IBM

IBM *@server* xSeries 460 servers — XpandOnDemand with eServer x3 architecture

Overview

Models of the xSeries® 460 server are powered with Intel™ Xeon MP processors at up to 3.33 GHz / 8 MB L3.

The xSeries 460 server contains advanced technology that combines scalable SMP-capable power, Peripheral Component Interconnect-X (PCI-X) expansion, third-generation Enterprise X-Architecture™ (EXA), high availability, scalability and substantial internal data storage capacity.

With the power of third-generation EXA, the x460 establishes a new standard in the market for modular XpandOnDemand scalability with:

- Increased performance
- Memory availability
- System manageability
- Simultaneous support for 32-bit and 64-bit applications with x86-64-bit extensions

The xSeries MXE-460 server, functionally identical to the xSeries 460 server, supports the same hardware configurations. However, it is supported only as an expansion module to a base xSeries 460 and not in a stand-alone configuration. It comes configured with two empty 4-slot Memory Expansion Cards (13M7409) and two power supplies as standard, but without any processors, memory, disks or optical drive.

In addition to processors and memory, the six disk bays and six PCI-X I/O card slots in each chassis allow you to add up to a total of 48 hard disks and 48 I/O slots into a 32-way configuration, eliminating the need for an external I/O expansion enclosure.

Power and scalability for e-business growth

- XA-64e third-generation EXA chipset powering XpandOnDemand up to 32-way
- Intel 64-bit Xeon MP, up to 3.33 GHz with 8MB L3 Cache

- x86 64-bit extensions (EM64T) support 32-bit or 64-bit applications on the same platform
- Active Memory with hot-swap support — Memory ProteXion, memory mirroring, hot-swap and hot-add memory
- XceL4v Server Accelerator Cache delivers high performance with 256MB per chassis
- 2 GB of high-speed PC2-3200 double data rate (DDR2) memory; expandable to 512GB in a 32-way complex — higher performance and capacity with DDR2 Memory for larger databases
- 6 x 64-bit Active PCI-X 2.0 266 MHz slots per x460/MXE-460 increases I/O bandwidth for higher performance and productivity
- Serial Attach SCSI (SAS) plus optional RAID maximize throughput, ease installation of RAID option card
- Modular expansion with the 3U MXE-460 — MXE modular expansion enclosure powers easy upgrades to 32-way

EXA for around-the-clock e-business

- Advanced third-generation Chipkill™ ECC memory controller to help correct single-, two-, three- and four-bit memory errors
- Active PCI slots, hot-add and hot-swap adapters
- Hot-swap drive bays and redundant fans to replace select components without powering down the server
- Two hot-swap, redundant power supplies
- Predictive Failure Analysis® (PFA) on processors, memory, fans, power supply and HDD options to help warn of problems before they occur
- Innovative Light Path Diagnostics and top access design; easy to service and configure

Key prerequisites

- Monitor, keyboard and mouse
- SAS HDD or Serial Attach SCSI HDD
- Rack

At a glance

New xSeries 460 servers incorporate high-performance Xeon MP processors:

- Intel Xeon MP up to 3.33GHz/8MB L3 Cache
- Up to 512 GB of high-speed PC2-3200 ECC DDR2 SDRAM system memory
- Six Active 64-bit/266 MHz PCI-X 2.0 slots
- SAS controller
- Integrated Broadcom 5704 Dual-port 10/100/1000 Gigabit Ethernet
- Six 2.5 inch hot-swap bays for flexible installation of HDDs, supporting up to 440.4 GB[1] internal data storage
- Standard Remote Supervisor Adapter II Slimline, enabling remote, full-band systems management
- Two 1,300-watt, voltage sensing, hot-swap power supplies
- Standard DVD-ROM
- Three USB ports, SVGA video port, mouse port, two serial ports, two Gb Ethernet ports and one keyboard port per chassis

Service and support perfected for e-business

- IBM Director
- ServerGuide™
- UpdateXpress
- Dynamic Systems Analysis
- ServerProven® compatibility testing and Web support
- Three-year on-site[2] limited warranty[3]

Planned availability dates

- July 1, 2005 — Up to 8-way support
- Second half 2005 — 16-way and 32-way support

This announcement is provided for your information only. For additional information, contact your IBM representative.

Description

Related options

xSeries 2.83 GHz 667 MHz 1 MB L2 4 MB L3 Cache Upgrade with Xeon Processor MP (13N0715) supports internal processing speeds of 2.83 GHz and external processing operations to memory at 667 MHz. It contains an integrated, full-speed, 4 MB L3 cache.

xSeries 3.00 GHz 667 MHz 1 MB L2 8 MB L3 Cache Upgrade with Xeon Processor MP (13N0714) supports internal processing speeds of 3.00 GHz and external processing operations to memory at 667 MHz. It contains an integrated, full-speed, 8 MB L3 cache.

xSeries 3.33 GHz 667 MHz 1 MB L2 8 MB L3 Cache Upgrade with Xeon Processor MP (13N0713) supports internal processing speeds of 3.33 GHz and external processing operations to memory at 667 MHz. It contains an integrated, full-speed, 8 MB L3 cache.

These processor options support up to 32-way SMP applications in the xSeries 460. A VRM and heatsink specifically designed to support this xSeries server is included.

ServeRAID™ 8i SAS RAID Controller (13N2227) performs with new Serial Attached SCSI (SAS) Raid technology. The ServeRAID 8i is a Zero Channel RAID (ZCR) controller designed to manage your internal data storage in selected xSeries servers. The ServeRAID 8i controller achieves higher performance and up to 10 times higher transfer rates at up to 3 GB/second than its Ultra-320 SCSI predecessors for a nominal increase in price.

The half-length adapter runs on a dedicated system's PCI-X 64-bit ZCR slot at speeds up to 133 MHz. With the onboard 256MB memory and 600MHz Intel processor, the ServeRAID 8i takes RAID processing workload and offloads it directly to the controller. This allows your CPU ample bandwidth to perform the application processing required.

ServeRAID 8i SAS RAID Controller offers:

- RAID levels 0, 1, 10, 5, 6, 50, IBM exclusive 1E and 5EE.

- Cache size of 256 MB battery-backed, low power DDR memory for protection of valuable data.

- RAID 6 allows for double parity checking for added data redundancy.

- Able to expand existing arrays through On-line Capacity Expansion.

- Performance up to 3GB/seconds of throughput.

- ServeRAID 8i supports independent and adjustable stripe unit sizes from 16K up to 512K and default to 64K configurable per logical drive.

- BIOS and Firmware updates can be performed under supported OS platform.

- Additional ServeRAID features such as Logical Drive Migration, Global Hot Spare, Copyback and Flashcopy are available to manage your storage drives.

- Rebuild and rapid restore features preserve RAID configurations.

- ServeRAID Manager software application is available for managing the SAS RAID array configurations.

- Performance is measured at 6 SFF Drives 16K OLTP:850 1O/sec.

- Performance of 512 bytes out of cached: 25,000 IO/sec.

Raid Manufacturing Instructions

- 32R0736 ─ RAID 6 ─ SAS Primary Array ─ minimum of 4 HDDs required

- 32R0737 ─ RAID 6 ─ SAS Secondary Array ─ minimum of 4 HDDs required

2 GB (2x1GB Kit) PC2-3200 CL3 ECC DDR2 SDRAM RDIMM (73P2866) contains two 1 GB DIMMs.

4 GB (2x2GB Kit) PC2-3200 CL3x4 ECC DDR2 SDRAM RDIMM (73P2867) contains two 2 GB DIMMs.

8 GB (2x4GB Kit) PC2-3200 CL3x4 ECC DDR2 SDRAM RDIMM (30R5145) contains two 4 GB DIMMs.

Note: This option is planned to be available fourth quarter 2005.

These high-speed, DDR2 registered DIMMs are synchronized to the processor so that once addressed, data can be transferred on both edges of the clock signal. This significantly improves performance of the new 667 MHz front-side bus Xeon MP processor. The memory bus transfers data at up to 5.3 GB per second.

Memory upgrade card (13M7409) allows you to upgrade your machine with up to four memory expansion cards. System memory can be expanded to 512 GB by adding two memory expansion card options and a 4 GB PC2-3200 ECC DDR-2 SDRAM RDIMM in each of the four DIMM sockets.

Scalability cables

- 2.3 m Scalability Cable (13M7414)
- 2.9 m Scalability Cable (13M7416)

Note: This cable is planned to be available July 15, 2005.

The two cables are functionally identical, they differ only in length.

IBM Director CD with 20 agent license proofs of entitlement includes support for x460.

xSeries 460 description

Standard xSeries 460 model configurations

Models	Processor	L3 Cache	Memory	HDDs	Power supply
8872 1Rx	2 x 2.83 GHz	4 MB	2 GB ECC	Open bay	Two
8872 2Rx	2 x 3.00 GHz	8 MB	2 GB ECC	Open bay	Two
8872 3Rx	2 x 3.33 GHz	8 MB	2 GB ECC	Open bay	Two
8874 1Rx			2xMemory Exp Cards	Open bay	Two

High-performance server subsystems: xSeries 460 servers are high-throughput, scalable SMP-capable Xeon-based network servers. They deliver excellent scalability for adding memory, adapter cards or multiple processors.

These models are equipped with powerful Xeon MP processors up to 3.33 GHz and 8 MB L3 cache that uses 64-byte cache lines. EMT64T architecture, supports 64-bit extensions. Four connectors for Xeon MP processors are standard on the system board. High-speed PC2-3200 ECC SDRAM provides excellent processor-to-memory subsystem performance.

The xSeries 460 system architecture is fine tuned and engineered to optimize the powerful Xeon MP processors. This architecture consists of the following components:

- Xeon MP processors
- Third-generation EXA-64e chipset
- System memory card
- PCI-X 2.0 host-bridge controller

These Xeon MP processors use 167 MHz common clock speed for external operations. They support 667 MHz data buses to the memory controller. This allows up to 5.3 GB/s data transfers between memory and the processor.

The MIOC supports:

- Data flow between the processor and memory and to the PCI-X 2.0 host-bridge controller
- Chipkill ECC memory function

The two PCI-X 2.0 host-bridge controllers reside between the PCI buses and memory controller.

High-availability and serviceability features: Many enterprise e-business environments run around the clock to supply information around the globe. These environments require ruggedly dependable servers designed with features that can tolerate a component failure without total shutdown. xSeries 460 servers pack numerous fault-tolerant and high-availability features into a high-density, rack-optimized package that helps significantly reduce the space needed to support massive network computing operations.

Text features include:

- Active PCI-X 2.0 slots; hot-add and hot-swap adapters in Windows™, Linux™ and NetWare environments
- Six Serial Attach SCSI (SAS) HDD bays
- ECC DIMMs combined with an integrated advanced ECC memory controller with third-generation Chipkill support to correct many single-, two-, three-, and four-bit memory errors to minimize disruption of service to LAN clients
- Memory ProteXion and memory mirroring hot-add and hot-swap memory support
- Memory hardware scrubbing to correct many soft memory errors automatically without software intervention
- ECC L3 cache processors to improve data integrity and help reduce downtime
- PFA on HDD options, memory, processors, VRMs, power supply, and fans in conjunction with IBM Director to help alert the system administrator of an imminent component failure
- Two 1,300-watt power supplies that support typical configuration redundancy or full configurations requiring redundancy
- Eight, hot-swap, multispeed fans to provide cooling redundancy and enable individual fan replacement without powering down the server
- Standard Remote Supervisor Adapter II Slimline enabling diagnostic, reset, POST, and auto recovery functions from remote locations and monitoring of temperature, voltage and fan speed; alerts generated when thresholds are exceeded without utilizing an IO slot

- Information LED panel, diagnostics LED panel and component LEDs for visual indications of system well-being
- Light Path Diagnostics for an outside view of the potential problem without removing the cover to reduce downtime and service costs
- Easy top access to system board, adapter cards, power supplies, and memory
- CPU failure recovery in SMP configurations, allowing a failed processor to be forced offline, the server rebooted, an alert generated and operation continued with the working processor

XpandOnDemand scalability: xSeries 460 servers are designed for complex applications. They feature XpandOnDemand scalability from third-generation Enterprise X-Architecture technology for future growth potential.

The servers include:

- Massive I/O expansion options supporting up to 48 PCI/PCI-X card slots with eight scaled chassis
- Up to 32-way SMP operations with powerful new Xeon MP processors
- 2 GB high-speed PC2-3200 DDR2 ECC memory standard, supporting up to 512 GB of system memory
- Support for two worldwide, voltage-sensing 1,300-watt, hot-swap power supplies with auto restart
- Six hot-swap drive bays, supporting up to 440 GB of internal data storage (using six 73.4 GB SAS Hot-Swap HDDs)
- Innovative tower configurations supported with optional NetBAY11
- Terabytes of external data storage supporting optional EXP400 storage units, ServeRAID SCSI controllers and Fibre Channel controllers and storage units

x460 Configurations

XpandOnDemand Scalability

- Modular Building-block Scalability eliminates the need for for-life upgrades and provides an easier growth path to larger, scale-up high-performance SMP configurations

  - x460 2W-4W Single Chassis ▬ Up to 64 GB Memory
  - x460 + 1-MXE-460 ▬ Two chassis 8-way, up to 128 GB Memory
  - x460 + 3-MXE-460 ▬ Four chassis 16-way, up to 256 GB Memory
  - x460 + 7-MXE-460 ▬ Eight chassis 32-way, up to 512 GB Memory

Scalable Partition Web Interface

The Scalable Partition Web Interface is an extension of the Remote Supervisor Adapter II SlimLine Web Interface and is used to create, delete, control and view scalable partitions. The Scalable Partition Web Interface is in the Remote Supervisor Adapter II SlimLine service processor.

The scalable partition defines a multi-node configuration, which interconnects two, four or eight servers, for up to 32-way operation. The multi-node configuration provides the function to individually power-on and power-off each node. The multinode configuration uses a single,

contiguous memory space and provides access to all associated adapters. Each multi-node configuration can have one or more scalable partitions.

- Two Chassis
  - x460 + MXE-460: single 8-way configuration
  - x460 + x460: single 8-way or two partitioned 4-way servers
  - Requires two 2.3m Scalability Cables (13M7414)
- Four Chassis
  - x460 + (3) MXE-460: single 16-way configuration
  - (2) x460 + (2) MXE-460: single 16-way or two partitioned 8-ways
  - (4) x460: single 16-way, two partitioned 8-ways or four partitioned 4-way servers
  - (4) x460: single 16-way, two partitioned 8-ways or four partitioned servers
  - Requires six 2.3m Scalability Cables (13M7414)
- Eight Chassis
  - x460 + (7) MXE-460: single 32-way configuration
  - Any combination of x460 and MXE chassis that when combined results in a supported 4-way, 8-way or 16-way combination and that has an x460 as the bootable node (the MXE is not supported as a bootable node for any partition size)
  - Requires eight 2.3m Scalability Cables (13M7414) and four 2.9m Scalability Cables (13M7416)
  - The two cables are functionally identical, they only differ in length

Note: 16-way and 32-way support is planned to be available Second Half 2005.

Systems management: xSeries 460 servers feature IBM Director, a powerful, highly integrated, systems-management software solution built on industry standards and designed for ease of use.

With IBM Director, a network administrator can perform the following tasks.

- View the hardware configuration of remote systems, in detail

- Monitor the usage and performance of critical components, such as microprocessors, disks and memory

- Manage individual or large groups of IBM and non-IBM Intel-based servers, desktop computers, workstations and mobile computers on a variety of platforms centrally

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:

- Advanced self-management capabilities for maximum system availability.

- Multiple operating-system platform support, including Microsoft™ Windows 2000 Server, Windows XP Professional, Red Hat Linux, SUSE LINUX and Novell NetWare. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at

> **http://www.ibm.com/servers/eserver/xseries/ systems_management/sys_migration/ ibmdiragent.html**

It is updated every six to eight weeks.

- Support for IBM and non-IBM servers, desktop computers, workstations and mobile computers.

- Support for systems-management industry standards.

- Integration into leading workgroup and enterprise systems-management environments.

- Ease of use, training and setup.

IBM Director also provides an extensible platform that supports advanced server tools that are designed to help reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:

- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

For more information about IBM Director, see the IBM Director CD that comes with the server, the IBM Director documentation on the CD and the IBM xSeries Systems Management Web page at

> **http://www-1.ibm.com/servers/eserver/xseries/ systems_management/xseries_sm.html**

IBM Director includes IBM Director Extensions, a portfolio of server tools that integrates into the IBM Director interface and works with the Remote Supervisor Adapter II Slimline or other systems-management monitoring functions contained in xSeries servers. Typical functions and monitoring capabilities can include:

- PFA-enabled critical hardware components
- Temperature
- Voltage
- Fan speed
- Light Path Diagnostics

The IT administrator gains comprehensive, virtual on-site control of xSeries servers through the ability to remotely:

- Access the server in many cases regardless of its status

- Inventory and display detailed system and component information

- View server bootup during POST

- Browse and delete logs of events and errors

- Reset or power cycle the server

- Run diagnostics, SCSI and RAID setup during POST

- Monitor thresholds on server health including:
  - Operating system load
  - POST time-out
  - Voltage
  - Temperature

- Set proactive alerts for critical server events including PFA on:
  - Processors
  - VRMs
  - Memory
  - Fans
  - Power supplies
  - HDDs

- Define automated actions such as:
  - Send an e-mail or page to an administrator
  - Execute a command or program
  - Pop up an error message to the IBM Director console

- Update Flash BIOS

- Monitor and graph the utilization of server resources such as:
  - Memory
  - Processor
  - HDDs

- Identify potential performance bottlenecks and react to prevent downtime

- Monitor, manage and configure RAID subsystems without taking them offline

IBM Director Agent provides integration into leading workgroup and enterprise system management environments, via Upward Integration Modules. This enables the advanced management capabilities built into xSeries servers to be accessed from:

- Tivoli® Enterprise and Tivoli NetView®
- Computer Associates Unicentre TNG
- HP OpenView
- Microsoft SMS
- BMC Patrol
- NetIQ

World-class support tools and programs: xSeries 460 servers include tools and programs designed to make ownership a positive experience. From the start, IBM programs help you purchase servers, get them running and keep them running. IBM can help your company maintain ownership of technology leadership network servers.

- IBM on-site, three-year limited warranty with next-business-day service (same-business-day service optionally available) protects your investment if a problem occurs. This service also includes replacement of parts identified through PFA.

- The ServerProven**4** program lets you confidently configure your server with various devices and operating systems. This Web-based program provides compatibility information from actual testing of the xSeries 460 server with various adapters and devices.

- The ServerGuide CD library includes on-line publications and utilities and drivers that help you load popular network operating systems.

- Electronic support on the Web offers additional support in an easy-to-use format.

Product positioning

These new xSeries 460 models enhance the xSeries 460 line by providing new levels of performance and price/performance. The xSeries 460 server features a high-density, 3 U mechanical platform that supports the higher clocked Xeon MP processors, PCI-X 2.0 architecture and high-speed DDR2 memory.

xSeries 460 servers provide additional processing, expandability and high-availability features over that of the xSeries 366 server. These features make them ideal for handling complex, business-critical e-business applications that must be supported by space-saving, rack-optimized servers.

The xSeries 460 server is designed for extremely complex, compute-intensive applications requiring eight-way plus processing power and large memory support.

The xSeries 460 server provides excellent scalable processing capability with models supporting Intel MP 2.83 GHz/4 MB, 3.00 GHz/8 MB and 3.33 GHz/8 MB, high-speed memory and PCI-X 2.0 bus architecture. This makes the xSeries 460 servers an excellent fit for today and future enterprise e-business applications.

These high-density, Xeon-based servers are designed to handle complex applications requiring high-speed computing power, advanced high-availability functions and a minimum amount of rack space.

Applications include:

- e-business

- Business intelligence

- Transaction processing

- ERP

- Collaboration applications (Microsoft Exchange and Lotus Notes®)

- Server consolidation

- Internet or intranet front-end serving

- Web content serving

- Database storage as a SAN solution

Reference information

Notes

- Refer to the Planning information section for slot configuration information and restrictions.

- Actual playback speed will vary and is often less than the maximum possible.

- GHz and MHz denote the internal and/or external clock speed of the microprocessor only, not application performance. Many factors affect application performance.

[1] When referring to hard drive or tape backup capacity, GB stands for one billion bytes. Total user capacity may vary depending on operating environments.

[2] IBM sends a technician after attempting to diagnose and resolve the problem remotely.

[3] For information on the IBM Statement of Limited Warranty, visit
http://www.ibm.com/servers/support/ machine_warranties/

Alternatively, this information is also available by contacting your IBM representative or reseller. Copies are available upon request. Visit
http://www.ibm.com/pc/safecomputing/
periodically for the latest information on safe and effective computing.

[4] IBM makes no warranties, expressed or implied, regarding non-IBM products and services that are ServerProven, including but not limited to implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

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