Lenovo ThinkSystem SD530 Server (Xeon SP Gen 1)
Product Guide

The Lenovo ThinkSystem SD530 is an ultradense and economical two-socket server in a 0.5U rack form factor. With four SD530 servers installed in either the ThinkSystem D2 Enclosure or ThinkSystem Modular Enclosure, you have an ideal high-density 2U four-node (2U4N) platform for enterprise and cloud workloads.

2U4N systems have gained popularity in a variety of data centers, from large enterprises to service providers, because their small footprint and inherent density make them ideal for building solution-based appliances at a low cost. The combination of the Lenovo ThinkSystem SD530 and D2 Enclosure is engineered to deliver these types of solutions.

Suggested use: Cloud, MSP, CSP, HPC, hyperconverged solutions, branch office or remote office needs

The following figure shows four ThinkSystem SD530 servers installed in a D2 Enclosure.

Figure 1. Four ThinkSystem SD530 servers installed in a D2 Enclosure

Did you know?

The SD530 combines the efficiency and density of blades with the value and simplicity of rack-based servers. It is designed to run the highest-core-count Xeon Platinum processors, to power through your most demanding HPC/technical computing/AI workloads.

The SD530 also supports two high-performance GPUs with the addition of the GPU Tray. The server supports a wide variety of NVIDIA GPUs.

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Key features

The ThinkSystem SD530 dense offering fits four hot-pluggable SD530 servers into a ThinkSystem D2 Enclosure or ThinkSystem Modular Enclosure. The enclosures each take up only 2U (0.5U per server) and include room for plenty of internal storage. The overall design makes the solution extremely affordable, with a low total cost of ownership (TCO).

Scalability and performance

The SD530 server and the enclosures offer numerous features to boost performance, improve scalability, and reduce costs:

- Up to four nodes in a single 2U enclosure, each with two processors from the Intel Xeon processor Scalable family, up to 16 DIMMs, 6 drive bays, and two PCIe slots. It is a highly dense, scalable, and price-optimized offering.
- Supports a wide selection of processors from the Intel Xeon processor Scalable family - designed to operate with the cost-effective Bronze processors up to the highest-core-count Xeon Platinum processors.
- Supports processors with up to 28 cores, core speeds up to 3.6 GHz, and TDP ratings up to 165W.
- Two processors in each server, up to 56 cores total, and 112 threads maximize the concurrent execution of multithreaded applications. With four nodes in the enclosure, a total of 224 cores are available in only 2U of rack space.
- Intelligent and adaptive system performance with Intel Turbo Boost Technology 2.0 allows CPU cores to run at maximum speeds during peak workloads by temporarily going beyond processor thermal design power (TDP).
- Intel Hyper-Threading Technology boosts performance for multithreaded applications by enabling simultaneous multithreading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better use the hardware for virtualization workloads.
- Intel Advanced Vector Extensions 512 (AVX-512) enable acceleration of enterprise-class workloads, including databases, and enterprise resource planning.
- Each processor has six memory channels with memory speeds of up to 2666 MHz to maximize system performance.
- Supports up to 16 DIMMs to maximize memory capacity, supporting 1 TB using 16x 64 GB LRDIMMs or 1.5 TB using 12x 128 GB 3DS RDIMMs.
- Supports up to two GPUs with the addition of a 1U GPU Tray, providing increased processing power.
- The 12 Gbps SAS internal storage connectivity doubles the data transfer rate of 6 Gb SAS solutions, to maximize performance of storage-intensive applications.
- Each SD530 server supports up to six 2.5-inch hot-swap drives. Two drive bays can be configured to support NVMe drives to maximize I/O performance in terms of throughput, bandwidth, and latency.
- With 7.68 TB 2.5-inch SAS hot-swap SSDs, each SD530 supports up to 46 TB of internal storage.
- Supports a new Lenovo patented-design M.2 adapter for convenient operating system boot functions. Available M.2 adapters support either one M.2 drive or two M.2 drives in a RAID 1 configuration for boot drive performance and reliability.
- The use of solid-state drives (SSDs) instead of, or along with, traditional hard disk drives (HDDs) can improve I/O performance. An SSD can support up to 100 times more I/O read operations per second (IOPS) than a typical HDD.
- The server has two optional 10 Gb Ethernet ports, either 10GBASE-T or SFP+, routed from the embedded X722 controller to the optional 8-port EIOM module at the rear of the enclosure.

- One PCIe 3.0 x16 or two PCIe 3.0 x8 slots for added I/O flexibility.
- PCI Express 3.0 I/O expansion capabilities improve the theoretical maximum bandwidth by 60% compared with the previous generation of PCI Express 2.0.

Manageability and security

Powerful systems management features simplify local and remote management of the SD530:

- 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.
- New 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.
- Integrated Trusted Platform Module (TPM) 2.0 support enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- 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 in the M.2 Adapter.
- 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.
- With the SMM management module installed in the enclosure, only one Ethernet connection is needed to provide remote systems management functions for all four SD530 servers and the enclosure.
- The enclosure also supports the Dual Ethernet Port SMM management module with allows a single Ethernet connection to be daisy chained across 7 enclosures and 28 servers, thereby significantly reducing the number of Ethernet switch ports needed to manage an entire rack of SD530 servers and enclosures.

Energy efficiency

The SD530 and the enclosures offer the following energy efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to a green environment:

- ASHRAE A4 compliance for certain configurations to enable operation in 45°C datacenters
- Energy-efficient planar components help lower operational costs.
- High-efficiency power supplies with 80 PLUS Platinum certifications. Energy Star 2.1 certified.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed to reduce power draw.
- Low-voltage 1.2 V DDR4 memory DIMMs use up to 20% less energy than 1.35 V DDR3 DIMMs.
- SSDs use as much as 80% less power than 2.5-inch HDDs.

- Optional Lenovo XClarity Energy Manager provide advanced data center power notification, analysis, and policy-based management to help achieve lower heat output and reduced cooling needs.
- The server uses hexagonal ventilation holes, which can be grouped more densely than round holes, providing more efficient airflow through the system.

Availability and serviceability

The SD530 server and the enclosures provide many features to simplify serviceability and increase system uptime:

- The server offers Single Device Data Correction (SDDC, also known as Chipkill), Adaptive Double-Device Data Correction (ADDDC, also known as Redundant Bit Steering or RBS), memory mirroring, and memory rank sparing 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.
- The Dual M.2 Boot Adapter supports RAID-1 which enables two installed M.2 drives to be configured as a redundant pair.
- The D2 Enclosure and Modular Enclosure both support two hot-swap power supplies, which form a redundant pair to provide availability for business-critical applications.
- Toolless access to upgrades and serviceable parts, such as fans, adapters, CPUs, and memory.
- Proactive Platform Alerts (including PFA and SMART alerts): Processors, voltage regulators, memory, internal storage (SAS/SATA HDDs and SSDs), fans, power supplies, RAID controllers, and server ambient and sub-component temperatures. Alerts can be surfaced through the XClarity Controller (XCC) 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.
- SSDs offer significantly better reliability than traditional mechanical HDDs for greater uptime.
- 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)
- 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 (requires the optional KVM Breakout Module).
- Three-year customer-replaceable unit and onsite limited warranty, 9 x 5 next business day. Optional service upgrades are available.

Components and connectors

The following figure shows the front of the D2 Enclosure. The front view shows the four SD530 nodes, each with 6 drive bays.

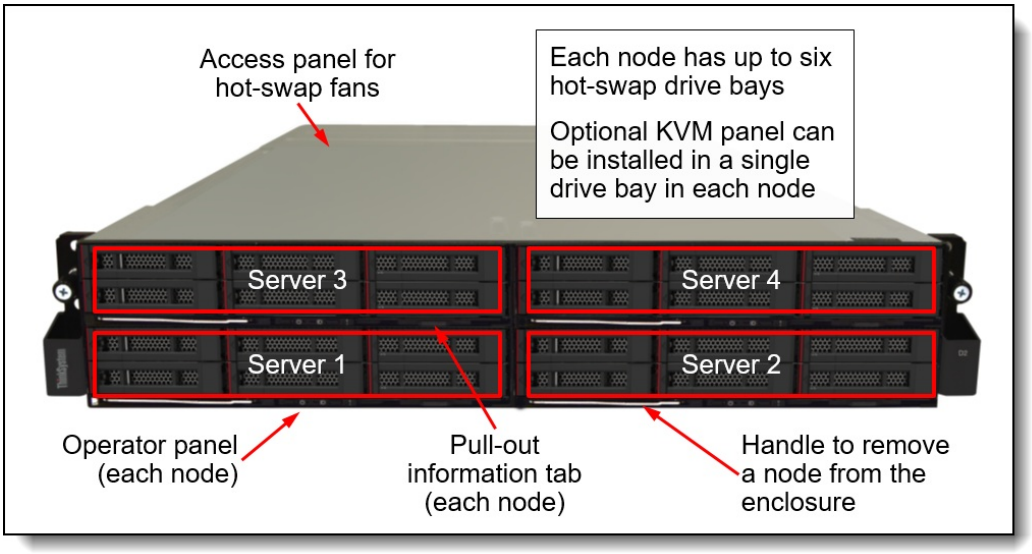

Figure 2. Front view of the ThinkSystem D2 Enclosure

The following figure shows the rear of the D2 Enclosure.

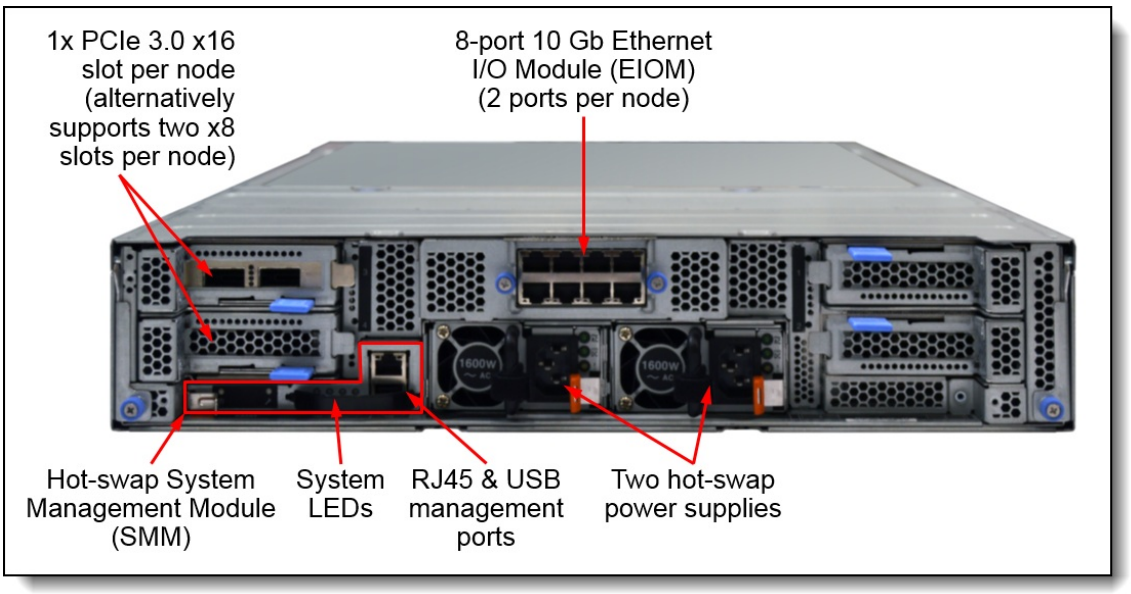

Figure 3. Rear view of the ThinkSystem D2 Enclosure

The following figure shows the I/O shuttle removed from the rear of the D2 Enclosure. The fans are hot-swap and are accessible from a removable cover on the top of the enclosure.

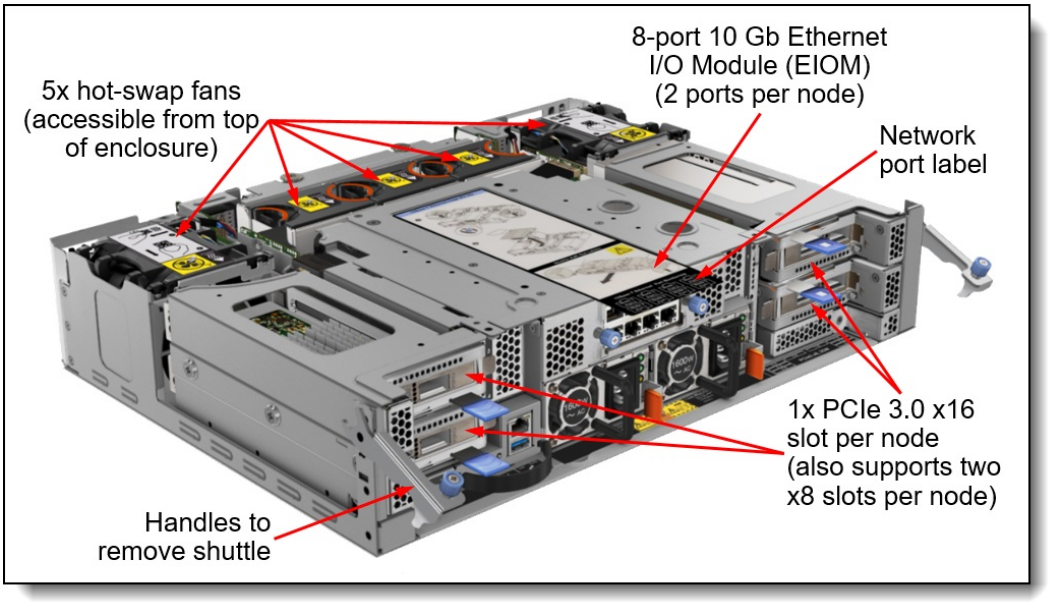

Figure 4. I/O Shuttle in the ThinkSystem D2 Enclosure

The following figure shows the front of the SD530 server.

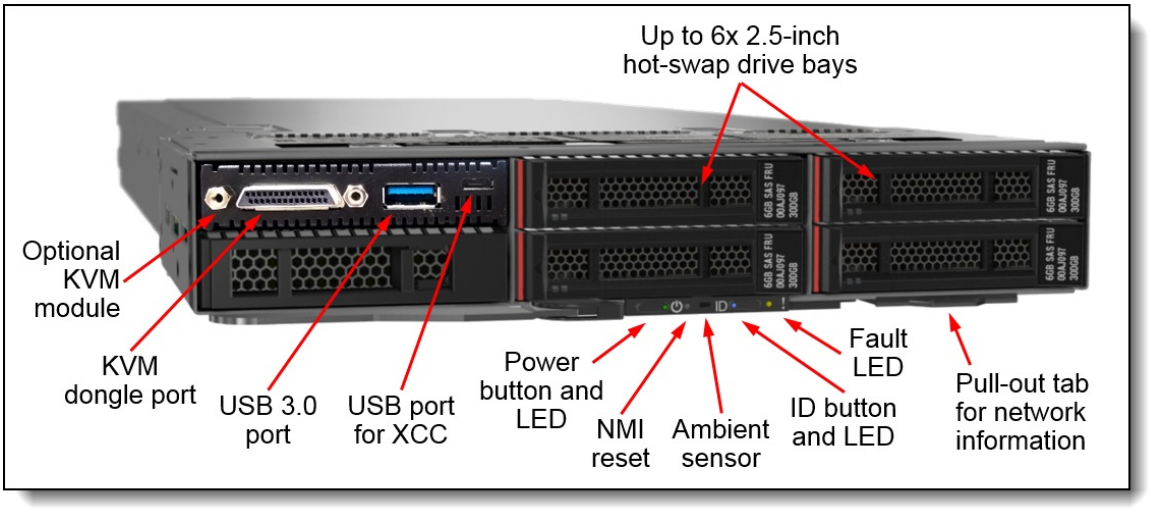

Figure 5. Front view of the SD530 compute node

The following figure shows the internals of the SD530 server identifying key components.

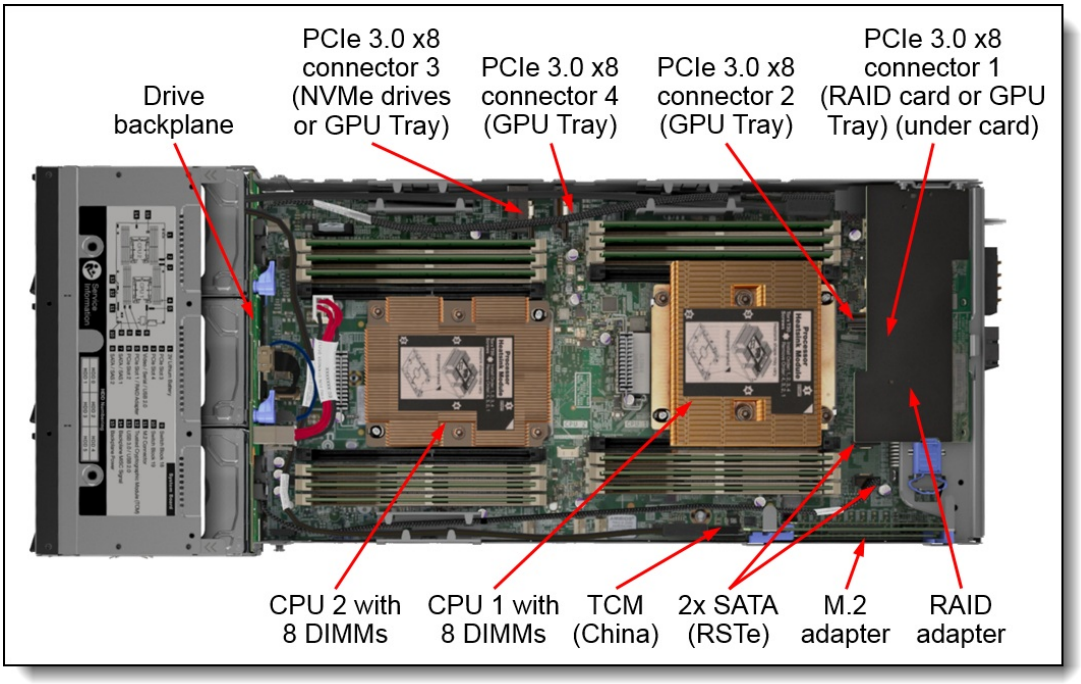

Figure 6. Internal view of the SD530 compute node

The SD530 also supports the addition of a GPU Tray which adds support for two double-wide GPUs, as shown in the following figure.

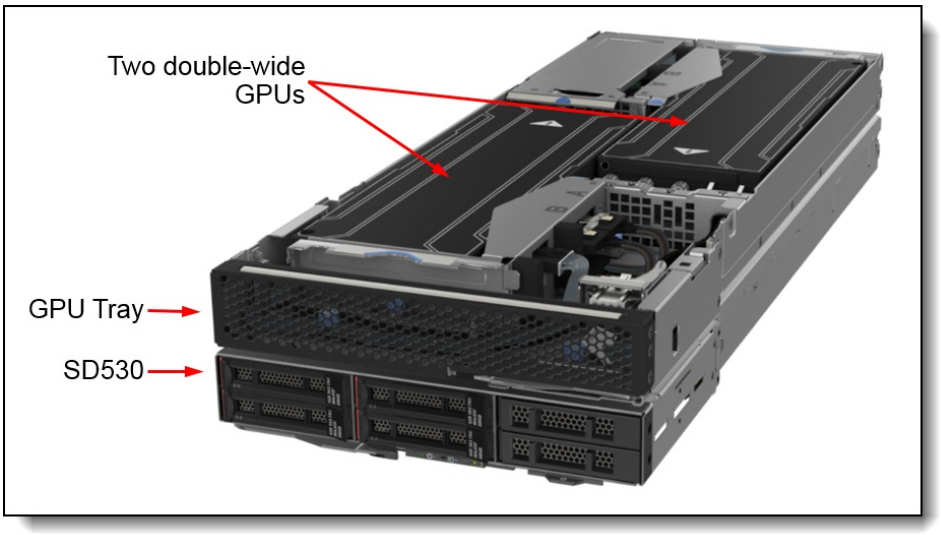

Figure 7. SD530 with attached GPU Tray

Standard specifications - SD530 server

The following table lists the standard specifications of the ThinkSystem SD530.

Table 1. Standard specifications - ThinkSystem SD530

Components	Specification
Machine type	7X21
Form factor	Half-wide, 1U compute node. Optional GPU Tray adds 1U.
Supported chassis	ThinkSystem D2 Enclosure, 2U high; up to 4 servers per chassis. ThinkSystem Modular Enclosure, 2U high; up to 4 servers per chassis.
Processor	One or two Intel Xeon Processor Scalable Family processors, either Bronze, Silver, Gold or Platinum level processors (formerly codename "Skylake"). Supports processors with core counts up to 28 cores, core speeds up to 3.6 GHz, and TDP ratings up to 205W. Two Intel Ultra Path Interconnect (UPI) links at up to 10.4 GTps each.
Chipset	Intel C624 "Lewisburg" chipset
Memory	Configurations with some processors: Up to 16 DIMM sockets (8 DIMMs per processor) Other configurations: Up to 12 DIMM sockets (6 DIMMs per processor) Support Lenovo TruDDR4 DIMMs at up to 2666 MHz. RDIMMs, LRDIMMs and 3DS RDIMMs are supported, but memory types cannot be mixed.
Memory maximums	With 16 DIMMs: • RDIMMs: Up to 512 GB with 16x 32 GB RDIMMs and two processors • LRDIMMs: Up to 1024 GB with 16x 64 GB LRDIMMs and two processors 12 DIMMs: • RDIMMs: Up to 384 GB with 12x 32 GB RDIMMs and two processors • LRDIMMs: Up to 768 GB with 12x 64 GB LRDIMMs and two processors • 3DS RDIMMs: Up to 1.5 TB with 12x 128 GB 3DS RDIMMs and two processors
Memory protection	ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs, requires Intel Xeon Gold or Platinum processors), memory mirroring, and memory sparing.
Storage bays	Up to six 2.5-inch hot-swap drive bays. Depending on the drive backplane selected, the supported drives can be SAS, SATA or NVMe drives. Up to four NVMe drives can be installed with a suitable drive backplane. Also supports one or two M.2 drives installed internally to each node. Other configurations exist including the substitution of a KVM Module in one drive bay for keyboard, video and mouse support. See the Internal storage section for details.
Maximum internal storage	• 92 TB with 6x 15.36 TB 2.5-inch SAS hot-swap SSDs • 12 TB with 6x 2 TB 2.5-inch SATA hot-swap HDDs • Intermix of SAS and SATA is supported.
Storage controller	Onboard 6 Gb SATA using embedded Intel RSTe software RAID, supporting RAID 0, 1, 10, 5, 50. Optional 12 Gb SAS/SATA RAID using SAS3408-based cacheless RAID controller, supporting RAID 0, 1, 10, 5. Optional 12 Gb SAS/SATA HBA.
Optical drive bays	No internal bays; use an external USB drive.
Tape drive bays	No internal bays. Use an external USB drive.
Network interfaces	Two 10 Gb interfaces, either 10GBASE-T ports (RJ-45) or SFP+ ports, routed through the Ethernet I/O Module at the rear of the enclosure. Networking ports are based on the Intel Ethernet Connection X722 in the chipset of the SD530 node.

Components	Specification
PCI Expansion slots	One or two PCIe 3.0 slots: • One PCIe 3.0 x16 low-profile slot, or • Two PCIe 3.0 x8 low-profile slots Additional slots with the optional GPU Tray: • Two PCIe 3.0 x16 full-length double-width slots
Ports	Front: Optional KVM Breakout Module providing one USB 3.0 port, one micro USB port for XClarity Controller connectivity, and a KVM connector port for a breakout cable that provides one VGA port, two USB 2.0 ports and one DB9 serial port for local connectivity. Additional ports provided by the enclosure as described in theEnclosure specifications section.
Cooling	Supplied by the D2 Enclosure.
Power supply	Supplied by the D2 Enclosure.
Hot-swap parts	HDDs and SSDs
Systems management	Operator panel with system error LED and ID and power controls. XClarity Controller embedded management, XClarity Administrator centralized infrastructure delivery, XClarity Integrator plugins, and XClarity Energy Manager centralized server power management. Optional XClarity Controller Advanced to enable remote control functions. System Management Module (SMM) in the D2 Enclosure provides additional systems management functions.
Video	G200 graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller. Maximum resolution is 1920x1200 32bpp at 60Hz.
Security	Power-on password, administrator's password, Trusted Platform Module (TPM), supporting TPM 1.2 or TPM 2.0. In China only, optional Trusted Cryptographic Module (TCM).
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 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.
Temperature	Up to ASHRAE Class A4: 5°C to 45°C (41°F to 113°F)
Dimensions	Height: 41 mm (1.7 inches), depth: 562 mm (22.2 inches), width: 222 mm (8.8 inches)
Weight	Minimum weight: 3.5 kg (7.8 lb), maximum weight: 7.5 kg (16.6 lb)

Standard specifications - Enclosure

The SD530 servers are supported in both the ThinkSystem D2 Enclosure and ThinkSystem Modular Enclosure. The following table lists the standard specifications of the enclosures.

Tip: The only difference between the D2 Enclosure and the Modular Enclosure is that the D2 Enclosure has a single-port SMM management module and the Modular Enclosure has a dual-port SMM management module.

Table 2. Standard specifications: D2 Enclosure and Modular Enclosure

Components	Specification
Machine type	7X20: D2 Enclosure (ships with single port SMM) 7X22: Modular Enclosure (ships with dual port SMM)
Form factor	2U rack-mounted chassis.
Server support	Up to 4 servers per chassis.
Servers per 42U rack	Up to 84 servers in 21 enclosures
System Management Module	*D2 Enclosure*: Single port SMM is standard, supports Dual Port SMM as a field upgrade *Modular Enclosure*: Dual Port SMM is standard The hot-swappable System Management Module (SMM) is the management device for the enclosure. Provides integrated systems management functions and controls the power and cooling features of the enclosure. Provides remote browser and CLI-based user interfaces for remote access via the dedicated Gigabit Ethernet port. Remote access is to both the management functions of the enclosure as well as the XClarity Controller (XCC) in each server. Supports the SMM with one Ethernet port (D2 Enclosure) or the Dual Port SMM with two Ethernet ports (Modular Enclosure, or the D2 Enclosure with the Dual Port SMM installed). The Dual Port SMM allows a single incoming Ethernet connection to be daisy chained across 7 enclosures and 28 servers, thereby significantly reducing the number of Ethernet switch ports needed to manage an entire rack of SD530 servers and enclosures.
Ethernet I/O Module	8-port Ethernet I/O Module (EIOM) routes two 10 GbE connections to each of the four servers.
Controls and LEDs	SMM has four LEDs: system error, identification, status, and system power. Each power supply has AC, DC and error LEDs
Power supplies	Two hot-swap power supplies either 1100 W, 1600 W, or 2000 W functioning as a redundant pair. Power supplies must be identical. Power supplies require a 200-240 V ac, 50 or 60 Hz supply, although the 1100 W also supports 100-127V ac 50 or 60 Hz. Power supplies are installed at the rear of the chassis. 80 PLUS Platinum certified. Built-in overload and surge protection.
Cooling	Five hot-swap system fans, accessible via removable panel in the top cover of the enclosure.
Hot-swap parts	Power supplies, fans, System Management Module
Power consumption	Input kilovolt-amperes (kVA): minimum: 0.153 kVA, maximum: 2.61 kVA
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5/NBD coverage.
Dimensions	2U chassis. Height: 87 mm (3.5 inches), depth: 892 mm (35.1 inches), width: 488 mm (19.3 inches)
Weight	Minimum configuration (with one minimally configured node): 22.4 kg (49.4 lbs) Maximum configuration (with four fully configured nodes): 55.0 kg (121.2 lbs)

SD530 models

SD530 server models are country-specific; that is, each country may define their own server models, and not all server models are available in every country. This section lists the available models. Information on the models is also available on the PSREF website, http://psref.lenovo.com.

Configure-to-order (CTO) models can also be created for factory-integrated server customization. CTO orders are built using the Data Center Solution Configurator, available at https://dcsc.lenovo.com

The following table lists the base CTO models of the ThinkSystem SD530 server.

Table 3. Base CTO models

Machine Type/Model	Description
7X21CTO1WW	ThinkSystem SD530 (3-Year Warranty)

The following table lists the base chassis choices for CTO configurations.

Table 4. Base chassis for CTO models

Feature code	Description
AUXN	ThinkSystem SD530 Computing Node
B0M3	ThinkSystem SD530 Computing Node for GPU Tray

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

- Models for Australia and New Zealand
- Models for South East Asian countries (ASEAN)
- Models for EMEA countries
- Models for Hong Kong, Taiwan, Korea (HTK)
- Models for India
- Models for Japan

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

Server models for Australia and New Zealand

Table 5. Server models for Australia and New Zealand

Model	Intel Xeon processors†	Memory	RAID	Drive bays (Avail/Max)	Drives	KVM Breakout	M.2 drives	XCC Level
Standard models								
7X21A01VAU	1x Bronze 3104 6C 85W 1.7GHz	1x 16GB 2Rx8	RSTe RAID	6x SAS/SATA*	Open	Optional	Open	Standard
7X21A025AU	1x Silver 4108 8C 85W 1.8GHz	1x 16GB 2Rx8	RSTe RAID	6x SAS/SATA*	Open	Optional	Open	Standard
7X21A02DAU	2x Silver 4108 8C 85W 1.8GHz	2x 16GB 2Rx8	RAID 530-8i	6x SAS/SATA	Open	Optional	Open	Standard
7X21A02LAU	2x Silver 4110 8C 85W 2.1GHz	2x 16GB 2Rx8	RAID 530-8i	6x SAS/SATA	Open	Optional	Open	Standard
7X21A02PAU	2x Silver 4110 8C 85W 2.1GHz	2x 16GB 2Rx8	RSTe RAID	6x SAS/SATA*	Open	Optional	Open	Standard
7X21A02JAU	2x Silver 4112 4C 85W 2.6GHz	2x 16GB 2Rx8	RSTe RAID	6x SAS/SATA* (2 AnyBay)	Open	Optional	Open	Standard