The engine of growth for your emerging businesses.

Product Guide

March 2010

IBM System x3400 M3

Product Overview

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IBM System x3400 M3 provides flexible capabilities and outstanding performance that drives affordable business growth

Suggested uses: *Small/medium businesses, large multilocation enterprises and bank branch offices seeking scalability, top performance and availability features at an entry-level price.*

The **dual-socket** IBM® System **x3400 M3**, incorporating IBM **X-Architecture**™ features, provides outstanding value to workgroups by combining scalable performance and availability features at an outstanding price. The x3400 M3 supports the latest **four-core** Intel® **Xeon**™ 5600 series (Westmere) processors, designed with up to **1066MHz** memory access and **12MB** of L3 cache and **Hyper-Threading Technology**, to help provide you with the computing power you need to match your business needs and growth. For maximum performance, x3400 M3 also supports the latest **six-core Xeon** 5600 series processors with up to **1333Mhz** memory access and **12MB** L3 cache, by CTO only. In addition, the x3400 M3 supports industry-standard **registered DDR-3** memory with **Chipkill**™ **ECC** (Error Checking and Correcting) protection—for high performance, energy savings, and reliability. For even higher levels of availability, the x3400 M3 also offers **memory mirroring**. A **dual-port** integrated high-speed **Gigabit Ethernet** controller is standard, as are high-performance PCIe adapter slots and a legacy PCI-32 slot to support legacy expansion cards.

All models offer impressive scalability, including dual-processor support and up to **128GB**[1] of memory. Some models supports up to **eight 2.5-inch hot-swap Serial-Attach SCSI** (SAS) or **Serial ATA II** (SATA II) HDDs with an internal storage capacity of up to **4TB**. Other models support up to **four** 3.5-inch **hot-swap** or **simple-swap** SATA II hard disk drives with a total capacity of up to **8.0TB**[2]**,** or up to **four** 3.5-inch high-performance **hot-swap Serial-Attach SCSI** (SAS) drives with an internal storage capacity of **2.4TB**. For additional storage capacity requirements, storage upgrade kits are available as options or configure-to-order (CTO) to support up to **sixteen 2.5**-inch **hot swap** SAS/SATA HDDs with a total capacity of up to **8TB**, or **eight 3.5**-inch **hot-swap** SATA/SAS hard disk drives with a total capacity of up to **16TB** (SATA) / **4.8TB** (SAS). For advanced performance and high availability, the four-drive hot-swap x3400 M3 models include an IBM **ServeRAID®-BR10il V2** controller, providing **RAID-0**/**1**/**1E** support. The IBM **ServeRAID®-M1015** controller, providing **RAID-0**/**1**/**10** with options to upgrade to **RAID 5** is standard on 2.5-inch models. Additional RAID support is available via the optional IBM ServeRAID™ family of SAS/SATA controllers, which support **RAID-1**/**1E**/**10**/**5**/**50**/**6**/**60**, and even **full-drive hardware encryption**. The x3400 M3 ships as a tower unit; a tower-to-rack option is available, or CTO models can be ordered as a **5U** rack-mounted server to help save precious data center floor space.

Standard in the x3400 M3 is an **Integrated Management Module (IMM)** that enables users to manage and control the server easily—both locally and, using an optional Virtual Media Key, remotely. Unified Extensible Firmware Interface (**UEFI**) is an evolutionary leap over legacy BIOS. This high level of manageability is designed to keep costs down and the system up—even when network usage increases. These advanced features help maximize network availability by increasing uptime, as do **hot-swap**/**redundant HDDs**; **Active Memory**™; **temperature-controlled fans** with **Calibrated Vectored Cooling**™; industry-standard **IPMI 2.0** support, including **highly secure remote power control** and **Serial over LAN**; as well as **text-console redirect over LAN**.

With the inclusion of unique IBM service and support features such as **IBM Systems Director**, **IBM Systems Director Active Energy Manager**, **ServerGuide**™, and the IMM, the x3400 M3 is as equally well designed for a locally managed data center environment as for a remotely managed or stand-alone environment, while offering maximum availability.

For a balance of high-performance two-, four-, or six-core, dual-socket processing, high availability and vast internal SAS storage at a budget price, the x3400 M3 is the ideal system.

[1] 128GB of RDIMM or 48GB of UDIMM memory supported when 8GB RDIMMs and 4GB UDIMMs are available in 2Q/2010..

[2] GB equals 1,000,000,000 bytes and TB equals 1,000,000,000,000 bytes when referring to hard disk drive capacity. Accessible capacity may be less.

Selling Features

Price/Performance

The x3400 M3 offers numerous features to boost performance and reduce product and operating costs:

- Up to **two 4-core** Xeon 5600 Series processors and **12MB** of shared cache per processor, offer superior performance capable of tackling the toughest jobs (**six-core** Xeon 5600 processors are available via CTO). **64-bit extensions** provide the flexibility to run 32-bit and 64-bit applications concurrently. Xeon 5600 series processors offer up to **43%** better performance than the previous-generation 5500 series processors and up to 900% better performance than the single-core processors of a few years ago that you may still be using.
- **Sixteen** DIMMs of fast registered **1066MHz** (or **800MHz**) **DDR3** ECC memory with **ChipkillI**[3] protection (optional) provides speed, high availability, and a memory capacity of up **128GB**. (1333Mhz support available via CTO)
- **Four high-speed PCIe Gen 2 adapter slots** offer investment protection by supporting high-performance adapters, such as 10Gb Ethernet, Fibre Channel and InfiniBand cards, none of which will run in older conventional PCI slots. A legacy PCI/33 adapter slot offers support for older adapters.
- The integrated **ServeRAID-BR10il V2** controller (model-specific) provides **RAID-0**/**1**/**1E** and full-duplex (**bidirectional 3GBps**) data transfers for SAS/SATA/SSD drives. Other server models include the **6Gbps ServeRAID-1015 (RAID-0**/**1**/**10)** controller standard, which provide **RAID-0**/**1**/**10**/**5**/**50** (optional **6**/**60** with **Self-Encrypting Disk**, or **SED**).
- Support for up to **four 3.5-inch hot-swap SAS** or **SATA II** hard disk drives or up to **eight 2.5-inch hot-swap SAS** drives offer high-performance with high availability (model-specific). The integrated SAS controller provides full-duplex (**2 x 300MBps**) data transfers for SAS drives. For lower cost and high capacity, other models support up to **four simple-swap SATA II** drives. CTO models are available to support **eight 3.5-inch hot-swap SAS** or **SATA II** drives or **sixteen 2.5-inch hot-swap SAS**/**SATA** drives.
- The integrated **dual-port Gigabit Ethernet** controller with **IPMI 2.0** support provides high-speed network communications.
- A **high degree of device integration**, including SAS/SATA, Gigabit Ethernet, systems management and video controllers, lowers costs and frees up valuable adapter slots.
- Energy-efficient components, including low-voltage transistors and voltage regulator modules, and power supplies that are up to 90% efficient, help keep your energy bills down.

Flexibility

The x3400 M3 has the ability to grow with your application requirements, thanks to:

- A choice of **two-core** or **four-core** processors starting at **2.00GHz** and up to **2.66GHz** clock rates, up to **5.86 Gigatransfers per second** (GTps), and **80W** maximum power draw. For more advanced processing power, a choice of **six-core** processors up to **2.93GHz** clock rates and **6.4 GTps** with 95W power is available via CTO**.**
- Up to **128GB** of high-speed registered **DDR-3** system memory.
- **Five** *available* **high-performance PCIe** adapter slots and one **legacy PCI** slot in all models. Optionally, a riser card supporting **two PCI-X**/**133 adapters** or **one additional PCIe** can be selected via Configure-to-Order (CTO) models.
- Upgrading to the **ServeRAID-M5014** or **ServeRAID-M5015** controller provides **256MB** or **512MB** of battery-backed cache (respectively) to enable higher-performance hardware RAID support, and allows the x3400 M3 to offer **five** RAID levels standard: **RAID-0**/**1**/**10**/**5**/**50** (and optionally **6**/**60** with **Self-Encrypting Disk)**.
- The **eight USB 2.0** ports (six external, two internal) are up to **40X** faster[4] than older **USB 1.1** ports. This provides speedy access to external HDDs (non-arrayed), floppy drives, flash drives, optical drives, tape drives, and other USB devices. Two ports are on the front of the unit and four are on the back.
- **Up to four** internal **3.5-inch simple-swap** or **hot-swap SATA**, **or hot-swap SAS HDDs**, or up to **eight 2.5-inch hot-swap SAS** or **SATA drives**, plus a **half-** or **full-high tape drive** standard. CTO models are available to increase 3.5-inch storage support to a maximum of **eight 3.5-inch hot-swap SAS** drives (with no tape drive support and slim optical device only), or **sixteen 2.5-inch hot-swap SAS**/**SATA** drives. This translates into as much as **16TB** of internal **3.5-inch SATA**, **4.8TB** of **3.5-inch SAS,** or **8TB** of **2.5-inch SAS** or **SATA** storage, providing tremendous internal storage capability, along with full data backup.

Manageability / Security

Powerful systems management features simplify local and remote management of the x3400 M3:

- The x3400 M3 includes an **Integrated Management Module (IMM)** to monitor server availability, perform Predictive Failure Analysis, etc., and trigger IBM **Systems Director** alerts. The IMM performs

[3] All models require Chipkill-enabled DIMMs for Chipkill protection.
[4] Data transfer rates may be less than the maximum possible.

the functions of both the Baseboard Management Controller (**BMC**) of earlier systems and the **Remote Supervisor Adapter II** and is upgradeable to **remote presence/cKVM.**

- An optional **Virtual Media Key** provides additional systems management capabilities, including Web-based out-of-band control; virtual floppy and optical drive support; Windows "blue screen" error capture; LDAP and SSL support; and remote redirection of PCI video, text, keyboard and mouse (cKVM). And it does all this without consuming a valuable adapter slot.
- **UEFI** — The Unified Extensible Firmware Interface is the next generation of BIOS, providing greater manageability and function. Used in PCs for several years, it is now moving into the server arena. IBM is the first to incorporate UEFI in our new servers. Features include:
  - Human readable event logs — no more beep codes
  - Complete out-of-band coverage by the Advance Settings Utility to simplify remote setup
  - A complete setup solution, allowing adapter configuration functions to be moved into UEFI
  - Consistent firmware management across an entire product line
- Integrated **IPMI 2.0** support alerts IBM Systems Director to anomalous environmental factors, such as voltage and thermal conditions. It also supports **highly secure remote power control** using data encryption.
- **Text Console Redirection** support allows the administrator to remotely and securely view x3400 M3 text messages over Serial or LAN.
- Integrated **Trusted Platform Module** (**TPM**) **1.2** support.
- The completely redesigned **IBM Systems Director** is included for proactive systems management. IBM Systems Director comes with a portfolio of tools, including *Active Energy Manager,* and *Service and Support Manager*. In addition, IBM Systems Director offers extended systems management tools for additional server management and increased availability. When a problem is encountered, IBM Systems Director can issue administrator alerts via e-mail, pager, and other methods.
- IBM **Systems Director Active Energy Manager™**, an IBM-exclusive, is designed to take advantage of new system power management features, by providing power monitoring and power capping features.
- The optional Virtual Media key provides IMM remote presence and it does this without consuming a valuable adapter slot.

Availability and Serviceability

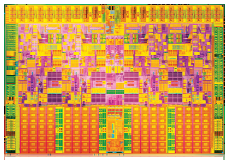
The x3400 M3 provides many features to simplify serviceability and increase system uptime:

- x3400 M3 servers offer **Chipkill** ECC memory protection[5] (when using x4 DIMMs). Chipkill memory is up to **16X** better than standard ECC memory at correcting memory errors. This can help reduce downtime caused by memory errors.
- The x3400 M3 offers **memory mirroring** for redundancy in the event of a non-correctable memory failure
- **Toolless cover removal** provides easy access to upgrades and serviceable parts. Similarly, the integrated **ServeRAID-BR10il V2** controller, the optional IMM **Virtual Media Key**, and the optional **ServeRAID-M5014** controller can be installed and serviced without tools. This means less time (and therefore less money) spent servicing the x3400 M3. Additionally, **hot-swap/redundant HDDs** and **power supplies** (model dependent)**,** as well as **Chipkill** memory protection and **mirrored** memory, mean greater system uptime while these components are being serviced.
- **Environmental monitoring** with fan speed control for temperature, voltages, fan failure, power supply failure, and power backplane failure.
- **IPMI 2.0** supports highly secure remote system power control using data encryption. This allows an administrator to restart a server without having to visit it in person, saving travel time and getting the server back up and running quickly and securely. It also adds new features to those provided by IPMI 1.5, including **VLAN** support, **Serial over LAN**, enhanced authentication and encryption algorithms (**RMCP+** and **AES**) and a **firmware firewall**.
- **Temperature-controlled fans** adjust to compensate for changing thermal characteristics. At the lower speeds they draw less power and suffer less wear. Equally important in a crowded data center, temperature-controlled fans produce less ambient noise in the data center than if they were constantly running at full speed.
- The **three-year (parts and labor) limited onsite warranty**[6] offered on Machine Type **7379** helps afford you peace of mind and greater investment protection than a one-year warranty does.

[5] Chipkill protection is supported with x4 DDR3 RDIMMs, but not x8 RDIMMs.

[6] For terms and conditions or copies of the IBM Statement of Limited Warranty, call 800-772-2227 in the U.S. In Canada call 800-426-2255. Telephone support may be subject to additional charges. For warranties including onsite labor, a technician is sent after IBM attempts to resolve the problem remotely. International warranty service is available in any country in which this product is sold.

Key Features



High-Performance Xeon 5600 and 5500 Series Processors

The x3400 M3 supports up to two high-performance Intel Xeon processors, allowing you to upgrade to a second processor as business needs require. The x3400 M3 offers a choice of processor clock rates, memory access speeds and power draw:

- **80W four-**core Xeon **5600** Series processor models **E5640**, **E5630** or **E5620** at 2.66, 2.53 or 2.40GHz (respectively) running **5.86GTps** (gigatransfers per second) with **12MB** of L3 processor cache, **1066MHz** memory access, 2 threads per core, and Intel Turbo Boost and Hyper Threading technology.
- **80W four-**core Xeon 5500 Series processor models **E5507** or **E5506** at 2.26GHz or 2.13GHz running **4.8GTps** with **4MB** of L3 processor cache, with **800MHz** memory access.
- **80W** two-core Xeon 5500 Series processor model **E5502** at 1.83GHz running **4.8GTps** with **4MB** of L3 processor cache, with **800MHz** memory access.

Other **Xeon 5600** and **5500 series** processors, available via CTO, include:

- **95W six-**core Xeon **5600** Series processor models **X5670**, **X5660** or **X5650** at 2.93, 2.80 or 2.66GHz (respectively) running **6.4GTps** with **12MB** of L3 processor cache, **1333MHz** memory access, 2 threads per core, and Intel Turbo Boost and Hyper Threading technology.
- **80W four**-core Xeon 5500 Series processor models **E5540**, **E5530**, and **E5520** at 2.53, 2.4, and 2.26Ghz (respectively) running **5.86GTps** with **8MB** of L3 processor cache, and **1066MHz** memory access
- **80W four**-core Xeon 5500 Series processor model **E5504** at 2.0Ghz running **4.8GTps** with **4MB** of L3 processor cache, and **800MHz** memory access

With the Xeon 5600 Series processors, Intel has diverged from its traditional Symmetric Multiprocessing (SMP) architecture to a Non-Uniform Memory Access (NUMA) architecture. The Xeon 5600 processors are connected through a serial coherency link called QuickPath Interconnect (QPI). QPI is capable of 6.4, 5.86 or 4.8 GTps (gigatransfers per second), depending on the processor model.

Six-core Xeon processors contain **six complete processor cores**. Processors contain one **shared 12MB** L3 cache. The cache is dynamically allocated between the cores as needed. The multiple cores appear to software as multiple physical processors. Six-core processors offer considerably higher performance than a same-speed Xeon processor with two cores.

Turbo Boost Technology increases performance by translating the temperature, power and current head room into higher frequency. It will dynamically increase by 133MHz for short and regular intervals until the upper limit is met or the maximum possible upside for the number of active cores is reached. The maximum frequency is dependent on the number of active cores. The amount of time the processor spends in the Turbo Boost Technology state depends on the workload and operating environment, providing the performance you need, when and where you need it. For example, a **2.93GHz six-core X5670** processor with **3-6** cores active can run the cores at **3.46GHz**. With only **one** or **two** cores active, the same processor can run those cores at **3.06GHz**. Similarly, a **2.66GHz four-core E5640** processor can run at **2.8GHz** or even **2.93GHz**. When the inactive cores are needed again, they are dynamically turned back on and the processor frequency is adjusted accordingly.

Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.

Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system.

Intel's **Virtualization Technology** (VT) integrates hardware-level virtualization hooks that allow operating system vendors to better utilize the hardware for virtualization workloads.

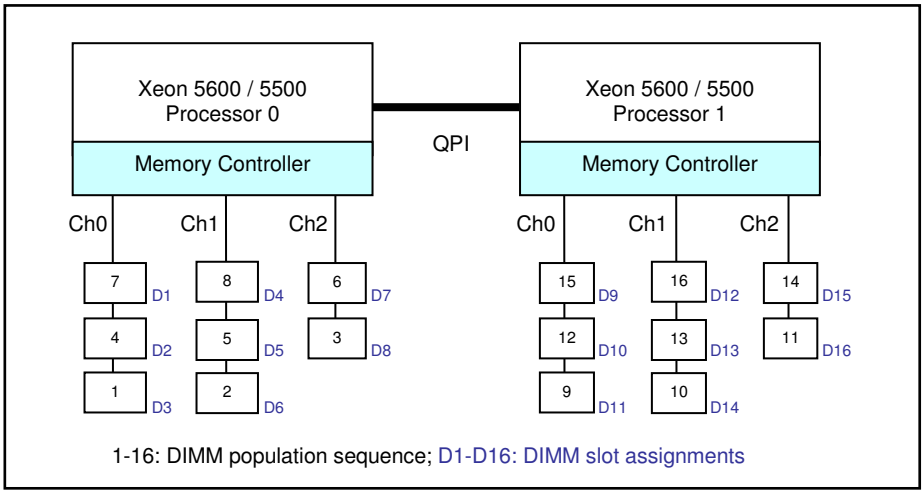
DDR-3 Registered Memory with Chipkill ECC Protection

The x3400 M3 ships with registered double data rate III (DDR-3) memory and provides Active Memory features, including advanced **ChipkiII** memory protection (optionally), for **up to 16X** better error correction than standard ECC memory. In addition to offering better performance than DDR-2 or fully-buffered memory, DDR-3 memory also uses less energy. DDR-2 memory already offered up to 37% lower energy use than fully buffered memory. Now, a generation later, DDR-3 memory is even more efficient, using **22% less energy** than DDR-2 memory.

The x3400 M3 supports up to **128GB** of **RDIMM** (registered DIMM) memory in **16** DIMM slots, or up to **24GB** of **UDIMM** (unbuffered DIMM) memory in **12** slots (**48GB** in **12** slots, as of 2Q/2010). Redesign in the architecture of the Xeon 5600 series processors bring radical changes in the way memory works in these servers. For example, the Xeon 5600 series processor **integrates the memory controller inside the processor**, resulting in two memory controllers in a 2-socket system. Each memory controller has three memory channels. Depending on the type of memory, population of memory, and processor model, the memory may be clocked at **1066MHz** or **800MHz**. (**1333Mhz** is available only via CTO.)

Note: If only one processor is installed, only the first eight DIMM slots can be used. Adding a second processor not only doubles the amount of memory available for use, but also doubles the number of memory controllers, thus doubling the system memory bandwidth. If you add a second processor, but no

additional memory for the second processor, the second processor has to access the memory from the first processor "remotely," resulting in longer latencies and lower performance. The latency to access remote memory is almost *75% higher* than local memory access. So, the goal should be to always populate both processors with memory.



1-16: DIMM population sequence; D1-D16: DIMM slot assignments

The **E5620**, **E5630**, and **E5640** models support up to **1066MHz** clock speed, and the **E550**x models support **800MHz** clock speed. Using 1066MHz memory (where supported) versus 800MHz offers up to **28%** better performance. **X5650** through **X5670** processors, supporting up to 1333MHz clock speed, are available via CTO,

Xeon 5600 series processors access memory with almost **50% lower latency** than the earlier 5400 series processors. That can result in faster processing of latency-sensitive workloads.

This new processor design comes with some trade-offs in memory capacity, performance, and cost: For example, **greater memory capacity** comes with **lower memory speed**. Alternatively, it is possible to achieve the **same memory capacity at lower cost** but **at a lower memory speed**.

Regardless of memory *speed*, the Xeon 5600 platform represents a significant improvement in memory *bandwidth* over the previous Xeon 5400 platform. This improvement is mainly due to the dual integrated memory controllers and faster DDR-3 memory. Throughput at 800MHz is **25 gigabytes per second** (GBps), and at 1066MHz it's **32GBps**. This improvement translates into improved application performance and scalability.

The new Xeon 5600 series processor also supports the new low voltage (LV) **1.35V** DIMMs.

Memory interleaving refers to how physical memory is interleaved across the physical DIMMs. A balanced system provides the best interleaving. A Xeon 5600 processor-based system is balanced when all memory channels on a socket have the same amount of memory.

A memory rank is simply a segment of memory that is addressed by a specific address bit. DIMMs typically have 1, 2 or 4 memory ranks, as indicated by their size designation.

- A typical memory DIMM description is 2GB 4Rx8 DIMM
- The 4R designator is the rank count for this particular DIMM (4R = quad-rank)
- The x8 designator is the data width of the rank

It is important to ensure that DIMMs with appropriate number of ranks are populated in each channel for optimal performance. Whenever possible, **it is recommended to use dual-rank DIMMs** in the system. Dual-rank DIMMs offer better interleaving and hence better performance than single-rank DIMMs. For instance, a system populated with six 2GB *dual*-rank DIMMs outperforms a system populated with six 2GB *single*-rank DIMMs by **7%** for SPECjbb2005. Dual-rank DIMMs are also better than quad-rank DIMMs because **quad-rank DIMMs will cause the memory speed to be down-clocked**.

Another important guideline is to populate equivalent ranks per channel. For instance, **mixing one single-rank DIMM and one dual-rank DIMM in a channel should be avoided**.

Note: It is important to ensure that all three memory channels in each processor are populated. The relative memory bandwidth decreases as the number of channels populated decreases. This is because the bandwidth of all the memory channels is utilized to support the capability of the processor. So, as the channels are decreased, the burden to support the requisite bandwidth is increased on the remaining channels, causing them to become a bottleneck.

RDIMMs and UDIMMs **cannot** be used in the same server. Different brands of DIMMs should **not** be mixed, due to possible timing issues.

For increased availability, the x3400 M3 offers an additional (but mutually exclusive) level of IBM Active Memory protection: online **memory mirroring**.

Memory mirroring works much like disk mirroring. The total memory is divided into two channels. Data is *written concurrently to both channels*. If a DIMM fails in one of the DIMMs in the primary channel, it is instantly disabled and the mirrored (backup) memory in the other channel becomes active (primary) until the failing DIMM is replaced. One-half of total memory is available for use with mirroring enabled. (***Note:*** Due to the double writes to memory, performance is affected.)

Mirroring is handled at the hardware level; no operating system support is required.

DDR3 memory is currently available in **1GB**, **2GB**, **4GB** and **8GB** RDIMMs, or **1GB** and **2GB** UDIMMs. (**4GB** UDIMMs are planned for 2Q/2010.) DIMMs are installed individually (not in pairs). However, for performance reasons, in a 2-processor system, it's best to install matching DIMMs for each processor.

Maximum memory capacity and speed in 2-processor configurations include:

Memory Frequency	DIMMs per Channel	Max. Memory Capacity *	5600 Series	5500 Series
1333MHz (CTO only)	1 (6 DIMMs)	48GB RDIMM 24GB UDIMM	X5650 and above	N/A
1333MHz (CTO only)	2 (12 DIMMs)	96GB RDIMM 48GB UDIMM	X5650 and above	N/A
1066MHz	2 (12 DIMMs)	96GB RDIMM 48GB UDIMM	E5620 and above	E5520 and above
800MHz	3 (16 DIMMs)	128GB RDIMM 48GB UDIMM	E5620, and above	E5502 - E5507 and above
800MHz-1333MHz (Mirroring)	3 (12 DIMMs)	96GB RDIMM 24GB UDIMM	E5620, L5609, and above	E5502 - E5507 and above

Hot-Swap/Redundant Components

System availability is maximized through the extensive use of hot-swap and redundant components, including:

- **Redundant memory protection** (with **memory mirroring** enabled) and **Chipkill** protection
- **Hot-swap, redundant hard disk drives** (with **RAID-1**/**10** protection standard, and **RAID-1E**/**5**/**50**/**6**/**60** protection optional)
- **Hot-swap, redundant power supplies** (model dependent)

Large HDD Storage Capacity

The x3400 M3 offers a choice of disk storage, supporting up to **four** 3.5-inch **hot-swap** or **simple-swap** Serial ATA (**SATA**) drives, **four** 3.5-inch **hot-swap** high-performance Serial-Attach SCSI (**SAS**) drives or **eight** 2.5-inch **hot-swap SAS** or **SATA** drives. **Eight 3.5-inch** or **sixteen 2.5-inch** hot-swap SAS/SATA drives are available via CTO.

3.5-inch SAS

- **15,000** RPMs — 73.4, 146.8, 300, 450,or **600GB** (**2.4TB** maximum standard / **4.8TB** via CTO)

3.5-inch SATA—Hot-Swap

- **7,200** RPMs — 250 or 500GB, 1TB, or **2TB** (**8TB** / **16TB**)

3.5-inch SATA—Simple-Swap

- **7,200** RPMs — 250 or 500GB, or **2TB** (**8.0TB** / **16TB**)

2.5-inch SAS

- **7,200** RPMs — **500GB (4TB** / **8TB)**
- **10,000** RPMs — 146.8 or **300GB** (**2.4TB** / **4.8TB**)
- **15,000** RPMs — 73.4 or **146.8GB** (**1.17TB** / **2.34TB**)

2.5-inch SATA

- **7,200** RPMs — 160 or **500GB** (**4TB** / **8TB**)

Notes: Hot-swap and simple-swap SATA drives offer exactly the same reliability as fixed SATA drives. Only the system *availability* improves using the swappable drives. (Less downtime is incurred removing and installing the drives.) Hot-swap SAS drives use the Converged Tray for interchangeability with other IBM System x™ systems.

Drive Bays

The x3400 M3 can contain up to **19** drive bays (in 2.5-inch models) or **11** bays (in 3.5-inch) models. **2.5-inch** models support **eight** small form-factor (SFF) **hot-swap SAS** drives standard. **3.5-inch** models support **four hot-swap SAS** or **SATA II** drives, or **four simple-swap SATA II** drives standard. Support for **eight 3.5-inch** or **sixteen 2.5-inch** drives is available by CTO. In addition, there are **three 5.25-inch** bays.

An internal **full-high** tape drive can be installed using **two** of the 5.25-inch drive bays; alternatively, an internal **half-high** tape drive can be installed using **one** of the 5.25-inch drive bays. The tape drive must have a **USB 2.0** interface. (Models with eight 3.5-inch bays do not support tape or half-height optical drives.)

In addition, a **half-high DVD-ROM** drive with a SATA interface ships standard in the other 5.25-inch bay. (Models with eight 3.5-inch bays support only slim type optical drives.) An external USB floppy drive may be used, if needed.

Hot-swap drives may be inserted or removed through the front of the server without powering off the system. Simple-swap drives may also be installed and removed through the front, but requires powering off the server first.

For still more storage, a direct-attach, NAS or SAN external expansion option can be added, using an optional controller.

Disk/Tape Controllers

All 3.5-inch **hot-swap** x3400 M3 models include an integrated hardware-based IBM **ServeRAID-BR10il V2 SAS/SATA controller**. This controller supports SAS and SATA drives. (Simple-swap models use the SATA support incorporated in the system chipset.) The **ServeRAID-M1015 SAS/SATA** controller is included in the hot-swap models featuring **eight** 2.5-inch drives. Supported ServeRAID controllers include:

The 3Gbps[7] (x4 PCIe) **ServeRAID-BR10il V2** controller offers hardware **RAID-0/1/1E** support (no cache) for up to 4 HDDs.

The standard/optional **6Gbps** (x8 PCIe) **ServeRAID-1015 SAS/SATA** controller supports **RAID-0/1/10** (no cache) for up to 16 drives. The **IBM ServeRAID M1000 Series Advance Feature Key** adds **RAID-5** and Self-Encrypting Disk (**SED**) support.

The standard/optional **6Gbps** (x8 PCIe) **ServeRAID-M5014 SAS/SATA** controller offers enhanced performance with **256MB** of cache memory, and supports **RAID-0/1/10/5/50** for up to 16 drives**.**

The optional **6Gbps** (x8 PCIe) **ServeRAID-M5015 SAS/SATA** controller offers enhanced performance with **512MB** of cache memory and battery backup, and supports **RAID-0/1/10/5/50** for up to 16 drives.

The optional **IBM ServeRAID M5000 Series Advance Feature Key** adds **RAID-6/60** and **SED** support to the M5014 and M5015. The **IBM ServeRAID M5000 Series Battery Key** adds **battery backup** support to the M5014.

For external storage, the 3GBps **ServeRAID-MR10M** controller enables connection to up to four IBM System Storage EXP3000 SAS expansion units (48 HDDs total). It provides RAID-0/1/10/5/50 support and **256MB** of onboard cache.

x3400 M3 models with the ServeRAID-BR10il V2 controller installed can be upgraded to any of the other ServeRAID controllers. Those with the M1015 controller standard can upgrade to the M5014 or 5015 controller. Models equipped with the ServeRAID-M5015 controller can upgrade to the 5015 controller. Any of them can be replaced with the MR10M controller for external storage needs, or it can be installed additionally in one of the standard PCIe slots.

Internal Backup

The x3400 M3 supports several internal data backup options. Supported technologies include:

- **DDS-5** tape (half-high)
- **DDS-6** tape (half-high)
- **RDX** Removable Disk Cartridge **– Internal/External** (half-high)
- **LTO-3 Ultrium** tape (half-high)
- **LTO-4 Ultrium** tape (half-high)
- **LTO-5 Ultrium** tape (half-high)

High-Performance Adapter Slots

The x3400 M3 provides **six** adapter slots standard: **five PCIe Gen 2** slots and **one** legacy **PCI** slot. **PCI Express** Gen 2 is the next-generation of high-performance, low-latency, serial I/O bus. **Slot 2** is a **x16** ("by 16") physical/**x8** electrical **PCIe (PCI Express) Gen 2 full-length/full-height** adapter slot. This means that although the slot runs at **x8 Gen 2** speeds (**8GBps**), it can accept a x16 Gen 2 adapter in the slot. It is also capable of supporting **x1/x4/x8** adapters at full speed. In addition to this slot, the x3400 M3 also

[7] Data transfer rates depend on many factors and are often less than the maximum possible.

includes two **x8 physical/x8 electrical Gen 2** slots (**8GBps**), two **x8 physical/x4 electrical Gen 2** slots (**4GBps**), and one **33MHz legacy PCI** slot. As part of a configure-to-order (CTO) build, two choices of riser card can be added, with either **two 133MHz PCI-X** slots (8 total) or one PCIe **x8 physical/x4 electrical Gen 1** (**2GBps**) slot (7 total).

Slot 1 is a **half-length/full-height PCIe** slot; **slots 2, 3, 4** and **5** are **full-length/full-height** PCIe slots, and **Slot 6** is a **half-length/full-height 33MHz** legacy **PCI** slot. The **PCI-X** riser contains two **full-length/full-height** slots.

Dual-Port Gigabit Ethernet Controller

The x3400 M3 includes **one dual-port** integrated **Broadcom 5716** Gigabit Ethernet controller for up to 10X higher maximum throughput than a 10/100 Ethernet controller, as well as support for **PXE 2.0 remote boot**, and **jumbo frames** (9KB).

Jumbo Frames—those larger than the standard frame (packet) size of 1,500 bytes—can be more efficient, dramatically increasing network performance and reducing server CPU overhead.

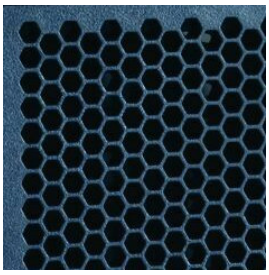
It also supports highly secure remote power management using **IPMI 2.0**, plus **Wake on LAN®** and **PXE** (Preboot Execution Environment) flash interface. Optional PCIe adapters offering failover and load balancing between adapters are available for added throughput and increased system availability.

Integrated Ethernet ports:

- 3 Gb RJ45 Ethernet ports, ideal for virtualization and I/O-intensive workloads
- 2 ports standard for Gb Ethernet and plus 1 dedicated Fast Ethernet port for systems management
- Primary performance improvement for data copying (CPU) where CPU utilization is 90-100%

Onboard Broadcom 5716 Gigabit Ethernet controller provides two Gigabit ports supporting IEEE 802.3 for 1000Base-T, 100Base-TX, and 10Base-T applications (802.3, 802.3u, 802.3ab) over a CAT 5 twisted-pair cable.

Ultra-Efficient Cooling



Strategically located fans, combined with efficient airflow paths, provide highly effective system cooling for the x3400 M3, known as **Calibrated Vectored Cooling**. The server includes **three hot-swap** fans (plus another in the power supply).

The system contains **three cooling zones**. **Zone 1** cools the **memory slots** and the three **5.25-inch drive bays**. **Zone 2** cools the **processors**, while **Zone 3** cools the **adapter slots** and the **HDD bays**.

The fans automatically adjust speeds in response to changing thermal requirements, depending on the zone, redundancy, and internal temperatures. When the temperature inside the server increases, the fans speed up to maintain the proper ambient temperature. When the temperature returns to a normal operating level, the fans return to their default speed. Why not simply run the fans at 100% capacity all the time? For several good reasons: to reduce the ambient noise, reduce the wear-and-tear on the fans and reduce the server power draw. The reduction in ambient noise and power draw may be relatively minor for a single server, but put dozens or hundreds in a data center and it can make a big difference!

In addition, the server uses **hexagonal ventilation holes** in the chassis. Hexagonal holes can be grouped more densely than round holes, providing greater airflow through the system cover.

This cooling scheme is important because newer, more powerful processors generate a significant amount of heat, and heat must be controlled for the system to function properly.

Other Features

- **Eight USB 2.0 ports** — Provides flexibility to add high-speed external devices. The USB 2.0 specification supports up to 480Mbps transfer rates. (Note: Not all USB 2.0 devices are capable of achieving this rate.) **Two** ports are provided on the front of the server, **four** are on the back, **one** is internal to support a USB-interface tape drive, and **one** is internal to support a USB flash drive for an embedded hypervisor.
- **Embedded hypervisor**; a USB port on the motherboard, activated with an optional USB key for supporting VMware ESXi for virtualization
- **IMM Virtual Media Key** — This optional feature adds local and remote management functions without consuming a valuable adapter slot.
- **Toolless chassis** — The cover can be opened without tools, and many components can be removed and replaced without tools, including the CD-RW/DVD combo drive, hot-swap drives, and PCIe/PCI-X adapters, as well as the integrated ServeRAID-BR10i controller, embedded hypervisor key, and IMM Virtual Media Key. This can save a servicer significant time.

Extensive System Support Features

The IBM services and technical support portfolio provides world-class, consistent, high-quality service and support. The x3400 M3 server offers a number of tools and services designed to make ownership a

positive experience. From the start, IBM programs make it easier for you to plan for, configure and purchase System x or xSeries servers, get them running and keep them running long-term. These features include IBM Express Portfolio, IBM ServerProven®, the IBM Standalone Solutions Configuration Tool, IBM System x and BladeCenter Power Configurator, IBM ServerGuide, IBM Systems Director Service and Support Manager, Product Customization Services and extensive technical support offerings.

This System x server is part of the **IBM Express Portfolio**, designed, developed and priced to meet the specific needs of midsized businesses. The IBM Express Portfolio of solutions is easy to acquire, install and manage. And they leverage IBM technology to provide tangible solutions to help you solve business problems in an on demand world.

The IBM **ServerProven** program provides the confidence that specific options and operating systems have been tested on the server and are officially supported to work together. It is updated frequently to ensure that the latest compatibility information is always at your fingertips.

The IBM **Standalone Solutions Configuration Tool** (SSCT) is a downloadable tool that simplifies the often complex chore of configuring a full rack of servers (including blade servers) and confirming that you have all the cables, power distribution units, KVM (keyboard, video and mouse) switch boxes and other components you need, as well as the proper airflow clearances, electrical circuits and other environmental conditions.

IBM **System x and BladeCenter Power Configurator** helps IT managers plan for data center power needs, by providing the following information for specific configurations of System x and BladeCenter systems: *power input* (watts), *PDU sizing* (amps), *heat output* (BTUs), *airflow requirements through chassis* (CFM), *VA rating*, *leakage current* (mA), and *peak inrush current* (amps).

IBM **ServerGuide** (installed from CD) simplifies the process of installing and configuring System x and xSeries servers. ServerGuide goes beyond mere hardware configuration by assisting with the automated installation of the Microsoft® Windows® Server 2000 and 2003 operating systems, device drivers and other system components, with minimal user intervention. (Drivers are also included for support of Novell NetWare, Red Hat Linux and SUSE LINUX.) This focus on deployment helps you reduce both your total cost of ownership and the complexity that administrators and technical personnel face.

IBM Systems Director Service and Support Manager (previously called IBM Electronic Service Agent™) is an innovative "call home" feature that allows System x and BladeCenter servers to automatically report hardware problems to IBM support, which can even dispatch onsite service[8] if necessary to those customers entitled to onsite support under the terms of their warranty or an IBM Maintenance Agreement. Electronic Service Agent resides on a server and provides electronic support and problem management capabilities through a highly secure electronic dialogue between your systems and IBM. It monitors networked servers for hardware errors and it can perform hardware and software inventories and report inventory changes to IBM. All information sent to IBM is stored in a highly secure database and used for improved problem determination.

Additional services include hardware warranty upgrades and factory-installed **Product Customization Services** (PCS), such as asset tagging, hardware integration, software imaging and operating systems personalization.

IBM offers extensive **technical support** by phone and via the Web. Support options include links to forums/newsgroups, problem submission, online shopping support, service offerings, device drivers for all IBM product lines, software downloads and even upcoming technical seminar worldwide schedules and registration. Also available are remote installation, configuration and usage support for System x and xSeries hardware and software, as well as onsite custom services to provide the level of expertise you require.

IBM Maintenance and Technical Support solutions can help you get the most out of your IT investment by reducing support costs, increasing availability and simplifying management with integrated support for your multiproduct, multivendor hardware and software environment. For more information on hardware maintenance, software support, solution support and managed support, visit http://**ibm.com**/services/maintenance.

Advanced Systems Management Capabilities

The x3400 M3 has a high level of systems management capabilities that are well-suited to remote locations as well as to stand-alone environments. Features include UEFI, IMM, IBM ToolsCenter, IBM Systems Director Active Energy Manager, Automatic Server Restart, Wake on LAN® support, PXE support, text console redirect, Predictive Failure Analysis, and IBM Systems Director.

The **Integrated Management Module** (**IMM**) provides industry-standard **Intelligent Platform Management Interface** (**IPMI**) **2.0**-compliant systems management. It provides a number of important system functions, including:

- Monitoring of system and battery voltage, system temperature, fans, power supplies, processor and DIMM status
- Fan speed control
- Product ID and Family ID detection

[8] For onsite labor, IBM will attempt to diagnose and resolve the problem remotely before sending a technician.

- Highly secure remote power on/off
- System reset control
- NMI/SMI detection and generation
- System diagnostic LED control (power, HDD, activity, alerts, heartbeat)
- IPMI over LAN
- Serial Over LAN
- Proxy server support
- LAN messaging and alerting
- Text console redirection over LAN
- Predictive Failure Analysis for system fans
- Web-based out-of-band control
- SSL (Secure Socket Layer) and LDAP (Lightweight Directory Access Protocol) support
- Enhanced authentication and encryption algorithms (RMCP+ and AES)
- VLAN support
- Local update of IMM firmware
- Firmware firewall
- Support for IPMI v2.0 compliant management software (e.g., xCAT)
- Other mandatory and optional IPMI IMM functions

The IMM alerts IBM Systems Director to anomalous environmental factors, such as voltage and thermal conditions—even if the server has failed.

The x3400 M3 also supports an optional IBM Virtual Media Key for additional systems management capabilities, including:

- Latest OS failure screen capture
- Graphical console redirection over LAN
- Remote virtual floppy and CD-ROM
- High-speed remote redirection of PCI video, keyboard and mouse

IBM **ToolsCenter** consolidates 42 needed tools for managing servers individually into an integrated suite of 8 tools. They are organized by function: deployment, updates, configuration and diagnostics. Tools are now simpler to access and use with a single webpage for access, a common look and feel and a common command line interface for the scripting tools. The ToolsCenter **Bootable Media Creator** offers significantly more functionality than past tools with the ability to add more tools to the bootable image and to automatically download the bootable environment if needed. Bootable Media Creator allows you to create bootable CDs, DVD, and USB keys for updates customized to your systems.

IBM developed IBM **Systems Director Active Energy Manager** to put control of system power-saving features at the fingertips of administrators. Active Energy Manager is designed to take advantage of new features, such as monitoring power usage and balancing the performance of the system according to available power input. It provides the ability to plan and predict power consumption based on your hardware configuration. It also helps enable you to reduce the infrastructure required for redundancy, by using fewer servers on smaller power feeds and potentially lowering your overall data center support costs. It does this by inventorying all components, then adding up the total power draw and tracking the usage. It also includes power management and capping features to help administrators manage or reduce power usage.

Automatic Server Restart (ASR) helps reduce downtime by restarting the server automatically in the event of a system lockup. ASR technology is a combination of hardware circuitry tied into the server's system reset function and a device driver. As long as the server continues running, the ASR watchdog timer will keep being reset, but if the operating system crashes or the hardware freezes somehow the ASR software will be unable to reset the hardware timer. If the timer is not reset within five minutes, it automatically triggers the ASR hardware, which immediately restarts the server (and logs an ASR event with IBM Systems Director). These features are designed so that *no more than five minutes can pass before the server is restarted*.

Wake on LAN permits the server to be remotely powered on if it has been shut off. Once powered up, the server can be controlled across the network, using the **Preboot Execution Environment** (PXE).

Like Wake on LAN, PXE is system firmware. It enables software such as the optional **IBM Remote Deployment Manager** to take control of a system before the BIOS, operating system or applications are loaded (using Wake on LAN/PXE) and lets an administrator perform many low-level tasks remotely that would otherwise require a visit to each system. These tasks may include such things as formatting a hard disk drive, updating system firmware, or deploying a Windows or Linux operating system.

Text Console Redirection support allows the administrator to remotely view x3400 M3 text messages

over serial or LAN. An optional IMM Virtual Media Key adds graphical console redirection.

Predictive Failure Analysis (PFA) is designed to allow the system to detect impending failure of supported components (processor, memory, HDDs, fans, VRM, and power supplies) *before* actual failure, and alert the administrator through IBM Systems Director. This gives you the ability to *replace* the failing component *before* it fails, resulting in increased uptime.

IBM Systems Director software for advanced workgroup management is included with the x3400 M3. IBM Systems Director comes with a portfolio of tools, including *Systems Director Active Energy Manager, System and Support Manager,* and other tools. *System Availability* (a no-charge download) and *Capacity Manager* (sold separately) are available as add-ons for additional server management and increased availability. IBM Systems Director provides a single uniform graphical interface for all of these systems management functions.

IBM Systems Director enables you to customize thresholds and monitor system components (for things like temperature, voltage regulation, etc.) to help maximize uptime.

Key Options

IBM options for System x servers help you take your servers to a higher level

You can rely on System x options to supply a complete solution for your business needs. Options help you create an optimized server system to meet your data protection, storage and availability needs. Every IBM option is designed and tested for peak performance and flexibility, helping to maximize your return on investment. The combination of System x servers and options lets you keep your fingers on the pulse of your e-business.

Processors — The Intel Xeon processor provides high clock rates, four cores, 64-bit extensions, a large cache and advanced features for availability and manageability. Large cache size, combined with fast **1066MHz** or **800MHz** memory access and an integrated memory controller reduce memory latency and facilitates the movement of data. (1333MHz support is available through CTO only). (***Note:*** System performance depends not only on the number of processors in the server but also on the power and functionality of each processor.) Adding a second processor may be a cost-effective way to achieve significant performance improvements.

Memory — Memory is a significant factor in systems application performance. Adding more memory to a System x server is one of the most effective ways to increase application performance. For best performance in a server with a four-core or six-core processor, there should be 2X or 3X (respectively) as much memory available as for a two-core processor.

Backup Drives — Backup drives help you protect your data. IBM offers several choices of capacities and technologies, including **DDS-5**, **DDS-6**, **LTO-3**, **LTO-4**, and **LTO-5** tape solutions, and the **RDX Removable Disk Cartridge** drive (both internal and external).

Hard Disk Drives — IBM hard disk drives help you improve the transaction and cost performance of your System x servers. The choice of hard disk drives can be a critical aspect of maximizing the I/O throughput of the system. For x3400 M3 systems with **2.5-inch** bays, **SAS** HDDs are available in capacities up to **300GB** apiece at **10,000** RPMs or up to **146.8GB** apiece at **15,000** RPMs. For large capacity nearline requirements, **500GB 7,200** RPM **SAS** and **SATA** drives are supported.

For systems with 3.5-inch bays, **SAS** HDDs are available with capacities up to **600GB** at **15,000** RPMs; **SATA** drives are available in capacities up to **2TB** at **7,200** RPMs.

Power Supply — The optional second power supply for the x3400 M3 enables redundancy for hot-swap power (model dependent). In addition, its 90%-efficient design helps lower your energy bill for power and cooling.

IMM Virtual Media Key — The x3400 M3 includes a plethora of systems management features built-in. The optional IMM Virtual Media Key not only offers powerful new features, it does so without taking up a valuable PCIe or PCI-X adapter slot, instead using a dedicated connector on the motherboard.

ServeRAID Controllers — System x servers using ServeRAID technology allow companies to build a reliable foundation for business-critical computing. IBM ServeRAID technology allows an array consisting of multiple physical hard disk drives to be treated as one logical drive. ServeRAID technology also allows data to be stored redundantly, across multiple hard disk drives— enhancing both the integrity and the availability of the data. SAS and SATA ServeRAID controllers offer enhanced performance due to onboard processors and cache. Because IBM ServeRAID controllers can help significantly improve data transfer rates, this technology is extremely effective when implementing demanding, transaction-oriented applications. By employing the advanced fault tolerance of IBM ServeRAID technology, companies can effectively implement networked business systems that require large amounts of storage space for data and applications that must be available for their businesses to continue operating.

The **ServeRAID-BR10il V2 SAS/SATA Controller** offers **RAID-0/1/1E** support, with up to **3Gbps** per SAS port. The IBM **ServeRAID-M1015**, x8 PCIe and **6Gbps**, offers RAID-0/1/10; optionally RAID-5 with **SED** support. The IBM **ServeRAID-M5014**, x8 PCIe and **6Gbps**, provides **256MB** cache and RAID-0/1/10/5/50; optionally RAID-6/60 with SED, and battery backup). The IBM **ServeRAID-M5015**, x8 PCIe and **6Gbps**, has **512MB** cache and RAID-0/1/10/5/50; optionally RAID-6/60 with SED, and battery backup. For external storage, the **ServeRAID-MR10M** controller provides **RAID-0/1/10/5/50** support and **256MB** of onboard

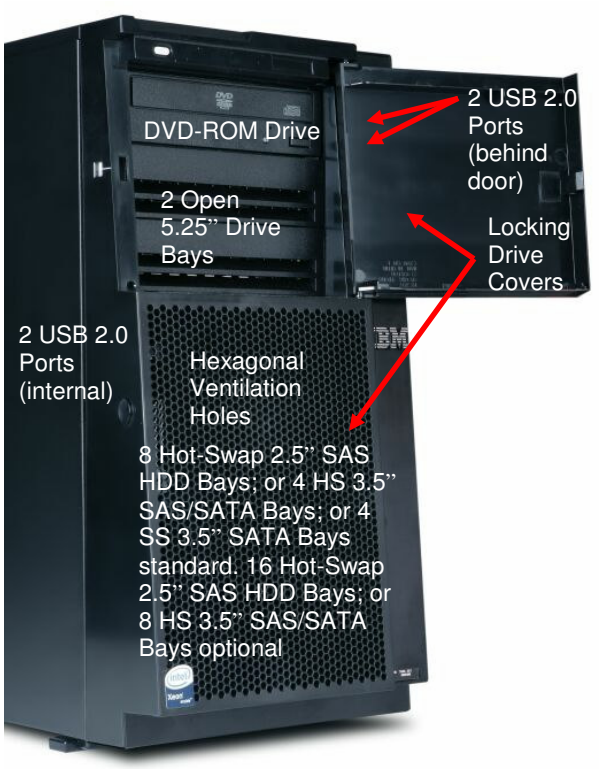
cache and enables connection to up to four IBM System Storage **EXP3000** SAS expansion units (48 HDDs total). The **IBM ServeRAID M1000 Series Advance Feature Key** adds **RAID-5** and **SED** support to the ServeRAID-M1015. Similarly, the **IBM ServeRAID M5000 Series Advance Feature Key** adds **RAID-6/60** with **SED** support to the M5014 and M5015. The **IBM ServeRAID M5000 Series Battery Key** adds **battery backup** support to the M5014.

External Storage — The IBM **System Storage EXP810** expansion units, as well as the **DS3000, DS4000, and DS8000** series storage subsystems and **N3000**, **N5000**, **N6000**, and **N7000** NAS systems comprise a powerful and broad shared storage family with integrated management software designed to meet midrange and enterprise needs.

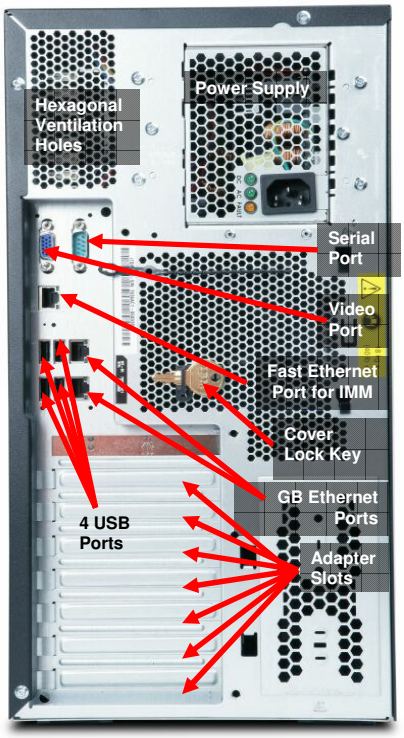
External SAN, iSCSI, and direct-attach storage is available using one of several IBM System Storage and TotalStorage host bus adapters. Additionally, external LAN-attached tape storage is available.

x3400 M3 Images

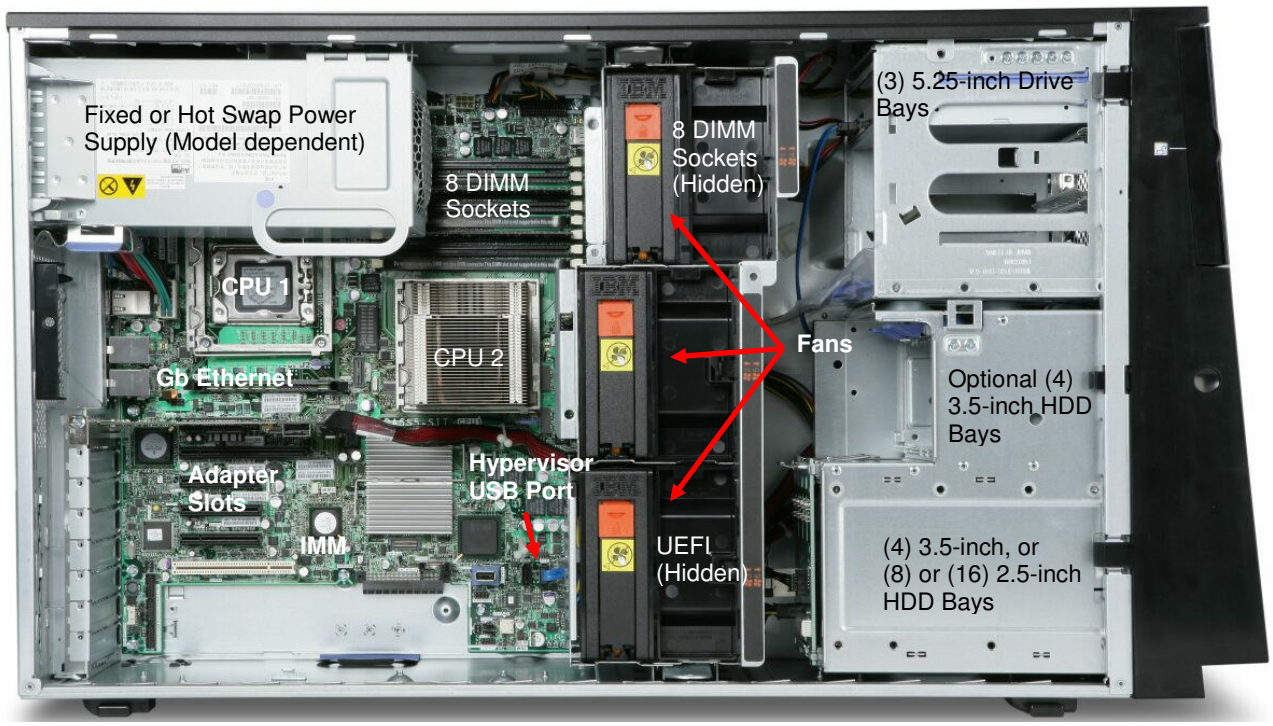
Front View



Rear View



Interior View



x3400 M3 Specifications			
Machine type	**7378-2xx, 3xx, 4xx, 5xx, 6xx, 7xx (1 yr. warr.)**[9]		**7379-2xx, 3xx, 4xx, 5xx, 6xx, 7xx (3 yr. warr.)**
Form factor	Tower (or 5U rack by CTO or optional conversion kit)		
BIOS type	Unified Extensible Firmware Interface (**UEFI**)		
Processor type	**6-Core** Intel **Xeon (X56xx)** **2.66GHz** X5650, **2.88GHz** X5660, **2.93GHz** X5679 (all by CTO only) **2-Core** Intel **Xeon (E55xx)** **2.00GHz** E5503 (22x/24x)	**4-Core** Intel **Xeon (E56xx)** **2.4GHz** E5620 (52x), **2.53GHz** E5630 (62x), **2.66GHz** E5640 (72x)	**4-Core** Intel **Xeon (E55xx)** **2.13GHz** E5506 (32x/34x), **2.26GHz** E5507 (42x), **2.0GHz** E5504 (CTO), **2.26GHz** E5520 (CTO), **2.4GHz** E5530 (CTO), **2.53GHz** E5540 (CTO)
Maximum processor power draw	**95W** (**X5650**/**X5660**/**X5679**—via CTO only)		**80W** (standard)—All other models
QuickPath Interconnect (QPI) speed (gigatransfers per second)	**6.4GTps** (by CTO only)	**5.86GTps** (52x/54x, 62x, 72x)	**4.8GTps** (22x/24x, 32x/34x, 42x, and CTO)
# of processors standard / maximum	1 / 2		
Internal L3 cache	**12MB** (52x/54x, 62x, 72x, and CTO)		**4MB** (22x/24x, 32x/34x, 42x,and CTO)
Chipset	Intel 5520		
Standard memory (maximum 128GB[10]**)**	**8GB** (2 x 4GB)—62x, 72x	**4GB** (1 x 4GB)—52x/54x	**2GB** (1 x 2GB)—22x/24x, 32x/34x, 42x

[9] Models with a 1-year warranty are available only in selected geographies.
[10] Maximum memory and disk capacity may require the replacement of standard components with the largest supported component available.

x3400 M3 Specifications					
Total / Available DIMM slots	**16** / **14**—62x, 72x			**16** / **15**—All other models	
Memory types standard	**Registered** PC3-10600 DDR III ECC (**Chipkill** protection when using x4 DIMMs); single- or dual-rank				
DIMM types / capacities supported (* when available)	**PC3-10600** **1333MHz RDIMM** 1GB **single**-rank x8, 1.5V; 2GB **single**-rank **x4 1.35V**; 2GB **single**-rank **x4**, 1.5V; 2GB dual-rank x8 **1.35V**; 2GB dual-rank x8 1.5V; 4GB dual-rank **x4 1.35V**; 4GB dual-rank **x4** 1.5V; 8GB **single**-rank x8 1.5V; 8GB dual-rank **x4 1.35V** *			**PC3-10600** **1333MHz UDIMM** 1GB **single**-rank x8 1.5V; 2GB dual-rank x8 1.5V	
Maximum memory access speed	**1333MHz** (via CTO only)		**1066MHz** (52x/54x, 62x, 72x)		**800MHz** (22x/24x, 32x/34x, 42x)
DIMM capacities supported	1GB, 2GB, 4GB, 8GB				
# of DIMM sockets total / available	16 (8 per processor) / 15				
Online hot-spare memory supported	No				
Memory mirroring supported / # of DIMM sockets reserved for mirroring	Yes / 1 channel (3 slots per processor) active, 1 spare, 1 unused				
# of drive bays total / available	**19** / **18** (via CTO)		**11** / **10** (54x, 62x, 72x)		**7** / **6** (22x/24x, 32x/34x, 42x, 52x)
# of HDD drive bays total / available standard	**8** / **8** 2.5-inch **hot**-swap SAS/SATA (54x, 62x, 72x)		**4** / **4** 3.5-inch **hot**-swap SAS/SATA (24x, 34x, 42x, 52x)		**4** / **4** 3.5-inch **simple**-swap SATA (22x, 32x)
# of HDD drive bays total / available maximum	**16** / **16** 2.5-inch **hot**-swap SAS/SATA (via CTO)		**8** / **8** 3.5-inch **hot**-swap SAS/SATA (via CTO)		**4** / **4** 3.5-inch **simple**-swap SATA
# of 5.25-inch bays total / available	3 / 2 (SATA DVD-ROM installed)				
Maximum HDD capacity	**3.5-inch hot-swap SAS** Standard: **2.4TB** (4 x 600GB); Via CTO: **4.8TB** (8 x 600GB)	**3.5-inch hot-swap SATA** Standard: **8TB** (4 x 2TB); Via CTO: **16TB** (8 x 2TB)	**3.5-inch simple-swap SATA** Standard: **8.0TB** (4 x 2TB)	**2.5-inch hot-swap SAS** Standard: **4TB** (8 x 500GB); Via CTO: **8TB** (16 x 500GB)	**2.5-inch hot-swap SATA** Standard: **4TB** (8 x 500GB); Via CTO: **8TB** (16 x 500GB)
HDD capacities supported	**3.5-inch hot-swap SAS** 73.4, 146.8, 300GB, 450GB, **600GB** — **15K** RPMs	**3.5-inch hot-swap SATA** 250, 500, 1TB, **2TB** — **7.2K** RPMs	**3.5-inch simple-swap SATA** 250, 500, **2TB** — **7.2K** RPMs	**2.5-inch hot-swap SAS** 146.8, **300GB** — **10K** RPMs; 73.4, **146.8GB** — **15K** RPMs; **500GB** — **7.2K** RPMs	**2.5-inch hot-swap SATA** 160, **500GB** — **7.2K** RPMs
Disk drive technology	Hot-swap SAS/SATA			Simple-swap SATA	
# of HDDs standard	None				
# of optical drives standard	1 SATA **DVD-ROM** (in dedicated 5.25" bay)				
# of diskette drives standard	None (USB-attach)				
Internal tape drives supported	One **full-high** (uses two 5.25" bays); One **half-high** (uses one 5.25" bay)				

x3400 M3 Specifications			
Integrated disk controller	ServeRAID-**M1015** (no cache) internal SAS/SATA (**RAID-0/1/10**, optional RAID-5/50)—54x, 62x, 72x	ServeRAID-**BR10il V2** internal SAS/SATA (**RAID-0/1/1E**)—24x, 34x, 42x, 52x	Four-port integrated SATA—22x, 32x
Optional RAID controllers supported	ServeRAID-**M5015** (**512MB** cache) internal SAS/SATA—**RAID-0/1/10/5/50;** optional RAID-6/60, battery, SED (all models)	ServeRAID-**M5014** (24x, 34x, 42x, 52x/54x, 62x, 72x/74x)	ServeRAID-**M1015** (22x/24x, 32x/34x, 42x, 52x)
External disk drives supported	Yes, via ServeRAID-**MR10M** controller (**256MB** cache standard; RAID-0/1/10/5/50/6/60)		
# of adapter slots total / available	6 / 5 (7 via CTO; models with RAID controller will consume one slot		
# of PCIe x16 Gen 2 physical/x8 Gen 2 electrical slots (8GBps)	**1** full-height/full-length		
# of PCIe x8 Gen 2 physical/x8 Gen 2 electrical slots (8GBps)	**2** full-height/full-length (1 slot reserved for RAID card in hot-swap models)		
# of PCIe x8 Gen 2 physical/x4 Gen 2 electrical slots (4GBps)	**2** full-height/full-length		
# of PCIe x8 Gen 1 physical/x4 Gen 1 electrical slots (2GBps)	**None standard** (1 optional via CTO, by adding a PCIe extender card)		
# of PCI-X/133 slots (1GBps)	**None standard** (2 optional via CTO, by adding a PCI-X extender card)		
# of 33MHz legacy PCI slots	**1** full-height/half-length		
# of video ports	1		
Video controller	Matrox G200eV (in IMM)		
Video memory	16MB DDR2 SDRAM (shared with IMM)		
Maximum video resolution at 32-bit color	**1024x768** resolution (analog), with a color depth of 32 bits at **85Hz**; **1440x900** resolution (digital), with a color depth of 32 bits at **60Hz**		
Gigabit Ethernet controller	**1 dual-port** Broadcom **BCM5716**		
# of Gigabit Ethernet ports	2 (rear)		
# of Fast Ethernet ports (via) IMM	1 (rear)		
# of RS485 ports	None		
# of serial ports	1 (rear)		
# of parallel ports	None (USB-attached)		
# of PS/2 mouse ports	None (USB-attached)		
# of PS/2 keyboard ports	None (USB-attached)		
# of USB 2.0 ports	**8** total; **6** *external* (2 front, 4 rear) ports, plus **1** *internal* connector for tape drive and **1** *internal* connector for an embedded hypervisor (on USB flash drive)		
Integrated systems management controller	Yes (IMM)		
Optional systems management controller	None		
Light path diagnostics support	No		
Predictive Failure Analysis support	Processors, memory, HDDs, VRMs, fans, and power supplies		
Power supply size	**920W** universal, autoswitching (54x or CTO)	**670W** universal, autoswitching—all other	

x3400 M3 Specifications				
			models	
# of power supplies standard / maximum	1 / 2 (redundant—54x or CTO		1 / 2 (nonredundant)—all other models	
# of fans/blowers standard / maximum	3 / 3 (hot-swap; nonredundant)			
Heat emitted: minimum/maximum BTUs/Watts	693 / 2,788 (BTUs); 203 / 817 (Watts)			
Maximum altitude	7,000 ft; 2,133 m			
Operating temperature range	50 – 95º F; 10 – 35º C (up to 7,000 ft / 2,133m)			
Operating humidity range	8-80%			
Dimensions (HWD) / weight	**Tower** 17.3" (440mm) **H** 8.6" (218mm) **W** 30.2" (767mm) **D**	**Tower** 59.7 – 83.4 **lb;** 27.1 - 37.85 **kg** (min/max)	**Rack** 16.7" (424mm) **H** 8.6" (218mm) **W** 27.6" (702mm) **D**	**Rack** 56.9 – 79.3 **lb;** 25.8 - 36.0 **kg** (min/max)
Operating systems supported	Microsoft Windows Server 2008 32/64-bit, Microsoft Windows Server 2008 R2 64-bit, Microsoft Windows Server 2003 32/64-bit, RHEL 4/5 32/64-bit (with and without Xen), SLES 10/11 64-bit (without Xen), VMware ESX Server 4.0			
Length of limited warranty	**3 years** (parts and labor)[11] — Machine Type **7379**		**1 year** (parts and labor) — Machine Type **7378**	

The Bottom Line

The x3400 M3 is an extremely powerful system, incorporating leading-edge industry-standard features and adding IBM-unique innovations:

Performance

- **High-throughput processors** — Up to two **2.13** to **2.66GHz four-core** Xeon 5600 or 5500 series processors; up to two **2.00GHz** two-core Xeon 5500 series **processors**; up to two **six-core** Xeon 5600 series processors available via CTO.
- **Large cache** — **12MB** or **4MB** of L3 processor cache
- **64-bit extensions** (EM64T)
- **Fast memory** — Registered **PC3-8500 DDR-3** ECC DIMMs standard, operating at **1066MHz** or **800Mhz** (depending on processor model and memory configuration)
- **Fast disk technology** — Integrated **SAS** controller and slotless hardware-based **RAID-0** data (hot-swap models)
- **Fast communications** — Integrated **dual-port Gigabit Ethernet** controller standard, supporting **Jumbo Frames**,**.**
- **Fast I/O** — Five **PCIe x16 Gen 2** and **x8 Gen 2** adapter slots (with optional 6th PCIe slot via CTO)

Flexibility

- **Large memory capacity** — Up to **128GB** of registered DDR3 DIMMs, using **16** DIMM slots
- Up to eight or sixteen **2.5-inch hot-swap SAS** drives, **four 3.5-inch hot-swap SAS** or **SATA** drives, or **four 3.5-inch simple-swap SATA** drives (eight 3.5-inch drives available via upgrade kit or CTO)
- **Choice of disk storage** — Up to **16.0TB** of **3.5-inch hot-swa**p or **simple-swap SATA**; up to **4.8TB** of **3.5-inch hot-swap SAS**; up to **8.0TB** of **2.5-inch hot swap SATA**
- **High-performance external expansion** — **Eight** 480Mbps **USB 2.0** ports (two front, four rear, two internal)
- Hardware-based RAID support standard on hot-swap models; optional support for **RAID-6/60** with **full disk encryption** and **external storage**

[11] For terms and conditions or copies of the IBM Statement of Limited Warranty, call 800-772-2227 in the U.S. In Canada call 800-426-2255. IBM makes no representation or warranty regarding third-party products or services including those designated as ServerProven or ClusterProven. Telephone support may be subject to additional charges. For warranties including onsite labor, a technician is sent after IBM attempts to resolve the problem remotely. International warranty service is available in any country in which this product is sold.

- **Six** adapter slots (with optional 7th or 8th slot) —
  - **One x16/x8**[12] **PCIe Gen 2** slots (8GBps)
  - **Two x8/x8**[13] **PCIe Gen 2** slots (8GBps)
  - **Two x8/x4**[14] **PCIe Gen 2** slots (4GBps)
  - **One 33MHz PCI** slot (500MBps)
  - Optionally, **one x8/x4 PCIe Gen 1** slot or **two 133MHz PCI-X** slots (via CTO)
- Integrated **DVD/CD-RW** combo drive

Manageability, Serviceability and Availability

- **IBM Systems Director** systems management software, including:
  - Active Energy Manager
  - Service and Support Manager
- **Integrated Management Module (IMM)**:
  - **IPMI 2.0** compliance, including highly secure remote power control
  - **Text console redirection** systems management standard
  - Combines former **BMC** and **Remote Supervisor Adapter II** functions
- **Active Memory protection:**
  - **Advanced Chipkill** ECC memory protection
  - **Memory mirroring**
- Support for **highly available** optional hardware-based **RAID-1/10/1E/5/50/6/60** arrays
- **Hot-swap SAS/SATA** or **simple-swap SATA** hard disk drives
- **Ultra-efficient cooling** incorporating **Calibrated Vectored Cooling** features

Server Comparison Table

The following table shows the suggested uses for the respective IBM System x tower servers, including comparisons of the uses for which each server is best suited:

Important — Nice to Have — Can do without — ● Best — ◒ Better — ○ Good

Theme	Key Workloads	Requirements: Scalability	Floating Point Performance	Memory Throughput	Integer Performance	I/O and Storage	Density	High Availability	Systems Management	Security	Distributed Deployment	Towers: x3100 M3	x3200 M3	x3400 M3	x3500 M3
HPC	Cluster / HPC		■	■			■								
	Modeling & Simulation		■	■	■		■								
	High Performance DB			■	■	■									
	Business Intelligence		■	■	■		■			■					
Web 2.0 / Web 3D	Search		■	■	■		■			■					
	Content						■								
	Communities	■				■	■								
	Commerce		■	■	■		■	■		■					
	Collaboration						■								
Business Applications	ERP/SCM	■		■	■	■		■	■	■		○	○	◒	●
	CRM									■		○	◒	◒	●
	Hosted Client	■			■			■	■			○	○	◒	◒
	Point of Sale					■		■	■	■	■	◒	●	◒	○
	Branch Office							■	■		■	◒	●	●	●
Infrastructure Applications	Virtualization	■				■		■	■			○	○	○	●
	Business Continuity					■			■			○	○	○	◒
	Database			■		■		■				○	○	◒	●
	Email/Collaboration				■			■	■			◒	●	●	◒
	Security						■	■	■	■		◒	●	◒	●
	Web Serving						■		■			◒	◒	◒	●
	File & Print					■			■			●	●	●	◒

[12] The x16/x8 Gen 2 slot can accept x1, x4, x8, or x16 adapters running at x1, x4, x8, or x8 throughput, respectively.
[13] The x8/x8 Gen 2 slots can accept x1, x4, or x8 adapters running at x1, x4, or x8 throughput, respectively.
[14] The x8/**x4** Gen 2 slots can accept x1, x4, or x8 adapters running at x1, x4, or **x4** throughput, respectively.

For More Information

IBM System x Servers	http://**ibm.com**/systems/x
IBM Systems Director Service and Support Manager	http://**ibm.com**/support/electronic
IBM System x and BladeCenter Power Configurator	http://**ibm.com**/systems/bladecenter/powerconfig
Standalone Solutions Configuration Tool	http://**ibm.com**/servers/eserver/xseries/library/configtools.html
Configuration and Options Guide	http://**ibm.com**/servers/eserver/xseries/cog
ServerProven Program	http://**ibm.com**/servers/eserver/serverproven/compat/us
Technical Support	http://**ibm.com**/server/support

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MB, GB and TB = 1,000,000, 1,000,000,000 and 1,000,000,000,000 bytes, respectively, when referring to storage capacity. Accessible capacity is less; up to 3GB is used in service partition. Actual storage capacity will vary based upon many factors and may be less than stated.

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will depend on considerations such as the amount of multiprogramming in the user’s job stream, the I/O configuration, the storage configuration and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

Maximum internal hard disk and memory capacities may require the replacement of any standard hard drives and/or memory and the population of all hard disk bays and memory slots with the largest currently supported drives available. When referring to variable speed CD-ROMs, CD-Rs, CD-RWs and DVDs, actual playback speed will vary and is often less than the maximum possible.

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