Lenovo NeXtScale nx360 M5 (E5-2600 v3)
Product Guide (withdrawn product)

NeXtScale System™ is the next generation of dense computing. It is an open, flexible, and simple data center solution for users of technical computing, grid deployments, analytics workloads, and large-scale cloud and virtualization infrastructures. The NeXtScale n1200 enclosure and NeXtScale nx360 M5 server are designed to optimize density and performance within typical data center infrastructure limits. The 6U NeXtScale n1200 enclosure fits in a standard 19-inch rack and up to 12 nx360 M5 servers can be installed into the enclosure. With more computing power per watt and Intel Xeon v3 processors, you can reduce costs while maintaining speed and availability.

Suggested use: HPC, technical computing, grid deployments, analytics workloads, and large-scale cloud, managed service providers, and virtualization infrastructures

The following figure shows the NeXtScale nx360 M5 server.

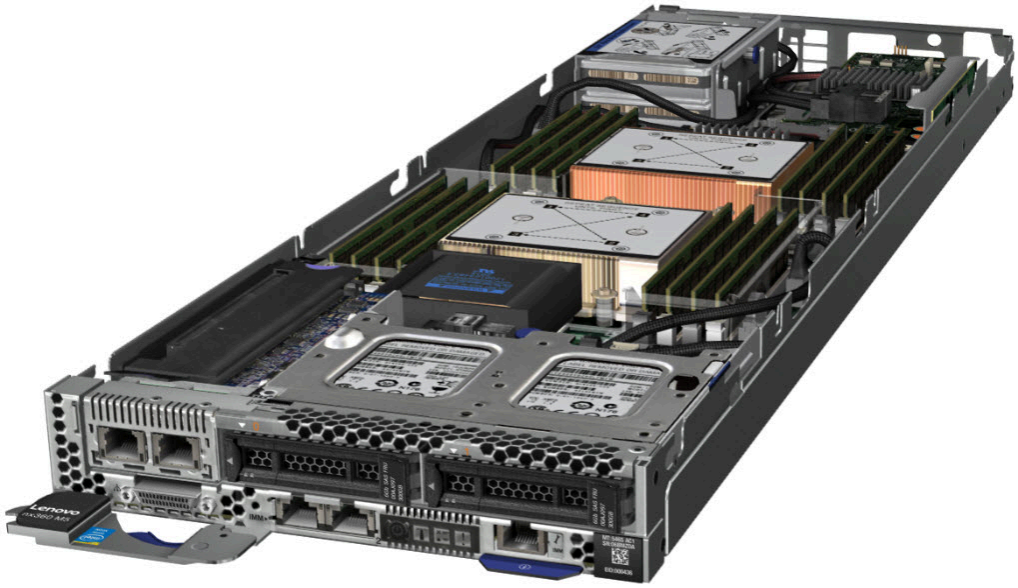

Figure 1. The NeXtScale nx360 M5 server

Did you know?

The NeXtScale System is built with industry-standard components to create flexible configurations of servers, chassis, and networking switches that integrate easily in a standard 19-inch rack. It is a general-purpose platform that provides flexibility to clients for creating unique and differentiated solutions using off-the-shelf components. Front-access cabling enables you to quickly and easily make changes in networking, power connections, and storage. The nx360 M5 and n1200 enclosure are also available in direct-water cooled configurations for the ultimate in data center cooling efficiencies.

Key features

The NeXtScale System M5 is the next generation dense platform from the System x® product line, following on from the NeXtScale System M4 offering and its predecessor, iDataPlex®. The NeXtScale system includes a dense chassis, half wide compute nodes, plus storage and GPU nodes, all fitting within a standard rack footprint. With M5, Lenovo extends the feature set to drive further growth in High Performance Computing and also to reach even more segments and workloads requiring dense performance, such as Cloud, Grid, and Analytics.

Designed with industry-standard, off-the-shelf components, the NeXtScale System is a general-purpose platform that is designed to give customers a flexible IT infrastructure. The offering includes compute-intensive systems, and GPU offerings and storage offerings. Customized solutions can be configured to provide an application-appropriate platform with a choice of servers, networking switches, adapters, and racks.

This modular system is designed to scale and grow with data center needs to protect and maximize IT investments. Because it is optimized for standard racks, users can easily mix high-density NeXtScale server offerings and non-NeXtScale components within the same rack. NeXtScale System also provides tremendous time to value by enabling users to set up and start it in a shorter period.

The NeXtScale nx360 M5 server provides a dense, flexible solution with a low total cost of ownership (TCO). The half-wide, dual-socket NeXtScale nx360 M5 server is designed for data centers that require high performance but are constrained by floor space. By taking up less physical space in the data center, the NeXtScale server enhances density, and it supports the Intel Xeon processor E5-2600 v3 series up to 145 W and 18-core processors, thus providing more performance per server. The nx360 M5 compute node contains only essential components in the base architecture to provide a cost-optimized platform.

The nx360 M5 also supports additional expansion options in the form of trays that attach to the top of the server. The PCIe Native Expansion Tray can be added to the nx360 M5 to form a powerful compute engine, supporting two GPU or coprocessor adapters. Also offered is the Storage Native Expansion Tray, which can be added to the nx360 M5 to form a storage-dense server supporting up to 48 TB of local SAS-attached storage.

The NeXtScale n1200 Enclosure is an efficient, 6U, 12-node chassis with no built-in networking or switching capabilities, and therefore requires no chassis-level management. Sensibly designed to provide shared, high-efficiency power and cooling for housed servers, the n1200 enclosure is designed to scale with your business needs.

The NeXtScale nx360 M5 is also available as a warm-water-cooled server for the ultimate in energy efficiency, cooling, noise, and TCO.

Scalability and performance

The NeXtScale System and the NeXtScale nx360 M5 server offer numerous features to boost performance, improve scalability, and reduce costs:

- Up to 12 compute nodes, each with two Xeon processors, 16 DIMMs, and three PCIe slots, in 6U of rack space. It is a highly dense, scalable, and price-optimized offering.
- The Intel Xeon processor E5-2600 v3 product family improves productivity by offering superior system performance with 18-core processors, core speeds up to 3.2 GHz, L3 cache sizes up to 45 MB, DDR4 memory speeds up to 2133 MHz, and QPI interconnect links of up to 9.6 GTps.
- Two processors, up to 36 cores, and 72 threads maximize the concurrent execution of multi-threaded applications.
- 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 multi-threaded applications by enabling simultaneous multi-threading 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 2 (AVX2) improve floating-point performance for compute-intensive technical and scientific applications.
- Sixteen DIMMs of registered 2133 MHz DDR4 ECC memory provide speed, high availability, and a memory capacity of up to 1024 GB.
- Supports drives up to 8 TB capacity in the 3.5-inch form factor.
- Support for internal simple-swap drives, either one 3.5-inch drive or two 2.5-inch drives. Plus, in place of a PCIe slot, add two 2.5-inch hot-swap drives.
- Support for additional local storage with the use of the 12G Storage Native Expansion Tray. When using 8 TB HDDs, you can create an ultra-dense storage server with up to 64 TB of total disk capacity within 1U of comparable rack density. The nx360 M5 with the Storage Native Expansion Tray offers a perfect solution for today's data-intensive workloads.
- Boosts performance with PCIe Native Expansion Tray by offering support for two high-powered GPUs or Intel Xeon Phi coprocessors within a single node.
- The use of solid-state drives (SSDs) instead of or with traditional hard disk drives (HDDs) can improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- Three PCIe slots internal to the nx360 M5: Full-height PCIe slot, mezzanine LOM Generation 2 (ML2) slot, and dedicated internal RAID adapter slot.
- Supports new mezzanine LOM Generation 2 (ML2) cards for 40 Gb Ethernet and FDR InfiniBand that offer network performance in the smallest footprint.
- 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.
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family, which reduces I/O latency and increases overall system performance.

Manageability and security

Powerful systems management features simplify local and remote management of the nx360 M5:

- Support for Lenovo XClarity Administrator, providing auto-discovery, inventory tracking, monitoring, policy-based firmware updates, address pool management, configuration patterns and operating system installation.
- The server includes an Integrated Management Module II (IMM 2.1) to monitor server availability and perform remote management.
- There is a standard Ethernet port that can be shared between the operating system and IMM for remote management with optional Features on Demand upgrade. There is an optional additional Ethernet port for dedicated IMM connectivity.
- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Integrated Trusted Platform Module (TPM) 1.2 and 2.0 support (TPM 2.0 requires UEFI 2.21 or later) enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing the application to run in its own isolated space that is protected from all other software running on a system.

- The Intel Execute Disable Bit function can prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system.

Energy efficiency

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

- Support for S3 standby power states in the processor (requires specific hardware components, software and operating system; contact Lenovo product management for details).
- Shared 80 PLUS Platinum-certified power supplies ensure energy efficiency.
- Large 80 mm fans maximize air flow efficiencies.
- The Intel Xeon processor E5-2600 v3 product family offers better performance per watt over the previous generation.
- Intel Intelligent Power Capability powers on and off individual processor elements as needed to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy the demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.2 V DDR4 memory DIMMs consume up to 20% less energy compared to 1.35 V DDR3 DIMMs.
- SSDs consume as much as 80% less power than traditional 2.5-inch HDDs.
- The server uses hexagonal ventilation holes in the front and rear of the casing, which can be grouped more densely than round holes, providing more efficient airflow through the system.
- There are power monitoring and power capping capabilities through the Power and Fan Management Module in the chassis

Availability and serviceability

The NeXtScale System and the nx360 M5 server provide many features to simplify serviceability and increase system uptime:

- The NeXtScale n1200 chassis supports N+N and N+1 power policies for its six power supplies, which means greater system uptime.
- All components can be removed from the front of the rack by sliding out the trays or the chassis for easy, quick servicing.
- Toolless cover removal provides easy access to upgrades and serviceable parts, such as HDDs and memory.
- Optional RAID arrays enable the server to keep operating if there is a failure of any one drive.
- SSDs offer better reliability than traditional mechanical HDDs for greater uptime.
- Predictive Failure Analysis (PFA) detects when system components (processors, memory, and hard disk drives) operate outside of standard thresholds and generates proactive alerts in advance of possible failure, therefore increasing uptime.
- The built-in Integrated Management Module II continuously monitors system parameters, triggers alerts, and performs recovering actions in case of failures to minimize downtime.
- The IMM offers optional remote management capability to enable remote keyboard, video, and mouse (KVM) control of the server.
- There is a three-year customer replaceable unit and onsite limited warranty, with next business day 9x5. Optional service upgrades are available.

Locations of key components and connectors

The following figure shows the front of the nx360 M5 server.

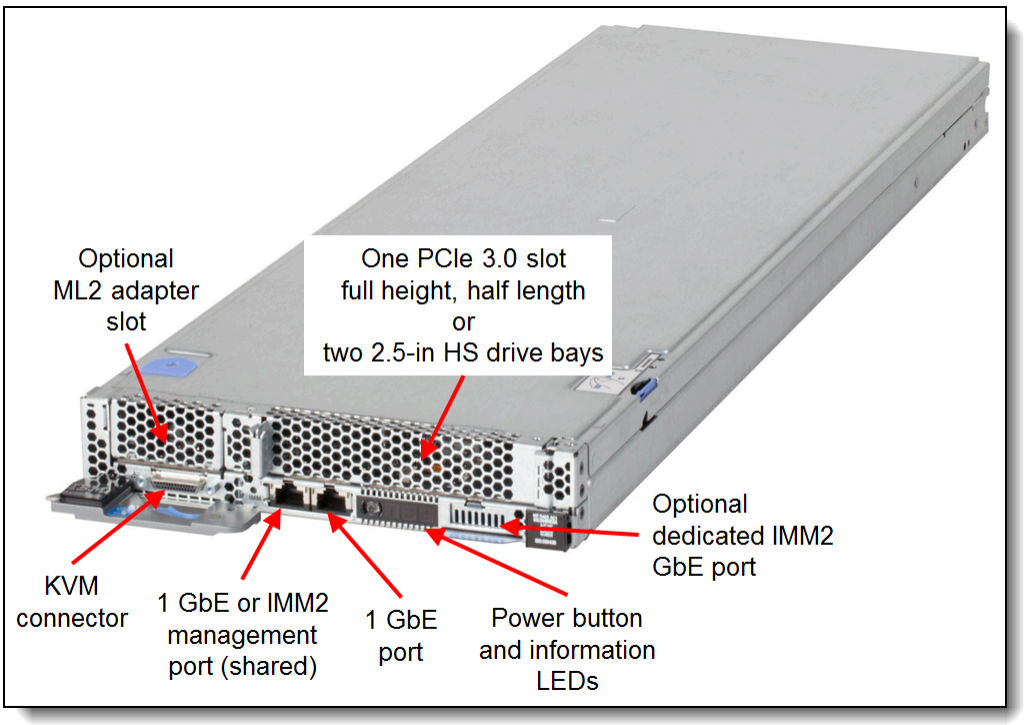

Figure 2. Front view of the NeXtScale nx360 M5

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

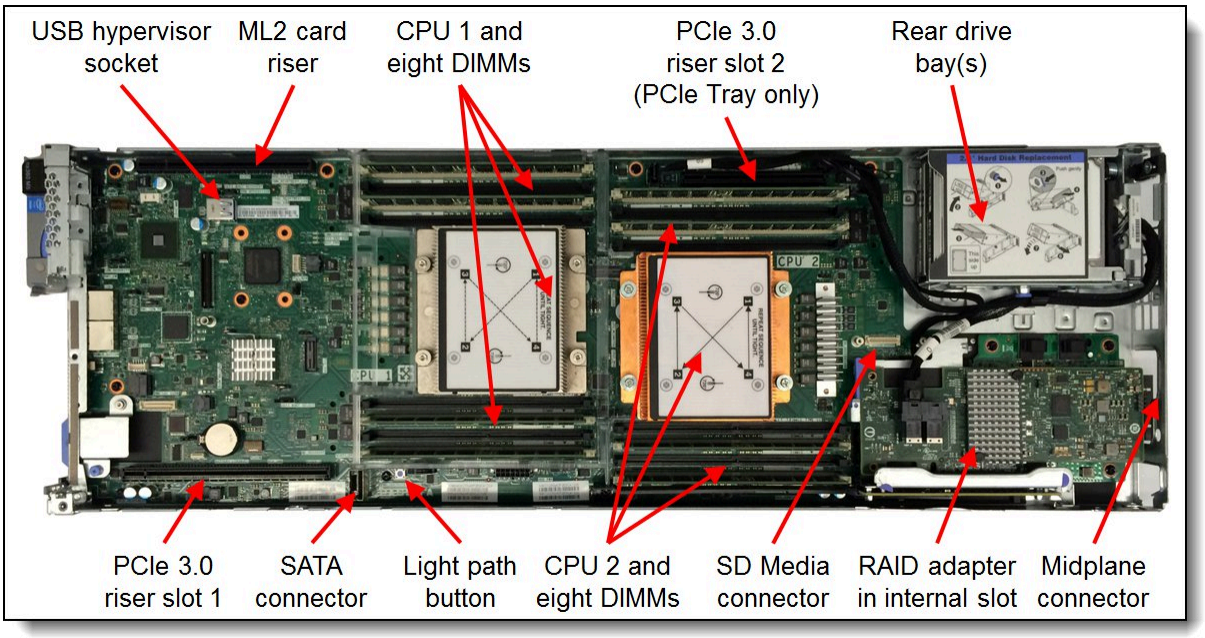

Figure 3. Inside view of the NeXtScale nx360 M5

The compute nodes are installed in the NeXtScale n1200 enclosure, as shown in the following figure.

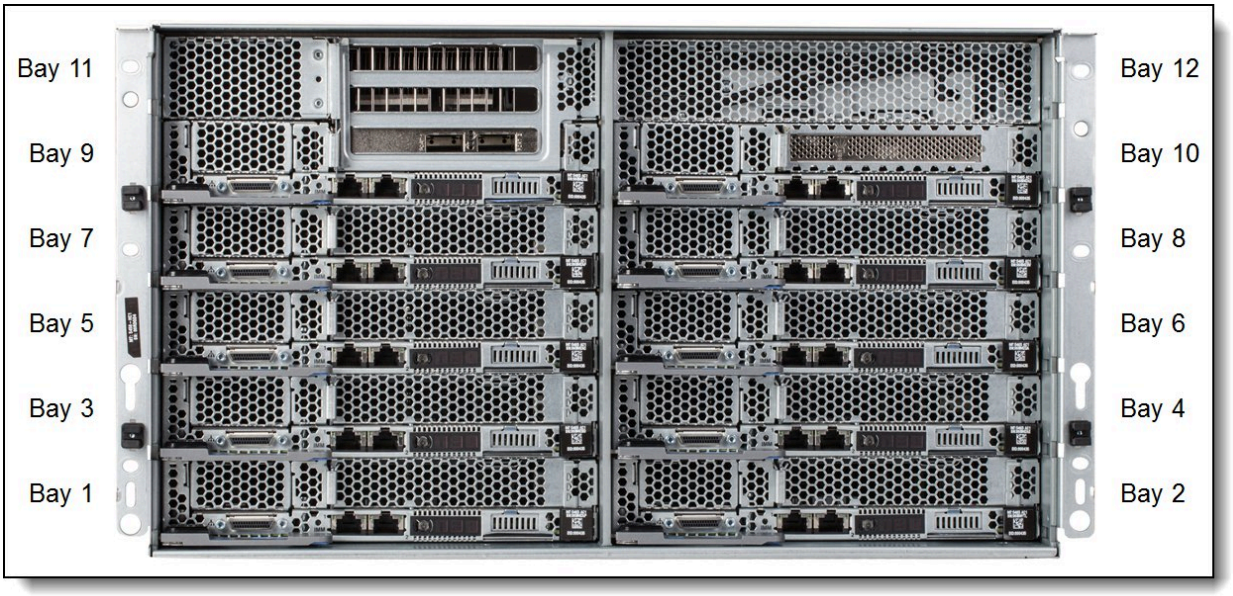

Figure 4. Front view of the NeXtScale n1200 enclosure

The rear of the enclosure contains the power supplies, fans, and the Fan and Power Controller, as shown in the following figure.

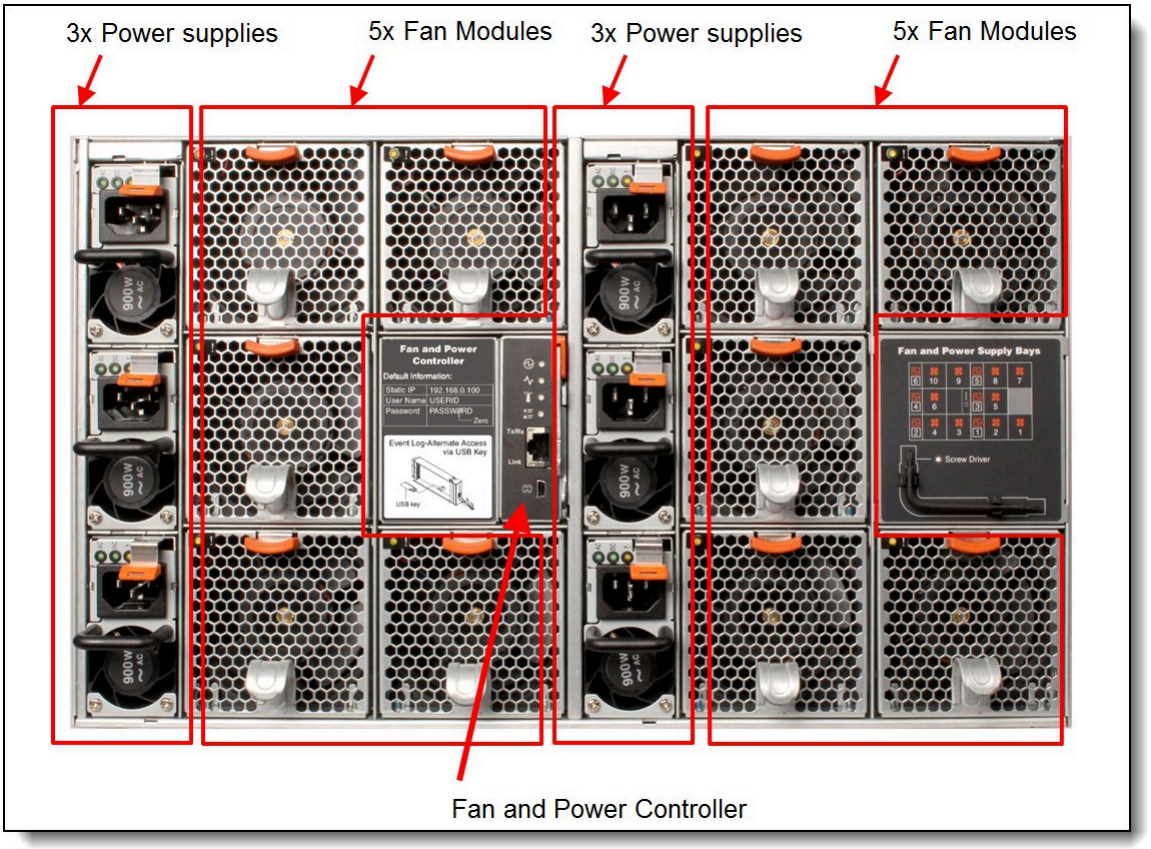

Figure 5. Rear view of the NeXtScale n1200 enclosure

Standard specifications - nx360 M5

The following table lists the standard specifications of the NeXtScale nx360 M5 compute node.

Table 1. Standard specifications

Components	Specification
Machine type	5465
Firmware	Lenovo-signed firmware
Form factor	Standard server: Half-wide, 1U compute node. With optional Native Expansion Tray (either PCIe Tray or Storage Tray): Half-wide 2U compute node.
Supported chassis	NeXtScale n1200 enclosure, 6U high; up to 12 compute nodes per chassis.
Processor	Two Intel Xeon Processor E5-2600 v3 series processors; Available processors with between 4 cores and 18 cores, up to 45 MB L3 cache and up to 3.5 GHz core speed. QuickPath Interconnect (QPI) links speed up to 9.6 GTps. Hyper-Threading Technology and Turbo Boost Technology. Intel C612 chipset.
Memory	Up to 16 DIMM sockets (8 DIMMs per processor) supporting DDR4 DIMMs up to 2133 MHz memory speeds. RDIMMs and LRDIMMs are supported but cannot be mixed. Four memory channels per processor (two DIMMs per channel).
Memory maximums	LRDIMMs: Up to 1 TB memory with 16x 64 GB LRDIMMs and two processors. RDIMMs: Up to 512 GB memory with 16x 32 GB RDIMMs and two processors.
Memory protection	Chipkill (x4 memory options only) and ECC.
Disk drive bays	*Internal to the nx360 M5* (not front accessible): One 3.5-inch simple-swap SATA or two 2.5-inch simple swap SAS/SATA HDDs or SSDs. *Front-accessible bays*: Two 2.5-inch hot-swap drive bays (optional, replaces the full-height PCIe slot, only supported if internal drive bays are also 2.5-inch bays); *With the addition of the NeXtScale 12G Storage Native Expansion Tray* (only supported with internal drive bay, not front accessible drive bays): Adds 7 more 3.5-inch simple-swap drive bays. *With the addition of the NeXtScale PCIe 2U Native Expansion Tray* (only supported with internal drive bay, not front accessible drive bays): Adds 4 more 2.5-inch hot-swap drive bays.
Maximum internal storage	Without any expansion tray attached: • With a single 3.5" drive: 10.0 TB using 1x 10TB 3.5" drive (internal) • With 2.5" drives: 10.1 TB using 2x 1.2 TB HDDs (internal) + 2x 3.84 TB HS SSDs (front) With the Storage Native Expansion Tray attached: • All 3.5" drives: 80 TB using 8x 10 TB 3.5" drives (1 internal, 7 in the tray) • With 2.5" drives internally: 44.4 TB using 2x 1.2 TB HDDs (internal) + 7x 6 TB 3.5" drives With the PCIe 2U Native Expansion Tray attached: • 3.5" internal drive: 25.3 TB using 1x 10TB 3.5" drive (internal) + 4x 3.84 TB HS SSDs (tray) • 2.5" internal drives: 17.8 TB using 2x 1.2 TB HDDs (internal) + 4x 3.84 TB HS SSDs (tray)
RAID support	Four 6 Gb SATA ports through onboard Intel C612 chipset. No RAID standard. Optional 12 Gb SAS/SATA RAID adapters: ServeRAID M5210 or M1215, both standard with RAID 0 and 1. Optional M5210 upgrades: RAID 5, 50 (zero-cache, or 1 GB non-backed cache, or 1 GB or 2 GB or 4 GB flash-backed cache), RAID 6, 60, FoD performance upgrades; Optional upgrade to M1215 for RAID 5 support (zero-cache). No support for ServeRAID C100 or C105 software RAID.
Optical drive bays	No internal bays; use an external USB drive. See http://support.lenovo.com/en/documents/pd011281 for options.
Tape drive bays	No internal bays. Use an external USB drive.

Components	Specification
Network interfaces	Integrated two-port Gigabit Ethernet (Broadcom BCM5717) with RJ45 connectors. One port dedicated for use by the operating system, and one configurable either as shared by the operating system and Integrated Management Module (IMM) or as dedicated to the operating system. Optional third GbE port for dedicated IMM access. Optionally, PCIe and Mezzanine LOM Gen 2 (ML2) adapters may be added to provide additional network interfaces. ML2 Ethernet adapters support shared access to the IMM.
PCI Expansion slots	nx360 M5 without PCIe Native Expansion Tray: • One PCIe 3.0 x16 ML2 adapter slot • One PCIe 3.0 x16 full-height half-length slot (or two 2.5" hot-swap drive bays) • One PCIe 2.0 x8 slot for internal RAID controller nx360 M5 with PCIe Native Expansion Tray: • One PCIe 3.0 x16 ML2 adapter slot • One PCIe 3.0 x8 full-height half-length slot (or two 2.5" hot-swap drive bays) • One PCIe 2.0 x8 slot for internal RAID controller • Two PCIe 3.0 x16 full-height full-length double-width slots nx360 M5 with 12G Storage Native Expansion Tray: • One PCIe 3.0 x16 ML2 adapter slot • One PCIe 3.0 x16 full-height half-length slot for RAID controller nx360 M5 with PCIe 2U Native Expansion Tray: • One PCIe 3.0 x16 ML2 adapter slot • One PCIe 3.0 x8 full-height half-length slot • One PCIe 2.0 x8 slot for internal RAID controller • Four PCIe 3.0 x16 full-height full-length double-width slots
Ports	*Front of the server*: KVM connector; with the addition of a console breakout cable (1 cable standard with the chassis) supplies one RS232 serial port, one VGA port, and two USB 1.1 ports for local console connectivity. Two 1 Gbps Ethernet ports with RJ45 connectors. Optional third GbE port for dedicated IMM2 access. *Internal*: One internal USB port for VMware ESXi hypervisor key. Optional support for SD Media Adapter for VMware vSphere hypervisor.
Cooling	Supplied by the NeXtScale n1200 enclosure.
Power supply	Supplied by the NeXtScale n1200 enclosure.
Systems management	UEFI, Integrated Management Module II (IMM2.1) with Renesas SH7758 controller, Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, and ServerGuide. IMM2 upgrades are available to IMM2 Standard and IMM2 Advanced for web GUI and remote presence features. Lenovo XClarity Administrator support.
Video	Matrox G200eR2 video core with 16 MB DDR3 video memory that is integrated into the IMM2. Maximum resolution is 1600x1200 with 16M colors (32 bpp) at 75 Hz, or 1680x1050 with 16M colors at 60 Hz.
Security	Power-on password, administrator's password, and Trusted Platform Module (TPM) 1.2 or 2.0 (TPM 2.0 requires UEFI 2.21 or later).
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/NBD.
Service and support	Optional service upgrades are available through Lenovo Services: 4-hour or 2-hour response time, 8-hour fix time, 1-year or 2-year warranty extension, remote technical support for hardware and some Lenovo and OEM software.
Dimensions	Width: 216 mm (8.5 in.), height: 41 mm (1.6 in.), depth: 659 mm (25.9 in.)
Weight	Maximum weight: 6.17 kg (13.6 lb)

Standard specifications - n1200 enclosure

The following table lists the standard specifications of the and NeXtScale n1200 enclosure.

Table 2. Standard specifications:NeXtScale n1200

Components	Specification
Machine type	5456
Firmware	With first generation Fan and Power Controller: IBM-signed firmware With second generation Fan and Power Controller: Lenovo-signed firmware
Form factor	6U rack-mounted chassis.
Maximum number of servers supported	Up to 12 compute nodes per chassis.
Servers per 42U rack	Up to 72 servers in six 6U chassis (36U total, leaving space for top-of-rack switches, UPS units, and so on)
Midplane	Passive midplane provides connections to the 12 servers in the front to the power supplies and fans at the rear. Provides signals to control fan speed, power consumption, and node throttling as needed.
Fan and Power Controller	The FPC module is the management device for the chassis. Provides integrated systems management functions and controls the power and cooling features of the enclosure. Hot-swappable. Browser and CLI-based user interfaces for remote access via the dedicated 10/100 Mbps Ethernet port. Internal USB memory key for logging and configuration data.
Ports	RJ45 port on the rear of the chassis for 10/100 Ethernet connectivity to the FPC for power and cooling management. Each server has RJ45 Ethernet connectors as well as a KVM connector for USB, video and serial connections.
I/O architecture	None integrated. Use top-of-rack networking and storage switches.
Power supplies	Up to six hot-swap power supplies either 900 W or 1300 W or 1500 W. The 900 W power supplies can operate at 200 V – 240 V or 100 V – 127 V. The 1300 W and 1500 W power supplies operate at 200 V – 240 V only. Power supplies installed at the rear of the chassis. Single power domain supplies power to all servers. Optional redundancy (N+1 or N+N) and oversubscription. Integrated 2500 RPM fan. 80 PLUS Platinum or 80 PLUS Titanium certified, depending on the power supply selected. Built-in overload and surge protection.
Cooling	10 hot-swap dual-rotor 80 mm system fans with tool-less design.
System LEDs	FPC LEDs: Power, Activity, Locator, System error log, Ethernet port LEDs. Power supply LEDs: AC power, DC power, Fault LEDs. Servers have more LEDs.
Security features	Login password for remote connection. Secure Sockets Layer (SSL) security for remote management access. Supports LDAP for authorization. Trusted and signed firmware.
Systems management	Browser-based chassis management through an Ethernet port on the FPC at the rear of the enclosure. Servers provide more management features.
Temperature	Operating air temperature: • ASHRAE class A3 environment: 5°C - 40°C (41°F - 104°F) • Derate maximum allowable temperature 1°C/175 m above 950 m
Electrical power	1300 W & 1500 W power supplies: 200 V - 240 V ac input (nominal), 50 or 60 Hz 900 W power supplies: 100 V - 127V or 200 V - 240 V ac input (nominal), 50 or 60 Hz
Power consumption	7,800 W maximum
Power cords	One AC power cord for each power supply, 1.5 m 10 A, IEC320 C14 to C13

Components	Specification
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5/NBD.
Dimensions	Width: 447 mm (17.6 in.), height: 263 mm (10.4 in.), depth: 915 mm (36 in.).
Weight	Fully configured (stand-alone): 112 kg (247 lb), empty chassis 28 kg (62 lb).

Standard nx360 M5 models

The following table lists the standard models of the NeXtScale nx360 M5 with Xeon E5 v3 processors.

Withdrawn from marketing: The models covered in this product guide are now withdrawn from marketing. The replacement system is the NeXtScale nx360 M5 (E5-2600 v4) which is described in https://lenovopress.com/lp0094.

Table 3. Standard models

Model	Intel Xeon Processor† (2 maximum)	Memory and speed	RAID controller	Drive bays	Disks	Network	Optical
5465-22x	2x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	2x 8 GB 2133 MHz	6 Gbps SATA (No RAID)	1x 3.5-inch SS bay	Open	2x GbE	None
5465-42x	2x E5-2650 v3 10C 2.3GHz 25MB 2133MHz 105W	2x 8 GB 2133 MHz	6 Gbps SATA (No RAID)	1x 3.5-inch SS bay	Open	2x GbE	None
5465-62x	2x E5-2680 v3 12C 2.5GHz 30MB 2133MHz 120W	2x 16 GB 2133 MHz	6 Gbps SATA (No RAID)	2x 2.5-inch SS bays	Open	2x GbE	None

† Processor detail: Processor quantity and model, cores, core speed, L3 cache, memory speed, and power consumption.

The nx360 M5 servers are shipped with the following items:

- Statement of Limited Warranty
- Important Notices
- Documentation CD that contains the *Installation and Service Guide*

For information about the standard features of the server, see the "Standard specifications" section.

Standard n1200 Enclosure models

The NeXtScale nx360 M5 is supported in the NeXtScale n1200 Enclosure. The standard n1200 Enclosure models are listed in the following table.

Table 4. Standard enclosure models

Model	Fan & Power Controller	Fans (standard / max)	Power (standard / max)
5456-B2x	FPC2 (Lenovo-signed firmware)	10x 80mm / 10	6x 900 W / 6
5456-B3x	FPC2 (Lenovo-signed firmware)	10x 80mm / 10	2x 1300 W / 6
5456-B4x	FPC2 (Lenovo-signed firmware)	10x 80mm / 10	6x 1300 W / 6
5456-A2x*	FPC (IBM-signed firmware)	10x 80mm / 10	6x 900 W / 6
5456-A3x*	FPC (IBM-signed firmware)	10x 80mm / 10	2x 1300 W / 6
5456-A4x*	FPC (IBM-signed firmware)	10x 80mm / 10	6x 1300 W / 6

* Withdrawn from marketing

The chassis ships with these items:

- Rail kit (88Y6763)
- Four detachable chassis lift handles
- One Console breakout cable (also known as a KVM Dongle)
- A Torx-8 (T8) screwdriver for use with components such as drive cages, mounted on the rear of the chassis
- One AC power cord for each power supply that is installed, 1.5m 10A, IEC320 C14 to C13 (part number 39Y7937)

The n1200 provides a shared high-efficiency power supply and fans. Like BladeCenter® and Flex System®, the NeXtScale System compute nodes connect to a midplane, but this connection is for power and control only; the midplane does not provide any I/O connectivity.

NeXtScale n1200 Enclosure support

The NeXtScale nx360 M5 is supported in all models of the NeXtScale n1200 Enclosure listed in the Standard enclosure models table. The number of servers that are supported in each chassis depends on the TDP value of the processors that are used in the servers, the number and capacity of power supplies installed (1300 W or 900 W), and the AC input voltage (100 - 127 V or 200 - 240 V). The following tables use the following conventions:

- A green cell means that the chassis can be filled with servers up to the maximum number that are supported in the chassis (for example, 12 servers without GPU Trays installed, six servers with GPU Trays installed).
- A yellow cell means that the maximum number of servers that the chassis can hold is fewer than the total available bays. Other bays in the chassis *must* remain empty.

Notes on the tables:

- OVS (Oversubscription) of the power system allows for more efficient use of the available system power. By using oversubscription, users can make the most of the extra power from the redundant power supplies when the power supplies are in healthy condition.
- Oversubscription and Power supply redundancy options are set through one of the available user interfaces to the Fan and Power Controller in the chassis.
- Use the Power Configurator to determine an accurate power model for your configuration, however for 110-120 V AC configurations using the 900 W power supplies, consult Table 24 below for supported numbers of compute nodes.
  https://ibm.com/support/entry/portal/docdisplay?lndocid=LNVO-PWRCONF
- Some cells indicate two numbers (for example “5 + 1”). This indicates support for a mixture of servers with and without the GPU Tray:
  - First number: Number of servers with a GPU Tray attached and two GPUs installed
  - Second number: Number of servers without a GPU Tray attached.

  For example, “5 + 1” means that the supported combination is five servers with the GPU Tray attached (consuming 10 bays in the chassis), plus one server without a GPU Tray attached (one bay). In such a configuration, 11 bays are consumed and the one remaining server bay in the chassis must remain empty.
- The tables are as follows:
  - **1500W power supplies and no GPUs**
    - Table 5 - 1500 W power supplies, 200-240V AC input, no GPUs
  - **1500W power supplies with 1U PCIe Native Expansion Tray**
    - Table 6 - 1500 W power supplies, 200-240V AC input, with two 130 W GPUs
    - Table 7 - 1500 W power supplies, 200-240V AC input, with two 225 W GPUs
    - Table 8 - 1500 W power supplies, 200-240V AC input, with two 235 W GPUs
    - Table 9 - 1500 W power supplies, 200-240V AC input, with two 300 W GPUs
  - **1500W power supplies with 2U PCIe Native Expansion Tray**
    - Table 10 - 1500 W power supplies, 200-240V AC input, with four 130 W GPUs
    - Table 11 - 1500 W power supplies, 200-240V AC input, with four 225 W GPUs
    - Table 12 - 1500 W power supplies, 200-240V AC input, with four 235 W GPUs
    - Table 13 - 1500 W power supplies, 200-240V AC input, with four 300 W GPUs
  - **1300W power supplies and no GPUs**
    - Table 14 - 1300 W power supplies, 200-240V AC input, no GPUs
  - **1300W power supplies with 1U PCIe Native Expansion Tray**
    - Table 15 - 1300 W power supplies, 200-240V AC input, with two 130 W GPUs
    - Table 16 - 1300 W power supplies, 200-240V AC input, with two 225 W GPUs
    - Table 17 - 1300 W power supplies, 200-240V AC input, with two 235 W GPUs

        - Table 18 - 1300 W power supplies, 200-240V AC input, with two 300 W GPUs
    - **1300W power supplies with 2U PCIe Native Expansion Tray**
        - Table 19 - 1300 W power supplies, 200-240V AC input, with four 130 W GPUs
        - Table 20 - 1300 W power supplies, 200-240V AC input, with four 225 W GPUs
        - Table 21 - 1300 W power supplies, 200-240V AC input, with four 235 W GPUs
        - Table 22 - 1300 W power supplies, 200-240V AC input, with four 300 W GPUs
    - **900W power supplies**
        - Table 23 - 900 W power supplies, 200-240V AC input, no GPUs
        - Table 24 - 900 W power supplies, 100-127V AC input, no GPUs
        - Table 25 - 900 W power supplies, -48 V DC input, no GPUs
- The use of GPUs requires the PCIe Native Expansion Tray and two processors.
- See the GPU and coprocessor adapters section for information about the power consumption of each supported GPU or coprocessor.

Chassis with six 1500 W power supplies

Table 5. Number of compute nodes that are supported (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	1	12	12	12	12
	2	12	12	12	12
65 W	1	12	12	12	12
	2	12	12	11	12
85 W	1	12	12	12	12
	2	12	12	9	10
90 W	1	12	12	12	12
	2	12	12	8	10
105 W	1	12	12	11	12
	2	12	12	7	9
120 W	1	12	12	10	12
	2	12	11	6	8
135 W	1	12	12	9	11
	2	12	10	6	7
145 W	1	12	12	8	10
	2	12	10	5	7

Table 6. Number of compute nodes that are supported each with two 130 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	6	6
65 W	2	6	6	5 + 1	6
85 W	2	6	6	5	6
90 W	2	6	6	5	6
105 W	2	6	6	5	6
120 W	2	6	6	4 + 1	5 + 1
135 W	2	6	6	4	5
145 W	2	6	6	4	5

Table 7. Number of compute nodes that are supported each with two 225 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	4 + 1	5 + 1
65 W	2	6	6	4	5
85 W	2	6	6	4	5
90 W	2	6	6	4	5

105 W	2	6	6	3 + 1	4 + 1
120 W	2	6	6	3 + 1	4 + 1
135 W	2	6	6	3 + 1	4
145 W	2	6	6	3 + 1	4

Table 8. Number of compute nodes that are supported each with two 235 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	4 + 1	5
65 W	2	6	6	4	5
85 W	2	6	6	4	5
90 W	2	6	6	4	4 + 1
105 W	2	6	6	3 + 1	4 + 1
120 W	2	6	6	3 + 1	4 + 1
135 W	2	6	6	3 + 1	4
145 W	2	6	6	3	4

Table 9. Number of compute nodes that are supported each with two 300 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	3 + 2	4 + 1
65 W	2	6	6	3 + 1	4 + 1
85 W	2	6	6	3 + 1	4
90 W	2	6	6	3 + 1	4
105 W	2	6	5 + 1	3	4
120 W	2	6	5 + 1	3	4
135 W	2	6	5	3	3 + 1
145 W	2	6	5	3	3 + 1

Table 10. Number of compute nodes that are supported each with four 130 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	4	4	4
65 W	2	4	4	4	4
85 W	2	4	4	4	4
90 W	2	4	4	4	4
105 W	2	4	4	4	4
120 W	2	4	4	4	4
135 W	2	4	4	4	4
145 W	2	4	4	3 + 1	4

Table 11. Number of compute nodes that are supported each with four 225 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	4	3 + 1	4
65 W	2	4	4	3	3 + 3
85 W	2	4	4	3	3 + 2
90 W	2	4	4	3	3 + 2
105 W	2	4	4	3	3 + 2
120 W	2	4	4	2 + 2	3 + 1
135 W	2	4	4	2 + 2	3 + 1
145 W	2	4	4	2 + 2	3 + 1

Table 12. Number of compute nodes that are supported each with four 235 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	4	3	3 + 3
65 W	2	4	4	3	3 + 2
85 W	2	4	4	3	3 + 2
90 W	2	4	4	3	3 + 2
105 W	2	4	4	2 + 2	3 + 1
120 W	2	4	4	2 + 2	3 + 1
135 W	2	4	4	2 + 2	3 + 1
145 W	2	4	4	2 + 1	3

Table 13. Number of compute nodes that are supported each with four 300 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1500 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	4	2 + 2	3 + 1
65 W	2	4	4	2 + 2	3
85 W	2	4	4	2 + 2	3
90 W	2	4	4	2 + 1	3
105 W	2	4	4	2 + 1	3
120 W	2	4	4	2 + 1	2 + 3
135 W	2	4	4	2 + 1	2 + 2
145 W	2	4	4	2 + 1	2 + 2

Chassis with six 1300 W power supplies

Table 14. Number of compute nodes that are supported (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	1	12	12	12	12
	2	12	12	10	12
65 W	1	12	12	12	12
	2	12	12	9	11
85 W	1	12	12	12	12
	2	12	12	8	10
90 W	1	12	12	12	12
	2	12	12	7	9
105 W	1	12	12	12	12
	2	12	12	7	8
120 W	1	12	12	11	12
	2	12	11	6	8
135 W	1	12	12	11	12
	2	12	10	6	7
145 W	1	12	12	10	12
	2	12	10	5	7

Table 15. Number of compute nodes that are supported each with two 130 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	6	6
65 W	2	6	6	5 + 1	6
85 W	2	6	6	5	6
90 W	2	6	6	5	6
105 W	2	6	6	5	6
120 W	2	6	6	4 + 1	5 + 1
135 W	2	6	6	4	5
145 W	2	6	6	4	5

Table 16. Number of compute nodes that are supported each with two 225 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	4 + 1	5 + 1
65 W	2	6	6	4	5
85 W	2	6	6	4	5
90 W	2	6	6	4	5
105 W	2	6	6	3 + 1	4 + 1

120 W	2	6	6	3 + 1	4 + 1
135 W	2	6	6	3 + 1	4
145 W	2	6	6	3 + 1	4

Table 17. Number of compute nodes that are supported each with two 235 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	4 + 1	5
65 W	2	6	6	4	5
85 W	2	6	6	4	5
90 W	2	6	6	4	4 + 1
105 W	2	6	6	3 + 1	4 + 1
120 W	2	6	6	3 + 1	4 + 1
135 W	2	6	6	3 + 1	4
145 W	2	6	6	3	4

Table 18. Number of compute nodes that are supported each with two 300 W GPUs installed in the 1U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	6	6	3 + 2	4 + 1
65 W	2	6	6	3 + 1	4 + 1
85 W	2	6	6	3 + 1	4
90 W	2	6	6	3 + 1	4
105 W	2	6	5 + 1	3	4
120 W	2	6	5 + 1	3	4
135 W	2	6	5	3	3 + 1
145 W	2	6	5	3	3 + 1

Table 19. Number of compute nodes that are supported each with four 130 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	4	4	4
65 W	2	4	4	4	4
85 W	2	4	4	3 + 1	4
90 W	2	4	4	3 + 1	4
105 W	2	4	4	3 + 1	4
120 W	2	4	4	3	4
135 W	2	4	4	3	4
145 W	2	4	4	3	4

Table 20. Number of compute nodes that are supported each with four 225 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	4	2 + 3	3 + 1
65 W	2	4	4	2 + 2	3 + 1
85 W	2	4	4	2 + 2	3
90 W	2	4	4	2 + 2	3
105 W	2	4	4	2 + 1	3
120 W	2	4	4	2 + 1	3
135 W	2	4	4	2 + 1	3
145 W	2	4	4	2 + 1	2 + 2

Table 21. Number of compute nodes that are supported each with four 235 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	4	2 + 2	3 + 1
65 W	2	4	4	2 + 2	3 + 1
85 W	2	4	4	2 + 1	3
90 W	2	4	4	2 + 1	3
105 W	2	4	4	2 + 1	3
120 W	2	4	4	2 + 1	3
135 W	2	4	4	2 + 1	2 + 2
145 W	2	4	4	2	2 + 2

Table 22. Number of compute nodes that are supported each with four 300 W GPUs installed in the 2U PCIe Native Expansion Tray (200 - 240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	2	4	3 + 3	2 + 1	2 + 3
65 W	2	4	3 + 3	2	2 + 3
85 W	2	4	3 + 2	2	2 + 2
90 W	2	4	3 + 2	2	2 + 2
105 W	2	4	3 + 2	2	2 + 2
120 W	2	4	3 + 1	2	2 + 1
135 W	2	4	3 + 1	2	2 + 1
145 W	2	4	3 + 1	2	2 + 1

Chassis with six 900 W power supplies

Table 23. Number of compute nodes that are supported (200 - 240 V AC Input, with 6 x 900 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	1	12	12	11	12
	2	12	11	6	8
65 W	1	12	12	10	12
	2	12	10	6	7
85 W	1	12	12	9	11
	2	11	9	5	6
90 W	1	12	12	9	11
	2	11	9	5	6
105 W	1	12	12	8	10
	2	10	8	4	5
120 W	1	12	12	7	9
	2	9	7	4	5
135 W	1	12	12	7	9
	2	8	7	4	5
145 W	1	12	12	7	8
	2	8	6	3	4

Table 24. Number of compute nodes that are supported (100- 127 V AC Input, with 6 x 900 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	1	12	12	6	8
	2	9	7	4	5
65 W	1	12	11	6	8
	2	8	6	3	4
85 W	1	12	10	5	7
	2	7	6	3	4
90 W	1	12	10	5	7
	2	7	5	3	4
105 W	1	11	9	5	6
	2	6	5	2	3
120 W	1	10	8	4	6
	2	6	4	2	3
135 W	1	10	8	4	5
	2	5	4	2	3
145 W	1	9	7	4	5
	2	5	4	2	3

Table 25. Number of compute nodes that are supported (-48 V DC Input, with 6 x 900 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
55 W	1	12	12	11	12
	2	12	11	6	8
65 W	1	12	12	10	12
	2	12	10	6	7
85 W	1	12	12	9	11
	2	11	9	5	6
90 W	1	12	12	9	11
	2	11	9	5	6
105 W	1	12	12	8	10
	2	10	8	4	5
120 W	1	12	12	7	9
	2	9	7	4	5
135 W	1	12	12	7	9
	2	8	7	4	5
145 W	1	12	12	7	8
	2	8	6	3	4

Processor options

The nx360 M5 supports the processor options that are listed in the following table.

Table 26. Processor options

Part number	Feature code*	Intel Xeon processors**	Where used
00FL166	A5HT / A5JA	Intel Xeon Processor E5-2603 v3 6C 1.6GHz 15MB 1600MHz 85W	-
00FL165	A5HS / A5J9	Intel Xeon Processor E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	-
00FL163	A5HQ / A5J7	Intel Xeon Processor E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	22x
00KA946	AS4N / AS4R	Intel Xeon Processor E5-2623 v3 4C 3.0GHz 10MB 1866MHz 105W	-
00FL162	A5HP / A5J6	Intel Xeon Processor E5-2630 v3 8C 2.4GHz 20MB 1866MHz 85W	-
00FL164	A5HR / A5J8	Intel Xeon Processor E5-2630L v3 8C 1.8GHz 20MB 1866MHz 55W	-
00FL169	A5HW / A5JD	Intel Xeon Processor E5-2637 v3 4C 3.5GHz 15MB 2133MHz 135W	-
00FL161	A5HN / A5J5	Intel Xeon Processor E5-2640 v3 8C 2.6GHz 20MB 1866MHz 90W	-
00FL168	A5HV / A5JC	Intel Xeon Processor E5-2643 v3 6C 3.4GHz 20 MB 2133MHz 135W	-
00FL159	A5HL / A5J3	Intel Xeon Processor E5-2650 v3 10C 2.3GHz 25MB 2133MHz 105W	42x
00FL160	A5HM / A5J4	Intel Xeon Processor E5-2650L v3 12C 1.8GHz 30MB 2133MHz 65W	-
00FL158	A5HK / A5J2	Intel Xeon Processor E5-2660 v3 10C 2.6GHz 25MB 2133MHz 105W	-
00FL167	A5HU / A5JB	Intel Xeon Processor E5-2667 v3 8C 3.2GHz 20MB 2133MHz 135W	-
00FL157	A5HJ / A5J1	Intel Xeon Processor E5-2670 v3 12C 2.3GHz 30MB 2133MHz 120W	-
00FL156	A5HH / A5J0	Intel Xeon Processor E5-2680 v3 12C 2.5GHz 30MB 2133MHz 120W	62x
00KA829	A5V0 / A5V1	Intel Xeon Processor E5-2683 v3 14C 2.0GHz 35MB 2133MHz 120W	-
00KG692	ASGP / ASGQ	Intel Xeon Processor E5-2685 v3 12C 2.6GHz 30MB 2133MHz 120W	-
00FL155	A5HG / A5HZ	Intel Xeon Processor E5-2690 v3 12C 2.6GHz 30MB 2133MHz 135W	-
00FL154	A5HF / A5HY	Intel Xeon Processor E5-2695 v3 14C 2.3GHz 35MB 2133MHz 120W	-
00KA945	AS4L / AS4P	Intel Xeon Processor E5-2698 v3 16C 2.3GHz 40MB 2133MHz 135W	-
00KA947	AS4M / AS4Q	Intel Xeon Processor E5-2699 v3 18C 2.3GHz 45MB 2133MHz 145W	-

* The first feature code corresponds to the first processor; the second feature code corresponds to the second processor.
** Processor detail: Model, core count, core speed, L3 cache, memory speed, and TDP power.

Memory options

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 on every System x server to maximize performance and reliability. TruDDR4 Memory has a unique signature that is programmed into the DIMM that enables System x servers to verify whether the memory installed is qualified/supported by Lenovo. Because TruDDR4 Memory is authenticated, certain extended memory performance features can be enabled to extend performance over industry standards. From a service and support standpoint, memory automatically assumes the Lenovo system warranty, and Lenovo provides service and support worldwide.

The NeXtScale nx360 M5 supports up to eight TruDDR4 Memory DIMMs when one processor is installed and up to 16x DIMMs when two processors are installed. Each processor has four memory channels, and there are two DIMMs per memory channel (2 DPC). RDIMMs and LRDIMMs are supported, but the mixing of these different types is not supported. UDIMMs are not supported.

The following table lists the memory options that are available for the nx360 M5 server.

Table 27. Memory options

Part number	Feature code	Description	Maximum supported	Models where used
2133 MHz RDIMMs & LRDIMMs				
46W0784	A5B6	4GB TruDDR4 Memory (1Rx8, 1.2V) PC4-17000 CL15 2133MHz LP RDIMM	16	-
46W0788	A5B5	8GB TruDDR4 Memory (1Rx4, 1.2V) PC4-17000 CL15 2133MHz LP RDIMM	16	-
95Y4808	A5UJ	32GB TruDDR4 Memory (2Rx4, 1.2V) PC4-17000 CL15 2133MHz LP RDIMM	16	-
46W0800	A5B9	32GB TruDDR4 Memory (4Rx4, 1.2V) PC417000 CL15 2133MHz LP LRDIMM	16	-
95Y4812	A5UK	64GB TruDDR4 Memory (4Rx4,1.2V) PC4-17000 CL15 2133MHz LP LRDIMM	16	-
2400 MHz RDIMMs & LRDIMMs (operates at a maximum of 2133 MHz)				
46W0821	ATC8	8GB TruDDR4 Memory (1Rx4, 1.2V) PC4-19200 CL17 2400MHz LP RDIMM	16	-
46W0825	ATC9	8GB TruDDR4 Memory (2Rx8, 1.2V) PC4-19200 CL17 2400MHz LP RDIMM	16	-
46W0829	ATCA	16GB TruDDR4 Memory (2Rx4, 1.2V) PC4-19200 CL17 2400MHz LP RDIMM	16	-
46W0833	ATCB	32GB TruDDR4 Memory (2Rx4, 1.2V) PC4-19200 CL17 2400MHz LP RDIMM	16	-

In the nx360 M5, the maximum memory speed of a configuration is the lower of the following two values:

- The memory speed of the processor
- The memory speed of the DIMM

The following memory protection technologies are supported:

- ECC

- Chipkill (x4 memory options only: 1Rx4, 2Rx4, and 4Rx4)

The following table shows the maximum memory speeds that are achievable. The table also shows the maximum memory capacity at any speed that is supported by the DIMM and the maximum memory capacity at the rated DIMM speed.

Table 28. Maximum memory speeds

Spec	**RDIMMs**		**LRDIMMs**
Rank	Single rank	Dual rank	Quad rank
Part numbers	46W0784 (4GB) 46W0788 (8GB)	46W0792 (8GB) 46W0796 (16GB) 95Y4808 (32 GB)	46W0800 (32GB) 95Y4812 (64 GB)
Rated speed	2133 MHz	2133 MHz	2133 MHz
Rated voltage	1.2 V	1.2 V	1.2 V
Operating voltage	1.2 V	1.2 V	1.2 V
Max quantity*	16	16	16
Largest DIMM	8 GB	32 GB	64 GB
Max memory capacity	128 GB	512 GB	1 TB
Max memory at rated speed	128 GB	256 GB	1 TB
Maximum operating speed (MHz)			
1 DIMM per channel	2133 MHz	2133 MHz	2133 MHz
2 DIMMs per channel	2133 MHz	2133 MHz	2133 MHz

* The maximum quantity that is supported is shown for two installed processors. When one processor is installed, the maximum quantity that is supported is half of that shown.

NeXtScale 12G Storage Native Expansion Tray

The NeXtScale 12G Storage Native Expansion Tray is a half-wide 1U expansion tray that attaches to the nx360 M5 to provide up to seven extra 3.5-inch simple-swap drives. The tray allows the configuration of storage-rich nx360 M5 compute nodes.

Note: The 12G Storage Native Expansion Tray and the PCIe Native Expansion Tray cannot be connected to the same compute node.

The following figure shows the storage tray attached to an nx360 M5 compute node.

Figure 6. NeXtScale 12G Storage Native Expansion Tray attached to an nx360 M5 compute node

Ordering information is listed in the following table.

Table 29. Ordering information

Part number	Feature code	Description
00KG601	ASGR	NeXtScale 12G Storage Native Expansion Tray

When the NeXtScale 12G Storage Native Expansion Tray is used, one of the following disk controller adapters must be installed in the front PCIe slot (slot 1) in the nx360 M5:

- ServeRAID M5210 SAS/SATA Controller for System x, 46C9110
- ServeRAID M1215 SAS/SATA Controller for System x, 46C9114
- N2215 SAS/SATA HBA for System x, 47C8675

No additional PCIe adapter is allowed for selection. The ML2 slot is still available.

Internal storage

The NeXtScale nx360 M5 server supports the following drives:

Internal drives:

- One 3.5-inch simple-swap HDD, or
- Four 2.5-inch HDDs or SSDs (two simple-swap and two hot-swap), or

Note: The server supports four 1.8-inch simple-swap SSDs, however all 1.8-inch drives are now withdrawn from marketing.

In addition, with optional expansion trays:

- Seven additional 3.5-inch simple-swap HDDs with the use of the NeXtScale 12G Storage Native Expansion Tray, or
- Four additional 2.5-inch hot-swap HDDs or SSDs with the use of the PCIe 2U Native Expansion Tray

Internal simple-swap drives

The NeXtScale nx360 M5 server supports the following internal drives to be installed at the rear of the server:

- Up to one 3.5-inch simple-swap HDD, or
- Up to two 2.5-inch simple-swap HDDs or SSDs

Use of 3.5-inch SAS and NL SAS drives: A 3.5-inch SAS and NL SAS drive is supported installed internally to the server only when the NeXtScale 12G Storage Native Expansion Tray is used. Without the NeXtScale 12G Storage Native Expansion Tray, the only 3.5-inch drives supported in the server are SATA or NL SATA drives.

Use of 2.5-inch SAS and NL SAS drives: 2.5-inch SAS drives are not supported in the internal (non-hot-swap) drive bays of the server if the 12G Storage Native Expansion Tray is attached.

The following figure shows the two available variations (1.8-inch drives are now withdrawn). These drives are installed internally in the server; to replace them the server must be powered down and removed from the n1200 enclosure.

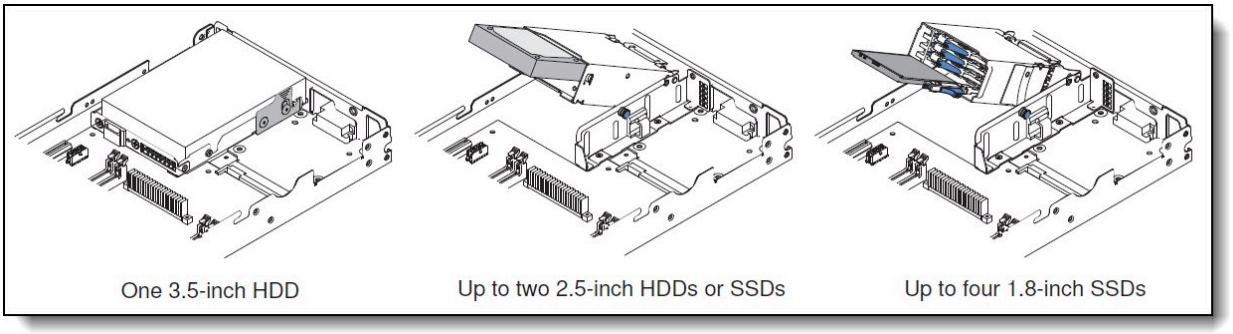

Figure 7. Drive bay options

These internal drives are installed in a drive cage. Ordering information for these drive cages are listed in the following table.

Table 30. Internal drive cages for the drive bay in the nx360 M5

Part number	Feature code	Description	Models where used
00KA895	A5V3	nx360 M5 1.8" Rear Drive Cage	-
00KA894	A5V2	nx360 M5 2.5" Rear Drive Cage	62x
00FL465	A5K1	nx360 M5 3.5" Rear Drive Cage	22x, 42x
00KG603	ASGS	nx360 3.5" HDD8 Cage - HW RAID*	-

* This single 3.5-inch drive cage is installed in the nx360 M5 when you have the 12G Storage Native Expansion Tray attached and want to configure all eight 3.5-inch drives as one RAID array using separate RAID adapter.

Hot-swap drives

In addition, if the internal drives are 2.5-inch drive bays (or if no internal drive bay is selected), then the server also supports two additional 2.5-inch drive bays. These are front accessible and are hot-swap drive bays. These hot-swap drive bays take the place of the full-height PCIe slot, as shown in the following figure.

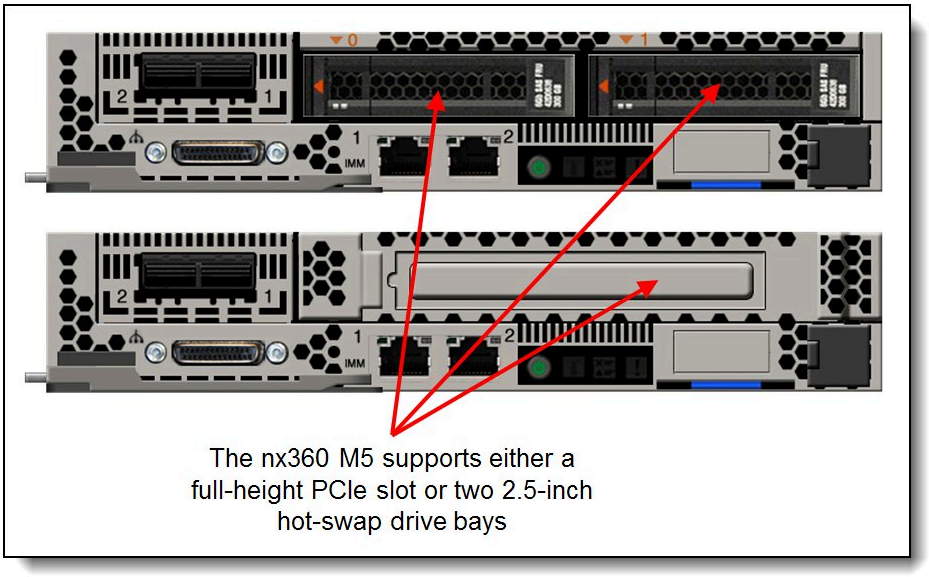

Figure 8. NeXtScale nx360 M5 configurations - hot-swap 2.5-inch drive bays or full-height PCIe slot

The following table shows the ordering information for the two 2.5-inch hot-swap drive bays.

Table 31. Drive cage for the hot-swap drive bay in the nx360 M5

Part number	Feature code	Description	Models where used
00FL175	A5NA	nx360 M5 2.5" Front Hot Swap Drive Cage	-

Note: Neither the 12G Storage Native Expansion Tray nor the PCIe 2U Native Expansion Tray can be used with the nx360 M5 2.5” Front Hot Swap Drive Cage

NeXtScale 12G Storage Native Expansion Tray

In addition to the drive bays internal to the server, the nx360 M5 supports seven additional 3.5-inch drive bays if the NeXtScale 12G Storage Native Expansion Tray is attached. The 12G Storage Native Expansion Tray can be used with any of the above four bay configurations to provide the following internal drive

combinations:

- Up to eight 3.5-inch simple-swap SATA, NL SATA or NL SAS drives
- Up to seven 3.5-inch simple-swap SATA, NL SATA or NL SAS drives and two 2.5-inch simple-swap SATA drives
- Up to seven 3.5-inch simple-swap SATA, NL SATA or NL SAS drives and four 1.8-inch simple-swap SATA SSDs

Drives that are used in the 12G Storage Native Expansion Tray do not need a cage.

There are two 3.5-inch drive cages (part numbers 00FL465 and 00KG603 in the last two rows of Table 30). If the 12G Storage Native Expansion Tray is attached to the nx360 M5, then the usage of the RAID cage (feature ASGS, option 00KG603) allows you to configure a RAID array that spans all eight drives, that is, the seven in the storage tray and the one drive internal to the nx360 M5. Such a configuration is connected either to a RAID adapter or SAS HBA; the usage of the internal SATA ports is not supported with this RAID cage.

If the 3.5-inch HDD cage (feature A5K1) is used, then a RAID array can be formed only with the seven drives in the storage tray. In such a configuration, the drives in the storage tray are connected either to RAID adapter or SAS HBA, and the single drive in the nx360 M5 is connected to an onboard SATA port.

These use of the storage tray requires a RAID controller or SAS HBA installed in the PCIe slot at the front of the server. The use a controller installed in the dedicated RAID slot at the rear of the server is not supported.

NeXtScale PCIe 2U Native Expansion Tray

As an alternative to the Storage Native Expansion Tray, the PCIe 2U Native Expansion Tray offers up to 4 additional 2.5-inch hot-swap drive bays beyond the bays internal to the server. The following drive combinations are supported:

- One 3.5-inch simple-swap SATA, NL SATA or NL SAS drive (internal) and up to four 2.5-inch hot-swap SAS/SATA drives (expansion tray)
- Two 2.5-inch simple-swap SATA drives (internal) and up to four 2.5-inch hot-swap SAS/SATA drives (expansion tray)
- Four 1.8-inch simple-swap SATA SSDs (internal) and up to four 2.5-inch hot-swap SAS/SATA drives (expansion tray)

The use of the four 2.5-inch hot-swap drive bays in the expansion tray require an optional backplane as listed in the following table.

Table 32. Backplane for the hot-swap drive bays in the PCIe 2U Native Expansion Tray

Part number	Feature code	Description	Models where used
44X4104	A4A6	4x 2.5" HDD Riser (Backplane and SAS cable)	-

These drive bays in the require a RAID controller or SAS HBA installed in the dedicated RAID slot at rear of the server.

For more information see the section NeXtScale PCIe 2U Native Expansion Tray.

Controllers for internal storage

The onboard SATA controller (integrated into the Intel C612 chipset) supports any of the following drive configurations:

- One 3.5-inch simple-swap SATA or NL SATA drive
- Up to two 2.5-inch simple-swap NL SATA drives
- Up to four 1.8-inch SATA Enterprise Value SSDs

The following drive combinations may be used instead with a RAID controller or SAS/SATA HBA that is installed in the internal RAID adapter riser slot:

- Up to two 2.5-inch simple-swap NL SATA drives
- Up to four 1.8-inch SATA Enterprise Value SSDs

Any of the following drive configurations *require* a RAID controller or SAS/SATA HBA that is installed in the internal RAID adapter riser slot:

- A 3.5-inch SAS or NL SAS simple-swap drive installed in the server
- Up to two 2.5-inch simple-swap SAS drives
- Up to two 2.5-inch hot-swap drives (installed in the front drive bays)
- Up to two 2.5-inch simple-swap SAS drives plus up to four 2.5-inch hot-swap drives installed in the PCIe 2U Native Expansion Tray.

The supported RAID controller or SAS/SATA host bus adapter is installed in a dedicated RAID adapter slot, through a riser card, at the rear of the server that is adjacent to the internal drive bays. Installation of the adapter is shown in the following figure.

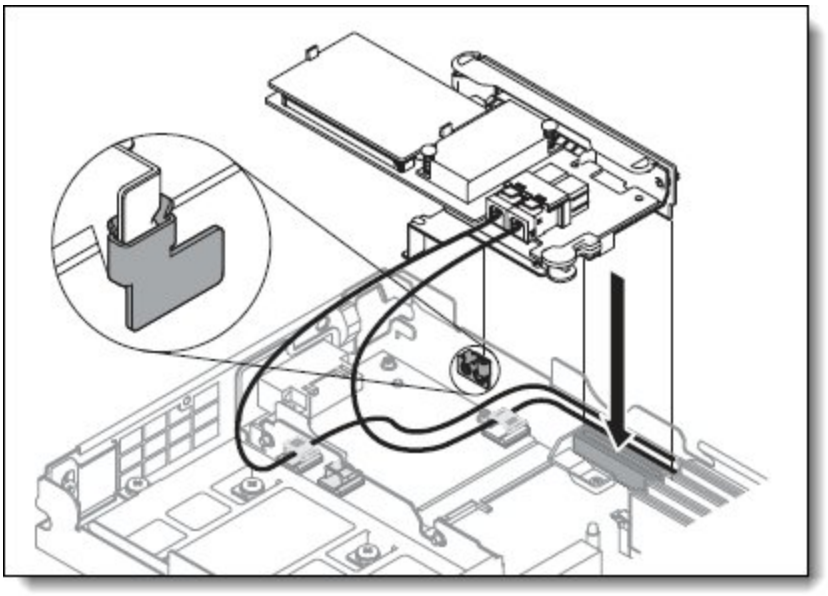

Figure 9. RAID controller and RAID riser card installation

When the NeXtScale 12G Storage Native Expansion Tray is used, the RAID controller or SAS/SATA host bus adapter must be installed in the front PCIe slot (slot 1) in the nx360 M5. The installed drives are connected as follows:

- The 3.5-inch drives in the storage tray are connected to the RAID controller or HBA
- If any 1.8-inch or 2.5-inch simple-swap drives are installed in the server, they are connected to the onboard SATA controller

- If a 3.5-inch SATA or NL SATA drive is installed in the server, it may be either connected to the on board SATA controller or to the RAID controller or HBA.
- If a 3.5-inch SAS or NL SAS drive is installed in the server, it is connected to the RAID controller or HBA

The following table lists the RAID controllers and HBAs that are used for internal disk storage of the nx360 M5 server and the Riser card that is needed to install the adapter.

Table 33. Drive controllers for internal storage

Part number	Feature code	Description	Maximum supported
Riser card for RAID adapter			
00FL179	A5JZ	nx360 M5 RAID Riser	1
RAID Controllers and SAS Host Bus Adapters			
46C9110	A3YZ	ServeRAID M5210 SAS/SATA Controller for System x	1*
46C9114	A45W	ServeRAID M1215 SAS/SATA Controller for System x	1*
47C8675	A3YY	N2215 SAS/SATA HBA for System x	1*
Hardware upgrades - ServeRAID M5210			
47C8656	A3Z0	ServeRAID M5200 Series 1GB Cache/RAID 5 Upgrade-FoD	1
47C8660	A3Z1	ServeRAID M5200 Series 1GB Flash/RAID 5 Upgrade-FoD	1
47C8664	A3Z2	ServeRAID M5200 Series 2GB Flash/RAID 5 Upgrade-FoD	1
47C8668	A3Z3	ServeRAID M5200 Series 4GB Flash/RAID 5 Upgrade-FoD	1
Features on Demand Upgrades - ServeRAID M5210			
47C8706	A3Z5	ServeRAID M5200 Series RAID 6 Upgrade-FoD	1
47C8708	A3Z6	ServeRAID M5200 Series Zero Cache/RAID 5 Upgrade-FoD	1
47C8710	A3Z7	ServeRAID M5200 Series Performance Accelerator-FoD	1
47C8712	A3Z8	ServeRAID M5200 Series SSD Caching Enabler-FoD	1
Features on Demand Upgrades - ServeRAID M1215			
00AE930	A5H5	ServeRAID M1200 Zero Cache/RAID 5 Upgrade FOD	1

* Mutually exclusive. Only one of these adapters is supported in the nx360 M5 and it requires RAID Riser 00FL179 when installed in the internal RAID slot.

Controller specifications

The ServeRAID M5210 SAS/SATA Controller has the following specifications:

- Eight internal 12 Gbps SAS/SATA ports
- 12 Gbps throughput per port
- Based on the LSI SAS3108 12 Gbps ROC controller
- Two mini-SAS HD internal connectors (SFF8643)
- Supports connections to SAS/SATA drives and SAS Expanders
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M5200 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5200 Series RAID 6 Upgrade
- Supports 1 GB cache (no battery backup) or 1 GB or 2 GB flash-backed cache
- Supports performance upgrades through Features on Demand

The ServeRAID M1215 SAS/SATA Controller has the following specifications:

- Eight internal 12 Gbps SAS/SATA ports
- Up to 12 Gbps throughput per port

- Two internal mini-SAS HD connectors (SFF8643)
- Based on the LSI SAS3008 12 Gbps RAID on Chip (ROC) controller
- Support for RAID levels 0, 1, and 10 standard; support for RAID 5 and 50 with optional FoD upgrade
- Zero Controller Cache, no battery/flash backup
- Optional support for self-encrypting drives (SEDs) with MegaRAID SafeStore (with RAID 5 upgrade)
- Fixed stripe size of 64 KB

For more information, see the list of Lenovo Press Product Guides in the RAID adapters category:
https://lenovopress.com/servers/options/raid

The N2215 SAS/SATA HBA has the following specifications:

- Eight internal 12 Gbps SAS/SATA ports (support for 12, 6, or 3 Gbps SAS speeds and 6 or 3 Gbps SATA speeds)
- Up to 12 Gbps throughput per port
- Two internal x4 HD Mini-SAS connectors (SFF-8643)
- Based on the LSI SAS3008 12 Gbps controller
- Non-RAID (JBOD mode) support for SAS and SATA HDDs and SSDs (RAID not supported)
- PCI low profile, half-length - MD2 form factor
- PCI Express 3.0 x8 host interface
- Optimized for SSD performance
- High-performance IOPS LSI Fusion-MPT architecture
- Advanced power management support
- Support for SSP, SMP, STP, and SATA protocols
- End-to-End CRC with Advanced Error Reporting
- T-10 Protection Model for early detection of and recovery from data corruption
- Spread Spectrum Clocking for EMI reductions

For more information about this SAS/SATA HBA, see the list of Lenovo Press Product Guides in the host bus adapters category:
https://lenovopress.com/servers/options/hba

The following table lists the SAS/SATA cables supported for connection from the onboard SATA controller, RAID controller or SAS/SATA HBA to the various drive cages.

Note: The 4x 2.5" backplane option (44X4104) for the NeXtScale PCIe 2U Native Expansion Tray includes the SAS cable needed to connect the backplane to the RAID controller.

Table 34. SAS/SATA cables

Part number	Feature code	Description
00FL170	A5K3	nx360 M5 1x2, 2.5” 12G HDD short cable, HW RAID (stack-up)
00FL173	A5K7	nx360 M5 1.8” SSD 12G short cable vertical (HW RAID)
00KA360	A5QH	nx360 M5 1x2, 2.5” 12G HDD short cable, HW RAID (stack-up) Port 1
00FL466	A5K4	nx360 M5 2.5” HDD 2x cable right angle cable (no RAID)
00FL467	A5K5	nx360 M5 Rear SSD cable 1.8” server node 4 SSD to planar (no RAID)

The following table indicates the required combination of drive cage, SAS/SATA adapter and SAS/SATA cable based on the drive type selected.

Table 35. Drive cages and cables required based on drive type and adapter

Drive type	Max drive qty	Cage feature code	Cable feature code No RAID		Cable feature code Hardware RAID	
			On board SATA	N2215 HBA	ServeRAID M1215	ServeRAID M5210
Simple-Swap rear drives only						
1.8-inch SS SATA SSD	4	A5V3	A5K5	A5K7	A5K7	A5K7
2.5-inch SS SATA HDD	2	A5V2	A5K4	A5K3	A5K3	A5K3
2.5-inch SS SATA SSD	2	A5V2	A5K4	A5K3	A5K3	A5K3
2.5-inch SS SAS HDD	2	A5V2	No support	A5K3	A5K3	A5K3
2.5-inch SS SAS SED HDD	2	A5V2	No support	No support	A5K3	A5K3
3.5-inch SS SATA HDD	1	A5K1	With cage(a)	No support	No support	No support
3.5-inch SS NL SATA HDD	1	A5K1	With cage(a)	No support	No support	No support
3.5-inch SS NL SAS HDD	0	No support	No support	No support	No support	No support
3.5-inch SS NL SAS SED HDD	0	No support	No support	No support	No support	No support
Host-Swap drives only						
2.5-inch HS SAS HDD	2	A5NA	No support	With cage(a)	With cage(a)	With cage(a)
2.5-inch HS NL SATA HDD	2	A5NA	No support	With cage(a)	With cage(a)	With cage(a)
2.5-inch HS SATA SSD	2	A5NA	No support	With cage(a)	With cage(a)	With cage(a)
2.5-inch HS SAS SSD	2	A5NA	No support	With cage(a)	With cage(a)	With cage(a)
2.5-inch HS SAS SED HDD	2	A5NA	No support	No support	With cage(a)	With cage(a)
2.5-inch HS SAS SED SSD	2	A5NA	No support	No support	With cage(a)	With cage(a)
Mixed Simple-Swap and Hot-Swap drives (b)						
2.5-inch Drives	2 + 2	A5V2 + A5NA	No support	A5QH(c)	A5QH(c)	A5QH(c)
2.5-inch Drives SED (d)	2 + 2	A5V2 + A5NA	No support	No support	A5QH(c)	A5QH(c)
With 12G Storage Native Expansion Tray attached (adds 7x 3.5-inch bays) (two controllers) (e)						
1.8-inch SS SSD	4 + 7	A5V3	A5K5(f)	With tray(g)	With tray(g)	With tray(g)
2.5-inch SS (NL) SATA HDD	2 + 7	A5V2	A5K4(f)	With tray(g)	With tray(g)	With tray(g)
2.5-inch SS (NL) SATA SSD	2 + 7	A5V2	A5K4(f)	With tray(g)	With tray(g)	With tray(g)
3.5-inch SS (NL) SATA HDD	1 + 7	A5K1	With cage(a)	With tray(g)	With tray(g)	With tray(g)
3.5-inch SS NL SAS HDD	0 + 7	None	None	With tray(g)	With tray(g)	With tray(g)
3.5-inch SS NL SAS SED	0 + 7	None	None	No support	With tray(g)	With tray(g)
With 12G Storage Native Expansion Tray attached (adds 7x 3.5-inch bays) (one controller for all drives)						
3.5-inch Drive	8	ASGS + ASGR	No support	With cage(a) & tray(g)	With cage(a) & tray(g)	With cage(a) & tray(g)
3.5-inch Drive SED	8	ASGS + ASGR	No support	No support	With cage(a) & tray(g)	With cage(a) & tray(g)

(a) Cable is provided with the cage.
(b) Any combination of 2.5-inch drive is allowed if no hardware RAID is required. For all four disks to be part of the same RAID array they need to have similar interface, capacity and speed. Alternatively 2 pairs of similar drives can be used to be part of 2 separate RAID arrays.
(c) The second cable is provided with the hot-swap cage.
(d) At least one of the drives is a Self-Encrypting Drive.
(e) The two controllers must be: (1) onboard SATA for internal rear SS drives, and (2) N2215 or ServeRAID

M1215 or ServeRAID M5210 for drives in the storage tray.
(f) Cable used to connect the rear SS drives to the onboard SATA controller.
(g) Cable is provided with the tray to connect to the controller.

Internal drive options

The following tables list hard disk drive options for the internal disk storage of the nx360 M5 server. Here are relevant configuration rules:

- As described in the Internal storage section, the server supports multiple drive form factors:
  - Internal simple-swap drives in 1.8-inch, 2.5-inch, or 3.5-inch form factors (all 1.8-inch drives now withdrawn from marketing)
  - Hot-swap drives in 2.5-inch form factor
- The server supports multiple drive types:
  These drive types can be intermixed in a server and on the same RAID controller, but they cannot be intermixed in the same RAID array. In other words, all drives in a single RAID array must be either all SAS (and NL SAS) or all SATA (and NL SATA), and must have the same size and speed.
  - SATA, NL SATA, SAS and NL SAS HDDs
  - SAS and SATA SSDs
  - SAS and NL SAS SED HDDs
  - SAS SED SSDs
- Mixing front hot-swap and internal (simple-swap) drives: Only 2.5-inch internal drives are supported in combination with 2.5-inch hot-swap drives. The 1.8-inch and 3.5-inch internal drives are not supported when 2.5-inch hot-swap drives are installed.
- SAS and NL SAS drives require a RAID adapter or HBA. The onboard SATA controller does not support SAS or NL SAS drives.
- The use of a 3.5-inch 12Gb SAS or NL SAS drive in the internal bay of the server is only supported if the 12G Storage Native Expansion Tray is attached.
- 2.5-inch SAS and NL SAS drives are not supported in the internal bays of the server if the 12G Storage Native Expansion Tray is attached.

Configurator tip: In order to mix hot-swap (front) and simple-swap (internal) HDDs with x-config configurator tool, you need to click the “Split” button of the “SFF Slim SAS SATA section”.

Self-encrypting drives (SEDs)

The following tables list a number of self-encrypting drives (SEDs). In order to use these drives, they need to be combined with a compatible RAID controller.

The SEDs are selectable with ServeRAID M5210 or ServeRAID M1215 controllers. In addition either of the following RAID Upgrade or FOD is required:

- ServeRAID M5210 SAS/SATA Controller for System x (PN 46C9110 / FC A3YZ) upgrades:
  - ServeRAID M5210 1GB Cache RAID 5 Upgrade (PN 47C8656 / FC A3Z0)
  - ServeRAID M5210 1GB Flash RAID 5 Upgrade (PN 47C8660 / FC A3Z1)
  - ServeRAID M5210 2GB Flash RAID 5 Upgrade (PN 47C8664 / FC A3Z2)
  - ServeRAID M5210 4GB Flash RAID 5 Upgrade (PN 47C8668 / FC A3Z3) or
  - ServeRAID M5200 Series Zero Cache/RAID 5 Upgrade (PN 47C8708 / FC A3Z6)
- ServeRAID M1215 SAS/SATA Controller for System x (PN 46C9114 / FC A45W) upgrades:
  - ServeRAID M1200 Zero Cache/RAID 5 Upgrade FOD (PN 00AE930 / FC A5H5)

In addition FC 5977 (no Lenovo-configured RAID required) must be selected. The RAID configuration will not be performed in the manufacturing plant with self-encrypting drives.

Drive options

The internal drives supported are listed in the following tables:

- Table 36: 2.5-inch internal 12 Gb HDDs for NeXtScale

- Table 37: 2.5-inch internal 6 Gb HDDs for NeXtScale
- Table 38: 2.5-inch internal 6 Gb SSDs for NeXtScale
- Table 39: 3.5-inch internal 12 Gb HDDs for NeXtScale
- Table 40: 3.5-inch internal 6 Gb HDDs for NeXtScale

The hot-swap drives supported are listed in the following tables:

- Table 41: 2.5-inch hot-swap 12 Gb SAS/SATA HDDs
- Table 42: 2.5-inch hot-swap 6 Gb SAS/SATA HDDs
- Table 43: 2.5-inch hot-swap 12 Gb SAS/SATA SSDs
- Table 44: 2.5-inch hot-swap 6 Gb SAS/SATA SSDs

Table 36. 2.5-inch internal 12 Gb HDDs for NeXtScale

Part number	Feature code	Description	Maximum supported
2.5-inch NeXtScale HDDs - 12 Gb SAS 10K HDDs			
00WG725	AT8H	300GB 10K 12Gbps SAS 2.5" HDD for NeXtScale System	2
00WG730	AT8J	600GB 10K 12Gbps SAS 2.5" HDD for NeXtScale System	2
00WG735	AT8K	900GB 10K 12Gbps SAS 2.5" HDD for NeXtScale System	2
00WG740	AT8L	1.2TB 10K 12Gbps SAS 2.5" HDD for NeXtScale System	2
00NA356	ASC4	1.8TB 10K 12Gbps SAS 2.5" 512e HDD for NeXtScale System	2
01GV075	B0YU	2.4TB 10K 12Gbps SAS 2.5" 512e HDD for NeXtScale System	2

Table 37. 2.5-inch internal 6 Gb HDDs for NeXtScale

Part number	Feature code	Description	Maximum supported
2.5-inch NeXtScale HDDs - 6 Gb SAS 15K HDDs			
00WG670	AT86	300GB 15K 12Gbps SAS 2.5" HDD for NeXtScale System	2
2.5-inch NeXtScale HDDs - 6 Gb NL SATA HDDs			
00NA566	AT83	2TB 7.2K 6Gbps NL SATA 2.5" 512e HDD for NeXtScale System	2
2.5-inch NeXtScale HDDs - 6 Gb SATA HDDs			
00AD035	A48B	500GB 7.2K 6Gbps SATA 2.5" HDD for NeXtScale System	2
00AD040	A48C	1TB 7.2K 6Gbps SATA 2.5" HDD for NeXtScale System	2

Table 38. 2.5-inch internal 6 Gb SSDs for NeXtScale

Part number	Feature code	Description	Maximum supported
2.5-inch NeXtScale SSDs - 6 Gb SATA - Enterprise Mainstream (3-5 DWPD)			
4XB7A08501	B10J	Intel S4600 240GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
7SD7A05707	B10K	Intel S4600 480GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
7SD7A05706	B10L	Intel S4600 960GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
7SD7A05705	B10M	Intel S4600 1.92TB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
01GV888	AXHE	5100 240GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
01GV893	AXHF	5100 480GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2

Part number	Feature code	Description	Maximum supported
01GV898	AXHG	5100 960GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
01GV903	AXHH	5100 1.92TB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
01GV095	AXHJ	5100 3.84TB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
00YK262	AU3N	Intel S3610 480GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
00YK267	AU3P	Intel S3610 800GB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
00YK272	AU3Q	Intel S3610 1.2TB Enterprise Mainstream SATA 2.5" SSD for NeXtScale	2
2.5-inch NeXtScale SSDs - 6 Gb SATA - Enterprise Entry (<3 DWPD)			
7SD7A05726	B0ZJ	Intel S4500 240GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
7SD7A05725	B0ZK	Intel S4500 480GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
7SD7A05724	B0ZL	Intel S4500 960GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
4XB7A08497	B0ZM	Intel S4500 1.92TB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
4XB7A08498	B0ZN	Intel S4500 3.84TB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01KR536	AXHK	5100 480GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01KR541	AXHL	5100 960GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01KR546	AXHM	5100 1.92TB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01KR551	AXHN	5100 3.84TB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR756	AUEL	Intel S3520 240GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR761	AUEN	Intel S3520 480GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01KR476	AXGH	Intel S3520 800GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR766	AUEQ	Intel S3520 960GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR812	AXGJ	Intel S3520 1.2TB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR827	AXGK	Intel S3520 1.6TB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR861	AVHV	PM863a 240GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR866	AVHW	PM863a 480GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR886	AVHX	PM863a 960GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
01GR716	AUE8	1.92TB Enterprise Entry SATA 2.5" SSD for NeXtScale (PM863a)	2
00YC430	AT90	240GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2
00YC440	AT92	960GB Enterprise Entry SATA 2.5" SSD for NeXtScale	2

Table 39. 3.5-inch internal 12 Gb SAS HDDs for NeXtScale

Part number	Feature code	Description	Maximum supported
3.5-inch NeXtScale HDDs - 12 Gb NL SAS HDDs			
00YK331	AU8H	4TB 7.2K 12Gbps NL SAS 3.5" HDD for NextScale System	0 / 8†

† 3.5-inch SAS drives not supported if the 12G Storage Native Expansion Tray is not attached. 8 drives supported if the 12G Storage Native Expansion Tray is attached: 7 drives in the tray + 1 drive in the server.

Table 40. 3.5-inch internal 6 Gb HDDs for NeXtScale

Part number	Feature code	Description	Maximum supported†
3.5-inch NeXtScale HDDs - 6 Gb NL SATA and SATA			
00AD010	A487	1TB 7.2K 6Gbps SATA 3.5" HDD for NeXtScale System	1 / 8

Part number	Feature code	Description	Maximum supported†
00FN123	A5VV	2TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NextScale System	1 / 8
00AD025	A4GC	4TB 7.2K 6Gbps SATA 3.5" HDD for NeXtScale System	1 / 8
00FN183	A5VZ	6TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NextScale System	1 / 8
00WH131	ATRU	8TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NeXtScale System	1 / 8
00YK346	AU7T	10TB 7.2K 6Gbps NL SATA 3.5'' 512e HDD for NeXtScale System	1 / 8
01GV065	B11B	12TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NeXtScale System	1 / 8

† 1 drive supported if the 12G Storage Native Expansion Tray is not attached. 8 drives supported if the 12G Storage Native Expansion Tray is attached: 7 drives in the tray + 1 drive in the server.

Table 41. 2.5-inch hot-swap 12 Gb SAS/SATA HDDs

Part number	Feature code	Description	Maximum supported†
2.5-inch hot-swap HDDs - 12 Gb SAS 10K			
00WG685	AT89	300GB 10K 12Gbps SAS 2.5" G3HS HDD	2 / 4
00WG690	AT8A	600GB 10K 12Gbps SAS 2.5" G3HS HDD	2 / 4
00WG695	AT8B	900GB 10K 12Gbps SAS 2.5" G3HS HDD	2 / 4
00WG700	AT8C	1.2TB 10K 12Gbps SAS 2.5" G3HS HDD	2 / 4
00NA271	ASBM	1.8TB 10K 12Gbps SAS 2.5" G3HS 512e HDD	2 / 4
2.5-inch hot-swap HDDs - 12 Gb SAS 15K			
00WG660	AT84	300GB 15K 12Gbps SAS 2.5" G3HS HDD	2 / 4
00WG665	AT85	600GB 15K 12Gbps SAS 2.5" G3HS HDD	2 / 4
2.5-inch hot-swap HDDs - 12 Gb NL SAS			
00NA491	AT7Z	1TB 7.2K 12Gbps NL SAS 2.5" G3HS HDD	2 / 4
00NA496	AT80	2TB 7.2K 12Gbps NL SAS 2.5" G3HS 512e HDD	2 / 4
2.5-inch hot-swap SEDs - 12 Gb SAS 10K			
00WG705	AT8D	300GB 10K 12Gbps SAS 2.5" G3HS SED	2 / 4
00WG710	AT8E	600GB 10K 12Gbps SAS 2.5" G3HS SED	2 / 4
00WG715	AT8F	900GB 10K 12Gbps SAS 2.5" G3HS SED	2 / 4
00WG720	AT8G	1.2TB 10K 12Gbps SAS 2.5" G3HS SED	2 / 4

† Maximum quantity is 2 if installed in the front-accessible bays inside the server, or 4 if installed in the NeXtScale PCIe 2U Native Expansion Tray

Table 42. 2.5-inch hot-swap 6 Gb SAS/SATA HDDs

Part number	Feature code	Description	Maximum supported†
2.5-inch hot-swap HDDs - 6 Gb NL SATA			
00AJ136	A4TW	500GB 7.2K 6Gbps NL SATA 2.5" G3HS HDD	2 / 4
00AJ141	A4TX	1TB 7.2K 6Gbps NL SATA 2.5" G3HS HDD	2 / 4
00NA526	AT81	2TB 7.2K 6Gbps NL SATA 2.5" G3HS 512e HDD	2 / 4

† Maximum quantity is 2 if installed in the front-accessible bays inside the server, or 4 if installed in the NeXtScale PCIe 2U Native Expansion Tray

Table 43. 2.5-inch hot-swap 12 Gb SAS/SATA SSDs

Part number	Feature code	Description	Maximum supported†
2.5-inch hot-swap SSDs - 12 Gb SAS - Enterprise Performance (10+ DWPD)			
01GV711	AVL0	400GB Enterprise Performance 12G SAS G3HS 2.5" SSD	2 / 4
01GV716	AVL1	800GB Enterprise Performance 12G SAS G3HS 2.5" SSD	2 / 4
01GV721	AVL2	1.6TB Enterprise Performance 12G SAS G3HS 2.5" SSD	2 / 4
00FN379	AS7C	200GB 12G SAS 2.5" MLC G3HS Enterprise SSD	2 / 4
00FN389	AS7E	400GB 12G SAS 2.5" MLC G3HS Enterprise SSD	2 / 4
00FN399	AS7G	800GB 12G SAS 2.5" MLC G3HS Enterprise SSD	2 / 4
00FN409	AS7J	1.6TB 12G SAS 2.5" MLC G3HS Enterprise SSD	2 / 4
2.5-inch hot-swap SSDs - 12 Gb SAS - Enterprise Mainstream (3-5 DWPD)			
00YC465	AT9N	800GB Enterprise Mainstream 12Gb SAS G3HS 2.5" SSD	2 / 4

† Maximum quantity is 2 if installed in the front-accessible bays inside the server, or 4 if installed in the NeXtScale PCIe 2U Native Expansion Tray

Table 44. 2.5-inch hot-swap 6 Gb SAS/SATA SSDs

Part number	Feature code	Description	Maximum supported†
2.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Performance (10+ DWPD)			
00YC330	AT9E	Intel S3710 800GB Enterprise Performance SATA G3HS 2.5" SSD	2 / 4
2.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Mainstream (3-5 DWPD)			
4XB7A08499	B10A	Intel S4600 240GB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
7SD7A05713	B10B	Intel S4600 480GB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
7SD7A05712	B10C	Intel S4600 960GB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
7SD7A05711	B10D	Intel S4600 1.92TB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
01GV843	AXFV	5100 240GB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
01GV848	AXFW	5100 480GB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
01GV853	AXFX	5100 960GB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
01GV858	AXFY	5100 1.92TB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
01GV863	AXFZ	5100 3.84TB Enterprise Mainstream SATA G3HS 2.5" SSD	2 / 4
00AJ405	A579	480GB SATA 2.5" MLC G3HS Enterprise Value SSD	2 / 4
00AJ410	A57A	800GB SATA 2.5" MLC G3HS Enterprise Value SSD	2 / 4
2.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Entry (<3 DWPD)			
7SD7A05732	B0Z8	Intel S4500 240GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
7SD7A05731	B0Z9	Intel S4500 480GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
7SD7A05730	B0ZA	Intel S4500 960GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
4XB7A08493	B0ZB	Intel S4500 1.92TB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
4XB7A08494	B0ZC	Intel S4500 3.84TB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01KR496	AXGL	5100 480GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01KR501	AXGM	5100 960GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01KR506	AXGN	5100 1.92TB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4

Part number	Feature code	Description	Maximum supported†
01KR511	AXGP	5100 3.84TB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01KR466	AXGB	Intel S3520 800GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01GR802	AXGD	Intel S3520 1.2TB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01GR817	AXGF	Intel S3520 1.6TB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01GR836	AVHP	PM863a 240GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01GR841	AVHQ	PM863a 480GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
01GR846	AVHR	PM863a 960GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
00WG630	AT95	Intel S3510 480GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
00YC385	AT8R	120GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
00YC390	AT8S	240GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4
00YC400	AT8U	960GB Enterprise Entry SATA G3HS 2.5" SSD	2 / 4

† Maximum quantity is 2 if installed in the front-accessible bays inside the server, or 4 if installed in the NeXtScale PCIe 2U Native Expansion Tray

Internal tape drives

The server does not support internal tape drive options.

Optical drives

The server does not support an internal optical drive option, however, you can connect an external USB optical drive. See http://support.lenovo.com/en/documents/pd011281 for information about available external optical drives from Lenovo.

I/O expansion options

The nx360 M5 offers the following I/O expansion options:

- One PCIe 3.0 x16 ML2 adapter slot (optional, front accessible)
- One PCIe 3.0 x16 full-height half-length slot (optional, front accessible)
- One PCIe 2.0 x8 slot for internal RAID controller (optional, not front accessible)

Notes:

- Each slot requires a riser card, as listed in the following table.
- The use of the PCIe full-height slot and the use of the two 2.5-inch hot-swap drive bays are mutually exclusive.
- When the PCIe Native Expansion Tray is installed, the full-height half-length slot becomes a PCIe 3.0 x8 interface (x8 connector).
- When the 12G Storage Native Expansion Tray is installed, the front accessible PCIe slot is used to host the RAID controller or the SAS/SATA HBA.

The front accessible slots are shown in the following figure. The internal slot for the RAID controller is shown in Figure 3.

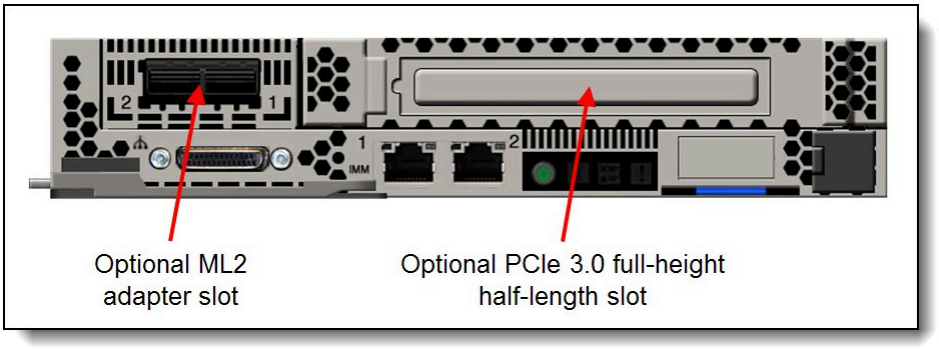

Figure 10. Optional front accessible PCIe slots

With the addition of the NeXtScale PCIe Native Expansion Tray, the server has two additional PCIe 3.0 x16 full-height full-length double-width slots, as described in the "NeXtScale PCIe Native Expansion Tray" section.

The ordering information for optional risers for the three slots is listed in the following table.

Table 45. Riser card options

Part number	Feature code	Description	Maximum supported
00FL180	A5JV	nx360 M5 ML2 Riser	1
00FL464	A5JY	nx360 M5 Compute Node Front Riser	1
00FL179	A5JZ	nx360 M5 RAID Riser	1

Network adapters

The nx360 M5 offers two Gigabit Ethernet ports with the following features:

- Broadcom BCM5717 Gigabit Ethernet controller
- TCP/IP Offload Engine (TOE) support
- Wake on LAN support
- Receive side Scaling (RSS) and Transmit side Scaling (TSS) support
- MSI and MSI-X capability (up to five MSI-X vectors)
- VLAN tag support (IEEE 802.1Q)
- Layer 2 priority encoding (IEEE 802.1p)
- Link aggregation (IEEE 802.3ad)
- Full-duplex flow control (IEEE 802.3x)
- IP, TCP, and UDP checksum offload (hardware based) on Tx/Rx over IPv4/IPv6
- Hardware TCP segmentation offload over IPv4/IPv6
- Jumbo frame support
- NIC Teaming (Load Balancing and Failover)
- One port that is shared with IMM2 by using the Network Controller-Sideband Interface (NC-SI)

The nx360 M5 server supports a Mezzanine LOM Generation 2 (ML2) adapter with a dedicated slot at the front of the server, as shown in the previous figure. The usage of an ML2 adapter also requires the installation of the ML2 Riser card. The Riser card and supported adapters are listed in the following table.

Table 46. Mezzanine LOM Gen 2 (ML2) Adapters

Part number	Feature code	Description
Riser card for ML2 adapters		
00FL180	A5JV	nx360 M5 ML2 Riser
ML2 Ethernet adapters		
00D2026	A40S	Broadcom NetXtreme II ML2 Dual Port 10GbaseT for System x
00D2028	A40T	Broadcom NetXtreme II ML2 Dual Port 10GbE SFP+ for System x*
01CV770	AU7Z	Emulex VFA5.2 ML2 2x10 GbE SFP+ Adapter and FCoE/iSCSI SW*
00AG560	AT7U	Emulex VFA5.2 ML2 Dual Port 10GbE SFP+ Adapter*
00JY940	ATRH	Intel X710-DA2 ML2 2x10GbE SFP+ Adapter
00FP650	A5RK	Mellanox ConnectX-3 Pro ML2 2x40GbE/FDR VPI Adapter for System x*
00MN990	ATZR	Mellanox ConnectX-4 Lx ML2 1x25GbE SFP28 Adapter
ML2 InfiniBand adapters		
00FP650	A5RK	Mellanox ConnectX-3 Pro ML2 2x40GbE/FDR VPI Adapter for System x*

* These adapters require either transceivers or direct-attach copper (DAC) cables. See the tables below.

The following table lists additional supported network adapters in the standard full-height half-length PCIe slot. The usage of an adapter in this slot also requires the installation of the PCIe Riser card.

Table 47. Network adapters

Part number	Feature code	Description
Riser card for PCIe adapters		
00FL464	A5JY	nx360 M5 Compute Node Front Riser
40 Gb Ethernet		
00D9550	A3PN	Mellanox ConnectX-3 40GbE / FDR IB VPI Adapter for System x*

00MM950	ATRN	Mellanox ConnectX-4 Lx 1x40GbE QSFP28 Adapter*
25 Gb Ethernet		
01GR250	AUAJ	Mellanox ConnectX-4 Lx 2x25GbE SFP28 Adapter*
10 Gb Ethernet		
44T1370	A5GZ	Broadcom NetXtreme 2x10GbE BaseT Adapter for System x
00AG570	AT7S	Emulex VFA5.2 2x10 GbE SFP+ PCIe Adapter*
00AG580	AT7T	Emulex VFA5.2 2x10 GbE SFP+ Adapter and FCoE/iSCSI SW*
49Y7960	A2EC	Intel X520 Dual Port 10GbE SFP+ Adapter*
49Y7970	A2ED	Intel X540-T2 Dual Port 10GBaseT Adapter
00MM860	ATPX	Intel X550-T2 Dual Port 10GBase-T Adapter
01DA900	AU2Y	Intel X710-DA2 2x10GbE SFP+ Adapter*
00D9690	A3PM	Mellanox ConnectX-3 10 GbE Adapter for System x*
Gigabit Ethernet		
94Y5180	A4Z6	Broadcom NetXtreme Dual Port 10GbE SFP+ Adapter for System x
90Y9370	A2V4	Broadcom NetXtreme I Dual Port GbE Adapter for System x
90Y9352	A2V3	Broadcom NetXtreme I Quad Port GbE Adapter for System x
00AG500	A56K	Intel I350-F1 1xGbE Fiber Adapter
00AG510	A56L	Intel I350-T2 2xGbE BaseT Adapter
00AG520	A56M	Intel I350-T4 4xGbE BaseT Adapter
InfiniBand		
00D9550	A3PN	Mellanox ConnectX-3 40GbE / FDR IB VPI Adapter for System x*
00MM960	ATRP	Mellanox ConnectX-4 2x100GbE/EDR IB QSFP28 VPI Adapter*
00KH924	ASWQ	Mellanox ConnectX-4 EDR IB VPI Single-port x16 PCIe 3.0 HCA*
Omni-Path Architecture (OPA)		
00WE023	AU0A	Intel OPA 100 Series Single-port PCIe 3.0 x8 HFA
00WE027	AU0B	Intel OPA 100 Series Single-port PCIe 3.0 x16 HFA

* These adapters require either transceivers or direct-attach copper (DAC) cables. See the tables below.

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

The following table lists the supported 10 Gb Ethernet SFP+ optical transceivers and DAC cables. For multi-port adapters, all adapter ports must have the same type of transceiver or DAC cable selected.

Table 48. Supported optical transceivers and DAC cables - 10 Gb Ethernet

Part number	Feature code	Description
10 GbE SFP+ LR transceivers (for SFP+ adapters)		
00FE331	B0RJ	Lenovo 10GBASE-LR SFP+ Transceiver
90Y9412	A1PM	Lenovo 10Gb/s LR SFP+ XCVR
10 GbE SFP+ SR transceivers (for SFP+ adapters)		
46C3447	5053	Lenovo 10GBASE-SR SFP+ Transceiver
49Y4216	0069	Brocade 10Gb SFP+ SR Optical Transceiver
49Y4218	0064	QLogic 10Gb SFP+ SR Optical Transceiver
10 GbE SFP+ DAC cables (for SFP+ adapters)		
00D6288	A3RG	Lenovo 0.5m Passive SFP+ DAC Cable
90Y9427	A1PH	Lenovo 1m Passive SFP+ DAC Cable
00AY764	A51N	Lenovo 1.5m Passive SFP+ DAC Cable
00AY765	A51P	Lenovo 2m Passive SFP+ DAC Cable
90Y9430	A1PJ	Lenovo 3m Passive SFP+ DAC Cable
90Y9433	A1PK	Lenovo 5m Passive SFP+ DAC Cable
00D6151	A3RH	Lenovo 7m Passive SFP+ DAC Cable

The following table lists the optical transceivers and DAC cables that can be used with the supported 40Gb Ethernet adapters listed. For multi-port adapters, all adapter ports must have the same type of transceiver or DAC cable selected.

Table 49. Supported optical transceivers and DAC cables - 40 Gb Ethernet

Part number	Feature code	Description
40 GbE QSFP+ transceivers (for 40 GbE QSFP+ adapters)		
49Y7884	A1DR	Lenovo 40GBASE-SR4 QSFP+ Transceiver
40 GbE QSFP+ DAC cables (for 40 GbE QSFP+ adapters)		
49Y7890	A1DP	Lenovo 1m Passive QSFP+ DAC Cable
49Y7891	A1DQ	Lenovo 3m Passive QSFP+ DAC Cable

Storage host bus adapters

The following table lists the storage HBAs that are supported by the nx360 M5 server. These are installed in the full-height PCIe slot and require the riser also to be installed.

Table 50. Storage adapters

Part number	Feature code	Description
Riser card for PCIe adapters		
00FL464	A5JY	nx360 M5 Compute Node Front Riser
Fibre Channel - 16 Gb		
01CV830	ATZU	Emulex 16Gb Gen6 FC Single-port HBA
01CV840	ATZV	Emulex 16Gb Gen6 FC Dual-port HBA
01CV750	ATZB	QLogic 16Gb Enhanced Gen5 FC Single-port HBA
01CV760	ATZC	QLogic 16Gb Enhanced Gen5 FC Dual-port HBA
81Y1655	A2W5	Emulex 16Gb FC Single-port HBA for System x
81Y1662	A2W6	Emulex 16Gb FC Dual-port HBA for System x
00Y3337	A3KW	QLogic 16Gb FC Single-port HBA for System x
00Y3341	A3KX	QLogic 16Gb FC Dual-port HBA for System x
Fibre Channel - 8 Gb		
42D0485	3580	Emulex 8Gb FC Single-port HBA for System x
42D0494	3581	Emulex 8Gb FC Dual-port HBA for System x
42D0501	3578	QLogic 8Gb FC Single-port HBA for System x
42D0510	3579	QLogic 8Gb FC Dual-port HBA for System x

For more information, see the list of Product Guides in the Host Bus Adapters category: https://lenovopress.com/servers/options/hba

PCIe SSD adapters

The server supports the Flash Adapter adapters listed in the following table.

Table 51. High IOPS PCIe SSD adapters

Part number	Feature code	Description	Maximum supported
00JY004	ARYS*	5200GB Enterprise io3 Flash Adapter	1*

* The io3 Flash Adapters cannot be factory installed; they are supported as field-installable options only. The server cannot be shipped with these adapters installed.

NeXtScale PCIe Native Expansion Tray

The NeXtScale PCIe Native Expansion Tray is a half-wide 1U expansion tray that attaches to the nx360 M5 to provide two full-height full-length double-width PCIe 3.0 x16 slots. The tray is designed to support two GPU adapters or coprocessors.

The use of the PCIe Native Expansion Tray requires that two processors be installed.

Note: All expansion trays are mutually exclusive. You can only attach one expansion tray to an nx360 M5 server.

The following figure shows the PCIe Native Expansion Tray attached to an nx360 M5 (shown with the top cover removed). The figure shows two NVIDIA GPUs installed.

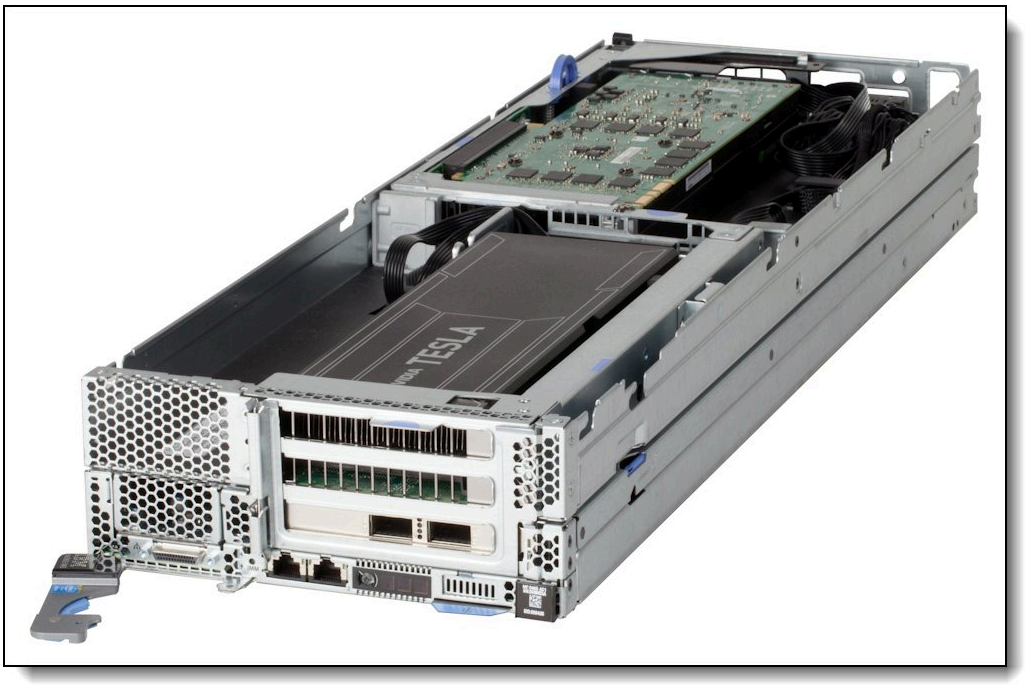

Figure 11.

NeXtScale PCIe Native Expansion Tray attached to an nx360 M5 compute node

Ordering information is listed in the following table.

Table 52. Ordering information

Part number	Feature code	Description
00Y8393	A4MB	NeXtScale PCIe Native Expansion Tray

When the PCIe Native Expansion Tray is used, it is connected to the compute node through two riser cards, each providing a PCIe 3.0 x16 connector to the GPUs or coprocessors that are installed in the tray.

- A 2-slot PCIe 3.0 x24 riser card is installed in the front riser slot (riser slot 1; see Figure 3). This riser card replaces the standard 1-slot riser that is used to connect standard PCIe cards that are internal to the compute node. The 2-slot riser card offers these connections:
  - PCIe 3.0 x8 slot for the slot internal to the compute node
  - PCIe 3.0 x16 slots for the front adapter in the PCIe Native Expansion Tray
- A 1-slot PCIe 3.0 x16 riser card is installed in the rear riser slot (riser slot 2; see Figure 3). This riser is used to connect the rear adapter in the PCIe Native Expansion Tray.

Only GPUs and coprocessors are supported in the PCIe Native Expansion Tray and only those that are listed in the following section. The PCIe Native Expansion Tray also includes the auxiliary power connectors and cables for each adapter slot that is necessary for each supported GPU and coprocessor.

NeXtScale PCIe 2U Native Expansion Tray

The NeXtScale PCIe 2U Native Expansion Tray is a half-wide 2U expansion tray that attaches to the nx360 M5 to provide four full-height full-length double-width PCIe 3.0 x16 slots, 2 at the front and two at the rear of the tray. The tray is designed to support four GPUs or coprocessors, each up to 300 W. In addition, the expansion tray supports up to four 2.5-inch hot-swap SAS/SATA drives with the addition of a hot-swap backplane.

The following figure shows the PCIe 2U Native Expansion Tray.

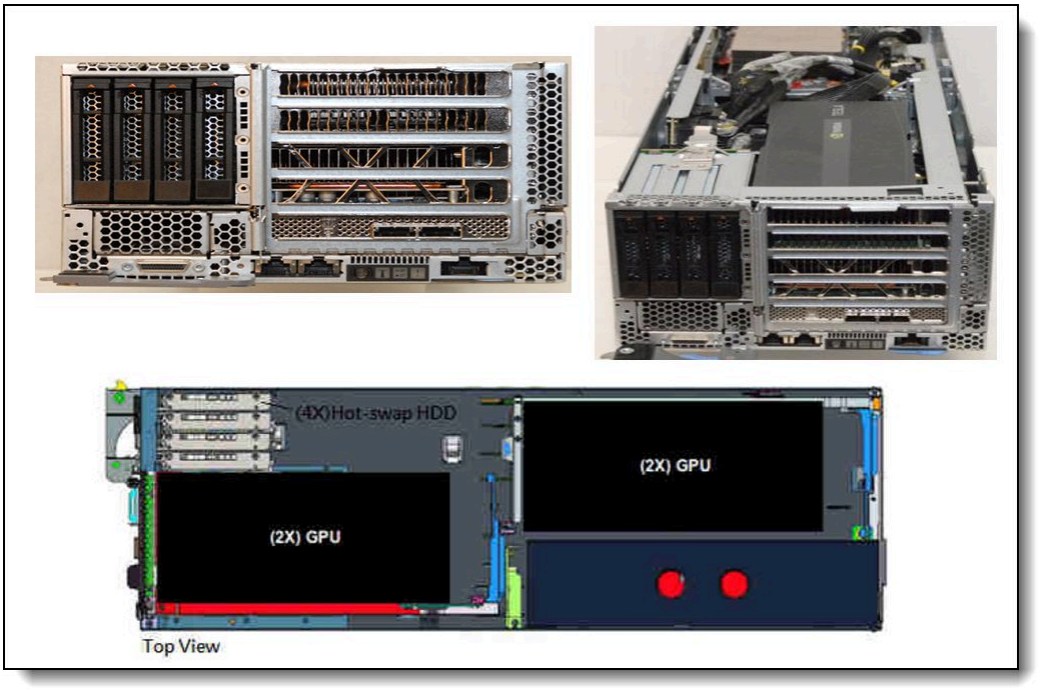

Figure 12. PCIe 2U Native Expansion Tray connected to an nx360 M5 server

Ordering information is listed in the following table.

Table 53. Ordering information

Part number	Feature code	Description
00MU758	ASYK	NeXtScale PCIe 2U Native Expansion Tray
44X4104	A4A6	4x 2.5" HDD Riser (Backplane and SAS cable)

When the PCIe 2U Native Expansion Tray is used, it is connected to the compute node through two riser cards:

- The front riser card connects to processor 1 via the PCIe 3.0 x24 slot at the front of the server and provides three slots:
  - One PCIe 3.0 x8 for the full-height half-length slot internal to the nx360 M5 server
  - Two PCIe 3.0 x16 full-height full-length double-width slots for GPUs or coprocessors
- The rear riser card connects to processor 2 via the PCIe 3.0 x16 slot at the front of the server and provides two slots:
  - Two PCIe 3.0 x16 full-height full-length double-width slots for GPUs or coprocessors

Each riser contains a PEX 8764 PCIe 3.0 switch that enables both x16 slots in the riser to operate at full x16 width. The two riser cards are also connected to each other via two PCIe cables connected to the

PCIe switch chips on each riser. The bridge cables allow all four x16 slots to usable even with only 1 processor installed. The connections and slots are shown in the following figure.

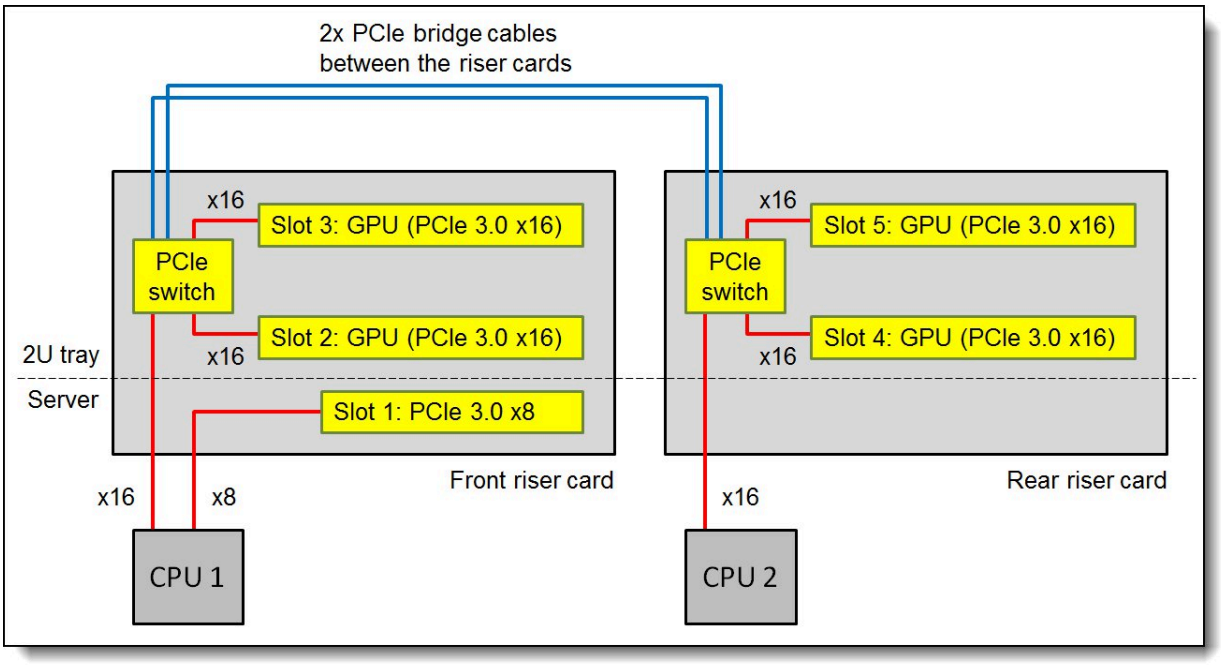

Figure 13. Block diagram of the PCIe 2U Native Expansion Tray

Only GPUs and coprocessors are supported in the PCIe 2U Native Expansion Tray and only those that are listed in the following section. The PCIe 2U Native Expansion Tray also includes the auxiliary power connectors and cables for each adapter slot that is necessary for each supported GPU and coprocessor.

GPU and coprocessor adapters

The nx360 M5 supports GPU adapters and coprocessors when the NeXtScale PCIe Native Expansion Tray or PCIe 2U Native Expansion Tray is attached. The following table lists the supported adapters.

The operating systems that are supported by each GPU and coprocessor adapter is listed in the Supported operating systems section.

When the PCIe Native Expansion Tray is used, the configuration rules are as follows:

- Two processors must be installed in the compute node.
- One or two GPUs or coprocessors can be installed.
- If two GPU adapters or coprocessors are installed, they must be identical.
- 1300 W power supplies are required in the chassis.
- 200 - 240 V AC utility power is required. 100 - 127 V AC is not supported.

When the PCIe 2U Native Expansion Tray is used, the configuration rules are as follows:

- When 1 processor and 3 or 4 GPUs are installed, the PCIe bridge cable must also be installed
- When 2 processors and 3 or 4 GPUs are installed, the PCIe bridge cable must be removed
- All GPU adapters or coprocessors installed in the tray must be identical.
- 1300 W power supplies are required in the chassis.
- 200 - 240 V AC utility power is required. 100 - 127 V AC is not supported.

Note: Larger numbers of GPUs may be supported via Special Bid than listed in this table, for example up to four NVIDIA K80 or four Intel Xeon Phi 7120P can be supported in the 2U Tray with additional considerations.

Table 54. GPU adapters and coprocessors

Part number	Feature code	Description	Power consumption	Maximum supported*	
				1U Tray (2 CPUs)	2U Tray (1 CPU / 2 CPUs)
00J6161	A3GN	NVIDIA GRID K2	225 W	2	4 / 4
00KG133	AS4D	NVIDIA Tesla K80	300 W	2	2 / 2
00MW982	ATYJ	NVidia Tesla M40 GPU, PCIe (passive)	250 W	2	4 / 4
00KG655	ATZE	NVidia Tesla M60 GPU, PCIe (passive)	300 W	2	2 / 2

* Maximums with PCIe Native Expansion Tray (1U Tray) / PCIe 2U Native Expansion Tray (2U Tray)

Power supplies

The NeXtScale n1200 enclosure supports up to six redundant hot-plug power supplies, providing N+N or N+1 redundancy. Power policies with no redundancy also are supported. These High Efficiency (HE) Platinum AC power supplies are 80 PLUS Platinum certified to allow for the best efficiency values of your data center. The following table lists the supported power supply options.

Table 55. Power supplies

Part number	Feature code	Description	FPC support†	Min / Max supported	Chassis model where used
00Y8569	A41T	CFF 900W Power Supply (Platinum)	Both	6 / 6	A2x, B2x
00Y8652	A4MM	NeXtScale n1200 CFF 1300W Power Supply (Platinum)	Both	2 / 6	A3x, A4x, B3x, B4x
00MU774	ASYH	NeXtScale n1200 1300W Titanium Power Supply	Lenovo	2 / 6	-
00MU775	ASYJ	NeXtScale n1200 1500W Platinum Power Supply	Lenovo	2 / 6	-
00KG685*	ASGJ	CFF -48V DC 900W Power Supply	Lenovo	6 / 6	-

* Withdrawn from marketing
† Fan & Power Controllers are either IBM-signed firmware (standard in Axx chassis models) or Lenovo-signed firmware (standard in Bxx models, or available as 00MU639)

The power supply options have the following features:

- Supports N+N or N+1 Power Redundancy, or Non-redundant power configurations to support higher density
- Power management controller and configured through the Fan and Power Controller
- Integrated 2500 RPM fan
- 80 PLUS Platinum or Titanium certified
- Built-in overload and surge protection

1500 W AC power supply specifications:

- Supports high-range voltage only: 200 - 240 V
- 200 - 240 (nominal) V AC; 50 or 60 Hz; 8.2 A (maximum)

1300 W AC power supply specifications:

- Supports high-range voltage only: 200 - 240 V
- 200 - 240 (nominal) V AC; 50 or 60 Hz; 6.9 A (maximum)

900 W AC power supply specifications:

- Supports dual-range voltage: 100 - 240 V
- 100 - 127 (nominal) V AC; 50 or 60 Hz; 6.8 A (maximum)
- 200 - 240 (nominal) V AC; 50 or 60 Hz; 5.0 A (maximum)

-48V DC 900 W power supply specifications:

- Supports -40 V to -75 V dc (-48 V nominal)
- Maximum input current 25.8A

- 3-cable (-48V, RTN, and GND) terminal block
- Line cord not included

Integrated virtualization

The server supports VMware vSphere (ESXi), which is installed on a USB memory key. The key is installed in a USB socket inside the server. The following table lists the virtualization options.

Customized VMware vSphere images can be downloaded from the following website:
http://shop.lenovo.com/us/en/systems/solutions/alliances/vmware/#tab-vmware_vsphere_esxi

Table 56. Virtualization options - USB Memory Keys

Part number	Feature code	Description	Maximum supported
00WH140	ATRM	Blank USB Memory Key 4G SLC for VMware ESXi Downloads	1
41Y8298	A2G0	Blank USB Memory Key for VMware ESXi Downloads	1
00ML233	ASN6	USB Memory Key for VMware ESXi 5.1 Update 2	1
00ML235	ASN7	USB Memory Key for VMware ESXi 5.5 Update 2	1
00WH138	ATRL	USB Memory Key 4G for VMware ESXi 6.0 Update 1A	1
00WH150	ATZG	USB Memory Key for VMware ESXi 5.5 Update 3B	1
00WH151	ATZH	USB Memory Key for VMware ESXi 6.0 Update 2	1
CTO only	AVNW	USB Memory Key for VMware ESXi 6.5	1

The nx360 M5 also supports the VMware vSphere (ESXi) hypervisor on one or two SD cards with the optional SD Media Adapter for System x. This adapter is installed in a dedicated slot as shown in Figure 3.

When only one SD card is installed in the adapter, you can create up to 16 volumes, each of which is presented to UEFI as a bootable device. When two SD Media cards are inserted, volumes can be mirrored (RAID 1) across both cards, up to a total of eight mirrored volumes. The use of mirrored volumes improves system availability because the server remains operational, even if one SD card fails. The RAID functionality is handled internally by the SD Media Adapter.

The following table shows the available options. The table also indicates how many SD cards are included.

Table 57. Virtualization options - SD Cards

Part number	Feature code	Description	SD Cards included
00ML706	A5TJ	SD Media Adapter for Systems x (Option 00ML706 includes 2 blank 32GB SD cards)	2*
00ML700	AS2V	Blank 32GB SD Media for System x	1
None	ATS9	RAID Adapter for SD Media w/VMware ESXi 6.0 U1A (2 SD Media, RAIDed)	2
None	ATSA	RAID Adapter for SD Media w/ VMware ESXi 6.0 U1A (1 SD Media)	1
None	AVNX	Adapter for SD Media w/ VMware ESXi 6.5 (1 SD Media)	1
None	AVNY	Adapter for SD Media w/ VMware ESXi 6.5 (2 SD Media, RAIDed)	2

* Option 00ML706 includes two 32GB SD cards; however, for CTO orders, feature code A5TJ does not include SD media and the SD Cards must be selected separately.

Customized VMware vSphere images can be downloaded from the following website:
http://shop.lenovo.com/us/en/systems/solutions/alliances/vmware/#tab-vmware_vsphere_esxi

Local server management

The nx360 M5 provides local console access through the KVM connector at the front of the server. A console breakout cable is used with this connector, which provides a VGA port, two USB ports, and a DB9 serial port. The cable is shown in the following figure.

Figure 14.

Console breakout cable

One console breakout cable is shipped with the NeXtScale n1200 enclosure. Additional cables can be ordered per the following table.

Table 58. Console breakout cable

Part number	Feature code	Description	Maximum supported
00Y8366	A4AK	Console breakout cable (KVM Dongle cable)	1

Tip: This is the same cable that is used with Flex System, but has a different part number because of the included materials.

To aid with problem determination, the server includes light path diagnostics, which is a set of LEDs on the front of the server and inside the server that show you which component is failing. The LEDs are shown in the following figure.

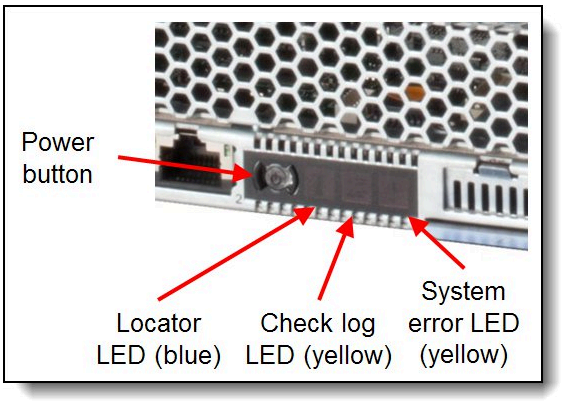

Figure 15. Power button and system LEDs

When an error occurs, the system error LED lights up. Review the logs through the web interface of the IMMv2 (see the "Remote server management" section). If needed, Then, press and hold the light path diagnostics button on the system board (see location on Figure 3) to activate the system board LEDs. The

LED next to the failed component lights up.

Remote server management

Each NeXtScale nx360 M5 compute node has an Integrated Management Module II (IMM 2.1) onboard and uses the Unified Extensible Firmware Interface (UEFI).

The IMM provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you about the problem. Optionally, the IMM also provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through the following industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) version 2.0
- Simple Network Management Protocol (SNMP) version 3.0
- Common Information Model (CIM)
- Web browser

The IMM2.1 also provides the following remote server management capabilities through the ipmitool management utility program:

- Command-line interface (IPMI Shell)
  The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- Serial over LAN
  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

The NeXtScale nx360 M5 server includes IMM Basic and can be upgraded to IMM Standard and IMM Advanced with Feature on Demand (FoD) licenses.

IMM2 Basic has the following features:

- Industry-standard interfaces and protocols
- Intelligent Platform Management Interface (IPMI) Version 2.0
- Common Information Model (CIM)
- Advanced Predictive Failure Analysis (PFA) support
- Continuous health monitoring
- Shared Ethernet connection
- Domain Name System (DNS) server support
- Dynamic Host Configuration Protocol (DHCP) support
- Embedded Dynamic System Analysis (DSA)
- LAN over USB for in-band communications to the IMM
- Serial over LAN
- Remote power control
- Server console serial redirection

IMM2 Standard (as enabled by using the Feature on Demand software license key using part number 90Y3900) has the following features in addition to the IMM2 Basic features:

- Remote access through a secure web console
- Access to server vital product data (VPD)
- Automatic notification and alerts
- Continuous health monitoring and control
- Email alerts

- Syslog logging support
- Enhanced user authority levels
- Event logs that are time stamped, saved on the IMM, and that can be attached to email alerts
- OS watchdogs
- Remote configuration through Advanced Settings Utility (ASU)
- Remote firmware updating
- User authentication using a secure connection to a Lightweight Directory Access Protocol (LDAP) server

IMM2 Advanced (as enabled by using the Feature on Demand software license key using part number 90Y3901) adds the following features on top of those of IMM Standard:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel color depths, regardless of the system state
- Remotely accessing the server by using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

The following table lists the remote management options.

Note: The IMM2 Advanced upgrade requires the IMM2 Standard upgrade.

Table 59. Remote management options

Part number	Feature codes	Description	Maximum supported
90Y3900	A1MK	Integrated Management Module Standard Upgrade	1
90Y3901	A1ML	Integrated Management Module Advanced Upgrade (requires Standard Upgrade, 90Y3900)	1

The nx360 M5 provides two 1 Gb Ethernet ports standard, one of which (port 1) is configured in UEFI by default to be shared between the operating system and the IMM2.

In shared mode, this port enables you to connect remotely to the IMM2 to perform systems management functions and provides a 10/100 Mbps Ethernet connection to the IMM2. A third Ethernet port is optional (with the addition of the IMM management Interposer) and provides a dedicated 1 Gbps Ethernet connection to the IMM2.

When the IMM management interposer is in use, port 1 of the two standard Ethernet ports no longer

provides access to the IMM but is instead dedicated to the operating system.

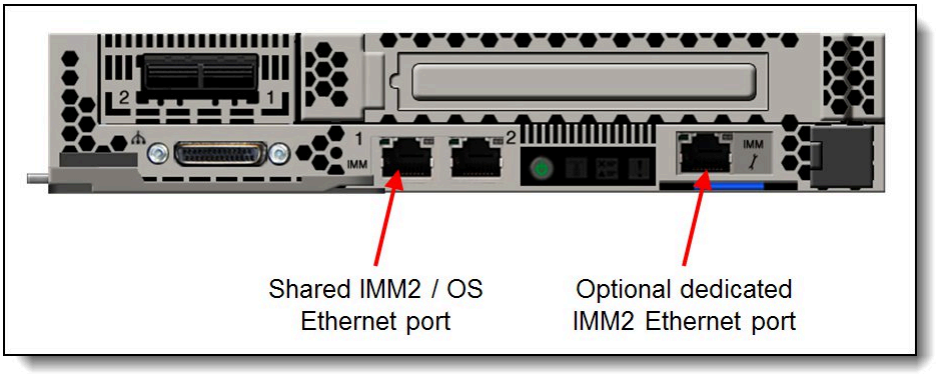

Figure 16. IMM ports

The following table lists the ordering information for the dedicated IMM2 port option.

Table 60. Dedicated IMM2 Ethernet port option

Part number	Feature codes	Description	Maximum supported
00FL177	A5JX	nx360 M5 IMM Management Interposer	1

Remote enclosure management

The NeXtScale n1200 Enclosure offers a remote management capability through the Fan and Power Controller, which is at the back of the enclosure, as shown in the following figure.

Figure 17. Fan and Power Controller

The Fan and Power Controller has one external RJ45 port, which provides a 10/100 Mbps Ethernet connection for browser-based remote control.

The port provides the following interfaces:

- An HTTP (web browser) interface for remote management of the FPC
- An IPMI interface for remote management of the FPC
- An IPMI interface to higher managers, such as xCAT

The module provides the following functions:

- Power supply redundancy and over-subscription configuration
- Power capping/saving configuration
- Power restore policy
- Acoustic mode setting
- Configuration/log export to USB (a USB port is provided inside the module)
- IMM remote reset or Server remote reseat (AC cycle)
- Status monitor: Power consumption, node status, power supply status, and fan status
- Network configuration

The FPC also includes a USB key that is housed inside the unit. The USB key stores the event log for the FPC plus power, cooling, and network configuration data.

There are two Fan and Power Controller components available as listed in the following table. The only difference between the two FPC components is the firmware codebase. Feature code A41G has IBM-

signed firmware and feature code ASUM has Lenovo-signed firmware.

Table 61. Fan and Power Controller

Part number	Feature codes	Description	Firmware codebase	Chassis models where used
None	A41G	n1200 Enclosure Fan Power Control Card Assembly	IBM-signed	A2x, A3x, A4x
00MU639	ASUM	Lenovo n1200 Enclosure Fan and Power Controller 2	Lenovo-signed	B2x, B3x, B4x

Rack installation

The NeXtScale n1200 enclosure includes a rail kit and lift handles. These items are shown in the following figure.

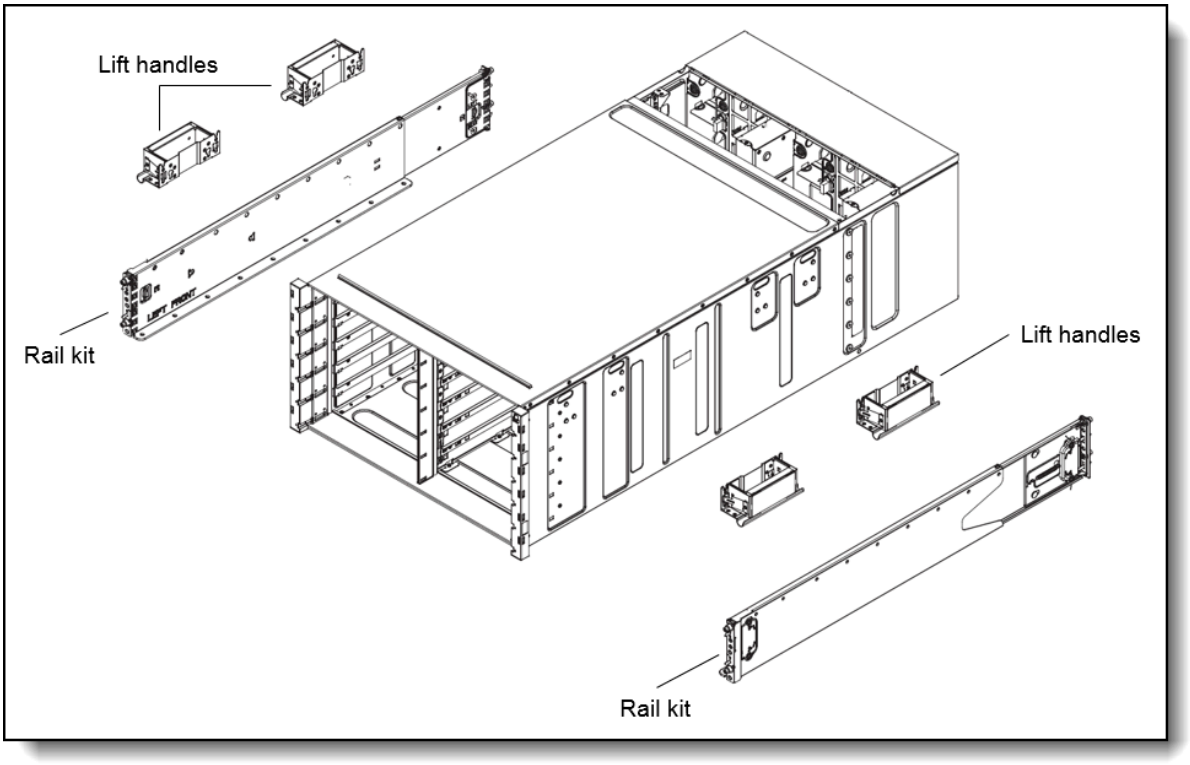

Figure 18. Rail kit and lift handles

Operating system support

The server supports the following operating systems:

- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Microsoft Windows Server, version 1709
- Red Hat Enterprise Linux 6.5 x64
- Red Hat Enterprise Linux 6.6 x64
- Red Hat Enterprise Linux 6.7 x64
- Red Hat Enterprise Linux 6.8 x64
- Red Hat Enterprise Linux 6.10 x64
- Red Hat Enterprise Linux 7.0
- Red Hat Enterprise Linux 7.1
- Red Hat Enterprise Linux 7.2
- Red Hat Enterprise Linux 7.3
- Red Hat Enterprise Linux 7.4
- Red Hat Enterprise Linux 7.5
- Red Hat Enterprise Linux 7.6
- Red Hat Enterprise Linux 7.7
- Red Hat Enterprise Linux 7.8
- Red Hat Enterprise Linux 7.9
- SUSE Linux Enterprise Server 11 Xen x64 SP3
- SUSE Linux Enterprise Server 11 Xen x64 SP4
- SUSE Linux Enterprise Server 11 x64 SP3
- SUSE Linux Enterprise Server 11 x64 SP4
- SUSE Linux Enterprise Server 12
- SUSE Linux Enterprise Server 12 SP1
- SUSE Linux Enterprise Server 12 SP2
- SUSE Linux Enterprise Server 12 SP3
- SUSE Linux Enterprise Server 12 SP4
- SUSE Linux Enterprise Server 12 Xen
- SUSE Linux Enterprise Server 12 Xen SP1
- SUSE Linux Enterprise Server 12 Xen SP2
- SUSE Linux Enterprise Server 12 Xen SP3
- SUSE Linux Enterprise Server 12 Xen SP4
- VMware ESXi 5.1 U2
- VMware ESXi 5.1 U3
- VMware ESXi 5.5 U2
- VMware ESXi 5.5 U3
- VMware ESXi 6.0
- VMware ESXi 6.0 U1
- VMware ESXi 6.0 U2
- VMware ESXi 6.0 U3
- VMware ESXi 6.5
- VMware ESXi 6.5 U1
- VMware ESXi 6.5 U3

For a complete list of supported, certified and tested operating systems, plus additional details and links to relevant web sites, see the Operating System Interoperability Guide:
https://lenovopress.com/osig#servers=nx360-m5-5465-e5-v3

The following table lists the operating system support for GPUs and coprocessors.

Table 62. Operating system support for GPU and coprocessor adapters

	Intel Xeon Phi 5110P	Intel Xeon Phi 7120P	NVIDIA GRID K1	NVIDIA GRID K2	NVIDIA Tesla K40	NVIDIA Tesla K80	NVidia Tesla M40	NVidia Tesla M60
Microsoft Windows Server 2012 R2	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2012	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7	Y	Y	N	N	Y	Y	Y	Y
Red Hat Enterprise Linux 6 x64	Y	Y	N	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 12	Y	Y	N	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 with Xen	Y	Y	N	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 11 x64	Y	Y	N	N	Y	Y	Y	Y
SUSE Linux Enterprise Server 11 x64 with Xen	Y	Y	N	N	Y	Y	Y	Y
VMware vSphere 6.0 (ESXi)	N	N	Y	Y	N	N	N	Y
VMware vSphere 5.5 (ESXi)	N	N	Y	Y	N	N	N	N
VMware vSphere 5.1 (ESXi)	N	N	Y	Y	N	N	N	N

Physical and electrical specifications

Here are the NeXtScale nx360 M5 dimensions:

- Width: 216 mm (8.5 in.)
- Height: 41 mm (1.6 in.)
- Depth: 659 mm (25.9 in.)
- Maximum weight: 6.17 kg (13.6 lb)

Here are the NeXtScale n1200 enclosure dimensions:

- Width: 447 mm (17.6 in.)
- Height: 263 mm (10.4 in.)
- Depth: 915 mm (36 in.)
- Fully configured (stand-alone): 112 kg (247 lb), empty chassis 28 kg (62 lb)

Supported environment

The NeXtScale nx360 M5 compute node complies with ASHRAE class A3 specifications. The supported environment when powered on is as follows:

- Temperature: 5°C - 40°C (41°F - 104°F) up to 950 m (3,117 ft)
- Above 950m, de-rated maximum air temperature 1C / 175m
- Humidity, non-condensing: -12°C dew point (10.4°F) and 8% - 85% relative humidity
- Maximum dew point: 24°C (75°F)
- Maximum altitude: 3050 m (10,000 ft) and 5°C - 28°C (41°F - 82°F)

The minimum humidity level for class A3 is the higher (more moisture) of the -12°C dew point and the 8% relative humidity. These intersect at approximately 25°C. Below this intersection (~25°C), the dew point (-12°C) represents the minimum moisture level, while above it relative humidity (8%) is the minimum.

Moisture levels lower than 0.5°C DP, but not lower -10 °C DP or 8% relative humidity, can be accepted if appropriate control measures are implemented to limit the generation of static electricity on personnel and equipment in the data center. All personnel and mobile furnishings and equipment must be connected to ground through an appropriate static control system. The following items are considered the minimum requirements:

- Conductive materials (conductive flooring, conductive footwear on all personnel that go into the data center, and all mobile furnishings and equipment will be made of conductive or static dissipative materials).
- During maintenance on any hardware, a properly functioning wrist strap must be used by any personnel who come into contact with IT equipment.

If you adhere to ASHRAE Class A3, Temperature: 36°C - 40°C (96.8°F - 104°F) with relaxed support:

- A support cloud like workload with no performance degradation is acceptable (Turbo-Off).
- Under no circumstance can any combination of worst case workload and configuration result in system shutdown or design exposure at 40°C.
- The worst case workload (like Linpack and Turbo-On) might have performance degradation.

Specific component restrictions:

- Processor E5-2699 v3, E5-2697 v3, E5-2667 v3, E5-2643 v3, E5-2637 v3: Temperature: 5°C - 30°C (41°F - 86°F); Altitude: 0 – 304.8 m (1000ft).
- Intel Xeon Phi 7120P: Temperature: 5°C - 30°C (41°F - 86°F); Altitude: 0 – 304.8 m (1000ft).

- nx360 M5 with rear HDD: Temperature: 5°C - 30°C (41°F - 86°F); Altitude: 0 – 304.8 m (1000ft).
- nx360 M5 servers in configuration that also includes nx360 M4 servers are not supported by any of the following processors: E5-2699 v3, E5-2697 v3, E5-2667 v3, E5-2643 v3, E5-2637 v3.

Electrical requirements

- 100 - 127 (nominal) V AC; 50 Hz or 60 Hz; 6.8 A
- 200 - 240 (nominal) V AC; 50 Hz or 60 Hz; 5.0 A
- Input kilovolt-amperes (kVA) (approximately):
    - Minimum configuration: 0.1 kVA
    - Maximum configuration: 6.0 kVA

BTU output

- Minimum configuration: 341 Btu/hr (100 watts)
- Maximum configuration: 20,471 Btu/hr (6,000 watts)

Noise level

- 7.0 bels (idle)

Regulatory compliance

The server conforms to the following international standards:

- Energy Star 2.0
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 5, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1
- NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- IEC 60950-1 (CB Certificate and CB Test Report)
- China CCC GB4943.1, GB9254, Class A, and GB17625.1
- Taiwan BSMI CNS13438, Class A; CNS14336-1
- Australia/New Zealand AS/NZS CISPR 22, Class A; AS/NZS 60950.1
- Korea KN22, Class A, KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22, and GOST R 51318.24,
- GOST R 51317.3.2, GOST R 51317.3.3
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, and EN61000-3-2,
- EN61000-3-3)
- CISPR 22, Class A
- TUV-GS (EN60950-1/IEC 60950-1, and EK1-ITB2000)

Warranty options

The NeXtScale nx360 M5 and NeXtScale n1200 enclosure have a three-year warranty with 24x7 standard call center support and 9x5 Next Business Day onsite coverage. Also available are Lenovo Services warranty maintenance upgrades and post-warranty maintenance agreements, with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo warranty service upgrade offerings are country-specific. Not all warranty service upgrades are available in every country. For more information about Lenovo warranty service upgrade offerings that are available in your country, visit the Lenovo Services website:

https://www-304.ibm.com/sales/gss/download/spst/servicepac/extProductSelectorWWW.do

The following table explains warranty service definitions in more detail.

Table 63. Warranty service definitions

Term	Description
On-site service	A service technician will arrive at the client's location for equipment service.
24x7x2 hour	A service technician is scheduled to arrive at the client's location within two hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
24x7x4 hour	A service technician is scheduled to arrive at the client's location within four hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
9x5x4 hour	A service technician is scheduled to arrive at the client's location within four business hours after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday-Friday, excluding Lenovo holidays. For example, if a customer reports an incident at 3:00 pm on Friday, the technician will arrive by 10:00 am the following Monday.
9x5 next business day	A service technician is scheduled to arrive at the client's location on the business day after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday - Friday, excluding Lenovo holidays. Calls received after 4:00 pm local time require an extra business day for service dispatch. Next business day service is not guaranteed.
Committed Repair	Problems receive priority handling so that repairs are completed within the committed time of 6, 8, or 24 hours. Lenovo provides service 24 hours/day, every day, including Lenovo holidays.

The following Lenovo warranty service upgrades are available:

- Warranty and maintenance service upgrades:
  - Three, four, or five years of 9x5 or 24x7 service coverage
  - Onsite response from next business day to 2 or 4 hours
  - Committed repair service
  - Warranty extension of up to 5 years
  - Post warranty extensions

- Committed Repair Service
  Committed Repair Services enhances the level of Warranty Service Upgrade or Post Warranty/Maintenance Service offering associated with the selected systems. Offerings vary and are available in select countries.
    - Priority handling to meet defined time frames to restore the failing machine to good working condition
    - Committed repair service levels are measured within the following coverage hours:
      - 24x7x6: Service performed 24 hours per day, 7 days per week, within 6 hours
      - 24x7x8: Service performed 24 hours per day, 7 days per week, within 8 hours
      - 24x7x24: Service performed 24 hours per day, 7 days per week, within 24 hours
- Hard Drive Retention
  Lenovo's Hard Drive Retention service is a multi-drive hard drive retention offering that ensures your data is always under your control, regardless of the number of hard drives that are installed in your Lenovo server. In the unlikely event of a hard drive failure, you retain possession of your hard drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The Hard Drive Retention service can be purchased in convenient bundles with our warranty upgrades and extensions.
- Microcode Support
  Keeping microcode current helps prevent hardware failures and security exposure. There are two levels of service: analysis of the installed base and analysis and update where required. Offerings vary by country and can be bundled with other warranty upgrades and extensions.
- Remote Technical Support Services (RTS)
  RTS provides comprehensive technical call center support for covered servers, storage, operating systems, and applications. Providing a single source for support of hardware and software issues, RTS can reduce problem resolution time, decreasing the cost to address technical problems and increasing uptime. Offerings are available for Windows, Linux, IBM Systems Director, VMware, Microsoft business applications, and Lenovo System x storage devices, and IBM OEM storage devices.

Rack cabinets

The NeXtScale n1200 enclosure is supported in the following racks:

- 42U 1100 mm Enterprise V2 Deep Dynamic Rack
- 42U 1100 mm Dynamic Enterprise V2 Expansion Rack

For more information about these racks, see the data sheet:
http://www.lenovo.com/images/products/system-x/pdfs/datasheets/42u_enterprise_v2_dynamic_rack.pdf

KVM console options

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

Table 64. Console keyboards

Part number	Description
Consoles	
17238BX	1U 18.5" Standard Console (without keyboard)
Console keyboards	
00MW310	Lenovo UltraNav Keyboard USB - US Eng
46W6713	Keyboard w/ Int. Pointing Device USB - Arabic 253 RoHS v2
46W6714	Keyboard w/ Int. Pointing Device USB - Belg/UK 120 RoHS v2
46W6715	Keyboard w/ Int. Pointing Device USB - Chinese/US 467 RoHS v2
46W6716	Keyboard w/ Int. Pointing Device USB - Czech 489 RoHS v2
46W6717	Keyboard w/ Int. Pointing Device USB - Danish 159 RoHS v2
46W6718	Keyboard w/ Int. Pointing Device USB - Dutch 143 RoHS v2
46W6719	Keyboard w/ Int. Pointing Device USB - French 189 RoHS v2
46W6720	Keyboard w/ Int. Pointing Device USB - Fr/Canada 445 RoHS v2
46W6721	Keyboard w/ Int. Pointing Device USB - German 129 RoHS v2
46W6722	Keyboard w/ Int. Pointing Device USB - Greek 219 RoHS v2
46W6723	Keyboard w/ Int. Pointing Device USB - Hebrew 212 RoHS v2
46W6724	Keyboard w/ Int. Pointing Device USB - Hungarian 208 RoHS v2
46W6725	Keyboard w/ Int. Pointing Device USB - Italian 141 RoHS v2
46W6726	Keyboard w/ Int. Pointing Device USB - Japanese 194 RoHS v2
46W6727	Keyboard w/ Int. Pointing Device USB - Korean 413 RoHS v2
46W6728	Keyboard w/ Int. Pointing Device USB - LA Span 171 RoHS v2
46W6729	Keyboard w/ Int. Pointing Device USB - Norwegian 155 RoHS v2
46W6730	Keyboard w/ Int. Pointing Device USB - Polish 214 RoHS v2
46W6731	Keyboard w/ Int. Pointing Device USB - Portuguese 163 RoHS v2
46W6732	Keyboard w/ Int. Pointing Device USB - Russian 441 RoHS v2
46W6733	Keyboard w/ Int. Pointing Device USB - Slovak 245 RoHS v2
46W6734	Keyboard w/ Int. Pointing Device USB - Spanish 172 RoHS v2
46W6735	Keyboard w/ Int. Pointing Device USB - Swed/Finn 153 RoHS v2
46W6736	Keyboard w/ Int. Pointing Device USB - Swiss F/G 150 RoHS v2
46W6737	Keyboard w/ Int. Pointing Device USB - Thai 191 RoHS v2
46W6738	Keyboard w/ Int. Pointing Device USB - Turkish 179 RoHS v2
46W6739	Keyboard w/ Int. Pointing Device USB - UK Eng 166 RoHS v2
46W6740	Keyboard w/ Int. Pointing Device USB - US Euro 103P RoHS v2
46W6741	Keyboard w/ Int. Pointing Device USB - Slovenian 234 RoHS v2
Console switches	
1754D2X	Global 4x2x32 Console Manager (GCM32)
1754D1X	Global 2x2x16 Console Manager (GCM16)
1754A2X	Local 2x16 Console Manager (LCM16)

Part number	Description
1754A1X	Local 1x8 Console Manager (LCM8)
Console switch cables	
43V6147	Single Cable USB Conversion Option (UCO)
39M2895	USB Conversion Option (4 Pack UCO)
46M5383	Virtual Media Conversion Option Gen2 (VCO2)
46M5382	Serial Conversion Option (SCO)

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

External disk storage systems

The following table lists the Fibre Channel external storage systems that are offered by Lenovo.

Table 65. External disk storage systems

Part number	Description
Lenovo Storage S2200	
64114B1	Lenovo Storage S2200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64114B2	Lenovo Storage S2200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
64114B3	Lenovo Storage S2200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64114B4	Lenovo Storage S2200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
Lenovo Storage S3200	
64116B1	Lenovo Storage S3200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64116B2	Lenovo Storage S3200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
64116B3	Lenovo Storage S3200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64116B4	Lenovo Storage S3200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
IBM Storwize	
6096CU2	IBM Storwize V3500 3.5-inch Dual Control Storage Controller Unit
6096CU3	IBM Storwize V3500 2.5-inch Dual Control Storage Controller Unit
6099L2C	IBM Storwize V3700 3.5-inch Storage Controller Unit
6099S2C	IBM Storwize V3700 2.5-inch Storage Controller Unit
6099T2C	IBM Storwize V3700 2.5-inch DC Storage Controller Unit
6194L2C	IBM Storwize V5000 LFF Control Enclosure
6194S2C	IBM Storwize V5000 SFF Control Enclosure
6195SC5	IBM Storwize V7000 2.5-inch Storage Controller Unit

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

- IBM Storage: https://lenovopress.com/storage/san/ibm
- Lenovo Storage: https://lenovopress.com/storage/san/lenovo

External backup units

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

Table 66. External backup options

Part number	Description
External RDX USB drives	
4T27A10725	ThinkSystem RDX External USB 3.0 Dock
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
Full High 8 Gb Fibre Channel for TS4300	
01KP938	LTO 7 FH Fibre Channel Drive
01KP954	LTO 8 FH Fibre Channel Drive
02JH837	LTO 9 FH Fibre Channel Drive
Half High 8 Gb Fibre Channel for TS4300	
01KP936	LTO 7 HH Fibre Channel Drive
01KP952	LTO 8 HH Fibre Channel Drive
02JH835	LTO 9 HH Fibre Channel Drive
Half High 6 Gb SAS for TS4300	
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

Top-of-rack Ethernet switches

The server supports the top-of-rack Ethernet switches that are listed in the following table.

Table 67. Top-of-rack switches

Part number	Description
1 Gb top-of-rack switches	
715952F	Lenovo RackSwitch G8052 (Front to Rear)
10 Gb top-of-rack switches	
7159BF7	Lenovo RackSwitch G8124E (Front to Rear)
715964F	Lenovo RackSwitch G8264 (Front to Rear)
7159DFX	Lenovo RackSwitch G8264CS (Front to Rear)
7159CFV	Lenovo RackSwitch G8272 (Front to Rear)
7159GR5	Lenovo RackSwitch G8296 (Front to Rear)
40 Gb top-of-rack switches	
7159BFX	Lenovo RackSwitch G8332 (Front to Rear)

For more information, see the list of Product Guides in the Top-of-rack switches categories:

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

Additional edge switches are offered as part of the Intelligent Cluster™ program, as listed in the following table.

Table 68. Switches in the Intelligent Cluster program

Feature code	Description
1 Gb top-of-rack switches	
2733	Cisco 2960G-48TC-L (48 port, Layer 2)
Not available	Juniper EX4200 (48 port, Layer 2/3)
6941	SMC 8126L2 (26 port, Layer 2)
6673	SMC 8150L2 (50 port, Layer 2)
10 Gb top-of-rack switches	
A1M6	Cisco 3750X-48T-L (48 port, Layer 2/3)

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#rt=product-guide

Uninterruptible power supply units

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

Table 69. Uninterruptible power supply units

Part number	Description
Rack-mounted or tower UPS units - 100-125VAC	
7DD5A001WW	RT1.5kVA 2U Rack or Tower UPS-G2 (100-125VAC)
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 server supports attachments to the power distribution units (PDUs) that are listed in the following table.

Table 70. Power distribution units

Part number	Description
Switched and Monitored PDUs	
46M4002	1U 9 C19/3 C13 Active Energy Manager DPI® PDU
46M4003	1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU
46M4004	1U 12 C13 Active Energy Manager DPI PDU
46M4005	1U 12 C13 Active Energy Manager 60A 3 Phase PDU
46M4167	1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU
Enterprise PDUs	
71762MX	Ultra Density Enterprise PDU C19 PDU+ (WW)
71762NX	Ultra Density Enterprise PDU C19 PDU (WW)
71763MU	Ultra Density Enterprise PDU C19 3 Phase 60A PDU+ (NA)
71763NU	Ultra Density Enterprise PDU C19 3 Phase 60A PDU (NA)
39M2816	DPI C13 Enterprise PDU without power cord
39Y8923	DPI 60A Three Phase C19 Enterprise PDU with IEC309 3P+G (208 V) fixed power cord
39Y8941	DPI Single Phase C13 Enterprise PDU without power cord
39Y8948	DPI Single Phase C19 Enterprise PDU without power cord
Front-end PDUs	
39Y8934	DPI 32 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8935	DPI 63amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8938	30 amp/125 V Front-end PDU with NEMA L5-30P connector
39Y8939	30 amp/250 V Front-end PDU with NEMA L6-30P connector
39Y8940	60 amp/250 V Front-end PDU with IEC 309 60A 2P+N+Gnd connector
Universal PDUs	
39Y8951	DPI Universal Rack PDU with US LV and HV power cords
39Y8952	DPI Universal Rack PDU with CEE7-VII Europe LC
39Y8953	DPI Universal Rack PDU with Denmark LC
39Y8954	DPI Universal Rack PDU with Israel LC
39Y8955	DPI Universal Rack PDU with Italy LC
39Y8956	DPI Universal Rack PDU with South Africa LC
39Y8957	DPI Universal Rack PDU with UK LC
39Y8958	DPI Universal Rack PDU with AS/NZ LC
39Y8959	DPI Universal Rack PDU with China LC
39Y8962	DPI Universal Rack PDU (Argentina)
39Y8960	DPI Universal Rack PDU (Brazil)
39Y8961	DPI Universal Rack PDU (India)
0U Basic PDUs	
46M4122	0U 24 C13 16A 3 Phase PDU

Part number	Description
46M4125	0U 24 C13 30A 3 Phase PDU
46M4128	0U 24 C13 30A PDU
46M4131	0U 24 C13 32A PDU
46M4140	0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	0U 12 C19/12 C13 32A 3 Phase PDU

For more information, see the list of Product Guides in the PDU category:
https://lenovopress.com/servers/options/pdu

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Related publications and links

For more information, see these resources:

- *NeXtScale nx360 M5 Installation and Service Guide*
  https://pubs.lenovo.com/nx360-m5/
- ServerProven hardware compatibility
  http://www.lenovo.com/us/en/serverproven
- NeXtScale nx360 M5 Support Portal:
  http://datacentersupport.lenovo.com/us/en/products/servers/nextscale/nx360-m5/5465
- Power Configurator:
  https://support.lenovo.com/documents/LNVO-PWRCONF
- xREF - System x Reference
  http://lenovopress.com/xref

Related product families

Product families related to this document are the following:

- GPU adapters
- Supercomputing Servers

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