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Fact Sheet

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Intel® Centrino® 2 Processor Technology and Intel® Centrino® 2 with vPro™ Technology

Intel® Centrino® 2 processor technology and Intel® Centrino® 2 with vPro™ technology are Intel's next-generation mobile platforms enabling a wave of innovative and powerful new notebook PC designs to meet the needs of even the most demanding user. Intel's latest processor technologies are designed to enable breakthrough performance and improved battery life over previous generation Intel Centrino processor technology-based platforms. Intel Centrino 2 processor technology and Intel Centrino 2 with vPro technology-based notebooks mark a dramatic step forward with the following next-generation components working together to deliver outstanding mobile computing capabilities:

- **45nm Intel® Core™2 Duo Processor**: Intel's best mobile processor, with industry-leading, energy-efficient dual-core performance, now offers a 1066MHz FSB, up to 6MB L2 cache, and new 25W TDP offerings, and delivers over 80% faster performance when compressing standard definition video[2], and up to 90% faster performance when compressing HD video[3].
- **Mobile Intel® 45 Express Chipset**: The newest Intel chipset delivers a dramatic improvement in video quality[4] and over 3X better 3D graphics performance[5] and native hardware-based decoding of HD video streams to enable playback of a typical Blu-ray* movie on a single charge.
- **Intel® WiFi Link 5000 Series:** The new Intel® Wi-Fi Link 5000 Series offers greater range and speed when connecting to a Wireless-N network. The Intel WiFi Link 5300 is the world's first WLAN Adapter that can provide up to 450 Mbps[6] of network bandwidth while the WiFi Link 5100 provides up to 300 Mbps of receive network bandwidth – a bandwidth increase of up to 8x and 5x respectively compared to 802.11a/g.[6]
- **Intel® 82567 Gigabit Network Connection:** three new Gigabit networking products with low TDPs and system idle link downshift for Energy Star* power savings.

– more –

- **New optional products and features:** a 2GB Intel® Turbo Memory module and switchable graphics capabilities.

Also announcing a new Intel® Core™2 Extreme processor:

- **Intel® Core™2 Extreme dual-core mobile processor X9100:** the Intel® Core™2 Extreme dual-core mobile processor X9100, with both cores running at a brisk 3.06 GHz with a 1066 MHz FSB and 6MB L2 cache, also features mobile-specific power saving features, is the world's highest performing mobile processor[1], and addresses demand for even faster notebook PCs for hardcore gamers, artists and media enthusiasts.

Intel Core 2 Duo Processor

The Intel Core 2 Duo processor is Intel's energy-efficient microprocessor that delivers breakthrough mobile performance and responsiveness for demanding business users and consumers alike, who will see improved performance when running multiple intense applications simultaneously and when running dual-core optimized applications.

Key new features of the Intel Core 2 Duo processor include:

- **Intel 45nm Hi-K Metal Gate Silicon Technology** –Nearly 2x more transistors and lower leakage than 65nm technologies, delivering new levels of performance and power efficiency.
- **1066 MHz FSB** – Faster performance as compared to the previous generation 800 MHz FSB
- **Intel® HD Boost** – Faster performance on intensive multimedia applications like HD video encoding
- **6MB L2 Cache** – Performance improvements for data intensive applications
- **Deep Power Down Technology** – Shuts down processor cores and L2 cache when they are not needed for greater energy efficiency

Key architectural features of the Intel Core 2 microarchitecture include:

- Intel Wide Dynamic Execution:
    - **Wider** – A full 4-wide super scalar pipeline that can fetch, decode, execute and retire instructions at a sustained rate of four instructions-per-clock vs. three for the Intel Core Duo processor.
    - **Deeper** – Buffer sizes optimize the effective number of instructions in flight relative to the pipeline, allowing the processor to look deeper into the program flow to find instructions that can be executed in parallel.
    - **Faster** – Efficiency optimized pipeline improves the architectural critical path for a very short and efficient 14-stage pipeline, attributing to higher frequency while delivering higher instructions-per-clock.
    - **Smarter** – Macro fusion combines commonly used instruction sequences into a single instruction for execution, reducing the internal resources required and increasing the instructions-per-clock rate, thus enabling the retiring of five instructions with the same work it would normally take to retire four.

- **Intel® Intelligent Power Capability** – A set of capabilities designed to reduce power consumption and design requirements by managing the runtime power consumption of all the processor's execution cores. The result is excellent energy optimization, enabling the Intel Core microarchitecture to deliver more energy-efficient performance notebook PCs.
- **Intel® Advanced Smart Cache** – A multi-core optimized cache that significantly reduces latency to frequently used data, thus improving performance and efficiency by increasing the probability that each execution core of a multi-core processor can access data from a higher-performance, more efficient cache subsystem.
- **Intel® Smart Memory Access** – Improves system performance by optimizing the use of the available data bandwidth from the memory subsystem and hiding the latency of memory accesses. This innovation also includes a capability called "memory disambiguation," which increases the efficiency of out-of-order processing by providing the execution cores with the built-in intelligence to speculatively load data for instructions that are about to execute before all previous store instructions are executed.
- **Intel® HD Boost** – Significantly improves performance when executing streaming SIMD extension (SSE/SSE2/SSE3/SSE4) instructions, accelerates a broad range of applications, including video, speech and image, photo processing, encryption, financial, engineering and scientific applications.
- **Intel® 64** – 64-bit headroom in hardware to take advantage of 64-bit operating systems such as Microsoft Windows Vista* and 64-bit applications as they become available for the mobile client to take advantage of greater system memory to support applications with larger datasets.

Mobile Intel® 45 Express Chipset

The Mobile Intel 45 Express chipset is the new Intel chipset for Intel Centrino 2 processor technology and Intel Centrino 2 with vPro technology and offers new capabilities and greater performance for an outstanding mobile computing experience.

- A suite of drivers enabling a robust and outstanding Windows Vista Premium experience featuring Windows* Aero across all platforms
- Improved game playability with more execution units (10, as compared to 8 in previous generation)
- Enhanced Intel® Clear Video Technology with software features including ProcAmp, high quality scaling, film mode detection and correction, MPEG2 and WMV9 hardware acceleration, all of which enable a premium high definition video experience with smoother stutter-free high def video playback, sharper image quality, customizable color controls, & fewer motion artifacts.
- Intel® Graphics Media Accelerator 4500MHD offers an increased graphics core frequency of 533MHz @1.05 and up to 384 MB of video memory
- Improved security with Intel® Trusted Platform Module, Intel® Trusted Execution Technology, Intel® Virtualization Technology
- Integrated high definition logo capability (Blu-ray*) with native hardware-based decoding of HD video streams (AVC, VC1, MPEG)
- Native support for digital displays with Integrated HDMI with HDCP key

- Power management features including Intel® Display Refresh Rate Switching Technology, support for D^2PO panel, Render Standby, all enabling power savings for longer battery life

Intel WiFi Link 5000 Series
The Intel® WiFi Link 5000 series is Intel's 2nd Generation 802.11 Draft-N wireless LAN solution offering maximum network connectivity for the home and the enterprise. 802.11 Draft-N technology, with its superior performance and range is a key requirement for Intel® Centrino® 2 processor technology and Intel® Centrino® 2 with vPro™ technology platforms.

- **Intel WiFi Link 5300** – World's first 450 Mbps[6] Draft-N WLAN adapter offering superior performance, features, and increased range compared to legacy 802.11a/g solutions. The WiFi Link 5300 enables faster uploads and downloads, more reliable and predictable connections, and Enterprise-class manageability via Wireless support for Intel® Active Management Technology v4.0. In addition, the WiFi Link 5300 is available in a PCIe Half Mini Card form factor to enable thinner and lighter notebook designs.
- **Intel WiFi Link 5100** – 802.11 Draft-N WLAN adapter providing up to 300Mbps of Rx bandwidth, a 5x increase as compared to legacy 802.11a/g solutions.[6]

Intel® 82567 Gigabit Network Connection:

- **Intel® 82567LM** – Gigabit networking solution for high-end corporate designs. It supports Intel Centrino 2 with vPro technology (Intel AMT and the System Defense Filters) for leading system manageability (or ASF 2.0), integrated Auto Connect Battery Saver (ACBS), Link Speed Battery Saver, Low Power Link Up (LPLU), System Idle link downshift for Energy Star* power savings, Jumbo Frames, Receive Side Scaling, and the Intel® Stable Image Platform Program (SIPP).
- **Intel® 82567LF** – Gigabit networking solution for mainstream notebook systems that require only basic manageability. It supports ASF 2.0, integrated ACBS, Link Speed Battery Saver, Low Power Link Up (LPLU), and System Idle link downshift for Energy Star* power savings as well as the Intel® Stable Image Platform Program (SIPP).
- **Intel® 82567V** – Gigabit networking solution for basic consumer notebook systems. It supports basic low power modes, Link Speed Battery Saver, Low Power Link Up (LPLU), and System Idle link downshift for Energy Star™ power savings.

Switchable graphics
Switchable graphics is a new (optional) feature now available on Intel Centrino 2-based notebook PCs that allows users to switch between energy-efficient integrated graphics, which enable longer battery life; and discrete graphics, which can deliver greater 3D performance, giving users the best of both worlds.

Intel® Turbo Memory
An optional feature available on many Intel Centrino 2 processor technology and Intel Centrino 2 with vPro technology-based notebooks, now available in a larger capacity 2GB module, that improves performance, boot time and battery life. It is a non-volatile memory module that increases system performance while reducing power consumption.[5]

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[1] System performance, battery life, high-definition quality video playback and functionality, and wireless performance and functionality will vary depending on your specific operating system, hardware, chipset, connection rate, site conditions, and software configurations. References to enhanced performance including wireless as measured by SYSMark 2004 SE, PCMark* 2005 and 3DMark*06, SPEC* CPU2006* and Adjacent Channel Interface (ACI)* refer to comparisons with previous generation Intel® Centrino® technologies. References to improved battery life as measured by MobileMark* 2007, if applicable, refer to previous generation Intel Centrino processor technology. Wireless connectivity and some features may require you to purchase additional software, services or external hardware. Availability of public wireless LAN access points is limited, wireless functionality may vary by country and some hotspots may not support Linux-based Intel Centrino processor technology systems. See http://www.intel.com/products/centrino/more_info for more information.*

[2] As measured based on VirtualDub 1.1.2 with DivX* 6.7 codec comparing Intel® Centrino® 2 processor technology-based notebooks with comparable frequency first generation dual-core Intel Centrino processor technology-based notebooks. Actual performance may vary. See http://www.itnel.com/go/consumerbenchmarks for important additional information.*

[3] Performance measured based on TMPGEncoder Xpress* 4.4 comparing Intel® Centrino® 2 processor technology-based notebooks with comparable frequency first generation dual-core Intel® Centrino® processor technology-based notebooks. Actual performance may vary. See http://www.intel.com/go/consumerbenchmarks for more important additional information.*

[4] Intel Graphics with Intel® ClearVideo Technology, including improved video quality are available on systems based on the Mobile Intel® GM45 Express Chipset.

*[5] As measured by 3D Mark*06 comparing latest generation Intel® Centrino® 2 processor technology-based notebooks including Intel Graphics, with first generation dual-core Intel Centrino processor technology based notebooks. Actual performance may vary. See http://www.intel.com/go/consumerbenchmarks for important additional information.*

[6] Up to 2x greater range enabled by 3x3 Draft-N implementations with 3 spatial streams. Up to 8x Bandwidth increase or up to 450 Mbps of Bandwidth based on the theoretical maximum bandwidth enabled by 3x3 Draft-N implementations with 3 spatial streams in combination with a 3 spatial stream Access Point. Up to 5x Bandwidth increase or up to 300 Mbps of Receive Bandwidth based on the theoretical maximum receive bandwidth enabled by 1x2 Draft-N implementations with 1 transmit spatial stream and 2 receive spatial streams. Actual wireless throughput and/or range will vary depending on your specific operating system, hardware, and software configurations. Check with your PC and access point manufacturer for details.

[7] Intel® Active Management Technology requires the computer to have an Intel® AMT-enabled chipset, network hardware and software, as well as connection with a power source and a corporate network connection. Setup of Intel AMT requires configuration by the purchaser and may require scripting with the management console or further integration into existing security frameworks to enable certain functionality. It may also require modifications or implementation of new business processes. With regard to notebooks, Intel AMT may not be available or certain capabilities may be limited over a host OS-based VPN or when connecting wirelessly, on battery power, sleeping, hibernating or powered off. For more information, see http://www.intel.com/technology/manage/iamt.

[8] Tests run on customer reference boards and preproduction latest generation Intel® Centrino® processor technology with optional Intel® Turbo Memory enabled against like systems without Intel® Turbo Memory. Results may vary based on hardware, software and overall system configuration. All tests and ratings reflect the approximate performance of Intel products as measured by those tests. All testing was done on Microsoft Vista* Ultimate (build 6000). Application load and runtime acceleration depend on Vista*'s preference to pre-load those applications into the Microsoft* ReadyBoost* cache. See http://www.intel.com/performance/mobile/Intel_Turbo_Memory.htm for more information.*

[*]Other names and brands may be claimed as the property of their respective owners. SPEC, SPECint, SPECfp, SPECrate, SPECweb, SPECjbb are trademarks of the Standard Performance Evaluation Corporation. See: http://www.spec.org for more information on the benchmarks.