IBM System x3650 M3

The IBM® System x3650 M3 provides outstanding performance for your mission-critical applications. Its energy-efficient design supports more cores, memory, and data capacity in a scalable 2U 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.

Figure 1 shows the IBM System x3650 M3.

Figure 1. The IBM System x3650 M3

Did you know?

The x3650 M3 offers a flexible, scalable design and simple upgrade path to 16 HDDs or SSDs plus an optical drive, and up to 192 GB of memory. In addition, a built-in altimeter provides more efficient power utilization and lower noise levels. Comprehensive systems management tools such as advanced diagnostics, a cable management arm, and the ability to control resources from a single point make it easy to deploy, integrate, service, and manage.

Locations of key components and connectors

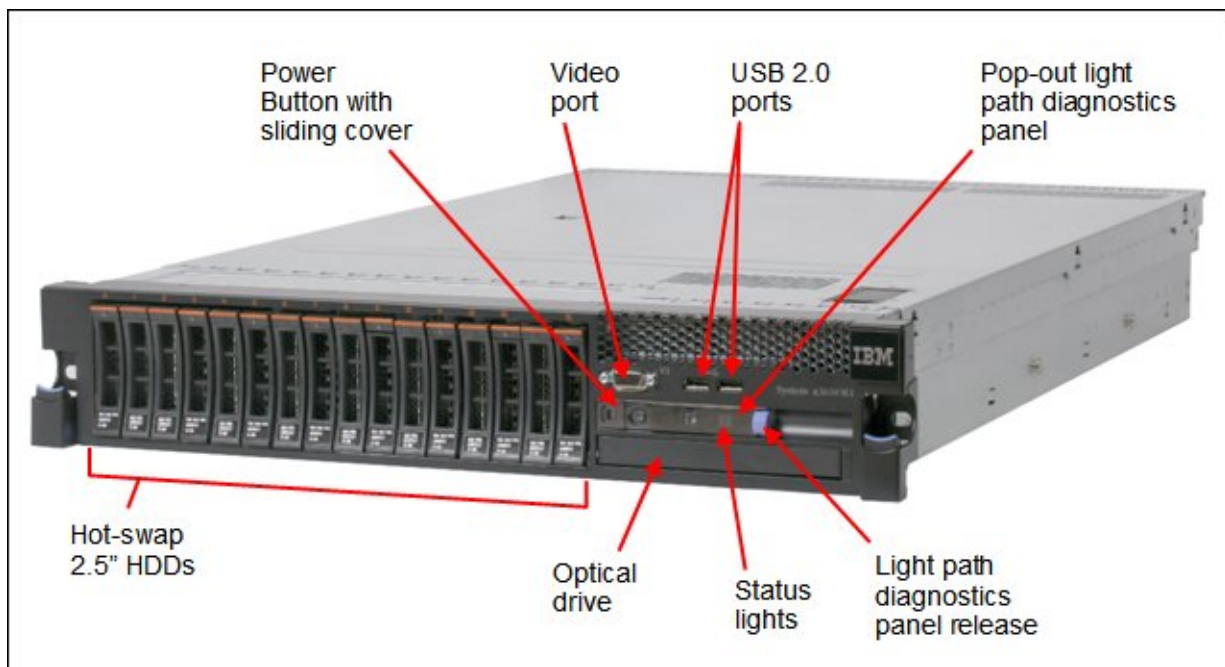Figure 2 shows the front of the server.

Figure 2. Front view of the IBM System x3650 M3
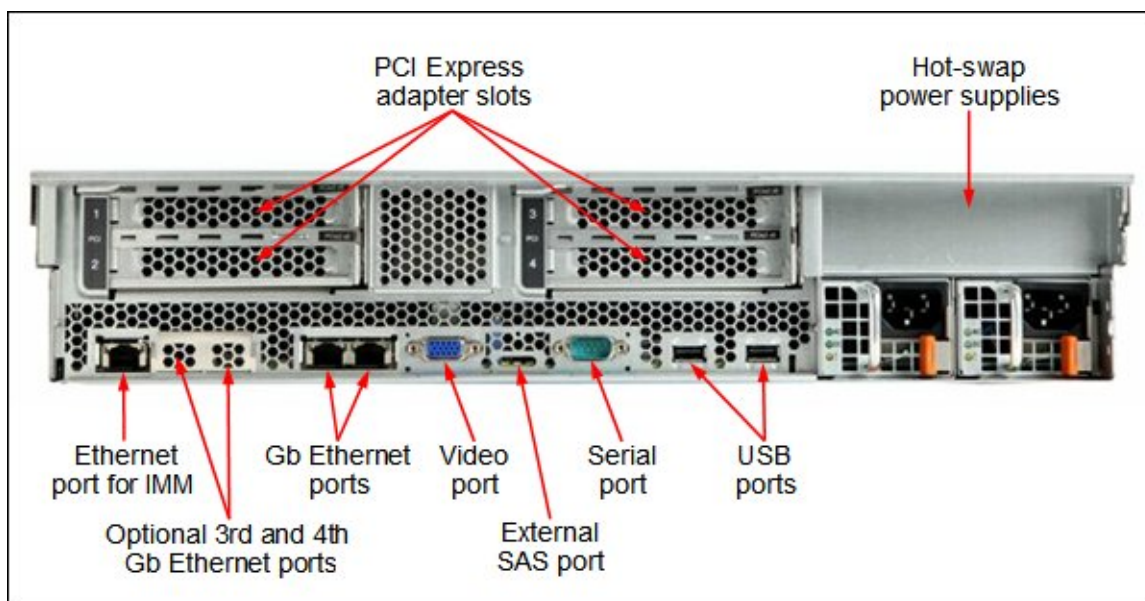
Figure 3 shows the rear of the server.

Figure 3. Rear view of the IBM System x3650 M3

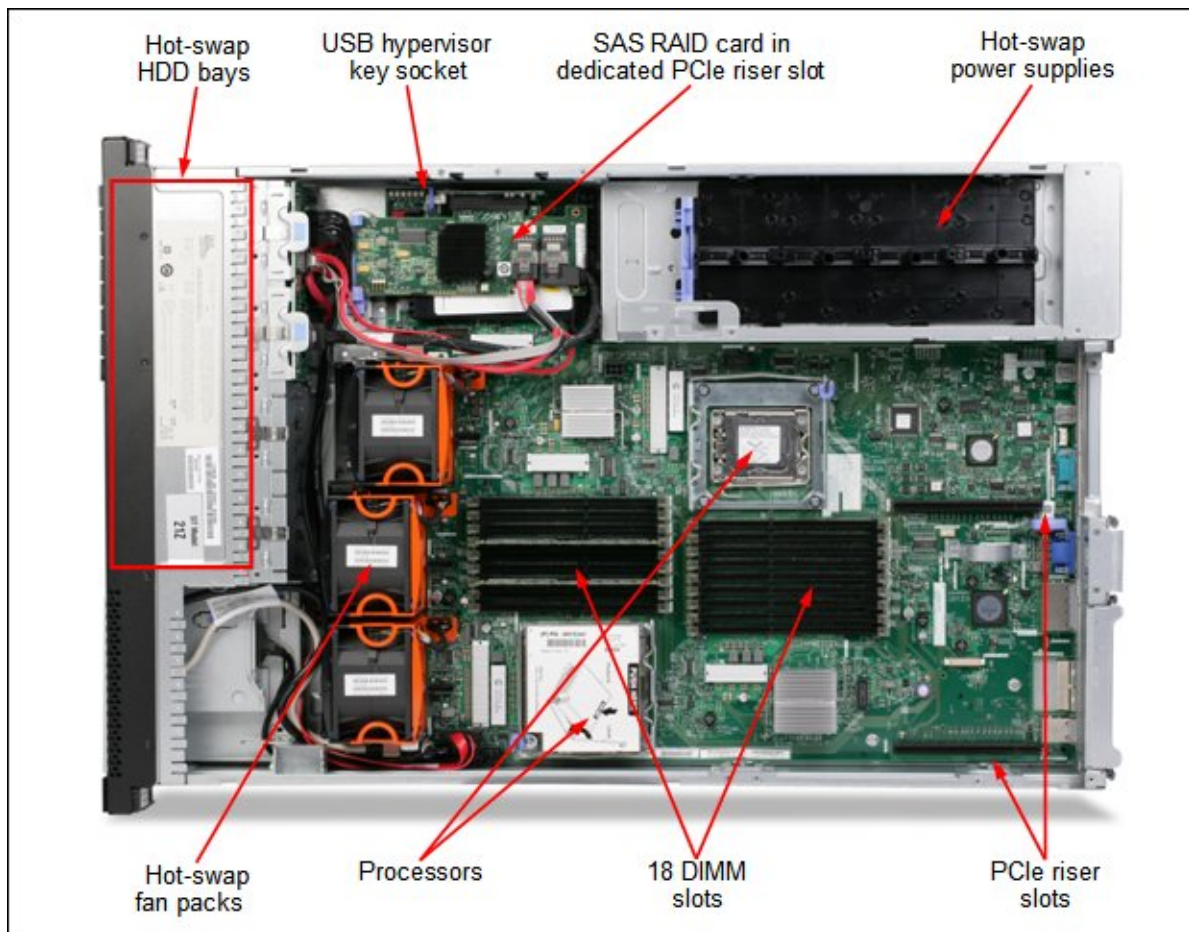Figure 4 shows the locations of key components inside the server.

Figure 4. Inside view of the IBM System x3650 M3

Standard specifications

Table 1. Standard specifications (part 1)

Components	Specification
Form factor	2U Rack.
Processor	Up to two six-core (up to 3.46 GHz) or quad-core (up to 3.6 GHz) Intel Xeon 5600 series processors with QuickPath Interconnect technology up to 6.4 GT/s, and up to 1333 MHz memory speed. Supports specific Quad-core and Dual-core Intel Xeon 5500 series processors via Configure-To-Order (CTO).
Memory cache	Up to 12 MB L3 for Xeon 5600 processors. Up to 8 MB L3 for Xeon 5500 processors.
Chipset	Intel 5520.
Memory	Up to 18 DIMM sockets (9 DIMMs per processor). Up to 192 GB with 16 GB DDR3 RDIMMs and 12 populated DIMM slots (up to 96 GB with 6 DIMMs per processor), or up to 48 GB with 4 GB DDR3 UDIMMs and 12 populated DIMM slots (up to 24 GB with 6 DIMMs per processor).
Memory protection	ECC, ChipKill (for x4-based memory DIMMs), memory mirroring, and memory sparing.
Disk drive bays	Up to 16 2.5" hot-swap SAS/SATA HDDs or solid-state drives.
Maximum internal storage	Up to 9.6 TB with 600 GB SAS HDDs, or up to 8.0 TB with 500 GB SATA HDDs, or up to 800 GB with 50 GB SSD HDDs. Intermix of SAS/SATA/SSD is supported.
RAID support	RAID 0, 1, 1E with ServeRAID-BR10il v2 or M1015; RAID 0, 1, 5, 10, 50 with M5014 or M5015. Optional upgrade to RAID 5 is available for M1015. Optional upgrade to RAID 6, 60 is available for M5014/M5015.
Optical drive bays	One, support for DVD-ROM or Multiburner. Separate bay.
Tape drive bays	Optional Tape Enablement Kit is available to support one DDS5, DDS6, or RDX internal tape drive. If used, the maximum number of HDD bays is limited to 8.
Network interfaces	Integrated 2 ports, plus 2 ports on optional Gigabit Ethernet with Ethernet Daughter Card (does not consume PCIe slot).
PCI Expansion slots	Up to 5 (up to 4 available, one slot is dedicated to RAID controller), dependant on the riser cards used (three different riser cards are available: 2x PCI-E x8 Gen 2, 1x PCI-E x16 Gen 2, and 2x PCI-X 64 bit/133 MHz). Up to two riser cards are supported.
External ports	Two USB 2.0 and one DB-15 video on front. Two USB 2.0, one DB-15 video, one DB-9 serial, one RJ-45 systems management, up to 4 RJ-45 network ports (2 standard, 2 optional) on rear. One internal USB port for embedded hypervisor.
Cooling	IBM Calibrated Vectored Cooling™ with 3 counter-rotating hot swap fans with N+1 redundancy. Altimeter is to control fan speed based on atmospheric pressure.
Power supply	Up to 2 redundant hot-swap 460 W AC or 675 W AC or 675 W high-efficiency (HE) AC power supplies with 90%+ efficiency. 675 W -48 V DC models are available via CTO.
Hot-swap components	Hard drives, power supplies, fans.
Systems management	UEFI, IBM Integrated Management Module (IMM), Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, IBM Systems Director and IBM Systems Director Active Energy Manager™, IBM ServerGuide. Optional Virtual Media Key for remote presence (graphics, keyboard and mouse, virtual media).

Table 1. Standard specifications (part 2)

Components	Specification
Security features	Power-on password, administrator's password, Trusted Platform Module (TPM)
Video	Matrox G200eV with 16 MB memory integrated into the IMM. Maximum resolution is 1280x1024 at 75 Hz with 16M 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 ESX 4.1 and VMware ESXi 4.1 embedded hypervisor, Sun Solaris 10.
Limited warranty	3-year customer-replaceable unit and onsite limited warranty with 9x5/next business day response time.
Service and support	Optional service upgrades are available through IBM ServicePacs®: 4-hour or 2-hour response time, 8 hours 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.

The x3650 M3 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 6.2 Base for x86 DVD-ROM
- IBM Gen 2 Slides Kit
- IBM Gen 2 Cable Management Arm (CMA)
- 2.8 m C13-C14 power cord (one for models with one power supply and two for models with two power supplies)

Standard models

The following table lists the standard models.

Table 2. Standard models

Model	Intel Xeon Processors† (2 maximum)	Memory	RAID	Disk bays	Disks	GbE	DVD	Power
Models announced February 2011								
7945-12x	1x E5603 1.60GHz 4C 4MB 1066MHz	1x 4 GB	BR10ilv2	4 / 16	Open	2 / 4	Open	1x 460 W
7945-22x	1x E5606 2.13GHz 4C 8MB 1066MHz	1x 4 GB	M1015	8 / 16	Open	2 / 4	Open	1x 460 W
7945-32x	1x E5607 2.26GHz 4C 8MB 1066MHz	1x 4 GB	M1015	8 / 16	Open	2 / 4	Open	1x 460 W
7945-D4x	1x E5620 2.40GHz 4C 12MB 1066MHz	1x 4 GB	M1015	8 / 16	Open	2 / 4	Open	1x 460 W
7945-H4x	1x L5640 2.26GHz 6C 12MB 1333MHz	1x 4 GB	M5015(b)	8 / 16	Open	2 / 4	Open	1x 460 W
7945-52x	1x E5645 2.40GHz 6C 12MB 1333MHz	1x 4 GB	M5014	8 / 16	Open	2 / 4	Open	1x 460 W
7945-54x	2x E5645 2.40GHz 6C 12MB 1333MHz	2x 4 GB	M5014	8 / 16	Open	2 / 4	Open	2x 675 W HE
7945-62x	1x E5649 2.53GHz 6C 12MB 1333MHz	1x 4 GB	M5014	8 / 16	Open	2 / 4	Open	1x 460 W
7945-J4x	1x X5650 2.66GHz 6C 12MB 1333MHz	1x 4 GB	M5015(b)	8 / 16	Open	2 / 4	Open	1x 675 W
7945-L4x	1x X5660 2.80GHz 6C 12MB 1333MHz	1x 4 GB	M5015(b)	8 / 16	Open	2 / 4	Open	1x 675 W
7945-72x	1x X5675 3.06GHz 6C 12MB 1333MHz	1x 4 GB	M5015(b)	8 / 16	Open	2 / 4	Open	1x 675 W HE
7945-82x	1x X5690 3.46GHz 6C 12MB 1333MHz	1x 4 GB	M5015(b)	8 / 16	Open	2 / 4	Open	1x 675 W HE
Models announced March 2010								
7945-A2x	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	BR10ilv2	4 / 16	Open	2 / 4	Open	1x 675W
7945-B2x	1x E5507 2.26GHz 4C 4MB 800MHz	1x 4GB	M1015	8 / 16	Open	2 / 4	Open	1x 675W
7945-C2x	1x L5630 2.13GHz 4C 12MB 1066MHz	1x 4GB	M1015	8 / 16	Open	2 / 4	Open	1x 675W
7945-D2x	1x E5620 2.40GHz 4C 12MB 1066MHz	1x 4GB	M1015	8 / 16	Open	2 / 4	Open	1x 675W
7945-F2x	2x E5630 2.53GHz 4C 12MB 1066MHz	2x 4GB	M5014	8 / 16	Open	2 / 4	Open	2x 675W
7945-G2x	1x E5640 2.66GHz 4C 12MB 1066MHz	1x 4GB	M5014	8 / 16	Open	2 / 4	Open	1x 675W
7945-H2x	1x L5640 2.26GHz 6C 12MB 1333MHz	1x 4GB	M1015	8 / 16	Open	2 / 4	Open	1x 675W
7945-J2x	1x X5650 2.66GHz 6C 12MB 1333MHz	3x 4GB	M5015 (b)	8 / 16	Open	2 / 4	Open	1x 675W
7945-L2x	1x X5660 2.80GHz 6C 12MB 1333MHz	3x 4GB	M5015 (b)	8 / 16	Open	2 / 4	Open	1x 675W
7945-M2x	1x X5670 2.93GHz 6C 12MB 1333MHz	3x 4GB	M5015 (b)	8 / 16	Open	2 / 4	Open	1x 675W
7945-N2x	1x X5680 3.33GHz 6C 12MB 1333MHz	3x 4GB	M1015	8 / 16	Open	2 / 4	Open	1x 675W

† Processor detail: Processor quantity and model, core speed, number of cores, L3 cache, memory speed.
(b) The ServeRAID M5015 RAID controller in this model includes a battery.

Model JSx is a workload-specifc model and includes SAP Discovery System v4 preloaded with SUSE Linux ES SAP Business All-in-one.

Table 3. Standard preload models

Workload model	Intel Xeon CPUs† (2 maximum)	RAM	RAID	Disk bays	Disks	GbE	DVD	Power	SW
7945-JSx*	2x Xeon X5650 2.66GHz 6C 12MB 1333MHz	6x 4GB	M5015 (b)	8 / 16	7x 300GB SAS +1x 500GB SATA	2 / 4	Multi	2x 675W	SAP*
7945-J6x*	2x Xeon X5650 2.66GHz 6C 12MB 1333MHz	6x 4GB	M5015 (b)	8 / 16	7x 300 GB SAS + 1x 500 GB SATA	2 / 4	Mult	2x 675W HE	SAP*
7945-JCx*	2x Xeon X5650 2.66GHz 6C 12MB 1333MHz	6x 4GB	M5015 (b)	8 / 16	7x 300 GB SAS + 1x 500 GB SATA	2 / 4	Multi	2x 675W HE	SAP*

* Models include SAP Discovery System v4 preloaded with SUSE Linux ES SAP Business All-in-one.
† Processor detail: Processor quantity and model, core speed, number of cores, L3 cache, memory speed
(b) The ServeRAID M5015 RAID controller in this model includes a battery

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

Express Models

The following table lists the region-specific Express models. Express models are preconfigured with additional components such as processors and memory to make the ordering and installation process simpler.

Table 4. Express models (part 1)

Region/ model	Intel Xeon Processors† (2 maximum)	RAM	RAID	Disk bays	Disks	GbE	DVD	PS
NA								
7945-E1U	1x E5507 2.26GHz 4C 4MB 800MHz	3x 2GB	M1015‡	8 / 16	Optional	2 / 4	Open	1x 675W
7945-E2U	1x E5620 2.40GHz 4C 12MB 1066MHz	3x 4GB	M5014	8 / 16	Optional	2 / 4	DVD	2x 675W
7945-E3U	1x X5650 2.66GHz 6C 12MB 1333MHz	3x 4GB	M5015(b)	8 / 16	Optional	2 / 4	Multi	2x 675W
7945-E4U	1x E5607 2.26GHz 4C 8MB 1066MHz	3x 2GB	M1015	8 / 16	Optional	2 / 4	Multi	1x 460W
7945-E5U	1x E5620 2.40GHz 4C 12MB 1066MHz	3x 2GB	M1015	8 / 16	Optional	2 / 4	Multi	1x 460W
7945-E6U	1x E5649 2.53GHz 6C 12MB 1333MHz	3x 4GB	M1015	8 / 16	Optional	2 / 4	Multi	2x 460W
7945-E7U	2x X5675 3.06GHz 6C 12MB 1333MHz	6x 4GB	M5015(b)	8 / 16	Optional	2 / 4	Multi	2x 675W
NE/SW IOT								
7945-K1G	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	M1015	4 / 16	Optional	2 / 4	Multi	1x 675W
7945-K2G	1x E5507 2.26GHz 4C 4MB 800MHz	1x 4GB	M1015	8 / 16	2x 146GB 10K	2 / 4	Multi	1x 675W
7945-K3G	1x E5620 2.40GHz 4C 12MB 1066MHz	2x 4GB	M5014	8 / 16	Optional	2 / 4	Multi	1x 675W
7945-K4G	2x X5660 2.80GHz 6C 12MB 1333MHz	4x 4GB	M5015(b)	8 / 16	3x 146GB 10K	2 / 4	Multi	2x 675W
7945-K8G	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	BR10ilv2	8 / 16	Optional	2 / 4	Multi	1x 675W
CEEMEA								
7945-K1G	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	M1015	4 / 16	Optional	2 / 4	Multi	1x 675W
7945-K3G	1x E5620 2.40GHz 4C 12MB 1066MHz	2x 4GB	M5014	8 / 16	Optional	2 / 4	Multi	1x 675W
7945-K4G	2x X5660 2.80GHz 6C 12MB 1333MHz	4x 4GB	M5015(b)	8 / 16	3x 146GB 10K	2 / 4	Multi	2x 675W
7945-K5G	1x E5506 2.13GHz 4C 4MB 800MHz	2x 4GB	M1015	8 / 16	Optional	2 / 4	Multi	1x 675W
7945-K6G	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	M5014	8 / 16	2x 146GB 10K	2 / 4	Multi	2x 675W
7945-K7G	1x E5620 2.40GHz 4C 12MB 1066MHz	2x 4GB	M5014	8 / 16	3x 146GB 10K	2 / 4	Multi	2x 675W
7945-K8G	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	BR10ilv2	8 / 16	Optional	2 / 4	Multi	1x 675W
7945-K9G	1x E5506 2.13GHz 4C 4MB 800MHz	2x 4GB	BR10ilv2	8 / 16	Optional	2 / 4	Multi	1x 675W
Russia								
7945-KAG	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	M5015(b)	8 / 16	Optional	2 / 4	Multi	1x 675W
7945-KBG	1x E5620 2.40GHz 4C 12MB 1066MHz	2x 4GB	M5015(b)	8 / 16	Optional	4 / 4	Multi	1x 675W
7945-KCG	1x E5630 2.53GHz 4C 12MB 1066MHz	2x 4GB	M5015(b)	8 / 16	Optional	4 / 4	Multi	2x 675W

† Processor detail: Processor quantity and model, core speed, number of cores, L3 cache, memory speed.
‡ Model 1EU includes the ServeRAID M5000 advance key.
(b) The ServeRAID M5015 RAID controller in this model includes a battery.

Table 4. Express models (part 2)

Region/ model	Intel Xeon Processors† (2 maximum)	RAM	RAID	Disk bays	Disks	GbE	DVD	PS
LA								
7945-E1U	1x E5507 2.26GHz 4C 4MB 800MHz	3x 2GB	M1015‡	8 / 16	Optional	2 / 4	Open	1x 675W
7945-E2U	1x E5620 2.40GHz 4C 12MB 1066MHz	3x 4GB	M5014	8 / 16	Optional	2 / 4	DVD	2x 675W
7945-E3U	1x X5650 2.66GHz 6C 12MB 1333MHz	3x 4GB	M5015(b)	8 / 16	Optional	2 / 4	Multi	2x 675W
7945-E4U	1x E5607 2.26GHz 4C 8MB 1066MHz	3x 2GB	M1015	8 / 16	Optional	2 / 4	Multi	1x 460W
7945-E5U	1x E5620 2.40GHz 4C 12MB 1066MHz	3x 2GB	M1015	8 / 16	Optional	2 / 4	Multi	1x 460W
7945-E6U	1x E5649 2.53GHz 6C 12MB 1333MHz	3x 4GB	M1015	8 / 16	Optional	2 / 4	Multi	2x 460W
7945-E7U	2x X5675 3.06GHz 6C 12MB 1333MHz	6x 4GB	M5015(b)	8 / 16	Optional	2 / 4	Multi	2x 675W
Japan								
7945-PAB	1x X5650 2.66GHz 6C 12MB 1333MHz	1x 2GB	M5015	8 / 16	Optional	2 / 4	Open	1x 675W
7945-PDP	1x E5503 2.0GHz 2C 4MB 800MHz	1x 2GB	M5015	8 / 16	Optional	2 / 4	Open	1x 675W
China								
7945-I01	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	M1015	8 / 16	1x 146GB 10K	2 / 4	Open	1x 675W
7945-I05	1x E5506 2.13GHz 4C 4MB 800MHz	1x 4GB	M5015(n)	8 / 16	1x 146GB 10K	2 / 4	Open	1x 675W
7945-I21	1x E5620 2.40GHz 4C 12MB 1066MHz	1x 4GB	M1015	8 / 16	1x 146GB 10K	2 / 4	Open	1x 675W
7945-I25	1x E5620 2.40GHz 4C 12MB 1066MHz	1x 4GB	M5015(n)	8 / 16	1x 146GB 10K	2 / 4	Open	1x 675W
7945-I41	1x E5620 2.40GHz 4C 12MB 1066MHz	2x 4GB	M1015	8 / 16	Optional	2 / 4	Open	1x 675W
7945-I45	1x E5620 2.40GHz 4C 12MB 1066MHz	2x 4GB	M5015(n)	8 / 16	Optional	2 / 4	Open	1x 675W
ISA								
7945-ICS	1x E5507 2.26GHz 4C 4MB 800MHz	1x 4GB	M1015	8 / 16	1x 146GB 10K	2 / 4	Multi	1x 675W
7945-IDS	1x E5620 2.40GHz 4C 12MB 1066MHz	1x 4GB	M1015	8 / 16	1x 146GB 10K	2 / 4	Multi	1x 675W
7945-IES	1x E5640 2.66GHz 4C 12MB 1066MHz	1x 4GB	M5014	8 / 16	1x 146GB 10K	2 / 4	Multi	1x 675W
Hong Kong								
7945-I4H	1x E5506 2.13GHz C 4MB 800MHz	1x 4GB	M5014	8 / 16	Optional	2 / 4	Multi	1x 675W
7945-I3H	1x E5507 2.26GHz 4C 4MB 800MHz	1x 4GB	M5014	8 / 16	Optional	2 / 4	Multi	1x 675W

† Processor detail: Processor quantity and model, core speed, number of cores, L3 cache, memory speed.
‡ Model 1EU includes the ServeRAID M5000 advance key.
(b) The ServeRAID M5015 RAID controller in this model includes a battery.
(n) The ServeRAID M5015 RAID controller in this model does not include a battery.

Processor options

The server supports the processor options listed in the following table. The server supports up to two processors. The following 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 5. Processor options (Part 1)

Part number	Description	Standard models where used
Intel Xeon 5600 series processors		
81Y6538	Intel Xeon E5603 4C 1.60GHz 4MB Cache 1066MHz 80w	12x
81Y6539	Intel Xeon E5606 4C 2.13GHz 8MB Cache 1066MHz 80w	22x
81Y6540	Intel Xeon E5607 4C 2.26GHz 8MB Cache 1066MHz 80w	32x
59Y4020	Intel Xeon E5620 4C 2.40 GHz 12 MB Cache 1066 MHz 80 w	D2x, E2x, D4x
59Y4021	Intel Xeon E5630 4C 2.53 GHz 12 MB Cache 1066 MHz 80 w	F2x
59Y4022	Intel Xeon E5640 4C 2.66 GHz 12 MB Cache 1066 MHz 80 w	G2x
81Y6537	Intel Xeon E5645 6C 2.40GHz 12MB Cache 1333MHz 80w	52x, 54x
81Y6542	Intel Xeon E5649 6C 2.53GHz 12MB Cache 1333MHz 80w	62x
59Y4017	Intel Xeon L5609 4C 1.86 GHz 12 MB Cache 1066 MHz 40 w	-
59Y4018	Intel Xeon L5630 4C 2.13 GHz 12 MB Cache 1066 MHz 40 w	C2x
59Y4019	Intel Xeon L5640 6C 2.26 GHz 12 MB Cache 1333 MHz 60 w	H2x, H4x
81Y6541	Intel Xeon X5647 4C 2.93GHz 12MB Cache 1333MHz 130w	-
59Y4023	Intel Xeon X5650 6C 2.66 GHz 12 MB Cache 1333 MHz 95 w	J2x, JSx, J4x, J6x, JCx,
59Y4024	Intel Xeon X5660 6C 2.80 GHz 12 MB Cache 1333 MHz 95 w	L2x, L4x
59Y4026	Intel Xeon X5667 4C 3.06 GHz 12 MB Cache 1333 MHz 95 w	-
59Y4025	Intel Xeon X5670 6C 2.93 GHz 12 MB Cache 1333 MHz 95 w	M2x
81Y6543	Intel Xeon X5672 4C 3.20GHz 12MB Cache 1333MHz 95w	-
81Y6544	Intel Xeon X5675 6C 3.06GHz 12MB Cache 1333MHz 95w	72x
59Y4027	Intel Xeon X5677 4C 3.46 GHz 12 MB Cache 1333 MHz 130 w	-
59Y4028	Intel Xeon X5680 6C 3.33 GHz 12 MB Cache 133 3MHz 130 w	N2x
81Y6545	Intel Xeon X5687 4C 3.60GHz 12MB Cache 1333MHz 130w	-
81Y6546	Intel Xeon X5690 6C 3.46GHz 12MB Cache 1333MHz 130w	82x

Table 5. Processor options (Part 2)

Part number	Description	Standard models where used
Intel Xeon 5500 series processors		
59Y4015	Intel Xeon E5503 2C 2.0 GHz 4 MB Cache 800 MHz 80 w	-
46M1078	Intel Xeon E5504 4C 2.0 GHz 4 MB L3 Cache 800 MHz 80 w	-
46M1079	Intel Xeon E5506 4C 2.13 GHz 4 MB L3 Cache 800 MHz 80 w	A2x
59Y4016	Intel Xeon E5507 4C 2.26 GHz 4 MB Cache 800 MHz 80 w	B2x
46M1081	Intel Xeon E5520 4C 2.26 GHz 8 MB L3 Cache 1066 MHz 80 w	-
46M1083	Intel Xeon E5530 4C 2.4 GHz 8 MB L3 Cache 1066 MHz 80 w	-
46M1084	Intel Xeon E5540 4C 2.53 GHz 8 MB L3 Cache 1066 MHz 80 w	-
46M1085	Intel Xeon X5550 4C 2.66 GHz 8 MB L3 Cache 1333 MHz 95 w	-
46M1086	Intel Xeon X5560 4C 2.8 GHz 8 MB L3 Cache 1333 MHz 95 w	-
46M1087	Intel Xeon X5570 4C 2.93 GHz 8 MB L3 Cache 1333 MHz 95 w	-

Memory options

The IBM System x3650 M3 supports DDR3 memory. The server supports up to nine DIMMs when one processor is installed and up to 18 DIMMs when two processors are installed. However, the maximum number of DIMMs is limited by the number of ranks in the DIMMs:

- RDIMMs
    - Up to 18 single-rank RDIMMs (nine per processor) for a maximum of 72 GB (18x 4 GB)
    - Up to 18 dual-rank RDIMMs for a maximum of 144 GB (18x 8 GB)
    - Up to 12 quad-rank RDIMMs for a maximum of 192 GB (12x 16 GB)
- UDIMMs
    - Up to 12 dual-rank UDIMMs for a maximum of 48 GB (12x 4 GB)

Each processor has three memory channels, and there are three DIMMs per channel. RDIMMs can be populated three per channel. However, UDIMMs can only be populated two DIMMs per channel. That is, you can have up to 18 RDIMMs installed in the server, but only up to 12 UDIMMs. Mixing UDIMMs and RDIMMs is not supported.

Maximum memory speed is limited by memory speed supported by the specific processor and by the number and type of DIMMs installed (whichever has a lower memory speed rating), as follows:

- Intel Xeon 5600 series processors:
    - 1333 MHz when one or two single-rank or dual-rank RDIMMs per channel are installed or one UDIMM per channel is installed
    - 1066 MHz when one quad-rank RDIMM per channel is installed or two UDIMMs per channel are installed
    - 800 MHz when three single-rank or dual-rank RDIMMs or two quad-rank RDIMMs per channel are installed

- Quad-core Intel Xeon 5500 series processors:

  - 1333 MHz when one single-rank or dual-rank RDIMM per channel is installed or one UDIMM per channel is installed

  - 1066 MHz when two single-rank or dual-rank RDIMMs per channel are installed, or one quad-rank RDIMM per channel is installed, or two UDIMMs per channel are installed

  - 800 MHz when three single-rank or dual-rank RDIMMs or two quad-rank RDIMMs per channel are installed

- Dual-core Intel Xeon 5500 series processors only support memory speed at 800 MHz.

The server supports both 1.5 V and 1.35 V DIMMs. Mixing 1.5 V and 1.35 V DIMMs in the same server is supported for Intel Xeon 5600 series processor-based systems, in such a case all DIMMs operate at 1.5 V. Intel Xeon 5500 series processor-based systems do not support 1.35 V DIMMs.

The following memory protection technologies are supported:

- ECC
- ChipKill (for x4-based RDIMMs)
- Memory mirroring
- Memory sparing

If memory mirroring is used then DIMMs must be installed in pairs (minimum of one pair per each CPU), and both DIMMs in a pair must be identical in type and size. If Memory 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. Memory sparing is only supported for Intel Xeon 5600 series processor-based systems.

Table 6 lists memory options available for x3650 M3 server.

Table 6. Memory options

Part number	Description	Maximum quantity supported	Standard models where used
UDIMMs			
44T1569	2 GB (1x 2 GB, 2Rx8, 1.5 V) PC3-10600 ECC 1333 Mhz LP UDIMM	12 (6 per CPU)	-
49Y1403	2 GB (1x 2 GB, 1Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP UDIMM	12 (6 per CPU)	-
49Y1404	4 GB (1x 4 GB, 2Rx8, 1.35 V) PC3L-10600 CL9 ECC 1333 MHz LP UDIMM	12 (6 per CPU)	-
RDIMMs			
49Y1434	2 GB (1x 2 GB, 1Rx4, 1.5 V) PC3-10600 CL9 ECC 1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1405	2 GB (1x 2 GB, 1Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	18 (9 per CPU)	-
44T1592	2 GB (1x 2 GB, 1Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1392	2 GB (1x 2 GB, 2Rx8, 1.35 V) PC3L-10600 CL9 ECC 1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1433	2 GB (1x 2 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC 1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1406	4 GB (1x 4GB, 1Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	18 (9 per CPU)	12x, 22x, 32x, D4x, H4x, 52x, 54x, 62x, J4x, J6x, JCx, L4x, 72x, 82x
49Y1394	4 GB (1x 4 GB, 2Rx4, 1.35 V) PC3L-10600 CL9 ECC 1333 MHz LP RDIMM	18 (9 per CPU)	C2x, H2x
49Y1435	4 GB (1x 4 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC 1333 MHz LP RDIMM	18 (9 per CPU)	A2x, B2x, D2x, F2x, G2x, J2x, L2x, M2x, N2x, JSx
49Y1407	4 GB (1x 4GB, 2Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	18 (9 per CPU)	-
44T1599	4 GB (1x 4 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1397	8 GB (1x 8 GB, 2Rx4, 1.35 V) PC3L-10600 CL9 ECC 1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1398	8 GB (1x 8 GB, 2Rx4, 1.35 V) PC3L-8500 CL7 ECC 1066 MHz LP RDIMM	18 (9 per CPU)	-
46C7449	8 GB (1x 8 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3-1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1436	8 GB (1x 8 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC 1333 MHz LP RDIMM	18 (9 per CPU)	-
49Y1400	16 GB (1x 16 GB, 4Rx4, 1.35 V) PC3L-8500 CL7 ECC DDR3 1066 MHz LP RDIMM	12 (6 per CPU)	-
46C7483	16 GB (1x 16 GB, 4Rx4, 1.5 V) PC3-8500 CL7 ECC 1066 MHz LP RDIMM	12 (6 per CPU)	-

Internal disk storage options

IBM System x3650 M3 server supports the following internal storage configurations:

- Four SATA 2.5" SFF Simple-Swap hard drive bays (only available in CTO)
- Four SAS/SATA 2.5" SFF hot-swap hard drive bays
- Eight SAS/SATA 2.5" SFF hot-swap hard drive bays
- Sixteen SAS/SATA 2.5" SFF hot-swap hard drive bays
- Eight SAS/SATA 2.5" SFF hot-swap hard drive bays and internal tape drive
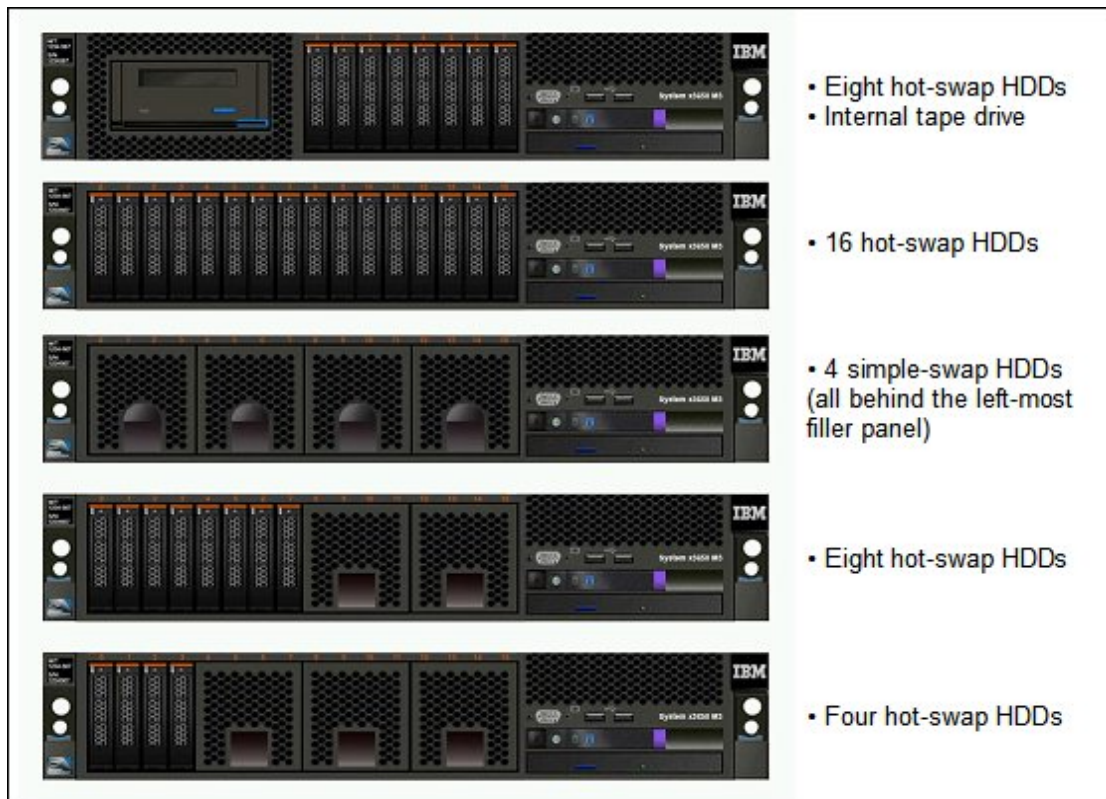
Figure 5 shows these configurations.

Figure 5. Internal drive configurations

Backplanes and enablement kits

Standard models of x3650 M3 ship with four (model A2x) or eight (all models except A2x) SAS/SATA 2.5"
SFF hot-swap hard drive bays. The following table shows internal storage expansion options available for
x3650 M3 server.

Table 7. Internal storage expansion options

Part number	Name	Maximum quantity supported
69Y4236	IBM System x3650 M3 Hot-Swap SAS/SATA 4 Pac HDD Upgrade Option	1
59Y3825	Hot-swap SAS SATA 8 Pack HDD Enablement Option (with 6 Gb/sec expander)	1
69Y5034	Hot-swap SAS SATA 8 Pack HDD Enablement Kit (with two ServeRAID M5015 adapters)	1
59Y3806	IBM System x3650 M3 Tape Enablement Kit	1

These options have the following descriptions:

- 69Y4236 upgrades models with four hot-swap HDD bays to eight hot-swap HDD bays. This option
  requires a ServeRAID M1015, M5014, or M5015.

- 59Y3825 upgrades models with eight hot-swap HDD bays to 16 hot-swap HDD bays. This option
  includes a SAS expander card that fits into a dedicated RAID slot, and RAID controller occupies one
  of the four PCIe slots, limiting the number of available slots to three.

- 69Y5034 upgrades models with eight hot-swap HDD bays to 16 hot-swap HDD bays. This option
  includes two ServeRAID M5015 RAID controllers (without batteries). The number of available PCIe
  slots is three.

- 59Y3806 upgrades models with eight hot-swap HDD bays to eight hot-swap HDD bays plus an
  internal tape drive (DDS5, DDS6, or RDX). This includes the riser card with USB and SAS tape
  connectors, replacing the standard SAS RAID riser card.

RAID controllers

The following table lists the RAID controllers and additional options used for internal disk storage of x3650 M3 server.

Table 8. RAID controllers for internal storage

Part number	Description	Max quantity supported	Standard models where used
44E8689	ServeRAID-BR10i SAS/SATA Controller	1	-
49Y4731	ServeRAID-BR10il SAS/SATA Controller V2	1	A2x, 12x
46M0831	ServeRAID M1015 SAS/SATA Controller	1	B2x, C2x, D2x, H2x, N2x, 22x, 32x, D4x
46M0832	ServeRAID M1000 Series Advance Feature Key	1	-
46M0916	ServeRAID M5014 SAS/SATA Controller	1	F2x, G2x, 52x, 54x, 62x
46M0829	ServeRAID M5015 SAS/SATA Controller	1 or 2*	J2x, L2x, M2x, JSx, H4x, J4x,J6x, JCx, L4x, 72x, 82x
46M0917	ServeRAID M5000 Series Battery Kit	1	J2x, L2x, M2x, JSx, H4x, J4x,J6x, JCx, L4x, 72x, 82x
46M0930	ServeRAID M5000 Series Advance Feature Key	1†	-
81Y4426	ServeRAID M5000 Series Performance Accelerator Key	1†	-
46M0969	ServeRAID B5015 SSD Controller	1	-

* When this RAID controller is ordered separately, then the maximum quantity supported is one. When this RAID controller is ordered as a part of the 69Y5034 upgrade (See Table 7), then the maximum quantity supported is two.
† Only one key is supported in each controller, either the Advance Feature Key or the Performance Accelerator Key.

When the maximum number of HDD bays is eight, the RAID controller occupies a dedicated PCIe slot on x3650 M3 and does not consume the regular PCIe slot. When 16 HDD bay configurations are used, the number of available regular PCIe slots is three.

The ServeRAID BR10il v2 SAS/SATA Controller has the following specifications:

- One Mini-SAS internal connector
- Supports RAID levels 0, 1, and 1E
- 3 Gbps throughput per port
- Based on the LSI 1064E controller
- PCI Express 2.0 x4 host interface
- Stripe size: 64 KB (fixed)

For more information, see the IBM System x® at-a-glance guide *ServeRAID-BR10il SAS/SATA Controller v2 for IBM System x* at: http://www.redbooks.ibm.com/abstracts/tips0741.html?Open

The ServeRAID M1015 SAS/SATA Controller has the following specifications:

- Two Mini-SAS internal connectors
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional ServeRAID M1000 Series Advanced Feature Key
- 6 Gbps throughput per port
- Based on the LSI SAS2008 6 Gbps RAID on Chip (ROC) controller
- PCI Express 2.0 x8 host interface
- Configurable stripe size up to 64 KB

For more information, see the at-a-glance guide *ServeRAID M1015 SAS/SATA Controller for System x* at: http://www.redbooks.ibm.com/abstracts/tips0740.html?Open

The ServeRAID M5014 SAS/SATA Controller has the following specifications:

- Two Mini-SAS internal connectors
- Supports RAID levels 0, 1, 5, 10, and 50
- Supports RAID 6 and 60 with the optional M5000 Advanced Feature Key
- Performance optimization for SSD drives with optional M5000 Series Performance Accelerator Key
- 6 Gbps throughput per port
- PCI Express 2.0 x8 host interface
- Based on the LSI SAS2108 6 Gbps ROC controller
- 256 MB of onboard cache
- Optional Intelligent Li-Ion-based battery backup unit with the ServeRAID M5000 Series Battery Kit

For more information, see the at-a-glance guide *ServeRAID M5015 and M5014 SAS/SATA Controllers for IBM System x* at: http://www.redbooks.ibm.com/abstracts/tips0738.html?Open

The ServeRAID M5015 SAS/SATA Controller has the following specifications:

- Two Mini-SAS internal connectors
- Supports RAID levels 0, 1, 5, 10, and 50
- Supports RAID 6 and 60 with the optional M5000 Advanced Feature Key
- Performance optimization for SSD drives with optional M5000 Series Performance Accelerator Key
- 6 Gbps throughput per port
- PCI Express 2.0 x8 host interface
- Based on the LSI SAS2108 6 Gbps ROC controller
- 512 MB of onboard cache
- Standard Intelligent Li-Ion-based battery backup unit with up to 48 hours of data retention

For more information, see the at-a-glance guide *ServeRAID M5015 and M5014 SAS/SATA Controllers for IBM System x* at: http://www.redbooks.ibm.com/abstracts/tips0738.html?Open

The ServeRAID B5015 SSD Controller has the following specifications:

- Two Mini-SAS internal connectors
- Supports RAID levels 1 and 5
- 6 Gbps throughput per SAS port
- PCI Express 2.0 x8 host interface
- Based on PMC-Sierra PM8013 maxSAS 6 Gb/s SAS RoC controller
- Performance optimized for SSDs
- Stripe size of up to 1 MB

For more information, see the at-a-glance guide *ServeRAID B5015 SSD Controller* at: http://www.redbooks.ibm.com/abstracts/tips0763.html?Open

The following table lists hard drive options for internal disk storage of x3650 M3 server.

Table 9. Disk drive options for internal disk storage

Part number	Description	Maximum quantity supported
Hot-Swap SATA HDDs		
42D0747	IBM 160 GB 7200 NL SATA 2.5" SFF Slim-HS HDD	16
42D0752	IBM 500 GB 7200 NL SATA 2.5" SFF Slim-HS HDD	16
Hot-Swap SAS HDDs		
42D0632	IBM 146 GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	16
42D0637	IBM 300 GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	16
42D0672	IBM 73 GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	16
42D0677	IBM 146 GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	16
42D0707	IBM 500 GB 7200 6Gbps NL SAS 2.5" SFF Slim-HS HDD	16
49Y2003	IBM 600 GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	16
44W2264	IBM 300 GB 10K 6Gbps SAS 2.5" SFF Slim-HS SED	16
44W2294	IBM 146 GB 15K 6Gbps SAS 2.5" SFF Slim-HS SED	16
Hot-Swap SATA Solid state drives		
43W7714	IBM 50 GB SATA 2.5" SFF Slim-HS High IOPS SSD	16
Simple-Swap SATA Solid state drives		
None*	50 GB Simple Swap SATA SSD	4

* This drive cannot be ordered separately. It is only available via special bid or the Configure To Order (CTO) process.

Internal tape drives

The server supports the internal tape drive options listed in the following table. x3650 M3 Tape Enablement Kit, 59Y3806, is required to support these tapes internally.

Table 10. 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
43W8480	IBM DDS Gen 5 SATA Tape Drive	1
39M5636	IBM DDS Gen 6 USB Tape Drive	1

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 11. Optical drives

Part number	Description	Maximum quantity supported	Standard models where used
46M0901	IBM UltraSlim Enhanced SATA DVD-ROM	1	-
46M0902	UltraSlim Enhanced SATA Multi-Burner	1	JSx, J6x, JCx

IBM UltraSlim Enhanced SATA DVD-ROM (part number 46M0901) 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

IBM UltraSlim Enhanced SATA Multi-Burner (part number 46M0902) supports the same media and speeds for reading as DVD-ROM (46M0901). 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
- 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

External disk storage expansion

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

Table 12. External storage expansion enclosures

Part number	Description	Maximum quantity supported per one M5025
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 13. Hard drive options for external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
EXP3000 Hot-Swap SATA 3.5" Hard Drives		
43W7630	1000 GB Dual Port Hot Swap SATA	12
49Y1940	IBM 2 TB 7200 Dual Port SATA 3.5" HS HDD	12
EXP3000 Hot-Swap SAS 3.5" Hard Drives		
44W2234	IBM 300 GB 15K 6 Gbps SAS 3.5" Hot-Swap HDD	12
44W2239	IBM 450 GB 15K 6 Gbps SAS 3.5" Hot-Swap HDD	12
44W2244	IBM 600 GB 15K 6 Gbps SAS 3.5" Hot-Swap HDD	12
EXP2512 Hot-Swap SAS 3.5" Hard Drives		
49Y1899	300 GB 15K 6 Gb SAS 3.5" HDD	12
49Y1900	450 GB 15K 6 Gb SAS 3.5" HDD	12
49Y1901	600 GB 15K 6 Gb SAS 3.5" HDD	12
49Y1903	1 TB 7,200 RPM 6 Gb SAS NL 3.5" HDD	12
49Y1902	2 TB 7,200 RPM 6 Gb SAS NL 3.5" HDD	12
EXP2524 Hot-Swap SAS 2.5" Hard Drives		
49Y1896	146 GB 15K 6 Gb SAS 2.5” HDD	24
49Y1895	300 GB 10K 6 Gb SAS 2.5” HDD	24
81Y9596	600 GB 10K 6 Gb SAS 2.5” HDD	24
49Y1898	500 GB 7,200 RPM 6 Gb SAS NL 2.5” HDD	24

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

Table 14. RAID controllers for external storage expansion enclosures

Part number	Description	Maximum quantity supported
46M0830	ServeRAID M5025 SAS/SATA Controller	4
46M0930	ServeRAID M5000 Series Advance Feature Key†	1 per one M5025
81Y4426	ServeRAID M5000 Series Performance Accelerator Key†	1 per one M5025

† Only one key is supported in each controller, either the Advance Feature Key or the Performance Accelerator Key.

The ServeRAID M5025 SAS/SATA Controller has the following specifications:

● Two Mini-SAS external connectors
● Supports RAID levels 0, 1, 5, 10, and 50
● Supports RAID 6 and 60 with the optional M5000 Advanced Feature Key
● Performance optimization for SSD drives with optional M5000 Series Performance Accelerator Key
● 6 Gbps throughput per port
● PCI Express 2.0 x8 host interface
● Based on the LSI SAS2108 6 Gbps ROC controller
● 512 MB of onboard cache
● Intelligent Li-Ion-based battery backup unit with up to 48 hours of data retention
● Supports connectivity to the EXP3000, EXP2512, and EXP2524 storage expansion enclosures

For more information, see the *ServeRAID M5025 SAS/SATA Controller for IBM System x* at-a-glance guide: http://www.redbooks.ibm.com/abstracts/tips0739.html?Open

The external SAS cables listed in the following table are supported with external expansion enclosures and M5025 RAID controllers.

Table 15. 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

* Note: 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 previous one by one cable.

External tape backup

The server supports the external tape attachment options listed in the following table.

Table 16. External tape options

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 tape 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
39M5636	IBM DDS Generation 6 USB Tape Drive
43W8478	IBM 400/800GB HH LTO3 SAS Tape Drive
44E8895	IBM Half High LTO Gen 4 SAS Tape Drive
49Y9898	IBM Internal Half High LTO Gen 5 SAS Tape Drive
External tape drives	
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
3628L5X	IBM External Half High LTO Gen 5 SAS Tape Drive (with US linecord)
3628N5X	IBM External Half High LTO Gen 5 SAS Tape Drive (no US linecord)
3572-Sxx	IBM System Storage TS2900 Tape Autoloader
3573-xxx	IBM System Storage TS3100/TS3200 Tape Library
3576-xxx	IBM System Storage TS3310
3580-H5S	IBM System Storage TS2250 Tape Drive Model H5S
3580-S3E	IBM System Storage TS2230 Tape Drive Express Model
3580-S4E	IBM System Storage TS2240 Tape Drive Model S4E
3580-S53	IBM System Storage TS2350 Tape Drive Model S53

I/O expansion options

The server supports up to four PCI Express slots with different riser cards installed into two riser sockets on the system planar (one riser socket supports installation of one riser card). The slot form factors are as follows:

- Slot 1: Full height, full length
- Slot 2: Low profile with standard bracket
- Slot 3: Full height, full length
- Slot 4: Full height, half length

Riser 1 supplies slots 1 and 2. Riser 2 supplies slots 3 and 4. Standard models have two riser cards installed that provide a total of four PCI Express 2.0 x8 slots (two PCI Express x8 Gen 2 slots per riser card).

You can replace each standard riser with one of the following risers (or configure one of these riser cards instead of the standard 2 x8 riser using special bid or CTO) :

- Riser with one PCI Express x16 Gen 2 slot
- Riser with two PCI-X 64 bit/133 MHz slots

The following table lists the PCI riser card options.

Table 17. PCI riser card options

Part number	Description	Maximum quantity supported
46M1072	PCI Express (2x8) Riser Card (included in standard models)	2
46M1073	PCI Express (1x16) Riser Card	2
46M1074	PCI-X Riser Card (two PCI-X 1.0a 64-bit 133 MHz slots)	2

The server has an additional PCI Express slot dedicated to the RAID controller.

Network adapters

x3650 M3 supports up to four integrated Gigabit Ethernet ports. Two ports are standard, and two ports can be added by installing the optional Dual-port Gigabit Ethernet Daughter card, 46M1076. This card uses a dedicated connector on the motherboard and does not consume a PCI expansion slot.

Integrated NICs have the following features:

- Broadcom BCM5709 chip
- 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 18. Network adapters

Part number	Description	Maximum quantity supported
10 Gb Ethernet		
42C1790	NetXtreme II 10 GigE Express Fiber SR Adapter	4
49Y4250	Emulex 10 GbE Virtual Fabric Adapter for IBM System x	3
Gigabit Ethernet		
46M1076	Dual Port 1 Gb Ethernet Daughter Card	1
39Y6066	NetXtreme II 1000 Express Ethernet Adapter	4
39Y6126	PRO/1000 PT Dual Port Server Adapter by Intel	4
39Y6136	PRO/1000 PT Quad Port Server Adapter by Intel	3
42C1750	PRO/1000 PF Server Adapter by Intel	4
42C1780	NetXtreme II 1000 Express Dual Port Ethernet Adapter	4
49Y4220	NetXtreme II 1000 Express Quad Port Ethernet Adapter	4
49Y4230	Intel Ethernet Dual Port Server Adapter I340-T2 for IBM System x	4
49Y4240	Intel Ethernet Quad Port Server Adapter I340-T4 for IBM System x	4

Storage host bus adapters

The following table lists storage HBAs supported by x3650 M3 server.

Table 19. Storage adapters

Part number	Description	Maximum quantity supported
Fibre Channel		
39R6525	QLogic 4 Gb FC Single-Port PCIe HBA for IBM System x	4
39R6527	QLogic 4 Gb FC Dual-Port PCIe HBA for IBM System x	4
42C2069	Emulex 4 Gbps FC Single-Port PCI-e HBA for IBM System x	4
42C2071	Emulex 4 Gbps FC Dual-Port PCI-e HBA for IBM System x	4
42D0485	Emulex 8 Gb FC Single-port HBA for IBM System x	4
42D0494	Emulex 8 Gb FC Dual-port HBA for IBM System x	4
42D0501	QLogic 8 Gb FC Single-port HBA for IBM System x	4
42D0510	QLogic 8 Gb FC Dual-port HBA for IBM System x	4
46M6049	Brocade 8 Gb FC Single-port HBA for IBM System x	4
46M6050	Brocade 8 Gb FC Dual-port HBA for IBM System x	4
59Y1987	Brocade 4 Gb FC Single-port HBA for IBM System x	4
59Y1993	Brocade 4 Gb FC Dual-port HBA for IBM System x	4
Converged Network Adapters (CNA)*		
42C1800	QLogic 10 Gb Dual Port CNA for IBM System x	4
42C1820	Brocade 10 Gb Dual-port CNA for IBM System x	4
iSCSI		
39Y6146	QLogic iSCSI Single-Port PCIe HBA for IBM System x	4
42C1770	QLogic iSCSI Dual-Port PCIe HBA for IBM System x	4
SAS		
46M0907	IBM 6 Gb SAS HBA Controller	4
44E8700	IBM 3 Gb SAS HBA v2	4

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

PCIe SSD adapters

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

Table 20. SSD adapters

Part number	Description	Maximum quantity supported
46M0877	IBM 160GB High IOPS SS Class SSD PCIe Adapter	4
46M0878	IBM 320 GB High IOPS SD Class SSD PCIe Adapter	3
46M0898	IBM 320GB High IOPS MS Class SSD PCIe Adapter	4
81Y4519	640GB High IOPS MLC Duo Adapter for IBM System x	2

Power supplies

The server supports up to two redundant power supplies, providing N+N redundancy. Standard models come with one or two power supplies (model dependent). -48V DC models are only available through CTO. The following table lists the power supplies.

Table 21. Power supplies

Part number	Description	Max quantity supported	Standard models where used
46M1075	IBM 675 W Redundant Power Supply	2*	A2x, B2x, C2x, D2x, F2x, G2x, H2x, J2x, JSx, L2x, M2x, N2x, J4x, L4x
69Y1510	IBM -48V DC Input 675 W Redundant Power Supply	2	-
81Y6557	IBM 675W High Efficiency Redundant AC Power Supply	2*	54x, 72x, 82x, J6x, JCx
81Y6558	IBM 460W Redundant AC Power Supply	2*	12x, 22x, 32x, D4x, H4x, 52x, 62x

* At least 1 power supply comes standard with every model

An AC power supply ships standard with one 2.8 m C13 - C14 power cord. A DC power supply ships without power cords.

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 22. Virtualization options

Part number	Description	Maximum quantity supported
41Y8278	IBM USB Memory Key for VMware Hypervisor ESXi 4.0	1
41Y8287	IBM USB Memory Key for VMware ESXi 4.1	1

Remote management

The server contains IBM Integrated Management Module (IMM), 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 IMM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the IMM also provides a virtual presence capability for remote server management capabilities.

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

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

The optional virtual media key 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 1280x1024 at 75 Hz, 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 23. Remote management option

Part number	Description	Maximum quantity supported
46C7526	IBM Virtual Media Key	1

Uninterruptible power supply units

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

Table 24. Uninterruptible power supply units

Part number	Description
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 (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)

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

Table 26. 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

Rack options

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

Table 27. Rack options

Part number	Description
Monitor kits and keyboard trays	
17231RX	IBM 1U 17" Flat Panel Console Kit w/ Optical Drive Bay
17233RX	IBM 1U 15" Flat Panel Console Kit
17235RX	IBM Rack Keyboard Tray
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)

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

Warranty options

The IBM System x3650 M3 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.ibm.com/sales/gss/spst/servicepac/extProductSelectorWWW.do.

The following table explains warranty service definitions in more detail.

Table 28. 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

Physical and electrical specifications

Dimensions and weight:

- Height: 85 mm (3.36 in)
- Width: 443 mm (17.5 in)
- Depth: 698 mm (27.5 in)
- Weight:

    - Minimum configuration: 21.1 kg (46.5 lb)
    - Maximum configuration: 29.6 kg (65 lb)

Supported environment:

- Air temperature

    - Server on: 10 to 35° C (50 to 95° F); altitude: 0 to 914 m (3,000 ft). Decrease system temperature by 0.75° C for every 1,000-foot increase in altitude.
    - Server off: 5 to 45° C (41 to 113° F)
    - Shipment: -40 to +60° C (-40 to 140° F)

- Humidity

    - Server on: 20 to 80%; maximum dew point 21° C; maximum rate of change 5° C/hr
    - Server off: 8 to 80%; maximum dew point 27° C

- Electrical

    - Models with 675 W power supplies:

        - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 7.8 A
        - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 3.8 A
        - Input kilovolt-amperes (kVA) (approximately):
            - Minimum configuration: 0.12 kVA
            - Maximum configuration: 0.78 kVA

    - Models with 460 W power supplies:

        - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 5.3 A
        - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 2.6 A
        - Input kilovolt-amperes (kVA) (approximately):
            - Minimum configuration: 0.12 kVA
            - Maximum configuration: 0.53 kVA

- BTU output

    - Minimum configuration: 307 Btu/hr (90 watts)
    - Maximum configuration: 2260 Btu/hr (780 watts)

- Noise level

    - 6.5 bels (operating)
    - 6.3 bels (idle)

Regulatory compliance

The server conforms to the following international 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. 69950-1-03
- NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- IEC-60950-1:2001 (CB Certificate and CB Test Report)
- Taiwan BSMI CNS 13438, Class A; CNS 14336
- China CCC (4943-2001), GB 9254-2008 Class A, GB 17625.1:2003
- Korea KN22, Class A; KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22-99, GOST R 51318.24-99, GOST R 51317.3.2-2006, GOST R 51317.3.3-99
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A
- TUV-GS (EN60950-1 /IEC60950-1,EK1-ITB2000)

Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2003 R2 x64 Datacenter Edition Unlimited Virtualization
- Microsoft Windows Server 2003, Web Edition
- Microsoft Windows Server 2003/2003 R2, Datacenter x64 Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise x64 Edition
- Microsoft Windows Server 2003/2003 R2, Standard Edition
- Microsoft Windows Server 2003/2003 R2, Standard x64 Edition
- 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 HPC Server 2008
- Microsoft Windows Small Business Server 2003/2003 R2 Premium Edition
- Microsoft Windows Small Business Server 2003/2003 R2 Standard Edition
- Microsoft Windows Small Business Server 2008 Premium Edition
- Microsoft Windows Small Business Server 2008 Standard Edition
- Red Hat Enterprise Linux 4 AS for x86
- Red Hat Enterprise Linux 4 ES for x86
- Red Hat Enterprise Linux 4 WS/HPC for x86
- Red Hat Enterprise Linux 5 Server 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
- Red Hat Enterprise MRG 1.0 Realtime (x64)
- Solaris 10 Operating System
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for x86
- SUSE LINUX Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 4.0
- VMware ESX 4.1
- VMware ESXi 4.0
- VMware ESXi 4.1

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

Related publications and links

For more information see these resources:

- IBM System x3650 M3 product page
  http://www.ibm.com/systems/x/hardware/rack/x3650m3/index.html

- IBM System x 3650 M3 Installation and User's Guide
  http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5083595

- IBM System x 3650 M3 Problem Determination and Service Guide
  http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5083596

- ServerProven hardware compatibility page for the x3650 M3
  http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/xseries/7945.html

- At-a-glance guides for IBM System x options
  http://www.redbooks.ibm.com/portals/systemx?Open&page=ataglance

- IBM System x DDR3 Memory Configurator
  http://www.ibm.com/systems/x/hardware/ddr3config/

- Configuration and Option Guide
  http://www.ibm.com/systems/xbc/cog/

- xRef - IBM System x Reference Sheets
  http://www.redbooks.ibm.com/xref

- IBM System x Support Portal
  http://ibm.com/support/entry/portal/
  http://ibm.com/support/entry/portal/Downloads/Hardware/Systems/System_x/System_x3650_M3

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