

# The Intel® P965 Express Chipset

Optimized performance for digital home computing and entertainment

Desktop PC platforms based on the Intel® P965 Express Chipset, combined with either the Intel® Core™2 Duo or Intel® Pentium® D processor, deliver incredible performance and innovative capabilities for digital home consumers. Exciting improvements expand digital home capabilities, while enabling lower power and quieter systems.



## The Intel® P965 Express Chipset

The Intel P965 Express Chipset continues the Intel chipset legacy and extends it to new levels with purpose-built capabilities designed specifically to address the key needs of the home user. With advancements in memory performance, responsiveness, power efficiency and data protection, the Intel P965 Express Chipset allows your PC to be the center of home computing, communication, and entertainment.

## Faster System Performance

With the growing imbalance between CPU and memory performance, it becomes critical to optimize the memory controller features to obtain the maximum possible performance out of the memory subsystem. The Intel P965 Express Chipset incorporates Intel® Fast Memory Access, an updated Memory Controller Hub (MCH) backbone architecture that significantly increases overall system performance through the optimization of available bandwidth and reduction of memory access latency. This updated MCH with Intel Fast Memory Access also includes wider internal data buses that support dual-channel DDR2 memory technology at 800 MHz (up to 12.8 GB/s of peak memory bandwidth) for greater platform performance and memory flexibility.

## The Intel Chipset Story

Since delivering its first chipset almost 25 years ago, Intel's Chipset Group has maintained a vision to design, develop and deliver the highest quality and most innovative chipsets to maximize the home and office computing experiences. A commitment to the highest levels in validation, interoperability, ecosystem completeness and scalability goes into each and every Intel chipset. The work of over 2,500 people and Intel's annual investment of \$300M in platform validation, combined with full chipset simulation a year prior to production shipment, ensure these high quality products are delivered on a predictable annual cadence. Bringing these chipsets to you requires the industry's most far reaching supply and services network. Intel chipsets mean innovation, completeness and reliability.

## Intel® Fast Memory Access

Just In Time Command Scheduling

- Maximizes bandwidth by monitoring all pending accesses to memory allowing for the safe and efficient overlapping of commands on the system memory bus.

Out of Order Execution

- Monitors pending requests to system memory, allowing for on the fly reordering to make better use of open memory pages, reducing latency and increasing bandwidth efficiency.

Opportunistic Writes

- Monitors system memory requests and issues pending write requests to memory during idle times, allowing for a more efficient flow of data.

Clock Crossing Optimizations

- Ensures that data is transferred in a highly optimized manner, enabling data transfer on the first usable clock phase encountered between the two frequency domains.

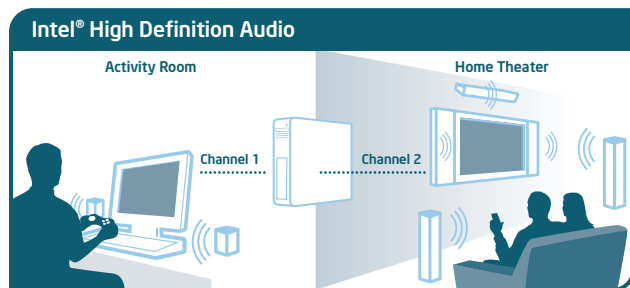
## Intel® I/O Controller Hub (Intel® ICH8/R/DH)

The I/O controller hub of the Intel P965 Express Chipset integrates several capabilities designed to improve data protection, audio, and performance in the PC.

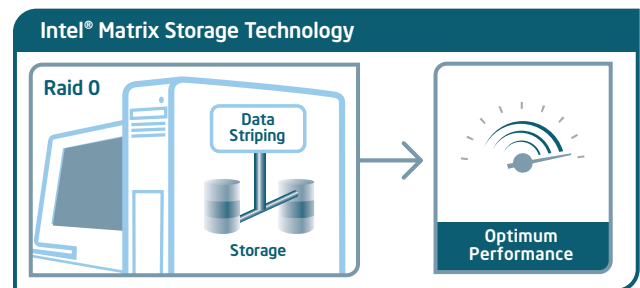
- Intel® Matrix Storage Technology<sup>1</sup> (Intel® MST): With new support for external SATA\* ports (eSATA), Intel MST provides flexibility to add a second external drive for increased data protection with up to 6 times faster performance<sup>2</sup> than USB\* 2.0 or Firewire\* 400. Support for eSATA enables the full SATA interface speed outside the chassis, up to 3 Gb/s. Support for RAID levels 0, 1, 5 and 10 enables greater reliability for storing personal data, or maximum storage performance for intensive applications.

The Advanced Host Controller Interface (AHCI) provides easier expandability with support for eSATA devices and native hot plug, while boosting boot and multi-tasking performance with Native Command Queuing (NCQ).

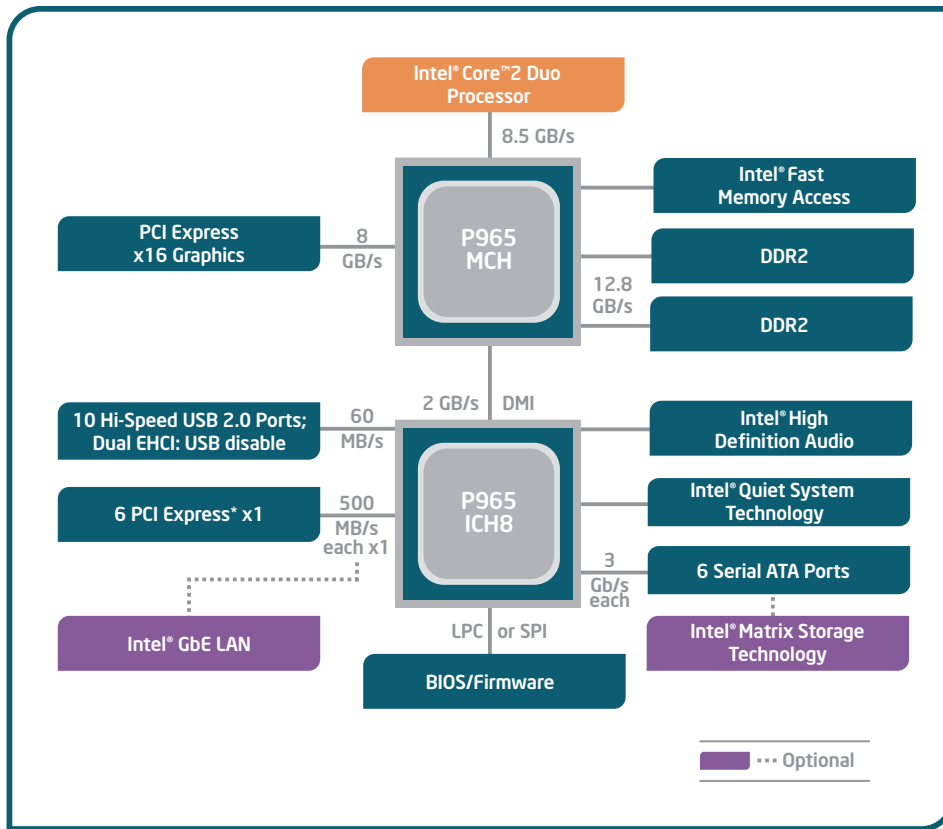
- Intel® High Definition Audio<sup>3</sup> (Intel® HD Audio) enables premium digital sound in the PC for an immersive surround sound home theater experience. Support for multiple audio streams enables users to listen to two different audio streams simultaneously in two separate rooms.
- Intel® Quiet System Technology integrated into the Intel P965 Express Chipset can help reduce system noise and heat through more intelligent fan speed control algorithms.



Intel® High Definition Audio enables premium digital sound in the PC for an immersive surround sound experience. This technology delivers multiple audio channels in your PC so you can listen to two different streams simultaneously in two separate rooms.



Intel® Matrix Storage Technology can deliver significantly faster storage performance<sup>4</sup> with PCs equipped with two hard drives using RAID 0 data striping.



Intel® P965 Express Chipset Block Diagram

## Intel® P965 Express Chipset Features At A Glance

Feature	Benefit
1066/800/533 MHz System Bus	• Supports the Intel® Core™2 Duo processor with Intel® Virtualization Technology, Intel® Pentium® D processor 900, Intel® Pentium® 4 processor with HT Technology <sup>5</sup> and all other Intel® processors using the LGA775 socket.
PCI Express* Interface	• The PCI Express x16 graphics interface supports the latest high-performance graphics cards. The PCI Express x1 I/O ports offer up to 3.5X the bandwidth over traditional PCI architecture, delivering faster access to peripheral I/O devices.
Intel® Fast Memory Access	• Updated Graphics Memory Controller Hub (GMCH) backbone architecture that improves system performance by optimizing the use of available memory bandwidth and reducing the latency of the memory accesses.
Dual-Channel DDR2 Memory Support	• Delivers up to 12.8 GB/s of bandwidth and 8 GB memory addressability for faster system responsiveness and support of 64-bit computing.
Intel® Flex Memory Technology	• Facilitates easier upgrades by allowing different memory sizes to be populated and remain in dual-channel mode.
Intel® High Definition Audio	• Integrated audio support enables premium digital sound and delivers advanced features such as multiple audio streams and jack re-tasking. The Dolby PC Entertainment Experience <sup>6</sup> is available exclusively on systems with and Intel chipset and Intel High Definition Audio.
Intel® Matrix Storage Technology	• With a second hard drive added, provides quicker access to digital photo, video and data files with RAID 0, 5, and 10, and greater data protection against a hard disk drive failure with RAID 1, 5, and 10. Support for external SATA (eSATA) enables the full SATA interface speed outside the chassis, up to 3 Gb/s.
Serial ATA (SATA) 3 Gbp/s	• High-speed storage interface supports faster transfer rate for improved data access.
USB* Port Disable	• Enables individual USB ports to be enabled or disabled as needed. This feature provides added protection of data by preventing malicious removal or insertion of data through USB ports.
Intel® Quiet System Technology	• Intelligent system fan speed control algorithms use operating temperature ranges more efficiently to reduce perceived system noise by minimizing fan speed changes.

**For more information, visit the Intel Web site: [www.intel.com/products/desktop/chipsets](http://www.intel.com/products/desktop/chipsets)**

<sup>1</sup>Intel® Matrix Storage Technology requires a motherboard with the Intel® 82801HR (ICH8R), Intel® 82801GR (ICH7R), or Intel® 82801FR (ICH6R) I/O Controller Hub System. The system must also have the RAID controller in the BIOS enabled and the Intel Matrix Storage Technology software driver installed. Please consult your system vendor for more information.

<sup>2</sup>Performance based on interface speed and data transfer rate specifications for eSATA, USB 2.0 and Firewire 400.

<sup>3</sup>Intel® High Definition Audio requires a system with the Intel 965, 955, 945, 925, 915 or 910 Express Chipset and a motherboard with an appropriate codec and the necessary drivers.

<sup>4</sup>For Intel storage performance data, please visit [www.intel.com/performance/desktop/platform\\_technologies/storage\\_performance.htm](http://www.intel.com/performance/desktop/platform_technologies/storage_performance.htm)

<sup>5</sup>Hyper-Threading (HT) Technology requires a computer system with an Intel® processor supporting HT Technology and a HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See [www.intel.com/info/hyperthreading](http://www.intel.com/info/hyperthreading) for more information including details on which processors support HT Technology.

<sup>6</sup>The Dolby PC Entertainment Experience\* Initiative is only available on systems based on the Intel 965, 975, 955, 945, 925, 915 or 910 Express Chipset. Only boards with either Dolby Home Theater Ready or Dolby Master Studio Ready logo and systems with either Dolby Home Theater or Dolby Master Studio logos are capable of supporting the Dolby PC Entertainment Initiative.

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