



Intel® Centrino™ Mobile Technology Performance Brief



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Wireless connectivity and some features may require you to purchase additional software, services or external hardware. Availability of public wireless LAN access points limited and some hotspots may not support Linux-based Intel Centrino mobile technology systems. System performance measured by MobileMark* 2002. System performance, battery life, wireless performance and functionality will vary depending on your specific operating system, hardware and software configurations. See http://www.intel.com/products/centrino/more_info for more information.

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 configuration, as well as system use patterns including wireless connectivity, may affect actual test results and ratings. For more information on performance tests and on the performance of Intel products, visit www.intel.com/performance/resources/limits.htm.



Executive Summary:

Intel® Centrino™ Mobile Technology

Intel is expanding its history of innovation with new notebook PC capabilities designed specifically for the mobile world. This technology allows users to work, play and connect without wires and choose from a whole new generation of thin and light notebook PCs that are designed to enable extended battery life.

This new innovative technology delivers breakthrough notebook PC performance and low-power enhancements to enable extended battery life in notebook PCs, combined with integrated wireless LAN connectivity and standards-based security support.

With Intel Centrino mobile technology, three components work together to deliver a breakthrough in freedom and capability— to work, learn and play on the go. These components include:

- Intel® Pentium® M Processor based on 90nm process technology featuring 2MB L2 cache
- Intel® 855 chipset family
- Intel® PRO/Wireless 2100 Network Connection

The Intel Pentium M processor with 90nm process technology is based on a high performance, low power micro-architecture and includes several innovative features like a high performance, power optimized 400 MHz System Bus, 32KB Level 1 instruction and data caches, 2MB Level 2 Advanced Transfer Cache, advanced branch prediction and data prefetching, Streaming SIMD Extensions 2 support, Enhanced Intel SpeedStep® Technology support, Intel MMX™ media enhancement technology support and advanced thermal monitoring capabilities. These features are offered in Micro-FCPGA and Micro-FCBGA package form factors.

The Intel Pentium M processor is the next step towards achieving high mobile performance at very low power. This exciting new processor supports Enhanced Intel SpeedStep technology at multiple operating points instead of two points support on existing processors. Real-time dynamic switching of the voltage and frequency between multiple performance modes is based on CPU demand. This occurs by switching the bus ratios, core operating voltage, and core processor speeds without resetting the system. Multiple Enhanced Intel SpeedStep technology operating points enable optimal performance at the lowest power.

The highly scalable Intel 855PM Chipset has been designed specifically for mobile systems with enhancements in performance while reducing power consumption at the same time. The Intel 855PM Chipset was designed in tandem with the Intel Pentium M processor. The Intel 855PM Chipset was designed to maximize performance and enhance the PC user experience both on and off the Internet. Features such as a 400 MHz system bus offer a peak bandwidth of 3.2 GB/s, support of Double Data Rate (DDR) memory channels offer a peak bandwidth of 2.66 GB/s and the AGP 4X interface allows graphics controllers access to main memory at over 2 GB/s. The memory controller hub is connected to the I/O controller hub with the very efficient and high bandwidth Hub Interface. With dedicated data paths to fully optimize the additional bandwidth, the Intel 855PM Chipset delivers high performance and support for future Intel Pentium M processors.

The Intel 855PM Chipset has a lower core voltage in comparison to previous generations of memory controller hubs and utilizes innovative design features to reduce memory interface power during system idle conditions. Design enhancements like increased burst length size, timing improvements, shorter refresh cycles help improve the performance over previous generations of memory controller hubs.

The integrated Wi-Fi Certified Intel PRO/Wireless 2100 Network Connection has been designed and validated to work with all of the Intel Centrino mobile technology components and is able to connect to 802.11b Wi-Fi Certified access points. It also supports advanced Wireless LAN (WLAN) security features including WPA and Cisco* Compatible Extensions. For comprehensive security support, the Intel PRO/Wireless 2100 Network Connection has been verified with leading VPN suppliers like Cisco*, CheckPoint*, Microsoft* and Intel. Future feature support is targeted to include Cisco's implementation of the Advanced Encryption Standard (AES). The

Intel® PRO/Wireless 2100 Network Connection with Intel PROSet Software offers many ease-of-use features for users in addition to the core benefit features of Intel Centrino™ mobile technology, including advanced profile management which allows multiple profiles to automate connection and switching between different wireless LANs, VPNs and wired networks at home, work, cafes, hotels and airports around the globe. Intel's special connection wizard provides a simple interface for setting up ad hoc networks. The Intel PRO/Wireless 2100 Network Connection with Intel PROSet Software also provides the ability to connect using Single-Sign-On (SSO) with Cisco* LEAP features. The Intel wireless coexistence system support enables reduced interference between the Intel PRO/Wireless network connection and Bluetooth* devices. WLAN performance is further optimized by per-packet antenna selection. The Intel PRO/Wireless 2100 network connection also includes a number of low power features to extend battery life, presenting power saving capabilities that allows users to set power at five different settings to trade off performance for longer battery life and Intel Intelligent Scanning technology that reduces power by controlling the frequency of scanning for access points when a link is lost.

Notebook PCs based on Intel Centrino mobile technology include the latest features to simplify system management, decrease power consumption, and lower the total cost of ownership for large and small business environments. Notebook PCs with Intel Centrino mobile technology offer great performance for today's and tomorrow's applications, as well as the quality, reliability, and compatibility that is expected from the world's leading microprocessor company.

This performance brief introduces the Intel Centrino mobile technology, explains the technologies that make it work, examines the purpose and methods behind several industry standard performance benchmarks, and shows how Intel Centrino mobile technology currently performs on each of the respective benchmarks. As new benchmarks are introduced, this performance brief will be updated as appropriate.

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1. Introduction

Intel is expanding its history of innovation with new notebook PC capabilities designed specifically for the mobile world. This technology allows users to work, play and connect without wires and choose from a whole new generation of thin and light notebook PCs that are designed to enable extended battery life.

This new innovative technology delivers breakthrough mobile performance and low-power enhancements to enable extended battery life in notebook PCs, combined with integrated wireless LAN connectivity and standards-based security support.

With Intel® Centrino™ mobile technology, three components work together to deliver a breakthrough in freedom and capability— to work, learn and play on the go. These components include:

- Intel® Pentium® M Processor based on 90nm process technology featuring 2MB L2 cache
- Intel® 855 chipset family
- Intel® PRO/Wireless network connection

In the Highest Frequency Mode (HFM), the notebook PC can achieve high performance on the most complex business and Internet applications. In the Lowest Frequency Mode (LFM), the processor's power consumption is reduced further which enables extended battery life. The on-demand performance switches between HFM, LFM and intermediate Enhanced Intel SpeedStep® technology operating points based on user needs, optimizing application performance and enabling extended battery life.

When an Intel Pentium M processor is used in conjunction with the Intel 855 chipset family, the resulting platform provides reliable, balanced performance for today's mainstream notebook PCs, with headroom to remain productive as new applications emerge. The Intel 855 chipset family offers support for DDR memory technology and offers a system bus frequency of 400 MHz.

The integrated Wi-Fi Certified Intel PRO/Wireless 2100 Network Connection has been designed and validated to work with all of the Intel Centrino mobile technology components and is able to connect to 802.11b Wi-Fi Certified access points. It also supports advanced Wireless LAN (WLAN) security features including WPA and Cisco* Compatible Extensions. For comprehensive security support, the Intel PRO/Wireless 2100 Network Connection has been verified with leading VPN suppliers like Cisco*, CheckPoint*, Microsoft* and Intel. Future feature support is targeted to include Cisco's implementation of the Advanced Encryption Standard (AES).

Notebook PC performance does not depend on the microprocessor alone. Hardware and software system components—such as the operating system, the graphics and I/O subsystems, application software, and memory—may significantly affect performance results. For this reason, this Performance Brief illustrates Intel Centrino mobile technology performance on a consistent notebook PC configuration. Details of the notebook PC configuration used for the performance scores throughout this brief can be found in Appendix A.

2. The Intel® Pentium® M Processor

The Intel® Pentium® M processor is designed with a mobile optimized architecture that delivers advanced performance at very low power.

Highlights of the Intel Pentium M processor 755, 745 and 735:

- Manufactured on Intel's advanced 90nm Process Technology
- Core frequencies of 2 GHz, 1.80 GHz and 1.70 GHz
- Supported by the Intel 855 chipset family
- Featuring a high performance, low power mobile optimized micro-architecture
- On-die, primary 32 KB instruction cache and 32 KB write-back data cache
- On-die, 2MB Level 2 cache with Advanced Transfer Cache Architecture
- Advanced power management including Enhanced Intel SpeedStep® technology support with multiple operating points
- Fully compatible with existing Intel Architecture-based software
- Streaming SIMD Extensions 2
- Intel MMX™ media enhancement technology
- Memory cacheability up to 4 GB of addressable memory space and system memory scalability up to 64 GB of physical memory
- Available in Micro-FCPGA and Micro-FCBGA packages

3. Intel® Pentium® M Processor Product Feature Highlights

The Intel® Pentium® M processor micro-architecture is optimized for high performance and low power. It includes a number of features including Enhanced Intel SpeedStep® technology support, a high performance power optimized 400 MHz System Bus, 32KB Level 1 instruction and data caches, 2MB Level 2 Advanced Transfer Cache, Streaming SIMD Extensions 2 support and advanced thermal monitoring capabilities. These features and resulting benefits are described in more detail below:

- High Performance and Low Power Core

The Intel Pentium M processor features a high performance core architecture that uses techniques like micro-op fusion and Advanced Stack Management to maximize performance. Micro-op fusion combines micro-ops derived from the same macro-op. Advanced Stack Management reduces the number of micro-ops in stack related operations by tracking relative stack pointer changes locally. Reduction in number of micro-ops results in more efficient scheduling and better performance at lower power. The Intel Pentium M processor core can operate at very low voltages and uses advanced techniques to minimize clock and signal switching, resulting in very low power dissipation in the active state. The processor features dynamic power management states that consist of Stop Grant, Sleep, Deep Sleep, and Deeper Sleep Alert states that allow the processor to quickly enter and exit from these states to provide fast responsiveness and significant power savings.

- Enhanced Intel SpeedStep Technology Support

The Intel Pentium M processor features Enhanced Intel SpeedStep Technology support at multiple voltage and frequency operating points. Highlights of this technology include:

- Multiple performance modes ranging from the Lowest Frequency Mode (LFM) to Highest Frequency Mode (HFM) enable optimum performance at the lowest power
- Real-time dynamic switching of the voltage and frequency between multiple performance modes based on CPU demand. This occurs by switching the bus ratios, core operating voltage, and core processor speeds without resetting the notebook PC
- Software control of voltage and frequency operating points
- Very low transition latency

- 400 MHz System Bus with enhanced low power features

The Intel Pentium M processor supports Intel's highest performance mobile system bus by delivering 3.2 GB of data per second into and out of the processor. This is accomplished through a physical signaling scheme of quad pumping the data transfers over a 100-MHz clocked system bus and a buffering scheme allowing for sustained 400-MHz data transfers. The system bus features the following low power enhancements:

- Low voltage swing
- Intelligent disabling of data, address and control signal buffers
- Dynamic on-die termination disabling

- 32KB Level 1 Instruction and Data Caches

Both Instruction and Data Caches on the Intel Pentium M processor are 32KB in size. Large L1 caches provide fast access to critical instructions and data, resulting in very high performance.

- 2MB Level 2 Advanced Transfer Cache

The Level 2 Advanced Transfer Cache (ATC) is 2MB in size and delivers an extremely high data throughput channel between the Level 2 cache and the processor core. The Advanced Transfer Cache transfers data on each core clock. Features of the ATC include:

- Non-Blocking, full speed, on-die Level 2 cache
- 8-way set associativity
- Data clocked into and out of the cache every clock cycle
- Advanced Branch Prediction and Data Prefetching

The Intel® Pentium® M processor features an advanced branch prediction architecture that combines three types of predictors – Global, Bi-Modal and Loop Detector. The processor automatically selects the most optimal algorithm to use, significantly reducing the number of mis-predicted branches. The processor also features an advanced data prefetcher that can track up to 8 upstream and 4 downstream operations simultaneously. Data is prefetched from main memory to the L2 cache in advance, resulting in higher performance by reducing the need to access system memory.

- Streaming SIMD Extensions 2 (SSE2)

The Intel Pentium M processor supports the complete SSE2 instruction set. These instructions include 128-bit SIMD integer arithmetic and 128-bit SIMD double-precision floating-point operations. These instructions reduce the overall number of instructions required to execute a particular program task and as a result can contribute to an overall performance increase.

- Features used for Test and Performance / Thermal Monitoring:
 - Built-in Self Test (BIST) provides single stuck-at fault coverage of the microcode and large logic arrays, as well as testing of the instruction cache, data cache, Translation Lookaside Buffers (TLBs), and ROMs.
 - IEEE 1149.1 Standard Test Access Port and Boundary Scan mechanism enables testing of the Intel Pentium M processor and system connections through a standard interface.
 - Internal performance counters can be used for performance monitoring and event counting.
 - Includes an on-die thermal diode and the Intel Thermal Monitor feature for thermal management purposes. The Intel Pentium M processor features a new Thermal Monitor mode which uses Enhanced Intel SpeedStep technology instead of clock control. This technique achieves efficient thermal management with minimal performance impact.
 - The Intel Pentium M processor has a maximum junction temperature (T_j) specification of 100°C.

4. Intel® 855PM Chipset Product Feature Highlights

As the next step in the evolution of the Intel Hub Architecture for the notebook PCs using Intel® Centrino™ mobile technology, the Intel 855PM chipset was designed in tandem with the Intel Pentium® M processor.

The Intel 855PM Memory Controller Hub (MCH) delivers support for either PC1600, PC2100, or PC2700 DDR memory technology and a 400 MHz system bus, providing the latest graphics support through 1.5V AGP4X technology. Together these features deliver the highest total bandwidth capabilities to the PC platform. The enhanced 82801DBM I/O Controller Hub 4 (ICH4-M) delivers twice the I/O bandwidth over traditional bridge architecture and provides dedicated data paths to fully optimize the additional bandwidth. The ICH4-M has reduced core voltage from previous generation of I/O hub architecture chipsets. The ICH4-M makes a direct connection from the graphics and memory for faster access to peripherals and provides the features and bandwidth required for a high performance notebook PC.

In addition to advanced application support, the Intel 855PM chipset was designed with the following features to enhance the end-user experience:

- 400 MHz system bus delivers a high bandwidth connection between the Intel Pentium M processor and the platform
- The DDR memory channel delivers up to 2.66 GB/s of memory bandwidth to the processor. High memory bandwidth, coupled with an efficient protocol, deliver balanced platform support and provide the memory bandwidth necessary to extract the highest performance from the Intel Pentium M processor.
- The AGP4X interface allows graphics controllers to access main memory at over 1 GB/s, twice that of previous AGP platforms
- Support for Hi-Speed Universal Serial Bus (USB 2.0) with backward compatibility with USB 1.1
- AC97 2.2 Interface with support for a third codec to provide 20 bit resolution. The latest AC97 audio delivers six channels of audio for enhanced sound quality and full surround sound capability for live broadcast and other Digital Dashboard programming
- LAN Connect Interface (LCI) provides flexible network solutions such as home phone line, 10/100 Mbps Ethernet, and 10/100 Mbps Ethernet with LAN manageability
- Dual Ultra ATA-100 controllers support the fastest IDE interface for transfers to storage devices
- Support for ACPI-defined power states C1-C4, S1, S3-S5
- Support for Enhanced Intel SpeedStep® Technology
- Support for "Deeper Sleep" power state
- Allows wake-up from sleep states S1-S4

The 855PM chipset is designed for low power and great performance supporting architectural features for power reduction techniques including:

- Chipset MCH core voltage reduced to 1.2V for reduced power consumption
- Management of DDR SO-DIMM (platform) power by using aggressive use of CKE Power-Down when memory interface is idle and enhancement of per-bank page-closing policy for the memory interface
- Management of Intel® 855PM MCH DDR I/O power with aggressive tri-stating of control signals when not needed and partial drive of command signals when possible and including during idle cycles and reducing toggle rates of control line
- Support for DDR Read Throttling via External Thermal Sensor to prevent memory overheating, disabling of I/O buffers and DLLs when possible, turning off Hub Interface and Host PLLs also add to increased power savings for the 855PM chipset

Some of the features added to the Intel 855PM chipset design to boost MCH performance include:

- Significant timing improvements to allow a robust DDR266 channel with a combination of significant logic changes and I/O changes
- Shorter memory refresh sequence with shorter memory controller queues provides additional bandwidth improvement by reducing CPU access latencies
- Reduction in page-miss occurrences due to significant improvements in page closing algorithms

5. Intel® PRO/Wireless 2100 Network Connection Product Feature Highlights

The Intel® PRO/Wireless 2100 network connection is the integrated Wireless LAN (WLAN) solution for Intel Centrino™ mobile technology. The Intel PRO/Wireless 2100 network connection works in concert with the other Intel Centrino mobile technology components to provide freedom and flexibility to work and play on the go without searching for a phone jack, network cable, or plugging in a special card. The Intel Centrino mobile technology is based upon four major categories: Security, Performance, Ease-of-use, and Verification.

- **Security**
Intel Centrino mobile technology has been Intel tested to support advanced, standard and industry enhancement-based wireless security solutions including WEP, 802.1X, Cisco*Compatible Extensions and WPA.
- **Performance**
With 802.11b support and speeds up to 11Mbps, Intel PRO/Wireless 2100 network connection enables fast network connections. It includes per-packet antenna selection to enable optimized WLAN performance. The Intel Wireless Coexistence System helps reduce interference between Intel PRO/Wireless and certain Bluetooth* devices.
- **Ease-of-use**
Intel PROSet software enables easy configuration and management of wireless network connections with the automated profile wizard.
- **Verification**
Intel Centrino mobile technology is verified with leading VPN infrastructure products. Intel is working with hardware and software developers and wireless service providers to deliver a reliable and integrated wireless mobile computing experience.

In addition to the core benefits of Intel Centrino mobile technology, additional highlights of the Intel PRO/Wireless 2100 Network Connection include:

- Single band support, providing the ability to connect to 802.11b networks
- Industry standard and extended wireless security support (WEP, 802.1X, Cisco* Compatible Extensions and WPA)
- Intel PROSet software with advanced profile management support, allows multiple setup profiles to connect to different WLAN networks
- Intel PROSet software with automatic WLAN switching support enables automatic switching between wired and wireless LAN connections
- Intel PROSet software supports Cisco*, CheckPoint*, Microsoft* and Intel VPN connections
- Intel PROSet software with ad hoc connection wizard support provides a simple interface for setting up ad hoc networks

- Intel® Wireless Coexistence System support enables reduced interference between Intel PRO/Wireless and certain Bluetooth* devices
- Per-packet antenna selection enables optimized WLAN performance
- Intel Intelligent Scanning Technology, reduces power by controlling the frequency of scanning for access points
- Power saving capability with five different power settings allows users to trade off performance and battery life

6. Performance Summary

Mobile Experience - MobileMark* 2002

MobileMark*2002 is used to evaluate notebook PC user experience by measuring both performance and battery life at the same time on the same workload. MobileMark 2002 is a tool that measures notebook PC performance on popular business-oriented applications in the Microsoft* Windows* operating environment. The productivity usage model provides computations representing today's business users using popular office productivity and content creation applications. This usage model reports a performance score and a battery life score.

The productivity workload of MobileMark 2002 consists of emerging usage models and popular productivity applications including:

- Adobe* Photoshop* 6.0.1
- Macromedia* Flash* 5.0
- McAfee* VirusScan* 5.13
- Microsoft* Excel* 2002
- Microsoft* Outlook* 2002
- Microsoft* PowerPoint* 2002
- Microsoft* Word* 2002
- Netscape* Communicator* 6.0
- WinZip* 8.0

Mobile Experience

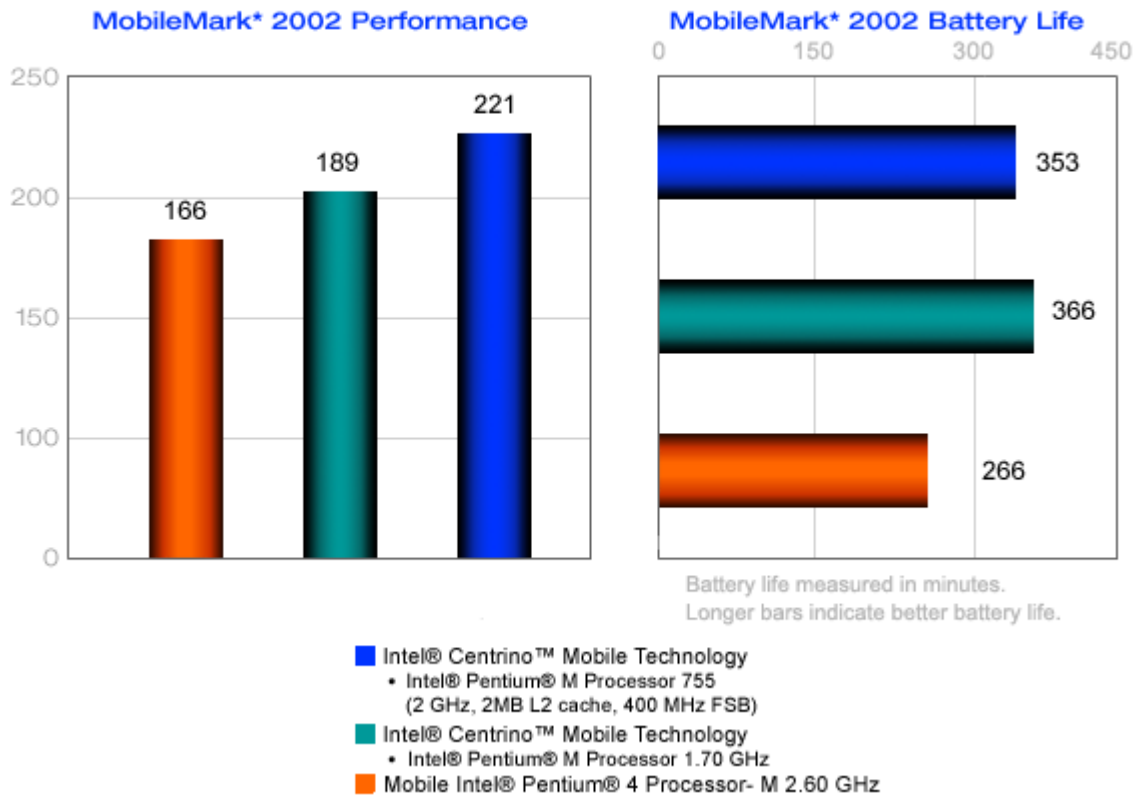


Figure 1. Intel® Centrino™ Mobile Technology Performance and Battery Life on MobileMark* 2002

Internet Experience - WebMark* 2004

WebMark* 2004 measures Internet Client performance based on the latest web technologies and internet usage models. WebMark 2004 enables comparison of PC performance based upon Information Processing and Commercial Transaction workloads. Featuring two modes of operation, the Offline mode enables users to measure the Internet client performance of a PC using content stored locally while the On-line mode requires an additional server to host test content.

Figure 2 below shows WebMark* 2004 - Offline Mode

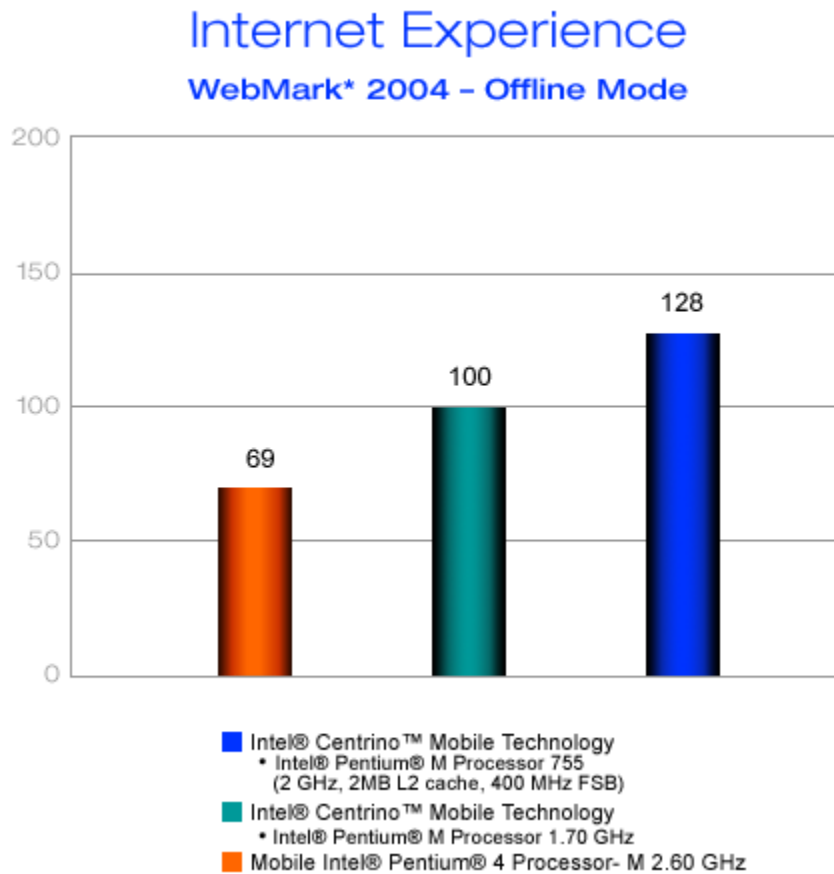


Figure 2. Intel® Centrino™ Mobile Technology Performance on WebMark* 2004 – Offline Mode

7. Summary of Results

Table 1 and Table 2 summarize the benchmark performance of Intel® Centrino™ Mobile Technology featuring Intel® Pentium® M Processor 755, Intel® Centrino™ Mobile Technology featuring Intel® Pentium® M Processor 1.70 GHz, and the Mobile Intel® Pentium® 4 Processor-M 2.60 GHz.

Table 1. Raw Performance Data

Benchmarks	Mobile Intel® Pentium® 4 Processor – M 2.60 GHz	Intel® Centrino™ Mobile Technology featuring Intel® Pentium® M Processor 1.70 GHz	Intel® Centrino™ Mobile Technology featuring Intel® Pentium® M Processor 755
MobileMark* 2002 – Performance	166	189	221
MobileMark* 2002 – Battery Life (minutes)	266	366	353
WebMark* 2004 – Offline Mode	69	100	128

Table 2. Normalized Performance Results

Benchmarks	Mobile Intel® Pentium® 4 Processor – M 2.60 GHz	Intel® Centrino™ Mobile Technology featuring Intel® Pentium® M Processor 1.70 GHz	Intel® Centrino™ Mobile Technology featuring Intel® Pentium® M Processor 755
MobileMark* 2002 – Performance	1.00	1.14	1.33
MobileMark* 2002 – Battery Life (minutes)	N/A	N/A	N/A
WebMark* 2004 – Offline Mode	1.00	1.45	1.86

Appendix A: Notebook PC Configuration

Table 3. Notebook PC Configuration Used for Performance Measurement

Intel® Mobile System	Mobile Intel® Pentium® 4 Processor - M	Intel® Centrino™ Mobile Technology	Intel® Centrino™ Mobile Technology
Processor Name	Mobile Intel® Pentium® 4 Processor - M 2.60 GHz	Intel® Pentium® M Processor 1.70 GHz	Intel® Pentium® M Processor 755
Processor Speed	2.60 GHz	1.70 GHz	2 GHz
Processor Secondary Cache	512KB Full-Speed On-Die Level 2 Cache	1MB Full-Speed On-Die Level 2 Cache	2MB Full-Speed On-Die Level 2 Cache
Motherboard Chipset	Intel® 845MP	Intel® 855PM	Intel® 855PM
Network Card	Intel® Pro/Wireless 2011B LAN 3A mini-PCI adaptor (Wireless transmitter disabled for MobileMark* 2002)	Intel® Pro/Wireless LAN 2100 3B mini-PCI Adapter (Wireless transmitter enabled and associated with an Access Point for MobileMark* 2002)	Intel® Pro/Wireless LAN 2100 3B mini-PCI Adapter (Wireless transmitter enabled and associated with an Access Point for MobileMark* 2002)
Vendor and Model	IBM* T30 (Modified)	IBM* T41p (Modified)	IBM* T41p (Modified)
Motherboard BIOS	2.01	1RETC4WW	1RETC4WW
Memory Size	512MB (2x256MB) PC2100 DDR266 Crucial	1024MB (2x512MB) PC2700 DDR333 Micron	1024MB (2x512MB) PC2700 DDR333 Micron
Chipset INF File	Intel® Chipset Software Installation Utility V4.00.1013	N/A	N/A
Hard Disk	IBM IC25N04ATCS05-0 Travelstar* 40GB 8MB 5400 RPM	Hitachi* HTS726060M9AT00 60GB 8MB 7200 RPM	Hitachi* HTS726060M9AT00 60GB 8MB 7200 RPM
Hard Disk Driver	Microsoft* Default UDMA-5	Microsoft* Default UDMA-5	Microsoft* Default UDMA-5
Video Controller	ATI* Mobility* Radeon* 7500	ATI* Mobility* Fire GL* T2	ATI* Mobility* Fire GL* T2
Video Memory Size/Type	16MB DDR SDRAM	128MB DDR SDRAM	128MB DDR SDRAM
Video Driver Revision	ATI Mobility 7500 6.13.10.6114	ATI 6.14.10.6392	ATI 6.14.10.6392
Operating System	Microsoft Windows XP Professional, Build 2600, Service Pack 1 on NTFS	Microsoft Windows XP Professional, Build 2600, Service Pack 1 on NTFS	Microsoft Windows XP Professional, Build 2600, Service Pack 1 on NTFS
Graphics	1024x768 resolution, 32-bit color	1400x1050 resolution, 32-bit color	1400x1050 resolution, 32-bit color



Intel® Mobile System	Mobile Intel® Pentium® 4 Processor - M	Intel® Centrino™ Mobile Technology	Intel® Centrino™ Mobile Technology
Sound Card	Intel® Integrated Audio	Intel® Sound MAX Digital Audio	Intel® Sound MAX Digital Audio
Battery Capacity	86.4 WHr	71.3 WHr	71.3 WHr
Weight	5.7 lbs	5.3 lbs	5.3 lbs
Thickness	1.4"	1.0"	1.0"
Screen Size	14.1"	14.1"	14.1"
Screen Brightness	~30 nits	~30 nits	~30 nits
Power Management Mode for MobileMark* 2002	Portable/laptop	Portable/laptop	Portable/laptop
Power Management Mode for WebMark* 2004	Always On	Always On	Always On

* Other names and brands may be claimed as the property of others.



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