

## System x3650 M4 HD

### Product Guide (withdrawn product)

The System x3650 M4 HD is a 2-socket 2U rack-optimized server. It supports up to 32 internal drives and features an innovative design that delivers an optimal balance of performance, uptime, and dense storage. It offers excellent reliability, availability, and serviceability (RAS) for an improved business environment. The System x3650 M4 HD is designed for easy deployment, integration, service, and management.

*Suggested use:* Big data applications, cloud-computing deployments, data management, and business-critical workloads

The following figure shows the System x3650 M4 HD configured with 24 hot-swap 2.5-inch drive bays.



Figure 1. The System x3650 M4 HD

### Did you know?

The x3650 M4 HD offers a flexible design that supports up to 26 2.5-inch drives (24 in the front, two accessible from the rear), or 16 2.5-inch drives and 16 1.8-inch solid-state drive bays. Combined with Intel E5-2600 v2 processors, up to 768 GB of memory, 12 Gbps SAS controllers, and up to 6 PCIe 3.0 slots, you have a system that can handle big data applications. Comprehensive systems management tools with the next-generation Integrated Management Module II (IMM2) make the server easy to deploy, integrate, service, and manage.

## Key features

The x3650 M4 HD is an outstanding 2U two-socket business-critical server, offering improved performance and pay-as-you grow flexibility along with new features that improve server management capability. This powerful system is designed for your most important business applications and cloud deployments.

Combining balanced performance and flexibility, the x3650 M4 HD is a great choice for small and medium businesses up to the large enterprise. It can provide outstanding uptime to keep business-critical applications and cloud deployments running safely. Ease of use and comprehensive systems management tools make it easy to deploy. Outstanding RAS and high-efficiency design improve your business environment and help save operational costs.

## Scalability and performance

The x3650 M4 HD offers numerous features to boost performance, improve scalability, and reduce costs:

- Featuring the Intel Xeon processor E5-2600 v2 product family, which improves productivity by offering superior system performance with up to 12 core per processors, core speeds up to 3.5 GHz, L3 cache up to 30 MB, and QPI interconnect links of up to 8 GTps.
- Two processors, up to 24 cores, and 48 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 (AVX) improve floating-point performance for compute-intensive technical and scientific applications.
- Supports up to 24 Load Reduced DIMMs (LRDIMMs) of 1866 MHz DDR3 ECC memory, which provide speed, high availability, and a memory capacity of up to 768 GB (running at 1066 MHz).
- The use of solid-state drives (SSDs) instead of, or along with, traditional hard disk drives (HDDs) can improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- Up to 26x 2.5-inch bays or a combination of up to 16x 2.5-inch bays and 16x 1.8-inch SSD bays provide a flexible and scalable platform to meet your increasing demands.
- The server has four integrated Gigabit Ethernet ports and two optional 10 Gb Ethernet (or InfiniBand) ports with mezzanine cards that do not use PCIe slots.
- The server offers PCI Express 3.0 I/O expansion capabilities that improve the theoretical maximum bandwidth by 60% (8 GTps per link) compared to 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. This integration helps to reduce I/O latency dramatically and increase overall system performance.
- Support for up to two NVIDIA Quadro graphics processing units (GPUs) to maximize computing power.

## Availability and serviceability

The x3650 M4 HD provides many features to simplify serviceability and increase system uptime:

- The server offers memory mirroring and memory rank sparing for redundancy in the event of a non-correctable memory failure.
- Tool-less cover removal provides easy access to upgrades and serviceable parts, such as CPU,

memory, and adapters.

- The server offers hot-swap drives, supporting RAID redundancy for data protection and greater system uptime.
- The server has up to two redundant hot-swap power supplies and four hot-swap dual-motor redundant fans (two fan zones with an N+1 fan design) to provide availability for business-critical applications.
- A light path diagnostics panel and individual light path LEDs quickly lead the technician to failed (or failing) components, which simplifies servicing, speeds up problem resolution, and helps improve system availability.
- Predictive Failure Analysis (PFA) detects when system components (processors, VRMs, memory, HDDs, fans, and power supplies) operate outside of standard thresholds and generates proactive alerts in advance of a possible failure, therefore increasing uptime.
- SSDs offer better reliability than traditional HDDs for greater uptime.
- The built-in Integrated Management Module Version II (IMM2) continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failures to minimize downtime.
- Built-in diagnostics, using Dynamic Systems Analysis (DSA) Preboot, speed up troubleshooting tasks to reduce service time.
- Three-year customer-replaceable unit and onsite limited warranty, 9x5 next business day. Optional service upgrades are available.

### **Manageability and security**

Powerful systems management features simplify local and remote management of the x3650 M4 HD:

- Local console ports are standard at the rear of the server. Front video and USB ports are available through an optional console breakout cable.
- The server includes an Integrated Management Module II (IMM2) to monitor server availability and perform remote management.
- An Integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Integrated Trusted Platform Module (TPM) 1.2 support enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Industry-standard Advanced Encryption Standard (AES) NI support for faster, stronger encryption.
- IBM Systems Director is included for proactive systems management. It offers comprehensive systems management tools that help increase uptime, reduce costs, and improve productivity through advanced server management capabilities.
- Intel Execute Disable Bit functionality can prevent certain classes of malicious buffer overflow attacks when combined with a supported operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing an application to run in its own isolated space, protected from all other software running on a system.

### **Energy efficiency**

The x3650 M4 HD offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to a green environment:

- Energy-efficient system board components help lower operational costs.
- The x3650 M4 HD is Energy Star 2.0 compliant. Energy Star is the trusted, US government-backed symbol for energy efficiency, with the goal of helping customers save money and protect the environment through energy efficient products and practices. For the Power and Performance Data Sheet, see <http://ibm.com/systems/x/hardware/energy-star>

- There are highly efficient 550 W, 750 W, and 900 W AC power supplies with 80 PLUS Platinum certification. A 750W DC power option is available.
- The Intel Xeon processor E5-2600 v2 product family offers better performance over the previous generation while fitting into the same thermal design power (TDP) limits.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy the demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.35 V DDR3 memory RDIMMs consume 15% less energy compared to 1.5 V DDR3 RDIMMs.
- SSDs use as much as 80% less power than traditional 2.5-inch HDDs.
- The server uses hexagonal ventilation holes, which are a part of Calibrated Vectors Cooling™ technology. Hexagonal holes can be grouped more densely than round holes, providing more efficient airflow through the system.
- IBM Systems Director Active Energy Manager™ provides advanced data center power notification and management to help achieve lower heat output and reduced cooling needs.

## Locations of key components and connectors

The following figure shows the front of the server.

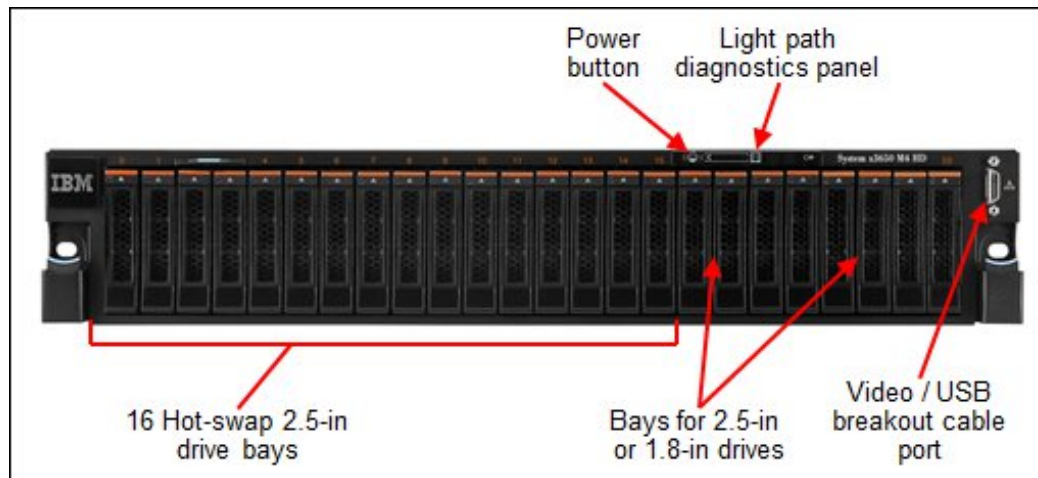


Figure 2. Front view of the System x3650 M4 HD

The following figure shows the rear of the server.

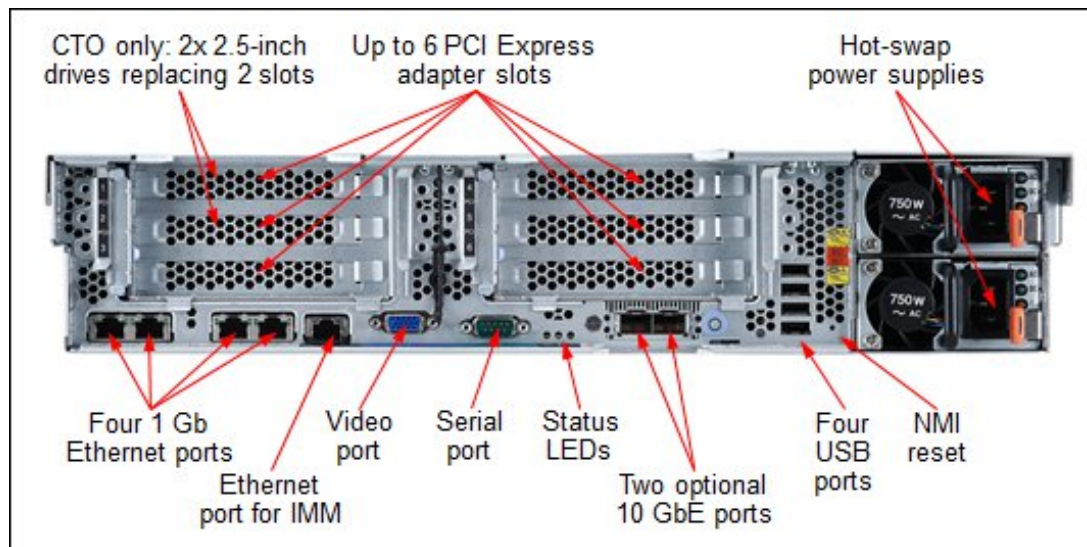


Figure 3. Rear view of the System x3650 M4 HD

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

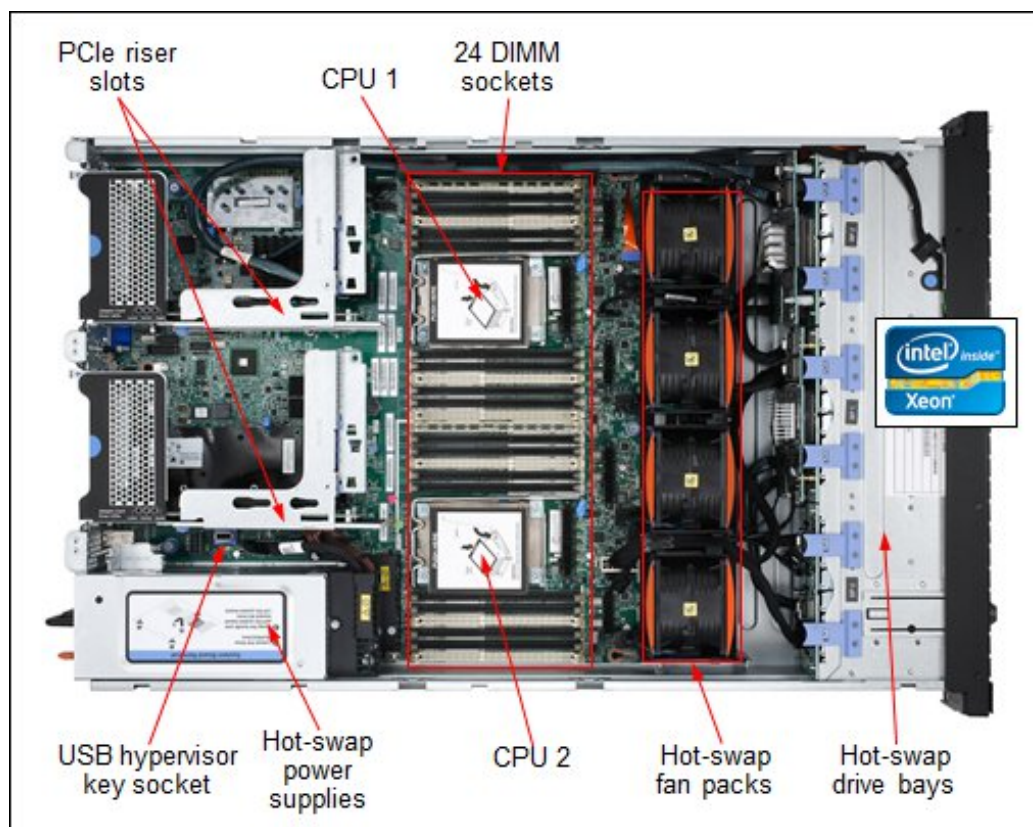


Figure 4. Inside view of the System x3650 M4 HD



## Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications

Components	Specification
Machine type	5460
Form factor	2U rack.
Processor	Up to two Intel Xeon processor E5-2600 v2 product family CPUs. Two QPI links up to 8.0 GTps each. Up to 1866 MHz memory speed. Twelve cores up to 2.7 GHz and 30 MB L3 cache Ten cores up to 3.0 GHz and 25 MB L3 cache Eight cores up to 3.3 GHz and 25 MB L3 cache Six cores up to 3.5 GHz and 25 MB L3 cache Four cores up to 3.5 GHz and 15 MB L3 cache
Chipset	Intel C602J.
Memory	Up to 24 DIMM sockets (12 DIMMs per processor). RDIMMs, UDIMMs, and LRDIMMs (Load Reduced DIMMs) are supported, but memory types cannot be intermixed. Memory speed up to 1866 MHz.
Memory maximums	With RDIMMs: Up to 384 GB with 24x 16 GB RDIMMs and two processors. With UDIMMs: Up to 128 GB with 16x 8 GB UDIMMs and two processors. With LRDIMMs: Up to 768 GB with 24x 32 GB LRDIMMs and two processors.
Memory protection	ECC, Chipkill, memory mirroring, and memory rank sparing.
Disk drive bays	Up to 26x 2.5-inch hot-swap bays supporting HDDs or SSDs (24 bays front accessible and 2 bays rear accessible); or 16x 2.5-inch HDDs/SSDs (front) plus 16x 1.8-inch SSDs (front accessible).
Maximum internal storage	Up to 41.6 TB with 26x 1.6TB 2.5" SSDs. Up to 31.2 TB with 26x 1.2TB SAS HDDs. An intermix of SAS/SATA is supported.
RAID support	RAID 0, 1, and 10 with integrated ServeRAID M5210e. Optional upgrades to RAID 5 and 50 are available with zero-cache, 1 GB cache without battery, or 1 GB or 2 GB flash-backed cache. Optional upgrade to RAID 6 or 60.
Optical drive bays	No internal bays; use an external USB drive. See <a href="http://support.lenovo.com/en/documents/pd011281">http://support.lenovo.com/en/documents/pd011281</a> for options.
Tape drive bays	None.
Network interfaces	Four integrated Gigabit Ethernet 1000BASE-T ports (RJ-45): Two embedded 10 Gb Ethernet ports (10GBASE-T RJ-45 or 10GBASE-SR SFP+ based) on an optional 10 Gb Ethernet mezzanine card (does not use a PCIe slot).
PCI Expansion slots	Up to six slots depending on the riser cards that are installed. The slots are as follows: <ul style="list-style-type: none"> <li>Slot 1: PCIe 3.0 x8; full-height, full-length</li> <li>Slot 2: PCIe 3.0 x8; full-height, half-length</li> <li>Slot 3: PCIe 3.0 x8; full-height, half-length</li> <li>Slot 4: Optional, requires second processor and second riser card</li> <li>Slot 5: Optional, requires second processor and second riser card</li> <li>Slot 6: Optional, requires second processor and second riser card</li> </ul> Optional riser cards available through CTO with PCIe x8 or PCIe x16 or PCI-X slots. Slots 1 and 2 can be replaced with two 2.5-inch hot-swap drive bays through CTO.

Components	Specification
Ports	Front: A breakout cable port offers two USB 2.0 ports and one DB-15 video. Four USB 2.0, one DB-15 video, one DB-9 serial, one RJ-45 systems management, four RJ-45 GbE network ports, two optional RJ-45 or SFP+ 10 GbE network ports on rear. One internal USB port for embedded hypervisor.
Cooling	Calibrated Vectored Cooling with up to four redundant hot swap fans (all standard; two fan zones with N+1 fan design; each fan has two motors).
Power supply	Up to two redundant hot-swap 550 W AC, 750 W AC, or 900 W AC power supplies (all 80 PLUS Platinum certification), or -48V 750 W DC power supply options.
Video	Matrox G200eR2 with 16 MB memory integrated into the IMM2. Maximum resolution is 1600x1200 at 75 Hz with 16 M colors.
Hot-swap parts	Hard disk drives, power supplies, and fans.
Systems management	UEFI, Integrated Management Module II (IMM2), Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, Systems Director and Active Energy Manager, and ServerGuide. Optional IMM Advanced Upgrade software feature for remote presence.
Security features	Power-on password, administrator's password, and Trusted Platform Module (TPM).
Operating systems supported	Microsoft Windows Server 2012, 2008 R2 and 2008, Red Hat Enterprise Linux 6, SUSE Linux Enterprise Server 11, and VMware vSphere 5.1
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5 next business day (NBD).
Service and support	Optional service upgrades are available through ServicePac® offerings: Four-hour or two-hour response time, eight-hour fix time, one-year or two-year warranty extension, remote technical support for Lenovo hardware and some Lenovo and third-party applications.
Dimensions	Height: 86 mm (3.4 in.), width: 445 mm (17.5 in.), depth: 746 mm (29.4 in.)
Weight	Minimum configuration: 25 kg (55 lb), maximum: 30 kg (65 lb)

The x3650 M4 HD servers are shipped with the following items:

- Statement of Limited Warranty
- Important Notices
- Rack Installation Instructions
- Documentation CD that contains the *Installation and Service Guide*
- System x® Gen-III Slides Kit
- System x Gen-III Cable Management Arm (CMA)
- 2.8 m (9.18 in.) C13-C14 power cord (one for models with one power supply, and two for models with two power supplies)

## Standard models

The following table lists the standard models.

Table 2. Standard models

Model	Intel Xeon processors† (two maximum)	Memory	RAID	Disk bays	Disks	Slots* S/A/M	GbE	Power supply
5460-B3x	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 8 GB (1333MHz)‡	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
5460-C3x	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8 GB 1600 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
5460-D3x	1x E5-2630 v2 6C 2.6GHz 15MB 1600MHz 80W	1x 8 GB 1600 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
5460-F3x	1x E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	1x 8 GB 1600 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
5460-G3x	1x E5-2650 v2 8C 2.6GHz 20MB 1866MHz 95W	1x 8 GB 1866 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
5460-H3x	1x E5-2660 v2 10C 2.2GHz 25MB 1866MHz 95W	1x 8 GB 1866 MHz	M5210-e + H1110	16+2x 2.5"	Open	1 / 0 / 4	4	1x 750W
5460-J3x	1x E5-2670 v2 10C 2.5GHz 25MB 1866MHz 115W	1x 16 GB 1866 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
5460-L3x	1x E5-2680 v2 10C 2.8GHz 25MB 1866MHz 115W	1x 16 GB 1866 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
5460-M3x	1x E5-2690 v2 10C 3.0GHz 25MB 1866MHz 130W	1x 16 GB 1866 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 900W
5460-83x	1x E5-2697 v2 12C 2.7GHz 30MB 1866MHz 130W	1x 16 GB 1866 MHz	M5210-e	16x 2.5"	Open	3 / 3 / 6	4	1x 900W

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

\* The PCIe slot counts are: Slots standard / slots available / slots maximum.

‡ Model B3x includes a 1600 MHz DIMM standard, however, it operates at 1333 MHz to match the installed processor.

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



## Express models

The following table lists the express models.

Table 3. Express models

Model	Intel Xeon processors† (two maximum)	Memory	RAID controller	Disk bays	Disks	Slots* S/A/M	GbE	Power
North America (NA)								
5460-EAU	1x E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	1x 8 GB 1600 MHz	M5210-e	16x 2.5"	4x 1TB NL SAS	3 / 3 / 6	4	1x 750W
Latin America (LA)								
5460-EAU	1x E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	1x 8 GB 1600 MHz	M5210-e	16x 2.5"	4x 1TB NL SAS	3 / 3 / 6	4	1x 750W
Europe Integrated Operating Team (IOT)								
5460-E1G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8 GB 1600 MHz	M5210-e + 1GB Flash/R5	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
Central and Eastern Europe (CEE) and Middle East and Africa (MEA)								
5460-E1G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8 GB 1600 MHz	M5210-e + 1GB Flash/R5	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
Russia/Commonwealth of Independent States (CIS)								
5460-E1G	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8 GB 1600 MHz	M5210-e + 1GB Flash/R5	16x 2.5"	Open	3 / 3 / 6	4	1x 750W
Japan								
5460-PAA	1x E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	1x 8 GB (1333 MHz)‡	M5210-e + 1GB Flash/R5	16x 2.5"	Open	3 / 3 / 6	4	1x 750W

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

\* The PCIe slot counts are: Slots standard / slots available / slots maximum.

‡ Model PAA includes a 1600 MHz DIMM standard, however, it operates at 1333 MHz to match the installed processor.

## Processor options

The x3650 M4 HD supports the processor options that are listed in the following table. The server supports up to two processors. This table shows which server models have each processor standard. If there is no corresponding *where-used* model for a particular processor, this processor is available only through CTO.

Table 4. Processor options

Part number	Feature codes*	Description	Models where used
46W4210	A3PT / A3RJ	Intel Xeon E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	-
46W4211	A3PU / A3RK	Intel Xeon E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	B3x
46W4213	A3PW / A3RM	Intel Xeon E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	C3x, E1x
00Y8430	A4EU / A4EW	Intel Xeon E5-2628L v2 8C 1.9GHz 20MB 1600MHz 70W	-
46W4214	A3PX / A3RN	Intel Xeon E5-2630 v2 6C 2.6GHz 15MB 1600MHz 80W	D3x
46W4226	A3S2 / A3S0	Intel Xeon E5-2630L v2 6C 2.4GHz 15MB 1600MHz 60W	-
46W4212	A3PV / A3RL	Intel Xeon E5-2637 v2 4C 3.5GHz 15MB 1866MHz 130W	-
46W4217	A3Q0 / A3RR	Intel Xeon E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	EAx, F3x
46W4221	A3Q4 / A3RV	Intel Xeon E5-2643 v2 6C 3.5GHz 25MB 1866MHz 130W	-
00Y8431	A4EV / A4EX	Intel Xeon E5-2648L v2 10C 1.9GHz 25MB 1866MHz 70W	-
46W4215	A3PY / A3RP	Intel Xeon E5-2650 v2 8C 2.6GHz 20MB 1866MHz 95W	G3x
46W4225	A3Q8 / A3RZ	Intel Xeon E5-2650L v2 10C 1.7GHz 25MB 1600MHz 70W	-
46W4216	A3PZ / A3RQ	Intel Xeon E5-2660 v2 10C 2.2GHz 25MB 1866MHz 95W	H3x
46W4222	A3Q5 / A3RW	Intel Xeon E5-2667 v2 8C 3.3GHz 25MB 1866MHz 130W	-
46W4219	A3Q2 / A3RT	Intel Xeon E5-2670 v2 10C 2.5GHz 25MB 1866MHz 115W	J3x
46W4220	A3Q3 / A3RU	Intel Xeon E5-2680 v2 10C 2.8GHz 25MB 1866MHz 115W	L3x
46W4297	A3Q9 / A3S1	Intel Xeon E5-2690 v2 10C 3.0GHz 25MB 1866MHz 130W	M3x
46W4223	A3Q6 / A3RX	Intel Xeon E5-2695 v2 12C 2.4GHz 30MB 1866MHz 115W	-
46W4224	A3Q7 / A3RY	Intel Xeon E5-2697 v2 12C 2.7GHz 30MB 1866MHz 130W	83x

\* The first feature code is for the first processor; the second feature code is for the second processor.

## Memory options

Lenovo DDR3 memory is compatibility tested and tuned for optimal System x performance and throughput. Lenovo memory specifications are integrated into the light path diagnostics for immediate system performance feedback and optimum system uptime. From a service and support standpoint, Lenovo memory automatically assumes the system warranty, and Lenovo provides service and support worldwide.

The System x3650 M4 HD supports DDR3 memory. The server supports up to 12 DIMMs when one processor is installed and up to 24 DIMMs when two processors are installed. Each processor has four memory channels, and there are three DIMMs per channel.

The following rules apply when selecting the memory configuration:

- The server supports UDIMMs, RDIMMs, and LRDIMMs.
- Mixing different types of memory (UDIMMs, RDIMMs, and LRDIMMs) is not supported.
- Mixing 1.5 V and 1.35 V DIMMs is supported; in such a case, all DIMMs operate at 1.5 V.
- The maximum number of ranks per one channel is eight (except for Load Reduced DIMMs, where more than eight ranks are supported, because one quad-rank LRDIMM provides the same electrical

load on a memory bus as a single-rank RDIMM).

- The maximum quantity of DIMMs that can be installed in the server depends on the number of CPUs, DIMM type, rank, and operating voltage, as shown in the "Max. qty supported" row in Table 5.
- All DIMMs in the server operate at the same speed, which is determined as the lowest value of the following items:
  - Memory speed that is supported by the specific CPU.
  - Lowest of maximum operating speeds for selected memory configuration that depends on rated speed, operating voltage, and quantity of DIMMs per channel, as shown under the "Maximum operating speed" section in Table 5.

The following table (Parts 1 and 2) shows the characteristics of the supported DIMMs. Tables cells that are highlighted with a gray background indicate when the combination of DIMM voltage and the number of DIMMs per channel still allows the DIMMs to operate at a rated speed.

Table 5. Maximum memory speeds (Part 1: RDIMMs)

DIMM specification	RDIMM					
Rank	Single rank			Dual rank		
Part numbers	00D5024 (4 GB) 00D5036 (8 GB)		00D5020 (4 GB) 00D5032 (8 GB)	00D5044 (8 GB) 46W0672 (16 GB)		00D5028 (4 GB) 00D5040 (8 GB) 00D5048 (16 GB)
Rated speed	1600 MHz		1866 MHz	1600 MHz		1866 MHz
Rated voltage	1.35 V		1.5 V	1.35 V		1.5 V
Operating voltage	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V	1.5 V
Max qty supported*	24	24	24	24	24	24
Max DIMM capacity	8 GB	8 GB	8 GB	16 GB	16 GB	16 GB
Max memory capacity	192 GB	192 GB	192 GB	384 GB	384 GB	384 GB
Max. memory at rated speed	None	128 GB	64 GB	None	256 GB	128 GB
<b>Maximum operating speed</b>						
1 DIMM per channel	1333 MHz	1600 MHz	1866 MHz	1333 MHz	1600 MHz	1866 MHz
2 DIMMs per channel	1333 MHz	1600 MHz	1600 MHz	1333 MHz	1600 MHz	1600 MHz
3 DIMMs per channel	800 MHz	1066 MHz	1066 MHz	800 MHz	1066 MHz	1066 MHz

\* The maximum quantity that is supported is shown for two processors installed.

Table 6. Maximum memory speeds (Part 2: UDIMMs and LRDIMMs)

<b>DIMM specification</b>	<b>UDIMM</b>		<b>LRDIMM</b>
Rank	Dual rank		Quad rank
Part number	00D5016 (8 GB)		46W0761 (32 GB)
Rated speed	1600 MHz		1866 MHz
Rated voltage	1.35 V		1.5 V
Operating voltage	1.35 V	1.5 V	1.5 B
Max. qty supported*	16	16	24
Max. DIMM capacity	8 GB	8 GB	32 GB
Max. memory capacity	128 GB	128 GB	768 GB
Max. memory at rated speed	None	128 GB	256 GB
<b>Maximum operating speed</b>			
1 DIMM per channel	1333 MHz	1600 MHz	1866 MHz
2 DIMMs per channel	1333 MHz	1600 MHz	1600 MHz
3 DIMMs per channel	No support	No support	1066 MHz

\* The maximum quantity that is supported is shown for two processors installed.

The following memory protection technologies are supported:

- ECC
- Chipkill (for x4-based memory DIMMs)
- Memory mirroring
- Memory rank sparing

If memory mirroring is used, DIMMs must be installed in pairs (minimum of one pair per each CPU), and both DIMMs in a pair must be identical in type and size.

If memory rank sparing is used, then a minimum of one quad-rank DIMM or two single-rank or dual-rank DIMMs must be installed per populated channel (the DIMMs do not need being identical). In rank sparing mode, one rank of a DIMM in each populated channel is reserved as spare memory. The size of a rank varies depending on the DIMMs that are installed.

The following table lists the memory options that are available for x3650 M4 HD server.

Table 7. Memory options

Part number	Feature codes	Description	Maximum supported	Standard models where used
UDIMMs				
00D5016	A3QC	8GB (1x8GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP UDIMM	16 (8 per CPU)	-
RDIMMs - 1866 MHz				
00D5020	A3QD	4GB (1x4GB, 1Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	24 (12 per CPU)	-
00D5028	A3QF	4GB (1x4GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	24 (12 per CPU)	-
00D5032	A3QG	8GB (1x8GB, 1Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	24 (12 per CPU)	G3x, H3x
00D5040	A3QJ	8GB (1x8GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	24 (12 per CPU)	83x, J3x, L3x, M3x
00D5048	A3QL	16GB (1x16GB, 2Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	24 (12 per CPU)	-
RDIMMs - 1600 MHz				
00D5024	A3QE	4GB (1x4GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
00D5036	A3QH	8GB (1x8GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	B3x, C3x, D3x, E1x, EAx, F3x
00D5044	A3QK	8GB (1x8GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
46W0672	A3QM	16GB (1x16GB, 2Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	24 (12 per CPU)	-
LRDIMMs				
46W0761	A47K	32GB (1x32GB, 4Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP LRDIMM	24 (12 per CPU)	-

## Internal storage

System x3650 M4 HD server supports 1.8-inch and 2.5-inch drives. The server supports the following drive configurations:

- 16x 2.5-inch hot-swap drive bays (front of server)
- 16x 2.5-inch hot-swap drive bays (front) + 2x 2.5-inch hot-swap drive bays (rear)
- 24x 2.5-inch hot-swap drive bays (front)
- 24x 2.5-inch hot-swap drive bays (front) + 2x 2.5-inch hot-swap drive bays (rear)
- 16x 2.5-inch hot-swap drive bays (front) + 16x 1.8-inch hot-swap drive bays (front)

**Note:** The combination of 16x 2.5-inch hot-swap drive bays (front) + 16x 1.8-inch hot-swap drive bays (front) + 2x 2.5-inch hot-swap drive bays (rear) is not supported.

The following figure shows these drive bay configurations.

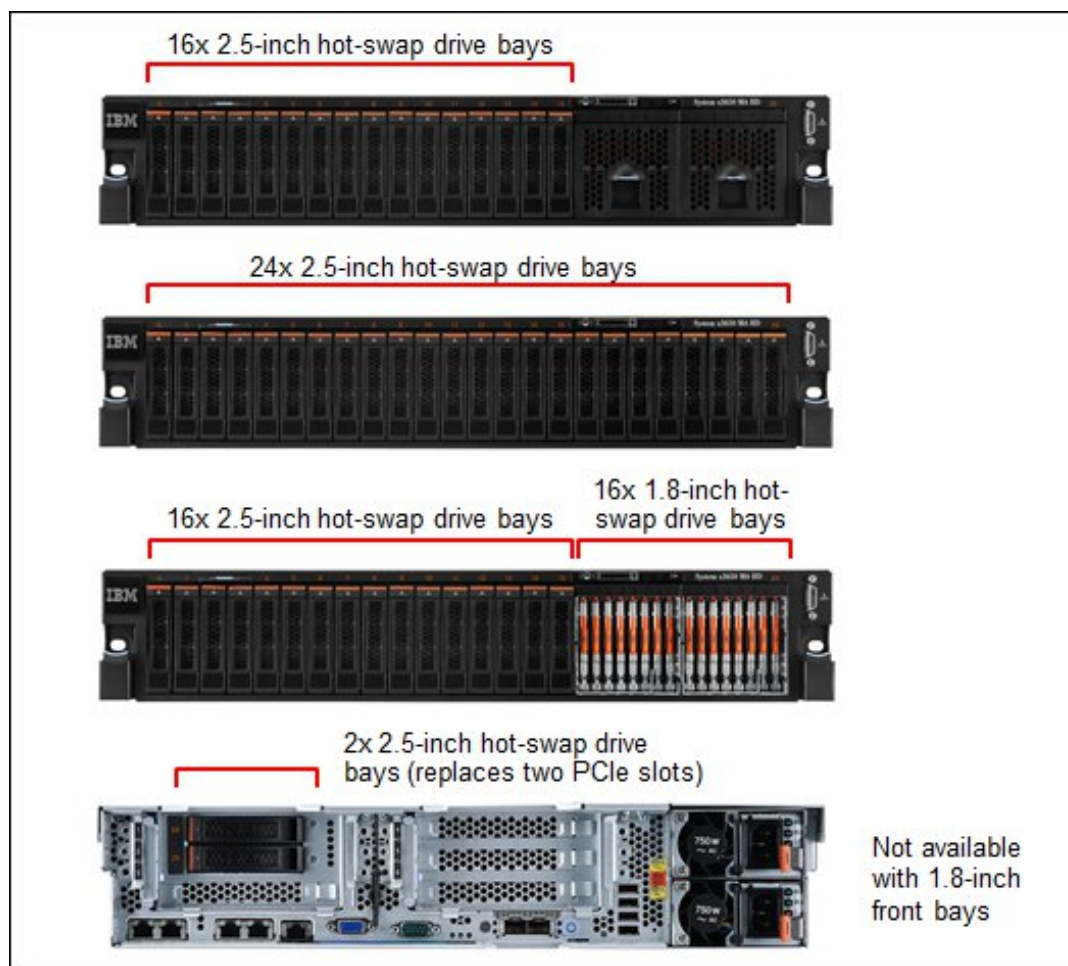


Figure 5. Internal drive configurations

### Backplanes and enablement kits

All standard models ship with 16x 2.5-inch hot-swap drive bays (feature code A3NR). Model H3x also ships with 2x 2.5-inch bays in the rear of the server (feature code A3NQ).

Backplane and enablement kits are listed in the following table. All backplanes operate at 6 Gbps SAS.

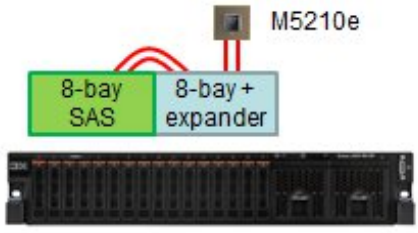
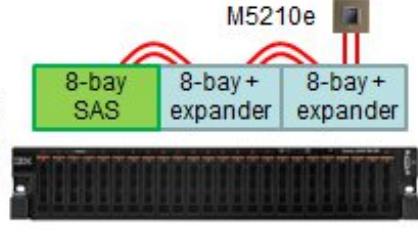
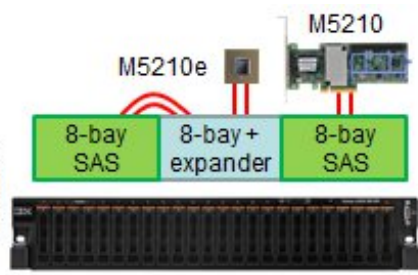
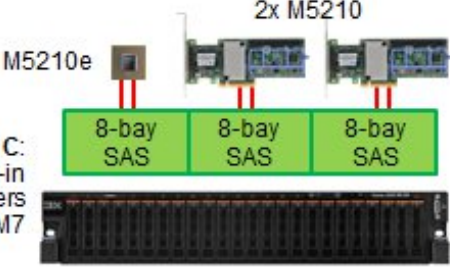
Table 8. Backplane kits

Part number	Feature codes	Description	Maximum supported	Models where used
None	A3NR	System x3650 M4 HD 16 Base Kit	1	All models
46W4204	A4M4	x3650 M4 HD Plus 8 x 2.5" HS HDD Assembly Kit with Expander	1 (mutually exclusive)	-
46W4206	A4M6	x3650 M4 HD Plus 8 x 2.5" HS HDD Assembly Kit		-
00Y7658	A4M7	x3650 M4 HD 3 x 8 2.5" HS HDD Assembly Kit		-
46W4205	A4M5	x3650 M4 HD Plus 16 x 1.8" SSD Assembly Kit		-
None	A3NQ	x3650 M4 HD Rear 2 HDD Kit*	1*	-

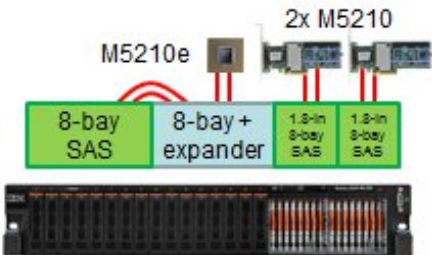
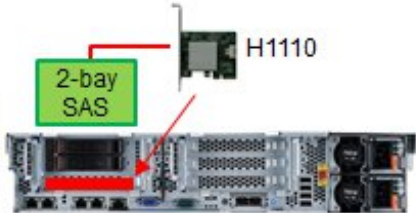
\* Model H3x or CTO only. A3NQ can be combined with A3NR, A4M4, A4M6, and A4M7 (but not A4M5).

The following table shows the internal storage expansion options that are available for the x3650 M4 HD server.

Table 9. Internal storage expansion options

Configuration	Name and description
<p><b>Base:</b> 16x 2.5-in 1 controller Feature A3NR</p> 	<p><b>Base offering, feature A3NR</b></p> <ul style="list-style-type: none"> <li>• 16x 2.5-inch hot-swap drive bays (front).</li> <li>• One 8-bay backplane + one 8-bay backplane with SAS expander.</li> <li>• The SAS expander is mounted on the backplane and does not use a PCIe slot.</li> <li>• All 16 drives are driven by an onboard M5210e controller.</li> </ul>
<p><b>CTO option A:</b> 24x 2.5-in 1 controller Feature A4M4</p> 	<p><b>CTO Option A, feature A4M4</b> <b>x3650 M4 HD Plus 8x 2.5" HS HDD Assembly Kit with Expander</b></p> <ul style="list-style-type: none"> <li>• One 8-bay backplane + two 8-bay backplanes with SAS expanders</li> <li>• The SAS expanders are mounted on backplanes and do not use a PCIe slot.</li> <li>• All 24 drives are driven by two ports of an onboard M5210e controller.</li> </ul>
<p><b>CTO option B:</b> 24x 2.5-in 2 controllers Feature A4M6</p> 	<p><b>CTO Option B, feature A4M6</b> <b>x3650 M4 HD Plus 8 2.5" HS HDD Assembly Option Kit</b></p> <ul style="list-style-type: none"> <li>• One 8-bay backplane + two 8-bay backplanes with SAS expanders.</li> <li>• Two backplanes connect to M5210e.</li> <li>• One backplane connects to an M5210 or N2215 adapter.</li> <li>• Adapters are not part of feature A4M6.</li> </ul>
<p><b>CTO option C:</b> 24x 2.5-in 3 controllers Feature A4M7</p> 	<p><b>CTO Option C, feature A4M7</b> <b>x3650 M4 HD 3 x 8 2.5" HS HDD Assembly Kit</b></p> <ul style="list-style-type: none"> <li>• Maximizes the performance of the RAID subsystem.</li> <li>• Three 8-bay backplanes.</li> <li>• One backplane connects to M5210e.</li> <li>• One backplane connects to an M5210 or N2215 adapter.</li> <li>• Adapters are not part of feature A4M7.</li> </ul>



Configuration	Name and description
<p><b>CTO option D:</b> 16x 2.5-in + 16x 1.8-in 3 controllers Feature A4M5</p> 	<p><b>CTO Option D, feature A4M5</b> <b>x3650 M4 HD Plus 16 x 1.8" SSD Assembly Kit</b></p> <ul style="list-style-type: none"> <li>• Best use case for storage tiering.</li> <li>• Two 8-bay 2.5-inch backplanes with M5210e.</li> <li>• Two 8-bay 1.8-inch backplanes.</li> <li>• Each 1.8-in backplane connects to an M5210 or N2215 adapter.</li> <li>• Adapters are not part of feature A4M5.</li> </ul>
<p><b>CTO Rear option:</b> 2x 2.5-in 1 controller Feature A3NQ</p> 	<p><b>x3650 M4 HD Rear 2 HDD Kit, feature A3NQ</b></p> <ul style="list-style-type: none"> <li>• Add-on for Option A, B or C; not supported by D.</li> <li>• Two drives are installed in place of PCIe slots 1 and 2.</li> <li>• ServeRAID H1110 is installed in slot 3.</li> <li>• CTO only.</li> <li>• The adapter is separate from feature A3NQ.</li> </ul>

The following figure shows the inside of the server with the x3650 M4 HD Plus 8 x 2.5" HS HDD Assembly Kit with Expander installed (option 46W4204 or feature code A4M4). You can see the three backplanes, two of which have SAS expanders.



Figure 6. x3650 M4 HD Plus 8 x 2.5" HS HDD Assembly Kit with Expander installed in the server

## Controllers for internal storage

The following table lists the RAID controllers, SAS HBAs, and additional options that are used for the internal disk storage of an x3650 M4 HD server.

Table 10. RAID controllers and SAS HBAs for internal storage

Part number	Feature code	Description	Maximum supported	Standard models where used
Integrated	None	ServeRAID M5210e SAS/SATA Controller	1	All models
46C9110	A3YZ	ServeRAID M5210 SAS/SATA Controller	2	-
81Y4492	A1XL	ServeRAID H1110 SAS/SATA Controller	1	H3x
47C8675	A3YY	N2215 SAS/SATA HBA for System x	2	-
Hardware upgrades for the M5210 and M5210e				
47C8656	A3Z0	ServeRAID M5200 Series 1GB Cache/RAID 5 Upgrade	1	-
47C8660	A3Z1	ServeRAID M5200 Series 1GB Flash/RAID 5 Upgrade	1	-
47C8664	A3Z2	ServeRAID M5200 Series 2GB Flash/RAID 5 Upgrade	1	-
47C8668	A3Z3	ServeRAID M5200 Series 4GB Flash/RAID 5 Upgrade	1	-
Feature on Demand upgrades for the M5210 and M5210e				
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	-

† The ServeRAID M5200 Series RAID 6 Upgrade (47C8706) requires one of the RAID 5 upgrades with cache (47C8656, 47C8660, 47C8664).

The integrated ServeRAID M5210e SAS/SATA Controller has the following specifications:

- Two x4 mini-SAS HD internal connectors (SFF8643)
- 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
- 12 Gbps throughput per port
- PCIe x8 Gen 3 host interface
- Based on the LSI SAS3108 12 Gbps ROC controller

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

- Eight internal 12 Gbps SAS/SATA ports
- Two x4 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

- 12 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS3108 12 Gbps ROC controller
- IBM PowerPC® 476 1.2GHz dual core processor

The ServeRAID H1110 adapter has the following specifications:

- Four internal 6 Gbps SAS/SATA ports
- One x4 mini-SAS internal connector (SFF8087)
- 6 Gbps throughput per port
- Based on the LSI SAS2004 6 Gbps RAID on Chip (ROC) controller
- PCIe 2.0 x4 host interface
- Supports RAID 0, 1, 1E, and 10
- Connects to up to four SAS or SATA drives (SAS expanders are not supported.)

The N2215 SAS/SATA host bus adapter has the following specifications:

- Two internal mini-SAS HD x4 connectors (SFF8643)
- MD2 small form factor
- PCI Express x8 3.0 host interface
- SAS Controller: LSI SAS3008
- 12 Gbps per port data transfer rate
- No RAID support, no cache
- UEFI support

For more information, see the list of Lenovo Press Product Guides in the RAID adapters category:

<http://lenovopress.com/systemx/raid>

## Internal drive options

The following table lists hard disk drive options for the internal disk storage of the x3650 M4 HD server.

Table 11. Disk drive options for internal disk storage

Part number	Feature code	Description	Maximum supported
<b>2.5" NL SAS Hot-Swap HDDs</b>			
90Y8953	A2XE	500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	26
81Y9690	A1P3	1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	26
<b>2.5" 15K SAS Hot-Swap HDDs</b>			
90Y8926	A2XB	146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	26
81Y9670	A283	300GB 15K 6Gbps SAS 2.5" G2HS HDD	26
00AJ300	A4VB	600GB 15K 6Gbps SAS 2.5" G2HS HDD	26
<b>2.5" 10K SAS Hot-Swap HDDs</b>			
90Y8877	A2XC	300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	26
90Y8872	A2XD	600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	26
81Y9650	A282	900GB 10K 6Gbps SAS 2.5" SFF HS HDD	26
00AD075	A48S	1.2TB 10K 6Gbps SAS 2.5" G2HS HDD	26

Part number	Feature code	Description	Maximum supported
00NA441	ASCD	1.8TB 10K 6Gbps SAS 2.5" G2HS 512e HDD	26
2.5" 10K SAS Hot-Swap self-encrypting drives (SEDs)			
90Y8908	A3EF	600GB 10K 6Gbps SAS 2.5" SFF G2HS SED	26
81Y9662	A3EG	900GB 10K 6Gbps SAS 2.5" SFF G2HS SED	26
00AD085	A48T	1.2TB 10K 6Gbps SAS 2.5" G2HS SED	26
00NA476	ASCF	1.8TB 10K 6Gbps SAS 2.5" G2HS 512e SED	26
2.5" 10K SAS Hot-Swap SAS-SSD Hybrid drives			
00AD102	A4G7	600GB 10K 6Gbps SAS 2.5" G2HS Hybrid	26
2.5" solid-state drives (SSDs) - hot-swap - Enterprise			
00W1125	A3HR	100GB SATA 2.5" MLC HS Enterprise SSD	26
49Y6134	A3EY	400GB SAS 2.5" MLC HS Enterprise SSD	26
49Y6139	A3F0	800GB SAS 2.5" MLC HS Enterprise SSD	26
49Y6195	A4GH	1.6TB SAS 2.5" MLC HS Enterprise SSD	26
41Y8331	A4FL	S3700 200GB SATA 2.5" MLC HS Enterprise SSD	26
41Y8336	A4FN	S3700 400GB SATA 2.5" MLC HS Enterprise SSD	26
41Y8341	A4FQ	S3700 800GB SATA 2.5" MLC HS Enterprise SSD	26
2.5" solid-state drives (SSDs) - hot-swap - Enterprise Value			
00AJ355	A56Z	120GB SATA 2.5" MLC HS Enterprise Value SSD	26
00AJ360	A570	240GB SATA 2.5" MLC HS Enterprise Value SSD	26
00AJ365	A571	480GB SATA 2.5" MLC HS Enterprise Value SSD	26
00AJ370	A572	800GB SATA 2.5" MLC HS Enterprise Value SSD	26
00AJ000	A4KM	S3500 120GB SATA 2.5" MLC HS Enterprise Value SSD	26
00AJ005	A4KN	S3500 240GB SATA 2.5" MLC HS Enterprise Value SSD	26
00AJ010	A4KP	S3500 480GB SATA 2.5" MLC HS Enterprise Value SSD	26
00AJ015	A4KQ	S3500 800GB SATA 2.5" MLC HS Enterprise Value SSD	26
00FN268	A5U4	S3500 1.6TB SATA 2.5" MLC HS Enterprise Value SSD	26
2.5" solid-state drives (SSDs) - hot-swap - Entry			
00FN298	AS0D	240GB SATA 2.5" MLC HS Entry SSD	26
00FN327	AS0E	480GB SATA 2.5" MLC HS Entry SSD	26
00FN332	AS0F	960GB SATA 2.5" MLC HS Entry SSD	26
1.8" solid-state drives (SSDs) - Enterprise			
41Y8366	A4FS	S3700 200GB SATA 1.8" MLC Enterprise SSD	16
41Y8371	A4FT	S3700 400GB SATA 1.8" MLC Enterprise SSD	16
00W1120	A3HQ	100GB SATA 1.8" MLC Enterprise SSD	16
49Y6119	A3AN	200GB SATA 1.8" MLC Enterprise SSD	16
49Y6124	A3AP	400GB SATA 1.8" MLC Enterprise SSD	16
1.8" solid-state drives (SSDs) - Enterprise Value			
00AJ040	A4KV	S3500 80GB SATA 1.8" MLC Enterprise Value SSD	16
00AJ045	A4KW	S3500 240GB SATA 1.8" MLC Enterprise Value SSD	16
00AJ050	A4KX	S3500 400GB SATA 1.8" MLC Enterprise Value SSD	16

Part number	Feature code	Description	Maximum supported
00AJ455	A58U	S3500 800GB SATA 1.8" MLC Enterprise Value SSD	16
00AJ335	A56V	120GB SATA 1.8" MLC Enterprise Value SSD	16
00AJ340	A56W	240GB SATA 1.8" MLC Enterprise Value SSD	16
00AJ345	A56X	480GB SATA 1.8" MLC Enterprise Value SSD	16
00AJ350	A56Y	800GB SATA 1.8" MLC Enterprise Value SSD	16

\* Withdrawn from marketing

## Internal backup units

The server does not support an internal tape drive.

## Optical drives

No internal bays; use an external USB drive. See <http://support.lenovo.com/en/documents/pd011281> for options.

## I/O expansion options

The server supports up to six PCIe slots with different riser cards that are installed into two riser sockets on the system board (one riser socket supports the installation of one riser card). Riser 1 supplies slots 1, 2, and 3. Riser 2 supplies slots 4, 5, and 6. Standard models have Riser card 1 installed with three PCIe 3.0 x8 slots. To enable slots 4 - 6, install a second processor and a second riser card.

These options are available through CTO only. Slots 1 and 2 can be replaced with a two-bay 2.5-inch hot-swap drive kit, feature A3NQ. The kit includes a 1-card riser for a RAID card that is installed in slot 3.a

The following table lists the PCI riser card options that are available.

Table 12. PCI riser card options

Part number	Feature code*	Description	Maximum supported	Models where used
None*	A47M	x3650 M4 HD PCIe Riser Card 1 (1 x16 FH/FL + 1 x8 FH/HL Slots)	1	-
00Y7757	A47Z	x3650 M4 HD PCIe Riser Card 2 (1 x16 FH/FL + 1 x8 FH/HL Slots)	1†	-
None*	A47Y	x3650 M4 HD PCIX Riser Card 1 (1 x16 FH/HL PCIe + 2 PCI-X FH/FL)	1	-
00Y7758	A480	x3650 M4 HD PCIX Riser Card 2 (1 x16 FH/HL PCIe + 2 PCI-X FH/FL)	1†	-
None*	A47N	x3650 M4 HD PCIe Riser Card 1 (1 x8 FH/FL + 2 x8 FH/HL Slots)	1	All other models
00Y7759	A481	x3650 M4 HD PCIe Riser Card 2 (1 x8 FH/FL + 2 x8 FH/HL Slots)	1†	-
None*	A47P	x3650 M4 HD PCIe Riser Card 1 (1 x16 for GPU + 1 x8 FH/HL Slots)	1	-
00Y7760	A47Q	x3650 M4 HD PCIe Riser Card 2 (1 x16 for GPU + 1 x8 FH/HL Slots)	1†	-
None	A3NQ	x3650 M4 HD Rear 2 HDD Kit -- includes riser for RAID card in slot 3	1	H3x

\* CTO only.

† The use of Riser card slot 2 requires a second processor to be installed.

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

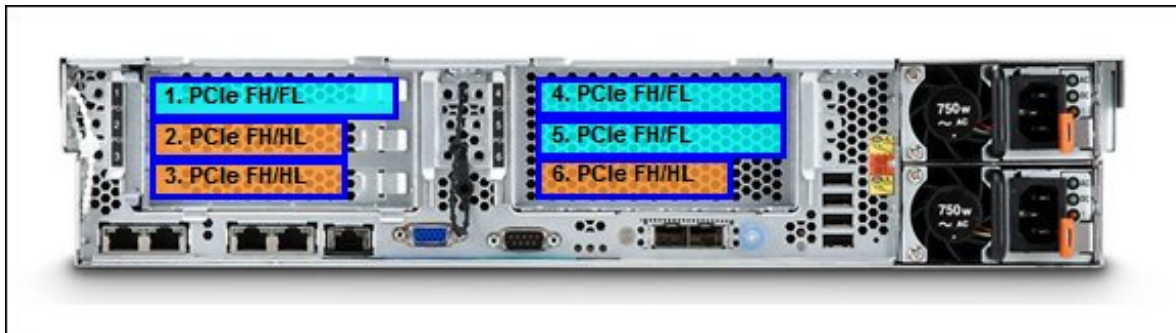


Figure 7. Slot dimensions

The specific slots that are available depend on the riser cards that are installed in Riser socket 1 and Riser socket 2, as shown in the following table. Standard models except for model H3x have 00Y7759 installed in Riser socket 1.

**Tip:** All slots support full-height adapters. Slots 1, 4, and 5 support full-length adapters, and slots 2, 3, and 6 (when present) support half-length adapters.

Table 13. PCIe slot descriptions (FH=full height, FL=full length, HL=half length, DW=double width)

Slot number	PCIe 3 x8 riser 00Y7759 (standard)	PCIe x16 riser 00Y7757	PCI-X riser 00Y7758	GPU riser 00Y7760
Riser socket 1 (CPU 1)	1: PCIe 3.0 x8; FH, FL	1: PCIe 3.0 x16 FH, FL	1: PCI-X 64b/133 FH, FL	1: No slot present
	2: PCIe 3.0 x8; FH, HL	2: PCIe 3.0 x8 FH, HL	2: PCI-X 64b/133 FH, HL	2: PCIe 3.0 x16 FH, FL, DW
	3: PCIe 3.0 x8; FH, HL	3: No slot present	3: PCIe 3.0 x16 FH, HL	3: PCIe 3.0 x8 FH, HL
Riser socket 2 (CPU 2 required)	4: PCIe 3.0 x8 FH, FL	4: PCIe 3.0 x16 FH, FL	4: PCI-X 64b/133 FH, FL	4: No slot present
	5: PCIe 3.0 x8 FH, FL	5: PCIe 3.0 x8 FH, FL	5: PCI-X 64b/133 FH, FL	5: PCIe 3.0 x16 FH, FL, DW
	6: PCIe 3.0 x8 FH, HL	6: No slot present	6: PCIe 3.0 x16 FH, HL	6: PCIe 3.0 x8 FH, HL

**Note:** Slots 4, 5, and 6 require a second processor to be installed.

## Network adapters

x3650 M4 HD supports four integrated Gigabit Ethernet ports. Optionally, two 10 Gb Ethernet ports or InfiniBand can be added by installing one of the available dual-port mezzanine cards that are listed in the following table. These cards use a dedicated connector on the system board and do not use a PCI expansion slot.

Integrated NICs have the following features:

- Intel I350AM4 chip
- Four GbE ports
- TCP Offload Engine (TOE) support
- Wake on LAN support
- 802.1Q VLAN tagging support
- NIC Teaming (load balancing and failover)

The following table lists additional supported network adapters.

Table 14. Network adapters

Part number	Feature code	Description	Maximum supported#
Mezzanine Card - does not use a PCI expansion slot			
49Y7980	A3JS	Intel X520 Dual Port 10GbE SFP+ Embedded Adapter	1
49Y7990	A3JT	Intel X540 Dual Port 10GBase-T Embedded Adapter	1
00Y7730	A4MC	Emulex Dual Port 10GbE SFP+ Embedded VFA IIIr for System x	1
90Y5178	A2TE	Emulex Mezz VFA III/IIIr FCoE/iSCSI License for System x (FoD) (Features on Demand upgrade for 00Y7730)	1
00D4143	A36R	Dual Port FDR Embedded Adapter	1
90Y6454	A22H	QLogic Dual Port 10GbE SFP+ Embedded VFA	1
90Y5179	A2TF	QLogic Embedded VFA FCoE/iSCSI License for System x (FoD) (Features on Demand upgrade for 90Y6454)	1



Part number	Feature code	Description	Maximum supported#
40 Gb Ethernet			
00D9550	A3PN	Mellanox ConnectX-3 40GbE / FDR IB VPI Adapter for System x	6
10 Gb Ethernet			
49Y7910	A18Y	Broadcom NetXtreme II Dual Port 10GBaseT Adapter	6
44T1360	A4YQ	Broadcom NetXtreme 2x10 GbE SFP+ Mezz Adapter for System x	6
44T1370	A5GZ	Broadcom NetXtreme 2x10GbE BaseT Adapter for System x	6
94Y5180	A4Z6	Broadcom NetXtreme Dual Port 10GbE SFP+ Adapter for System x	6
00D8540	A4XH	Emulex Dual Port 10GbE SFP+ VFA IIIr for System x	6
95Y3760	A2U2	Emulex VFA III/IIIr FCoE/iSCSI License for System x (FoD) (Features on Demand upgrade for 00D8540)	6
00JY830	A5UU	Emulex VFA5 2x10 GbE SFP+ Adapter and FCoE/iSCSI SW for System x	6
None*	AS3M	Emulex VFA5 2x10 GbE SFP+ Integrated Adapter for System x	6
00JY820	A5UT	Emulex VFA5 2x10 GbE SFP+ PCIe Adapter for System x	6
00JY824	A5UV	Emulex VFA5 FCoE/iSCSI SW for PCIe Adapter for System x (FoD) (Features on Demand upgrade for 00JY820 and feature AS3M)	6
49Y7960	A2EC	Intel X520 Dual Port 10GbE SFP+ Adapter for System x	6
49Y7970	A2ED	Intel X540-T2 Dual Port 10GBaseT Adapter for System x	6
81Y3520	AS73	Intel X710 2x10GbE SFP+ Adapter for System x	6
00D9690	A3PM	Mellanox ConnectX-3 10 GbE Adapter for System x	6
42C1800	5751	QLogic 10Gb CNA for System x	6
90Y4600	A3MR	QLogic 8200 Dual Port 10GbE SFP+ VFA for System x	6
00Y5624	A3MT	QLogic 8200 VFA FCoE/iSCSI License for System x (FoD) (Features on Demand upgrade for 90Y4600)	6
Gigabit Ethernet			
90Y9370	A2V4	Broadcom NetXtreme I Dual Port GbE Adapter for System x	6
90Y9352	A2V3	Broadcom NetXtreme I Quad Port GbE Adapter for System x	6
49Y4230	5767	Intel Ethernet Dual Port Server Adapter I340-T2 for System x	6
49Y4240	5768	Intel Ethernet Quad Port Server Adapter I340-T4 for System x	6
00AG500	A56K	Intel I350-F1 1xGbE Fiber Adapter for System x	6
00AG510	A56L	Intel I350-T2 2xGbE BaseT Adapter for System x	6
00AG520	A56M	Intel I350-T4 4xGbE BaseT Adapter for System x	6
42C1780	2995	NetXtreme II 1000 Express Dual Port Ethernet Adapter	6
None*	1485	NetXtreme II 1000 Express G Ethernet Adapter- PCIe	6
42C1750	2975	PRO/1000 PF Server Adapter	6
InfiniBand			
95Y3750	A2MY	Mellanox ConnectX-2 Dual-port QSFP QDR IB Adapter	6
00D9550	A3PN	Mellanox ConnectX-3 40GbE / FDR IB VPI Adapter for System x	6

\* CTO only.

# Maximum quantity is achieved with two processors installed. With one processor, the maximum quantity is half of the listed value (this does not apply to mezzanine cards).

For more information, see the list of Lenovo Press Product Guides in the Networking adapters category:  
<http://lenovopress.com/systemx/networkadapters>

## Storage HBAs and external RAID controllers

The following table lists the storage HBAs that are supported by the x3650 M4 HD server. The maximum quantity that is listed is for configurations with two processors installed. If one processor is installed, the maximum quantity that is supported is half of the listed value.

Table 15. Storage adapters

Part number	Feature code	Description	Maximum supported
Fibre Channel - 16 Gb			
81Y1668	A2XU	Brocade 16Gb FC Single-port HBA for System x	6
81Y1675	A2XV	Brocade 16Gb FC Dual-port HBA for System x	6
81Y1655	A2W5	Emulex 16Gb FC Single-port HBA for System x	6
81Y1662	A2W6	Emulex 16Gb FC Dual-port HBA for System x	6
00Y3337	A3KW	QLogic 16Gb FC Single-port HBA for System x	6
00Y3341	A3KX	QLogic 16Gb FC Dual-port HBA for System x	6
Fibre Channel - 8 Gb			
46M6049	3589	Brocade 8 Gb FC Single-port HBA for System x	6
46M6050	3591	Brocade 8 Gb FC Dual-port HBA for System x	6
42D0485	3580	Emulex 8 Gb FC Single-port HBA for System x	6
42D0494	3581	Emulex 8 Gb FC Dual-port HBA for System x	6
42D0501	3578	QLogic 8 Gb FC Single-port HBA for System x	6
42D0510	3579	QLogic 8 Gb FC Dual-port HBA for System x	6
SAS			
00AE912	A5M0	N2225 SAS/SATA HBA for System x	2
00AE916	A5M1	N2226 SAS/SATA HBA for System x	2

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

The server supports attachments to the external storage expansion enclosures, by using the ServeRAID M5225 SAS/SATA Controller.

The following table provides the ordering part numbers for the ServeRAID M5225 SAS/SATA Controller and upgrades.

Table 16. Ordering part numbers and feature codes

Part number	Feature code	Description	Maximum supported
Adapters			
00AE938	A5ND	ServeRAID M5225-2GB SAS/SATA Controller for System x	4
Upgrades for the M5225			
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*

\* 1 Features on Demand (FoD) upgrade will enable all M5200 series adapters installed in the server

The ServeRAID M5225 SAS/SATA Controller has the following specifications:

- Eight external 12 Gbps SAS/SATA ports
- Supports 12, 6, and 3 Gbps SAS and 6 and 3 Gbps SATA data transfer rates
- Two external x4 mini-SAS HD connectors (SFF-8644)
- Supports 2 GB flash-backed cache (standard)
- Supports RAID levels 0, 1, 5, 10, and 50 (standard)
- Supports RAID 6 and 60 with the optional M5200 Series RAID 6 Upgrade
- Supports optional M5200 Series Performance Accelerator and SSD Caching upgrades
- PCIe x8 Gen 3 host interface
- Based on the LSI SAS3108 12 Gbps ROC controller
- Supports connectivity to the EXP2512 and EXP2524 storage expansion enclosures

For more information, see the Lenovo Press Product Guide *ServeRAID M5225-2GB SAS/SATA Controller* at:

<http://lenovopress.com/tips1258>

## PCIe SSD adapters

The server supports the High IOPS SSD adapters that are listed in the following table.

Table 17. SSD adapters

Part number	Feature code	Description	Maximum supported
00AE983	ARYK	1250GB Enterprise Value io3 Flash Adapter for System x	4
00AE986	ARYL	1600GB Enterprise Value io3 Flash Adapter for System x	4
00AE989	ARYM	3200GB Enterprise Value io3 Flash Adapter for System x	4
00AE992	None*	6400GB Enterprise Value io3 Flash Adapter for System x	4
00AE995	ARYP	1000GB Enterprise io3 Flash Adapter for System x	4
00AE998	ARYQ	1300GB Enterprise io3 Flash Adapter for System x	4
00JY001	ARYR	2600GB Enterprise io3 Flash Adapter for System x	4
00JY004	None*	5200GB Enterprise io3 Flash Adapter for System x	4

\* These adapters cannot be ordered via CTO. They must be ordered as options and shipped separately from the server.

For details about these adapters, see the Lenovo Press Product Guides in the Internal Storage category: <http://lenovopress.com/systemx/internalstorage>

## GPU adapters

The server supports graphics processing units (GPUs).

The following table lists the supported GPUs. Certain riser cards are needed as listed in the table. The server supports up to two NVIDIA adapters, one in each riser card. The use of the second GPU requires that the second processor be installed. GPUs are available through CTO only. Additional cables and other components are included by the configurator.

Table 18. GPU adapters

Part number	Feature code	Description	Riser used	Maximum supported
None*	A3WJ	NVIDIA Quadro K2000	GPU riser, 00Y7760	2
None*	A3WH	NVIDIA Quadro K600	PCIe x16 riser, 00Y7757	2

\* CTO only.

## Power supplies

The server supports up to two redundant power supplies. Standard models come with one or two power supplies (model dependent). The following table lists the power supplies.

Table 19. Power supplies

Part number	Feature code	Description	Maximum supported	Standard models where used
94Y6667	A2EB	System x 900W High Efficiency Platinum AC Power Supply	2	M3x, 83x
94Y6669	A1H5	System x 750W High Efficiency Platinum AC Power Supply	2	All other models
94Y6668	A1H6	System x 550W High Efficiency Platinum AC Power Supply	2	
94Y7631	A39N	System x 750W High Efficiency -48 V DC Power Supply	2	-

An AC power supply ships standard with one 2.8 m C13 - C14 power cord.

All CFF power supplies are compliant with and exceed 80 Plus Platinum standard, as shown in the following table. Maximum power efficiency is achieved at 50% load.

Table 20. Power supply efficiencies

Power supply unit	20% load	50% load	100% load
80 PLUS Platinum standard			
	90.00%	94.00%	91.00%
Power supplies			
System x 900W High Efficiency Platinum AC Power Supply	90.45%	94.02%	91.89%
System x 750W High Efficiency Platinum AC Power Supply	92.32%	94.31%	93.14%
System x 550W High Efficiency Platinum AC Power Supply	92.94%	94.21%	92.74%

For power supply selection, use the following rule-of-thumb:

Select 550W power supplies if all of the following items are true:

- 8 or fewer DIMMs (no LRDIMMs)
- 16 or fewer HDDs
- One CPU 115W or lower
- 1 or 2 PCIe adapters
- No High IOPS adapters
- No GPUs

Select 750 W power supplies if all of the following items are true:

- 16 or fewer DIMMs (no LRDIMMs)
- 24 or fewer drives
- Two CPUs 115 W or lower
- No High IOPS adapters
- No GPUs

Select 900 W power supplies if all of the following items are true:

- More than 16 DIMMs
- 26 or 32 drives

- CPUs above 115 W
- High IOPS adapters
- GPU adapters

For accurate power supply selection, use the Power Configurator:  
<http://ibm.com/systems/bladecenter/resources/powerconfig.html>

## Integrated virtualization

The server supports VMware ESXi that 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.

Table 21. Virtualization options

Part number	Feature code	Description	Maximum supported	Standard models where used
41Y8298	A2G0	Blank USB Memory Key for VMware ESXi Downloads	1	None

## Local server management

The x3650 M4 HD offers local console access USB ports and a video port on the rear of the server, as shown in Figure 3. Console access from the front of the server is available through an optional console breakout cable that is connected to a port on the front of the server as shown in the following figure.



Figure 8. Optional console breakout cable

The console breakout cable can be ordered by using the information in the following table.

Table 22. Console breakout cable

Part number	Feature code	Description	Maximum supported	Standard models where used
00Y8325	A47X	x3650 M4 HD Video and USB Breakout Cable	1	None

To aid with problem determination, the server includes basic light path diagnostics, which are 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.

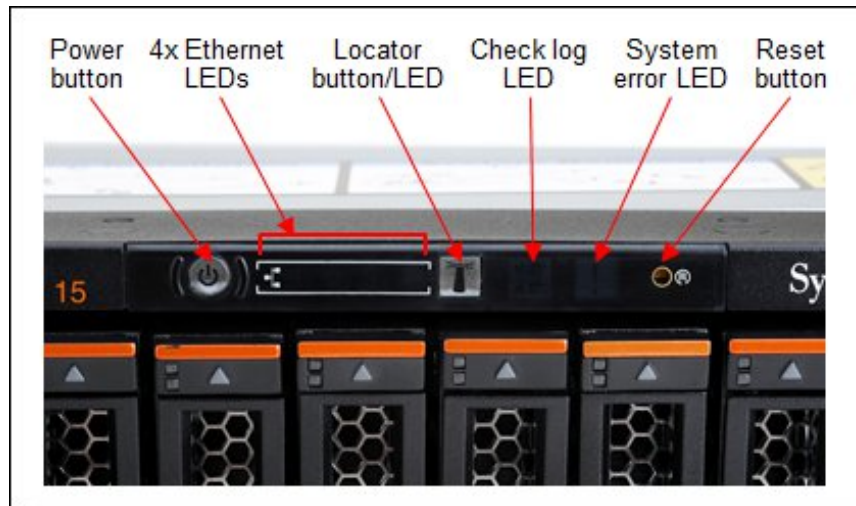


Figure 9. Power button and system LEDs

When an error occurs, the system error LED lights up. You can review the logs through the web interface of the IMMv2 (see the "Remote management" section).



## Remote management

The server contains Integrated Management Module II (IMM2), which provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM2 lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the IMM2 also provides a virtual presence capability for remote server management capabilities.

The x3650 M4 HD offers a dedicated Ethernet port at the rear of the server for remote access to the IMM2. Alternatively, one of the four Ethernet ports that are accessible by the operating system can be shared with IMM2 access. This feature is enabled through the system setup in UEFI.

The IMM provides remote server management through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Common Information Model (CIM)
- Web browser

The optional Integrated Management Module Advanced Upgrade is required to enable the remote presence and blue-screen capture features. The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel colors, regardless of the system state
- Remotely accessing the server 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 option ordering information.

Table 23. Remote management option

Part number	Feature code	Description	Maximum supported	Models where used
90Y3901	A1ML	Integrated Management Module Advanced Upgrade	1	None

## Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Web x86 Edition
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 7
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE Linux Enterprise Server 12
- SUSE Linux Enterprise Server 12 with XEN
- VMware vSphere 5.1 (ESXi)
- VMware vSphere 5.5 (ESXi)

For more information about the specific versions and service levels that are supported and any other prerequisites, see the Operating System Interoperability Guide:

<http://lenovopress.com/osig>

## Physical and electrical specifications

Dimensions and weight:

- Height: 86.5 mm (3.4 in.)
- Width: 445 mm (17.5 in.)
- Depth: 746 mm (29.4 in.)
- Weight:
  - Minimum configuration: 25 kg (55 lb)
  - Maximum configuration: 30 kg (65 lb)

Supported environment:

The System x3650 M4 HD complies with ASHRAE class A3 specifications.

- Power on:
  - Temperature: 5 °C to 40 °C (41 °F to 104 °F) up to 950 m (3,117 ft)
  - Above 950 m, de-rated maximum air temperature 1 °C / 175 m
  - 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 to 28 °C (41 °F to 82 °F)
  - Maximum rate of temperature change: 20 °C/hr (68 °F/hr) for HDDs
- Power off:
  - Temperature: 5 °C to 45 °C (41 °F to 113 °F)
  - Relative humidity: 8% - 85%
  - Maximum dew point: 27 °C (80.6 °F)
- Storage (non-operating):
  - Temperature: 1 °C to 60 °C (33.8 °F to 140 °F)
  - Altitude: 3050 m (10,000 ft)
  - Relative humidity: 5% - 80%
  - Maximum dew point: 29 °C (84.2 °F)
- Shipment (non-operating):
  - Temperature: -40 °C to 60 °C (-40 °F to 140 °F)
  - Altitude: 10,700 m (35,105 ft)
  - Relative humidity: 5% - 100%
  - Maximum dew point: 29 °C (84.2 °F)
- Electrical:
  - Models with 900 W power supplies:
    - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 10 A
    - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 5 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.15 kVA
      - Maximum configuration: 1.2 kVA
  - Models with 750 W AC power supplies:
    - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 8.9 A
    - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 4.5 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.15 kVA
      - Maximum configuration: 0.99 kVA
  - Models with 550 W power supplies:
    - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 6.5 A
    - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 3.3 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.16 kVA
      - Maximum configuration: 0.73 kVA
- BTU output:
  - Minimum configuration: 525 Btu/hr (154 watts)
  - Maximum configuration: 4053 Btu/hr (1188 watts)
- Noise level:
  - 6.6 bels (operating)
  - 6.4 bels (idle)

## Warranty options

The System x3650 M4 HD has 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:

The following table explains warranty service definitions in more detail.

Table 24. 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.

## **Regulatory compliance**

The server conforms to the following 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
- Australia/New Zealand AS/NZS CISPR 22, Class A; AS/NZS 60950.1
- 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
- Korea KN22, Class A; KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22, GOST R 51318.24, GOST R 51317.3.2, and GOST R 51317.3.3
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, and EN61000-3-3)
- CISPR 22, Class A
- TUV-GS (EN60950-1 /IEC60950-1, EK1-ITB2000)

## External drive enclosures

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

The following table lists the 6 Gbps SAS external drive enclosures that are offered by Lenovo that can be used with the server for storage expansion.

Table 25. E1012 and E1024 external drive enclosure models

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

For details about supported drives and cables for the Lenovo Storage E1012 and E1024, see the Lenovo Press Product Guide:

<http://lenovopress.com/lp0043>

The following table lists the 12 Gbps SAS external drive enclosures offered by Lenovo that can be used with the server for storage expansion.

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

<http://datacentersupport.lenovo.com>

Table 26. External drive enclosures

Description	Part number		
	Worldwide	Japan	PRC
Lenovo Storage D1212 LFF Disk Expansion with Dual SAS IO Modules	4587A11	4587A1J	4587A1C
Lenovo Storage D1224 SFF Disk Expansion with Dual SAS IO Modules	4587A31	4587A3J	4587A3C
Lenovo Storage D3284 4TB x 84 HD Expansion Enclosure	641311F		
Lenovo Storage D3284 6TB x 84 HD Expansion Enclosure	641312F		
Lenovo Storage D3284 8TB x 84 HD Expansion Enclosure	641313F		
Lenovo Storage D3284 10TB x 84 HD Expansion Enclosure	641314F		

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

- Lenovo Storage D1212 and D1224  
<http://lenovopress.com/lp0512>
- Lenovo Storage D3284  
<http://lenovopress.com/lp0513>

## External disk storage systems

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

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



## External backup units

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

Table 27. External backup options

Part number	Description
External RDX USB drives	
4T27A10725	ThinkSystem RDX External USB 3.0 Dock
External SAS tape backup drives	
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	
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
6741A3F	IBM TS4300 3U Tape Library-Expansion Unit
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 following table lists the Ethernet LAN switches that are offered by Lenovo.

Table 28. Ethernet LAN switches

Part number	Description
<b>1 Gb Ethernet Rack switches</b>	
7Y810011WW	Lenovo ThinkSystem NE0152T RackSwitch (Rear to Front)
7Z320011WW	Lenovo ThinkSystem NE0152TO RackSwitch (Rear to Front, ONIE)
7159BAX	Lenovo RackSwitch G7028 (Rear to Front)
7159CAX	Lenovo RackSwitch G7052 (Rear to Front)
7159G52	Lenovo RackSwitch G8052 (Rear to Front)
7165H1X	Juniper EX2300-C PoE Switch
7165H2X	Juniper EX2300-24p PoE Switch
<b>1 Gb Ethernet Campus switches</b>	
7Z340011WW	Lenovo CE0128TB Switch (3-Year Warranty)
7Z360011WW	Lenovo CE0128TB Switch (Limited Lifetime Warranty)
7Z340012WW	Lenovo CE0128PB Switch (3-Year Warranty)
7Z360012WW	Lenovo CE0128PB Switch (Limited Lifetime Warranty)
7Z350021WW	Lenovo CE0152TB Switch (3-Year Warranty)
7Z370021WW	Lenovo CE0152TB Switch (Limited Lifetime Warranty)
7Z350022WW	Lenovo CE0152PB Switch (3-Year Warranty)
7Z370022WW	Lenovo CE0152PB Switch (Limited Lifetime Warranty)
<b>10 Gb Ethernet switches</b>	
7159A1X	Lenovo ThinkSystem NE1032 RackSwitch (Rear to Front)
7159B1X	Lenovo ThinkSystem NE1032T RackSwitch (Rear to Front)
7Z330011WW	Lenovo ThinkSystem NE1064TO RackSwitch (Rear to Front, ONIE)
7159C1X	Lenovo ThinkSystem NE1072T RackSwitch (Rear to Front)
7159CRW	Lenovo RackSwitch G8272 (Rear to Front)
7159GR6	Lenovo RackSwitch G8296 (Rear to Front)
7159BR6	Lenovo RackSwitch G8124E (Rear to Front)
<b>25 Gb Ethernet switches</b>	
7159E1X	Lenovo ThinkSystem NE2572 RackSwitch (Rear to Front)
7Z210021WW	Lenovo ThinkSystem NE2572O RackSwitch (Rear to Front, ONIE)
7Z330021WW	Lenovo ThinkSystem NE2580O RackSwitch (Rear to Front, ONIE)
<b>100 Gb Ethernet switches</b>	
7159D1X	Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front)
7Z210011WW	Lenovo ThinkSystem NE10032O RackSwitch (Rear to Front, ONIE)

For more information, see the list of Product Guides in the following switch 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>
- 25 Gb Ethernet switches: <http://lenovopress.com/networking/tor/25gb?rt=product-guide>
- 40 Gb Ethernet switches: <http://lenovopress.com/networking/tor/40gb?rt=product-guide>
- 100 Gb Ethernet switches: <https://lenovopress.com/networking/tor/100Gb?rt=product-guide>

## Uninterruptible power supply units

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

Table 29. Uninterruptible power supply units

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

† Only available in China and the Asia Pacific market.

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

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

## Power distribution units

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

Table 30. Power distribution units

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
<b>0U Basic PDUs</b>															
00YJ776	ATZY	0U 36 C13/6 C19 24A 1 Phase PDU	N	Y	Y	N	N	N	N	N	N	Y	Y	Y	N
00YJ779	ATZX	0U 21 C13/12 C19 48A 3 Phase PDU	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
00YJ777	ATZZ	0U 36 C13/6 C19 32A 1 Phase PDU	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y
00YJ778	AU00	0U 21 C13/12 C19 32A 3 Phase PDU	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y
<b>0U Switched and Monitored PDUs</b>															
00YJ783	AU04	0U 12 C13/12 C19 Switched and Monitored 48A 3 Phase PDU	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
00YJ781	AU03	0U 20 C13/4 C19 Switched and Monitored 24A 1 Phase PDU	N	N	Y	N	Y	N	Y	N	N	Y	Y	Y	N
00YJ782	AU02	0U 18 C13/6 C19 Switched and Monitored 32A 3 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
00YJ780	AU01	0U 20 C13/4 C19 Switched and Monitored 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
<b>1U Switched and Monitored PDUs</b>															
4PU7A90808	C0D4	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 ETL	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A81117	BNDV	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	N	N	N	N	N	N	N	N	N	N	N	Y	N
4PU7A90809	C0DE	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 CE	N	N	N	N	N	Y	Y	N	N	N	N	N	N
4PU7A81118	BNDW	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
4PU7A90810	C0DD	1U 18 C19/C13 Switched and monitored 80A 3P Delta PDU V2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A77467	BLC4	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	N	N	N	N	N	N	N	N	N	Y	N	Y	N
4PU7A90811	C0DC	1U 12 C19/C13 Switched and monitored 32A 3P WYE PDU V2	N	N	N	N	N	Y	Y	N	N	N	N	N	N
4PU7A77468	BLC5	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A90812	C0DB	1U 12 C19/C13 Switched and monitored 60A 3P Delta PDU V2	N	N	N	N	N	N	N	N	N	Y	N	N	N
4PU7A77469	BLC6	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	N	N	N	N	N	N	N	N	N	N	N	Y	N
46M4002	5896	1U 9 C19/3 C13 Switched and Monitored DPI PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
46M4004	5894	1U 12 C13 Switched and Monitored DPI PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
46M4003	5897	1U 9 C19/3 C13 Switched and Monitored 60A 3 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
46M4005	5895	1U 12 C13 Switched and Monitored 60A 3 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>1U Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)</b>															
71763NU	6051	Ultra Density Enterprise C19/C13 PDU 60A/208V/3PH	N	N	Y	N	N	N	N	N	N	Y	Y	Y	N
71762NX	6091	Ultra Density Enterprise C19/C13 PDU Module	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>1U C13 Enterprise PDUs (12x IEC 320 C13 outlets)</b>															
39M2816	6030	DPI C13 Enterprise PDU Plus Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8941	6010	DPI C13 Enterprise PDU Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>1U C19 Enterprise PDUs (6x IEC 320 C19 outlets)</b>															
39Y8948	6060	DPI C19 Enterprise PDU Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
39Y8923	6061	DPI Three-phase 60A/208V C19 Enterprise PDU (US)	N	N	Y	N	N	N	Y	N	N	N	Y	Y	N
<b>1U Front-end PDUs (3x IEC 320 C19 outlets)</b>															
39Y8938	6002	DPI Single-phase 30A/120V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8939	6003	DPI Single-phase 30A/208V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8934	6005	DPI Single-phase 32A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8940	6004	DPI Single-phase 60A/208V Front-end PDU (US)	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N
39Y8935	6006	DPI Single-phase 63A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>1U NEMA PDUs (6x NEMA 5-15R outlets)</b>															
39Y8905	5900	DPI 100-127V NEMA PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<b>Line cords for 1U PDUs that ship without a line cord</b>															
40K9611	6504	4.3m, 32A/380-415V, EPDU/IEC 309 3P+N+G 3ph wye (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9612	6502	4.3m, 32A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9613	6503	4.3m, 63A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9614	6500	4.3m, 30A/208V, EPDU to NEMA L6-30P (US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9615	6501	4.3m, 60A/208V, EPDU to IEC 309 2P+G (US) Line Cord	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
40K9617	6505	4.3m, 32A/230V, Souriau UTG Female to AS/NZ 3112 (Aus/NZ) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9618	6506	4.3m, 32A/250V, Souriau UTG Female to KSC 8305 (S. Korea) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

For more information, see the Lenovo Press documents in the PDU category:  
<https://lenovopress.com/servers/options/pdu>

## Rack cabinets

The server supports the rack cabinets that are listed in the following table.

Table 31. Rack cabinets

Part number	Description
201886X	11U Office Enablement Kit
93072PX	25U Static S2 Standard Rack
93072RX	25U Standard Rack
93074RX	42U Standard Rack
93074XX	42U Standard Rack Extension
93084EX	42U Enterprise Expansion Rack
93084PX	42U Enterprise Rack
93604EX	42U 1200 mm Deep Dynamic Expansion Rack
93604PX	42U 1200 mm Deep Dynamic Rack
93614EX	42U 1200 mm Deep Static Expansion Rack
93614PX	42U 1200 mm Deep Static Rack
93624EX	47U 1200 mm Deep Static Expansion Rack
93624PX	47U 1200 mm Deep Static Rack
99564RX	S2 42U Dynamic Standard Rack
99564XX	S2 42U Dynamic Standard Expansion Rack

For more information, see the list of Lenovo Press Product Guides in the Rack cabinets and options category:

<http://lenovopress.com/systemx/rack>

## KVM console options

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

Table 32. 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

Part number	Description
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)
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>

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<https://www.lenovo.com/us/en/landingpage/lenovo-financial-services/>

## Related publications and links

For more information, see these resources:

- US Announcement Letter  
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-151>
- *System x3650 M4 HD Installation and Service Guide*  
<http://ibm.com/support>
- xREF - System x Reference Sheets  
<http://lenovopress.com/xref>
- System x Support Portal  
<http://ibm.com/support/entry/portal/>  
[http://ibm.com/support/entry/portal/Downloads/Hardware/Systems/System\\_x/System\\_x3650\\_M4\\_HD](http://ibm.com/support/entry/portal/Downloads/Hardware/Systems/System_x/System_x3650_M4_HD)

## Related product families

Product families related to this document are the following:

- [2-Socket Rack Servers](#)



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