm (23.6 in.) |

* For 0U PDU support, the rack must be at least 1100 mm (43.31 in.) deep.

*** Measured when mounted on the rack, from the front surface of the front mounting flange to the rearmost point of the rail.

Supported rack cabinets are listed in the [Rack cabinets](#) section.

If you configured your server as a rack server, but later wish to convert it to a tower, use the kit in the following table to add the recommended stabilization feet.

Table 73. Stabilization feet for ST650 V2

| Part number | Description |
|-------------|---|
| 4M27A60833 | ThinkSystem ST650 V2 Rack to Tower Conversion Kit <ul style="list-style-type: none">Contains 4 stabilization feet |

Operating system support

The server supports the following operating systems:

- Microsoft Windows Server 2016
- Microsoft Windows Server 2019
- Microsoft Windows Server 2022
- Microsoft Windows Server 2025
- Red Hat Enterprise Linux 7.9
- Red Hat Enterprise Linux 8.2
- Red Hat Enterprise Linux 8.3
- 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
- Red Hat Enterprise Linux 9.6
- Red Hat Enterprise Linux 10.0
- SUSE Linux Enterprise Server 12 SP5
- SUSE Linux Enterprise Server 12 Xen SP5
- SUSE Linux Enterprise Server 15 SP2
- SUSE Linux Enterprise Server 15 SP3
- SUSE Linux Enterprise Server 15 SP4
- SUSE Linux Enterprise Server 15 SP5
- SUSE Linux Enterprise Server 15 Xen SP2
- SUSE Linux Enterprise Server 15 Xen SP3
- SUSE Linux Enterprise Server 15 Xen SP4
- SUSE Linux Enterprise Server 15 Xen SP5
- Ubuntu 18.04 LTS 64-bit
- Ubuntu 22.04 LTS 64-bit
- Ubuntu 24.04 LTS 64-bit
- VMware ESXi 6.7 U3

- VMware ESXi 7.0 U2
- VMware ESXi 7.0 U3
- VMware ESXi 8.0
- VMware ESXi 8.0 U1
- VMware ESXi 8.0 U2
- VMware ESXi 8.0 U3
- VMware ESXi 9.0

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=st650-v2-7z75-7z74>

For configure-to-order configurations, the ST650 V2 can be preloaded with VMware ESXi. Ordering information is listed in the following table.

Table 74. VMware ESXi preload

| Part number | Feature code | Description |
|-------------|--------------|--|
| CTO only | B88T | VMware ESXi 6.7 U3 (factory installed) |
| CTO only | BE5E | VMware ESXi 7.0 U1 (Factory Installed) |
| CTO only | BHSR | VMware ESXi 7.0 U2 (Factory Installed) |
| CTO only | BMEY | VMware ESXi 7.0 U3 (Factory Installed) |
| CTO only | BMT5 | VMware ESXi 8.0 (Factory Installed) |
| CTO only | BQ8S | VMware ESXi 8.0 U1 (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/

Physical and electrical specifications

The ST650 V2 has the following overall physical dimensions, including tower feet, excluding components that extend outside the standard chassis, such as power supply handles:

- Width: 175 mm (6.9 inches)
- Height: 462 mm (18.2 inches)
- Depth: 734 mm (28.9 inches)

The following table lists the detailed dimensions. See the figure below for the definition of each dimension.

Table 75. Detailed dimensions

| Dimension | Description |
|-----------|---|
| 175 mm | X_a = Width, using widest features (not including feet) |
| 248 mm | X_b = Width, with chassis feet extended |
| 462 mm | Y_a = Height, from bottom of feet to top of chassis body |
| 448 mm | Y_b = Height, from bottom of chassis body to top of chassis body |
| 713 mm | Z_a = Depth, from front door to most rearward I/O port surface |
| 734 mm | Z_b = Depth, from front door to deepest feature of the chassis body feature |
| 758 mm | Z_c = Depth, from front door to deepest feature such as power supply handle |
| 23 mm | Z_e = Depth, front door to front plate of chassis body |

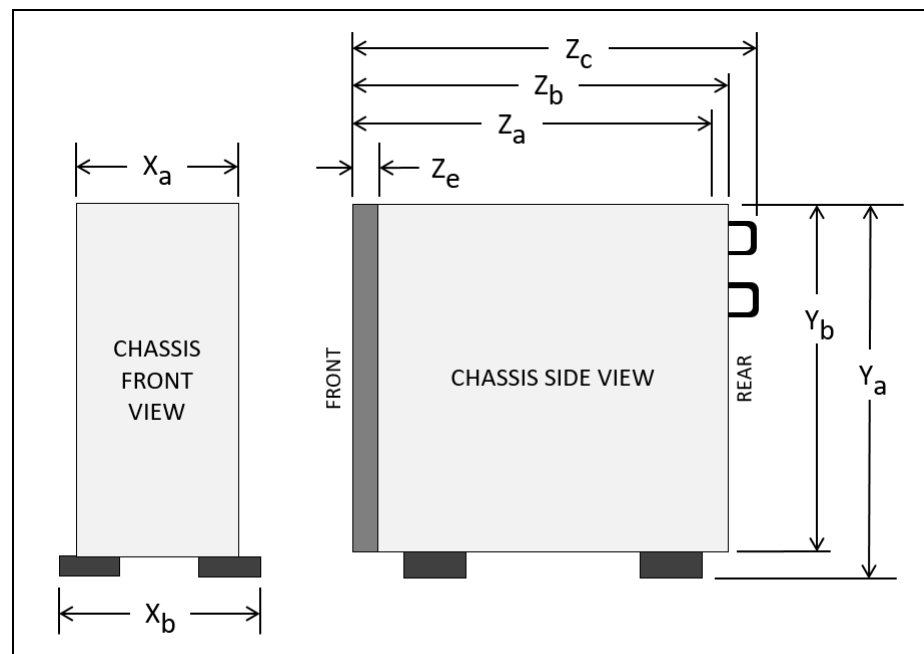


Figure 14. Server dimension

The shipping (cardboard packaging) dimensions of the ST650 V2 are as follows:

- Width: 597 mm (23.5 inches)
- Height: 374 mm (14.7 inches)
- Depth: 996 mm (39.2 inches)

The server has the following weight:

- Maximum weight:
 - 2.5-inch configuration: 39.28 kg (86.60 lb) maximum
 - 3.5-inch configuration: 46.23 kg (101.92 lb) maximum

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
 - 180 to 300 Vdc (China only)
- Inlet current:

- 100-127 V:
 - 750W Platinum power supply: 8.4 A
 - 750W Titanium power supply: Not supported
 - 1100W power supply: 12 A*
 - 1800W power supply: Not supported
 - 2400W power supply: Not supported
- 200-240 V:
 - 750W Platinum power supply: 4.1 A
 - 750W Titanium power supply: 4 A
 - 1100W power supply: 6 A
 - 1800W power supply: 10 A
 - 2400W power supply: 14 A

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

Operating environment

The ST650 V2 server complies with ASHRAE Class A2 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A3 and Class A4 specifications.

The server is supported in the following environment:

- Air temperature:
 - Operating:
 - ASHRAE Class 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 Class 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 Class 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 45°C (41°F to 113°F)
 - Shipment/storage: -40°C to 60°C (-40°F to 140°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%

The following table lists ambient temperature requirements by component type.

Table 76. Ambient temperature requirements

| | Ambient temperature of 30 °C or lower | Ambient temperature of 35 °C or lower | Ambient temperature of 40 °C or lower | Ambient temperature of 45 °C or lower |
|-------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Processor | Processors with 205 to 250W TDP | Processors with 165 to 195W TDP | Processors with 135 to 150W TDP | Processors with 120W TDP or lower |
| System Memory | 32x DIMMs, each 64 GB or less | 32x DIMMs, each 64 GB or less | 32x DIMMs, each 32 GB or less | 32x DIMMs, each 32 GB or less |
| Persistent Memory | Supported | Supported | No Persistent Memory support | No Persistent Memory support |
| Drive backplanes | All supported | All supported | Maximum of 2x backplanes/backplates | Maximum of 2x backplanes/backplates |
| GPUs | Supported | No GPU support | No GPU support | No GPU support |
| NVMe Retimer adapters | Supported | Supported | No NVMe retimer support | No NVMe retimer support |
| ConnectX-6 adapters | Supported | Supported | No ConnectX-6 adapters | No ConnectX-6 adapters |
| Fibre Channel adapters | Supported | Supported | No Fibre Channel adapter support | No Fibre Channel adapter support |
| NVMe drives | Supported | Supported | No NVMe drive support (includes M.2) | No NVMe drive support (includes M.2) |
| RAID/SAS HBA adapters | Supported | Supported | Supported | Supported |
| Ethernet adapters | Supported | Supported | Supported | Supported |

Acoustic noise emissions

The server has the following acoustic noise emissions declaration:

- Sound power level (L_{WAd}):
 - Idling: 5.0 Bel (Minimum), 5.6 Bel (Typical), 7.2 Bel (GPU)
 - Operating: 5.6 Bel (Minimum), 5.6 Bel (Typical), 8.5 Bel (GPU)
- Sound pressure level (L_{pAm}):
 - Idling: 37 dBA (Minimum), 41 dBA (Typical), 57 dBA (GPU)
 - Operating: 41 dBA (Minimum), 41 dBA (Typical), 69 dBA (GPU)

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 specified configurations, which may change slightly depending on configuration/conditions.
 - Min configuration: 1x 105W processor, 4x 16 GB DIMMs, 2x 480 GB SSD drives, 2-port onboard 10Gb Ethernet, 1x 750W power supply
 - Typical configuration: 2x 125W processors, 16x 32 GB DIMMs, 8x SAS hard disk drives, 1x 530-8i RAID Adapter, 2-port onboard 10Gb Ethernet, 2x 750W power supplies
 - GPU configuration: 2x 165W processors, 32x 64 GB DIMMs, 8x SAS hard disk drives, 1x 930-8i RAID adapter, 2-port onboard 10Gb Ethernet, 8x NVIDIA Tesla T4 GPU adapters, 2x 1800W power supplies

- The declared acoustic noise levels may increase greatly, if high-power components are installed such as high-power NICs, high-power processors and GPUs.
- Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

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: 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:
 - Server weight 12 kg - 22 kg: 50 G for 152 in./sec velocity change across 6 surfaces
 - Server weight 23 kg - 31 kg: 35 G for 152 in./sec velocity change across 6 surfaces
 - Server weight 32 kg - 68 kg: 35 G for 136 in./sec velocity change across 6 surfaces

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 room air should be continuously filtered with MERV 8 filters.
 - Air entering a data center should be filtered with MERV 11 or preferably MERV 13 filters.
 - 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/>

Warranty upgrades and post-warranty support

The ST650 V2 has a 1-year or 3-year warranty based on the machine type of the system:

- 7Z75 - 1 year warranty
- 7Z74 - 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 ST650 V2 conforms to the following standards:

- ANSI/UL 62368-1
- 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
- Japan VCCI, Class A
- Taiwan BSMI CNS13438, Class A; CNS14336-1; Section 5 of CNS15663
- CE, UKCA Mark (EN55032 Class A, EN62368-1, EN55024, EN55035, EN61000-3-2, EN61000-3-3, (EU) 2019/424, and EN50581-1 (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)
- 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
- China CECF 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)

External drive enclosures

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

Note: Information provided in this section is for ordering reference purposes only. For the operating system and adapter support details, refer to the interoperability matrix for a particular storage enclosure that can be found on the Lenovo Data Center Support web site:

<http://datacentersupport.lenovo.com>

Table 77. External drive enclosures

| Model | Description |
|------------|--|
| 4587HC1 | Lenovo Storage D1212 Disk Expansion Enclosure (2U enclosure with 12x LFF drive bays) |
| 4587HC2 | Lenovo Storage D1224 Disk Expansion Enclosure (2U enclosure with 24x SFF drive bays) |
| 6413HC1 | Lenovo Storage D3284 High Density Expansion Enclosure (5U enclosure with 84x LFF drive bays) |
| 7DAHCTO1WW | Lenovo ThinkSystem D4390 Direct Attached Storage (4U enclosure with 90x LFF drive bays) |

For details about supported drives, adapters, and cables, see the following Lenovo Press Product Guides:

- Lenovo Storage D1212 and D1224
<http://lenovopress.lenovo.com/lp0512>
- Lenovo Storage D3284
<http://lenovopress.lenovo.com/lp0513>
- Lenovo ThinkSystem D4390
<https://lenovopress.lenovo.com/lp1681>

External storage systems

Lenovo offers the ThinkSystem DE Series, ThinkSystem DG Series and ThinkSystem DM Series external storage systems for high-performance storage. See the DE Series, DG Series and DM Series product guides for specific controller models, expansion enclosures and configuration options:

- ThinkSystem DE Series Storage
<https://lenovopress.com/storage/thinksystem/de-series#rt=product-guide>
- ThinkSystem DM Series Storage
<https://lenovopress.com/storage/thinksystem/dm-series#rt=product-guide>
- ThinkSystem DG Series Storage
<https://lenovopress.com/storage/thinksystem/dg-series#rt=product-guide>

External backup units

The server supports both USB-attached RDX backup units and SAS-attached tape drives.

The following table lists the available external SAS tape backup options.

Tip: Verify the end-to-end support of an IBM tape backup solution through the IBM System Storage Interoperation Center (SSIC): <http://www.ibm.com/systems/support/storage/ssic>

Table 78. External SAS backup options

| Part number | Description |
|---|---|
| External SAS tape backup drives | |
| 6160S6E | IBM TS2260 Tape Drive Model H6S |
| 6160S7E | IBM TS2270 Tape Drive Model H7S |
| 6160S8E | IBM TS2280 Tape Drive Model H8S |
| 6160S9E | IBM TS2290 Tape Drive Model H9S |
| External SAS tape backup autoloaders | |
| 6171S6R | IBM TS2900 Tape Autoloader w/LTO6 HH SAS |
| 6171S7R | IBM TS2900 Tape Autoloader w/LTO7 HH SAS |
| 6171S8R | IBM TS2900 Tape Autoloader w/LTO8 HH SAS |
| 6171S9R | IBM TS2900 Tape Autoloader w/LTO9 HH SAS |
| External tape backup libraries | |
| 6741A1F | IBM TS4300 3U Tape Library Base Unit |
| 6741B1F | IBM TS4300 3U Tape Library Base Unit - Max 48U |
| 6741A3F | TS4300 Tape Library Expansion Unit |
| 6741B3F | IBM TS4300 3U Tape Library Expansion Unit - Max 48U |
| SAS backup drives for TS4300 Tape Library | |
| 01KP934 | LTO 6 HH SAS Drive |
| 01KP937 | LTO 7 HH SAS Drive |
| 01KP953 | LTO 8 HH SAS Drive |
| 02JH836 | LTO 9 HH SAS Drive |

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

The following table lists the external RDX backup options available.

Table 79. External RDX dock and cartridges

| Part number | Feature code | Description |
|--------------------|--------------|--|
| External RDX docks | | |
| 4T27A10725 | B32R | ThinkSystem RDX External USB 3.0 Dock (No cartridge included with the drive) |
| Cartridges | | |
| 7TP7A01601 | AVF8 | ThinkSystem RDX 500GB Cartridge |
| 7TP7A01602 | AVF1 | ThinkSystem RDX 1TB Cartridge |
| 7TP7A01603 | AVF0 | ThinkSystem RDX 2TB Cartridge |
| 7TP7A04318 | AXD1 | ThinkSystem RDX 4TB Cartridge |

For more information, see the Lenovo RDX USB 3.0 Disk Backup Solution product guide:
<https://lenovopress.com/tips0894-rdx-usb-30>

Fibre Channel SAN switches

Lenovo offers the ThinkSystem DB Series of Fibre Channel SAN switches for high-performance storage expansion. See the DB Series product guides for models and configuration options:

- ThinkSystem DB Series SAN Switches:
<https://lenovopress.com/storage/switches/rack#rt=product-guide>

Uninterruptible power supply units

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

Table 80. Uninterruptible power supply units

| Part number | Description |
|--|--|
| Tower UPS units - 100-125VAC | |
| 7DD6A000WW | T1kVA Tower UPS-G2 (100-125VAC) |
| 55951AX | T1kVA Tower UPS (100-125VAC) |
| 7DD6A002WW | T1.5kVA Tower UPS-G2 (100-125VAC) |
| 55952AX | T1.5kVA Tower UPS (100-125VAC) |
| Tower UPS units - 200-240VAC | |
| 7DD6A001WW | T1kVA Tower UPS-G2 (200-240VAC) |
| 55951KX | T1kVA Tower UPS (200-240VAC) |
| 7DD6A003WW | T1.5kVA Tower UPS-G2 (200-240VAC) |
| 55952KX | T1.5kVA Tower UPS (200-240VAC) |
| Rack-mounted or tower UPS units - 100-125VAC | |
| 7DD5A001WW | RT1.5kVA 2U Rack or Tower UPS-G2 (100-125VAC) |
| 55941AX | RT1.5kVA 2U Rack or Tower UPS (100-125VAC) |
| 55942AX | RT2.2kVA 2U Rack or Tower UPS (100-125VAC) |
| 7DD5A003WW | RT3kVA 2U Rack or Tower UPS-G2 (100-125VAC) |
| 55943AX | RT3kVA 2U Rack or Tower UPS (100-125VAC) |
| Rack-mounted or tower UPS units - 200-240VAC | |
| 7DD5A002WW | RT1.5kVA 2U Rack or Tower UPS-G2 (200-240VAC) |
| 55941KX | RT1.5kVA 2U Rack or Tower UPS (200-240VAC) |
| 55942KX | RT2.2kVA 2U Rack or Tower UPS (200-240VAC) |
| 7DD5A005WW | RT3kVA 2U Rack or Tower UPS-G2 (200-240VAC) |
| 55943KX | RT3kVA 2U Rack or Tower UPS (200-240VAC) |
| 7DD5A007WW | RT5kVA 3U Rack or Tower UPS-G2 (200-240VAC) |
| 55945KX | RT5kVA 3U Rack or Tower UPS (200-240VAC) |
| 7DD5A008WW | RT6kVA 3U Rack or Tower UPS-G2 (200-240VAC) |
| 55946KX | RT6kVA 3U Rack or Tower UPS (200-240VAC) |
| 55948KX | RT8kVA 6U Rack or Tower UPS (200-240VAC) |
| 7DD5A00AWW | RT11kVA 6U Rack or Tower UPS-G2 (200-240VAC) |
| 55949KX | RT11kVA 6U Rack or Tower UPS (200-240VAC) |
| 55943KT† | ThinkSystem RT3kVA 2U Standard UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets) |
| 55943LT† | ThinkSystem RT3kVA 2U Long Backup UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets) |
| 55946KT† | ThinkSystem RT6kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output) |
| 5594XKT† | ThinkSystem RT10kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output) |
| Rack-mounted or tower UPS units - 380-415VAC | |
| 55948PX | RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) |
| 55949PX | RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) |

† 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 81. 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 |
| 00YJ776 | ATZY | 0U 36 C13/6 C19 24A 1 Phase PDU | N | Y | Y | N | N | N | N | N | N | Y | Y | Y | N |
| 00YJ779 | ATZX | 0U 21 C13/12 C19 48A 3 Phase PDU | N | N | Y | N | N | N | Y | N | N | Y | Y | Y | N |
| 00YJ777 | ATZZ | 0U 36 C13/6 C19 32A 1 Phase PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | N | Y | Y |
| 00YJ778 | AU00 | 0U 21 C13/12 C19 32A 3 Phase PDU | Y | Y | N | Y | Y | Y | Y | Y | Y | N | N | 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 | N | N | N | N | 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 | N | N | N | N | Y | N | N | N | Y | N |
| 00YJ783 | AU04 | 0U 12 C13/12 C19 Switched and Monitored 48A 3 Phase PDU | N | N | Y | N | N | N | Y | N | N | Y | Y | Y | N |
| 00YJ781 | AU03 | 0U 20 C13/4 C19 Switched and Monitored 24A 1 Phase PDU | N | N | Y | N | Y | N | Y | N | N | Y | Y | Y | N |

| Part number | Feature code | Description | ANZ | ASEAN | Brazil | EET | MEA | RUCIS | WE | HTK | INDIA | JAPAN | LA | NA | PRC |
|---|--------------|--|-----|-------|--------|-----|-----|-------|----|-----|-------|-------|----|----|-----|
| 00YJ782 | AU02 | 0U 18 C13/6 C19 Switched and Monitored 32A 3 Phase PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | N | Y |
| 00YJ780 | AU01 | 0U 20 C13/4 C19 Switched and Monitored 32A 1 Phase PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | N | Y |
| 1U Switched and Monitored PDUs | | | | | | | | | | | | | | | |
| 4PU7A90808 | C0D4 | 1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 ETL | N | N | N | N | N | N | N | Y | N | Y | Y | Y | N |
| 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 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y |
| 4PU7A81118 | BNDW | 1U 18 C19/C13 switched and monitored 48A 3P WYE PDU – CE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | Y |
| 4PU7A90810 | C0DD | 1U 18 C19/C13 Switched and monitored 80A 3P Delta PDU V2 | N | N | N | N | N | N | N | Y | N | Y | Y | Y | N |
| 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 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 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 | Y | N | Y | Y | Y | 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 |
| 46M4002 | 5896 | 1U 9 C19/3 C13 Switched and Monitored DPI PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 46M4004 | 5894 | 1U 12 C13 Switched and Monitored DPI PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 46M4003 | 5897 | 1U 9 C19/3 C13 Switched and Monitored 60A 3 Phase PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 46M4005 | 5895 | 1U 12 C13 Switched and Monitored 60A 3 Phase PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 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) | | | | | | | | | | | | | | | |
| 39M2816 | 6030 | DPI C13 PDU+ | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 39Y8941 | 6010 | Enterprise C13 PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 1U C19 Enterprise PDUs (6x IEC 320 C19 outlets) | | | | | | | | | | | | | | | |
| 39Y8948 | 6060 | Enterprise C19 PDU | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 39Y8923 | 6061 | Enterprise C19 3 phase PDU (60a) | N | N | Y | N | N | N | Y | N | N | N | Y | Y | N |
| 1U Front-end PDUs (3x IEC 320 C19 outlets) | | | | | | | | | | | | | | | |
| 39Y8938 | 6002 | DPI 30amp/125V Front-end PDU with NEMA L5-30P | 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 |
|---|--------------|---|-----|-------|--------|-----|-----|-------|----|-----|-------|-------|----|----|-----|
| 39Y8939 | 6003 | DPI 30amp/250V Front-end PDU with NEMA L6-30P | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 39Y8934 | 6005 | DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 39Y8940 | 6004 | DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd connector | Y | N | Y | Y | Y | Y | Y | N | N | Y | Y | Y | N |
| 39Y8935 | 6006 | DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd connector | 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 PDU with Fixed Nema L5-15P line cord | 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 | DPI 32a Cord (IEC 309 3P+N+G) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 40K9612 | 6502 | DPI 32a Cord (IEC 309 P+N+G) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 40K9613 | 6503 | DPI 63a Cord (IEC 309 P+N+G) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 40K9614 | 6500 | DPI 30a Cord (NEMA L6-30P) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 40K9615 | 6501 | DPI 60a Cord (IEC 309 2P+G) | N | N | Y | N | N | N | Y | N | N | Y | Y | Y | N |
| 40K9617 | 6505 | 4.3m, 32A/230V, Souriau UTG to AS/NZS 3112 (Aus/NZ) Line Cord | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 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 rack cabinets.

Table 82. Rack cabinets

| Model | Description |
|---------|--------------------------------------|
| 93072RX | 25U Standard Rack (1000mm) |
| 93072PX | 25U Static S2 Standard Rack (1000mm) |
| 93604PX | 42U 1200mm Deep Dynamic Rack |
| 93614PX | 42U 1200mm Deep Static Rack |
| 93634PX | 42U 1100mm Dynamic Rack |
| 93074RX | 42U Standard Rack (1000mm) |
| 93084PX | 42U Enterprise Rack |

For specifications about these racks, see the Lenovo Rack Cabinet Reference, available from:
<https://lenovopress.com/lp1287-lenovo-rack-cabinet-reference>

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

KVM console options

The following table lists the supported KVM consoles.

Table 83. KVM console

| Part number | Description |
|-------------|---|
| Consoles | |
| 4XF7A84188 | ThinkSystem 18.5" LCD console (with US English keyboard) |
| 4XF7A73009 | ThinkSystem 18.5" LCD console (with US English keyboard) |
| 17238BX | 1U 18.5" Standard Console (without keyboard - see the next table) |

The following table lists the keyboards supported with the 1U 18.5" Standard Console (now withdrawn).

Note: These keyboards are not supported with the ThinkSystem 18.5" LCD Console.

Table 84. Keyboards for 1U 18.5" Standard Console

| Part number | Description |
|-------------|--|
| 7ZB7A05469 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Arabic 253 RoHS v2 |
| 7ZB7A05468 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Belg/UK 120 RoHS v2 |
| 7ZB7A05206 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Czech 489 RoHS v2 |
| 7ZB7A05207 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Danish 159 RoHS v2 |
| 7ZB7A05208 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Dutch 143 RoHS v2 |
| 7ZB7A05210 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Fr/Canada 445 RoHS v2 |
| 7ZB7A05209 | ThinkSystem Keyboard w/ Int. Pointing Device USB - French 189 RoHS v2 |
| 7ZB7A05211 | ThinkSystem Keyboard w/ Int. Pointing Device USB - German 129 RoHS v2 |
| 7ZB7A05212 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Greek 219 RoHS v2 |
| 7ZB7A05213 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Hebrew 212 RoHS v2 |
| 7ZB7A05214 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Hungarian 208 RoHS v2 |
| 7ZB7A05215 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Italian 141 RoHS v2 |
| 7ZB7A05216 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Japanese 194 RoHS v2 |
| 7ZB7A05217 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Korean 413 RoHS v2 |
| 7ZB7A05218 | ThinkSystem Keyboard w/ Int. Pointing Device USB - LA Span 171 RoHS v2 |
| 7ZB7A05219 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Norwegian 155 RoHS v2 |
| 7ZB7A05220 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Polish 214 RoHS v2 |
| 7ZB7A05221 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Portugese 163 RoHS v2 |
| 7ZB7A05222 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Russian 441 RoHS v2 |
| 7ZB7A05223 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Slovak 245 RoHS v2 |
| 7ZB7A05231 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Slovenian 234 RoHS v2 |
| 7ZB7A05224 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Spanish 172 RoHS v2 |
| 7ZB7A05225 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Swed/Finn 153 RoHS v2 |
| 7ZB7A05226 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Swiss F/G 150 RoHS v2 |
| 7ZB7A05227 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Thai 191 RoHS v2 |
| 7ZB7A05467 | ThinkSystem Keyboard with Int. Pointing Device USB - Trad Chinese/US 467 RoHS v2 |
| 7ZB7A05228 | ThinkSystem Keyboard w/ Int. Pointing Device USB - Turkish 179 RoHS v2 |
| 7ZB7A05229 | ThinkSystem Keyboard w/ Int. Pointing Device USB - UK Eng 166 RoHS v2 |
| 7ZB7A05470 | ThinkSystem Keyboard w/ Int. Pointing Device USB - US Eng 103P RoHS v2 |
| 7ZB7A05230 | ThinkSystem Keyboard w/ Int. Pointing Device USB - US Euro 103P RoHS v2 |

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

Table 85. KVM switches and options

| Part number | Description |
|--|---|
| KVM Console switches | |
| 1754D1T | ThinkSystem Digital 2x1x16 KVM Switch (DVI video output port) |
| 1754A1T | ThinkSystem Analog 1x8 KVM Switch (DVI video output port) |
| 1754D2X | Global 4x2x32 Console Manager (GCM32) |
| 1754D1X | Global 2x2x16 Console Manager (GCM16) |
| 1754A2X | Local 2x16 Console Manager (LCM16) |
| 1754A1X | Local 1x8 Console Manager (LCM8) |
| Cables for ThinkSystem Digital and Analog KVM Console switches | |
| 4X97A11108 | ThinkSystem VGA to DVI Conversion Cable |
| 4X97A11109 | ThinkSystem Single-USB Conversion Cable for Digital KVM |
| 4X97A11107 | ThinkSystem Dual-USB Conversion Cable for Digital KVM |
| 4X97A11106 | ThinkSystem USB Conversion Cable for Analog KVM |
| Cables for GCM and LCM Console switches | |
| 43V6147 | Single Cable USB Conversion Option (UCO) |
| 39M2895 | USB Conversion Option Pack |
| 46M5383 | Virtual Media Conversion Option Gen2 (VCO2) |
| 46M5382 | Serial Conversion Option (SCO) |

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

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Seller training courses

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

1. **Family Portfolio: ThinkSystem Rack and Tower Servers Powered by Intel**

2025-06-23 | 25 minutes | Employees and Partners

This course is designed to give Lenovo sales and partner representatives a foundation of the ThinkSystem Intel Rack and Tower server family.

After completing this course, you will be able to:

- Identify products within this ThinkSystem server family
- Describe features of this family
- Recognize when a specific product should be selected

Tags: Server, ThinkSystem

Published: 2025-06-23

Length: 25 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo 360 Learning Center](#)

Course code: SXXW1204r14

2. **ThinkSystem Rack and Tower Introduction for ISO Client Managers**

2025-06-16 | 20 minutes | Employees Only

In this course, you will learn about Lenovo's Data Center Portfolio, its ThinkSystem Family and the key features of the Rack and Tower servers. It will equip you with foundational knowledge which you can then expand upon by participating in the facilitated session of the curriculum.

Tags: Server, ThinkSystem

Published: 2025-06-16

Length: 20 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DSRT0101r2_JP

3. **VTT HPC: AI and the Impact on the Environment**

2025-06-11 | 58 minutes | Employees Only

Please join us as Matthew Ziegler, Director of Lenovo Neptune and Sustainability speaks with us about AI and the Impact on the Environment.

Topics will include:

- Why is ESG essential for your customer?
- How to find and read an eco declaration
- What is a product carbon footprint?
- Demo of the Lenovo Capacity Planner

Tags: Advanced DataCenter, Artificial Intelligence (AI), Environmental Social Governance (ESG), High-Performance Computing (HPC), Server

Published: 2025-06-11

Length: 58 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DVHPC223

4. **Lenovo Data Center Product Portfolio**

2025-06-11 | 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.

Course objectives:

1. Identify product types within each data center family
2. Describe the features of the product family or category
3. Recognize when a specific product should be selected

Tags: Advanced DataCenter, DataCenter Products, Server, ThinkAgile, ThinkEdge, ThinkSystem

Published: 2025-06-11

Length: 20 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo 360 Learning Center](#)

Course code: SXXW1110r8

5. **Partner Technical Webinar - RTX Pro 6000**

2025-05-22 | 60 minutes | Employees and Partners

In this 60-minute replay, Allen Bourgoyne, Product Marketing for NVIDIA, presented the newly announced RTX Pro 6000 Blackwell Server Edition GPU.

Tags: Artificial Intelligence (AI)

Published: 2025-05-22

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo 360 Learning Center](#)

Course code: MAY1525

6. **Partner Technical Webinar - DCSC Improvements - MAY0225**

2025-05-05 | 60 minutes | Employees and Partners

In this 60-minute replay, new improvements to DCSC were reviewed. Joe Allen, Lenovo NA LETS, presented the new PCI wizard and discussed RAID adapters. Ryan Tuttle, Lenovo NA LETS presented Spreadsheet import, Autocorrect and Expanded selections on by default. Joe Murphy, Lenovo NA LETS closed out with review of Error Message improvements and location of ThinkAgile MX and VX in the DCSC menus.

Tags: Technical Sales

Published: 2025-05-05

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo 360 Learning Center](#)

Course code: MAY0225

7. **Family Portfolio: Storage Controller Options**

2025-03-03 | 25 minutes | Employees and Partners

This course covers the storage controller options available for use in Lenovo servers. The classes of storage controller are discussed, along with a discussion of where they are used, and which to choose.

After completing this course, you will be able to:

- Describe the classes of storage controllers
- Discuss where each controller class is used
- Describe the available options in each controller class

Tags: Sales, Storage

Published: 2025-03-03

Length: 25 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo 360 Learning Center](#)

Course code: SXXW1111r2

8. **ThinkSystem Rack and Tower Introduction for ISO Client Managers**

2024-12-10 | 20 minutes | Employees Only

In this course, you will learn about Lenovo's Data Center Portfolio, its ThinkSystem Family and the key features of the Rack and Tower servers. It will equip you with foundational knowledge which you can then expand upon by participating in the facilitated session of the curriculum.

Course Objectives:

- By the end of this course, you should be able to:
- Identify Lenovo's main data center brands.
- Describe the key components of the ThinkSystem Family servers.
- Differentiate between the Rack and Tower servers of the ThinkSystem Family.
- Understand the value Rack and Tower servers can provide to customers.

Tags: Server, ThinkSystem

Published: 2024-12-10

Length: 20 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DSRT0101r2

9. **Partner Technical Webinar - Server Update with Mark Bica**

2024-11-26 | 60 minutes | Employees and Partners

In this 60-minute replay, Mark Bica, Lenovo Product Manager gave an update on the server portfolio. Mark presented on the new V4 Intel servers with Xeon 6 CPUs. He reviewed where the new AMD 5th Gen EPYC CPUs will be used in our servers. He followed with a review of the GPU dense servers including SR680, SR680a, SR575 and SR780a. Mark concluded with a review of the SC777 and SC750 that were introduced at TechWorld.

Tags: Server

Published: 2024-11-26

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo 360 Learning Center](#)

Course code: 112224

10. **Partner Technical Webinar - LenovoPress updates and LPH Demo**
2024-11-13 | 60 minutes | Employees and Partners

In this 60-minute replay, we had 3 topics. First, David Watts, Lenovo Sr Manager LenovoPress, gave an update on LenovoPress and improvements to finding Seller Training Courses (both partner and Lenovo). Next, Ryan Tuttle, Lenovo LETS Solution Architect, gave a demo of Lenovo Partner Hub (LPH) including how to find replays of Partner Webinars in LPL. Finally, Joe Murphy, Lenovo Sr Manager of LETS NA, gave a quick update on the new Stackable Warranty Options in DCSC.

Tags: Technical Sales

Published: 2024-11-13

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo 360 Learning Center](#)

Course code: 110824

11. **Virtual Facilitated Session - ThinkSystem Rack and Tower Primer for ISO Client Managers**
2024-10-31 | 90 minutes | Employees Only

In this Virtual Instructor-Led Training Session, ISO Client Managers will be able to build on the knowledge gained in Module 1 (eLearning) of the ThinkSystem Rack and Tower Server Primer for ISO Client Managers curriculum.

IMPORTANT! Module 1 (eLearning) must be completed to be eligible to participate in this session. Please note that places are subject to availability. If you are selected, you will receive the invite to this session via email.

Tags: Sales, Server, ThinkSystem

Published: 2024-10-31

Length: 90 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DSRT0102

12. **Partner Technical Webinar - OneIQ**
2024-07-15 | 60 minutes | Employees and Partners

In this 60-minute replay, Peter Grant, Field CTO for OneIQ, reviewed and demo'd the capabilities of OneIQ including collecting data and analyzing. Additionally, Peter and the team discussed how specific partners (those with NA Channel SA coverage) will get direct access to OneIQ and other partners can get access to OneIQ via Distribution or the NA LETS team.

Tags: Technical Sales

Published: 2024-07-15

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo 360 Learning Center](#)

Course code: 071224

13. **SAP Webinar for Lenovo Sellers: Lenovo Portfolio Update for SAP Landscapes**
2024-06-04 | 60 minutes | Employees Only

Join Mark Kelly, Advisory IT Architect with the Lenovo Global SAP Center of Competence as he discusses:

- Challenges in the SAP environment
- Lenovo On-premise Solutions for SAP
- Lenovo support resources for SAP solutions

Tags: SAP, ThinkAgile, ThinkEdge, ThinkSystem

Published: 2024-06-04

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DSAPF101

14. **VTT Cloud Architecture: NVIDIA Using Cloud for GPUs and AI**
2024-05-22 | 60 minutes | Employees Only

Join JD Dupont, NVIDIA Head of Americas Sales, Lenovo partnership and Veer Mehta, NVIDIA Solution Architect on an interactive discussion about cloud to edge, designing cloud Solutions with NVIDIA GPUs and minimizing private\hybrid cloud OPEX with GPUs. Discover how you can use what is done at big public cloud providers for your customers. We will also walk through use cases and see a demo you can use to help your customers.

Tags: Artificial Intelligence (AI), Cloud, Nvidia, Software Defined Infrastructure (SDI), Technical Sales

Published: 2024-05-22

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DVCLD212

15. Family Introduction: Rack and Tower

2024-01-19 | 11 minutes | Employees and Partners

This course is designed to give Lenovo sales and partner representatives a foundation on the characteristics of the rack and tower server family. As an introduction to the family, this course also includes positioning, when to use a product, and keywords a client may use when discussing a rack product.

Course Objectives:

- Family Characteristics
- Priority Positioning
- Product Usage
- Keywords and Phrases

Tags: Server

Published: 2024-01-19

Length: 11 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo 360 Learning Center](#)

Course code: SXXW1100r3

Related publications and links

For more information, see these resources:

- ThinkSystem ST650 V2 product page:
<https://www.lenovo.com/us/en/p/data-center/servers/towers/thinksystem-st650-v2/len21ts0001>
- ThinkSystem ST650 V2 datasheet
<https://lenovopress.com/DS0127>
- Interactive 3D Tour of the ThinkSystem ST650 V2:
<https://lenovopress.com/lp1422>
- Lenovo Press video walk-through of the ThinkSystem ST650 V2:
<https://lenovopress.com/lp1401>
- ThinkSystem ST650 V2 drivers and support
<http://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v2/7z75/downloads>
- Lenovo Hardware Installation & Removal Videos on the ST650 V2:
 - YouTube: <https://www.youtube.com/playlist?list=PLYV5R7hVcs-AzfPHlrxiNI8euajJKKXqy>
 - Youku: http://list.youku.com/albumlist/show/id_59636523.html
- Lenovo ThinkSystem ST650 V2 product publications:
<http://thinksystem.lenovofiles.com/help/index.jsp>
 - Quick Start
 - Rack Installation Guide
 - Setup Guide
 - Maintenance Manual
 - Backplane/Backplate Cable Routing Guide
 - Messages and Codes Reference
 - Memory Population Reference
- ServerProven hardware compatibility:
<http://www.lenovo.com/us/en/serverproven>

Related product families

Product families related to this document are the following:

- [2-Socket Tower Servers](#)
- [ThinkSystem ST650 V2 server](#)

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