Product Brief

Intel® Q965 Express Chipset

Embedded Computing

Intel® Q965 Express Chipset for Embedded Computing

Product Overview

The Intel® Q965 Express chipset offers features that address key requirements of many embedded computing designs, including memory performance, graphics, manageability, responsiveness, noise reduction and data protection. When combined with the Intel® Core™2 Duo processors E6400[A] or E4300,[A] Intel® Pentium® Dual-Core processor E2160[A] or Intel® Celeron® processor 440,[A] this impressive platform can help embedded equipment manufacturers deploy more responsive, high-performance, low-power systems for interactive clients (i.e., point-of-sale terminals and ATMs), industrial control and automation, gaming, digital security surveillance, and medical imaging applications.

The Intel Q965 Express chipset consists of an updated Graphics Memory Controller Hub (GMCH) and I/O Controller Hub (ICH) available in two SKUs: Intel® ICH8 and Intel® ICH8 DO (digital office). The GMCH includes dual-channel DDR2 800 MHz memory technology (up to 12.8 GB/s of peak memory bandwidth), Intel® Graphics Media Accelerator 3000 (Intel® GMA 3000) and Intel® Fast Memory Access. Both the ICH8 and ICH8 DO deliver outstanding system performance through high-bandwidth interfaces such as PCI Express*, Serial ATA, and Hi-Speed USB* 2.0 connectivity, while Intel® Quiet System Technology regulates system and processor fan speeds for noise reduction. Additionally, the ICH8 DO features Intel® Matrix Storage Technology[1] with RAID support, and Intel® Active Management Technology[2] (Intel® AMT) with system defense feature for remote, down-the-wire management of out-of-band networked systems.

Remote Management

Intel AMT (ICH8 DO only) is a hardware- and firmware-based solution powered by the system's auxiliary power plane, providing around-the-clock availability to monitor networked embedded systems such as of point-of-sale terminals (see Figure 1). Intel AMT stores hardware and software information in non-volatile memory, supporting discovery and protection of assets, even while the enabled systems are powered off. With built-in manageability, it provides out-of-band management capabilities to allow network system administrators to remotely "heal" systems in the event of OS failures. The "protect" capability has reached a new level with the addition of the System Defense Feature. Through inbound and outbound filtering and real-time agent presence, this feature can help block incoming software attacks, isolate a device from the network if it does become infected, and proactively alert the network administrator if critical software agents are missing.

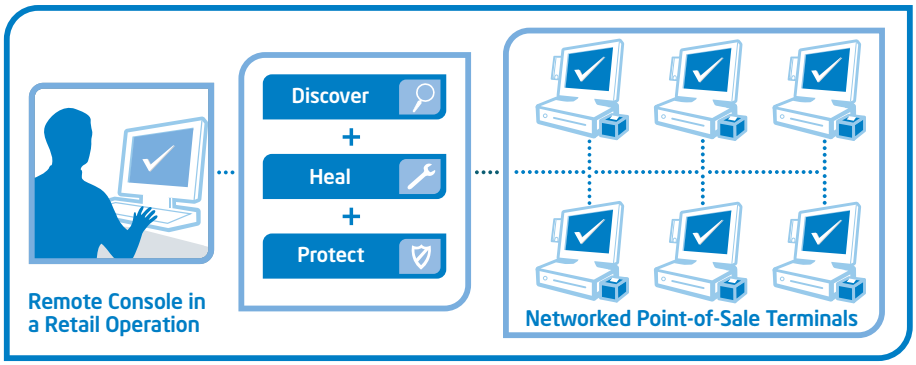
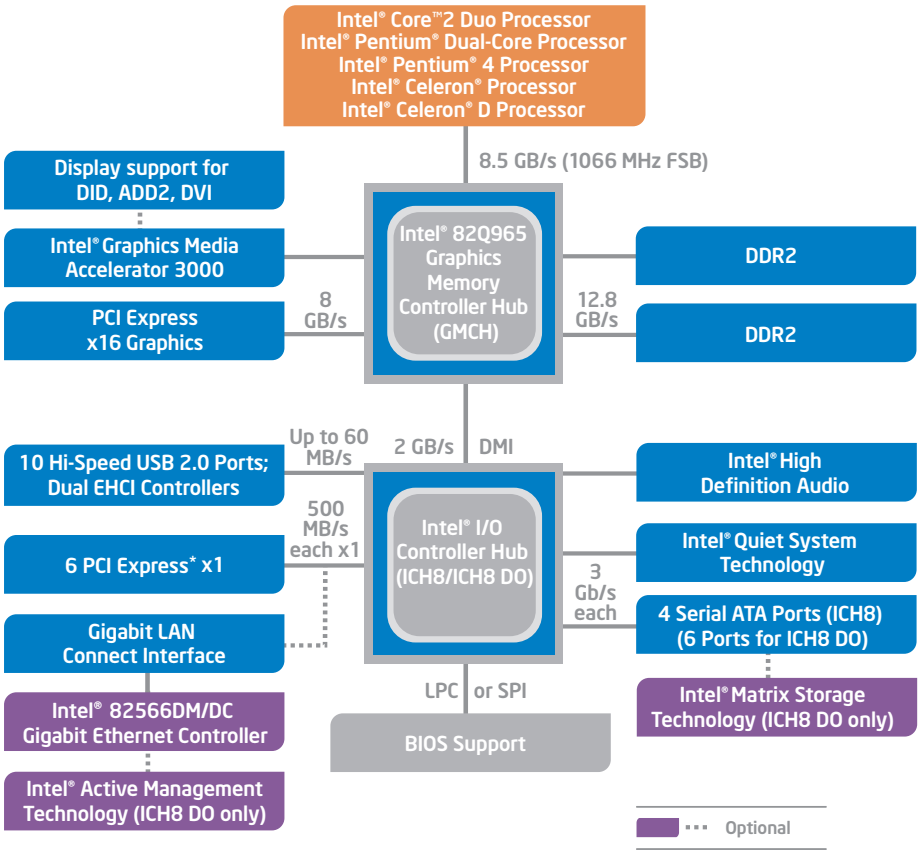


Figure 1. Example using Intel® Active Management Technology in a retail operation to monitor a network of embedded systems even while the enabled systems are powered off.

Features	Benefits
1066/800/533 MHz system bus	▪ Supports the Intel® Core™2 Duo processor E6400[Δ] with Intel® Virtualization Technology,[3] Intel® Core™2 Duo processor E4300,[Δ] Intel® Pentium® Dual-Core processor E2160,[Δ] Intel® Pentium® 4 processor 651[Δ] with Hyper-Threading Technology,[4] Intel® Celeron® processor 440,[Δ] and Intel® Celeron® D processor 352[Δ]
PCI Express* interfaces	▪ PCI Express x16 graphics interface in the GMCH supports the latest high-performance graphics cards ▪ PCI Express x1 I/O ports in the ICH offer up to 3.5x the bandwidth over traditional PCI architecture, delivering faster access to peripheral I/O devices
Intel® Fast Memory Access	▪ Helps improve system performance by optimizing use of available memory bandwidth and reducing latency of memory access by monitoring all pending read/write requests; allows safe and efficient overlapping of commands on all system bus interfaces
Dual-channel DDR2 memory support	▪ Delivers up to 12.8 GB/s of bandwidth and 8 GB memory addressability for faster system responsiveness with support for 64-bit computing ▪ Supports up to four DIMMS, two devices per channel (DDR2 800/667/533 MHz)
Intel® Graphics Media Accelerator 3000 (Intel® GMA 3000)	▪ Delivers richer visual color and picture clarity without the need for additional discrete graphics cards ▪ Dual independent display expands viewable workspace for devices such as point-of-sale terminals with two monitors ▪ Provides next-generation graphics performance for advanced embedded operating systems
Intel® High Definition Audio (Intel® HD Audio)	▪ Enables premium digital sound and delivers advanced features such as multiple audio streams and jack re-tasking ▪ Support for microphone array enables enhanced voice capture for high-quality input to voice-driven activities
Intel® AMT with system defense feature (ICH8 DO only)	▪ Enables remote, down-the-wire management of out-of-band networked systems regardless of system state, helping improve efficiency, asset management and system security and availability ▪ System Defense Feature can help block incoming software attacks, isolate a device from the network if infected, and proactively alert embedded system vendors if critical software agents are missing
Intel® Quiet System Technology	▪ Intelligent system fan-speed control algorithms use operating temperature ranges more efficiently to minimize fan-speed changes and reduce system noise ▪ System fans spin only as fast as needed to cool the system, and slower fans generate less noise
Serial ATA (SATA) 3 Gb/s	▪ Improved storage performance through high-speed, efficient storage interfaces supports faster transfer rate for improved access
Dual Enhanced Host Controller Interface (EHCI); USB port disable	▪ 10 Hi-Speed USB* 2.0 ports with dual EHCI controllers ▪ Individual USB ports are enabled or disabled as needed ▪ Provides added protection of data by preventing malicious removal or insertion of data through USB ports
Intel® Matrix Storage Technology (Intel® ICH8 DO only)	▪ 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
Ecosystem support	▪ Along with a strong ecosystem of hardware and software vendors, including members of the Intel® Communications Alliance (intel.com/go/ica), Intel helps cost-effectively meet development challenges and speed time-to-market
Extended lifecycle	▪ Protects system investment by enabling extended product availability for embedded customers



Block diagram for Intel® Q965 Express chipset

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Product	Product Code	Package	Features
Intel® 82Q965 Graphics Memory Hub (GMCH)	LE82Q965	34 mm 1226-pin FC-BGA	1066/800/533 MHz system bus; DDR2-800/667/533; Controller Intel® GMA 3000; high-bandwidth Direct Media Interface (DMI) chip interconnect
Intel® I/O Controller Hub 8 (Intel® ICH8)	FW82801HB	31 mm 652-pin PBGA	Four PCI masters and six PCI Express* x1 channels; four SATA ports; 10 Hi-Speed USB* 2.0 ports, dual EHCI controllers; enhanced SPI Interface; integrated 10/100/1000 MAC
Intel® I/O Controller Hub 8 DO (Intel® ICH8 DO)	FW82801HO	31 mm 652-pin PBGA	Same features as Intel ICH8 with six SATA ports. Also supports RAID 0, 1, 5 and 10, Intel® AMT, and Intel® Matrix Storage Technology
Intel® 82566DM/DC Gigabit Ethernet Controller (optional)	RU82566DM RU82566DC	81-pin, 10x10 mm FCMMAP (BGA)	Smaller footprint and lower power dissipation compared to multi-chip MAC and PHY solutions; supports 10/100/1000 Mb/s data transfer; footprint-compatible with the Intel® 82562V 10/100 Network Connection; Intel® 82566DM SKU supports Intel® AMT
Intel® 82562V 10/100 Network Connection (optional)	PC82562V	81-pin mold cap package, 10x10 mm	Supports 10/100 Mb/s data transfer; footprint-compatible with Intel® 82566DM/DC Gigabit Ethernet controller FCMMAP (BGA)

Intel Access

Embedded Intel® Architecture Home Page:	intel.com/design/intarch
Developer's Site:	developer.intel.com
Intel in Embedded and Communications:	intel.com/go/embedded
General Information Hotline:	(800) 628-8686 or (916) 356-3104 5 a.m. to 5 p.m. PST
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.

[A]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.

[1]Intel® Matrix Storage Technology requires a motherboard with the Intel® ICH8DO 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.

[2]Intel® Active Management Technology requires a system with an Intel® Q965 Express Chipset with ICH8 DO, Intel® 82566DM with Intel® PRO/1000 PM network connection and appropriate third-party software. The system must be plugged into a power source and connected to a LAN.

[3]Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

[4]Hyper-Threading Technology requires a system with an Intel® Pentium® 4 processor supporting HT Technology and an HT Technology-enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. For more information visit: http://developer.intel.com/products/ht/Hyperthreading_more.htm.

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