

## IBM System x3500 M4

### IBM Redbooks Product Guide

The IBM® System x3500 M4 server provides outstanding performance for your business-critical applications. Its energy-efficient design supports more cores, memory, and data capacity in a scalable Tower or 5U Rack package that is easy to service and manage. With more computing power per watt and the latest Intel Xeon processors, you can reduce costs while maintaining speed and availability.

Suggested use: infrastructure applications, collaboration/email, web, and virtualized desktops in a workgroup or distributed environments.

Figure 1 shows the IBM System x3500 M4.



Figure 1. The IBM System x3500 M4

### Did you know?

The x3500 M4 offers a flexible, scalable design and simple upgrade path to 32 HDDs, with up to eight PCIe 3.0 slots and up to 768 GB of memory. The Onboard Ethernet solution provides four standard integrated Gigabit Ethernet ports without occupying PCIe slots. Comprehensive systems management tools with the next-generation Integrated Management Module II (IMM2) make it easy to deploy, integrate, service, and manage.

## Key features

A high-performance dual-socket tower server, the IBM System x3500 M4, can deliver the scalability, reliable performance, and optimized efficiency for your business-critical applications. Start with the basics and upgrade as your business changes without jeopardizing existing investments. Virtualizing the PC infrastructure into one server can provide access to a powerful server with abundant storage space, while significantly reducing IT costs.

### Scalability and performance

The x3500 M4 offers numerous features to boost performance, improve scalability, and reduce costs:

- The Intel Xeon processor E5-2600 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 two QPI interconnect links of up to 8 GT/s.
- Up to two processors, 16 cores, and 32 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 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 utilize the hardware for virtualization workloads.
- Intel Advanced Vector Extensions (AVX) significantly improve floating point performance for compute-intensive technical and scientific applications compared to Intel Xeon E5 series processors.
- Twenty-four Load Reduced DIMMs (LRDIMMs) of 1333 MHz DDR3 ECC memory provide speed, high availability, and a memory capacity of up to 768 GB.
- The theoretical maximum memory bandwidth of the Intel Xeon processor E5 family is 51.6 GBps, which is 60% more than in the previous generation of Intel Xeon processors.
- Up to 32 drive bays together with internal backup and optical drive at the same time provide a flexible and scalable all-in-one platform to meet increasing demands.
- The server has four integrated Gigabit Ethernet ports that double the network throughput compared with the previous generation of IBM System x® servers.
- The server offers PCI Express 3.0 I/O expansion capabilities that improve the theoretical maximum bandwidth by 60% (8 GT/s per link) compared with the previous generation of PCI Express 2.0.
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family. This helps to dramatically reduce I/O latency and increase overall system performance.

### Availability and serviceability

The x3500 M4 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 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 up to six simple swap N+N redundant fans to provide availability for business-critical applications.
- The power source independent light path diagnostics panel and individual light path LEDs quickly lead the technician to failed (or failing) components. This simplifies servicing, speeds up problem resolution and helps improve system availability.
- The Predictive Failure Analysis (PFA) detects when system components (for example, processors, memory, hard disk drives) operate outside of standard thresholds and generates pro-active alerts in advance of possible failure, therefore increasing uptime.
- Built-in Integrated Management Module Version II (IMM2) continuously monitors system parameters, triggers alerts, and performs recovering actions in case of failures to minimize downtime.
- Built-in diagnostics using Dynamic Systems Analysis (DSA) Preboot speeds up troubleshooting tasks to reduce service time.
- Three-year customer replaceable unit and onsite limited warranty, next business day 9x5. Optional service upgrades available.

### **Manageability and security**

Powerful systems management features simplify local and remote management of the x3500 M4:

- The server includes an Integrated Management Module II (IMM2) to monitor server availability and perform remote management.
- 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 AES NI support for faster, stronger encryption.
- IBM Systems Director is included for proactive systems management. It offers comprehensive systems management tools that help to increase up-time, reduce costs, and improve productivity through advanced server management capabilities.
- Intel Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting 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 x3500 M4 offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to the green environment:

- Energy-efficient planar components help lower operational costs.
- High-efficient 750 W and 900 W power supplies with 80 PLUS Platinum certification.
- The Intel Xeon processor E5-2600 product family offers significantly 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 demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.35 V DDR3 memory RDIMMs consume 15% less energy than 1.5 V DDR3 RDIMMs.
- The server uses hexagonal ventilation holes, a part of IBM 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

Figure 2 shows the front of the server.

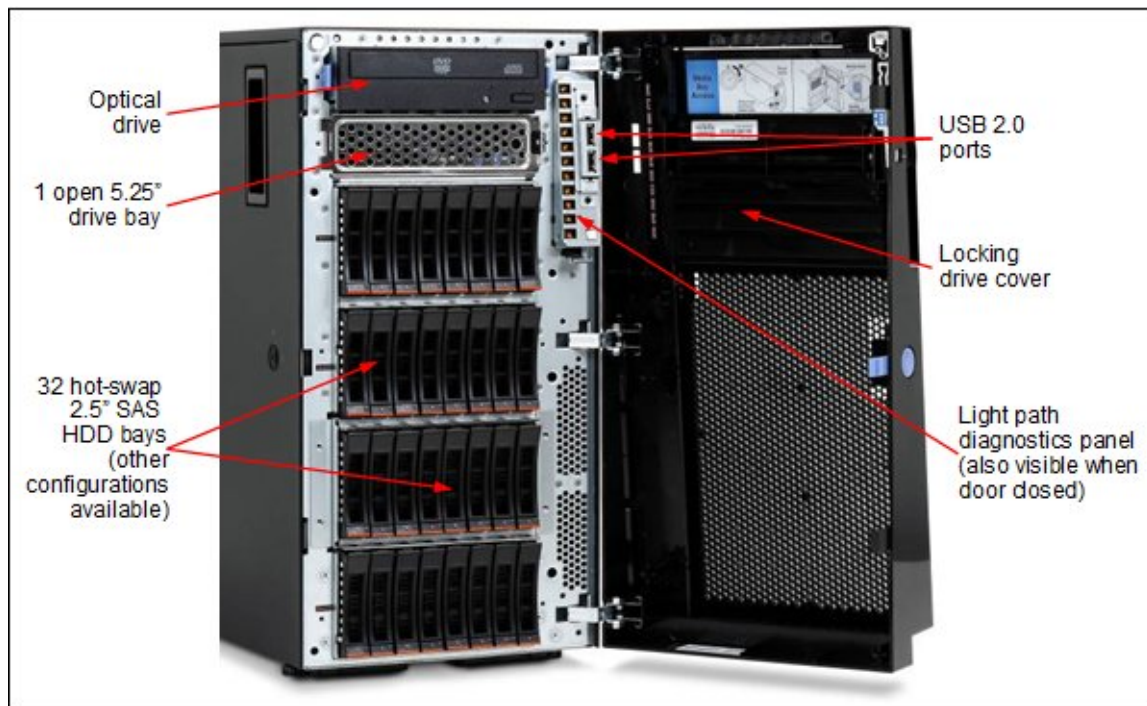


Figure 2. Front view of the IBM System x3500 M4

Figure 3 shows the rear of the server.

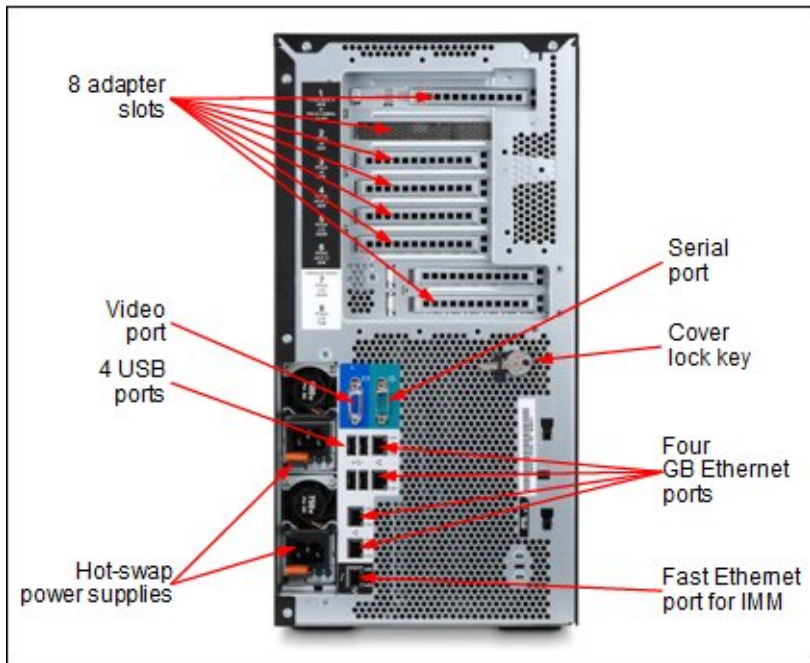


Figure 3. Rear view of the IBM System x3500 M4

Figure 4 shows the locations of key components inside the server.

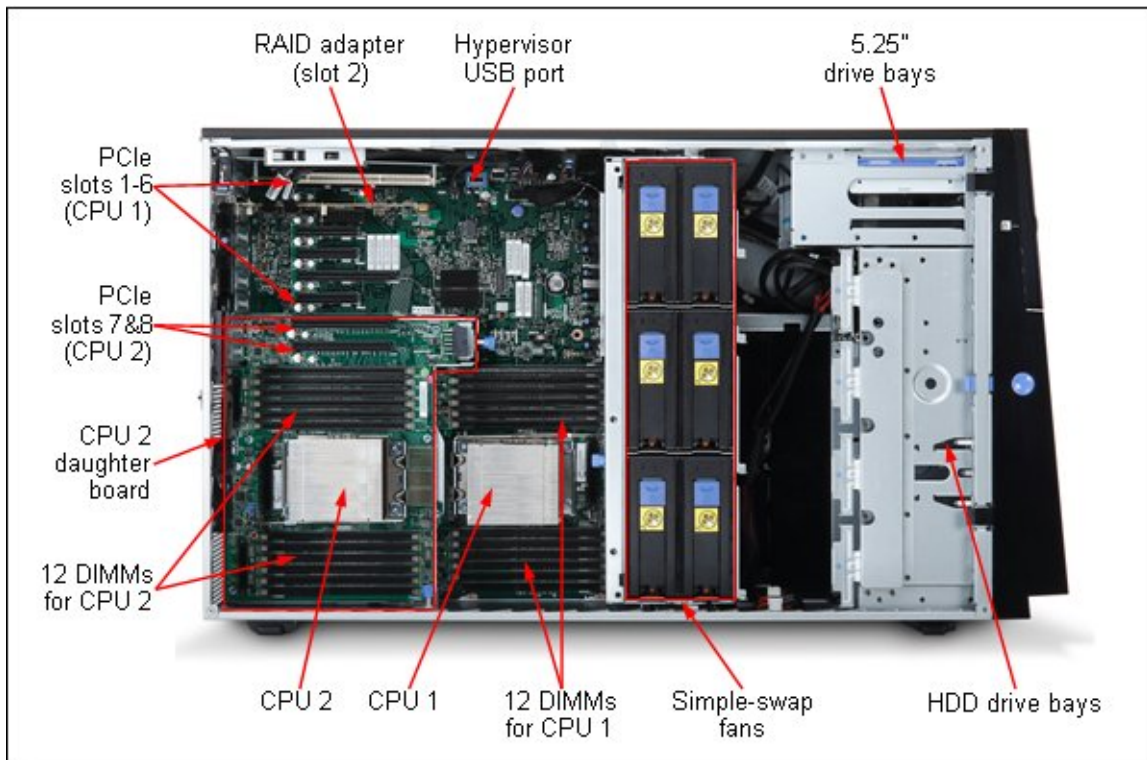


Figure 4. Inside view of the IBM System x3500 M4

## Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications (part 1)

| Components               | Specification   |
|--------------------------|---|
| Form factor              | Tower or 5U Rack.   |
| Processor                | Up to two Intel Xeon processor E5-2600 product family CPUs with eight cores (up to 2.9 GHz) or six cores (up to 2.9 GHz) or quad-cores (up to 3.3 GHz). Two QPI links up to 8.0 GT/s each. Up to 1600 MHz memory speed. Up to 20 MB L3 cache.   |
| Chipset                  | Intel C602J.  |
| Memory                   | Up to 24 DDR3 DIMM sockets (12 DIMMs per processor). RDIMMs, UDIMMs, and LRDIMMs are supported, but memory types cannot be intermixed.  |
| Memory maximums          | With LRDIMMs: Up to 768 GB with 24x 32 GB LRDIMMs and two processors.<br>With RDIMMs: Up to 384 GB with 24x 16 GB RDIMMs and two processors.<br>With UDIMMs: Up to 32 GB with 16x 2 GB UDIMMs and two processors.   |
| Memory protection        | ECC, memory mirroring, and memory sparing.  |
| Disk drive bays          | Up to thirty-two 2.5" hot-swap SAS/SATA HDDs, or up to eight 3.5" hot-swap SAS/SATA HDDs, or up to eight 3.5" Simple Swap SATA HDDs.  |
| Maximum internal storage | 28.8 TB with 900 GB 2.5" SAS HDDs, or 32 TB with 1 TB 2.5" SATA HDDs, or 24 TB with 3 TB 3.5" SATA HDDs. Intermix of SAS/SATA is supported.   |
| RAID support             | RAID 0, 1, 10 with M1115 or ServeRAID M5110. Optional upgrade to RAID 5, 50 available for M1115. Optional upgrades to RAID 5, 50 are available for M5110 (zero-cache, 512 MB battery-backed cache, 512 MB or 1 GB flash-backed cache). Optional upgrade to RAID 6, 60 available for M5110.  |
| Optical drive bays       | Two half-height 5.25" bays for optical or tape drives. Supports DVD-ROM or Multiburner.   |
| Tape drive bays          | Two half-height 5.25" bays for optical or tape drives. Support for one RDX or DDS internal USB tape drive. Supports up to two LTO internal SAS tape drives.   |
| Network interfaces       | Four integrated Gigabit Ethernet 1000BASE-T ports (RJ-45) based on Intel I350AM4 Quad Port GbE LAN Controller chip.   |
| PCI Expansion slots      | Up to eight slots with two processors and six slots when one CPU is installed. All slots are PCIe 3.0 slots except Slot 1, which is a Gen 2 slot: <ul style="list-style-type: none"> <li>● Slot 1: PCIe x8 (x4 wired); full-height, half-length (supports optional PCI-X 64 bit/133 MHz interposer card)</li> <li>● Slot 2: PCIe x8; full-height, half-length</li> <li>● Slot 3: PCIe x8; full-height, full-length</li> <li>● Slot 4: PCIe x8 (x4 wired); full-height, full-length</li> <li>● Slot 5: PCIe x16; full-height, full-length</li> <li>● Slot 6: PCIe x8 (x4 wired); full-height, full-length</li> <li>● Slot 7: PCIe x16; full-height, full-length (requires second processor)</li> <li>● Slot 8: PCIe x16; full-height, full-length (requires second processor)</li> </ul> |
| Ports                    | Two USB 2.0s on front. Four USB 2.0s, one DB-15 video, one DB-9 serial, one RJ-45 systems management, four RJ-45 GbE network ports on rear. Two internal USB ports (for embedded hypervisor and internal tape drive).   |
| Cooling                  | IBM Calibrated Vectored Cooling with up to six simple swap fans (two fans shipped standard on single processor models and three fans shipped on dual processor models) with optional N+N redundancy available .   |

Table 1. Standard specifications (part 2)

| Components                  | Specification   |
|-----------------------------|---|
| Power supply                | Up to two redundant hot-swap 750 W ac or 900 W ac power supplies (80 PLUS Platinum certification).  |
| Hot-swap parts              | Hard drives, power supplies.  |
| Systems management          | UEFI, IBM Integrated Management Module II (IMM2), Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, IBM Systems Director and IBM Systems Director Active Energy Manager, IBM ServerGuide. Optional IMM Advanced Upgrade via Feature on Demand (FoD) for remote presence (graphics, keyboard and mouse, virtual media). |
| Security features           | Power-on password, administrator's password, Trusted Platform Module (TPM).   |
| Video                       | Matrox G200eR2 with 16 MB memory integrated into the IMM2. Maximum resolution is 1600x1200 at 75 Hz with 16 M colors.   |
| 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 vSphere 5.  |
| Limited warranty            | 3-year customer-replaceable unit and onsite limited warranty with 9x5/NBD.  |
| Service and support         | Optional service upgrades are available through IBM ServicePacs®: 4-hour or 2-hour response time, 8-hour fix time, 1-year or 2-year warranty extension, remote technical support for IBM hardware and selected IBM and third-party (Microsoft, Linux, VMware) software.   |
| Dimensions                  | Width: 218 mm (8.6 in), depth: 750 mm (29.5 in), height: 440 mm (17.3 in).  |
| Weight                      | Minimum configuration: 25.0 kg (55.1 lb), maximum: 39.8 kg (87.7lb).  |

The x3500 M4 servers are shipped with the following items:

- Statement of Limited Warranty
- Important Notices
- Registration flyer
- Documentation CD that contains the *Installation and User's Guide*
- IBM Systems Director 6.3 Base for x86 DVD-ROM
- One 2.8 m C13 line cord (country-specific)

## Standard models

The following table lists the standard models.

Table 2. Standard models

| Model                       | Intel Xeon processors†<br>(2 maximum)     | Memory  | RAID               | Disk bays       | Disks | GbE | DVD     | Power   |
|-----------------------------|---|---------|--------------------|-----------------|-------|-----|---------|---------|
| Models announced March 2012 |   |         |                    |                 |       |     |         |         |
| 7383-A2x                    | 1x E5-2603 4C 1.8GHz<br>10MB 1066MHz 80W  | 1x 4 GB | M1115              | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 750W |
| 7383-B2x                    | 1x E5-2609 4C 2.4GHz<br>10MB 1066MHz 80W  | 1x 4 GB | M1115              | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 750W |
| 7383-C2x                    | 1x E5-2620 6C 2.0GHz<br>15MB 1333MHz 95W  | 1x 8 GB | M1115              | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 750W |
| 7383-C4x                    | 1x E5-2620 6C 2.0GHz<br>15MB 1333MHz 95W  | 1x 8 GB | M1115              | 8x 3.5" HS / 8  | Open  | 4   | DVD-ROM | 1x 750W |
| 7383-D2x                    | 1x E5-2630 6C 2.3GHz<br>15MB 1333MHz 95W  | 1x 8 GB | M1115              | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 750W |
| 7383-F2x                    | 1x E5-2640 6C 2.5GHz<br>15MB 1333MHz 95W  | 1x 8 GB | M5110<br>512MB (f) | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 750W |
| 7383-G2x                    | 1x E5-2650 8C 2.0GHz<br>20MB 1600MHz 95W  | 1x 8 GB | M5110<br>1GB (f)   | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 900W |
| 7383-H2x                    | 1x E5-2670 8C 2.6GHz<br>20MB 1600MHz 115W | 1x 8 GB | M5110<br>1GB (f)   | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 900W |
| 7383-J2x                    | 1x E5-2680 8C 2.7GHz<br>20MB 1600MHz 130W | 1x 8 GB | M5110<br>1GB (f)   | 8x 2.5" HS / 32 | Open  | 4   | DVD-ROM | 1x 900W |

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

(f) The ServeRAID M5110 RAID controller in this model includes flash-backed cache. The cache size is 512 MB or 1 GB, as indicated.

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



## Processor options

The x3500 M4 supports the processor options 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, then this processor is only available through CTO.

Table 3. Processor options

| Part number                                 | Description  | Standard models where used |
|---|--|----------------------------|
| Intel Xeon processor E5-2600 product family |  |                            |
| 90Y5942                                     | Intel Xeon Processor E5-2603 4C 1.8GHz 10MB 80W Upgrade Kit  | A2x                        |
| 90Y5944                                     | Intel Xeon Processor E5-2609 4C 2.4GHz 10MB 80W Upgrade Kit  | B2x                        |
| 90Y5945                                     | Intel Xeon Processor E5-2620 6C 2.0GHz 15MB 95W Upgrade Kit  | C2x, C4x                   |
| 90Y5946                                     | Intel Xeon Processor E5-2630 6C 2.3GHz 15MB 95W Upgrade Kit  | D2x                        |
| 90Y5953                                     | Intel Xeon Processor E5-2630L 6C 2.0GHz 15MB 60W Upgrade Kit | -                          |
| 94Y7342                                     | Intel Xeon Processor E5-2637 2C 3.0GHz 5MB 80W Upgrade Kit   | -                          |
| 90Y5947                                     | Intel Xeon Processor E5-2640 6C 2.5GHz 15MB 95W Upgrade Kit  | F2x                        |
| 94Y7341                                     | Intel Xeon Processor E5-2643 4C 3.3GHz 10MB 130W Upgrade Kit | -                          |
| 90Y5948                                     | Intel Xeon Processor E5-2650 8C 2.0GHz 20MB 95W Upgrade Kit  | G2x                        |
| 90Y5954                                     | Intel Xeon Processor E5-2650L 8C 1.8GHz 20MB 70W Upgrade Kit | -                          |
| 90Y5949                                     | Intel Xeon Processor E5-2660 8C 2.2GHz 20MB 95W Upgrade Kit  | -                          |
| 94Y7442                                     | Intel Xeon Processor E5-2665 8C 2.4GHz 20MB 115W Upgrade Kit | -                          |
| 90Y5951                                     | Intel Xeon Processor E5-2667 6C 2.9GHz 15MB 130W Upgrade Kit | -                          |
| 90Y5955                                     | Intel Xeon Processor E5-2670 8C 2.6GHz 20MB 115W Upgrade Kit | H2x                        |
| 90Y5950                                     | Intel Xeon Processor E5-2680 8C 2.7GHz 20MB 130W Upgrade Kit | J2x                        |
| 94Y7343                                     | Intel Xeon Processor E5-2690 8C 2.9GHz 20MB 135W Upgrade Kit | -                          |

## Memory options

The IBM System x3500 M4 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 in the same server is supported. In such a case all DIMMs operate at 1.5 V.
- The maximum number of ranks per 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 a server depends on the number of CPUs, DIMM type, rank, and operating voltage, as shown in the "Max. qty supported" row in Table 4.
- All DIMMs in the server operate at the same speed, which is determined as the lowest value of:
  - Memory speed supported by specific CPU
  - Lowest maximum operating speed for the selected memory configuration that depends on rated speed, operating voltage, and quantity of DIMMs per channel, as shown in the "Max. operating speed" section in Table 4

Table 4. Maximum memory speeds

| DIMM type<br>DIMM specification | UDIMM    |          | RDIMM       |          |           |          |           |         | LRDIMM    |          |          |  |
|---------------------------------|----------|----------|-------------|----------|-----------|----------|-----------|---------|-----------|----------|----------|--|
|                                 | Rank     |          | Single rank |          | Dual rank |          | Quad rank |         | Quad rank |          |          |  |
| Rated speed                     | 1333 MHz |          | 1333 MHz    |          | 1333 MHz  |          | 1600 MHz  |         | 1066 MHz  |          | 1333 MHz |  |
| Rated voltage                   | 1.35 V   |          | 1.35 V      |          | 1.35 V    |          | 1.5 V     |         | 1.35 V    |          | 1.35 V   |  |
| Operating voltage               | 1.35 V   | 1.5 V    | 1.35 V      | 1.5 V    | 1.35 V    | 1.5 V    | 1.5 V     | 1.35 V  | 1.5 V     | 1.35 V   | 1.5 V    |  |
| Max. qty supported*             | 16       | 16       | 16          | 24       | 16        | 24       | 24        | 16      | 16        | 24       | 24       |  |
| Max. DIMM capacity              | 2 GB     | 2 GB     | 4 GB        | 4 GB     | 16 GB     | 16 GB    | 4 GB      | 16 GB   | 16 GB     | 32 GB    | 32 GB    |  |
| Max. memory capacity            | 32 GB    | 32 GB    | 64 GB       | 96 GB    | 256GB     | 384GB    | 96GB      | 256GB   | 256GB     | 768GB    | 768GB    |  |
| <b>Max. operating speed</b>     |          |          |             |          |           |          |           |         |           |          |          |  |
| 1 DIMM per channel              | 1333 MHz | 1333 MHz | 1333 MHz    | 1333 MHz | 1333 MHz  | 1333 MHz | 1600 MHz  | 800 MHz | 1066 MHz  | 1333 MHz | 1333 MHz |  |
| 2 DIMMs per channel             | 1066 MHz | 1333 MHz | 1333 MHz    | 1333 MHz | 1333 MHz  | 1333 MHz | 1600 MHz  | 800 MHz | 800 MHz   | 1066 MHz | 1333 MHz |  |
| 3 DIMMs per channel             | NS**     | NS**     | NS**        | 1066 MHz | NS**      | 1066 MHz | 1066 MHz  | NS**    | NS**      | 1066 MHz | 1066 MHz |  |

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

\*\* NS = Not supported.

The following memory protection technologies are supported:

- ECC
- Memory mirroring
- Memory 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 sparing is used, then DIMMs must be installed in sets of three, and all DIMMs in the same set must be identical in type and size.

The following table lists memory options available for the x3500 M4 server.

Table 5. Memory options

| Part number    | Description  | Maximum quantity supported | Standard models where used        |
|----------------|--|----------------------------|-----------------------------------|
| <b>UDIMMs</b>  |  |                            |                                   |
| 49Y1403        | 2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 ECC DDR3 1333MHz LP UDIMM        | 16 (8 per CPU)             | -                                 |
| <b>RDIMMs</b>  |  |                            |                                   |
| 49Y1405        | 2GB (1x2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM   | 24 (12 per CPU)            | -                                 |
| 49Y1406        | 4GB (1x4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM   | 24 (12 per CPU)            | -                                 |
| 49Y1407        | 4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM   | 24 (12 per CPU)            | A2x, B2x                          |
| 90Y3178        | 4GB (1x4GB, 2Rx8, 1.5V) PC3-12800 CL11 ECC DDR3 1600MHz LP RDIMM     | 24 (12 per CPU)            | -                                 |
| 49Y1397        | 8GB (1x8GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC 1333 MHz LP RDIMM        | 24 (12 per CPU)            | C2x, C4x, D2x, F2x, G2x, H2x, J2x |
| 49Y1400        | 16GB (1x16GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM   | 16 (8 per CPU)             | -                                 |
| 49Y1563        | 16GB (1x16GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM  | 24 (12 per CPU)            | -                                 |
| <b>LRDIMMs</b> |  |                            |                                   |
| 90Y3105        | 32GB (1x32GB, 4Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP LRDIMM | 24 (12 per CPU)            | -                                 |

## Internal disk storage options

The IBM System x3500 M4 server supports the following internal storage configurations:

- 8x 3.5" Simple Swap SATA hard drive bays (only available in CTO)
- 8x 3.5" hot-swap SAS/SATA hard drive bays
- 8x 3.5" hot-swap SAS/SATA drive bays + 8x 2.5" Slim-SFF SAS/SATA hot-swap drive bays (only available in CTO, requires two RAID controllers)
- 8x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
- 16x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
- 24x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays
- 32x 2.5" Slim-SFF SAS/SATA hot-swap hard drive bays

Figure 5 shows these configurations.

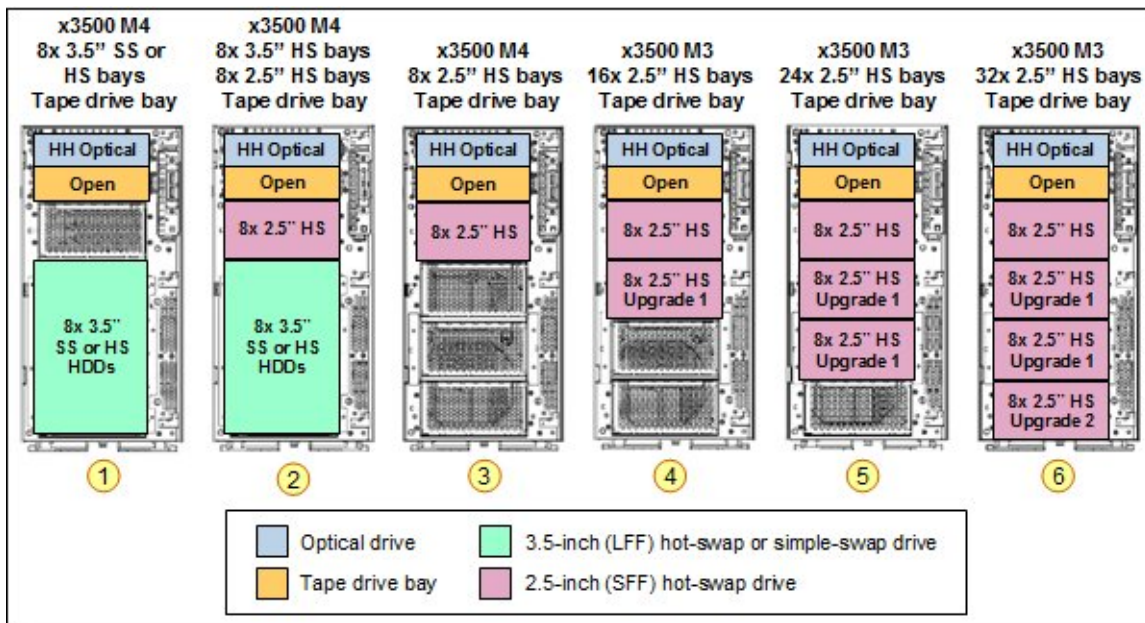


Figure 5. Internal drive configurations

## Backplanes

Standard models of x3500 M4 ship with eight (all models except C4x) 2.5" Slim-SFF SAS/SATA hot-swap drive bays. Model C4x ships with eight 3.5" SAS/SATA hot-swap hard drive bays. The following table shows internal storage expansion options available for the x3500 M4 server.

Table 6. Internal storage expansion options

| Part number | Name   | Maximum quantity supported |
|-------------|--|----------------------------|
| 94Y5978     | Additional 8 x 2.5" Hot-Swap SAS/SATA Upgrade Kit for 16 or 24 HDDs (shown in Figure 5 as an Upgrade 1 used in configurations 4, 5, and 6) | 2                          |
| 81Y7010     | Additional 8 x 2.5" Hot-Swap SAS/SATA Upgrade Kit for 32 HDDs (shown in Figure 5 as an Upgrade 2 used in configuration 6)                  | 1                          |

These options have the following descriptions:

- 94Y5978 upgrades models with eight hot-swap 2.5" drive bays to 16 hot-swap 2.5" drive bays or models with 16 hot-swap 2.5" drive bays to 24 hot-swap 2.5" drive bays. This option includes a SAS expander card that is mounted on an HDD backplane, and does not consume a PCIe slot.
- 81Y7010 upgrades models with 24 hot-swap 2.5" drive bays to 32 hot-swap 2.5" drive bays. This option does not include an SAS expander.

As shown in Figure 5, each configuration supports an optical drive and a tape drive. All standard configurations ship with DVD-ROM optical drive. For configure-to-order (CTO) configurations, you can add a tape drive instead of an optical drive if so desired.

Configurations 4, 5, and 6 shown in Figure 5 can be implemented with one or two RAID controllers (M1115 or M5110). Configuration 2 requires two RAID controllers.

### RAID controllers

The following table lists the RAID controllers and additional options used for internal disk storage of the x3500 M4 server.

Table 7. RAID controllers for internal storage

| Part number | Description  | Max quantity supported | Standard models where used |
|-------------|--|------------------------|----------------------------|
| 81Y4448     | ServeRAID M1115 SAS/SATA Controller for System x                   | 2                      | A2x, B2x, C2x, C4x, D2x    |
| 81Y4542     | ServeRAID M1100 Series Zero Cache/RAID 5 Upgrade for IBM System x  | 2                      | -                          |
| 81Y4481     | ServeRAID M5110 SAS/SATA Controller                                | 2                      | F2x, G2x, H2x, J2x         |
| 81Y4544     | ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade for IBM System x  | 2                      | -                          |
| 81Y4484     | ServeRAID M5100 Series 512MB Cache/RAID 5 Upgrade for IBM System x | 2                      | -                          |
| 81Y4487     | ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade for IBM System x | 2                      | F2x                        |
| 81Y4559     | ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade for IBM System x   | 2                      | G2x, H2x, J2x              |
| 81Y4508     | ServeRAID M5100 Series Battery Kit for IBM System x                | 2*                     | -                          |
| 81Y4546     | ServeRAID M5100 Series RAID 6 Upgrade for IBM System x             | 2†                     | -                          |

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

† The ServeRAID M5100 Series RAID 6 Upgrade (81Y4546) requires RAID 5 Upgrade.

The ServerRAID M1115 SAS/SATA Controller has the following specifications:

- Eight internal 6 Gbps SAS/SATA ports
- Two x4 mini-SAS internal connectors (SFF-8087)
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M1100 Series RAID 5 upgrades
- 6 Gbps throughput per port
- PCIe x8 Gen 3 host interface
- Based on the LSI SAS2008 6 Gbps ROC controller

The ServerRAID M5110 SAS/SATA Controller has the following specifications:

- Eight internal 6 Gbps SAS/SATA ports
- Two x4 mini-SAS internal connectors (SFF-8087)
- 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 TB flash-backed cache
- 6 Gbps throughput per port
- PCIe x8 Gen 3 host interface
- Based on the LSI SAS2208 6 Gbps ROC controller

## Internal disk drive options

The following table lists hard drive options for internal disk storage of the x3500 M4 server.

Table 8. Disk drive options for internal disk storage

| Part number                          | Description                                   | Maximum quantity supported |
|--------------------------------------|---|----------------------------|
| <b>2.5" NL SATA Hot-Swap HDDs</b>    |   |                            |
| 81Y9730                              | IBM 1TB 7.2K 6Gbps NL SATA 2.5" SFF HS HDD    | 32                         |
| <b>2.5" NL SAS Hot-Swap HDDs</b>     |   |                            |
| 90Y8953                              | IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD | 32                         |
| 81Y9690                              | IBM 1TB 7.2K 6Gbps NL SAS 2.5" SFF HS HDD     | 32                         |
| <b>2.5" SAS Hot-Swap HDDs</b>        |   |                            |
| 90Y8926                              | IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD     | 32                         |
| 90Y8877                              | IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD     | 32                         |
| 90Y8913                              | IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS SED     | 32                         |
| 81Y9670                              | IBM 300GB 15K 6Gbps SAS 2.5" SFF HS HDD       | 32                         |
| 90Y8872                              | IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD     | 32                         |
| 81Y9650                              | IBM 900GB 10K 6Gbps SAS 2.5" SFF HS HDD       | 32                         |
| <b>3.5" NL SAS Hot-swap HDDs</b>     |   |                            |
| 90Y8567                              | IBM 1TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD       | 8                          |
| 90Y8572                              | IBM 2TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD       | 8                          |
| 90Y8577                              | IBM 3TB 7.2K 6Gbps NL SAS 3.5" G2HS HDD       | 8                          |
| <b>3.5" NL SATA Hot-swap HDDs</b>    |   |                            |
| 81Y9786                              | IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2HS HDD    | 8                          |
| 81Y9790                              | IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD      | 8                          |
| 81Y9794                              | IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD      | 8                          |
| 81Y9798                              | IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2HS HDD      | 8                          |
| <b>3.5" NL SATA Simple-Swap HDDs</b> |   |                            |
| 81Y9802                              | IBM 500GB 7.2K 6Gbps NL SATA 3.5" G2SS HDD    | 8                          |
| 81Y9806                              | IBM 1TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD      | 8                          |
| 81Y9810                              | IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD      | 8                          |
| 81Y9814                              | IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2SS HDD      | 8                          |

## Internal backup units

The server supports the internal tape drive options listed in the following table.

Table 9. Internal tape drives

| Part number | Description   | Maximum quantity supported |
|-------------|---|----------------------------|
| 46C5364     | IBM RDX Removable Hard Disk System - Internal USB 160 GB Bundle | 1                          |
| 46C5387     | IBM RDX Removable Hard Disk System - Internal USB 320 GB Bundle | 1                          |
| 46C5388     | IBM RDX Removable Hard Disk System - Internal USB 500 GB Bundle | 1                          |
| 46C5399     | IBM DDS Generation 5 USB Tape Drive                             | 1                          |
| 39M5636     | IBM DDS Generation 6 USB Tape Drive                             | 1                          |
| 43W8478     | IBM Half High LTO Gen 3 SAS Tape Drive                          | 2*                         |
| 44E8895     | IBM Half High LTO Gen 4 SAS Tape Drive                          | 2*                         |
| 49Y9898     | IBM Half High LTO Gen 5 Internal SAS Tape Drive                 | 2*                         |

\* Note: With standard models, installation of a second tape drive requires removal of DVD-ROM.

USB tape drives are attached to the internal USB connector. SAS tape drives require SAS HBA (sold separately). See Table 13 for list of available SAS HBAs.

For more information, see the following at-a-glance guides:

- *IBM RDX Removable Disk Backup Solution* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0726.html?Open>
- *IBM DDS Generation 5 USB Tape Drive* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0755.html?Open>
- *IBM DDS Generation 6 USB Tape Drive* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0725.html?Open>

## Optical drives

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

Table 10. Optical drives

| Part number | Description                | Maximum quantity supported | Standard models where used                  |
|-------------|----------------------------|----------------------------|---|
| None*       | Half-High SATA DVD-ROM     | 2                          | A2x, B2x, C2x, C4x, D2x, F2x, G2x, H2x, J2x |
| 81Y6404     | Half-High SATA Multiburner | 2                          | -   |

\* This option is only available via CTO or is already installed in standard models.

The two half-high drives in the table can be installed in any open 5.25" drive bay (Figure 5).



Half-High SATA DVD-ROM supports the following media and speeds for reading:

- CD-ROM 48X
- CD-DA (DAE) 40X
- CD-R 48X
- CD-RW 40X
- DVD-ROM (single layer) 16X
- DVD-ROM (dual layer) 12X
- DVD-R (4.7 GB) 16X
- DVD-R DL 12X
- DVD+R 16X
- DVD+R DL 12X
- DVD-RW (4.7 GB) 12X
- DVD+RW 12X
- DVD-RAM (4.7/9.4 GB) 6X

Half-High SATA multiburner supports the same media and speeds for reading as HH DVD-ROM. In addition, this drive supports the following media and speeds for writing:

- CD-R 24X
- CD-RW 4X
- High Speed CD-RW 10X
- Ultra Speed CD-RW 16X
- DVD-R 8X
- DVD-R DL 8X
- DVD+R 8X
- DVD+R DL 8X
- DVD-RW 6X
- DVD+RW 8X
- DVD-RAM 3X

## I/O expansion options

The server supports up to eight PCIe slots: six slots (1 to 6) when one CPU is installed or eight slots when two CPUs are installed. These are the slot form factors:

- Slot 1: PCIe x8 (x4 wired); full-height, half-length (supports optional PCI-X interposer card)
- Slot 2: PCIe x8; full-height, half-length
- Slot 3: PCIe x8; full-height, full-length
- Slot 4: PCIe x8 (x4 wired); full-height, full-length
- Slot 5: PCIe x16; full-height, full-length
- Slot 6: PCIe x8 (x4 wired); full-height, full-length
- Slot 7: PCIe x16; full-height, full-length (requires second processor)
- Slot 8: PCIe x16; full-height, full-length (requires second processor)

All PCIe slots are PCI Express 3.0 slots except Slot 1, which is a PCI Express 2.0 slot. Slot 1 can be converted to a PCI-X slot with the PCI-X Conversion Kit, which is described in the following table.

Table 11. PCI riser card options

| Part number | Description                     | Maximum quantity supported |
|-------------|---------------------------------|----------------------------|
| 81Y7012     | PCI-X Interposer Conversion Kit | 1                          |

## Network adapters

x3500 M4 supports four integrated Gigabit Ethernet ports.

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 12. Network adapters

| Part number                             | Description  | Maximum quantity supported† |
|---|--|-----------------------------|
| <b>10 Gb Ethernet</b>                   |  |                             |
| 49Y7910                                 | Broadcom NetXtreme II Dual Port 10GBase-T Adapter for IBM System x | 8                           |
| 95Y3762                                 | Emulex Dual Port 10GbE SFP+ VFA III for IBM System x               | 8                           |
| SBB 95Y3768#                            | Emulex Dual Port 10GbE SFP+ Integrated VFA III for IBM System x    | 1                           |
| 95Y3760                                 | Emulex VFA III FCoE/iSCSI License for IBM System x                 | 8*                          |
| 49Y7960                                 | Intel X520-DA2 Dual Port 10GbE SFP+ Adapter for IBM System x       | 8                           |
| <b>Converged Network Adapters (CNA)</b> |  |                             |
| 42C1800                                 | QLogic 10 Gb Dual Port CNA for IBM System x                        | 8**                         |
| 42C1820                                 | Brocade 10 Gb Dual-port CNA for IBM System x                       | 8**                         |
| <b>Gigabit Ethernet</b>                 |  |                             |
| 39Y6066                                 | NetXtreme II 1000 Express Ethernet Adapter                         | 8                           |
| 42C1780                                 | NetXtreme II 1000 Express Dual Port Ethernet Adapter               | 8                           |
| 49Y4220                                 | NetXtreme II 1000 Express Quad Port Ethernet Adapter               | 8                           |
| 42C1750                                 | PRO/1000 PF Server Adapter by Intel                                | 8                           |
| 49Y4230                                 | Intel Ethernet Dual Port Server Adapter I340-T2 for IBM System x   | 8                           |
| 49Y4240                                 | Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x   | 8                           |
| 90Y9352                                 | Broadcom NetXtreme I Quad Port GbE Adapter for IBM System x        | 8                           |
| 90Y9370                                 | Broadcom NetXtreme I Dual Port GbE Adapter for IBM System x        | 8                           |

† The maximum quantity is achieved with two processors installed. With one processor, the maximum quantity is limited to six.

# Emulex Dual Port 10GbE SFP+ Integrated VFA III is only available through CTO or Special Bid.

\* One license per one Emulex Dual Port 10GbE VFA III (95Y3762) or Emulex Dual Port 10GbE Integrated VFA III (SBB 95Y3768).

\*\* Converged Network Adapters require SFP+ optical transceivers or DAC cables that must be purchased separately.

## Storage host bus adapters

The following table lists storage HBAs supported by the x3500 M4 server.

Table 13. Storage adapters

| Part number   | Description   | Maximum quantity supported |
|---------------|---|----------------------------|
| Fibre Channel |   |                            |
| 39R6525       | QLogic 4 Gb FC Single-Port PCIe HBA for IBM System x    | 8                          |
| 39R6527       | QLogic 4 Gb FC Dual-Port PCIe HBA for IBM System x      | 8                          |
| 42C2069       | Emulex 4 Gbps FC Single-Port PCI-e HBA for IBM System x | 8                          |
| 42C2071       | Emulex 4 Gbps FC Dual-Port PCI-e HBA for IBM System x   | 8                          |
| 42D0485       | Emulex 8 Gb FC Single-port HBA for IBM System x         | 8                          |
| 42D0494       | Emulex 8 Gb FC Dual-port HBA for IBM System x           | 8                          |
| 42D0501       | QLogic 8 Gb FC Single-port HBA for IBM System x         | 8                          |
| 42D0510       | QLogic 8 Gb FC Dual-port HBA for IBM System x           | 8                          |
| 46M6049       | Brocade 8 Gb FC Single-port HBA for IBM System x        | 8                          |
| 46M6050       | Brocade 8 Gb FC Dual-port HBA for IBM System x          | 8                          |
| 59Y1987       | Brocade 4 Gb FC Single-port HBA for IBM System x        | 8                          |
| 59Y1993       | Brocade 4 Gb FC Dual-port HBA for IBM System x          | 8                          |
| SAS           |   |                            |
| 46M0907       | IBM 6 Gb SAS HBA Controller                             | 8                          |

## PCIe SSD adapters

Currently, the server does not support High IOPS SSD adapters.

## Power supplies and redundant cooling

The server supports up to two redundant power supplies. Standard models come with one or two power supplies (model dependent). The server also comes standard with either two (for models with one processor installed) or three (for models with two processors installed) simple swap cooling fans. Optional upgrade is available to provide N+N cooling redundancy. The following table lists the power supplies and redundant cooling upgrade option.

Table 14. Power supplies

| Part number | Description  | Max quantity supported | Standard models where used   |
|-------------|--|------------------------|------------------------------|
| 94Y5973     | IBM System x 750W High Efficiency Platinum AC Power Supply | 2                      | A2x, B2x, C2x, C4x, D2x, F2x |
| 94Y5974     | IBM System x 900W High Efficiency Platinum AC Power Supply | 2                      | G2x, H2x, J2x                |
| 81Y7007     | Redundant Cooling Upgrade Kit                              | 1                      | -                            |

An AC power supply ships standard with one 2.8 m line cord (country specific). The redundant cooling kit contains three simple swap fans.

## 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 15. Virtualization options

| Part number | Description  | Maximum quantity supported |
|-------------|--|----------------------------|
| 41Y8298     | IBM Blank USB Memory Key for VMware ESXi Downloads | 1                          |
| 41Y8300     | IBM USB Memory Key for VMware vSphere 5.0          | 1                          |

## Remote management

The server contains IBM 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 IMM2 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 IMM Advanced Upgrade (software feature) 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 color depths, 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.

Table 16. Remote management option

| Part number | Description                                       | Maximum quantity supported |
|-------------|---|----------------------------|
| 90Y3901     | IBM Integrated Management Module Advanced Upgrade | 1                          |

## 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 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 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware vSphere 5

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:

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

## Physical and electrical specifications

Dimensions and weight (approximate):

Tower:

- Width: 218 mm (8.6 in)
- Depth: 750 mm (29.5 in)
- Height: 440 mm (17.3 in)
- Weight:
  - Minimum configuration: 25.0 kg (55.1 lb)
  - Maximum configuration: 39.8 kg (87.7 lb)

Rack (using the Tower-to-Rack Conversion Kit, 81Y7006):

- Width: 424 mm (16.7 in)
- Depth: 702 mm (27.6 in)
- Height: 218 mm (8.5 in)
- Weight:
  - 24.5 kg (53.9 lb) (minimum configuration)
  - 39.3 kg (86.6 lb) (maximum configuration)

Supported environment:

- Air temperature
  - Server on: 10 - 35 °C (50 to 95 °F); altitude: 0 - 915 m (3,000 ft)
  - Server on: 10 - 32 °C (50 - 90 °F); altitude: 915 m (3,000 ft) - 2,134 m (7,000 ft)
  - Server on: 10 - 28 °C (50 - 83 °F); altitude: 2,134 m (7,000 ft) - 3,050 m (10,000 ft)
  - Server off (with standby power): 5 - 45 °C (41.0 - 113 °F)
  - Shipping: -40 - 60 °C (-40 - 140 °F)
- Humidity
  - Server on: 20 - 80% , Max. Dew Point 21 °C, Max. rate of change 5 °C/hr
  - Server off: 8 - 80%, Max. Dew Point 27 °C
- Electrical
  - Models with 900 W power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 11 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 5.5 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.6 kVA
      - Maximum configuration: 1.1 kVA
  - Models with 750 W 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: 0.6 kVA
      - Maximum configuration: 0.9 kVA
- BTU output
  - Minimum configuration: 2013 Btu/hr (590 watts)
  - Maximum configuration: 3610 Btu/hr (1056 watts)

## Warranty options

The IBM System x3500 M4 has a 3-year onsite warranty with 9x5/next business day terms. IBM offers the warranty service upgrades through IBM ServicePacs, discussed 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 ServicePacs might be available in a particular country. For more information about IBM ServicePac offerings available in your country visit the IBM ServicePac Product Selector at:

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

The following table explains warranty service definitions in more detail.

Table 17. Warranty service definitions

| Term                    | Description  |
|-------------------------|--|
| IBM onsite repair (IOR) | A service technician will come 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 after 1:00 p.m. it is determined that onsite 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 will arrive 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 ServicePacs are as follows:

- Warranty and maintenance service upgrades
  - One, 2, 3, 4, or 5 years of 9x5 or 24x7 service coverage
  - Onsite repair from next business day to 4 or 2 hours
  - One or 2 years of warranty extension
- Remote technical support services
  - One or three years with 24x7 coverage (severity 1) or 9x5/next business day for all severities
  - Installation and startup 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:

- 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. 60950-1-07
- NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- IEC-60950-1 (CB Certificate and CB Test Report)
- Taiwan BSMI CNS13438, Class A; CNS14336-1
- China CCC (GB4943-2001), GB9254-2008 class A, GB17625.1-2003
- Korea KN22, Class A; KN24
- 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)
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22-99, GOST R 51318.24-99, GOST R 51317.3.2-99, GOST R 51317.3.3-99
- IEC 60950-1 (CB Certificate and CB Test Report)

## External disk storage expansion

Currently, IBM x3500 M4 does not support external storage expansion like the EXP2500 series. It can be attached to the supported external storage system shown in Table 18, using the supported HBAs listed in Table 13.



## External disk storage systems

Table 18 lists the external storage systems that are supported by x3500 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. Refer to IBM System Storage® Interoperability Center for further information.

Table 18. 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          |

## External backup units

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

Table 19. 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 LineCord)                      |
| 8767HNX  | Half High Tape Drive Enclosure (with Nema 5-15P LineCord)               |
| Tape enclosure adapters (with cables)                        |   |
| 44E8869  | USB Enclosure Adapter Kit   |
| 40K2599  | SAS Enclosure Adapter Kit   |
| Internal backup drives supported by external tape enclosures |   |
| 46C5364  | IBM RDX Removable Hard Disk Storage System - Internal USB 160 GB Bundle |
| 46C5387  | IBM RDX Removable Hard Disk Storage System - Internal USB 320 GB Bundle |
| 46C5388  | IBM RDX Removable Hard Disk Storage System - Internal USB 500 GB Bundle |
| 46C5399  | IBM DDS Generation 5 USB Tape Drive                                     |
| 39M5636  | IBM DDS Generation 6 USB Tape Drive                                     |
| 43W8478  | IBM Half High LTO Gen 3 SAS Tape Drive                                  |
| 44E8895  | IBM Half High LTO Gen 4 SAS Tape Drive                                  |
| 49Y9898  | IBM Half High LTO Gen 5 Internal SAS Tape Drive                         |

Table 19. External backup options (part 2)

| Part number            | Description   |
|------------------------|---|
| External backup units* |   |
| 362516X                | IBM RDX Removable Hard Disk Storage System - External USB 160 GB Bundle |
| 362532X                | IBM RDX Removable Hard Disk Storage System - External USB 320 GB Bundle |
| 362550X                | IBM RDX Removable Hard Disk Storage System - External USB 500 GB Bundle |
| 3628L3X                | IBM Half High LTO Gen 3 External SAS Tape Drive (with US line cord)     |
| 3628L4X                | IBM Half High LTO Gen 4 External SAS Tape Drive (with US line cord)     |
| 3628L5X                | IBM Half High LTO Gen 5 External SAS Tape Drive (with US line cord)     |
| 3628N3X                | IBM Half High LTO Gen 3 External SAS Tape Drive (without line cord)     |
| 3628N4X                | IBM Half High LTO Gen 4 External SAS Tape Drive (without line cord)     |
| 3628N5X                | IBM Half High LTO Gen 5 External SAS Tape Drive (without line 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                                |

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

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

External USB tape drives are connected to the external USB ports on the server. External SAS or Fibre Channel tape drives require respective HBA (sold separately, see Table 14).

See the IBM ServerProven website for the latest information about the specific versions and service levels supported and any other prerequisites:

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

## Top-of-rack Ethernet switches

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

Table 20. 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 |   |
| 0446017  | IBM System Networking RackSwitch G8124R         |
| 7309BF9  | IBM System Networking RackSwitch G8124F         |
| 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         |
| 7309-CR9   | IBM System Networking RackSwitch G8264TR        |
| 7309-CF9   | IBM System Networking RackSwitch G8264TF        |
| 0719-410   | Juniper Networks EX4500 - Front to Back Airflow |
| 0719-420   | 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         |

## Uninterruptible power supply units

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

Table 21. Uninterruptible power supply units

| Part number      | Description                                  |
|------------------|--|
| Tower UPS        |  |
| 53961AX          | IBM 1000VA LCD Tower UPS (120V)              |
| 53961JX          | IBM 1000VA LCD Tower UPS (100V)              |
| 53961KX          | IBM 1000VA LCD Tower UPS (230V)              |
| 53962AX          | IBM 1500VA LCD Tower UPS (120V)              |
| 53962JX          | IBM 1500VA LCD Tower UPS (100V)              |
| 53962KX          | IBM 1500VA LCD Tower UPS (230V)              |
| Rack-mounted UPS |  |
| 21304RX          | IBM UPS 10000XHV                             |
| 53951AX          | IBM 1500VA LCD 2U Rack UPS (100V/120V)       |
| 53951KX          | IBM 1500VA LCD 2U Rack UPS (230V)            |
| 53952AX          | IBM 2200VA LCD 2U Rack UPS (100V/120V)       |
| 53952KX          | IBM 2200VA LCD 2U Rack UPS (230V)            |
| 53953AX          | IBM 3000VA LCD 3U Rack UPS (100V/120V)       |
| 53953JX          | IBM 3000VA LCD 3U Rack UPS (200V/208V)       |
| 53956AX          | IBM 6000VA LCD 4U Rack UPS (200V/208V)       |
| 53956KX          | IBM 6000VA LCD 4U Rack UPS (230V)            |
| 53959KX          | IBM 11000VA LCD 5U Rack UPS (200V/208V/230V) |

For more information, see the following at-a-glance guides:

- *IBM 3000VA LCD 3U Rack Uninterruptible Power Supply for IBM System x* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0782.html?Open>
- *IBM 6000VA LCD 4U Rack UPS* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0793.html?Open>

## Power distribution units

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

Table 22. 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 linecord                                     |
| 39Y8923                     | DPI 60A Three Phase C19 Enterprise PDU with IEC309 3P+G (208 V) fixed line cord |
| 39Y8941                     | DPI Single Phase C13 Enterprise PDU without line cord                           |
| 39Y8948                     | DPI Single Phase C19 Enterprise PDU without line cord                           |
| Front-end PDUs              |   |
| 39Y8934                     | DPI 32 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector                    |
| 39Y8935                     | DPI 63amp/250 V Front-end PDU with IEC 309 2P+Gnd connector                     |
| 39Y8938                     | 30 amp/125 V Front-end PDU with NEMA L5-30P connector                           |
| 39Y8939                     | 30 amp/250 V Front-end PDU with NEMA L6-30P connector                           |
| 39Y8940                     | 60 amp/250 V Front-end PDU with IEC 309 60A 2P+N+Gnd connector                  |

Table 22. 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 *IBM 1U Switched and Monitored Power Distribution Units* at-a-glance guide at: <http://www.redbooks.ibm.com/abstracts/tips0775.html?Open>

## Rack cabinets

The x3500 M4 server can be installed in the rack with the Tower to Rack Conversion Kit (81Y7006). The server supports the rack cabinets listed in the following table.

Table 23. Rack cabinets and Tower to Rack Conversion Kits

| Part number                   | Description                                 |
|-------------------------------|---|
| Tower to rack conversion kits |   |
| 81Y7006                       | Tower to Rack Conversion Kit                |
| Rack cabinets                 |   |
| 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  |



Figure 6 shows the server installed in the Tower to Rack Conversion Kit.



Figure 6. The IBM System x3550 M4 with the Tower to Rack Conversion Kit

## Rack options

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

Table 24. Rack options

| Part number                     | Description                                      |
|---------------------------------|--|
| Monitor kits and keyboard trays |  |
| 172317X                         | 1U 17in Flat Panel Console Kit                   |
| 172319X                         | 1U 19in 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 following IBM Redbooks® at-a-glance guides:

- *IBM 1754 LCM8 and LCM16 Local Console Managers* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0788.html?Open>
- *IBM GCM16 and GCM32 Global Console Managers* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0772.html?Open>
- *IBM 1U 17-inch and 19-inch Flat Panel Console Kits* at-a-glance guide  
<http://www.redbooks.ibm.com/abstracts/tips0731.html?Open>

## Related publications and links

For more information see these resources:

- IBM System x3500 M4 product page  
<http://www.ibm.com/systems/x/hardware/rack/x3500m4/index.html>
- IBM System x 3500 M4 Installation and User's Guide  
<http://ibm.com/support>
- IBM System x 3500 M4 Problem Determination and Service Guide  
<http://ibm.com/support>
- ServerProven hardware compatibility page for the x3500 M4  
<http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/xseries/7383.html>
- IBM Redbooks Product Guides for IBM System x servers and options  
<http://www.redbooks.ibm.com/portals/systemx?Open&page=pgbycat>
- IBM System x DDR3 Memory Configurator  
<http://www.ibm.com/systems/x/hardware/ddr3config/>
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<http://www.ibm.com/systems/xbc/cog/>
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