IBM System x3650 M5

IBM Redbooks Product Guide

With the powerful, versatile new 2U two-socket IBM® System x3650 M5 rack server, you can run even more workloads, 24 x 7, and gain faster business insights. Integrated with Intel Xeon processor E5-2600 v3 product family and industry-leading two-socket storage capacity, the x3650 M5 fast forwards your business. You can select from an impressive array of storage configurations (up to 26 drive bays) that optimize diverse workloads from cloud to big data.

Suggested uses: Database, cloud computing and virtualization, enterprise applications, collaboration/email, business analytics and big data, and Microsoft RemoteFX applications.

Figure 1 shows the System x3650 M5.

Figure 1. The System x3650 M5

Did you know?

The x3650 M5 incorporates energy-smart features for minimized costs and efficient performance. Dual fan zones support operation in up to 40°C environments. The 80 PLUS Titanium power supply units (PSUs) can deliver 96% efficiency at 50% load.

The x3650 M5 has outstanding memory performance that is achieved by supporting two-RDIMMs-per-channel configurations at speeds up to 12% faster than the Intel specification, while still maintaining world-class IBM reliability.

IBM System x® servers achieved the highest reliability of any x86 servers; see ITIC 2014-2015 Global Server Hardware, Server OS Reliability Survey:
http://ibm.co/1A25sl8

The x3650 M5 integrates leadership security and reliability. System x Trusted Platform Assurance, an exclusive set of System x features and practices, establishes a foolproof security foundation for your workloads. Enterprise-class data protection is provided with optional self-encrypting drives and simple, centralized key management through IBM Security Key Lifecycle Management. Diagnostic tools facilitate reduced downtime and costs.

Key features

The x3650 M5 is a versatile 2U two-socket business-critical server that offers improved performance and pay-as-you-grow flexibility along with new features that improve server management capability. This powerful system is designed for your most important business applications and cloud deployments.

Combining balanced performance and flexibility, the x3650 M5 is a great choice for small and medium businesses up to the large enterprise. It can provide outstanding uptime to keep business-critical applications and cloud deployments running safely. Ease of use and comprehensive systems management tools help make deployment easier. Outstanding reliability, availability, and serviceability (RAS) and high-efficiency design improve your business environment and help save operational costs.

Scalability and performance

The x3650 M5 offers numerous features to boost performance, improve scalability, and reduce costs:

- Improves productivity by offering superior system performance with up to 18-core processors, up to 45 MB of L3 cache, and up to 9.6 GT/s QPI interconnect links.
- Supports up to two processors, 36 cores, and 72 threads maximize the concurrent execution of multi-threaded applications.
- Intelligent and adaptive system performance with energy efficient Intel Turbo Boost Technology allows CPU cores to run at maximum speeds during peak workloads by temporarily going beyond processor thermal design power (TDP).
- Intel Hyper-Threading Technology boosts performance for multithreaded applications by enabling simultaneous multithreading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better utilize the hardware for virtualization workloads.
- Intel Advanced Vector Extensions 2.0 (AVX 2.0) enable acceleration of enterprise-class workloads such as databases, enterprise resource planning, and others.
- Up to 2133 MHz memory speeds with two DIMMs per channel running at 2133 MHz to help maximize system performance.
- Up to 1.5 TB of memory capacity with 64 GB load-reduced DIMMs, or LRDIMMs (support for 64 GB LRDIMMs is planned for a later date).
- The 12 Gbps SAS internal storage connectivity doubles the data transfer rate compared to 6 Gb SAS solutions to maximize performance of storage I/O-intensive applications.
- Flexible and scalable internal storage configurations provide for up to 86.4 TB of storage capacity in a 2U rack form factor.
- The use of solid-state drives (SSDs) instead of or along with traditional spinning drives (HDDs) can significantly improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- The server has four integrated Gigabit Ethernet ports and optional 10 Gb Ethernet ports with ML2 adapters.
- The server offers up to eight PCI Express (PCIe) 3.0 I/O expansion slots plus one dedicated PCIe 3.0 slot for an internal storage controller in a 2U rack form factor.
- 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 x3650 M5 provides many features to simplify serviceability and increase system uptime:

- Tool-less cover removal provides easy access to upgrades and serviceable parts, such as processors, memory DIMMs, and adapter cards.
- The server offers hot-swap drives supporting RAID redundancy for data protection and greater system uptime.
- The server offers redundant hot-swap power supplies and hot-swap redundant fans to provide availability for business-critical applications.
- The new Next Gen light path diagnostics LCD display panel simplifies servicing, speeds up problem resolution, and helps improve system availability.
- Predictive Failure Analysis (PFA) detects when system components (processors, VRMs, memory, disks, fans, and power supplies) operate outside of standard thresholds and generates proactive alerts in advance of possible failure, therefore increasing uptime.
- Solid-state drives (SSDs) offer significantly better reliability than traditional mechanical HDDs for greater uptime.
- Built-in Integrated Management Module II (IMM2.1) continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failure, 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 are available.

Manageability and security

Powerful systems management features simplify local and remote management of the x3650 M5:

- The server includes an Integrated Management Module II (IMM2.1) to monitor server availability and perform remote management.
- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- IBM Systems Director offers comprehensive systems management tools that help to increase uptime, reduce costs and improve productivity through advanced server management capabilities.
- Two integrated Trusted Platform Modules (TPMs) enable advanced cryptographic functionality such as digital signatures and remote attestation.
- System x Trusted Platform Assurance, an exclusive set of System x security features and practices, establishes a foolproof security foundation for workloads by delivering firmware that is securely built, tested, digitally signed and verified prior to execution.
- The server offers enterprise-class data protection with optional self-encrypting drives and simple, centralized key management through IBM Security Key Lifecycle Management.
- Industry-standard AES NI support offers faster, stronger encryption.
- 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 x3650 M5 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-efficiency power supplies with 80 PLUS Platinum and Titanium certifications.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy the demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.2 V DDR4 memory DIMMs consume up to 20% less energy compared to 1.35 V DDR3 DIMMs.
- Solid-state drives (SSDs) consume less power than traditional spinning HDDs.
- The server uses hexagonal ventilation holes, a part of IBM Calibrated Vectored 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.

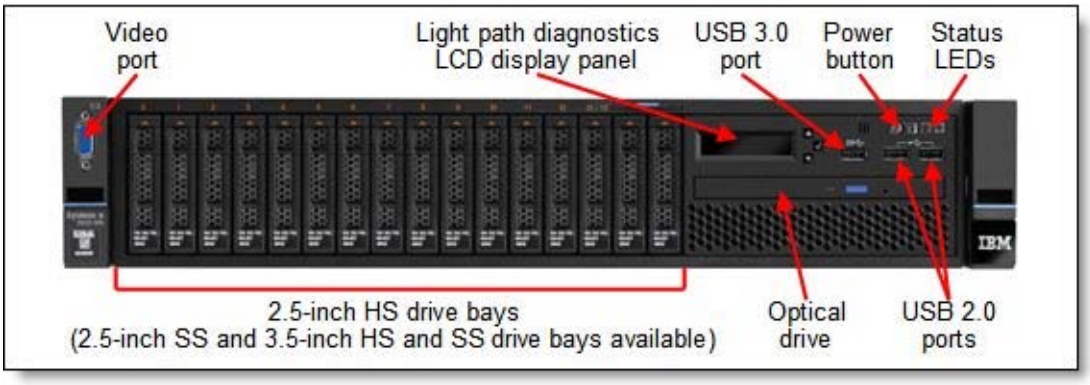

Figure 2. Front view of the System x3650 M5

Figure 3 shows the rear of the server.

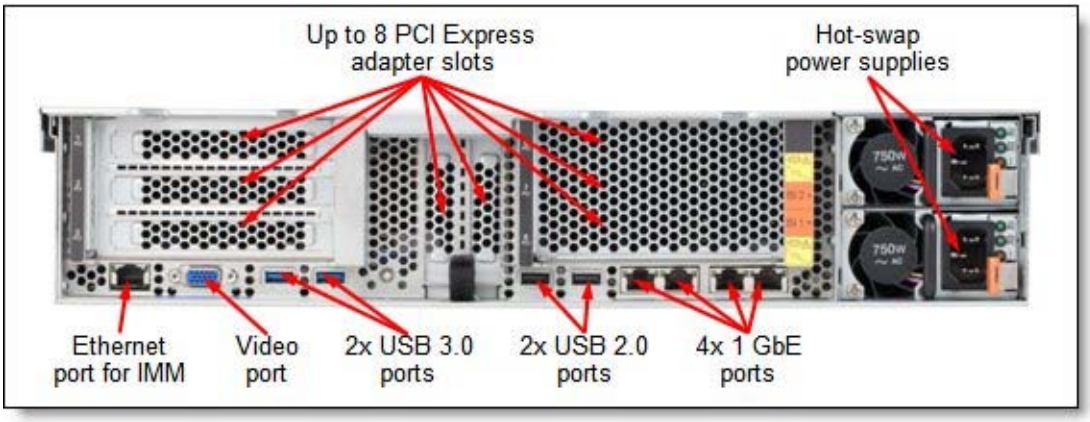

Figure 3. Rear view of the System x3650 M5

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

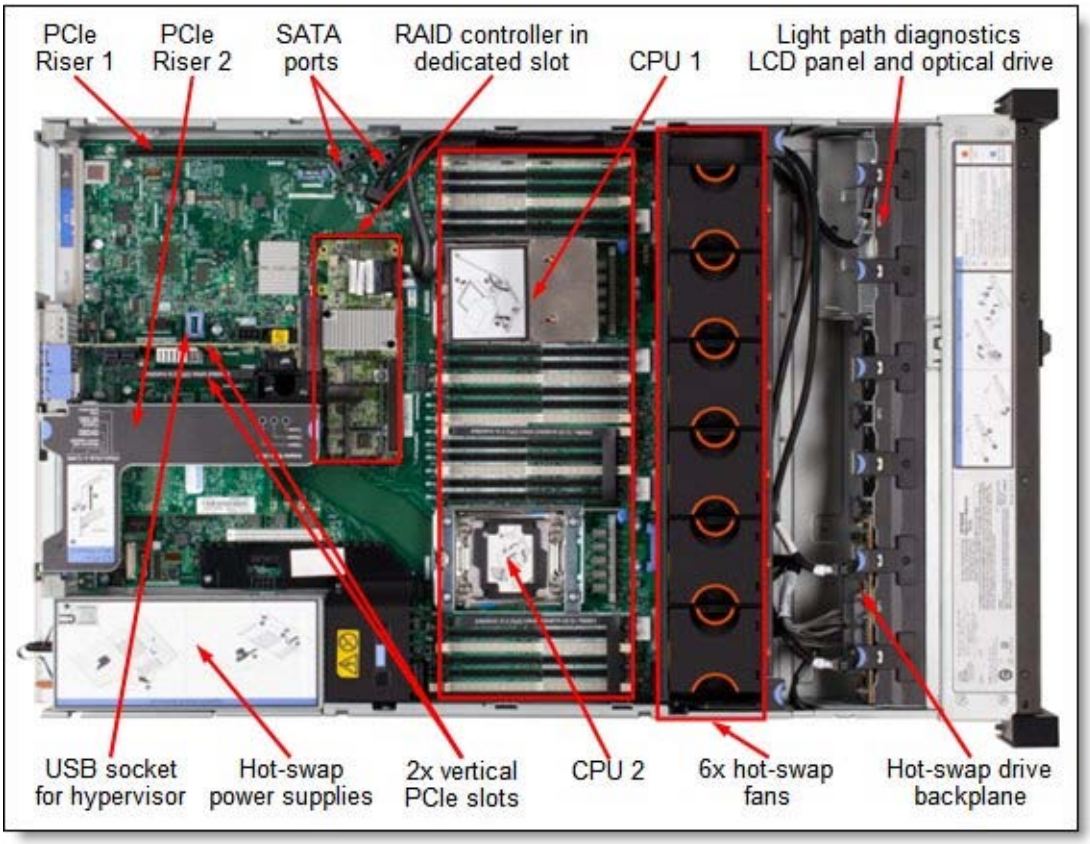

Figure 4. Inside view of the System x3650 M5

Standard specifications

Table 1 lists the standard specifications.

Table 1. Standard specifications (part 1)

Components	Specification
Form factor	2U Rack.
Processor	Up to two Intel Xeon processor E5-2600 v3 product family CPUs with 18 cores (2.3 GHz core speeds) or up to 12 cores (up to 2.6 GHz core speeds). Two QPI links up to 9.6 GT/s each. Up to 2133 MHz memory speed. Up to 45 MB L3 cache.
Chipset	Intel C612.
Memory	Up to 24 DIMM sockets (12 DIMMs per processor). RDIMMs and LRDIMMs are supported. Memory types cannot be intermixed. Memory speed up to 2133 MHz.
Memory maximums	● With RDIMMs: Up to 384 GB with 24x 16 GB RDIMMs and two processors ● With LRDIMMs: Up to 1.5 TB with 24x 64 GB LRDIMMs and two processors (support for 64 GB LRDIMMs is planned for a later date)
Memory protection	ECC, and Chipkill.
Disk drive bays	Up to 26x 2.5" hot-swap SAS/SATA drive bays, or up to 14x 3.5" + 2x 2.5" hot-swap SAS/SATA drive bays, or up to 16x 2.5" Simple Swap SATA bays, or up to 8x 3.5" Simple Swap SATA bays.
Maximum internal storage	Up to 31.2 TB with 1.2 TB 2.5" SAS HDDs, or up to 26 TB with 1 TB 2.5" NL SAS/SATA HDDs, or up to 24.3 TB with 960 GB 2.5" SATA SSDs, or up to 86.4 TB with 6 TB 3.5" NL SAS/SATA HDDs and 1.2 TB 2.5" SAS HDDs. Intermix of SAS/SATA is supported.
Storage controller	● Onboard 6 Gb SATA: no RAID support ● 12 Gb SAS/SATA RAID: RAID 0, 1, 10 with M1215 or M5210. Optional upgrade to RAID 5, 50 is available for M1215. Optional upgrade to RAID 5, 50 is available for M5210 (zero-cache; 1 GB non-backed cache; 1 GB, 2 GB or 4 GB flash-backed cache). Optional upgrade to RAID 6, 60 is available for M5210 with memory cache upgrades. ● 12 Gb SAS/SATA non-RAID: N2215 HBA
Optical drive bays	One for models with 8x 3.5" or up to 16x 2.5" drive bays (models with 24x 2.5" or 12x 3.5" drive bays do not support an internal optical drive). Support for DVD-ROM or Multiburner.
Tape drive bays	None.
Network interfaces	Four integrated RJ-45 Gigabit Ethernet 1000BASE-T ports (BCM5719); optional Mezzanine LOM (ML2) slot for dual-port 10 GbE cards with SFP+ or RJ-45 connectors or quad-port GbE cards with RJ-45 connectors.

Table 1. Standard specifications (part 2)

Components	Specification
PCI Expansion slots	Up to nine slots. Slots 0, 4, and 5 are the standard slots on the system planar, and the remaining slots depend on the riser cards installed. The slots are as follows: ● Slot 0: PCIe 3.0 x8 (dedicated for an internal RAID controller) ● Slot 1: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, full-length (PCIe x16 slot is double-wide) ● Slot 2: PCIe 3.0 x8; full-height, full-length (not present if the slot 1 is PCIe x16) ● Slot 3: PCIe 3.0 x8 or ML2; full-height, half-length ● Slot 4: PCIe 3.0 x8; low profile (vertical slot on system planar) ● Slot 5: PCIe 3.0 x16; low profile (vertical slot on system planar) ● Slot 6: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, full-length (PCIe x16 slot is double-wide) ● Slot 7: PCIe 3.0 x8; full-height, full-length (not present if the slot 6 is PCIe x16) ● Slot 8: PCIe 3.0 x8; full-height, half-length Slots 5, 6, 7, and 8 require the second processor to be installed.
Ports	● Front: 2x USB 2.0, 1x USB 3.0 (8x 3.5" and up to 16x 2.5" drive bay models), and 1x DB-15 video. ● Rear: 2x USB 3.0, 2x USB 2.0, 1x DB-15 video, 1x RJ-45 systems management, 4x RJ-45 GbE network ports. Optional 1x DB-9 serial port. ● Internal: 1x USB port (for embedded hypervisor).
Cooling	IBM Calibrated Vectored Cooling with up to six redundant hot-swap fans (four standard, additional two fans with the second processor); two fan zones with N+1 fan redundancy; each fan has two motors.
Power supply	Up to two redundant hot-swap 550 W, 750 W or 900 W High Efficiency Platinum AC power supplies, or 750 W High Efficiency Titanium AC power supplies.
Video	Matrox G200eR2 with 16 MB memory integrated into the IMM2.1. Maximum resolution is 1600x1200 at 75 Hz with 16 M colors.
Hot-swap parts	Hard drives, power supplies, and fans.
Systems management	UEFI, IBM Integrated Management Module II (IMM2.1) based on Renesas SH7758, Predictive Failure Analysis, light path diagnostics, Automatic Server Restart, IBM ToolsCenter, IBM Systems Director and Active Energy Manager. Optional IBM Integrated Management Module Advanced Upgrade software feature for remote presence.
Security features	Power-on password, administrator's password, two Trusted Platform Modules (TPMs): on the IMM2 (TPM 1.2) and on the host (TPM 1.2/2.0). Optional lockable front bezel.
Operating systems supported	Microsoft Windows Server 2012 R2, 2012 and 2008 R2, Red Hat Enterprise Linux 6 and 7, SUSE Linux Enterprise Server 11, VMware vSphere (ESXi) 5.1 and 5.5.
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5 next business day (NBD).
Service and support	Optional service upgrades are available through IBM ServicePac®: Four-hour or two-hour response time, eight-hour fix time, one-year or two-year warranty extension, remote technical support for IBM hardware and some IBM and third-party applications.
Dimensions	Height: 86.5 mm (3.4 in), width: 445.6 mm (17.5 in), depth: 800 mm (31.5 in)
Weight	Minimum configuration: 19 kg (42 lb), maximum: 34 kg (75 lb)

The x3650 M5 servers include the following items:

- Statement of Limited Warranty
- Important Notices
- Rack Installation Instructions
- Documentation CD that contains the *Installation and User's Guide*
- System x Enterprise Slides Kit
- 2.8 m C13-C14 power cord (one for models with one power supply and two for models with two power supplies)

Note: Cable Management Arm (CMA) is not included. See the "Rack options" section for ordering information.

Standard models

Table 2 lists the standard models of the x3650 M5.

Table 2. Standard models

MTM#	Intel Xeon processor† (2 maximum)	Memory (RDIMMs)	RAID	Drive bays (std / max)	Drives	Onboard NIC	I/O slots (std / max)*	Optical drive	Power supply (std / max)
Models announced September 2014									
5462-A2x	1x E5-2603 v3 6C 1.6GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	Onboard 6Gb SATA (no RAID)	8x 2.5" SS / 16	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-B2x	1x E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	Onboard 6Gb SATA (no RAID)	8x 3.5" SS / 8	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-C2x	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	1x 16GB 2133MHz§	M1215	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-C4x	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	1x 16GB 2133MHz§	M1215	8x 3.5" HS / 10	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-D2x	1x E5-2630 v3 8C 2.4GHz 20MB 1866MHz 85W	1x 16GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-D4x	1x E5-2630 v3 8C 2.4GHz 20MB 1866MHz 85W	1x 16GB 2133MHz§	M5210 1GB Flash	12x 3.5" HS / 16‡	Open bay	4x GbE	3 / 9	None	1x 750 W HS / 2
5462-52x	1x E5-2630L v3 8C 1.8GHz 20MB 1866MHz 55W	1x 16GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-F2x	1x E5-2640 v3 8C 2.6GHz 20MB 1866MHz 90W	1x 16GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-F4x	1x E5-2640 v3 8C 2.6GHz 20MB 1866MHz 90W	1x 16GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 26	Open bay	4x GbE	3 / 9	None	1x 750 W HS / 2
5462-G2x	1x E5-2650 v3 10C 2.3GHz 25MB 2133MHz 105W	1x 16GB 2133MHz	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 750 W HS / 2
5462-62x	1x E5-2670 v3 12C 2.3GHz 30MB 2133MHz 120W	1x 16GB 2133MHz	M5210 2GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 750 W HS / 2
5462-J2x	1x E5-2680 v3 12C 2.5GHz 30MB 2133MHz 120W	1x 16GB 2133MHz	M5210 2GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 900 W HS / 2
5462-L2x	1x E5-2690 v3 12C 2.6GHz 30MB 2133MHz 135W	1x 16GB 2133MHz	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 900 W HS / 2
5462-M2x	1x E5-2699 v3 18C 2.3GHz 45MB 2133MHz 145W	1x 16GB 2133MHz	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 750 W HS / 2

The letter "x" in the Machine Type Model (MTM) represents a country-specific letter (for example, the EMEA MTM is 5462-A2G, and the US MTM is 5462-A2U). Ask an IBM representative for specifics.
† Processor detail: Processor quantity and model, cores, core speed, L3 cache, memory speed, TDP.
* With one processor, only two standard PCIe slots (Slots 0 and 4) can be used (Slot 5 requires the second processor). If a RAID controller is present, it occupies one of the standard PCIe slots (Slot 0).
§ For these models, the standard DIMM is rated at 2133 MHz, but operates at a lower speed to match the processor memory speed. Actual memory speed maximums depend on several factors, described in the "Memory options" section.
‡ The maximum number of the drive bays (16) include 14x 3.5" HS bays and 2x 2.5" HS bays.

See the Specifications section for information about standard features of the server.

Express models

Table 3 lists the express models of the x3650 M5.

Table 3. Express models (Part 1: United States, Canada, Latin America)

MTM	Intel Xeon processor† (2 maximum)	Memory (RDIMMs)	RAID	Drive bays (std / max)	Drives	Onboard NIC	I/O slots (std / max)*	Optical drive	Power supply (std / max)
United States, Canada									
5462-EAU	1x E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-EFU	2x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	2x 16GB 2133MHz§	M5210 2GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	2x 550 W HS / 2
5462-EBU	1x E5-2630 v3 8C 2.4GHz 20MB 1866MHz 85W	1x 16GB 2133MHz§	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-ECU	1x E5-2640 v3 8C 2.6GHz 20MB 1866MHz 90W	1x 16GB 2133MHz§	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-EDU	1x E5-2650 v3 10C 2.3GHz 25MB 2133MHz 105W	1x 16GB 2133MHz	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 750 W HS / 2
5462-EGU	2x E5-2650 v3 10C 2.3GHz 25MB 2133MHz 105W	4x 16GB 2133MHz	M5210 4GB Flash	16x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	2x 750 W HS / 2
5462-EEU	1x E5-2670 v3 12C 2.3GHz 30MB 2133MHz 120W	1x 16GB 2133MHz	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 750 W HS / 2
Latin America									
5462-ENU	1x E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-EOU	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-EPU	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	2x 300GB 10K	4x GbE	3 / 9	Multi burner	2x 550 W HS / 2
5462-EQU	1x E5-2630 v3 8C 2.4GHz 20MB 1866MHz 85W	1x 16GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-ERU	2x E5-2650 v3 10C 2.3GHz 25MB 2133MHz 105W	2x 16GB 2133MHz	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	2x 750 W HS / 2
5462-ESU	1x E5-2670 v3 12C 2.3GHz 30MB 2133MHz 120W	1x 16GB 2133MHz	M5210 2GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 750 W HS / 2

† Processor detail: Processor quantity and model, cores, core speed, L3 cache, memory speed, TDP.
§ For these models, the standard DIMM is rated at 2133 MHz, but operates at a lower speed to match the processor memory speed. Actual memory speed maximums depend on several factors, described in the "Memory options" section.
* With one processor, only two standard PCIe slots (Slots 0 and 4) can be used (Slot 5 requires the second processor). If a RAID controller is present, it occupies one of the standard PCIe slots (Slot 0).

Table 3. Express models (Part 2: Asia Pacific, Japan, Europe, Middle East and Africa)

MTM	Intel Xeon processor† (2 maximum)	Memory (RDIMMs)	RAID	Drive bays (std / max)	Drives	Onboard NIC	I/O slots (std / max)*	Optical drive	Power supply (std / max)
Asia Pacific (Australia and New Zealand only)									
5462-EHM	1x E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M1215	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-EIM	1x E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	2x 300GB 10K	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-EJM	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	2x 8GB 2133MHz§	M1215	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-EKM	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	2x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	2x 300GB 10K	4x GbE	3 / 9	Multi burner	1x 750 W HS / 2
5462-ELM	1x E5-2630 v3 8C 2.4GHz 20MB 1866MHz 85W	2x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 750 W HS / 2
5462-EMM	2x E5-2650 v3 10C 2.3GHz 25MB 2133MHz 105W	2x 16GB 2133MHz	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	2x 750 W HS / 2
Japan									
5462-E7J	1x E5-2603 v3 6C 1.6GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-E8J	1x E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-E9J	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
Europe, Middle East and Africa									
5462-E1G	1x E5-2603 v3 6C 1.6GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-E2G	1x E5-2609 v3 6C 1.9GHz 15MB 1600MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Optional	1x 550 W HS / 2
5462-E3G	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	1x 8GB 2133MHz§	M5210	8x 2.5" HS / 18	2x 300GB 10K	4x GbE	3 / 9	Multi burner	2x 550 W HS / 2
5462-E4G	1x E5-2620 v3 6C 2.4GHz 15MB 1866MHz 85W	1x 8GB 2133MHz§	M5210	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-E5G	1x E5-2630 v3 8C 2.4GHz 20MB 1866MHz 85W	1x 8GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 550 W HS / 2
5462-E6G	1x E5-2640 v3 8C 2.6GHz 20MB 1866MHz 90W	1x 16GB 2133MHz§	M5210 1GB Flash	8x 2.5" HS / 18	Open bay	4x GbE	3 / 9	Multi burner	1x 750 W HS / 2

† Processor detail: Processor quantity and model, cores, core speed, L3 cache, memory speed, TDP.
§ For these models, the standard DIMM is rated at 2133 MHz, but operates at a lower speed to match the processor memory speed. Actual memory speed maximums depend on several factors, described in the "Memory options" section.
* With one processor, only two standard PCIe slots (Slots 0 and 4) can be used (Slot 5 requires the second processor). If a RAID controller is present, it occupies one of the standard PCIe slots (Slot 0).

Processor options

The x3650 M5 supports processor options listed in Table 4. The server supports up to two processors. This table shows which server models have each processor as standard. If no corresponding "where used" model exists for a particular processor, this processor is available only through CTO. Second processor options include two extra cooling fans.

Table 4. Processor options

Part number	Feature codes*	Description	Standard models where used
00FK640	A5EB / A5EG	Intel Xeon Processor E5-2603 v3 6C 1.6GHz 15MB Cache 1600MHz 85W	A2x
00FK641	A5EC / A5EH	Intel Xeon Processor E5-2609 v3 6C 1.9GHz 15MB Cache 1600MHz 85W	B2x
00FK642	A5ED / A5EJ	Intel Xeon Processor E5-2620 v3 6C 2.4GHz 15MB Cache 1866MHz 85W	C2x, C4x
00FK643	A5EE / A5EK	Intel Xeon Processor E5-2630 v3 8C 2.4GHz 20MB Cache 1866MHz 85W	D2x, D4x
00FK655	A5EF / A5ES	Intel Xeon Processor E5-2630L v3 8C 1.8GHz 20MB Cache 1866MHz 55W	52x
00FK644	A5GT / A5EL	Intel Xeon Processor E5-2640 v3 8C 2.6GHz 20MB Cache 1866MHz 90W	F2x, F4x
00FK645	A5GU / A5EM	Intel Xeon Processor E5-2650 v3 10C 2.3GHz 25MB Cache 2133MHz 105W	G2x
00FK647	A5GV / A5EN	Intel Xeon Processor E5-2670 v3 12C 2.3GHz 30MB Cache 2133MHz 120W	62x
00FK648	A5GW / A5EP	Intel Xeon Processor E5-2680 v3 12C 2.5GHz 30MB Cache 2133MHz 120W	J2x
00FK649	A5GX / A5EQ	Intel Xeon Processor E5-2690 v3 12C 2.6GHz 30MB Cache 2133MHz 135W	L2x
00KF372	ARYJ / ARYT	Intel Xeon Processor E5-2699 v3 18C 2.3GHz 45MB Cache 2133MHz 145W	M2x

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

Memory options

The System x3650 M5 supports IBM TruDDR4 memory. IBM TruDDR Memory uses the highest quality components sourced from Tier 1 DRAM suppliers and only memory that meets our strict requirements is selected. It is compatibility tested and tuned on every IBM System x server to maximize performance and reliability. IBM TruDDR4 Memory has a unique signature programmed into the DIMM that enables IBM System x servers to verify whether the memory installed is qualified or supported by IBM. Because the IBM TruDDR4 Memory is authenticated, certain extended memory performance features can be enabled to extend performance over industry standards. From a service and support standpoint, IBM memory automatically assumes the IBM system warranty, and IBM provides service and support worldwide.

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; there are three DIMMs per channel.

The following rules apply when selecting the memory configuration:

- The server supports RDIMMs and LRDIMMs.
- Mixing types of memory (RDIMMs and LRDIMMs) is not supported.
- The maximum quantity of DIMMs that can be installed in the server depends on the number of processors.
- All DIMMs in the server operate at the same speed, which is determined as the lowest value of these:
  - Memory speed that is supported by the specific processor.
  - Lowest of maximum operating speeds for selected memory configuration that depends on quantity of DIMMs per channel, as shown under "Maximum operating speed" section in Table 5.

The following memory protection technologies are supported:

- ECC
- Chipkill (for x4-based memory DIMMs)

Chipkill works only in independent channel mode (the default is operational mode) and supports only x4-based memory DIMMs.

Table 5 shows the characteristics of the supported DIMMs. Tables cells highlighted with a gray background indicate when the number of DIMMs per channel still allows the DIMMs to operate at a rated speed.

Table 5. Maximum memory speeds

DIMM specification	**RDIMM**			**LRDIMM**
Rank	Single rank	Dual rank		Quad rank
Part numbers	46W0784 (4 GB) 46W0788 (8 GB)	46W0792 (8 GB)	46W0796 (16 GB)	46W0800 (32 GB) 95Y4812 (64 GB)*
Rated speed	2133 MHz	2133 MHz	2133 MHz	2133 MHz
Rated voltage	1.2 V	1.2 V	1.2 V	1.2 V
Maximum quantity supported**	24	24	24	24
Maximum DIMM capacity	8 GB	8 GB	16 GB	64 GB
Maximum memory capacity	192 GB	192 GB	384 GB	1.5 TB
Maximum memory at rated speed	64 GB	64 GB	256 GB	512 GB
Maximum operating speed				
1 DIMM per channel	2133 MHz	2133 MHz	2133 MHz	2133 MHz
2 DIMMs per channel	1866 MHz	1866 MHz	2133 MHz	2133 MHz
3 DIMMs per channel	1600 MHz	1600 MHz	1600 MHz	1600 MHz

* Support for 64 GB LRDIMMs is planned for a later date.
** The maximum quantity that is supported is shown for two processors installed.

Table 6 lists available memory options for the x3650 M5 server.

Table 6. Memory options

Part number	Feature code	Description	Maximum supported	Standard models where used
RDIMMs - 2133 MHz				
46W0784	A5B6	4GB TruDDR4 Memory (1Rx8, 1.2V) PC4-17000 CL15 2133MHz LP RDIMM	24 (12 per CPU)	-
46W0788	A5B5	8GB TruDDR4 Memory (1Rx4, 1.2V) PC4-17000 CL15 2133MHz LP RDIMM	24 (12 per CPU)	-
46W0792	A5B8	8GB TruDDR4 Memory (2Rx8, 1.2V) PC4-17000 CL15 2133MHz LP RDIMM	24 (12 per CPU)	A2x, B2x
46W0796	A5B7	16GB TruDDR4 Memory (2Rx4, 1.2V) PC4-17000 CL15 2133MHz LP RDIMM	24 (12 per CPU)	52x, 62x, C2x, C4x, D2x, D4x, F2x, F4x, G2x, J2x, L2x, M2x
LRDIMMs - 2133 MHz				
46W0800	A5B9	32GB TruDDR4 Memory (4Rx4, 1.2V) PC417000 CL15 2133MHz LP LRDIMM	24 (12 per CPU)	-
95Y4812*	A5UK	64GB TruDDR4 Memory (4Rx4,1.2V) PC4-17000 CL15 2133MHz LP LRDIMM	24 (12 per CPU)	-

* Support for 64 GB LRDIMMs is planned for a later date.

Internal storage

The System x3650 M5 server supports the following configurations:

1. 8x 2.5-inch SAS/SATA hot-swap drive bay storage dense server models that can be upgraded to 26 (24 on the front; 2 on the rear) 2.5-inch SAS/SATA hot-swap drive bays
2. 8x 2.5-inch SAS/SATA hot-swap drive bay server models that can be upgraded to 18 (16 on the front; 2 on the rear) 2.5-inch SAS/SATA hot-swap drive bays
3. 8x 2.5-inch SATA Simple Swap drive bay server models that can be upgraded to 16x 2.5-inch SATA Simple Swap drive bays
4. 8x 3.5-inch SAS/SATA hot-swap drive bay server models that can be upgraded to 10 (8 on the front; 2 on the rear) 3.5-inch SAS/SATA hot-swap drive bays or 8x 3.5-inch plus 2x 2.5-inch SAS/SATA hot-swap drive bays (for a total of 10 drive bays)
5. 8x 3.5-inch SATA Simple Swap drive bay server models
6. 12x 3.5-inch SAS/SATA hot-swap drive bay server models that can be upgraded to 14 (12 on the front; 2 on the rear) 3.5-inch SAS/SATA hot-swap drive bays plus 2x 2.5-inch SAS/SATA hot-swap drive bays (for a total of 16 drive bays)

Figure 5 shows these base configurations.

Figure 5. Internal drive configurations

Table 7 shows the internal storage options available for the x3650 M5 server.

Table 7. Internal storage options

Part number	Feature code	Description	Maximum supported	Standard models where used
Base drive kits (factory installed)*				
None*	A5G6	x3650 M5 8x 2.5" HS HDD Assembly Kit (Single RAID)	1	52x, 62x, C2x, D2x, F2x, F4x, G2x J2x, L2x
None*	A5GF	x3650 M5 16x 2.5" HS HDD Assembly Kit (Single RAID)	1	-
None*	A5GG	x3650 M5 16x 2.5" HS HDD Assembly Kit (Dual RAID)	1	-
None*	A5G7	x3650 M5 24x 2.5" HS HDD Assembly Kit (Single RAID)	1	-
None*	A5TN	x3650 M5 24x 2.5" HS HDD Assembly Kit (Dual RAID)	1	-
None*	A5G8	x3650 M5 24x 2.5" HS HDD Assembly Kit (Triple RAID)	1	-
None*	A5G9	x3650 M5 8x 2.5" SS HDD Assembly Kit (non-RAID)	1	A2x
00MU147	A5GB	x3650 M5 8x 2.5" SS HDD ServeRAID Assembly Kit	1	-
None*	A5GD	x3650 M5 8x 3.5" HS HDD Assembly Kit	1	C4x
None*	A5GE	x3650 M5 12x 3.5" HS HDD Assembly Kit	1	D4x
None*	A5GA	x3650 M5 8x 3.5" SS HDD Assembly Kit (non-RAID)	1	B2x
00MU148	A5GC	x3650 M5 8x 3.5" SS HDD ServeRAID Assembly Kit	1	-
None*	A5GH	System x3650 M5 Rear 2x 2.5" HDD Kit (Independent RAID)	1	-
None*	A5GL	System x3650 M5 Rear 2x 3.5" HDD Kit (Cascaded)	1	-
None*	A5GK	System x3650 M5 Rear 2x 3.5" HDD Kit (Independent RAID)	1	-
Upgrade drive kits (require the base drive kit)**				
00FK661	AS44	System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit with Expander	2	-
00FK676	AS45	System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit	2	-
00MU147	A5GB	x3650 M5 8x 2.5" SS HDD ServeRAID Assembly Kit	1	-
00MU148	A5GC	x3650 M5 8x 3.5" SS HDD ServeRAID Assembly Kit	1	-
00FK658	AS42	System x3650 M5 Rear 2x 2.5" HDD Kit	1	-
00FK659	AS43	System x3650 M5 Rear 2x 3.5" HDD Kit	1	-

* Base drive kits are always factory-installed in either standard or custom (CTO or Special Bid) models, and they might not have an option part number assigned.
** Upgrade drive kits can be installed as a field upgrade for supported standard or custom models.

Note: The Rear 2.5" HDD Kit is installed in place of the PCIe Riser Card 1, and PCIe slots 1, 2 and 3 are not present. The kit includes special riser that provides PCIe 3.0 x8 slot 3 for the M1215 RAID controller that is dedicated to rear 2.5-inch drives. The Rear 3.5" HDD Kit is installed in place of PCIe Riser Card 2; PCIe slots 6, 7, and 8 are not present. See the "I/O expansion options" section for more information.

Table 8 lists possible factory-installed internal storage configurations and field upgrades.

Table 8. Internal storage configurations (FC=Feature Code, PN=Part Number, qty=quantity) (Part 1)

Drive bay type	Drive bay qty	Storage controller*	Drive kits required
Front drive bays			
2.5-inch SAS/SATA hot-swap (front)	8	• 1x RAID or HBA (8 drives)	Factory installed • 1x x3650 M5 8x 2.5" HS HDD Assembly Kit (Single RAID) (FC A5G6)
	16	• 1x RAID or HBA (16 drives)	Factory installed • 1x x3650 M5 16x 2.5" HS HDD Assembly Kit (Single RAID) (FC A5GF) Field upgrade for 8x 2.5-inch HS drive bay models: • 1x System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit with Expander (PN 00FK661)
		• 2x RAID or HBA (8+8 drives)	Factory installed • 1x x3650 M5 16x 2.5" HS HDD Assembly Kit (Dual RAID) (FC A5GG) Field upgrade for 8x 2.5-inch HS drive bay models: • 1x System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit (PN 00FK676)
	24	• 1x RAID or HBA (24 drives)	Factory installed • 1x x3650 M5 24x 2.5" HS HDD Assembly Kit (Single RAID) (FC A5G7) Field upgrade for 16 (8+8)x 2.5-inch HS drive bay models: • 1x System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit with Expander (PN 00FK661)
		• 2x RAID or HBA (16+8 drives)	Factory installed • 1x x3650 M5 24x 2.5" HS HDD Assembly Kit (Dual RAID) (FC A5TN) Field upgrade for 16 (8+8)x 2.5-inch HS drive bay models: • 1x System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit with Expander (PN 00FK661) Field upgrade for 16 (16)x 2.5-inch HS drive bay models: • 1x System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit (PN 00FK676)
		• 3x RAID or HBA (8+8+8 drives)	Factory installed • 1x x3650 M5 24x 2.5" HS HDD Assembly Kit (Triple RAID) (FC A5G8) Field upgrade for 16 (8+8)x 2.5-inch HS drive bay models: • 1x System x3650 M5 Plus 8x 2.5" HS HDD Assembly Kit (PN 00FK676)

Table 8. Internal storage configurations (FC=Feature Code, PN=Part Number, qty=quantity) (Part 2)

Drive bay type	Drive bay qty	Storage controller*	Drive kits required
2.5-inch SATA Simple Swap (front)	8	• Integrated 8-port 6 Gbps SATA (8 drives; no RAID support)	Factory installed • 1x x3650 M5 8x 2.5" SS HDD Assembly Kit (non-RAID) (FC A5G9)
		• 1x RAID or HBA (8 drives)	Factory installed • 1x x3650 M5 8x 2.5" SS HDD ServeRAID Assembly Kit (FC A5GB) Field upgrade for 8x 2.5-inch SS drive bay models without RAID or HBA: • 1x x3650 M5 8x 2.5" SS HDD ServeRAID Assembly Kit (PN 00MU147)
	16	• 2x RAID or HBA (8+8 drives)	Factory installed • 2x x3650 M5 8x 2.5" SS HDD ServeRAID Assembly Kit (FC A5GB) Field upgrade for 8x 2.5-inch SS drive bay models with RAID or HBA: • 1x x3650 M5 8x 2.5" SS HDD ServeRAID Assembly Kit (PN 00MU147)
3.5-inch SAS/SATA hot-swap (front)	8	• 1x RAID or HBA (8 drives)	Factory installed • 1x x3650 M5 8x 3.5" HS HDD Assembly Kit (FC A5GD)
	12	• 1x RAID or HBA (12 drives)	Factory installed • 1x x3650 M5 12x 3.5" HS HDD Assembly Kit (FC A5GE)
3.5-inch SATA Simple Swap (front)	8	• Integrated 8-port 6 Gbps SATA (no RAID support)	Factory installed • 1x x3650 M5 8x 3.5" SS HDD Assembly Kit (non-RAID) (FC A5GA)
		• 1x RAID or HBA (8 drives)	Factory installed • 1x x3650 M5 8x 3.5" SS HDD ServeRAID Assembly Kit (FC A5GC) Field upgrade for 8x 3.5-inch SS drive bay models without RAID or HBA: • 1x x3650 M5 8x 3.5" SS HDD ServeRAID Assembly Kit (PN 00MU148)

Table 8. Internal storage configurations (FC=Feature Code, PN=Part Number, qty=quantity) (Part 3)

Drive bay type	Drive bay qty	Storage controller*	Drive kits required
Rear drive bays			
2.5-inch SAS/SATA hot-swap (rear)	2	• 1x M1215 (2 drives)	Factory installed • 1x System x3650 M5 Rear 2x 2.5" HDD Kit (Independent RAID) (FC A5GH) Field upgrade for 2.5-inch and 3.5-inch HS drive bay models: • 1x System x3650 M5 Rear 2x 2.5" HDD Kit (PN 00FK658)
3.5-inch SAS/SATA hot-swap (rear)	2	• 1x RAID or HBA (12+2 drives)**	Factory installed • 1x System x3650 M5 Rear 2x 3.5" HDD Kit (Cascaded) (FC A5GL) Field upgrade for 3.5-inch HS drive bay models: • 1x System x3650 M5 Rear 2x 3.5" HDD Kit (PN 00FK659)
		• 1x M1215 (2 drives)	Factory installed • 1x System x3650 M5 Rear 2x 3.5" HDD Kit (Independent RAID) (FC A5GK) Field upgrade for 3.5-inch HS drive bay models: • 1x System x3650 M5 Rear 2x 3.5" HDD Kit (PN 00FK659)

* In the Storage controller column, RAID or HBA means that any combination of the M1215, M5210, and N2215 storage controllers is supported up to a maximum quantity listed; the numbers in brackets (x+y+z) specify the number of drives connected to each of the storage controllers.
** Two drives in the 2x 3.5-inch Rear HDD Kit are connected to the SAS expander on the 12-drive backplane, that is, to the same storage controller as 12 drives on the front.

The following additional rules apply to the storage configurations:

- 24x 2.5-inch drives are supported on storage dense models only (models without the System x3650 M5 2.5" ODD/LCD Light Path Bay, FC A5FY; the first configuration in Figure 5).
- 2x 2.5-inch rear drives are supported on 2.5-inch and 3.5-inch hot-swap drive bay models.
  - If the 2x 3.5-inch Rear HDD Kit is installed and connected to a dedicated controller, the 2x 2.5-inch Rear HDD Kit cannot be installed.
- 2x 3.5-inch rear drives are supported on 3.5-inch hot-swap drive bay models only.
  - With 8x 3.5-inch HS drive bay models, the 2x 3.5-inch Rear HDD Kit is connected to a dedicated M1215 controller, and the 2x 2.5-inch Rear HDD Kit cannot be installed.
  - With 12x 3.5-inch HS drive bay models, the 2x 3.5-inch Rear HDD Kit can be connected to a dedicated M1215 controller or SAS expander on the 12-drive backplane. If the 2x 3.5-inch Rear HDD Kit is connected to a dedicated M1215 controller, the 2x 2.5-inch Rear HDD Kit cannot be installed. If the 2x 3.5-inch Rear HDD Kit is connected to a SAS expander, the 2x 2.5-inch Rear HDD Kit can be installed.
- Both 2.5-inch and 3.5-inch Rear HDD Kits are not supported on Simple Swap models.

Controllers for internal storage

Table 9 lists the RAID controllers and additional options used for internal disk storage of x3650 M5 server.

Table 9. RAID controllers and HBAs for internal storage

Part number	Feature code	Description	Maximum supported	Standard models where used
12 Gb SAS/SATA controllers				
46C9110	A3YZ	ServeRAID M5210 SAS/SATA Controller	3	62x, D2x, D4x, F2x, F4x, G2x, J2x, L2x, M2x
46C9114	A45W	ServeRAID M1215 SAS/SATA Controller	4	C2x, C4x
47C8675	A3YY	N2215 SAS/SATA HBA	3	-
Hardware upgrades for the M5210				
47C8656	A3Z0	ServeRAID M5200 Series 1GB Cache/RAID 5 Upgrade	3	-
47C8660	A3Z1	ServeRAID M5200 Series 1GB Flash/RAID 5 Upgrade	3	D2x, D4x, F2x, F4x, G2x
47C8664	A3Z2	ServeRAID M5200 Series 2GB Flash/RAID 5 Upgrade	3	62x, J2x
47C8668	A3Z3	ServeRAID M5200 Series 4GB Flash/RAID 5 Upgrade	3	-
Features on Demand upgrades for the M5210*				
47C8708	A3Z6	ServeRAID M5200 Series Zero Cache/RAID 5 Upgrade	1	-
47C8706	A3Z5	ServeRAID M5200 Series RAID 6 Upgrade	1**	-
47C8710	A3Z7	ServeRAID M5200 Series Performance Accelerator	1**	-
47C8712	A3Z8	ServeRAID M5200 Series SSD Caching Enabler	1**	-
Features on Demand upgrades for the M1215*				
00AE930	A5H5	ServeRAID M1200 Zero Cache/RAID 5 Upgrade for IBM Systems FOD	1	-

* Features on Demand (FoD) upgrades for ServeRAID adapters are applied system-wide, that is one FoD upgrade is required to activate the feature on all RAID controllers of the same type installed in the server.
** Requires cache memory upgrade (47C8656, 47C8660, 47C8664, or 47C8668).

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

- Eight internal 12 Gbps SAS/SATA ports
- Up to 12 Gbps throughput per port
- Two internal mini-SAS HD connectors (SFF-8643)
- Supports connections to SAS/SATA HDDs and SSDs
- LSI SAS3008 12 Gbps RAID on Chip (ROC) controller
- Support for RAID levels 0, 1, and 10 standard; support for RAID 5, 50 with optional FoD upgrade
- Zero Controller Cache, no battery/flash backup
- Optional support for self-encrypting drives (SEDs) with MegaRAID SafeStore (with RAID 5 upgrade)
- Fixed stripe size of 64 KB

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

- Eight internal 12 Gbps SAS/SATA ports
- Up to 12 Gbps throughput per port
- Two x4 HD mini-SAS internal connectors (SFF-8643)
- Supports connections to SAS/SATA HDDs and SSDs and SAS Expanders
- Supports RAID 0, 1, and 10
- Supports RAID 5 and 50 with optional M5200 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5200 Series RAID 6 upgrade
- Optional support for self-encrypting drives (SEDs) with MegaRAID SafeStore (with RAID 5 upgrade)
- Supports 1 GB non-backed cache or 1 GB, 2 GB or 4 GB flash-backed cache
- PCIe 3.0 x8 host interface
- Based on the LSI SAS3108 12 Gbps ROC controller

The IBM N2215 SAS/SATA HBA has the following specifications:

- Eight internal 12 Gbps SAS/SATA ports
- Up to 12 Gbps throughput per port
- Two x4 HD mini-SAS internal connectors (SFF-8643)
- Supports connections to SAS/SATA HDDs and SSDs
- Optimized for SSD performance
- No RAID support
- PCIe 3.0 x8 host interface
- Based on the LSI SAS3008 12 Gbps controller

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

Internal drive options

Table 10 lists drive options.

Table 10. Drive options for internal disk storage (Part 1)

Part number	Feature code	Description	Maximum supported
3.5-inch hot-swap HDDs - NL SAS			
00FN188	A5VP	IBM 2TB 7.2K 12Gbps NL SAS 3.5" G2HS 512e HDD	14
00FN208	A5VQ	IBM 4TB 7.2K 12Gbps NL SAS 3.5" G2HS 512e HDD	14
00FN228	A5VR	IBM 6TB 7.2K 12Gbps NL SAS 3.5" G2HS 512e HDD	14
3.5-inch hot-swap SEDs - NL SAS			
00FN238	A5VS	IBM 2TB 7.2K 12Gbps NL SAS 3.5" G2HS 512e SED	14
00FN248	A5VT	IBM 4TB 7.2K 12Gbps NL SAS 3.5" G2HS 512e SED	14
00FN258	A5VU	IBM 6TB 7.2K 12Gbps NL SAS 3.5" G2HS 512e SED	14
3.5-inch hot-swap HDDs - NL SATA			
00FN113	A5VD	IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2HS 512e HDD	14
00FN128	A5VF	IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2HS 512e HDD	14
00FN143	A5VH	IBM 4TB 7.2K 6Gbps NL SATA 3.5" G2HS 512e HDD	14
00FN158	A5VK	IBM 5TB 7.2K 6Gbps NL SATA 3.5" G2HS 512e HDD	14
00FN173	A5VM	IBM 6TB 7.2K 6Gbps NL SATA 3.5" G2HS 512e HDD	14
3.5-inch simple-swap HDDs - NL SATA			
00FN118	A5VE	IBM 2TB 7.2K 6Gbps NL SATA 3.5" G2SS 512e HDD	8
00FN133	A5VG	IBM 3TB 7.2K 6Gbps NL SATA 3.5" G2SS 512e HDD	8
00FN148	A5VJ	IBM 4TB 7.2K 6Gbps NL SATA 3.5" G2SS 512e HDD	8
00FN163	A5VL	IBM 5TB 7.2K 6Gbps NL SATA 3.5" G2SS 512e HDD	8
00FN178	A5VN	IBM 6TB 7.2K 6Gbps NL SATA 3.5" G2SS 512e HDD	8

Table 10. Drive options for internal disk storage (Part 2)

Part number	Feature code	Description	Maximum supported
2.5-inch hot-swap 10K HDDs - SAS			
00AJ096	A4TL	IBM 300GB 10K 6Gbps SAS 2.5" G3HS HDD	26
00AJ091	A4TM	IBM 600GB 10K 6Gbps SAS 2.5" G3HS HDD	26
00AJ071	A4TN	IBM 900GB 10K 6Gbps SAS 2.5" G3HS HDD	26
00AJ146	A4TP	IBM 1.2TB 10K 6Gbps SAS 2.5" G3HS HDD	26
2.5-inch hot-swap 15K HDDs - SAS			
00AJ081	A4TR	IBM 300GB 15K 6Gbps SAS 2.5" G3HS HDD	26
00AJ126	A4TS	IBM 600GB 15K 6Gbps SAS 2.5" G3HS HDD	26
2.5-inch hot-swap HDDs - NL SAS			
00AJ121	A4TT	IBM 500GB 7.2K 6Gbps NL SAS 2.5" G3HS HDD	26
00AJ086	A4TU	IBM 1TB 7.2K 6Gbps NL SAS 2.5" G3HS HDD	26
2.5-inch hot-swap HDDs - NL SATA			
00AJ136	A4TW	IBM 500GB 7.2K 6Gbps NL SATA 2.5" G3HS HDD	26
00AJ141	A4TX	IBM 1TB 7.2K 6Gbps NL SATA 2.5" G3HS HDD	26
2.5" hot-swap SAS SSDs - Enterprise			
00AJ217	A4UC	IBM 800GB SAS 2.5" MLC G3HS Enterprise SSD	26
2.5" hot-swap SATA SSDs - Enterprise Value			
00AJ161	A4U4	S3700 400GB SATA 2.5" MLC G3HS Enterprise SSD for IBM System x	26
00AJ405	A579	IBM 480GB SATA 2.5" MLC G3HS Enterprise Value SSD	26
00FN347	AS0J	IBM 960GB SATA 2.5" MLC G3HS Entry SSD	26
2.5" simple-swap SSDs - Enterprise Value			
00FN475	AS5Z	IBM 960GB SATA 2.5" MLC G3SS Entry SSD	16

Internal backup units

The x3650 M5 server does not support internal tape drive options or other internal backup units. However, it can be attached to the external tape drives using SAS or Fibre Channel connectivity (see Table 29).

Optical drives

The x3650 M5 server supports the optical drive options listed in Table 11. Storage dense models with 12x 3.5-inch or up to 24x 2.5-inch drive bays on the front do not support internal optical drive; a supported external optical drive can used instead.

Table 11. Optical drives

Part number	Feature code	Description	Maximum supported	Standard models where used
00AM066	A5KG	Ultraslim 9.5mm SATA DVD-ROM	1	-
00AM067	A5KH	Ultraslim 9.5mm SATA Multi Burner	1	-

Ultraslim 9.5mm SATA DVD-ROM (part number 00AM066) supports the following media and speeds for reading:

- CD-ROM 24X
- CD-DA (DAE) 24X
- CD-R 24X
- CD-RW 24X
- DVD-ROM 8X
- DVD-R 8X
- DVD+R 8X
- DVD-R DL 6X
- DVD+R DL 8X
- DVD-RW 8X
- DVD+RW 8X
- DVD-RAM (4.7 GB) 5X

Ultraslim 9.5mm SATA Multi Burner (part number 00AM067) supports the same media and speeds for reading as DVD-ROM (part number 00AM066). This drive also supports the following media and speeds for writing:

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

I/O expansion options

The server supports up to nine PCIe slots: one slot on the system planar that is dedicated for an internal RAID controller, two regular PCIe slots on the system planar, and up to six PCIe 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 0: PCIe 3.0 x8 (dedicated for an internal RAID controller)
- Slot 1: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, full-length (PCIe x16 slot is double-wide)
- Slot 2: PCIe 3.0 x8; full-height, full-length (not present if the slot 1 is PCIe x16)
- Slot 3: PCIe 3.0 x8 or ML2; full-height, half-length
- Slot 4: PCIe 3.0 x8; low profile (vertical slot on system planar)
- Slot 5: PCIe 3.0 x16; low profile (vertical slot on system planar)
- Slot 6: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, full-length (PCIe x16 slot is double-wide)
- Slot 7: PCIe 3.0 x8; full-height, full-length (not present if the slot 6 is PCIe x16)
- Slot 8: PCIe 3.0 x8; full-height, half-length

Note: Slots 5, 6, 7, and 8 require the second processor to be installed.

The locations of the PCIe slots are shown in Figure 6.

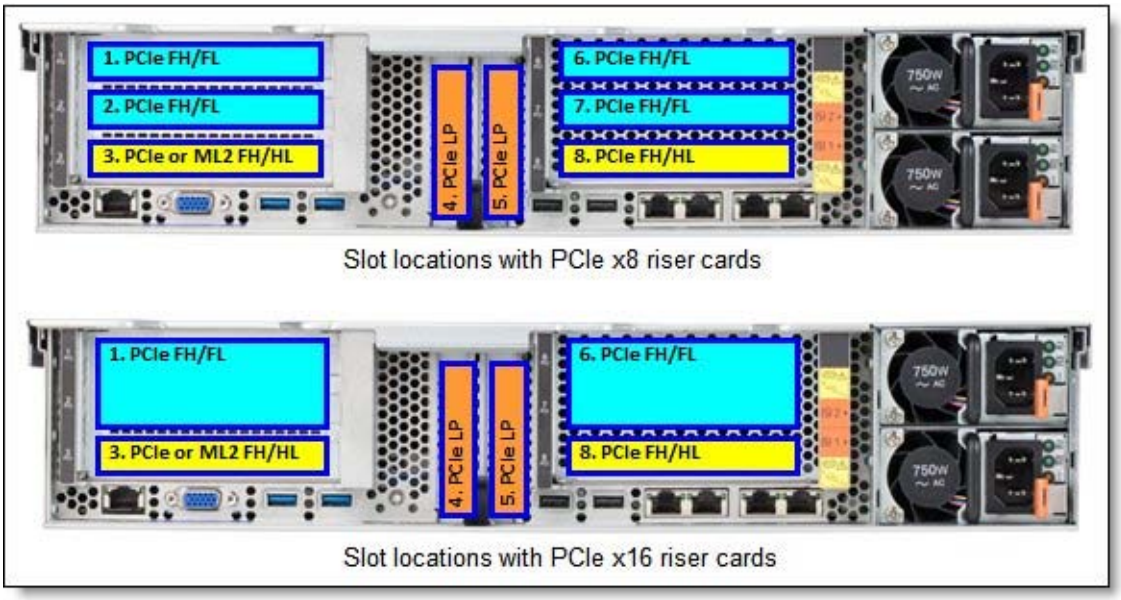

Figure 6. Slot locations

Riser 1 supplies slots 1, 2, and 3, and Riser 2 supplies slots 6, 7, and 8. Standard models do not include any riser cards. Table 12 lists available PCIe riser card options.

Table 12. PCIe riser card options and brackets

Part number	Feature code	Description	Maximum supported	Standard models where used
Riser 1 options (supplies slots 1, 2 and 3)				
00KA504	A5FR	System x3650 M5 PCIe Riser 1 (1 x16 FH/FL + 1 x8 ML2 Slots)	1	-
00KA519	A5FQ	System x3650 M5 PCIe Riser 1 (2 x8 FH/FL + 1 x8 ML2 Slots)	1	-
00KA489	A5FN	System x3650 M5 PCIe Riser (1 x16 FH/FL + 1 x8 FH/HL Slots)	1	-
00KA498	A5FP	System x3650 M5 PCIe Riser (2 x8 FH/FL + 1 x8 FH/HL Slots)	1	-
Riser 2 options (supplies slots 6, 7 and 8)				
00KA489	A5R5	System x3650 M5 PCIe Riser (1 x16 FH/FL + 1 x8 FH/HL Slots)	1	-
00KA498	A5R6	System x3650 M5 PCIe Riser (2 x8 FH/FL + 1 x8 FH/HL Slots)	1	-
Serial port bracket				
00KA161	A5AN	COM Port Bracket	1	-

Riser option part numbers 00KA489 and 00KA498 can be installed in both riser slots 1 and 2; for CTO or special bid orders these option part numbers have different feature codes depending on the riser slot into which they are installed.

The COM Port Bracket, part number 00KA161, is used for mounting the external serial port on the rear of the x3650 M5. This option includes the bracket and the cable. The COM Port option is mounted in place of the PCIe slot 5, and the PCIe slot 5 cannot be used.

Network adapters

The x3650 M5 supports four integrated Gigabit Ethernet ports. Optionally, the x3650 M5 server supports ML2 adapters that are installed in the custom ML2 slot provided by the PCIe ML2 riser cards (part numbers 00KA504 and 00KA519). This slot supports adapters with either two 10 Gb ports or four Gigabit Ethernet ports and supports direct connectivity to the IMM2 service processor for out-of-band systems management.

The integrated network interface controller (NIC) has the following features:

- A Broadcom BCM5719 chip
- Four Gigabit Ethernet ports
- NIC Teaming (load balancing and failover)
- Ethernet features:
  - Compliant with 1 Gb Ethernet IEEE 802.3, 802.3u, and 802.3ab PHY specifications
  - Integrated PHY for 10/100/1000 Mbps for multispeed, full, and half-duplex auto-negotiation
  - Automatic MDI crossover
  - IEEE 802.3x-compliant flow control support
  - IEEE 1588 protocol and 802.1AS time synchronization implementation
  - IEEE802.3az - Energy Efficient Ethernet (EEE)
- I/O Virtualization features:
  - I/O Virtualization support for VMware NetQueue and Microsoft virtual machine queue (VMQ)
  - Function Level Reset (FLR)
  - IEEE 802.1q Virtual Local Area Network (VLAN) tagging support
- Stateless offload and performance features:
  - TCP, IP, and User Datagram Protocol (UDP) checksum offload
  - TCP segmentation offload (TCO)
  - Large Send Offload (LSO)
  - Receive Side Scaling (RSS) and Transmit Side Scaling (TSS)
  - Message Signal Interrupt (MSI) and Message Signal Interrupt Extension (MSI-X) support
  - Support for jumbo frames up to 9600 bytes

Table 13 lists additional supported network adapters.

Table 13. Network adapters

Part number	Feature code	Description	Maximum supported**
10 Gb Ethernet - ML2			
00D2026	A40S	Broadcom NetXtreme II ML2 Dual Port 10GbaseT for IBM System x	1
00D2028	A40T	Broadcom NetXtreme II ML2 Dual Port 10GbE SFP+ for IBM System x*	1
00D1996	A40Q	Emulex VFA5 ML2 Dual Port 10GbE SFP+ Adapter for IBM System x*	1
00D8544	A4NZ	Emulex VFA5 ML2 FCoE/iSCSI License for IBM System x (FoD) (Features on Demand upgrade for 00D1996 - one for each adapter)	1
00D1994	A40P	Intel X540 ML2 Dual Port 10GbaseT Adapter for IBM System x	1
1 Gb Ethernet - ML2			
00D1998	A40R	Intel I350-T4 ML2 Quad Port GbE Adapter for IBM System x	1
40 Gb Ethernet / FDR InfiniBand - PCIe			
00D9550	A3PN	Mellanox ConnectX-3 40GbE / FDR IB VPI Adapter for IBM System x*	8
10 Gb Ethernet - PCIe			
44T1370	A5GZ	Broadcom NetXtreme 2x10GbE BaseT Adapter for IBM System x	8
94Y5180	A4Z6	Broadcom NetXtreme Dual Port 10GbE SFP+ Adapter for IBM System x*	8
49Y7960	A2EC	Intel X520 Dual Port 10GbE SFP+ Adapter for IBM System x*	8
00D9690	A3PM	Mellanox ConnectX-3 10 GbE Adapter for IBM System x*	8
90Y4600	A3MR	Qlogic 8200 Dual Port 10GbE SFP+ VFA for IBM System x*	8
00Y5624	A3MT	Qlogic 8200 VFA FCoE/iSCSI License for IBM System x (FoD) (Features on Demand upgrade for 90Y4600 - one for each adapter)	8
1 Gb Ethernet - PCIe			
90Y9370	A2V4	Broadcom NetXtreme I Dual Port GbE Adapter for IBM System x	8
90Y9352	A2V3	Broadcom NetXtreme I Quad Port GbE Adapter for IBM System x	8
00AG510	A56L	Intel I350-T2 2xGbE BaseT Adapter for IBM System x	8
00AG520	A56M	Intel I350-T4 4xGbE BaseT Adapter for IBM System x	8

* SFP+ and QSFP+ based adapters require supported transceivers or DAC cables that must be purchased separately.
** Maximum quantity is achieved with two processors installed. With one processor, the maximum quantity is half of the listed value (this does not apply to mezzanine cards).

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

Storage host bus adapters

Table 14 lists storage host bus adapters (HBAs) supported by the x3650 M5 server. The maximum quantity listed is for configurations with two installed processors. If one processor is installed, the maximum quantity supported is half of the listed value.

Table 14. Storage adapters

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

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

PCIe SSD adapters

Currently, the x3650 M5 server does not support the High IOPS SSD adapters.

GPU adapters

The x3650 M5 server supports a graphics processing units (GPUs) listed inTable 15.

Table 15. GPU adapters

Part number	Feature code	Description	Maximum supported
None*	A470	NVIDIA Grid K2 (Actively Cooled)	2
None*	A5FG	NVIDIA Tesla K40c	2
None*	AS3G	NVIDIA Grid K1 (Actively Cooled)	2

* These GPU adapters are available only through Special Bid or CTO.

The following configuration rules apply if a GPU is installed:

- Installation of two GPUs requires two processors.
- If the GPU is installed, the maximum memory that can be installed is 1 TB.
- If the GPU is installed, maximum of 16 LRDIMMs can be installed.
- Further restrictions may apply depending on the power supplies installed as described in the "Power supplies" section.

Power supplies

The x3650 M5 server supports up to two redundant power supplies. Standard models come with one power supply. The following table lists the power supplies.

Table 16. Power supplies

Part number	Feature code	Description	Maximum supported	Standard models where used
00FK930	A5ET	System x 550W High Efficiency Platinum AC Power Supply	2	52x, A2x, B2x, C2x, C4x, D2x, F2x,
00FK932	A5EU	System x 750W High Efficiency Platinum AC Power Supply	2	62x, D4x, F4x, G2x, M2x
00FK934	A5EV	System x 750W High Efficiency Titanium AC Power Supply (200-240V)	2	-
00FK936	A5EW	System x 900W High Efficiency Platinum AC Power Supply	2	J2x, L2x

General power supply rules are as follows:

- Minimum of 1 and maximum of 2 power supplies per system.
- If 2 are installed, power supplies must be identical.

550W power supply restrictions

The following restrictions apply:

- GPUs are not supported
- Rear HDD kits (both 2.5-in. and 3.5-in.) are not supported
- LRDIMMs are not supported
- 145 W processors are not supported; 135 W and lower processors are supported with these restrictions:
  - With 1 processor of 135 W or lower:
    - Maximum 12 RDIMMs
    - Maximum 4 PCIe adapters
    - Maximum 16 SFF (2.5-in.) drives or 8 LFF (3.5-in.) drives
  - With 2 processors of 105 W or lower:
    - Maximum 8 RDIMMs
    - Maximum 3 PCIe adapters
    - Maximum 8 SFF (2.5-in.) drives or 8 LFF (3.5-in.) drives

750W power supply restrictions

The following restrictions apply:

- GPUs are not supported
- Maximum 12 RDIMMs or 12 LRDIMMs
- 145 W and lower processors are supported with these restrictions:
  - With 1 processor of 145 W or lower:
    - Maximum 5 PCIe adapters
    - Maximum 26 (24 on the front; 2 on the rear) SFF (2.5-in.) drives; or 14 (12 on the front, 2 on the rear) LFF (3.5-in.) drives and 2 SFF (2.5-in.) rear drives
  - With 2 processors of 135 W or 145 W:
    - Maximum 4 PCIe adapters
    - Maximum 10 (8 on the front, 2 on the rear) SFF (2.5-in.) drives; or 10 (8 on the front, 2 on the rear) LFF (3.5-in.) drives; or 8 LFF (3.5-in.) front drives and 2 SFF (2.5-in.) rear drives
  - With 2 processors of 120 W or lower:
    - Maximum 3 PCIe adapters
    - Maximum 18 (16 on the front, 2 on the rear) SFF (2.5-in.) drives; or 10 (8 on the front, 2 on the rear) LFF (3.5-in.) drives; or 8 LFF (3.5-in.) front drives and 2 SFF (2.5-in.) rear drives

900W power supply restrictions

The following restrictions apply:

- With 1 processor of 145 W or lower:
  - Maximum 1 GPU
  - Maximum 12 RDIMMs or 12 LRDIMMs
  - Maximum 5 PCIe adapters
  - Maximum 26 (24 in the front, 2 in the rear) SFF (2.5-in.) drives; or maximum 16 drives with 14 (12 in the front, 2 in the rear) LFF (3.5-in.) drives and 2 SFF (2.5-in.) rear drives
- With 2 processors of 135 W or 145 W:
  - GPUs are not supported
  - Maximum 12 RDIMMs or 12 LRDIMMs
  - Maximum 9 PCIe adapters
  - Maximum 10 (8 in the front, 2 in the rear) SFF (2.5-in.) drives; or 10 (12 in the front, 2 in the rear) LFF (3.5-in.) drives; or 8 LFF (3.5-in.) front drives and 2 SFF (2.5-in.) rear drives
- With 2 processors of 120 W or lower:
  - Without GPUs:
    - With RDIMMs:
      - Maximum 24 RDIMMs
      - Maximum 3 PCIe adapters
      - Maximum 26 (24 in the front, 2 in the rear) SFF (2.5-in.) drives; or maximum 16 drives with 14 (12 in the front, 2 in the rear) LFF (3.5-in.) drives and 2 SFF (2.5-in.) rear drives
    - With LRDIMMs:
      - Maximum 24 LRDIMMs
      - Maximum 4 PCIe adapters
      - Maximum 16 SFF (2.5-in.) front drives; or maximum 16 drives with 14 (12 in the front, 2 in the rear) LFF (3.5-in.) drives and 2 SFF (2.5-in.) rear drives
  - With 1 GPU:
    - Maximum 16 RDIMMs or 16 LRDIMMs
    - Maximum 7 PCIe adapters
    - Maximum 16 SFF (2.5-in.) front drives; or maximum 10 drives with 8 LFF (3.5-in.) front drives and 2 LFF (3.5-in.) or 2 SFF (2.5-in.) rear drives
  - With 2 GPUs:
    - 2x 900 W power supplies must be installed
    - Maximum 8 RDIMMs or 8 LRDIMMs
    - Maximum 4 PCIe adapters
    - Maximum 8 SFF (2.5-in.) front drives or 8 LFF (3.5-in.) front drives
    - Rear HDD kits (both 2.5-in. and 3.5-in.) are not supported

A power supply does not include a power cable; the cable must be ordered separately (see Table 17).

Table 17. Power cables

Part number	Feature code	Description
Rack power cables		
39Y7932	6263	12ft Power Cable C13-C14
39Y7937	6201	1.5m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable
39Y7938	6204	IEC309 C20 to C13 rack jumper cable
Country-specific power cords		
39Y7917	6212	European 10A line C13 to CEE 7/7 (2.8M)
39Y7918	6213	Denmark 10A line C13 to DK2-5A (2.8M)
39Y7919	6216	Switzerland 10A line C13 to SEV 1011 (2.8M)
39Y7920	6218	Israel 10A line C13 to SI 32 (2.8M)
39Y7921	6217	Italy 10A line C13 to CEE 7/7 (2.8M)
39Y7922	6214	South Africa 10A line C13 to SABS 164/1 (2.8M)
39Y7923	6215	United Kingdom 10A line C13 to BS 1363 (2.8M)
39Y7924	6211	Australia/NZ 10A line C13 to SAA-AS C112 (2.8M)
39Y7925	6219	Korea 7A line C13 to KETI 15A/250V (2.8M)
39Y7927	6269	India 6A line C13 to Fig 68 (2.8M)
39Y7928	6210	China 6A line C13 to GB 2099.1 (2.8M)
39Y7929	6223	Brazil 10A line C13 to NBR 6147 (2.8M)
39Y7930	6222	Argentina 10A line C13 to IRAM 2063 (2.8M)
39Y7931	6207	Power Cable - C13 / NEMA 5-15P 14ft
00CG265	A53E	Power Cord Taiwan AC plug 10A/250V, 2.8M; OPT
00CG267	A53F	Power Cord Taiwan AC plug 15A/125V; 2.8M; OPT
46M2592	A1RF	10A/250V C13 to NEMA 6-15P 2.8m line cord
46M2593	A1RE	Japan 10A/100V C13 to JIS C-8303 2.8m line cord

Integrated virtualization

The server supports VMware ESXi installed on a USB memory key. The key is installed in a USB socket inside the server. Table 18 lists the virtualization option.

Table 18. Virtualization option

Part number	Feature code	Description	Maximum supported
41Y8298	A2G0	IBM Blank USB Memory Key for VMware ESXi Downloads	1
00ML200	A5R7	IBM 32GB Enterprise Value USB Memory Key	1

Systems management

The server contains IBM Integrated Management Module II (IMM2.1), 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 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 IBM Integrated Management Module Advanced Upgrade is required for enabling remote presence and blue-screen capture features. The remote presence feature provides the following functions:

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

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition. Table 19 lists the remote management option.

Table 19. Remote management option

Part number	Feature code	Description	Maximum supported
90Y3901	A1ML	IBM Integrated Management Module Advanced Upgrade	1

All standard models include basic light path diagnostics, which include system LEDs on the front of the server (See Figure 2) and LEDs near the monitored components (for example, the DIMM error LED on the system board). In addition, server models with eight 3.5-inch drive bays are standard with a next-gen light path diagnostics LCD display panel. With LCD display, you have quick access to system status, firmware, network, and health information. Standard models with eight or sixteen 2.5-inch drive bays and basic light path can be upgraded to a next-gen light path LCD panel. Also, Configure-to-order (CTO) customers may configure an LCD display panel for their factory-built models. Table 20 shows the LCD display panel ordering information.

Table 20. Light path diagnostics option

Part number	Feature code	Description	Maximum supported	Standard models where used
00KA503	A4VH	System x3650 M5 Advanced LCD Light Path Kit	1	B2x, C4x

The following x3650 M5 Express models have the Light Path LCD Display Panel as standard: E1x, E2x, E3x, E4x, E5x, E6x, E7x, E8x, E9x, EAx, EBx, ECx, EDx, EEx, EFx, EGx, EHx, EIx, EJx, EKx, ELx, EMx, ENx, EOx, EPx, EQx, ERx, ESx.

IBM Security Key Lifecycle Manager for System x SEDs - FoD (SKLM - FoD) is an optional feature, available in System x environments, that centralizes, simplifies, and automates the data encryption key management process to help minimize risk and reduce operational costs. SKLM - FoD offers a simple and robust solution for key storage, key serving, and key lifecycle management for IBM self-encrypting drives (SEDs) in local and distributed System x environments. With the x3550 M5, the Feature on Demand (FoD) upgrade can be configured with the ServeRAID M5210 and M1215 RAID controllers paired with SEDs. Table 21 lists SKLM-FoD part numbers.

Table 21. Security Key Lifecycle Manager - FoD part numbers

Part number	Feature code	Description	Maximum supported
United States, Canada, Asia Pacific and Japan			
00D9998	A5U1	IBM SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	1
00D9999	AS6C	IBM SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	1
Latin America, Europe, Middle East and Africa			
00FP648	A5U1	IBM SKLM for System x w/SEDs - FoD per Install w/1Yr S&S	1
00FP649	AS6C	IBM SKLM for System x w/SEDs - FoD per Install w/3Yr S&S	1

Supported operating systems

The server supports the following operating systems:

- Microsoft
  - Microsoft Windows Server 2012 R2
  - Microsoft Windows Server 2012
  - Microsoft Windows Server 2008 R2
- Red Hat
  - Red Hat Enterprise Linux 7
  - Red Hat Enterprise Linux 6 Server x64 Edition (Update 5)
- SUSE
  - SUSE LINUX Enterprise Server 11 for AMD64/EM64T (SP3)
  - SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T (SP3)
- VMware
  - VMware vSphere 5.5 (ESXi) (planned for later in 2014)
  - VMware vSphere 5.1 (ESXi) (Update 2)

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):

- Height: 86.5 mm (3.4 in.)
- Width: 445.6 mm (17.5 in.)
- Depth: 800 mm (31.5 in.)
- Weight:
  - Minimum configuration: 19 kg (42 lb)
  - Maximum configuration: 34 kg (75 lb)

Supported environment:

- Air temperature:
  - Server on: 5 °C to 40 °C (41 °F to 104 °F); altitude: 0 to 950 m (3,117 ft); decrease the maximum system temperature by 1 °C for every 175-m increase in altitude above 950 m.
  - Server off: 5 °C to 45 °C (41 °F to 113 °F)
  - Maximum altitude: 3,050 m (10,000 ft), 5 °C to 28 °C (41 °F to 82 °F)
  - Shipment: -40 °C to +60 °C (-40 °F to 140 °F) at up to 10,700 m (35,105 ft)
- Humidity:
  - Server on: 8% to 85%, maximum dew point 24 °C, maximum rate of change 5 °C/hr
  - Server off: 8% to 85%, maximum dew point 27 °C
- Design to ASHRAE Class A3, ambient of 36 °C to 40 °C (96.8 °F to 104 °F), with relaxed support:
  - Supports cloud-like workload with no performance degradation acceptable (Turbo-Off).
  - Under no circumstance can any combination of worst-case workload and configuration result in system shutdown or design exposure at 40 °C.
  - The worst-case workload (like Linpack, Turbo-On) might have performance degradation.

- Electrical:
  - Models with 900 W AC power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 10.3 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 5.0 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.15 kVA
      - Maximum configuration: 1.194 kVA
  - Models with 750 W Platinum AC power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 8.6 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 4.2 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.15 kVA
      - Maximum configuration: 1.015 kVA
  - Models with 750 W Titanium AC power supplies:
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 4.2 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.15 kVA
      - Maximum configuration: 0.965 kVA
  - Models with 550 W AC power supplies:
    - 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; 6.5 A
    - 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; 3.3 A
    - Input kilovolt-amperes (kVA) (approximately):
      - Minimum configuration: 0.16 kVA
      - Maximum configuration: 0.732 kVA
- BTU output:
  - Minimum configuration: 525 Btu/hr (154 watts)
  - Maximum configuration: 4064 Btu/hr (1191 watts)
- Noise level:
  - 6.6 bels (operating)
  - 6.4 bels (idle)

Warranty options

The System x3650 M5 has a three-year onsite warranty with 9x5/next business day terms. IBM offers the warranty service upgrades through IBM ServicePac options, 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 are available in a particular country. For more information about the IBM ServicePac offerings that are available in your country, visit the IBM ServicePac Product Selector:
https://www-304.ibm.com/sales/gss/download/spst/servicepac

Table 22 explains warranty service definitions in more detail.

Table 22. Warranty service definitions

Term	Description
IBM onsite repair (IOR)	A service technician goes 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 non-critical 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, two, three, four, or five years of 9x5 or 24x7 service coverage
  - Onsite repair from next business day to 4 or 2 hours
  - One or two years of warranty extension
- Remote technical support services:
  - One or three years with 24x7 coverage (severity 1) or 9x5 next business day for all severities
  - Installation and start-up support for System x servers
  - Remote technical support for System x servers
  - Software support - Support Line:
    - Microsoft or Linux software
    - VMware
    - IBM Director

Regulatory compliance

The server conforms to the following regulations:

- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 5, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1
- NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22, Class A; AS/NZS 60950.1
- China CCC GB4943.1, GB9254 Class A, GB17625.1
- Taiwan BSMI CNS13438, Class A; CNS14336-1
- Korea KN22, Class A; KN24
- Russia, Belorussia and Kazakhstan, TR CU 020/2011 (for EMC) and TR CU 004/2011 (for safety)
- 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)

External disk storage expansion

The x3650 M5 supports attachment to external storage expansion enclosures, such as the EXP2500 series, by using the ServeRAID M5225 SAS/SATA Controller. The x3650 M5 can also be attached to supported external storage systems, such as the IBM System Storage® DS3500 series, using a supported HBA. See Table 23.

Table 23. RAID controllers and options for external disk storage expansion

Part number	Feature code	Description	Maximum supported	Standard models where used
12 Gb RAID controllers				
00AE938	A5ND	ServeRAID M5225-2GB SAS/SATA Controller	4	-
Feature on Demand (FoD) upgrades for the M5225				
47C8706	A3Z5	ServeRAID M5200 Series RAID 6 Upgrade	1*	-
47C8710	A3Z7	ServeRAID M5200 Series Performance Accelerator	1*	-
47C8712	A3Z8	ServeRAID M5200 Series SSD Caching Enabler	1*	-

* One FoD upgrade for the M5225 activates the feature on all M5225 controllers installed in a server.

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

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

The ServeRAID M5225 SAS/SATA Controller supports connectivity to the IBM System Storage external expansion enclosures listed in Table 24. Up to nine expansion enclosures can be daisy-chained per one M5225 external port. For better performance, distribute expansion enclosures evenly across both M5225 ports.

Table 24. IBM System Storage external expansion enclosures

Part number	Description	Maximum quantity supported per one M5225
174712X	IBM System Storage EXP2512 Express	18
174724X	IBM System Storage EXP2524 Express	9

The external SAS cables listed in Table 25 support connectivity between external expansion enclosures and the ServeRAID M5225 SAS/SATA Controller.

Table 25. External SAS cables for external storage expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
Server to Expansion enclosure connectivity (Mini-SAS HD x4 to Mini-SAS x4)		
00Y2459	0.6m SAS Cable (mSAS HD to mSAS)	1
00Y2461	1.5m SAS Cable (mSAS HD to mSAS)	1
00Y2463	3m SAS Cable (mSAS HD to mSAS)	1
90Y7682	External Expansion Cable - 6M SAS Cable - HD SAS to Mini SAS	1
Expansion enclosure to Expansion enclosure connectivity (Mini-SAS x4 to Mini-SAS x4)		
39R6529	IBM 1 m SAS Cable	1
39R6531	IBM 3 m SAS Cable	1

Table 26 lists drives that are supported by EXP2512 external expansion enclosures.

Table 26. Drive options for EXP2512 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
3.5" NL SAS HS HDDs		
49Y1903	1TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
49Y1902	2TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
90Y8720	3TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
46W0975	4TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
3.5" SAS HS HDDs		
49Y1899	300GB 15,000 rpm 6Gb SAS 3.5" HDD	12
49Y1900	450GB 15,000 rpm 6Gb SAS 3.5" HDD	12
49Y1901	600GB 15,000 rpm 6Gb SAS 3.5" HDD	12

Table 27 lists hard disk drives that are supported by EXP2524 external expansion enclosures.

Table 27. Drive options for EXP2524 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
2.5" NL SAS HS HDDs		
49Y1898	500GB 7,200 rpm 6Gb SAS NL 2.5" HDD	24
81Y9952	1TB 7,200 rpm 6Gb SAS NL 2.5" HDD	24
2.5" SAS HS HDDs		
49Y1896	146GB 15,000 rpm 6Gb SAS 2.5" HDD	24
81Y9944	300GB 15,000 rpm 6Gb SAS 2.5" HDD	24
00W1595	600GB 10,000 rpm 6Gb SAS 2.5" HDD	24
46W0970	900GB 10,000 rpm 6Gb SAS 2.5" HDD	24
46W0980	1.2TB 10,000 rpm 6Gb SAS 2.5" HDD	24
2.5" SAS HS SSDs		
49Y6072	200GB 6Gb SAS 2.5" SSD	24
49Y6077	400GB 6Gb SAS 2.5" SSD	24

External disk storage systems

Table 28 lists the external storage systems that are supported by the x3650 M5 and can be ordered through the System x sales channel. The server might support other IBM disk systems that are not listed in this table. See the IBM System Storage® Interoperability Center (SSIC) for further information.

Table 28. 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
2071CU2	IBM Storwize® V3500 LFF Dual Control Enclosure
2071CU3	IBM Storwize V3500 SFF Dual Control Enclosure
2072L2C	IBM Storwize V3700 LFF Dual Control Enclosure
2072S2C	IBM Storwize V3700 SFF Dual Control Enclosure

For more information, see the list of IBM Redbooks Product Guides in the System Storage category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=externalstorage

External backup units

The server supports the external backup attachment options that are listed in Table 29.

Table 29. External backup options

Part number	Description
External tape expansion enclosures for internal tape drives	
87651UX	1U Tape Drive Enclosure
87651NX	1U 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	
00D2786	IBM RDX Internal USB 3.0 Dock with 320GB Cartridge
00D2787	IBM RDX Internal USB 3.0 Dock with 500GB Cartridge
00D2788	IBM RDX Internal USB 3.0 Dock with 1TB Cartridge
49Y9898	IBM Half High LTO Gen 5 Internal SAS Tape Drive
00D8924	IBM Half High LTO Ultrium Gen 6 Internal SAS Tape Drive
External backup units*	
362532Y	IBM RDX External USB 3.0 Dock with 320GB Cartridge
362550Y	IBM RDX External USB 3.0 Dock with 500GB Cartridge
36251TY	IBM RDX External USB 3.0 Dock with 1TB Cartridge
3628L5X	IBM Half High LTO Gen 5 External SAS Tape Drive (with US line cord)
3628N5X	IBM Half High LTO Gen 5 External SAS Tape Drive (without line cord)

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

For more information, see the list of IBM Redbooks Product Guides in the Backup units category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape

Top-of-rack Ethernet switches

The server supports the top-of-rack Ethernet switches from IBM System Networking and are listed in Table 30.

Table 30. IBM System Networking: Top-of-rack switches

Part number	Description
IBM System Networking - 1 Gb top-of-rack switches	
7309BAX	IBM System Networking RackSwitch G7028 (24 ports)
7309CAX	IBM System Networking RackSwitch G7028 (48 ports)
7309CAX	IBM System Networking RackSwitch G7052
0446013	IBM System Networking RackSwitch G8000R
7309CFC	IBM System Networking RackSwitch G8000F
7309G52	IBM System Networking RackSwitch G8052R
730952F	IBM System Networking RackSwitch G8052F
IBM System Networking - 10 Gb top-of-rack switches	
7309DRX	IBM System Networking RackSwitch G8264CS (Rear to Front)
7309DFX	IBM System Networking RackSwitch G8264CS (Front to Rear)
7309BR6	IBM System Networking RackSwitch G8124ER
7309BF7	IBM System Networking RackSwitch G8124EF
7309G64	IBM System Networking RackSwitch G8264R
730964F	IBM System Networking RackSwitch G8264F
7309CR9	IBM System Networking RackSwitch G8264TR
7309CF9	IBM System Networking RackSwitch G8264TF
IBM System Networking - 40 Gb top-of-rack switches	
8036BRX	IBM System Networking RackSwitch G8332 (Rear to Front)
8036BFX	IBM System Networking RackSwitch G8332 (Front to Rear)
8036ARX	IBM System Networking RackSwitch G8316R
8036AFX	IBM System Networking RackSwitch G8316F

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

Uninterruptible power supply units

The server supports attachments to the uninterruptible power supply (UPS) units listed in Table 31.

Table 31. Uninterruptible power supply units

Part number	Description
Rack-mounted UPS	
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)
53959KX	IBM 11000VA LCD 5U Rack UPS (200V/208V/230V)
24195KX	IBM UPS5000
21303RX	IBM UPS 7500XHV
21304RX	IBM UPS 10000XHV

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

Power distribution units

The server supports attachments to the power distribution units (PDUs) listed in Table 32.

Table 32. 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 line cord
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 63 amp/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 32. Power distribution units (Part 2)

Part number	Description
Universal PDUs	
39Y8951	DPI Universal Rack PDU with US LV and HV line cords
39Y8952	DPI Universal Rack PDU with CEE7-VII Europe LC
39Y8953	DPI Universal Rack PDU with Denmark LC
39Y8954	DPI Universal Rack PDU with Israel LC
39Y8955	DPI Universal Rack PDU with Italy LC
39Y8956	DPI Universal Rack PDU with South Africa LC
39Y8957	DPI Universal Rack PDU with UK LC
39Y8958	DPI Universal Rack PDU with AS/NZ LC
39Y8959	DPI Universal Rack PDU with China LC
39Y8962	DPI Universal Rack PDU (Argentina)
39Y8960	DPI Universal Rack PDU (Brazil)
39Y8961	DPI Universal Rack PDU (India)
0U Basic PDUs	
46M4122	IBM 0U 24 C13 16A 3 Phase PDU
46M4125	IBM 0U 24 C13 30A 3 Phase PDU
46M4128	IBM 0U 24 C13 30A PDU
46M4131	IBM 0U 24 C13 32A PDU
46M4140	IBM 0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	IBM 0U 12 C19/12 C13 32A 3 Phase PDU

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

Rack cabinets

The server supports the rack cabinets listed in Table 33.

Table 33. Rack cabinets

Part number	Description
201886X	IBM 11U Office Enablement Kit
93072RX	IBM 25U Standard Rack
93072PX	IBM 25U Static S2 Standard Rack
93634EX	IBM 42U 1100mm Dynamic Expansion Rack
93634PX	IBM 42U 1100mm Dynamic Rack
93604EX	IBM 42U 1200mm Deep Dynamic Expansion Rack
93604PX	IBM 42U 1200mm Deep Dynamic Rack
93614EX	IBM 42U 1200mm Deep Static Expansion Rack
93614PX	IBM 42U 1200mm Deep Static Rack
93084EX	IBM 42U Enterprise Expansion Rack
93084PX	IBM 42U Enterprise Rack
93074RX	IBM 42U Standard Rack
93074XX	IBM 42U Standard Rack Extension
93624EX	IBM 47U 1200mm Deep Static Expansion Rack
93624PX	IBM 47U 1200mm Deep Static Rack
93634BX	IBM PureFlex® System 42U Expansion Rack
93634DX	IBM PureFlex System 42U Expansion Rack
93634AX	IBM PureFlex System 42U Rack
93634CX	IBM PureFlex System 42U Rack

For more information, see the list of IBM Redbooks Product Guides in the Rack cabinets and options category:
http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack

Rack options

The server supports the rack console switches, monitor kits and management gateways listed in Table 34.

Table 34. Rack options

Part number	Feature code	Description
Miscellaneous options for the x3650 M5		
00FK656	A5FV	System x Enterprise Slides Kit (included with the server)
00FK622	A5FX	System x Enterprise 2U Cable Management Arm (CMA)
00KA500	A5FW	System x Gen-II Universal Slides Kit
00FK660	A5G0	System x3650 M5 Lockable Bezel
Monitor kits and keyboard trays		
17238BX	1723HC1 fc A3EK	IBM 1U 18.5" Standard Console
17238EX	1723HC1 fc A3EL	IBM 1U 18.5" Enhanced Media Console
Console switches		
1754D2X	1754HC2 fc 6695	IBM Global 4x2x32 Console Manager (GCM32)
1754D1X	1754HC1 fc 6694	IBM Global 2x2x16 Console Manager (GCM16)
1754A2X	1754HC4 fc 0726	IBM Local 2x16 Console Manager (LCM16)
1754A1X	1754HC3 fc 0725	IBM Local 1x8 Console Manager (LCM8)
Console cables		
43V6147	3757	IBM Single Cable USB Conversion Option (UCO)
39M2895	3756	IBM USB Conversion Option (4 Pack UCO)
46M5383	5341	IBM Virtual Media Conversion Option Gen2 (VCO2)
46M5382	5340	IBM Serial Conversion Option (SCO)
Universal management gateway and cables		
3858D3X	3858HC1 fc A4X1	Avocent Universal Management Gateway 6000 for IBM
00AK142	A4X4	UM KVM Module VGA+SD Dual RJ45

For more information, see the list of IBM Redbooks Product Guides in the Rack cabinets and options category:
http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack

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Related publications and links

For more information, see these resources:

- IBM System x3650 M5 product page
  http://www.ibm.com/systems/x/hardware/rack/x3650m5/index.html
- ServerProven hardware compatibility page for the x3650 M5
  http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/xseries/5462.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 Configuration and Options Guide*
  http://www.ibm.com/systems/xbc/cog/
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