

IBM System x3750 M4

IBM Redbooks Product Guide

The IBM® System x3750 M4 is a 4-socket server featuring a streamlined design, optimized for price and performance, with best-in-class flexibility and expandability. Models of the x3750 M4 are powered with Intel Xeon E5-4600 processors, up to 8 cores each, for an entry-level 4-socket solution. The x3750 M4 provides maximum storage density, with flexible PCI and 10 Gb Ethernet networking options in a 2U form factor.

Suggested uses: High performance computing (HPC), workloads with floating-point computations, and small to medium databases requiring fast I/O; applications that require 4-socket performance without needing the scalability that the IBM eX5 systems provide.



Figure 1. The IBM System x3750 M4

Did you know

The x3750 M4 has outstanding memory performance that is achieved by supporting three-RDIMM-per-channel configurations at speeds up to 25% faster than the Intel specification, while still maintaining world-class IBM reliability. LR-DIMM speeds are also 25% beyond the Intel specification for 1.35 V DIMMs, and this speed improve not only performance, but reduces overall system power at the same time.

The x3750 M4 offers a flexible, scalable design and simple upgrade path to 16 hard-disk drives (HDDs) or 32 IBM eXFlash solid-state drives (SSDs), with up to eight PCIe Gen 3 slots and up to 1.5 TB of memory. The flexible embedded Ethernet solution provides two standard Gigabit Ethernet ports onboard, along with a dedicated 10 GbE slot that allows for a choice of either two copper or two fiber optic connections. Comprehensive systems management tools with the next-generation Integrated Management Module II (IMM2) make it easy to deploy, integrate, service, and manage.

Key features

The IBM System x3750 M4 blends outstanding flexibility and expandability. The x3750 M4 2+2 socket design enables pay-as-you-grow processing with the new Intel Xeon E5-4600 series processors and memory scalability to help lower cost and manage growth. The 5+3 PCIe socket design allows you to pay for PCIe capabilities as needed.

With the capability to support up to 48 DIMMs, four sockets, mix and match internal storage with up to 16 HDDs or 32 eXFlash SSD drives, 6 hot-swap dual rotor fans, two power supplies, and integrated 10 GbE networking with options for fiber or copper, the x3750 M4 provides unmatched features and capabilities in a dense 2U design.

Scalability and performance

The x3750 M4 offers numerous features to boost performance, improve scalability, and reduce costs:

- The Intel Xeon processor E5-4600 product family improves productivity by offering superior system performance with 8-core processors and up to 2.9 GHz core speeds, up to 20 MB of L3 cache, and up to two 8 GTps QPI interconnect links.
- The x3750 M4 2+2 processor socket design enables pay-as-you-grow processing with the Intel new Xeon E5-4600 series processors and memory scalability to help lower cost and manage growth.
- Up to four processors, 32 cores, and 64 threads maximize the concurrent execution of multithreaded applications.
- Intelligent and adaptive system performance with Intel Turbo Boost Technology 2.0 allows processor cores to run at maximum speeds during peak workloads by temporarily going beyond processor TDP.
- Intel Hyper-Threading Technology boosts performance for multithreaded applications by enabling simultaneous multithreading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better use the hardware for virtualization workloads.
- Intel Advanced Vector Extensions (AVX) improve floating-point performance for compute-intensive technical and scientific applications compared to Intel Xeon 5600 series processors.
- The outstanding RDIMM memory performance of the x3750 M4 is achieved by supporting three DIMMs per channel configurations at speeds up to 25% faster than the Intel specification.
- 48 Load Reduced DIMMs (LRDIMMs) of 1333 MHz DDR3 ECC memory provide speed, high availability, and a memory capacity of up to 1.5 TB.
- LR-DIMM speeds implemented in the x3750 M4 are also 25% beyond the Intel specification at 1.35 V for one, two, and three DIMM per channel configurations. This configuration improves performance and reduces overall system power at the same time, all while maintaining reliability.
- The use of IBM eXFlash solid-state drives (SSDs) instead of, or along with, traditional spinning 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 16 HDDs or 32 eXFlash SSDs, together with an optical drive at the same time, provide a flexible and scalable all-in-one platform to meet your increasing demands.
- The server offers a SAS switch backplane option (88Y7421) to allow up to 16 SFF devices to attach to a single controller.
- The server has two integrated Gigabit Ethernet ports and two optional 10 Gb Ethernet ports that do not consume PCIe slots.
- The 5+3 PCI Express socket design of the server allows you to pay for PCIe capabilities as needed.

- The server offers PCI Express 3.0 I/O expansion capabilities that improve the theoretical maximum bandwidth by almost 100% (8 GTps per link using 128b/130b encoding) compared to the previous generation of PCI Express 2.0 (5 GTps per link using 8b/10b encoding).
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family. This integration reduces I/O latency and increases overall system performance.

Availability and serviceability

The x3750 M4 provides many features to simplify serviceability and increase system uptime:

- The server offers Chipkill, memory mirroring and memory rank sparing for redundancy in the event of a memory failure.
- The server provides restart recovery for any failed processor. In the event of a failure of processor 1, the server connects the southbridge to processor 2 for reboot.
- Tool-less cover removal provides easy access to upgrades and serviceable parts, such as the processor, memory, and adapter cards.
- 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 six hot-swap dual-rotor N+N redundant fans to provide availability for business-critical applications.
- The power source independent light path diagnostics panel and individual light path LEDs 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 operate outside of standard thresholds and generates proactive alerts in advance of a possible failure, therefore increasing uptime. These components support PFA:
 - Memory
 - SAS/SATA HDDs
 - Fans
 - VRDs
 - Power supplies
- Solid-state drives (SSDs) offer more reliability than traditional mechanical 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 on-site limited warranty, 9 x 5 next business day. Optional service upgrades are available.

Manageability and security

Powerful systems management features simplify local and remote management of the x3750 M4:

- The server includes an Integrated Management Module II (IMM2) to monitor server availability and perform remote management. Remote presence support is standard.
- The 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 increases uptime, reduces costs, and improves 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 x3750 M4 offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to a green environment:

- Energy-efficient planar components help lower operational costs.
- Highly efficient 900 W and 1400 W AC power supplies with 80 PLUS Platinum certification at high voltage AC.
- The Intel Xeon processor E5-4600 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 19% less energy compared to 1.5 V DDR3 RDIMMs.
- Solid-state drives (SSDs) consume as much as 80% less power than traditional spinning 2.5-inch HDDs.
- The server uses hexagonal ventilation holes, which is a part of IBM Calibrated Vecteded 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.

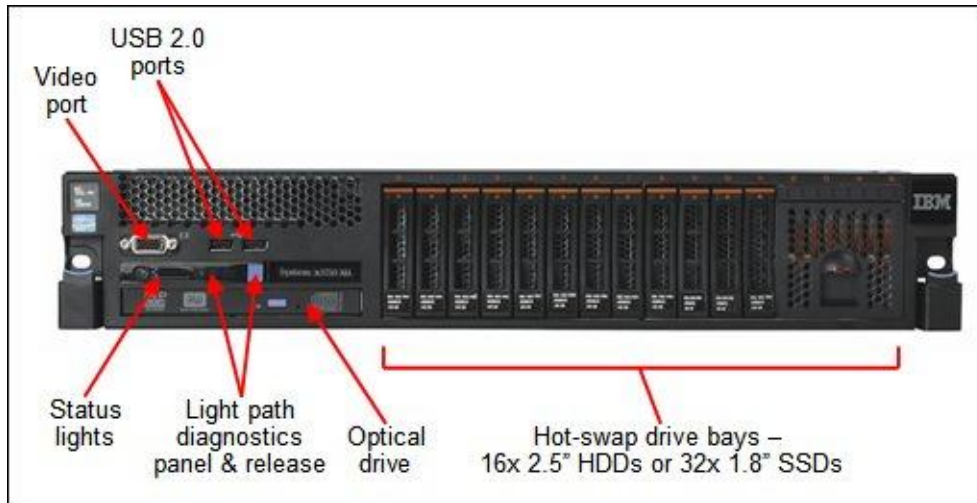


Figure 2. Front view of the IBM System x3750 M4

The following figure shows the rear of the server.

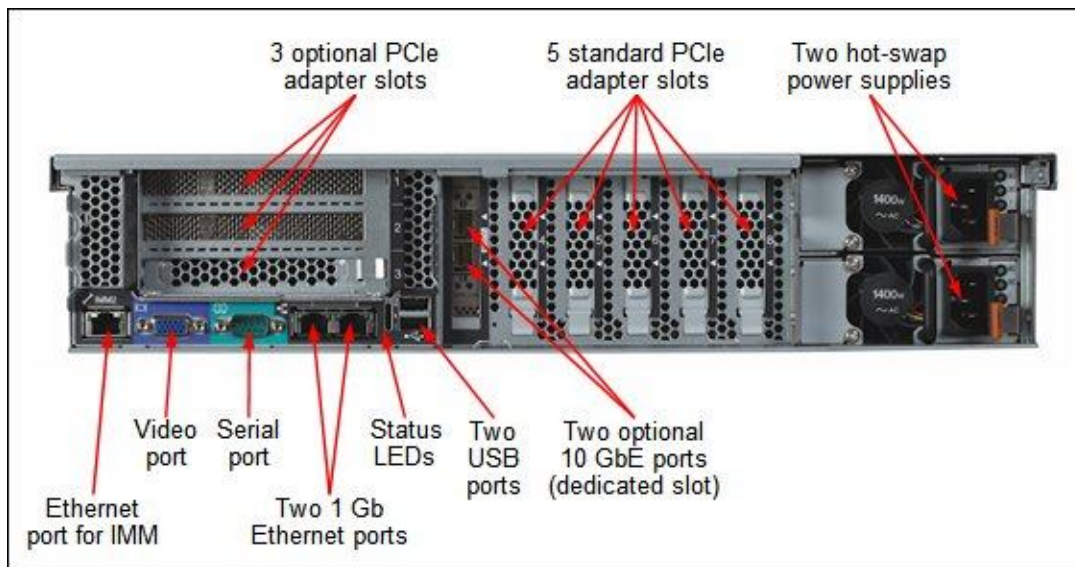


Figure 3. Rear view of the IBM System x3750 M4

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

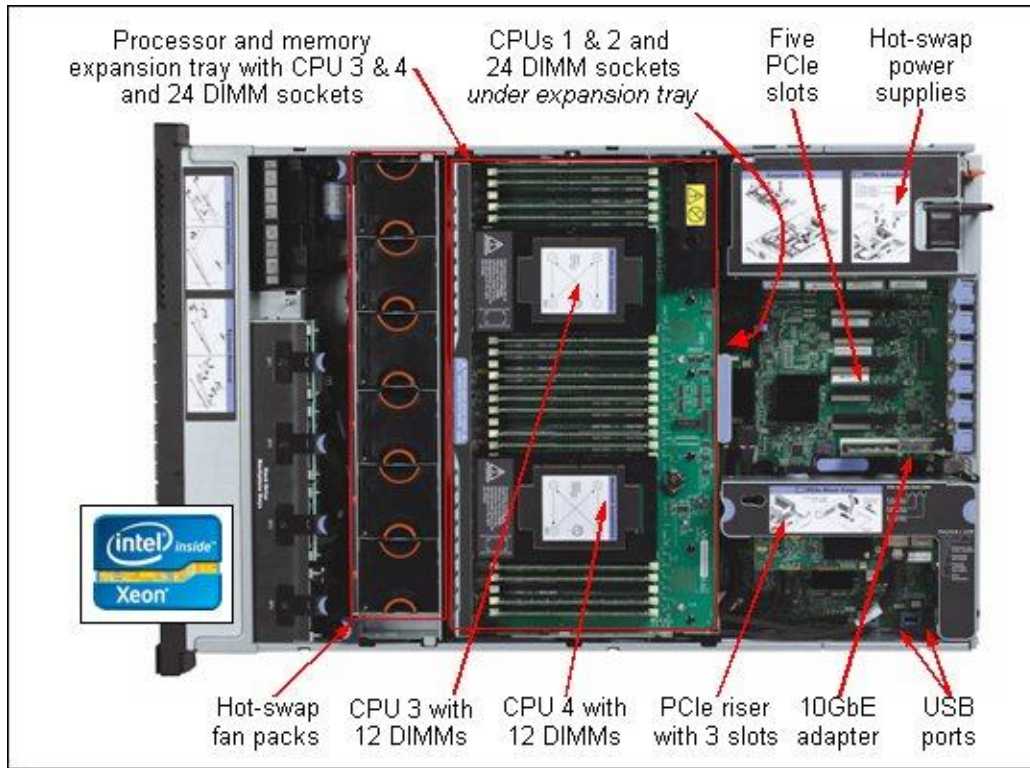


Figure 4. Inside view of the IBM System x3750 M4

Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications (part 1)

Components	Specification
Form factor	2U rack.
Processor	Up to four Intel Xeon processor E5-4600 product family processors, each with eight cores (up to 2.7 GHz), six cores (up to 2.9 GHz), or four cores (up to 2.0 GHz). Two processor sockets on the system board and two processors on the processor and memory expansion tray (standard on most models). Two QPI links up to 8.0 GTps each. Up to 1600 MHz memory speed. Up to 20 MB L3 cache per processor.
Chipset	Intel C600 series.
Memory	Up to 48 DIMM sockets (12 DIMMs per processor). RDIMMs and LRDIMMs (Load Reduced DIMMs) are supported, but memory types cannot be intermixed. The memory speed is up to 1600 MHz. There are 24 DIMM sockets on the system board. There are an additional 24 DIMM sockets on the processor and memory expansion tray (standard on most models).
Memory maximums	With RDIMMs: Up to 768 GB with 48x 16 GB RDIMMs and four processors, With LRDIMMs: Up to 1.5 TB with 48x 32 GB LRDIMMs and four processors.
Memory protection	ECC, Chipkill (for x4-based memory DIMMs), memory mirroring, and memory sparing.
Disk drive bays	Up to 16 2.5-inch hot-swap SAS/SATA bays or up to 32 1.8-inch hot-swap solid-state drive (SSD) eXFlash bays. Drive bays can be in any combination of four 2.5-inch drives or eight 1.8-inch eXFlash SSD drives.
Maximum internal storage	Up to 14.4 TB with 900 GB 2.5-inch SAS HDDs, up to 16 TB with 1 TB 2.5-inch NL SAS/SATA HDDs, or up to 16 TB of SSDs using 512 GB 1.8-inch drives. An intermix of SAS/SATA is supported.
RAID support	RAID 0, 1, 10 with integrated ServeRAID M5110e with LSI SAS2208 6 Gbps RAID on Chip (ROC) controller. Optional upgrades to RAID 5 and 50 are available (zero-cache is 512 MB and battery-backed cache is 512 MB or 1 GB flash-backed cache). There is an optional upgrade to RAID 6 and 60 for a 512 MB or 1 GB cache.
Optical drive bays	There is one bay for an optional Multiburner drive.
Tape drive bays	None internal. Use a supported external tape drive.
Network interfaces	Emulex BE3 controller with two standard integrated Gigabit Ethernet 1000BASE-T ports (RJ-45) and two optional 10 Gb ports through an adapter in a dedicated slot. The 10 GbE options are 10Base-T dual port (copper) or SFP+ dual port (fiber).
PCI Expansion slots	Up to eight slots, five on the system board, three on an optional riser card. The slots are as follows: <ul style="list-style-type: none"> ● Slot 1: PCIe 3.0 x8; full-height, half-length (optional with riser card, requires processor 2) ● Slot 2: PCIe 3.0 x8; full-height, half-length (optional with riser card, requires processor 2) ● Slot 3: PCIe 3.0 x8; full-height, half-length (optional with riser card, requires processor 2) ● Slot 4: PCIe 3.0 x8; low profile (requires processor 2) ● Slot 5: PCIe 3.0 x8; low profile (requires processor 2) ● Slot 6: PCIe 3.0 x8; low profile ● Slot 7: PCIe 3.0 x8; low profile ● Slot 8: PCIe 3.0 x8; low profile Slots 1, 2, and 3 are physically x16 slots.

Table 1. Standard specifications (part 2)

Components	Specification
Ports	Front: Two USB 2.0 and one DB-15 video on front. Rear: Two USB 2.0, one DB-15 video, one DB-9 serial, one RJ-45 systems management ports, two RJ-45 1 GbE network ports, two optional RJ-45 or SFP+ 10 GbE network ports. Internal: Two internal USB ports (for the embedded hypervisor).
Cooling	IBM Calibrated Vektored Cooling with up to six N+N redundant hot swap fans (all six standard); each fan has two rotors.
Power supply	Up to two hot-swap redundant 1400 W AC power supplies (80 PLUS Platinum certification). 900 W power supplies also available through CTO or Special Bid. A second power supply requires that the processor expansion tray (88Y7365) or the power interposer card (88Y7367) be installed.
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 drives, power supplies, and fans.
Systems management	UEFI, IBM Integrated Management Module II (IMM2), Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, IBM Systems Director and Active Energy Manager, and the IBM ServerGuide. IMM Advanced Upgrade software feature for remote presence are standard with the x3750 M4.
Security features	Power-on password, administrator's password, Trusted Platform Module (TPM).
Operating systems supported	Microsoft Windows Server 2008 R2 and 2008, Red Hat Enterprise Linux 5 and 6, SUSE Linux Enterprise Server 10 and 11, VMware ESX 4.1 and VMware ESXi 4.1 embedded hypervisor, and VMware vSphere 5.
Limited warranty	Three-year customer-replaceable unit and on-site limited warranty with 9x5 next business day (NBD).
Service and support	Optional service upgrades are available through IBM ServicePac® offerings: Four-hour or two-hour response time, eight-hour fix time, one-year or two-year warranty extension, remote technical support for IBM hardware and some IBM 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 x3750 M4 servers are shipped with the following items:

- Statement of Limited Warranty
- Important Notices
- Rack Installation Instructions
- Documentation CD that contains the *Installation and User's Guide*
- IBM Systems Director 6.3 Base for x86 DVD-ROM
- IBM System x® Gen-III Slides Kit
- IBM System x Gen-III Cable Management Arm (CMA)
- 2.8 m (9.2 ft.) 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 processor† (four maximum)*	Memory	RAID controller	Hot-swap disk bays	Disks	PCIe	GbE	Power supply
Models announced May 2012								
8722-A1x	2x E5-4617 6C 2.9 GHz 15 MB 1600 MHz 130W	2x 8 GB RDIMM 1600 MHz	M5110e	4x 2.5" 16 max	Open	5 / 8	2	1x 1400W
8722-A2x	1x E5-4603 4C 2.0 GHz 10 MB 1066 MHz 95W*	1x 8 GB RDIMM 1333 MHz	M5110e	Open	Open	5 / 8	2	1x 1400W
8722-A3x	2x E5-4607 6C 2.2 GHz 12 MB 1066 MHz 95W	2x 8 GB RDIMM 1333 MHz	M5110e	4x 2.5" 16 max	Open	5 / 8	2	1x 1400W
8722-B1x	2x E5-4610 6C 2.4 GHz 15 MB 1333 MHz 95W	2x 8 GB RDIMM 1333 MHz	M5110e	4x 2.5" 16 max	Open	5 / 8	2	1x 1400W
8722-B2x	2x E5-4620 8C 2.2 GHz 16 MB 1333 MHz 95W	2x 8 GB RDIMM 1333 MHz	M5110e	8x 1.8" 32 max	Open	8 / 8	2	1x 1400W
8722-C1x	2x E5-4640 8C 2.4 GHz 20 MB 1600 MHz 95W	2x 8 GB RDIMM 1333 MHz	M5110e (1 GB,F,R5)‡	4x 2.5" 16 max	Open	8 / 8	2	1x 1400W
8722-C2x	2x E5-4650 8C 2.7 GHz 20 MB 1600 MHz 130W	2x 8 GB RDIMM 1333 MHz	M5110e (1 GB,F,R5)‡	4x 2.5" 16 max	Open	5 / 8	2	1x 1400W
8722-D1x	4x E5-4610 6C 2.4 GHz 15 MB 1333 MHz 95W	24x 8 GB RDIMM 1333 MHz	M5110e + 1xM5110 (512,B,R5,SSD)§	16x 1.8" 32 max	16x 200G SSD	8 / 8	2	2x 1400W
8722-D2x	4x E5-4650 8C 2.7 GHz 20 MB 1600 MHz 130W	24x 16GB LRDIMM 1333 MHz	M5110e + 3xM5110 (512,B,R5,SSD)§	32x 1.8" 32 max	32x 200G SSD	8 / 8	2	2x 1400W

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

* All models except for 8722-A2x include the processor and memory expansion tray containing sockets for processors 3 and 4 and 24 DIMMs. For model A2x, order part number 88Y7365.

‡ **Models C1x and C2x** include the 1 GB Flash/RAID 5 Upgrade (part number 81Y4559) which is a 1 GB flash-backed cache with support for RAID 5.

§ **Model D1x** has two RAID controllers, **D2x** has four RAID controllers total. **D1x and D2x** include the 512 MB Cache/RAID 5 Upgrade (81Y4484), plus the Battery Kit (81Y4508), plus the SSD Performance Key (90Y4273) for each controller.

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

Processor options

The x3750 M4 supports the processor options listed in the following table. The server supports up to four processors. Two processors are installed in sockets on the system board. Processors 3 and 4 are installed on the processor and memory expansion tray. Most models (with the exception of A2x, as listed in Table 2) have the expansion tray installed as standard. For model A2x, order part number 88Y7365 for the processor and memory expansion tray.

The following processor quantities are supported:

- One processor, installed in socket 1
- Two processors, installed in sockets 1 and 2
- Four processors, installed in all four sockets

The following table also shows which server models have each processor standard. If there is no corresponding *where-used* model for a particular processor, this processor is only available through CTO.

Table 3. Processor options

Part number	Description	Standard models where used
88Y7365	IBM System x3750 M4 processor and memory expansion tray	All except A2x
88Y7446	Intel Xeon E5-4603 4C 2.0 GHz 10 MB 1066 MHz 95 W	A2x
88Y7342	Intel Xeon E5-4607 6C 2.2 GHz 12 MB 1066 MHz 95 W	A3x
88Y7336	Intel Xeon E5-4610 6C 2.4 GHz 15 MB 1333 MHz 95 W	B1x and D1x
88Y7354	Intel Xeon E5-4617 6C 2.9 GHz 15 MB 1600 MHz 130 W	A1x
88Y7330	Intel Xeon E5-4620 8C 2.2 GHz 16 MB 1333 MHz 95 W	B2x
88Y7348	Intel Xeon E5-4640 8C 2.4 GHz 20 MB 1600 MHz 95 W	C1x
88Y7324	Intel Xeon E5-4650 8C 2.7 GHz 20 MB 1600 MHz 130 W	C2x and D2x
88Y7458	Intel Xeon E5-4650L 8C 2.6 GHz 20 MB 1600 MHz 115 W	-

Memory options

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

The IBM System x3750 M4 supports DDR3 memory. The server supports up to 48 DIMMs when four processors are installed, with 12 DIMMs for each processor. 24 DIMM sockets (for processors 1 and 2) are located on the system board. The remaining DIMM sockets (for processors 3 and 4) are located on the processor and memory expansion tray. Each processor has four memory channels, and there are three DIMMs per channel.

The x3750 M4 memory system has been carefully tuned so that the server supports higher memory frequencies than the Intel processor specification. You can, for example, use low-voltage DIMMs but still operate them at the rated speed.

The following rules apply when selecting the memory configuration:

- The server supports RDIMMs and LRDIMMs. UDIMMs are not supported.
- Mixing different types of memory (RDIMMs and LRDIMMs) is not supported.
- Mixing 1.5 V and 1.35 V DIMMs in the same server is supported; in such a case, all DIMMs operate at 1.5 V.
- The maximum number of ranks per one channel is eight (with the exception of 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 processors installed. The table shows the maximum when all four processors are installed. When two processors are installed, the maximum quantity supported is a half of the quantity that is shown.
- All DIMMs in the server operate at the same speed, which is determined as the lowest value of:
 - Memory speed that is supported by the specific processor.
 - 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 "Max. operating speed" section in the table.

Table highlighting:

- The entries highlighted in **red text** indicate that the IBM System x3750 M4 supports higher memory frequencies than the Intel processor specification. In some instances, this configuration also results larger memory capacity that the specification recommends.
- Tables cells highlighted with a grey background indicate when the specific combination of DIMM voltage and number of DIMMs per channel still allows the DIMMs to operate at rated speed

Table 4. Maximum memory speeds

DIMM specification	RDIMM					LRDIMM		
	Single-rank DIMMs		Dual-rank DIMMs			Quad-rank LRDIMMs		
Ranks								
Part numbers	49Y1406 (4 GB)	49Y1559 (4 GB)	49Y1397 (8 GB) 49Y1563 (16 GB)	90Y3109 (8 GB) 00D4968 (16 GB)	49Y1567 (16 GB) 90Y3105 (32 GB)			
Rated speed	1333 MHz	1600 MHz	1333 MHz	1600 MHz	1333 MHz			
Rated voltage	1.35 V	1.5 V	1.35 V	1.5 V	1.35 V			
Operating voltage	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V
Max. qty supported*	48	48	48	48	48	48	48	48
Max. DIMM capacity	4 GB	4 GB	4 GB	16 GB	16 GB	16 GB	32 GB	32 GB
Max. mem. capacity	192 GB	192 GB	192 GB	768 GB	768 GB	768 GB	1.5 TB	1.5 TB
Max memory at maximum speed	128 GB	128 GB	128 GB	512 GB	768 GB	512 GB	1.5 TB	1.5 TB
Max operating speed (MHz)								
1 DIMM per channel	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz
2 DIMMs per channel	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz	1600 MHz	1333 MHz	1333 MHz
3 DIMMs per channel	1066 MHz	1066 MHz	1066 MHz	1066 MHz	1333 MHz	1333 MHz	1333 MHz	1333 MHz

* Maximum quantity supported is shown for four processors installed. When two processors are installed, the maximum quantity supported is a half of the quantity that is shown. When one processor is installed, the quantity is one quarter of that shown.

The following memory protection technologies are supported:

- ECC
- Chipkill (for x4-based memory DIMMs -- look for "x4" in the DIMM description)
- Memory mirroring
- Memory rank sparing

If memory mirroring is used, then DIMMs must be installed in pairs (minimum of one pair per 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 installed.

The following table lists the memory options that are available for the x3750 M4 server.

Table 5. Memory options

Part number	Feature code	Description	Maximum supported	Models where used
RDIMMs				
49Y1406	8941	4 GB (1x 4 GB, 1Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	48 (12 per CPU)	-
49Y1559	A28Z	4 GB (1x 4 GB, 1Rx4, 1.5 V) PC3-12800 CL11 ECC DDR3 1600 MHz LP RDIMM	48 (12 per CPU)	-
49Y1397	8923	8 GB (1x 8 GB, 2Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	48 (12 per CPU)	All other models
90Y3109	A292	8 GB (1x 8 GB, 2Rx4, 1.5 V) PC3-12800 CL11 ECC DDR3 1600 MHz LP RDIMM	48 (12 per CPU)	A1x
49Y1563	A1QT	16 GB (1x 16 GB, 2Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	48 (12 per CPU)	-
00D4968	A2U5	16 GB (1x 16 GB, 2Rx4, 1.5 V) PC3-12800 CL11 ECC DDR3 1600 MHz LP RDIMM	48 (12 per CPU)	-
LRDIMMs				
49Y1567	A290	16 GB (1x 16 GB, 4Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP LRDIMM	48 (12 per CPU)	D2x
90Y3105	A291	32 GB (1x 32 GB, 4Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP LRDIMM	48 (12 per CPU)	-

Internal disk storage options

The server can support up to 16x 2.5-inch drives, up to 32x 1.8-inch drives, or a combination of both 2.5-inch and 1.8-inch hot-swap drives, using the supported SAS/SATA backplane configurations. The server supports 2.5-inch hot-swap SAS or hot-swap SATA hard disk drives, 2.5-inch hot-swap SATA solid-state drives, or 1.8-inch hot-swap SATA solid-state drives. You can mix drives in the same server as long as you do not mix drives on the same array.

Backplanes

IBM System x3750 M4 server supports a variety of internal storage configurations based on four different backplanes:

- 4-drive backplane for 2.5-inch drives: Up to four backplanes can be installed, each requiring one SAS connection to a supported controller. One RAID controller can connect to two of these backplanes.
- 8-drive backplane for 2.5-inch drives: Up to two backplanes can be installed, each requiring two SAS connections. One RAID controller per backplane.
- 8-drive backplane with a SAS expander for 2.5-inch drives: Use in conjunction with the other 2.5-inch drive backplanes (8-drive or one 4-drive or two 4-drive backplanes) which will result in being able to connect up to 16 2.5-inch drive bays to the one RAID controller.
- 8-drive backplane for 1.8-inch solid-state drives (eXFlash Pack): Up to four backplanes can be installed, each requiring two SAS connections. One RAID controller per backplane. Cannot be connected to the 8-drive backplane with a SAS expander.

When building drive backplane configurations, all 1.8-inch SSD drive backplanes must be installed to the right of all 2.5-inch HDD or 2.5-inch SSD drive backplanes (when looking at the front of the server). Every four drives uses a SAS signal cable except when the 8-drive backplane with SAS expander is used. When the 8-drive backplane with SAS expander is used, the other backplanes connect to the SAS expander backplane with the supplied cables and then the SAS expander backplane is connected to the single RAID controller with two cables. All backplane options include the necessary cables.

See the *IBM System x3750 M4 Installation and Service Guide* for a description of all supported backplane combinations.

Standard models (all models except A2x) ship with at least one backplane; see Table 2 for details. The following table shows the backplane options that are available for a x3750 M4 server.

Table 6. Internal storage expansion options

Part number	Feature code	Name	Maximum supported
88Y7418	A2A3	IBM 4x 2.5-in. HS SAS HDD Backplane	4
88Y7419	A2A4	IBM 8x 2.5-in. HS SAS HDD Backplane	2
88Y7421	A2A2	IBM 8x 2.5-in. HS SAS HDD Backplane with RAID expansion (SAS expander)	1*
88Y7422	A2XR	IBM eXFlash 8x 1.8-in. HS SAS SSD Backplane	4

* Only one backplane with SAS expander (88Y7421) can be installed in a server and can be used connected to a single 8-drive backplane (88Y7419), a single 4-drive backplane (88Y7418), or two 4-drive backplanes (88Y7418). The SAS expander backplane cannot be used with the eXFlash backplane.

RAID controllers

The following table lists the RAID controllers and SAS HBAs used for the internal disk storage of the x3750 M4 server.

Table 7. RAID controllers for internal storage

Part number	Feature code	Description	Maximum supported	Models where used
Integrated	A2N2	ServeRAID M5110e SAS/SATA Controller	1 (integrated)	All
81Y4481	A347	ServeRAID M5110 SAS/SATA Controller	3	D1x (1 standard) D2x (3 standard)
81Y4448	A1MZ	ServeRAID M1115 SAS/SATA Controller	1	-
46M0912	3876	IBM 6Gb Performance Optimized HBA	3	-
46C8988	A3MW	N2115 SAS/SATA HBA for IBM System x	3	-

The integrated ServeRAID M5110e SAS/SATA Controller is a chip on the system board. The ServeRAID M5110 is a PCIe low-profile, half-length (MD2) form factor adapter. Both controllers have the following specifications:

- Two Mini-SAS internal connectors.
- 6 Gbps throughput per port.
- PCIe x8 2.0 host interface.
- Based on the LSI SAS2208 6 Gbps ROC controller.
- Supports RAID levels 0, 1, and 10.
- Supports RAID levels 5 and 50 with optional M5100 Series RAID 5 upgrades (see below).
- Supports RAID 6 and 60 with the optional M5100 Series RAID 6 Upgrade (see below).
- Supports 512 MB battery-backed cache or 512 MB or 1 GB flash-backed cache (see below).

The ServeRAID M1115 offers a low-cost RAID 0/1/10 solution that can be upgraded to a cacheless RAID 5 with a Features-on-Demand license upgrade. It has the following specifications:

- PCI Low Profile, Half-length - MD2 form factor
- Two internal Mini-SAS connectors (SFF-8087)
- Eight internal 6 Gbps SAS/SATA ports
- 6 Gbps throughput per port
- 533 MHz IBM PowerPC® processor with LSI SAS2008 6 Gbps RAID on Chip (ROC) controller
- PCI Express 2.0 x8 host interface
- Support for RAID levels 0, 1, and 10 standard; support for RAID 5 and 50 with an optional upgrade (81Y4542)
- Zero Controller Cache, no battery/flash backup

For more information, see the list of IBM Redbooks Product Guides in the RAID adapters category:
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=raid>

Note: The supported adapters for internal storage need to be installed in slots 1, 2 and 3 because of cable routing requirements. The IBM x3750 M4 PCIe 3x8 riser (88Y7371) must be installed. These slots also require that Processor 2 be installed.

The following table lists the optional upgrades supported with the ServeRAID controllers.

Table 8. RAID controller upgrades

Part number	Feature code	Description	Maximum supported	Models where used
81Y4544	A1X2	ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade	1	-
81Y4484	A1J3	ServeRAID M5100 Series 512 MB Cache/RAID 5 Upgrade	4	D1x (2 standard) D2x, (4 standard)
81Y4487	A1J4	ServeRAID M5100 Series 512 MB Flash/RAID 5 Upgrade	4	-
81Y4559	A1WY	ServeRAID M5100 Series 1 GB Flash/RAID 5 Upgrade	4	C1x (1 standard) C2x (1 standard)
81Y4508	A22E	ServeRAID M5100 Series Battery Kit	4*	D1x (2 standard) D2x, (4 standard)
81Y4546	A1X3	ServeRAID M5100 Series RAID 6 Upgrade**	1†	-
90Y4273	A2MC	ServeRAID M5100 Series SSD Performance Key**	1	D1x, D2x
90Y4318	A2MD	ServeRAID M5100 Series SSD Caching Enabler **	1	-
81Y4542	A1X1	ServeRAID M1100 Series Zero Cache/RAID 5 Upgrade	1	-

* The ServeRAID M5100 Series Battery Kit (81Y4508) is only supported with ServeRAID M5100 Series 512 MB Cache/RAID 5 Upgrade (81Y4484).

† The ServeRAID M5100 Series RAID 6 Upgrade (81Y4546) requires RAID 5 upgrades with cache (81Y4484, 81Y4487, or 81Y4559 only).

** Only one ServeRAID Feature on Demand upgrade is required per system, regardless of the number of adapters installed.

Drive options

The following table lists the hard disk drive options for the internal disk storage of the x3750 M4 server.

Table 9. Disk drive options for internal disk storage (Part 1)

Part number	Feature code	Description	Maximum supported
2.5-inch NL SATA Hot-Swap HDDs			
81Y9730	A1AV	IBM 1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	16
81Y9726	A1NZ	IBM 500GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	16
81Y9722	A1NX	IBM 250GB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD	16
2.5-inch NL SAS Hot-Swap HDDs			
81Y9690	A1P3	IBM 1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD	16
90Y8953	A2XE	IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	16
2.5-inch 15K SAS Hot-Swap HDDs			
81Y9670	A283	IBM 300GB 15K 6Gbps SAS 2.5" SFF HS HDD	16
90Y8926	A2XB	IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	16
2.5-inch 10K SAS Hot-Swap HDDs			
81Y9650	A282	IBM 900GB 10K 6Gbps SAS 2.5" SFF HS HDD	16
90Y8872	A2XD	IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	16
90Y8877	A2XC	IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	16
2.5-inch SAS Hot-Swap SEDs			
81Y9662	A3EG	IBM 900GB 10K 6Gbps SAS 2.5" SFF G2HS SED	16
90Y8908	A3EF	IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS SED	16
90Y8913	A2XF	IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS SED	16
90Y8944	A2ZK	IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS SED	16
2.5-inch SSDs			
43W7718	A2FN	IBM 200GB SATA 2.5" MLC HS SSD	16
00W1125	A3HR	IBM 100GB SATA 2.5" MLC HS Enterprise SSD	16
49Y6129	A3EW	IBM 200GB SAS 2.5" MLC HS Enterprise SSD	16
49Y6134	A3EY	IBM 400GB SAS 2.5" MLC HS Enterprise SSD	16
49Y6139	A3F0	IBM 800GB SAS 2.5" MLC HS Enterprise SSD	16
49Y5839	A3AS	IBM 64GB SATA 2.5" MLC HS Enterprise Value SSD	16
49Y5844	A3AU	IBM 512GB SATA 2.5" MLC HS Enterprise Value SSD	16
90Y8643	A2U3	IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD	16
90Y8648	A2U4	IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD	16

Table 9. Disk drive options for internal disk storage (Part 2)

Part number	Feature code	Description	Maximum supported
1.8-inch SSDs			
43W7726	5428	IBM 50GB SATA 1.8" MLC SSD	32
43W7746	5420	IBM 200GB SATA 1.8" MLC SSD	32
00W1120	A3HQ	IBM 100GB SATA 1.8" MLC Enterprise SSD	32
49Y6119	A3AN	IBM 200GB SATA 1.8" MLC Enterprise SSD	32
49Y6124	A3AP	IBM 400GB SATA 1.8" MLC Enterprise SSD	32
00W1222	A3TG	IBM 128GB SATA 1.8" MLC Enterprise Value SSD	32
00W1227	A3TH	IBM 256GB SATA 1.8" MLC Enterprise Value SSD	32
49Y5834	A3AQ	IBM 64GB SATA 1.8" MLC Enterprise Value SSD	32
49Y5993	A3AR	IBM 512GB SATA 1.8" MLC Enterprise Value SSD	32

Internal backup units

The server does not supports any internal backup units, such as tape drives or RDX drives.

Optical drives

The server supports the optical drive options listed in the following table.

Table 10. Optical drives

Part number	Feature code	Description	Maximum supported	Models where used
46M0902	4163	UltraSlim Enhanced SATA Multi-Burner	1	-

The IBM UltraSlim Enhanced SATA Multi-Burner (46M0902) supports the following media and speeds for reading:

- CD-ROM 24X
- CD-DA (DAE) 20X
- CD-R 24X
- CD-RW 24X
- DVD-ROM (single layer) 8X
- DVD-ROM (dual layer) 8X
- DVD-R (4.7 GB) 6X
- DVD-R DL 4X
- DVD+R 6X
- DVD+R DL 4X
- DVD-RW (4.7 GB) 4X
- DVD+RW 4X
- DVD-RAM (4.7/9.4 GB) 4X

The drive also supports the following media and speeds for writing:

- CD-R 24X
- CD-RW 4X
- High Speed CD-RW 10X
- Ultra Speed CD-RW 16X
- Ultra Speed Plus CD-RW 16X
- DVD-R 8X
- DVD-R DL 6X
- DVD+R 8X
- DVD+R DL 6X
- DVD-RW 6X
- DVD+RW 8X
- DVD-RAM 5X

I/O expansion options

The server supports up to eight PCIe slots. Five slots are on the system board and three are through a riser card. The riser card is standard on some models as shown in the table below. It is optional on all other models. The use of slots 1 - 5 require processor 2 to be installed. The slot specifics are as follows:

- Slot 1: PCIe 3.0 x8 (x16 mechanical): Full-height, half-length (optional with riser card, requires processor 2)
- Slot 2: PCIe 3.0 x8 (x16 mechanical): Full-height, half-length (optional with riser card, requires processor 2)
- Slot 3: PCIe 3.0 x8 (x16 mechanical): Full-height, half-length (optional with riser card, requires processor 2)
- Slot 4: PCIe 3.0 x8: Low profile, half-length (requires processor 2)
- Slot 5: PCIe 3.0 x8: Low profile, half-length (requires processor 2)
- Slot 6: PCIe 3.0 x8: Low profile, half-length
- Slot 7: PCIe 3.0 x8: Low profile, half-length
- Slot 8: PCIe 3.0 x8: Low profile, half-length

The following table lists the ordering information for the riser card.

Table 11. PCI riser card options

Part number	Feature code	Description	Standard models where used	Maximum supported
88Y7371	A2A1	IBM x3750 M4 PCIe 3 x8 riser	B2x, C1x, D1x, D2x	1

Network adapters

x3750 M4 supports two integrated Gigabit Ethernet ports. Optionally, two 10 Gb Ethernet ports can be added by installing one of the available dual-port 10 Gb Ethernet cards listed in Table 12 (88Y7429 or 88Y7427). These cards use a dedicated connector on the system board and do not consume a PCI expansion slot. The onboard Emulex BE3 controller provides both the Gigabit Ethernet ports and the 10 Gb Ethernet ports. The optional cards are used route the ports to external RJ45 or SFP+ ports.

The integrated controller has the following features:

- Emulex BE3 chip
- Two Gigabit Ethernet ports and two 10 Gb Ethernet ports with optional adapter (1 Gb and 10 Gb auto-negotiation)
- Full-duplex (FDX) capability
- Optional 10 Gb ports that operate in either a virtual NIC (vNIC) or physical NIC (pNIC) mode:
 - vNIC mode: Up to six vNICs (up to three vNICs per one 10 Gb port):
 - Virtual Fabric mode or Switch Independent operational mode
 - Virtual port bandwidth allocation in 100 Mbps increments
 - Up to two vNICs can be configured as an iSCSI or FCoE vNICs (one per port) with optional Advanced Upgrade (90Y9310)
 - pNIC mode: Dual-port 1/10 Gb Ethernet adapter
- IEEE 802.1Q VLAN tagging
- VLAN insertion and extraction
- Jumbo frames up to 9000 bytes.
- Load balancing and failover teaming support, including adapter fault tolerance (AFT), switch fault tolerance (SFT), adaptive load balancing (ALB), and IEEE 802.3ad
- Supports Serial over LAN (SoL) and concurrent KVM (cKVM)
- Wake On LAN support (1 Gb ports only)
- Message Signal Interrupt (MSI-X) support
- IPv4/IPv6 offload:
 - IPv4 TCP Chimney Offload
 - TCP, UDP checksum offload
 - Large send offload (LSO)
 - Large receive offload (LRO)
 - Receive side scaling (RSS)
- Enhanced Ethernet (draft) support:
 - Enhanced Transmission Selection (ETS) (P802.1Qaz)
 - Priority-based Flow Control (PFC) (P802.1Qbb)
 - Data Center Bridging eXchange Protocol (DCBX) (P802.1Qaz)

The following table lists additional supported network adapters.

Table 12. Network adapters

Part number	Feature code	Description	Maximum supported#
40 Gb Ethernet			
00D9550	A3PN	Mellanox ConnectX-3 FDR VPI IB/E Adapter for IBM System x	8
10 Gb Ethernet (does not consume a PCI expansion slot)			
88Y7427	A294	IBM x3750 M4 Dual port 10 GB-T Ethernet Adapter Card	1†
88Y7429	A295	IBM x3750 M4 Dual port 10 GB SFP+ Ethernet Adapter Card	1†
95Y3760	A2U2	Emulex VFA III FCoE/iSCSI License for IBM System x (FoD) (An upgrade for 88Y7429 which provides FCoE and iSCSI support)	1
10 Gb Ethernet			
42C1820	1637	Brocade 10Gb CNA for IBM System x	8
95Y3762	A2U1	Emulex Dual Port 10GbE SFP+ VFA III for IBM System x	8
49Y7960	A2EC	Intel X520 Dual Port 10GbE SFP+ Adapter for IBM System x	8
49Y7970	A2ED	Intel X540-T2 Dual Port 10GBaseT Adapter for IBM System x	8
00D9690	A3PM	Mellanox ConnectX-3 10GbE Adapter for IBM System x	8
42C1800	5751	QLogic 10Gb CNA for IBM System x	8
90Y4600	A3MR	QLogic 8200 Dual Port 10GbE SFP+ VFA for IBM System x	8
Gigabit Ethernet			
49Y4230	5767	Intel Ethernet Dual Port Server Adapter I340-T2 for IBM System x	8
49Y4240	5768	Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	8
InfiniBand			
00D9550	A3PN	Mellanox ConnectX-3 FDR VPI IB/E Adapter for IBM System x	8

Maximum quantity is achieved with processor 2 installed and the 3-slot riser card (88Y7371). With one processor, the maximum quantity is three (this maximum does not apply to the 10 Gb cards in the dedicated slot).

† The IBM x3750 M4 Dual port 10 GB-T Ethernet Adapter Card and IBM x3750 M4 Dual port 10 GB SFP+ Ethernet Adapter Card occupy the same dedicated slot and are mutually exclusive

For more information, see the list of IBM Redbooks Product Guides in the Networking adapters category:
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=networkadapters>

Storage host bus adapters

The following table lists storage HBAs supported by x3750 M4 server. The maximum quantity is achieved with processor 2 and the 3-slot riser card (88Y7371) installed. With one processor, the maximum quantity is three (this configuration does not apply to the 10 Gb cards in the dedicated slot).

Table 13. Storage adapters

Part number	Feature code	Description	Maximum supported#
Fibre Channel - 16 Gbps			
81Y1675	A2XV	Brocade 16Gb FC Dual-port HBA for IBM System x	8
81Y1668	A2XU	Brocade 16Gb FC Single-port HBA for IBM System x	8
81Y1662	A2W6	Emulex 16Gb FC Dual-port HBA for IBM System x	8
81Y1655	A2W5	Emulex 16Gb FC Single-port HBA for IBM System x	8
00Y3341	A3KX	QLogic 16Gb FC Dual-port HBA for IBM System x	8
00Y3337	A3KW	QLogic 16Gb FC Single-port HBA for IBM System x	8
Fibre Channel - 8 Gbps			
46M6050	3591	Brocade 8Gb FC Dual-port HBA for IBM System x	8
46M6049	3589	Brocade 8Gb FC Single-port HBA for IBM System x	8
42D0494	3581	Emulex 8Gb FC Dual-port HBA for IBM System x	8
42D0485	3580	Emulex 8Gb FC Single-port HBA for IBM System x	8
42D0510	3579	QLogic 8Gb FC Dual-port HBA for IBM System x	8
42D0501	3578	QLogic 8Gb FC Single-port HBA for IBM System x	8
Fibre Channel - 4 Gbps			
59Y1993	3886	Brocade 4Gb FC Dual-port HBA for IBM System x	8
59Y1987	3885	Brocade 4Gb FC Single-port HBA for IBM System x	8
42C2071	1699	Emulex 4Gb FC Dual-Port PCI-E HBA for IBM System x	8
42C2069	1698	Emulex 4Gb FC Single-Port PCI-E HBA for IBM System x	8
39R6527	3568	QLogic 4Gb FC Dual-Port PCIe HBA for System x	8
39R6525	3567	QLogic 4Gb FC Single-Port PCIe HBA for System x	8
SAS			
46M0907	5982	IBM 6 Gb SAS HBA Controller	8
46C9010	A3MV	N2125 SAS/SATA HBA for IBM System x	8

Maximum quantity is achieved with processor 2 and the 3-slot riser card (88Y7371) installed. With one processor, the maximum quantity is three.

* The IBM 6 Gb Performance Optimized HBA (46M0912) is for use only with internal disk storage and requires the IBM x3750 M4 PCIe 3x8 riser (88Y7371) and a second processor to be installed.

For more information, see the list of IBM Redbooks Product Guides in the Host bus adapters category:
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=hba>

PCIe SSD adapters

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

Note: The server supports a maximum quantity of three of the full-height adapters, which must be installed in slots 1, 2, and 3. These slots require the second processor and the 3-slot riser card, 88Y7371.

Table 14. SSD adapters

Part number	Feature code	Description	Maximum supported
46M0877	0096	IBM 160GB High IOPS SS Class SSD PCIe Adapter	8
46M0878	0097	IBM 320GB High IOPS SD Class SSD PCIe Adapter	3
46M0898	1649	IBM 320GB High IOPS MS Class SSD PCIe Adapter	8
81Y4539	A1ND	640GB High IOPS SLC Duo Adapter For IBM System x	3
81Y4535	A1NE	320GB High IOPS SLC Adapter For IBM System x	8
90Y4377	A3DY	IBM 1.2TB High IOPS MLC Mono Adapter	7
90Y4397	A3DZ	IBM 2.4TB High IOPS MLC Duo Adapter	3
46C9078	A3J3	IBM 365GB High IOPS MLC Mono Adapter	7
46C9081	A3J4	IBM 785GB High IOPS MLC Mono Adapter	7

For details about these adapters, see the IBM Redbooks Product Guide *IBM High IOPS SSD PCIe Adapters*, found at the following address:

<http://www.redbooks.ibm.com/abstracts/tips0729.html?Open>

Power supplies

The server supports up to two redundant power supplies. Standard models come with one or two power supplies (model dependent; see Table 2). Up to two hot-swap redundant 1400 W AC power supplies (80 PLUS Platinum certification). 900 W power supplies also available through CTO or Special Bid.

Installing a second power supply requires that the processor and memory expansion tray (88Y7365) or the power interposer card (88Y7367) be installed. The power interposer card option enables redundancy power support when the processor and memory expansion tray is not installed. If you do not have the processor and memory expansion tray installed and want to install two power supplies, then the power interposer card must be installed.

Table 15. Power supplies

Part number	Feature code	Description	Maximum supported	Models where used
88Y7373	A2A6	IBM 1400 W HE Redundant Power Supply	2	All models
88Y7431	A2A7	IBM 900 W Power Supply	2	-
88Y7367	A2A0	IBM Power Interposer for Redundant Power Supply	1*	-

* The power interposer is not needed if the processor and memory expansion tray (88Y7365) is installed.

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

Two installed 1400 W power supplies form a redundant pair. Under extreme configurations, it may be possible to exceed 1400 W DC output. If this condition exists and a power supply fails, the server caps power at 1400 W until the second power supply is back online.

Integrated virtualization

The server supports VMware ESXi 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 16. Virtualization options

Part number	Feature code	Description	Maximum supported
41Y8298	A2G0	IBM Blank USB Memory Key for VMware ESXi Downloads	1
41Y8300	A2VC	IBM USB Memory Key for VMware ESXi 5.0	1
41Y8307	A383	IBM USB Memory Key for VMware ESXi 5.0 Update 1	1
41Y8311	A2R3	IBM USB Memory Key for VMWare ESXi 5.1	1

Remote management

The server contains IBM Integrated Management Module II (IMM2), which provides advanced service-processor control, monitoring, and alerting functions. 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. A virtual presence capability also comes standard in this server for remote server management.

Remote server management is provided through industry-standard interfaces:

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

The server also supports virtual media and remote control features, which provide the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- 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 IMM2 memory and mapping it to the server as a virtual drive
- Capturing blue-screen errors

Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2008 HPC Edition
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2012
- Microsoft Windows Small Business Server 2008 Premium Edition
- Microsoft Windows Small Business Server 2008 Standard Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 4.1
- VMware ESXi 4.1
- VMware vSphere 5.0 (ESXi)
- VMware vSphere 5.1 (ESXi)

For the latest information about the specific versions and service levels supported and any other prerequisites, See the IBM ServerProven® website, found at the following address:

<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml>

Physical and electrical specifications

Dimensions and weight:

Width: 446 mm (17.5 in.)

Depth: 734 mm (28.9 in.)

Height: 87 mm (3.4 in.)

Approximate weight, fully configured: 31.1 kg (68.5 lb.)

Supported environment:

- Air temperature:
 - 5 - 40 °C (41 - 104 °F) at 0 - 3048 m (10,000 ft); ASHRAE A3 compliant
- Humidity: 8% - 80%
- Electrical:
 - 100 - 127 (nominal) V AC, 50 Hz or 60 Hz, and System 20 A (10 A per power supply)
 - 200 - 208 (nominal) V AC, 50 Hz or 60 Hz, and System 10 A
 - 200 - 240 (nominal) V AC, 50 Hz or 60 Hz, and System 9 A
 - Minimum configuration: 0.20 kVA (one power supply)
 - Minimum configuration: 0.26 kVA (two power supplies)
 - Typical configuration: 1.12 kVA (two power supplies)
 - Maximum configuration: 2.16 kVA (two power supplies)
- BTU output:
 - Minimum configuration: 648 BTU/hr (190 watts)
 - Maximum configuration: 7,336 BTU/hr (2150 watts)
- Noise level:
 - Idle: 6.5 bels
 - Operating: 6.6 bels

Warranty options

The IBM System x3750 M4 has a three-year on-site warranty with 9x5/next business day terms. IBM offers the warranty service upgrades through IBM ServicePac offerings, described in this section. The IBM ServicePac is a series of prepackaged 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.

IBM ServicePac offerings are country-specific, that is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePac offerings might be available in a particular country. For more information about the IBM ServicePac offerings that are available in your country, visit the IBM ServicePac Product Selector, found at the following address:

<https://www-304.ibm.com/sales/gss/download/spst/servicepac>

The following table explains the warranty service definitions in more detail.

Table 17. Warranty service definitions

Term	Description
IBM on-site repair (IOR)	A service technician comes to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your customer's location within two hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
24x7x4 hour	A service technician is scheduled to arrive at your customer's location within four hours after remote problem determination is completed. We provide service around the clock, every day, including IBM holidays.
9x5x4 hour	A service technician is scheduled to arrive at your customer's location within four business hours after remote problem determination is completed. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays. If the time is after 1:00 p.m., and it is determined that on-site service is required, the customer can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician arrives by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your customer's location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays.

In general, the types of IBM ServicePac offerings are as follows:

- Warranty and maintenance service upgrades:
 - One, 2, 3, 4, or 5 years of 9x5 or 24x7 service coverage
 - On-site repair from next business day to 4 or 2 hours
 - One or two years of warranty extension
- Remote technical support services:
 - One or three years with 24x7 coverage (severity 1) or 9x5/next business day for all other severities
 - Installation and start-up support for System x servers
 - Remote technical support for System x servers
 - Software support - Support Line:
 - Microsoft or Linux software
 - VMware
 - IBM Director

Regulatory compliance

The server conforms to the following standards:

- ASHRAE A3
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, 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
- IEC 60950-1(CB Certificate and CB Test Report)
- China CCC (GB4943), GB9254 Class A, 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 disk storage expansion

The external disk storage expansion enclosures listed in the following table are available.

Table 18. External storage expansion enclosures

Part number	Description	Maximum quantity supported per one adapter
172701X	IBM System Storage® EXP3000	18 (9 per port)
174712X	IBM System Storage EXP2512 Express	18 (9 per port)
174724X	IBM System Storage EXP2524 Express	9 (9 per port)

The hard disk drives listed in the following table are supported with external expansion enclosures.

Table 19. Hard drive options for external expansion enclosures (Part 1)

Part number	Description	Maximum quantity supported per one enclosure
EXP3000 Hot-Swap SATA 3.5-in. Hard Drives		
43W7630	1000 GB Dual Port Hot Swap SATA	12
49Y1940	IBM 2 TB 7200 Dual Port SATA 3.5-in. HS HDD	12
EXP3000 Hot-Swap SAS 3.5-in. Hard Drives		
44W2234	IBM 300 GB 15 K 6 Gbps SAS 3.5-in. Hot-Swap HDD	12
44W2239	IBM 450 GB 15 K 6 Gbps SAS 3.5-in. Hot-Swap HDD	12
44W2244	IBM 600 GB 15 K 6 Gbps SAS 3.5-in. Hot-Swap HDD	12
EXP2512 Hot-Swap SAS 3.5-in. Hard Drives		
49Y1899	300 GB 15 K 6 Gb SAS 3.5-in. HDD	12
49Y1900	450 GB 15 K 6 Gb SAS 3.5-in. HDD	12
49Y1901	600 GB 15 K 6 Gb SAS 3.5-in. HDD	12
49Y1903	1 TB 7,200 RPM 6 Gb SAS NL 3.5-in. HDD	12
43W7630	1000 GB Dual Port Hot Swap SATA	12
49Y1902	2 TB 7,200 RPM 6 Gb SAS NL 3.5-in. HDD	12
90Y8720	3 TB 7,200 RPM 6 Gb SAS NL 3.5-in. HDD	12

Table 19. Hard drive options for external expansion enclosures (Part 2)

Part number	Description	Maximum quantity supported per one enclosure
EXP2524 Hot-Swap SAS 2.5-in. Hard Drives		
49Y1896	146 GB 15 K 6 Gb SAS 2.5-in. HDD	24
49Y1895	300 GB 10 K 6 Gb SAS 2.5-in. HDD	24
81Y9596	600 GB 10 K 6 Gb SAS 2.5-in. HDD	24
49Y1898	500 GB 7,200 RPM 6 Gb SAS NL 2.5-in. HDD	24
EXP2524 Hot-Swap SAS 2.5-in. Solid-State Drives		
81Y9956	200 GB 2.5-in. SAS SSD	24
81Y9960	400 GB 2.5-in. SAS SSD	24

The RAID controllers listed in the following table are supported with external expansion enclosures.

Table 20. RAID controller and options for external storage expansion enclosures

Part number	Feature code	Description	Maximum supported
81Y4478	A1WX	ServeRAID M5120 SAS/SATA Controller	8
81Y4484	A1J3	ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade	1 per one M5120
81Y4487	A1J4	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade	1 per one M5120
81Y4559	A1WY	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade	1 per one M5120
81Y4508	A22E	ServeRAID M5100 Series Battery Kit	1 per one M5120
81Y4546	A1X3	ServeRAID M5100 Series RAID 6 Upgrade	1 per server
90Y4273	A2MC	ServeRAID M5100 Series SSD Performance Accelerator	1 per server
90Y4318	A2MD	ServeRAID M5100 Series SSD Caching Enabler	1 per server

The ServeRAID M5120 SAS/SATA Controller has the following specifications:

- Eight external 6 Gbps SAS/SATA ports
- Two external x4 mini-SAS connectors (SFF-8088)
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M5100 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5100 Series RAID 6 Upgrade
- Supports 512 MB battery-backed cache or 512 MB or 1 GB flash-backed cache
- 6 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS2208 6 Gbps ROC controller
- Supports connectivity to the EXP2512 and EXP2524 storage expansion enclosures

For more information, see the IBM Redbooks® Product Guide *ServeRAID M5120 SAS/SATA Controller for IBM System x* at:

<http://www.redbooks.ibm.com/abstracts/tips0858.html?Open>

The external SAS cables listed in the following table are supported with external expansion enclosures and RAID controllers.

Table 21. External SAS cables for external storage expansion enclosures

Part number	Description	Maximum quantity supported per enclosure*
39R6531	IBM 3 m SAS Cable	1
39R6529	IBM 1 m SAS Cable	1

*The EXP3000 and EX2500 series can be chained with each other. In such a case, one cable is used to connect first EXP25xx or EXP3000 to the RAID controller, and every consecutive EXP unit is connected to the previous one by one cable.

External disk storage systems

The following table lists the external storage systems that are supported by x3750 M4 and can be ordered through the System x sales channel. The server might support other IBM disk systems that are not listed in this table. See the IBM System Storage Interoperability Center for further information, found at the following address:

<http://www.ibm.com/systems/support/storage/ssic>

Table 22. External disk storage systems

Part number	Description
1746A2D	IBM System Storage DS3512 Express Dual Controller Storage System
1746A2S	IBM System Storage DS3512 Express Single Controller Storage System
1746A4D	IBM System Storage DS3524 Express Dual Controller Storage System
1746A4S	IBM System Storage DS3524 Express Single Controller Storage System
181494H	IBM System Storage DS3950 Model 94
181498H	IBM System Storage DS3950 Model 98
181492H	IBM System Storage EXP395 Expansion Unit
1746A2E	IBM System Storage EXP3512 Express Storage™ Expansion Unit
1746A4E	IBM System Storage EXP3524 Express Storage Expansion Unit

For more information, see the list of IBM Redbooks Product Guides in the System Storage category:

<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=externalstorage>

External backup units

The server supports the external backup attachment options that are listed in Table 19.

Table 23. External backup options (Part 1)

Part number	Description
External tape expansion enclosures for internal tape drives	
87651UX	1U Tape Drive Enclosure
8767HHX	Half High Tape Drive Enclosure
87651NX	1U Tape Drive Enclosure (with Nema 5-15P power cord)
8767HNX	Half High Tape Drive Enclosure (with Nema 5-15P power cord)
Tape enclosure adapters (with cables)	
44E8869	USB Enclosure Adapter Kit
40K2599	SAS Enclosure Adapter Kit
Internal backup drives supported by external tape enclosures	
43W8478	IBM Half High LTO Gen 3 SAS Tape Drive
44E8895	IBM Half High LTO Gen 4 SAS Tape Drive

Table 23. External backup options (Part 2)

Part number	Description
External backup units*	
36251TY	IBM RDX USB 3.0 Dock with 1TB Cartridge
362532Y	IBM RDX USB 3.0 Dock with 320GB Cartridge
362550Y	IBM RDX USB 3.0 Dock with 500GB Cartridge
3628L3X	IBM Half High LTO Gen 3 External SAS Tape Drive (with US power cord)
3628L4X	IBM Half High LTO Gen 4 External SAS Tape Drive (with US power cord)
3628L5X	IBM Half High LTO Gen 5 External SAS Tape Drive (with US power cord)
3628N3X	IBM Half High LTO Gen 3 External SAS Tape Drive (without power cord)
3628N4X	IBM Half High LTO Gen 4 External SAS Tape Drive (without power cord)
3628N5X	IBM Half High LTO Gen 5 External SAS Tape Drive (without power cord)
3580S3V	System Storage TS2230 Tape Drive Express Model H3V
3580S4V	System Storage TS2240 Tape Drive Express Model H4V
3580S5E	System Storage TS2250 Tape Drive Express Model H5S
3580S5X	System Storage TS2350 Tape Drive Express Model S53
3572S4R	TS2900 Tape Library with LTO4 HH SAS drive & rack mount kit
3572S5R	TS2900 Tape Library with LTO5 HH SAS drive & rack mount kit
35732UL	TS3100 Tape Library Model L2U Driveless
35734UL	TS3200 Tape Library Model L4U Driveless
46X2682†	LTO Ultrium 5 Fibre Channel Drive
46X2683†	LTO Ultrium 5 SAS Drive Sled
46X2684†	LTO Ultrium 5 Half High Fibre Drive Sled
46X2685†	LTO Ultrium 5 Half High SAS Drive Sled
46X6912†	LTO Ultrium 4 Half High Fibre Channel Drive Sled
46X7117†	LTO Ultrium 4 Half High SAS DriveV2 Sled
46X7122†	LTO Ultrium 3 Half High SAS DriveV2 Sled

*The external tape drives listed can be ordered through System x sales channel. The server might support other IBM tape drives that are not listed in this table. See the IBM System Storage Interoperability Center for further information.

†These part numbers are the tape drives options for 35732UL and 35734UL.

For the latest information about the specific versions and service levels supported and any other prerequisites, see the IBM ServerProven® website, found at the following address:

<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml>

For more information, see the list of IBM Redbooks Product Guides in the Backup units category:

<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape>

Top-of-rack Ethernet switches

The server supports the top-of-rack Ethernet switches from IBM System Networking listed in the following table.

Table 24. IBM System Networking - Top-of-rack switches

Part number	Description
IBM System Networking - 1 Gb top-of-rack switches	
0446013	IBM System Networking RackSwitch G8000R
7309CFC	IBM System Networking RackSwitch G8000F
7309CD8	IBM System Networking RackSwitch G8000DC
7309G52	IBM System Networking RackSwitch G8052R
730952F	IBM System Networking RackSwitch G8052F
427348E	IBM Ethernet Switch J48E
6630010	Juniper Networks EX2200 24 Port
6630011	Juniper Networks EX2200 24 Port with PoE
6630012	Juniper Networks EX2200 48 Port
6630013	Juniper Networks EX2200 48 Port with PoE
IBM System Networking - 10 Gb top-of-rack switches	
7309DRX	IBM System Networking RackSwitch G8264CS (Rear to Front)
7309DFX	IBM System Networking RackSwitch G8264CS (Front to Rear)
7309BD5	IBM System Networking RackSwitch G8124DC
7309BR6	IBM System Networking RackSwitch G8124ER
7309BF7	IBM System Networking RackSwitch G8124EF
7309G64	IBM System Networking RackSwitch G8264R
730964F	IBM System Networking RackSwitch G8264F
7309CR9	IBM System Networking RackSwitch G8264TR
7309CF9	IBM System Networking RackSwitch G8264TF
0719410	Juniper Networks EX4500 - Front to Back Airflow
0719420	Juniper Networks EX4500 - Back to Front Airflow
IBM System Networking - 40 Gb top-of-rack switches	
8036ARX	IBM System Networking RackSwitch G8316R
8036AFX	IBM System Networking RackSwitch G8316F

For more information, see the list of IBM Redbooks Product Guides in the Top-of-rack switches category: <http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tor>

Uninterruptible power supply units

The server supports attachments to the uninterruptible power supply (UPS) units listed in the following table.

Table 25. Uninterruptible power supply units

Part number	Description
Rack-mounted UPS	
21304RX	IBM UPS 10000XHV
53951AX	IBM 1500VA LCD 2U Rack UPS (100 V/120 V)
53951KX	IBM 1500VA LCD 2U Rack UPS (230 V)
53952AX	IBM 2200VA LCD 2U Rack UPS (100 V/120 V)
53952KX	IBM 2200VA LCD 2U Rack UPS (230 V)
53953AX	IBM 3000VA LCD 3U Rack UPS (100 V/120 V)
53953JX	IBM 3000VA LCD 3U Rack UPS (200 V/208 V)
53956AX	IBM 6000VA LCD 4U Rack UPS (200 V/208 V)
53956KX	IBM 6000VA LCD 4U Rack UPS (230 V)
53959KX	IBM 11000VA LCD 5U Rack UPS (200 V/208 V/230 V)

For more information, see the list of IBM Redbooks Product Guides in the Power infrastructure category:
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power>

Power distribution units

The server supports attachments to the power distribution units (PDUs) listed in the following table.

Table 26. Power distribution units (part 1)

Part number	Description
Switched and Monitored PDUs	
46M4002	IBM 1U 9 C19/3 C13 Active Energy Manager DPI PDU
46M4003	IBM 1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU
46M4004	IBM 1U 12 C13 Active Energy Manager DPI PDU
46M4005	IBM 1U 12 C13 Active Energy Manager 60A 3 Phase PDU
46M4167	IBM 1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU
46M4116	IBM 0U 24 C13 Switched and Monitored 30A PDU
46M4119	IBM 0U 24 C13 Switched and Monitored 32A PDU
46M4134	IBM 0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU
46M4137	IBM 0U 12 C19/12 C13 Switched and Monitored 32A 3 Phase PDU
Enterprise PDUs	
71762MX	IBM Ultra Density Enterprise PDU C19 PDU+ (WW)
71762NX	IBM Ultra Density Enterprise PDU C19 PDU (WW)
71763MU	IBM Ultra Density Enterprise PDU C19 3 Phase 60A PDU+ (NA)
71763NU	IBM Ultra Density Enterprise PDU C19 3 Phase 60A PDU (NA)
39M2816	IBM 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 63 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8938	30 A/125 V Front-end PDU with NEMA L5-30P connector
39Y8939	30 A/250 V Front-end PDU with NEMA L6-30P connector
39Y8940	60 A/250 V Front-end PDU with IEC 309 60A 2P+N+Gnd connector

Table 26. Power distribution units (part 2)

Part number	Description
Universal PDUs	
39Y8951	DPI Universal Rack PDU with US LV and HV line 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	IBM 0U 24 C13 16A 3 Phase PDU
46M4125	IBM 0U 24 C13 30A 3 Phase PDU
46M4128	IBM 0U 24 C13 30A PDU
46M4131	IBM 0U 24 C13 32A PDU
46M4140	IBM 0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	IBM 0U 12 C19/12 C13 32A 3 Phase PDU

For more information, see the list of IBM Redbooks Product Guides in the Power infrastructure category:
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power>

Rack cabinets

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

Table 27. Rack cabinets

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

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

<http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack>

Rack options

The server supports the rack console switches and monitor kits listed in the following table.

Table 28. Rack options

Part number	Description
Monitor kits and keyboard trays	
172317X	1U 17-in. Flat Panel Console Kit
172319X	1U 19-in. Flat Panel Console Kit
Console switches	
1754D2X	IBM Global 4x2x32 Console Manager (GCM32)
1754D1X	IBM Global 2x2x16 Console Manager (GCM16)
1754A2X	IBM Local 2x16 Console Manager (LCM16)
1754A1X	IBM Local 1x8 Console Manager (LCM8)
Console cables	
43V6147	IBM Single Cable USB Conversion Option (UCO)
39M2895	IBM USB Conversion Option (4 Pack UCO)
39M2897	IBM Long KVM Conversion Option (4 Pack Long KCO)
46M5383	IBM Virtual Media Conversion Option Gen2 (VCO2)
46M5382	IBM Serial Conversion Option (SCO)

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

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