

A highly available and expandable, rack-dense, 1U dual-socket SMP server, for application serving in Web environments



Product Guide

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IBM System x3550

Product Overview

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Outstanding performance and manageability in only 1U

Suggested Uses: Medium-to-large businesses requiring a general-purpose server in space-constrained data centers, and Scientific/Technical computing customers who require cluster nodes.

Your challenge is to do more with less—serve more Web pages, handle more secure connections, support more e-mail users—all while reducing costs and saving space. The **dual-socket IBM® System x3550**, incorporating **IBM X-Architecture™** features, meets that challenge. It supports the latest **quad- and dual-core Intel® Xeon™** processors (including **50W low-voltage quad-core** Xeon processors), designed with up to a leading-edge **1333MHz** front-side bus (FSB), **64-bit extensions (EM64T)**, and either **6MB** or **4MB** (dual-core) or **8MB** or **12MB** (quad-core) of L2 cache, to help provide you with the computing power you need to match your business needs and growth. In addition, the x3550 uses industry-standard **fully buffered 667MHz** memory with **Chipkill™ ECC** (Error Checking and Correcting) protection—for high performance and reliability. For even higher levels of availability, the x3550 also offers a choice of optional online hot-spare memory or memory mirroring. **Dual** integrated high-speed **Gigabit Ethernet** controllers with **TOE** (TCP Offload Engine) and **Jumbo Frame** support are standard, as are high-performance adapter slots (**PCI-E x8** and optional **PCI-X/133**).

All models offer impressive scalability, including dual-processor support, up to **32GB** of memory and a choice of high-performance hard disk drives with an internal storage capacity of **600GB** (**two 3.5-inch hot-swap Serial-Attached SCSI**), **587.2GB** (**four 2.5-inch hot-swap SAS**) or **2TB** (**two 3.5-inch simple-swap Serial ATA II**). The integrated SAS controller provides **hardware-based RAID-0/1/10** standard for SAS drives. (SATA models offer **firmware-based RAID 0/1** support standard.) Additional RAID support is available via the optional **IBM ServeRAID™** family of SAS and SATA controllers. The ultradense **1U** form factor allows businesses to increase their computing power and spread their workload without outgrowing their current data center. Up to **42** of these **1U** servers can be installed in a single 42U rack, for a total of up to **84** processors, offering tremendous deployment flexibility. Optional **Advanced Connectivity Technology (ACT)** interconnect cabling reduces cable clutter and cost and minimizes installation time when interconnecting many rack-mounted servers.

Standard in the x3550 is an integrated Baseboard Management Controller (BMC) that enables the user to manage and control the server easily—both locally and remotely. This high level of manageability is designed to keep costs down and the system up—even when network usage increases. The drop-down **light path diagnostics** panel enables quick servicing of the system if a problem develops. These advanced features help maximize network availability by increasing uptime, as do **simple-swap SATA HDDs**; **hot-swap/redundant SAS HDDs**, **power and fans**; **Active Memory™**; integrated **RAID**; **temperature-controlled fans** with **Calibrated Vektored Cooling™**; **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 the BMC, light path diagnostics, **IBM Director**, **IBM Systems Director Active Energy Manager for x86** (formerly known as PowerExecutive), **IBM ServerGuide™** and support for the optional slotless **Remote Supervisor Adapter II SlimLine**, the x3550 is designed for superior uptime.

If you need highly manageable, dual-socket/multi-core computing power in a rack-dense package, the x3550 is the ideal system.

Selling Features

Price/Performance

The x3550 offers numerous features to boost performance and reduce product and operating costs:

- Up to **two quad- or dual-core** Xeon processors, high-end **1333MHz** or **1066MHz** front side bus and **4MB** to **12MB** (processor-specific) of integrated Level 2 cache per processor, offer

superior performance capable of tackling the toughest jobs. **64-bit extensions** provide the flexibility to run 32-bit and 64-bit applications concurrently.

- **Low-voltage processors** draw less energy and produce less waste heat than high-voltage processors, thus helping to reduce data center energy costs. Some **dual-core** Xeon processors use only **65W**. This is half the wattage consumed by older 130W processors. The **50W** and **80W quad-core** processors are even more economical, consuming only **12.5W** and **20W** (respectively) per core, vs. 32.5W per core for the 65W dual-core processors.
- Ultra-fast **fully buffered 667MHz PC2-5300 DDR II ECC** memory with **Chipkill¹** protection provides speed and high availability.
- Two **high-speed PCI-E 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 33MHz and 66MHz conventional PCI slots.
- Integrated **ServeRAID-8k-I** provides **RAID-0/1/10** support at no extra charge and without consuming a valuable adapter slot. RAID-0 offers improved disk performance via data striping; RAID-1 offers disk mirroring for high availability, and RAID-10 combines the benefits of speed and availability. The x3550 is upgradeable to full **RAID-0/1/10/1E/5/6** support, using the optional ServeRAID-8k card. It also offers higher performance, due to the **256MB battery-backed onboard cache**.
- Up to **two 3.5-inch** or **four 2.5-inch** (depending on the model) **hot-swap SAS** hard disk drives offer high-performance with high availability. The SAS controller provides full-duplex (**2 x 300MBps**) data transfers for SAS drives. For lower cost and high capacity, other models support up to **two simple-swap Serial ATA** drives. The SATA II drives offer performance nearly equal to that of Ultra320 SCSI (**300MBps** half-duplex vs. 320MBps half-duplex, respectively). Alternatively, **2.5-inch** drives consume approximately *half the power* of 3.5-inch drives.
- The integrated **dual Gigabit Ethernet** controllers with **IPMI 2.0** support provide high-speed network communications. **Jumbo Frames** offer higher efficiency transfers for large data packets.
- The TCP Offload Engine (**TOE**) feature offers higher performance for TCP/IP traffic, with less overhead on the system processor.
- A **high degree of device integration**—including SAS or SATA, RAID, dual Gigabit Ethernet, systems management and video controllers—lowers costs and frees up valuable adapter slots.

Flexibility

The x3550 has the ability to grow with your application requirements, thanks to

- A choice of **quad-core** or **dual-core** processors with **1.6 to 3.16GHz** clock rates, **1333MHz** or **1066MHz** FSB, and **50W to 120W** maximum power draw.
- Up to **32GB** of high-speed fully-buffered DDR2 system memory.
- **Two available high-performance PCI-E** adapter slots in all models. Optionally, if desired, the riser card containing one of the PCI-E slots can be exchanged for a riser containing a **PCI-X/133** adapter slot.
- Installing the slotless **ServeRAID-8k** option upgrades the integrated **ServeRAID-8k-I** controller with **256MB** of low-cost, battery-backed cache to enable even higher-performance hardware RAID support, and allows the x3550 to offer **six** RAID levels: **RAID-0, 1, 10, 1E, 5** and **6**. The optional **MegaRAID 8480** controller supports up to **four** IBM System Storage™ **EXP3000** expansion units containing up to **48** SAS HDDs and **14.4TB** of external storage.
- The **six USB 2.0** ports are up to **40X** faster² than older **USB 1.1** ports. This provides speedy access to external HDDs (non-arrayed), optical drives, tape drives, and other USB devices. Two ports are on the front of the unit and four are on the back.
- A choice of up to **two** internal **3.5-inch hot-swap SAS** or **simple-swap SATA II** HDDs or **four 2.5-inch hot-swap SAS HDDs** (depending on the model) offer a variety of storage options. The 3.5-inch SAS models provide a maximum of **600GB** of internal **hot-swap** storage. The 2.5-inch SAS models support up to **587.2GB** of **hot-swap SAS** storage. The 3.5-inch SATA models provide a maximum of **2TB** of internal **simple-swap** storage.
- Alternatively, iSCSI or Fibre Channel-attached storage can be attached using IBM **System Storage** or **TotalStorage**® servers.

¹ All models require Chipkill-enabled DIMMs (provided standard) for Chipkill protection.

² Data transfer rates may be less than the maximum possible.

Manageability

Powerful systems management features simplify local and remote management of the x3550:

- The x3550 includes a **Baseboard Management Controller (BMC)** to monitor server availability, perform Predictive Failure Analysis, etc., and trigger IBM Director alerts. The BMC enables service personnel to use sophisticated diagnostic tools, such as light path diagnostics, to resolve problems quickly.
- Integrated **IPMI 2.0** support alerts IBM Director to anomalous environmental factors, such as voltage and thermal conditions. It also supports **highly secure remote power control** using data encryption.
- **IBM Systems Director Active Energy Manager for x86**, an IBM-exclusive, is designed to take advantage of new system power management features, by providing power monitoring and power capping features.
- **Text Console Redirection** support allows the administrator to remotely view x3550 text messages over Serial or LAN.
- **IBM Director** is included for proactive systems management and works with both the blade's internal BMC and the chassis' management module. IBM Director comes with a portfolio of tools, including *Management Processor Assistant*, *Rack Manager*, *RAID Manager*, *Update Assistant* and *Software Distribution*. In addition, IBM Director offers extended systems management tools for additional server management and increased availability. When a problem is encountered, IBM Director can issue administrator alerts via e-mail, pager, and other methods.
- An optional **Remote Supervisor Adapter II SlimLine** 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*. And it does all this without consuming a valuable adapter slot.

Availability and Serviceability

The x3550 provides many features to simplify serviceability and increase system uptime:

- x3550 servers use **Chipkill-enabled fully buffered** memory 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. **Fully buffered DIMMs** provide additional availability features, including CRC (cyclic redundancy check) monitoring.
- The x3550 offers selectable **online hot-spare memory** and **memory mirroring** for redundancy in the event of a noncorrectable memory failure
- **Toolless cover removal** provides easy access to upgrades and serviceable parts. Similarly, the **Remote Supervisor Adapter II SlimLine** and the **ServeRAID-8k** controller can be installed and replaced without tools. This means less time (and therefore less money) spent servicing the x3550. Similarly, **hot-swap/redundant HDDs, fans and power supplies**, as well as **online hot-spare** and **mirrored** memory, mean greater system uptime while these components are being serviced.
- New **toolless slides** ship with the server, together with a **Cable Management Arm (CMA)**, that allows the rack server to easily slide into place
- **IBM Thermal Diagnostics** allows the administrator to evaluate thermal data on the server without taking the hardware offline. This can provide greater server uptime.
- The **drop-down light path diagnostics panel** and individual light path LEDs quickly lead the technician to failed (or failing) components. This simplifies servicing, speeds up problem resolution and helps improve network availability.
- **Integrated RAID-1 disk mirroring** and **RAID-10 striped mirrored arrays** standard enable the server to keep operating in the event of a failure to any one drive.
- **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+**, **SHA-1**, **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**³ helps afford you peace of mind and greater investment protection than a one-year warranty does.

Key Features



High-Performance Xeon Processors

The x3550 supports up to two high-performance Intel Xeon processors, allowing you to upgrade to a second processor as your business needs require. The x3550 offers a choice of processor clock rates, FSB speeds and energy efficiency, including:

- **120W quad-core** Xeon processor models **X5450** or **X5460** at 3.0, 3.16GHz respectively with 64-bit extensions, a **1333MHz** FSB, and **12MB** of L2 processor cache (2 x 6MB)
- **50W quad-core** Xeon processor model **L5420** at 2.5GHz, with 64-bit extensions, *ultralow power draw (12.5W per core)*, a **1333MHz** FSB, and **12MB** of L2 processor cache (2 x 6MB)
- **80W quad-core** Xeon processor models **E5405**, **E5420**, **E5430**, **E5440** at 2.0, 2.5, 2.66, 2.8GHz (respectively), with 64-bit extensions, a **1333MHz** FSB, and **12MB** of L2 processor cache (2 x 6MB)
- **50W quad-core** Xeon processor models **L5310** or **L5320** at 1.6 or 1.86GHz (respectively), with 64-bit extensions, *ultralow power draw (12.5W per core)*, a **1066MHz** FSB, and **8MB** of L2 processor cache (2 x 4MB)
- **65W dual-core** Xeon processor model **E5205** at 1.86GHz, with 64-bit extensions, *low power draw*, a **1066MHz** FSB, and **6MB** of **shared** L2 processor cache
- **80W dual-core** Xeon processor model **5160** at 3.0GHz, with 64-bit extensions, *reduced power draw*, a **1333MHz** FSB, and **4MB** of **shared** L2 processor cache
- **65W dual-core** Xeon processor model **5140** at 2.33GHz, with 64-bit extensions, *low power draw*, a **1333MHz** FSB, and **4MB** of **shared** L2 processor cache
- **65W dual-core** Xeon processor model **5110** at 1.6GHz, with 64-bit extensions, *low power draw*, a **1066MHz** FSB, and **4MB** of **shared** L2 processor cache

Dual-core Xeon processors contain **two complete processor cores**; **quad-core** processors, similarly, contain **four** cores. Some processors contain one **unified** cache **shared** by all cores, while other processors have multiple **independent** caches (one per pair of cores). The shared cache is dynamically allocated between the cores as needed. The multiple cores appear to software as multiple physical processors. The dual-core processors offer considerably higher performance than a same-speed Xeon processor with a single core. Likewise, quad-core processors offer considerably higher performance than a same-speed Xeon processor with dual cores.

Intel **Extended Memory 64 Technology (EM64T)** 64-bit extensions allow the Xeon processor to use large memory addressing when running with a 64-bit operating system. This in turn lets individual software processes directly access more than 4GB of RAM, which was the limit of 32-bit addressing. This can result in much higher performance for certain kinds of programs, such as database management and CAD. Additional registers and instructions (SSE3) can further boost performance for applications written to use them. Contact your software provider to determine their software support for EM64T.

The **1066MHz** FSB (which connects memory to the processor) boasts a peak rate of **8.53GBps**, or up to **one-third** higher throughput at the same processor clock speed than an **800MHz** FSB (**6.4GBps**) used in older systems. The **1333MHz** FSB offers a peak rate of **10.67GBps**, or up to **two-thirds** higher throughput at the same processor clock speed than an **800MHz** FSB. This may result in much higher data transfer rates.

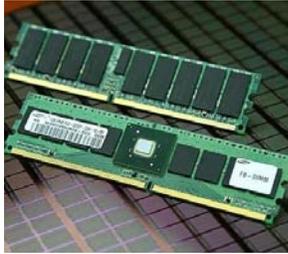
Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.

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

³ 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.

DDR II ECC Fully Buffered Memory with Chipkill Protection

The x3550 supports up to **32GB** of memory in **8** DIMM sockets. Some models include **two 512MB** DIMMs standard, while others ship with **two 1GB** DIMMs. The x3550 uses **PC2-5300 fully-buffered** double data rate II (DDR II) memory (operating at **667MHz**) for faster access, and provides Active Memory features, including advanced **Chipkill** memory protection, for **up to 16X** better error correction than standard ECC memory.



The fully buffered memory in the x3550 provides up to **triple** the memory bandwidth (up to **21.3GBps** in *four* channels of PC2-5300 fully-buffered DIMMs vs. a maximum of 6.4GBps in two channels of unbuffered PC2-3200 memory and up to **double** the system memory capacity (**8** DIMMs x **4GB**) of the predecessor x336 server (8 DIMMs x 2GB). By performing reads and writes simultaneously, it eliminates the previous memory read-to-write blocking latency. In addition, it also offers innovative data reliability and security features to help improve data integrity, including enhanced CRC protection, data retry on error detect and buffer registers for improved fault isolation.

For increased availability, the x3550 offers two additional (but mutually exclusive) levels of IBM Active Memory protection: online **memory mirroring**, and **online hot-spare memory**.

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. Mirroring can be accomplished with multiples of *four* DIMMs (one pair per memory channel). Up to **16GB** (four 4GB DIMMs) of memory is available for use with mirroring enabled. (**Note:** Due to the double writes to memory, performance is affected.)

When *online hot-spare memory* is enabled, using single and/or dual-rank DIMMs **one rank** is set aside per branch as online spares in case one of the other ranks fails. *The spare rank must have capacity at least that of the largest active rank*. Up to **24GB** (using 8 *single*-rank 4GB DIMMs) or **28GB** (using 8 *dual*-rank 4GB DIMMs) of memory is available when the hot-spare feature is active. (The lowest-numbered rank of those with the highest capacity in each branch is used for the hot-spares.)

Either of these features requires operating system support.

When multiples of four DIMMs (4 or 8) are installed, the x3550 operates in **four-way interleaved** mode, for higher performance. When only **two** DIMMs are used, the system defaults to **two-way interleaved** mode.

DIMMs must be installed in pairs. Memory is available in kits consisting of *two* **512MB**, **1GB**, **2GB** or **4GB** DIMMs.

Drive Bays

The x3550 contains *either two* or **four** drive bays in all, depending on the model. Some models offer **two 3.5-inch** bays that support **hot-swap SAS** or **simple-swap SATA II** drives. This enables up to two slimline (1.0") drives to be installed, totaling up to **600GB** (SAS) or **2TB** (SATA).

Other models feature **four 2.5-inch** bays that support **hot-swap SAS** drives totaling up to **587.2GB**.

Hot-swap drives may be inserted or removed through the front of the server without powering off the system. Simple-swap drives can be inserted or removed through the front of the server as well; however, the system power must first be turned off.

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

A **24X/24X/24X/8X⁴** speed (ultraslim, 0.5") CD-RW/DVD-ROM Combo drive with an IDE interface ships standard in all x3550 servers. No diskette drive is supplied with any model; an external USB floppy drive may be used, if needed.

⁴ Variable read rate. Actual playback speed varies and is often less than the maximum possible.

Disk Controllers

All SAS-equipped x3550 models include an integrated **Adaptec AIC9580W Serial-Attach SCSI (SAS)** controller. This controller supports up to **four** internal SAS LVD (low-voltage differential) drives. SATA models have a separate SATA controller, which supports up to two internal SATA drives.



The integrated **ServeRAID-8k-I** controller offers *hardware RAID-0/1/10* support and **32MB** of fast **PC2-4200 DDR2** cache for the SAS drives. The **ServeRAID-8k** option adds **three** additional RAID levels, **RAID-1E, 5** and **6**, along with **256MB** of cache memory for higher performance, and battery backup, *without* consuming a valuable adapter slot.

The **SAS** controller provides data transfer speeds of up to **300MB** per second⁵ in *each* direction (**full-duplex**) across the SAS bus, for an aggregate speed of **600MBps**, nearly double that of Ultra320 SCSI's **320MBps** (half-duplex) bandwidth. The serial design of the SAS bus allows maximum performance to be maintained as additional drives are added.

The **SATA** controller integrated in the SATA models supports up to **two** internal SATA II drives, with maximum data transfer rates of up to **300MB** (half-duplex) per second. This is throughput is similar to that of Ultra320 SCSI (**320MBps**, half-duplex). The SATA models also include firmware support for **RAID-0/1**. The system can be upgraded to *hardware*-based **RAID-0/1/10/1E/5/6** for higher performance, using the same IBM **ServeRAID-8k SAS/SATA** controller as the hot-swap server models.

For external storage, the **MegaRAID 8480** 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.

Additional external storage is available using one of several supported direct-attach, iSCSI or SAN controllers.

Large HDD Storage Capacity

The x3550 offers a choice of disk storage, supporting up to **two** (3.5-inch) or **four** (2.5-inch) **hot-swap** high-performance **SAS** drives, or **two** (3.5-inch) **simple-swap** **SATA** drives:

3.5-inch SAS

- **15,000** RPMs — 73.4, 146.8 or 300GB (600GB maximum)

2.5-inch SAS

- **10,000** RPMs — 73.4 or 146.8GB (587.2GB)
- **15,000** RPMs — 73.4GB (293.6GB)

3.5-inch SATA

- **7,200** RPMs — 160, 250, 500, 750GB or 1TB (2.0TB)



2.5-inch drives not only require less space than 3.5-inch drives, they *weigh less, consume half the power, produce less noise, seek faster, and offer increased reliability.*

Simple-swap SATA drives are *not* hot-swappable (the system must first be powered off); however, no tools or jumpers are required for installation and removal, allowing for faster, simpler servicing than fixed drives. The hot-swap SAS drives use the Converged Tray for interchangeability with other IBM System x™ systems. If you need more storage space, terabyte capacities are possible with external direct-attach, NAS and SAN solutions.

High-Performance Adapter Slots

The x3550 provides **two x8** ("by 8") **4GBps PCI-E (PCI Express)** adapters standard. Each is capable of supporting **x1/x4/x8** adapters at full speed. Both slots are **half-length/full-height**. If desired, the riser card containing slot **2** may optionally be replaced with one that provides **one half-length/full-height** (1GBps) **133MHz PCI-X** slot instead.



PCI-Express is a high-performance, low-latency, next-generation serial I/O bus that is rapidly replacing the older parallel PCI and PCI-X buses. A **x8** PCI-E adapter offers approximately *four times* the maximum throughput of a 133MHz PCI-X adapter⁶. (A **x1** adapter offers throughput similar to a **66MHz** PCI-X slot.)

Because the **SAS, ServeRAID-8k** and **8k-I**, dual **Gigabit Ethernet, systems management** and **video** controllers are integrated onto the system board, the two adapter slots are both *available*, which offers a wide degree of latitude in expansion options.

⁵ Data transfer rates depend on many factors and are often less than the maximum possible.



Dual Gigabit Ethernet Controllers

The x3550 includes **two** integrated **Broadcom 5708** Gigabit Ethernet controllers for up to 10X higher maximum throughput than a 10/100 Ethernet controller, as well as support for **Jumbo Frames** and **TOE** (TCP Offload Engine).

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. **TOE** helps improve overall system performance by offloading TCP/IP protocol processing from the system microprocessor to the onboard Ethernet TOE processor.

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

Ultra-Efficient Cooling

Strategically located fans, combined with efficient airflow paths, provide highly effective system cooling for the x3550, known as **Calibrated Vektored Cooling**. The base server with one power supply includes ten hot-swap fans, for redundant cooling. The second processor option also includes two more fans. In addition, each power supply also contains a fan.

The system contains **three cooling zones**. **Zone 1** (incorporating four fans) cools all 8 DIMM sockets. **Zone 2** (four fans) cools the primary processor, and **Zone 3** (two or four fans) cools the second processor.

The fans automatically adjust speeds in response to changing thermal requirements, from a minimum of **7,750 RPMs** to a maximum of **15,000 RPMs**, depending on the zone 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.

Light Path Diagnostics

Light path diagnostics enables a technician to quickly identify and locate a failed or failing system component, such as a specific fan or memory DIMM. This enables quick replacement of the component, which helps increase server uptime and lower operating costs.

The front of the server has an LED indicator light to show possible component failures. If the front LED indicates an error condition, by pressing a button on the front of the server an LED panel will pop out and drop down for easy viewing without the need to open the server cover or remove the server from the rack. The light path diagnostics panel tells the servicer which component requires attention. In addition, many components have their own identifying LEDs. For example, each of the eight memory modules has an LED next to the socket, as do both processors, all adapter slots, all fans, all power supplies, the voltage regulator module and the service processor, allowing the servicer to easily identify exactly which component needs servicing. By following the "light path," the component can be replaced quickly, and without guesswork. (**Note:** In the event of a failed DIMM, the system will restart and mark the DIMM as bad while offline, thus allowing the system to continue running, with reduced memory capacity, until serviced.)

Hot-Swap/Redundant Components

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

- **Redundant memory protection** (with online **hot-spare memory** or **memory mirroring** enabled)
 - **Hot-swap, redundant hard disk drives** (with **RAID-1/10** protection standard and three other
-

⁶ Actual throughput will depend on the adapter vendor's implementation.

A highly available and expandable, rack-dense, 1U dual-socket SMP server, for application serving in Web environments

RAID levels optional)

- **Hot-swap, redundant power supplies** (optional)
 - **Hot-swap, redundant cooling fans** (standard)
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Other Features

- **Six 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 and four on the back.
 - **Remote Supervisor Adapter II SlimLine support** — This optional full-function systems management adapter adds local and remote management functions without consuming a valuable adapter slot.
 - **Dual video ports** — An **ATI Radeon ES1000** SVGA video controller provides up to **1024x768** resolution, with a color depth of **32 bits** at **85Hz** refresh rate. To simplify local systems management, **one** video port is provided on the front of the unit and **one** on the back.
 - **Toolless slides** — Allows quick rack installation and quicker upgrade and servicing of the server.
 - **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 HDDs, plus PCI, PCI-X and PCI-E adapters, as well as the integrated ServerRAID-8k and Remote Supervisor Adapter II SlimLine. This can save a servicer significant time.
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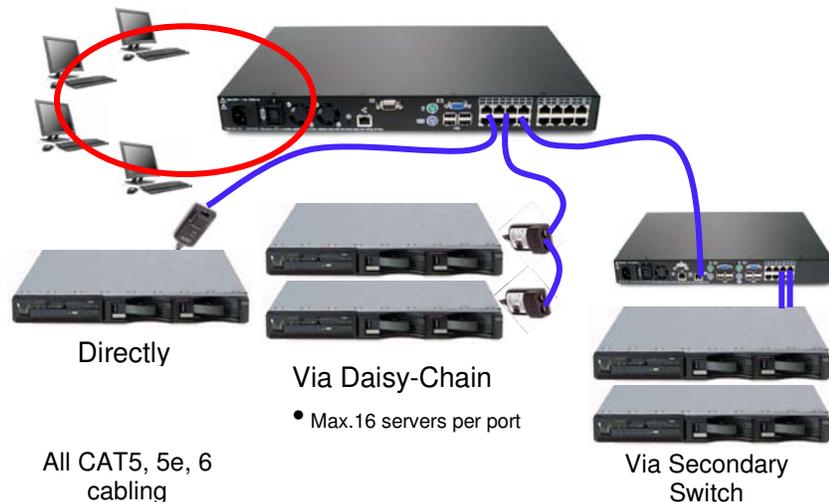


Rack Cable Management and KVM Console Switching

IBM Advanced Cabling Technology (**ACT**) is an optional feature that offers many advantages over standard KVM cabling across the entire System x and xSeries product line. So now you can interconnect all of your servers with one smart cabling architecture. ACT cabling eliminates the need for one-to-one direct connections between each server and a KVM switch by using a daisy-chain approach.

The snarl of cabling behind most racks is at best inconvenient to work around and at worst an expensive logistical nightmare, requiring the rewiring of servers, PDUs, KVM switches, and other equipment whenever a rack server is added or removed. Even worse, the veil of cables blocks rack airflow and can actually contribute to equipment failure due to overheating. ACT cabling is the solution for reducing behind-the-rack cabling by as much as **87%**.

The illustration below shows a sample ACT configuration:



Conventional cabling has bulky KVM cables exiting each server, which then connect to a KVM switch. The cables exiting a series of KVM switches must then be aggregated via additional KVM switches and PDUs, which only increases the number—and cost—of cables, KVM switches and PDUs. Instead, the daisy-chain approach of ACT cabling uses readily available, inexpensive CAT5 and 6 cabling to considerably *reduce* the number of cables, KVM switches, and PDUs needed, rather than increasing them. If a server is removed or added, no complicated rewiring is needed. One cable connects the first server in the rack to the next, and so on. Up to **16** servers

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form a chain; up to **8** chains can connect to one Local Console Manager (LCM); **16** LCMs can connect to one Global Console Manager (GCM). In this manner, up to **2,048 servers** can be centrally managed. Equally importantly, with ACT—unlike some other offerings—everything is done externally via cabling; *no special adapters are required.*

Extensive System Support Features

The IBM services and technical support portfolio provides world-class, consistent, high-quality service and support. The x3550 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[®], IBM Standalone Solutions Configuration Tool, IBM System x and BladeCenter Power Configurator, IBM ServerGuide, IBM Electronic Service Agent[™], Product Customization Services and extensive technical support offerings.



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 **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 service⁷ 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.

Advanced Systems Management Capabilities

The x3550 has a high level of systems management capabilities that are well-suited to remote locations as well as to stand-alone environments. Features include the Baseboard Management Controller (BMC), IBM Systems Director Active Energy Manager for x86, Automatic Server Restart, Wake on LAN[®] support, PXE support, text console redirect, Predictive Failure Analysis, IBM Director and support for an optional Remote Supervisor Adapter II SlimLine.

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

⁷ For onsite labor, IBM will attempt to diagnose and resolve the problem remotely before sending a technician.

-
- Monitoring of system and battery voltage, system temperature, fans, power supplies, processor and DIMM status
 - Fan speed control
 - Product ID and Family ID detection
 - 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
 - VLAN support
 - Enhanced authentication and encryption algorithms (RMCP+, SHA-1, AES)
 - Local update of BMC firmware
 - Firmware firewall
 - Support for IPMI v2.0 compliant management software (e.g., xCAT)
 - Other mandatory and optional IPMI BMC functions

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

The x3550 also supports an optional IBM **Remote Supervisor Adapter II SlimLine** for additional systems management capabilities, including:

- Predictive Failure Analysis for system fans
- Graphical console redirection over LAN
- Web-based out-of-band control
- Windows “blue screen” capture
- Remote virtual floppy and CD-ROM
- High-speed remote redirection of PCI video, keyboard and mouse
- SSL (Secure Socket Layer) and LDAP (Lightweight Directory Access Protocol) support

IBM developed IBM Systems Director Active Energy Manager for x86 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 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 x3550 text messages over serial or LAN. An optional upgrade to the **Remote Supervisor Adapter II SlimLine** adds graphical console redirection.

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

IBM Director software for advanced workgroup management is included with the x3550. IBM Director comes with a portfolio of tools, including *Management Processor Assistant, Rack Manager, RAID Manager, Update Assistant and Software Distribution*. *Systems Director Active Energy Manager for x86, System Availability* (a no-charge download) and *Capacity Manager* (sold separately) are available as add-ons for additional server management and increased availability. IBM Director provides a single uniform graphical interface for all of these systems management functions.

IBM 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 know 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, dual- or quad-cores, 64-bit extensions, a large cache and advanced features for availability and manageability. Large cache size, combined with a fast **1333MHz** or **1066MHz** front-side bus, reduces memory latency and facilitates the movement of data through the processor and I/O devices. (**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 dual-core processor, there should be twice as much memory available as for a single-core processor. The x3550 takes memory upgrades in pairs and provides either two-way or four-way interleaving (depending on the number of DIMMs installed).

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. **SAS** hard disk drives are available for the x3550 with capacities up to **300GB** (3.5-inch) apiece at **15,000 RPMs**, up to **146.8GB** (2.5-inch) apiece at **10,000 RPMs**, or up to **73.4GB** apiece (2.5-inch) at **15,000 RPM**. 3.5-inch Serial ATA hard disk drives are available with capacities up to **1TB** apiece at **7,200 RPMs**.

Power Supply — The optional second power supply for the x3550 enables redundancy for hot-swap power.

Remote Supervisor Adapter II SlimLine — The x3550 includes a plethora of systems management features built-in; however, sometimes additional management capability is needed. In those situations, the Remote Supervisor Adapter II SlimLine not only offers powerful new features, it does so without taking up a valuable PCI-X or PCI-E adapter slot, instead using a dedicated slot on the motherboard.

ServeRAID Controllers — System x servers using embedded ServeRAID-8k 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 optional **ServeRAID-8k SAS/SATA** controller offers enhanced performance over the

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integrated ServeRAID-8k-l controller (SAS models), **256MB** of battery-backed cache memory, and supports **six** RAID levels: **0** (striping), **1** (mirroring), **10** (mirroring and striping), **1E** (enhanced mirroring, supporting odd numbers of drives), **5** (striping with parity), and **6** (striping with double parity).

The optional **MegaRAID 8480** SAS controller offers high performance and **256MB** of cache memory (with optional battery backup) for *external* SAS storage capacity. The adapter supports **five** RAID levels: **0** (striping), **1** (mirroring), **10** (mirroring and striping), **5** (striping with parity), and **50** (striping/mirroring with parity).

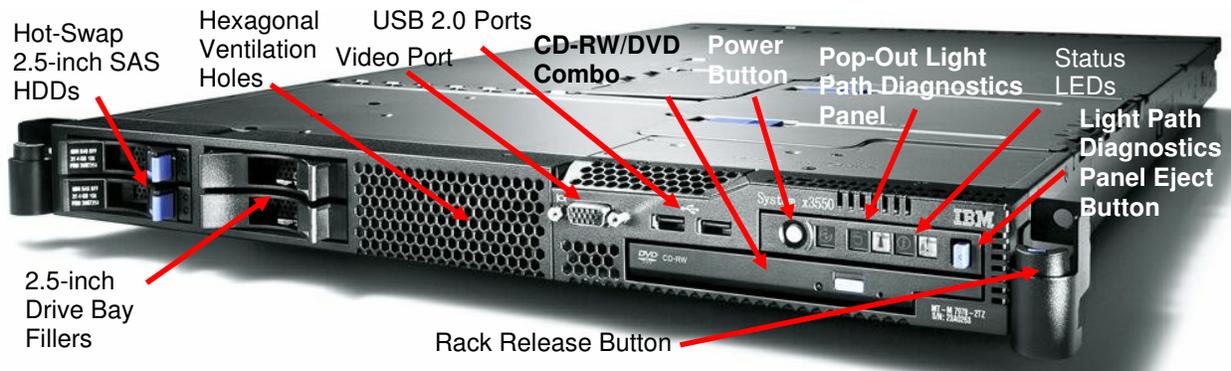
External Storage — The IBM **TotalStorage DS3000, DS4000, DS6000, and DS8000** series, as well as the **System Storage DS4000, N3000, N5000, and N7000** series, comprise a powerful and broad shared storage family with integrated management software designed to meet midrange and enterprise needs. For lower-end needs, IBM offers the TotalStorage **DS300** and **DS400** storage enclosures.

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.

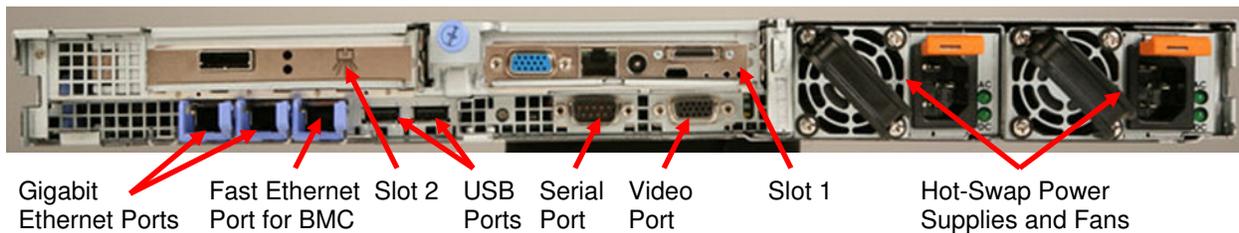
The **iSCSI HBA Adapter for IXA Connectivity** is a PCI adapter for selected System x and xSeries servers that provides a direct **1GBps** link to an IBM System i5 or iSeries server. This connection enables you to centralize your Microsoft Windows and System i5 or iSeries storage and consolidate the operations and backup of your System x, xSeries, System i5 and iSeries systems into a single infrastructure. It enables the tightest possible integration between Windows and System i5/iSeries data and applications, and allows as many as **32** servers to attach to one System i5 or iSeries system to share the iSeries server's systems management, DVD, tape and disk storage via the iSeries dynamic virtual storage architecture. This can take the place of a SAN if you have an established System i5 or iSeries infrastructure.

x3550 Images

Front View

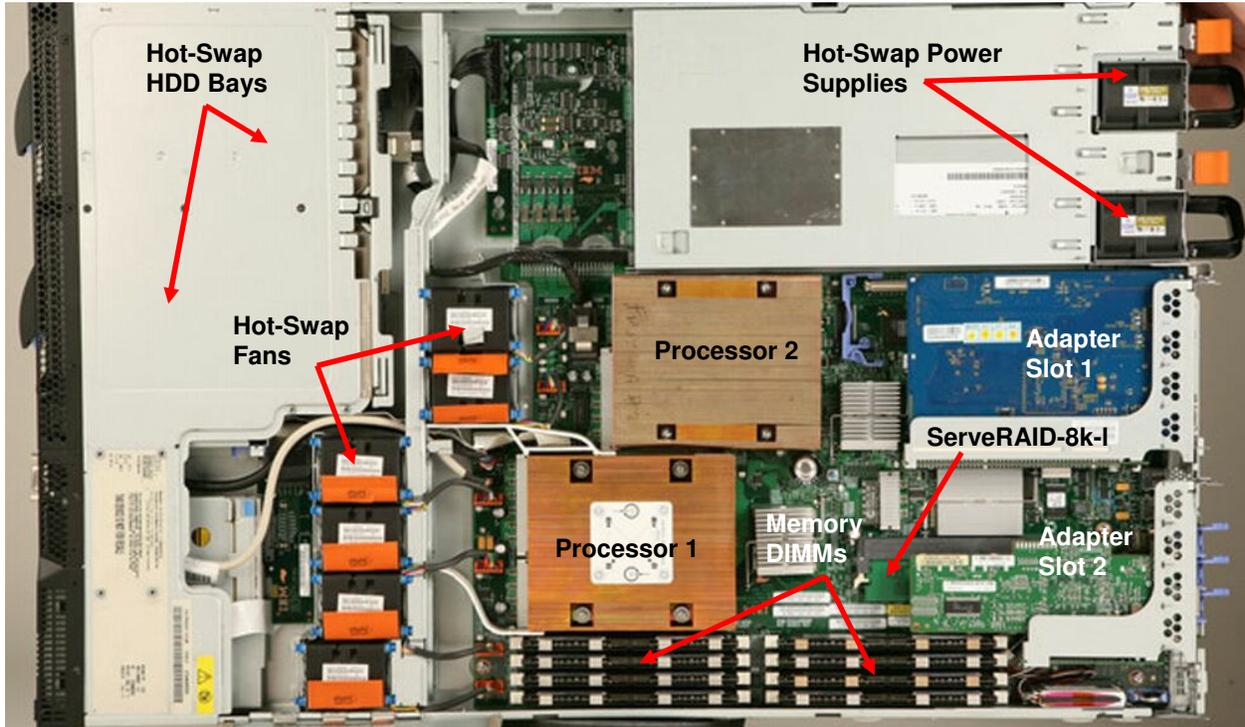


Rear View



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Interior View



x3550 Specifications				
Machine type	7978-2xX/2xY, 5xX/5xY, 7xX/7xY, JxX/JxY, LxX/LxY, MxX/MxY			
Form factor	1U			
Processor type	Quad-core Xeon (E54xx/L54xx/X54xx) 2.0GHz E5405 (B1X/B1Y, BAX/BAY), 2.5GHz E5420 (B3X/B3Y, BCX/BCY), 2.5GHz L5420 (LxX/LxY), 2.66GHz E5430 (B4X/B4Y, BDX/BDY), 2.8GHz E5450 (B5X/B5Y, BEX/BEY), 3.0GHz X5450 (B9X/BJY, BJX/BJY), 3.16GHz X5460 (B7X/B7Y, BGX/BGY)		Quad-core Xeon (E53xx/L53xx) 1.6GHz L5310 (JAX/JAY), 1.86GHz L5320 (JBX/JBY)	Dual-core Xeon (E52xx) 1.86GHz E5205 (MxX/MxY)
Maximum processor power draw	50W (JxX/JxY, LxX/LxY)	65W (2xX/2xY, 5xX/5xY, MxX/MxY)	80W (7xX/7xY, B1X/B1Y, B3X/B3Y, B4X/B4Y, B5X/B5Y, BAX/BAY, BCX/BCY, BDX/BDY, BEX/BEY)	120W (B7X/B7Y, B9X/B9Y, BGX/BGY, BJX/BJY)
Front-side bus (FSB) speed	1333MHz (5xX/5xY, 7xX/7xY, BxX/BxY, LxX/LxY)		1066MHz (2xX/2xY, JxX/JxY, MxX/MxY)	
# of processors standard / maximum	1 / 2			
Internal L2 cache	12MB (2 x 6MB shared cache)—BxX/BxY, LxX/LxY	8MB (2 x 4MB shared cache)—JxX/JxY, MxX/MxY	4MB (1 x 4MB shared cache)—2xX/2xY, 5xX/5xY, 7xX/7xY	

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x3550 Specifications			
Chipset	Intel 5000X		
Standard / maximum memory⁸	2GB (2 x 1GB) / 32GB (BxX/BxY, JxX/JxY, LxX/LxY, MxX/MxY)	1GB (2 x 512MB) / 32GB (2xX/2xY, 5xX/5xY, 7xX/7xY)	
Standard memory type	Fully buffered PC2-5300 (667MHz) DDR II ECC with Chipkill protection		
Memory interleaving	Yes (four-way using multiples of 4 DIMMs; two-way otherwise)		
DIMM capacities supported	512MB, 1GB, 2GB, 4GB		
# of DIMM sockets total / available	8 / 6		
Online spare memory supported / # of DIMM sockets reserved for sparing	Yes / 1 DIMM "rank" per memory branch (2 ranks total)		
Memory mirroring supported / # of DIMM sockets reserved for mirroring	Yes / 4		
# of drive bays total / available	3 / 2 (x1X/x1Y, x2X/x2Y, x3X/x3Y, x4X/x4Y, x5X/x5Y, x7X/x7Y, x9X/x9Y)	5 / 4 (xAX/xAY, xBX/xBY, xCX/xCY, xDX/xDY, xEX/xEY, xGX/xGY, xJX/xJY)	
# of HDD drive bays total / available	2 / 2 3.5-inch (x1X/x1Y, x2X/x2Y, x3X/x3Y, x4X/x4Y, x5X/x5Y, x7X/x7Y, x9X/x9Y)	4 / 4 2.5-inch (xAX/xAY, xBX/xBY, BCX/BCY, xDX/xDY, xEX/xEY, xGX/xGY, xJX/xJY)	
# of 5.25" bays total / available	1 / 0 (CD-RW/DVD installed)		
Maximum HDD capacity	3.5-inch SAS 600GB (2 x 300GB) hot-swap 3.5-inch SAS (x1X/x1Y, L2X/L2Y, x3X/x4Y, x3X/x4Y, x5X/x5Y, x7X/x7Y, x9X/x9Y)	2.5-inch SAS 587.6GB (4 x 146.8GB) hot-swap 2.5-inch SAS (xAX/xAY, xBX/xBY, BCX/BCY, xDX/xDY, xEX/xEY, xGX/xGY, xJX/xJY)	3.5-inch SATA 2TB (2 x 1TB) simple-swap 3.5-inch SATA (22X/22Y)
HDD capacities supported	3.5-inch SAS 73.4, 146.8, 300GB — 15K RPMs	2.5-inch SAS 73.4, 146.8GB — 10,000 RPMs; 73.4GB — 15K RPMs	3.5-inch SATA 160, 250, 500, 750GB, 1TB — 7,200 RPMs
# of HDDs standard	None		
# of optical drives standard	1 CD-RW/DVD Combo (24X/24X/24X/8X, in dedicated 5.25" UltraBay)		
# of diskette drives standard	None (optional)		
Internal tape drives supported	None (externally attached)		
Disk drive technology	Hot-swap SAS	Simple-swap SATA	
Integrated disk controller	Four-port Adaptec 9580W (SAS models); Processor chipset (SATA models)		
# of disk drives supported per port	1		
External disk drives supported	Yes, via MegaRAID 8480 controller		
Integrated RAID controller	ServeRAID-8k-I (32MB cache)—SAS models		
Optional RAID controllers supported	ServeRAID-8k (256MB cache)—internal SAS/SATA MegaRAID 8480 (256MB cache)—external SAS/SATA		
# of adapter slots total / available	4 / 4		
# of PCI-E x8 slots (4GBps)	2 (standard);		

⁸ Maximum memory and disk capacity may require the replacement of standard components with the largest supported component available.

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x3550 Specifications		
	full-height/half-length	
# of PCI-X/133 slots (1GBps)	None (1 optional, in place of 1 PCI-E slot)	
# of 33MHz legacy PCI slots	None	
# of video ports	2 (one front, one rear)	
Video controller	ATI Radeon ES1000	
Video memory	8MB SDRAM	
Maximum video resolution at 32-bit color	1024 x 758 x 32-bit color at 85Hz	
Gigabit Ethernet controller	Broadcom BCM5708	
# of Gigabit Ethernet ports	2 (rear)	
# of RS485 ports	None	
# of serial ports	1 (rear)	
# of parallel ports	None (USB-attached)	
# of mouse ports	None (USB-attached)	
# of keyboard ports	None (USB-attached)	
# of USB 2.0 ports	6 (2 front, 4 rear) ports	
Integrated systems management controller	Yes (BMC)	
Optional systems management adapter	Remote Supervisor Adapter II SlimLine	
Light path diagnostics support	Yes, with external pop-out/drop-down panel	
Predictive Failure Analysis support	Processors, memory, voltage regulator modules (VRMs), HDDs, power supplies (plus fans, when an optional Remote Supervisor Adapter SlimLine II is used)	
Power supply size	670W universal, autoswitching, hot-swap	
# of power supplies standard / maximum	1 / 2	
Hot-swap/redundant power supported	Yes (with two power supplies installed)	
# of fans/blowers standard / maximum	10 (with one processor installed)	12 (with two processors installed)
Hot-swap/redundant fans supported	Yes (standard)	
Rack mount method	Slides and Cable Management Arm (provided standard)	
Maximum altitude	7,000 ft; 2,133 m	
Operating temperature range	50 – 95° F; 10 – 35° C (up to 3,000 ft / 914.4 m)	50 – 90° F; 10 – 32° C (3,000 ft to 7,000 ft / 914.4m to 2,133m)
Dimensions (HWD) / weight	1.7" (43mm) H 17.3" (440mm) W 28.0" (711.4mm) D	28 (minimum) – 34.5 lb (maximum) 12.7 – 15.6 kg
Operating systems supported	Microsoft Windows Server 2003 R2 (Standard/Web/Enterprise Editions) 32/64-bit, Microsoft Windows 2000 Server (Standard/Enterprise Editions), Microsoft Small Business Server Standard Edition, RHEL 4/5 32/64-bit, SLES 9/10 32/64-bit, Novell Open Enterprise Server (NetWare 6.5), SCO UnixWare 7.1.4, SCO OpenServer 6, VMware ESX Server 2.5/3.0	

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x3550 Specifications

Length of limited warranty

3 years (parts and labor)⁹

The Bottom Line

The x3550 is an extremely powerful system, incorporating leading-edge industry-standard features and adding IBM-unique innovations:

Price/Performance

- **High-throughput processors** — 1.6 to 3.16GHz quad-core or 1.6 to 3.0GHz dual-core Xeon processors; up to 8 (quad-core) or 4 (dual-core) **processor cores** total
- **Energy-efficient low-voltage processors** — 50W quad-core and 65W dual-core Xeon processors
- **Large cache** — 12MB, 8MB, 6MB or 4MB of L2 processor cache
- **64-bit extensions** (EM64T)
- **Leading-edge front-side bus** — 1333MHz or 1066MHz FSB (model-specific)
- **Fast memory** — Fully buffered 667MHz PC2-5300 DDR II ECC memory standard with **two-way** or **four-way interleaving**
- **Fast disk technology** — Integrated **SAS** controller and slotless hardware-based **RAID-0** data striping and **RAID-10** striped/mirrored arrays, or **SATA** controller (model-specific)
- **Fast communications** — Integrated **dual Gigabit Ethernet** controllers, supporting **Jumbo Frames** and **TOE**
- **Fast I/O** — **PCI-E x8** adapter slots

Flexibility

- **Large memory capacity** — Up to **32GB** of **fully buffered memory**, using **8 DIMMs**
- The choice of **two 3.5-inch** or **four 2.5-inch hot-swap SAS** drives, or **two 3.5-inch simple-swap SATA II** drives
- **Choice of disk storage** — Up to **2TB** of internal SATA II storage, **600GB** of internal SAS storage (3.5-inch), or **587.2GB** of internal SAS storage (2.5-inch)
- **High-performance external expansion** — **Six 480Mbps USB 2.0** ports (two front, four rear)
- Hardware-based **RAID-0/1/10** support standard (in SAS models); optional slotless RAID support for **RAID-1E/5/6**
- **Two available** adapter slots —
 - Two x8¹⁰ PCI-E** slots (4GBps)
 - An optional riser card containing **one 133MHz PCI-X** slot can replace the riser card containing one of the PCI-E slots
- Integrated **DVD/CD-RW** combo drive
- **Two video ports** (one on the front and one on the back)
- Optional **iSCSI HBA Adapter for IXA Connectivity** (to System i™/iSeries™ servers)

Manageability, Serviceability and Availability

- **IBM Director** systems management software, including:
 - IBM Systems Director Active Energy Manager for x86
 - IBM Management Processor Assistant
 - IBM Rack Manager
 - IBM RAID Manager
 - IBM Update Assistant
 - IBM Software Distribution
 - IBM System Availability
- **IBM Systems Director Active Energy Manager for x86**

⁹ 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.

¹⁰ The x8 slots can accept x1, x4, or x8 adapters running at x1, x4, or x8 throughput, respectively.

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- **Integrated Baseboard Management Controller (BMC):**
 - ❑ **IPMI 2.0** compliance, including highly secure remote power control
 - ❑ **Text console redirection** systems management standard
 - **Active Memory protection:**
 - ❑ Advanced **Chipkill** ECC memory protection, and either
 - ❑ **Online hot-spare** memory, *or*
 - ❑ **Memory mirroring**
 - Slotless hardware-based **RAID-1** disk mirroring and **RAID-10** striped/mirrored arrays standard; optional slotless **RAID-1E/5/6** highly available arrays
 - **Hot-swap SAS** hard disk drives or **simple-swap SATA** drives
 - **Ultra-efficient cooling** incorporating **Calibrated Vektored Cooling** features and **hot-swap/redundant fans**
 - Optional **hot-swap/redundant power supplies**
 - **Light path diagnostics** (front LED panel, drop-down light path panel)
 - Optional **Remote Supervisor Adapter II SlimLine** daughter card (no slot required)
 - ❑ Supports **LDAP** and **SSL** industry standards
 - **Toolless chassis** and **toolless slide** design; integrated **Cable Management Arm**
-

For More Information

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