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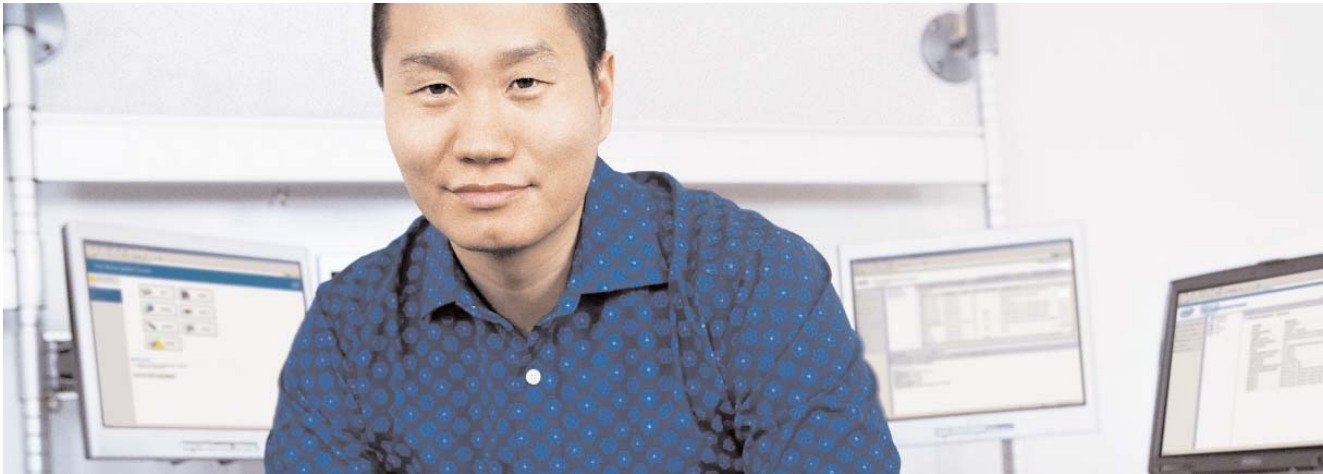
Intel® 5000X Chipset

Delivering enhanced performance and visualization for
Dual-Core Intel® Xeon® processor 5000 series-based workstations

Introducing next-generation technology for business productivity

Intel's new workstation chipset for the Dual-Core Intel® Xeon® processor 5000[1] series enables Intel® dual-processor (DP) balanced platforms that help businesses be more productive and efficient. With the Intel® 5000X chipset, Intel® dual-core processor-based workstations incorporate next-generation technologies for enhanced performance and visualization critical to high-end, graphic-intensive DP computing.

The Intel 5000X chipset supports Fully Buffered DIMM (FB DIMM) memory technology at 533 and 667 MHz for faster application response and greater memory capacity for data-intensive applications. Intel developed the Intel 5000X chipset specifically for Dual-Core Intel Xeon processor 5000 series-based DP workstations, using new dual independent buses at 1066 and 1333[2] MHz.

The Intel 5000X chipset consists of the following devices:

- Intel® 5000X Memory Controller Hub (MCH)
- Intel® 6321ESB I/O Controller Hub
- Intel® 6700PXH 64-bit PCI Hub

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Dual independent buses at 1066 and 1333² MHz enable optimal performance for Dual-Core Intel® Xeon® processor 5000 series, creating powerful workstation platforms

The Intel 5000X memory controller hub provides dual independent buses at 1066 and 1333 MHz to support two Dual-Core Intel Xeon processors 5000 series for unprecedented performance in a DP workstation platform. The two buses can deliver an aggregated throughput of as much as 17 GB/second at 1066 MHz and up to 21 GB/second at 1333 MHz. With an independent bus for each processor, next-generation Intel workstation platforms can deliver higher throughput for intensive computing workloads, compared to platforms based on the 64-bit Intel® Xeon® processor 3.60 GHz and Intel® 7525 chipset.

With the Intel 5000X chipset and Dual-Core Intel Xeon processors, system designers are able to offer new workstation platforms that enable businesses to speed up product development and find faster solutions to complex visualization problems.

Intel® 5000X chipset overview

Features	Benefits
Supports two Dual-Core Intel® Xeon® processors	• Optimized performance for faster time-to-solution
1066/1333² MHz dual independent buses	• Increased platform system bus bandwidth delivers outstanding performance
PCI Express*³ (PCIe)	• Serial I/O technology provides a direct connection between the MCH and PCI Express components/adapters with bandwidth up to 4 GB/second on each PCI Express x8 interface. PCI Express offers higher bandwidth, lower latency, and fewer I/O bottlenecks than PCI-X* • Enhanced visualization with the PCI Express x16 graphics interface, delivering twice the bandwidth of AGP 8X
FB DIMM 533/667 MHz memory interface	• Offers a maximum memory bandwidth of up to 17 GB/second for 533 MHz and up to 21 GB/second for 667 MHz • Increased DIMMs per system, providing enhanced memory scalability for memory-intensive applications
Intel® 6700PXH 64-bit PCI hub	• Optional component for PCI/PCI-X connectivity, offering increased platform flexibility • Supports two independent 64-bit, 133 MHz PCI-X segments and two hot-plug controllers (one per segment)
Advanced Platform RAS	• Features such as memory ECC and Intel® x4 and x8 Single Device Data Correction⁴ (SDDC) for improved system reliability • 32-bit CRC on PCIe • Hot swap PCIe enhances serviceability • SMBus port connects to Intel® 5000X MCH for remote management operation

Advanced technologies enhance price/performance and flexibility

The Intel 5000X chipset supports a variety of new technologies and configuration options, providing superior performance and visualization that can help improve productivity.

Fully Buffered DIMMs

The Intel 5000X chipset supports next-generation Fully Buffered DIMM (FB DIMM) technology, which significantly improves memory throughput and increases capacity for a more responsive system. FB DIMMs are ideal for high-end workstations where performance is crucial to reach solutions faster and visualize content quickly. Intel 5000X chipset platforms deliver up to 3X higher memory bandwidth and up to 4X higher capacity over previous-generation platforms based on the Intel Xeon processor 3.60 GHz and Intel 7525 chipset with DDR2-400 memory.

The memory interface for the Intel 5000X MCH supports four memory channels with four Fully Buffered DIMMs per channel, enabling a total system memory bandwidth of up to 17 GB/second on a 64 GB total capacity.

PCI Express* (PCIe)

The Intel 5000X chipset uses PCIe for high-speed communications of up to 8 GB/sec for graphics and I/O support. A PCI Express* x16 graphics interface supports as much as 8 GB/second bandwidth for communications with a variety of third-party graphics adapters for high-speed, enhanced visualization. A variety of Intel and third-party I/O solutions communicate directly with the MCH through a PCI Express x8 interface, which can be bifurcated into two x4 interfaces for additional configuration flexibility. The bandwidth of the PCI Express x8 is up to 4 GB/second.

PCI/PCI-X*

The Intel 6700PXH 64-bit PCI hub can attach directly to the MCH through a point-to-point PCIe x8 or x4 link for support of PCI and PCI-X* interfaces on the platform. Each Intel 6700PXH 64-bit PCI hub supports two bus segments that designers can independently configure to operate in PCI (33 MHz or 66 MHz) or PCI-X mode (at 66, 100, or 133 MHz), for 32-bit or 64-bit PCI/PCI-X devices. Each PCI/PCI-X interface integrates a PCI standard hot-plug controller. The hub supports multiple PCI-X slots and frequencies for the high bandwidth I/O connectivity required in today's server market segment.

Support for Intel Advanced Technologies

The Intel 5000X chipset integrates technologies to support new dual-processor platforms that are more responsive and manageable, including

- Intel® Extended Memory 64 Technology[5] (Intel® EM64T)
- Enhanced Intel SpeedStep® Technology
- Intel® I/O Acceleration Technology (Intel® I/OAT) – using Intel® 6321ESB I/O controller hub and Intel I/OAT-supported operating system and software
- Intel® Active Server Manager[6] – using Intel 6321ESB I/O controller hub and supporting software
- Intel® Active Matrix Storage Technology – using Intel 6321ESB I/O controller hub
- Hyper-Threading Technology△

Expanded I/O support with Intel® 6321ESB I/O controller hub

The Intel 6321ESB I/O controller hub attaches directly to the MCH through the ESI interface and a x8 or x4 PCIe link. The Intel 6321ESB integrates

- Six independent Serial ATA (SATA) controllers, each capable of up to 3.0 GB/second transfer rate.
- Software-driven RAID 0,1,5 technology for the most demanding storage data transfers and storage security.
- Full Baseboard Management Controller (BMC).

The new I/O controller hub also supports

- Six USB 2.0 ports.
- Three PCIe x4 links.
- PCI-X 64/133 bus segment.
- Intel® 82563EB Dual Port adapter and Intel® 82564EB Single Port adapter.

Product	Package
Intel® 5000X Memory Controller Hub (MCH)	1432 Flip Chip-Ball Grid Array (FC-BGA)
Intel® 6700PXH 64-bit PCI hub	567 Flip Chip-Ball Grid Array (FC-BGA)
Intel® 6321ESB I/O Controller Hub	1284 Flip Chip-Ball Grid Array (FC-BGA)

Contacts

United States and Canada
Intel Corporation
Robert Noyce Building
2200 Mission College Blvd.
P.O. Box 58119
Santa Clara, CA 95052-8119
USA

Europe
Intel Corporation (UK) Ltd.
Pipers Way
Swindon
Wiltshire SN3 1RJ
UK

Asia-Pacific
Intel Semiconductor Ltd.
32/F Two Pacific Place
88 Queensway, Central
Hong Kong, SAR

Japan
Intel Japan (Tsukuba HQ)
5-6
Tokodai Tsukuba-shi
300-2635 Ibaraki-ken
Japan

South America
Intel Semiconductores do Brasil LTDA
Av. Dr. Chucri Zaidan, 940-10° andar
04583-904 São Paulo, SP
Brazil

[1] Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See http://www.intel.com/products/processor_number for details.

[2] 1333 MHz available in 2nd half of 2006.

[3] Reduced power-state L0s not supported

[4] In a x8 DDR memory device, the Intel® x8 Single Device Data Correction (x8 SDDC) provides error detection and correction for 1 to 8 data bits within a single device.

[5] Intel® Extended Memory 64 Technology (Intel® EM64T) requires a computer system with a processor, chipset, BIOS, OS, device drivers and applications enabled for Intel EM64T. Processor will not operate (including 32-bit operation) without an Intel EM64T-enabled BIOS. Performance will vary depending on your hardware and software configurations. Intel EM64T-enabled OS, BIOS, device drivers and applications may not be available.

[6] Intel® Active Server Manager requires the computer to have additional hardware and software, connection with a power source, and a network connection. Check with your PC manufacturer for details.

[A] Hyper-Threading Technology requires a computer system with an Intel® Xeon® processor supporting Hyper-Threading Technology and an HT Technology-enabled chipset, BIOS, and operating system. Performance will vary depending on the specific hardware and software you use. See http://www.intel.com/info/hyperthreading/ for more information, including details on which processors support HT Technology.