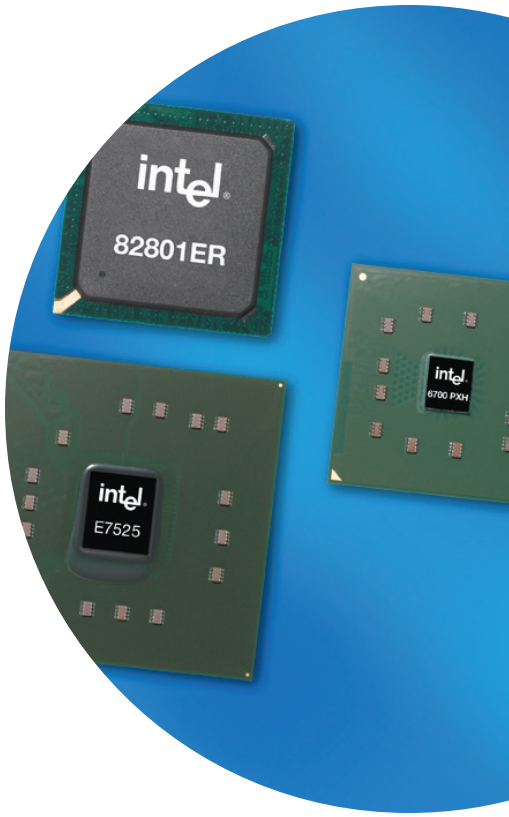
Offer your customers better graphics performance at the right price.



Intel® E7525 chipset supports next-generation PCI Express*[1] x16 graphics plus configuration options for a range of price points and workstation environments.

www.intel.com/xeon

Intel® E7525 Chipset Enables Outstanding Graphics Performance at the Right Price

The Intel® E7525 chipset, the next generation Intel® dual-processor (DP) workstation and server chipset technology offer increased graphics performance, reduced power consumption, and improved platform reliability and system manageability. These new dual-processor workstations deliver outstanding performance, dependability and value to digital content creation, MCAD, electronic design automation and other graphic workstation applications.

The Intel® E7525 chipset includes revolutionary PCI Express* technology for I/O and graphics as well as DDR2, the next generation memory technology to help increase I/O bandwidth and reduce system latency for data-intensive applications. The 800 MHz system bus connects this chipset to the Intel® Xeon™ processor with Intel® Extended Memory 64 Technology (Intel® EM64T), Hyper Threading technology, Enhanced Intel SpeedStep® Technology and Streaming SIMD Extensions 3 (SSE3) Instructions.

Advanced Technology For Next-generation Graphics, and I/O Flexibility

The Intel® E7525 chipset is designed to support next generation PCI Express* x16 graphics and a variety of configuration options, allowing platforms to address a range of price points and workstation applications.

The Intel E7525 memory controller hub (MCH) supports dual Intel® Xeon™ processors with 800 MHz system bus, PCI Express x16 graphics, an additional PCI Express* x8 interface, two types of memory technologies and legacy I/O. The PCI Express x16 interface directly attaches the MCH to a variety of third-party graphics adapters, ranging in performance and price points.

The PCI Express x8 interface directly attaches Intel and third-party components and adapters to the MCH at speeds up to 4 GB/second. Another option is the Intel® 6700PXH 64-bit PCI Hub. It provides two bus segments that support hot plug and can be independently configured up to two PCI-X 64/133 MHz segments.

The Intel E7525-based workstations can be designed to support one of two memory technologies: DDR 333 or DDR2-400. DDR2-400 is ideal for data-intensive applications, providing up to a 20% increase in memory bandwidth over DDR 333 and up to a 40% decrease in power consumption. Figure 1 illustrates the performance advantages of DDR2-400 memory technology.

There are two I/O controller hub options to choose from for legacy I/O support, the Intel® 82801ER I/O Controller Hub (ICH5R) and the Intel® 6300ESB I/O Controller Hub. They both attach directly to the MCH through the Intel® Hub Interface 1.5 connection. Both offer Serial ATA (SATA) interfaces and 32-bit PCI connectivity, and both are enabled for optional third-party software RAID 0, 1. The Intel 6300ESB I/O Controller Hub additionally supports 64-bit PCI-X.

The Intel® E7525 Chipset MCH is the central hub for all data passing between the core system elements: processors, memory, PCI Express x16 graphics, PCI Express I/O and

Memory Bandwidth Comparison[3]

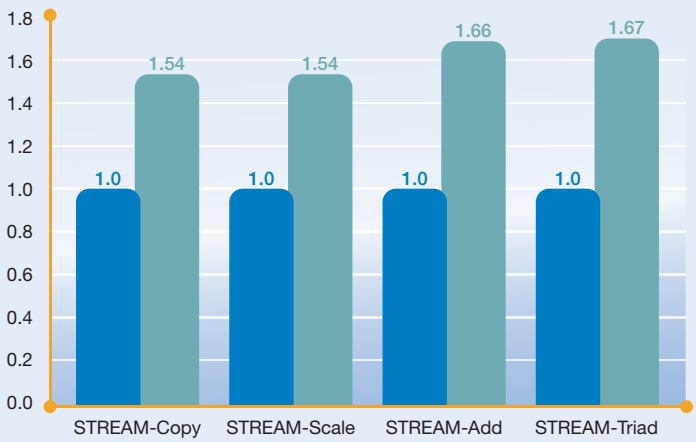


Figure 1 - Relative Improvement Between DDR2-400 (800 MHz system bus) and DDR 266 (533 MHz system bus) Memory

Source: Intel internal measurements (5/28/04).

System Configurations

All platforms: Microsoft Windows* XP Professional SP1, 36GB SCSI Seagate ST336753LW 15K hard drive.

- **Intel® Xeon™ processor with 533 MHz system bus-based workstation at 3.2 GHz with 1MB cache**
  Dell* Precision* 650, 2GB DDR266, Adaptec 29320 SCSI adapter, Intel Chipset Software Utility INF version 5.00.1012, nVidia* Quadro* 4 Pro 980XGL 128MB AGP 8x video card using driver 52.14.
- **Intel® Xeon™ processor with 800 MHz system bus-based workstation at 3.60 GHz with 1MB cache**
  Intel* WS400 pre-release reference board, 4GB DDR2-400 -512MB Samsung M393T6553BG0-CCC, Adaptec AIC7902 Ultra320 SCSI adapter, Intel Chipset Software Utility INF version 5.20.1006, nVidia* Quadro* FX 1300 128MB PCIe video card using driver 60.30.

NOTE: STREAM* measured on uni-processor platform configuration.

legacy I/O subsystems. It supports dual Intel Xeon processors with 1MB L2 cache over the 800 MHz system bus interface, delivering bandwidth up to 6.4 GB/second. The MCH also supports all of the Intel Xeon processor features, such as Hyper Threading technology, Enhanced Intel SpeedStep Technology, Intel EM64T and Streaming SIMD Extensions 3 (SSE3) Instructions.

The memory subsystem interface to the MCH is dual channel, supporting three or four registered DIMMs per channel (depending on memory technology), for a total system bandwidth of up to 6.4 GB/second. With DDR2-400 and DDR 333 memory, up to 16 GB of memory is supported.

The PCI Express x16 interface supports a total bandwidth of 8 GB/second (4 GB/second per direction) and directly attaches the MCH to a variety of third-party graphics adapters. A variety of Intel and third-party I/O solutions communicate directly with the MCH through the PCI Express x8 interface. The Intel E7525 MCH has one PCI Express x8 interface that can be bifurcated into two x4 interfaces for additional configuration flexibility. The bandwidth of the PCI Express x8 is up to 4 GB/second.

The legacy I/O connects to the MCH through the Intel Hub Interface architecture at 256 MB/second. There are two I/O controller hub options: the Intel 82801ER I/O Controller Hub (ICH5R) and the Intel 6300ESB I/O Controller Hub.

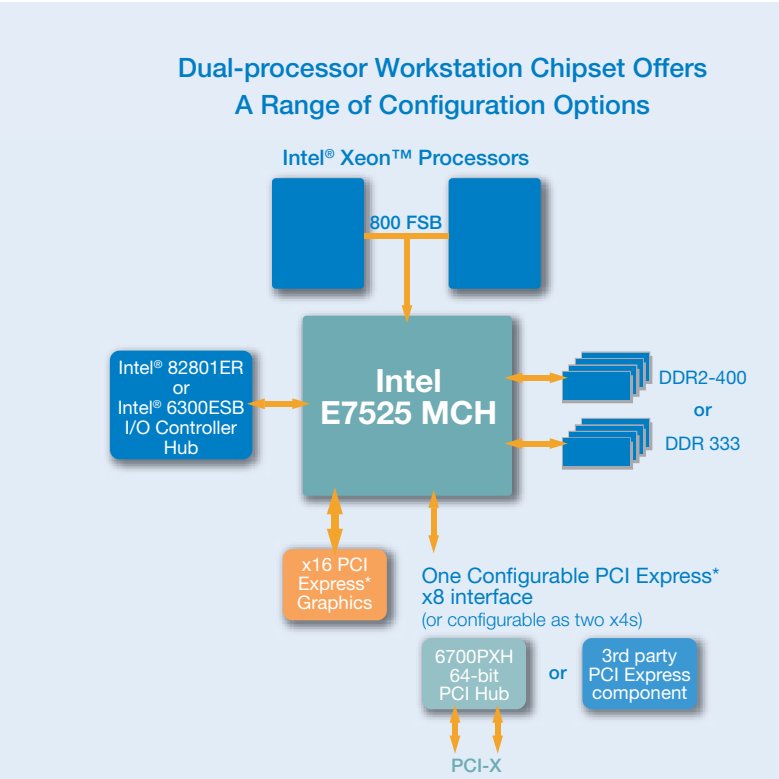


Figure 2 - The Intel E7525 chipset supports a variety of platform configurations to suit different price points and unique application environments.

- The Intel® 6700PXH 64-bit PCI Hub connects to the MCH through a point-to-point PCI Express x8 or x4 interface. Each Intel 6700PXH 64-bit PCI Hub contains two bus segments that can be independently configured to operate in PCI (33 or 66 MHz) or PCI-X mode 1 (66, 100, or 133 MHz), for either 32-bit or 64-bit PCI/PCI-X devices. In addition, the Intel 6700PXH 64-bit PCI Hub integrates two PCI standard hot-plug controllers, one per PCI/PCI-X interface. The Intel 6700PXH 64-bit PCI Hub supports multiple PCI-X slots and frequencies for the high-bandwidth I/O connectivity required in today's workstation and server markets.

- The Intel® 82801ER I/O Controller Hub (ICH5R) offers dual independent Serial ATA controllers, each capable of up to 150 MB/second transfer rate, for the most demanding storage data transfers and support for optional third-party software RAID 0, 1 technology. Four Hi-Speed USB 2.0 ports allow easy I/O connection while offering improved bandwidth compared to USB 1.1 devices.

- The Intel® 6300ESB I/O Controller Hub integrates dual independent Serial ATA controllers, each capable of up to 150 MB/second transfer rate, for the most demanding storage data transfers and support for optional third-party software RAID 0, 1 technology. Four Hi-Speed USB 2.0 ports allow easy I/O connection, while offering improved bandwidth compared to USB 1.1 devices. Unlike the Intel 82801ER I/O Controller Hub (ICH5R), the Intel 6300ESB I/O Controller Hub also includes one PCI-X 64/66 bus supporting up to 4 PCI-X 64/66 MHz interfaces.

Performance-Enhancing and Platform-Balancing Features

- Dual Intel Xeon processors and an 800 MHz system bus provide up to 6.4 GB/second of available bandwidth delivering a high performance, balanced platform with greater bandwidth for increased memory and I/O throughput.
- Next-generation graphics with the PCI Express x16 graphics interface, delivering twice the bandwidth of AGP 8X.
- Dual DDR2-400 memory channels deliver a total of 6.4 GB/second bandwidth and up to 16 GB of physical memory, providing up to a 20% increase in memory bandwidth over DDR 333 and up to a 40% decrease in power consumption, ideal for high performance computing (HPC) and memory-intensive applications.
- PCI Express I/O delivers up to 4 GB/second throughput on each x8 interface for demanding I/O and networking applications, allowing I/O to keep pace with the rest of the platform.

Features	Benefits
Supports two Intel® Xeon™ processors over an 800 MHz system bus for dual-processing workstation and server platforms	Optimized performance for the DP workstation market segment with a range of price points and support for a larger number of users/transactions with faster response times
800 MHz system bus capability	Increased bus bandwidth (50% greater than 533 MHz) and increased system bandwidth
Dual channel DDR2-400	• Offers a maximum memory bandwidth of 6.4 GB/second • Decreased power consumption – especially important in dense rack, HPC and blade configurations • Increased DIMMs per system provide enhanced memory scalability for memory-intensive applications
PCI Express*[1] X-16 graphics	Next generation graphics interface, delivers 4.0 GB/second of graphics bandwidth per direction directly into the Intel® E7525 MCH (total bandwidth 8 GB/second), for twice the bandwidth of AGP 8X
PCI Express* I/O	Serial I/O technology provides a direct connection between the MCH and PCI Express* component/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
Intel® 6700PXH 64-bit PCI Hub	• Optional component introduces next-generation PCI/PCI-X performance and significant enhancements to 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, Intel® x4 Single Device Data Correction[2] (x4 SDDC), DIMM sparing and DIMM scrubbing for improved system reliability. • SMBus port hooks into Intel® E7525 chipset MCH for remote management operation and support for variety of third-party BMC (base management controller) and BIOS solutions
Intel® Hub Interface 1.5 connection to the MCH	Point-to-point connection between the MCH and the Intel® 82801ER I/O Controller Hub or Intel® 6300ESB I/O Controller Hub devices provides 266 MB/s of bandwidth

Product	Package
Intel® E7525 Memory Controller Hub (MCH)	1077 Flip Chip-Ball Grid Array (FC-BGA)
Intel® 6700PXH 64-bit PCI Hub	567 Flip Chip-Ball Grid Array (FC-BGA)
Intel® 82801ER (ICH5R)	460 Micro Ball Grid Array (µBGA)
Intel® 6300ESB I/O Controller Hub	689 Plastic Ball Grid Array (PBGA)

Intel Access	
Products Web Site	*http://www.intel.com/products/server*
Intel® Chipsets Home Page	*http://www.intel.com/products/server/chipsets*
Intel® Xeon™ processor with 800 MHz system bus	*http://developer.intel.com/design/xeon.htm*
Intel® Gigabit Ethernet Controllers	*http://developer.intel.com/design/network/products/ethernet/index.htm*
Intel® I/O Processor	*http://developer.intel.com/design/iio/index.htm*
Other Intel Support	*http://appzone.intel.com/literature/index.asp* Intel Literature Center - (800) 548-4725 7 a.m. to 7 p.m. CST (U.S. and Canada) International locations please contact your local sales office.
General Information Hotline	(800) 628-8686 or (916) 356-3104 - 5 a.m. to 5 p.m. PST

[1] PCI Express reduced power-state "L0s" is not supported.
[2] In an x4 DDR memory device, the Intel® x4 Single Device Data Correction (x4 SDDC), provides error detection and correction for 1,2,3 or 4 data bits within that single device and provides error detection, up to 8 data bits, within two devices.
[3] Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit *http://www.intel.com/performance/resources/benchmark_limitations.htm*.

UNITED STATES AND CANADA	EUROPE	ASIA-PACIFIC	JAPAN	SOUTH AMERICA
Intel Corporation Robert Noyce Building 2200 Mission College Blvd. P.O. Box 58119 Santa Clara, CA 95052-8119 USA	Intel Corporation (UK) Ltd. Pipers Way Swindon Wiltshire SN3 1RJ UK	Intel Semiconductor Ltd. 32/F Two Pacific Place 88 Queensway, Central Hong Kong, SAR	Intel Japan (Tsukuba HQ) 5-6 Tokodai Tsukuba-shi 300-2635 Ibaraki-ken Japan	Intel Semicondutores do Brasil LTDA Av. Dr. Chucri Zaidan, 940-10° andar 04583-904 São Paulo, SP Brazil

Order Number: 302727-001 0604/BFC/SAJ/XX/PDF