

# AN INNOVATION ENCORE.

Introducing a new breakthrough  
in mobile performance.





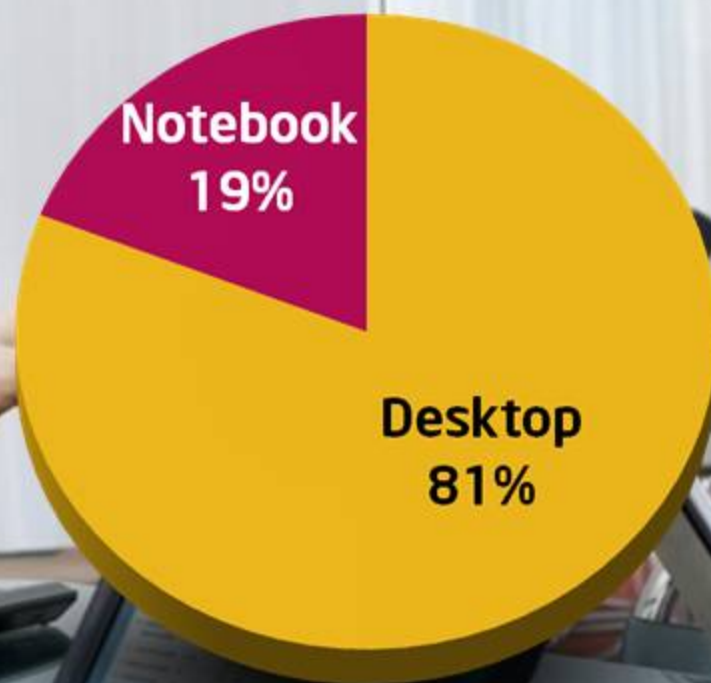
**An Innovation Encore:  
Intel® Centrino® 2 Processor Technology**

**Mooly Eden**

Corporate Vice President  
General Manager, Mobile Platforms Group  
Intel Corporation

# A Decade of Innovation and Growth

2000 **BC**



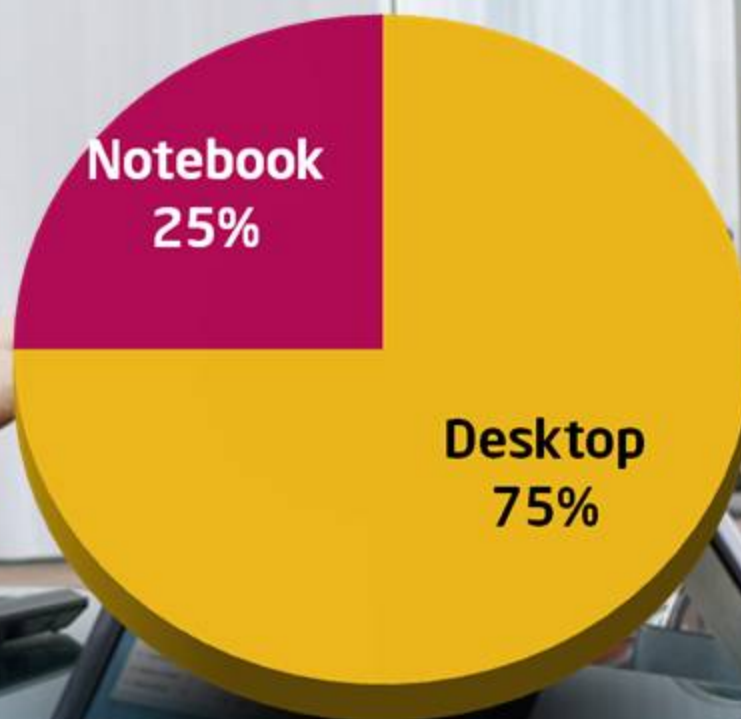
**TAM 137M**

Source: IDC Worldwide Quarterly PC Tracker June 2008



# A Decade of Innovation and Growth

2003



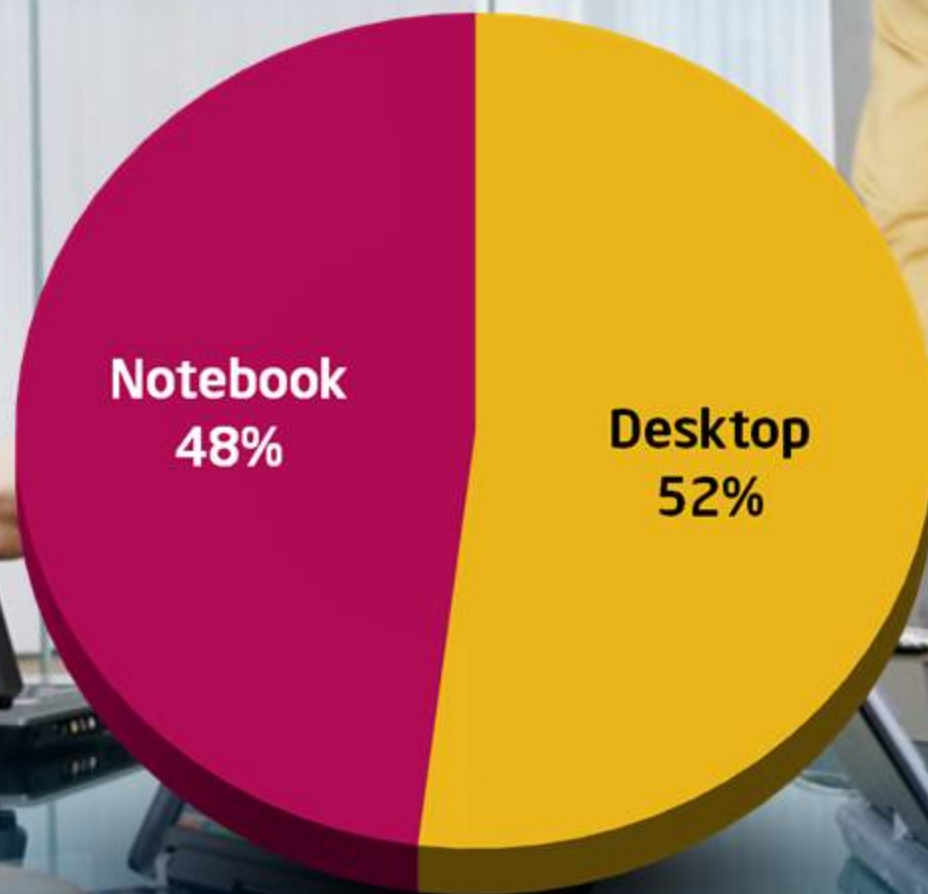
**TAM 151M**

Source: IDC Worldwide Quarterly PC Tracker June 2008



# A Decade of Innovation and Growth

2008



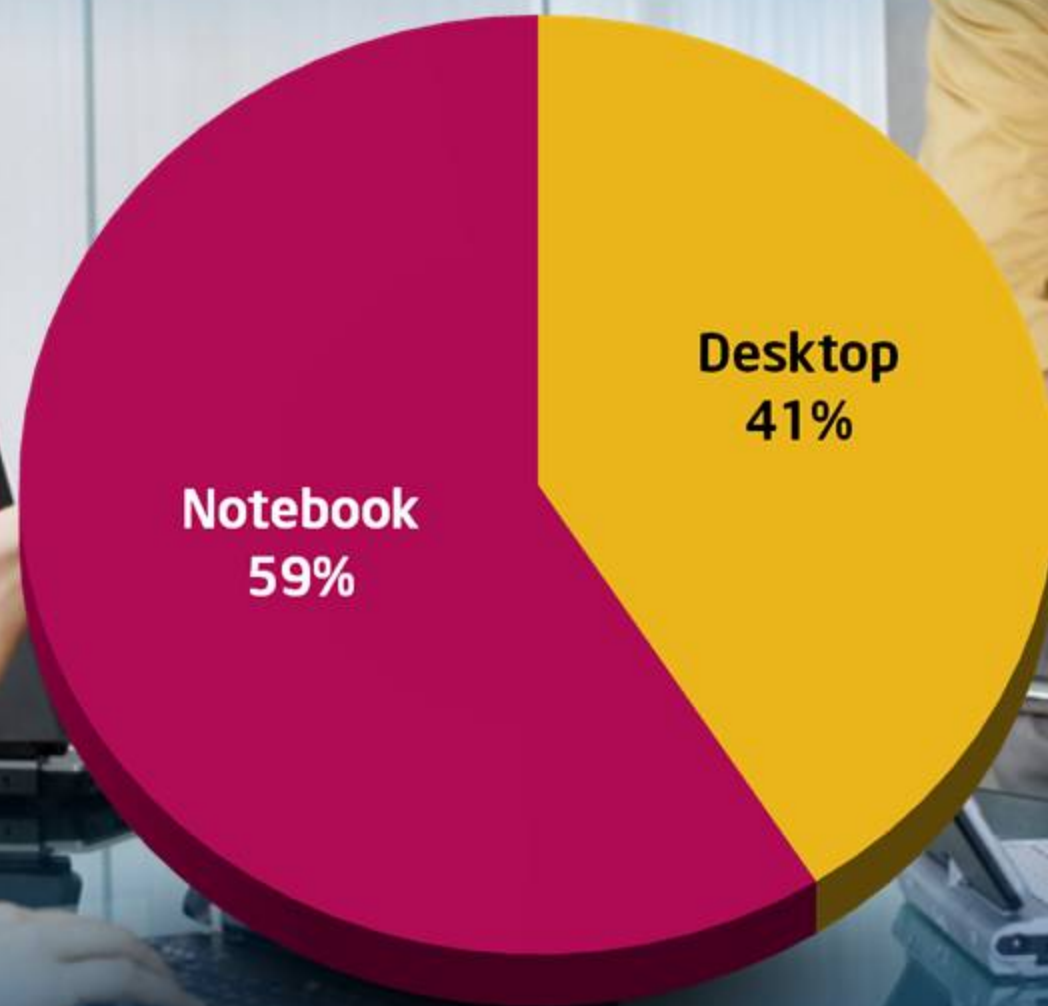
TAM 302M

Source: IDC Worldwide Quarterly PC Tracker June 2008



# A Decade of Innovation and Growth

2011



TAM 423M

Source: IDC Worldwide Quarterly PC Tracker June 2008



# A Brief Look Back - Lifestyle Trends









	Before Intel® Centrino® (2000 BC)	Intel® Centrino® Launch (2003)	Intel® Centrino® 2 (2008)
 <b>Buying Music<sup>1</sup></b>	Brick & Mortar	Online Sales Emerging	iTunes #1 in US
 <b>Digital Camera Sales<sup>2</sup></b>	11 Mu	50Mu	131 Mu
 <b>BB Videos Viewed<sup>3</sup></b>	<1 Billion	<3 Billion	>55 Billion
 <b>Internet Users<sup>4</sup></b>	360 Million	719 Million	1.4 Billion
 <b>Green Trends<sup>5</sup></b>	Prius launched; 5.5K sold in US	2 <sup>nd</sup> gen Prius; 24K sold in US	3 <sup>rd</sup> gen Prius; >200K built for US

Explosion of Digital Content, Internet as Social/Commerce Channel, Eco-awareness

Sources: 1. <http://www.msnbc.msn.com/id/23942136/>; 2. The 2000-2001 PMA Industry Trends Report, International Markets; PMA Data Watch, 2007 Worldwide Digital Camera Market Share Review Report; 3. ABI Research; 4. <http://www.internetworldstats.com/emarketing.html/>; 5. <http://www.toyoland.com/prius/chronology.html>; <http://www.slate.com/id/2096191/>; [http://www.soultek.com/lean\\_energy/hybrid\\_cars/hybrid\\_car\\_types/toyota\\_prius\\_hybrid.htm](http://www.soultek.com/lean_energy/hybrid_cars/hybrid_car_types/toyota_prius_hybrid.htm); 6. Techisle.com



# A Brief Look Back - Technology Trends

	Before Intel® Centrino® (2000 BC)	Intel® Centrino® Launch (2003)	Intel® Centrino® 2 (2008)
 <b>NB CPU Transistors<sup>1</sup></b>	28M (Coppermine) 	77M (Banias) 	410M (Penryn 6MB) 
 <b>Mobile CPU TDP<sup>1</sup></b>	27.5W	24.5W	25W
 <b>Wi-Fi in Notebook<sup>2</sup></b>	<1%	~16%**	>95%
 <b>Connection Speeds<sup>1</sup></b>	Wired - 56 Kbps	Wireless - 11 Mbps	Wireless - Up to 450 Mbps*
 <b>Personalization</b>	Any color as long as it's black, gray or tan	A few more color and style choices	Many sizes, styles, colors

Intel Delivering and Driving Technology That Sets the New Normal

Sources: 1. Intel 2. IDC \*\* Before launch of Intel® Centrino®

\* Requires an 802.11n 450Mbps access point



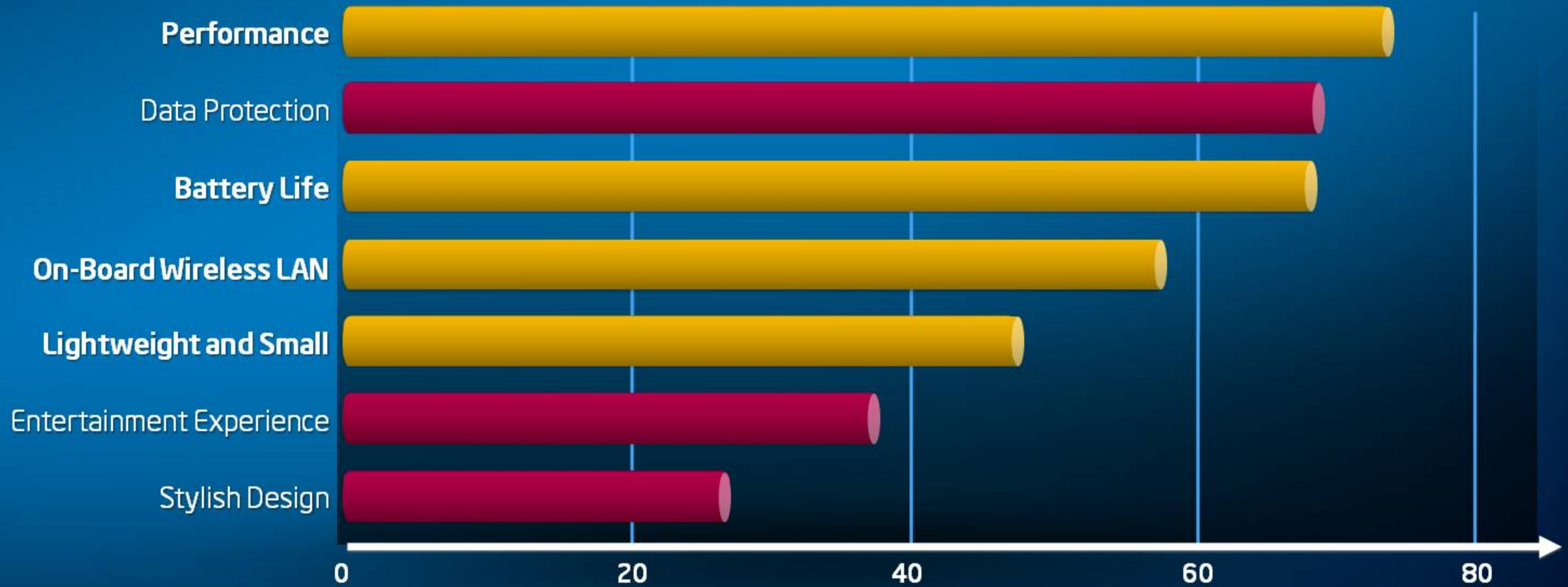


**SOME THINGS CHANGE, BUT SOME THINGS STAY THE SAME...**



# Top Mobile Computing Needs

## *Relative Feature Importance*



A woman with short brown hair, wearing a purple turtleneck and grey pants, is sitting on a light-colored sofa. She is smiling and looking towards the camera while holding a tablet in her left hand and a laptop in her right. The background is a bright, modern interior with large windows.

**NEW USAGES AND NEEDS CONTINUE TO EMERGE...**



# Internet Driving How People Use Their PCs

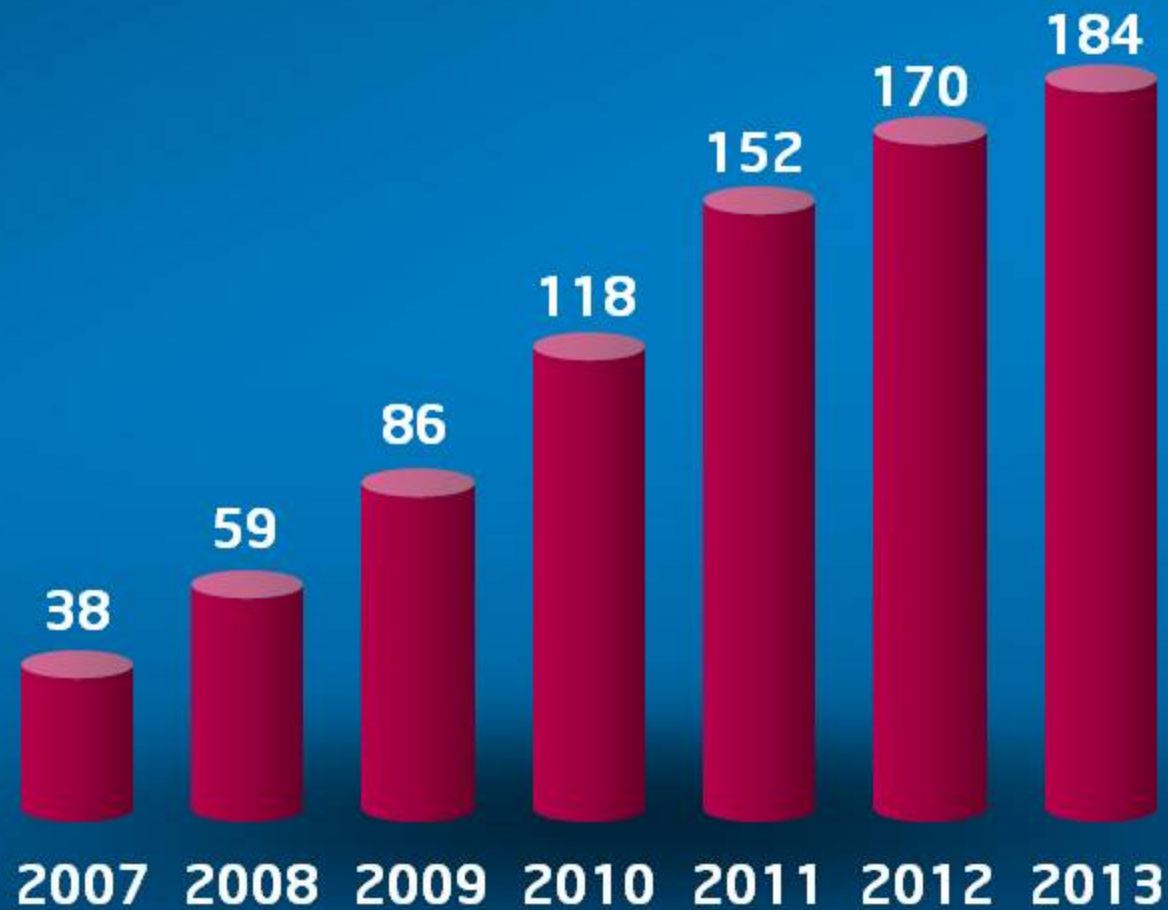


\*Other names and brands may be claimed as the property of others

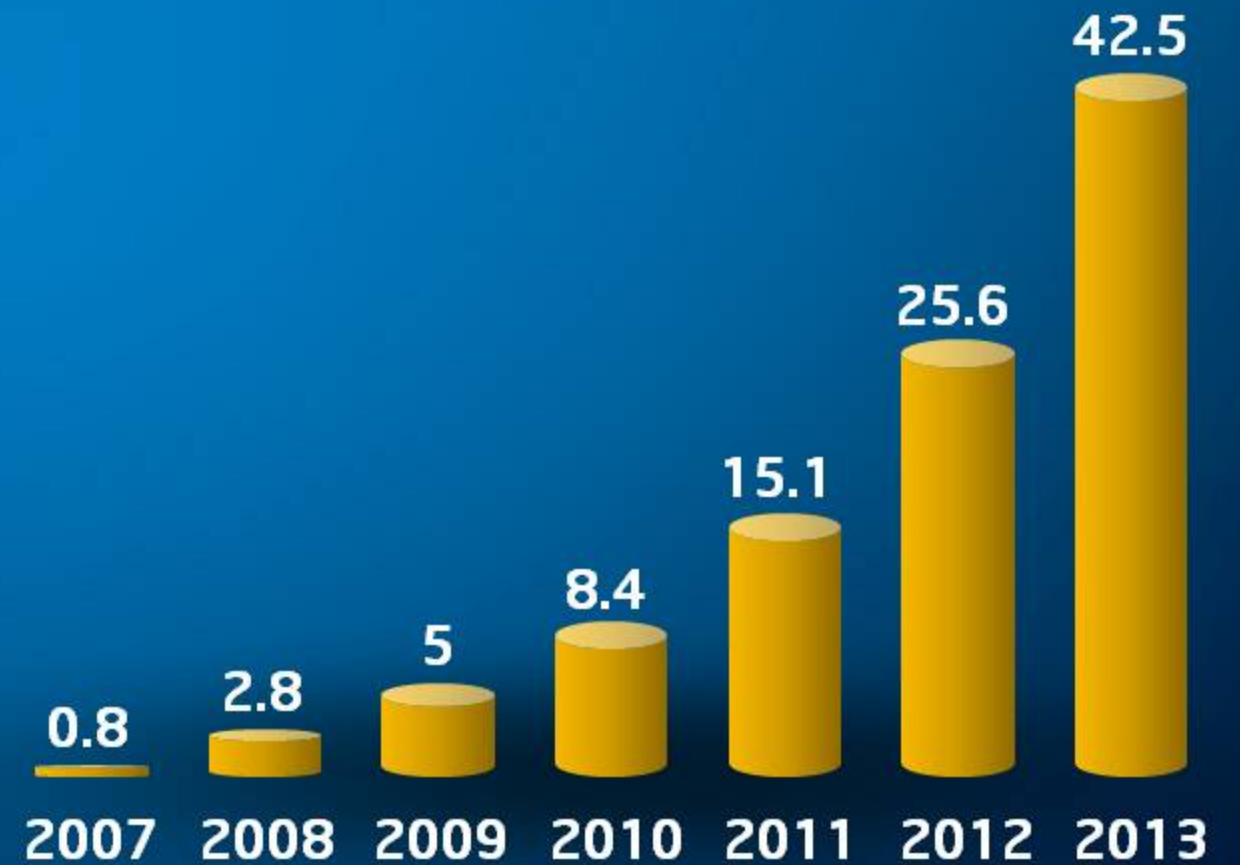


# High Definition Devices Exploding

HDTV Shipments Worldwide (MU)



Blu-ray\* Drive Shipments - PC & CE (MU)



To Meet These New and Emerging Needs



*Intel's Best Just Got Better*



# A New Breakthrough in Mobile Performance

## Enhanced CPU

*45nm Intel® Core™2 Duo Processor*

## New Graphics & Chipset

*Mobile Intel® 45 Express Chipset*

## New Wi-Fi

*Intel® WiFi Link 5000 Series*



Performance compares preproduction hardware to prior generation Intel components. Graphics performance measured by 3DMark06. Power savings (average power) compared to previous generation Intel components. Actual performance may vary. See [www.intel.com/performance](http://www.intel.com/performance) for details.



# Intel® Centrino® 2 Processor Technology

*Improvement On All Mobility Vectors*

## Performance

**~23%** better  
SYSmark\*  
Performance

**~1.7X** better  
3DMark\*  
Performance

First-ever in mobile:  
**Quad Core**  
Later this quarter!

## Battery Life

**~27%** Less  
CPU Average Power

Battery life to watch  
a full Blu-ray\* movie

## Form Factor

Beautiful Thin  
Systems with

**~30%** Less  
Mainstream CPU  
Thermal Power

Small Form Factor  
Later this quarter:

**~58%** Smaller

## Wireless

Improved  
Connectivity

Up to  
**450Mbps#**

**WiMAX**  
Available 2H 2008

## Security & Manageability

Improved for  
Enterprises and SMB

Out-of-Band  
**Wireless**  
Manageability  
&  
Secure

**Remote  
IT Access**



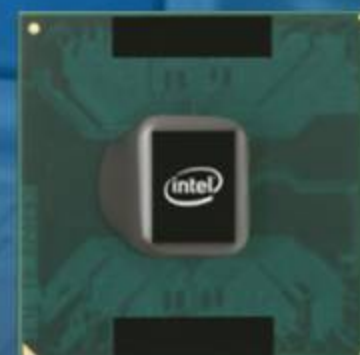
# Requires an 802.11n 450Mbps access point



# Intel® Centrino® 2 Processor Technology

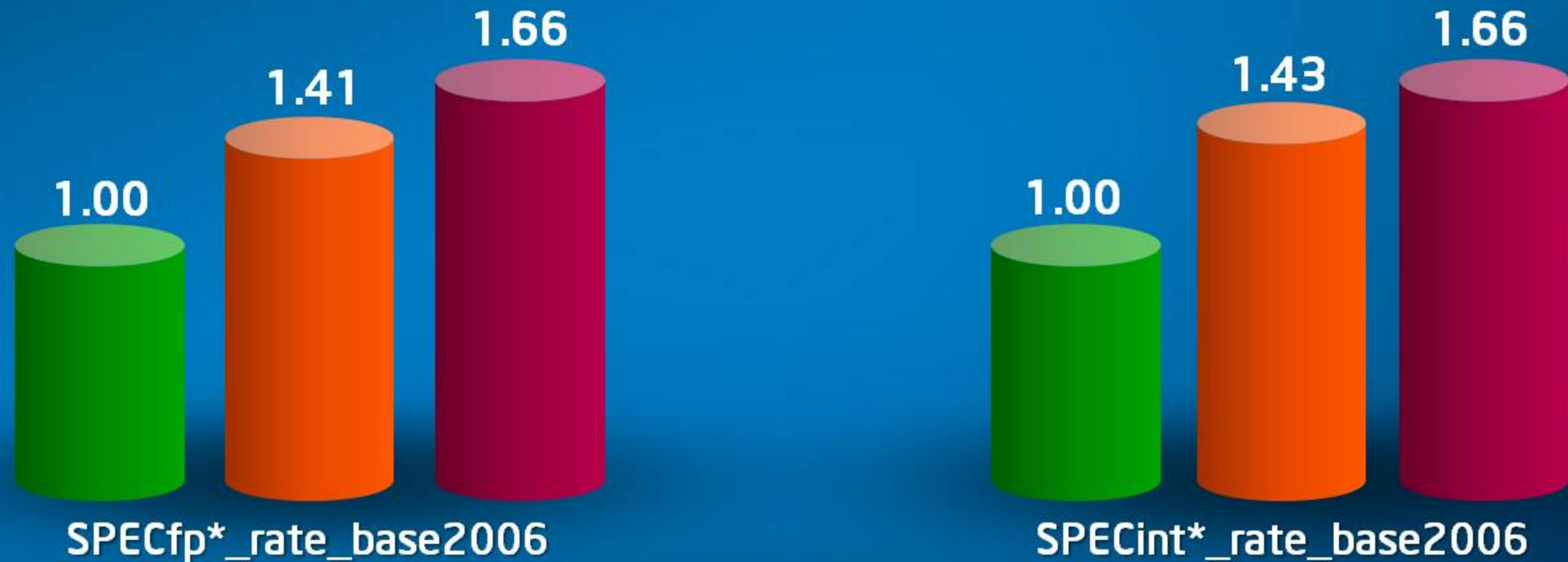
*45nm Intel® Core™2 Duo Processor*  
with up to 6MB L2 Cache  
and 1066 MHz FSB

*A New Breakthrough in Mobile Performance*



# Compute Intensive and Floating Point Benchmark

*Intel vs. Intel Running Windows\* XP\**



Increased Throughput For Parallel Execution Of Multiple Compute-intensive Applications

- Intel® Core™2 Duo processor T9600 (2.80GHz, 6MB L2, 1066MHz FSB), Mobile Intel® GM45 Express Chipset, 2x1 GB DDR3 1066 MHz
- Intel® Core™2 Duo processor T7800 (2.60GHz, 4MB L2, 800MHz FSB), Mobile Intel® GM965 Express Chipset, 2x1 GB DDR2 667 MHz
- Intel® Core™ Duo processor T2700 (2.33GHz, 2MB L2, 667MHz FSB), Mobile Intel® 945GM Express Chipset, 2x1 GB DDR2 667 MHz



# Speed Demon: Intel® Core™2 Extreme Mobile Processor X9100

## The World's Highest Performing Mobile Processor<sup>1</sup>

- Overspeed protection removed<sup>#</sup>
- Advanced features to allow fine tuning for optimum gaming performance
- Mobile friendly thermal power



1. Performance estimated for the Intel® Core™2 Extreme Mobile processor X9100 on SPECint\*\_rate\_base2006. Actual performance on final product may vary. See [www.intel.com/performance/](http://www.intel.com/performance/) for more information. SPEC, SPECint, SPECrate, are trademarks of the Standard Performance Evaluation Corporation. See: <http://www.spec.org> for more information on the benchmarks

<sup>#</sup> Warning: altering clock frequency and/or voltage may (i) reduce system stability and useful life of the system and processor; (ii) cause the processor and other system components to fail; (iii) cause reductions in system performance; (iv) cause additional damage; and (v) affect system data integrity. Intel has not tested, and does not warranty, the operation of the processor beyond its specifications.





# Mobile Intel® 45 Express Chipset



Blu-ray\* Playback Support



Stunning Visual Quality



DisplayPort and HDMI with HDCP



Battery Life Target: Watch a Full Blu-ray\* Movie



1.7X 3DMark\* Performance Improvement

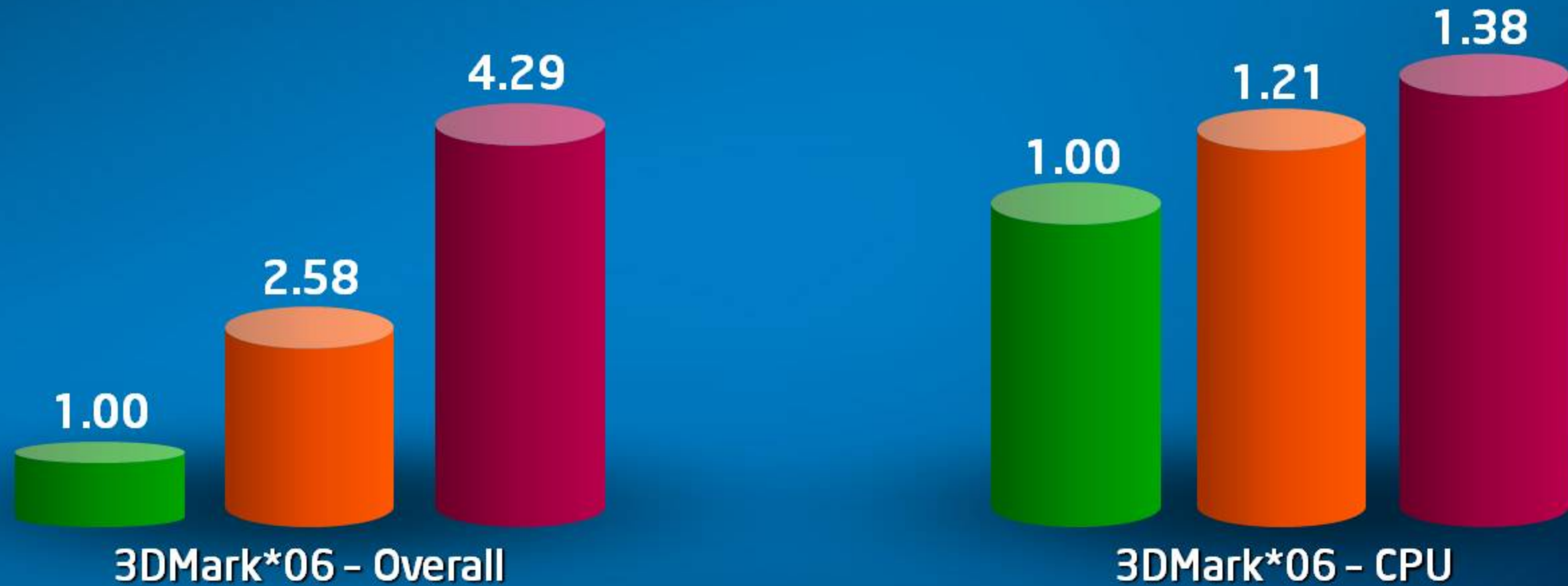


Dual Channel DDR3 Memory Support



# Advanced 3D Performance Benchmark

## *Intel vs. Intel Running Windows\* Vista\**



Enhanced 3D Performance with Mobile Intel® 45 Express Chipset Gen 5 Graphics!

- Intel® Core™2 Duo processor T9600 (2.80GHz, 6MB L2, 1066MHz FSB), Mobile Intel® GM45 Express Chipset, 2x1 GB DDR2 800 MHz
- Intel® Core™2 Duo processor T7800 (2.60GHz, 4MB L2, 800MHz FSB), Mobile Intel® GM965 Express Chipset, 2x1 GB DDR2 667 MHz
- Intel® Core™ Duo processor T2700 (2.33GHz, 2MB L2, 667MHz FSB), Mobile Intel® 945GM Express Chipset, 2x1 GB DDR2 667 MHz



# Delivering Real Value for Consumers

## Significant Performance Improvement on Everyday Applications

**1.4X** Better  
iTunes\* MP3 encoding



**2.3X** Better  
Sony\* Vegas\* video encoding



**1.5X** Better  
Adobe\* Photoshop\* Elements



Source: Intel. Comparisons refer to comparably configured Intel® Core™ Duo Processor T2700 (2 MB L2 Cache, 2.33 GHz, 667 MHz FSB) and Intel® Core™2 Duo Processor T9600 (6 MB L2 Cache, 2.8 GHz, 1066MHz FSB) systems. See back-up for system configurations and other important legal information.



# Intel® Centrino®2 Processor Technology Your High Definition Hero



Blazing Fast Video Encoding

Clear, Stutter-free Blu-ray\* Playback

Battery Life To Enjoy It On The Go





Energy Efficient Performance



*HUGI*



# Intel® Switchable Graphics

- Energy efficiency of Intel's integrated graphics with...
- Power of discrete graphics in...
- A single notebook solution



**System Contains Two Graphics Cores;  
Switch Based on Power Policy (AC vs. Battery) or User Setting**

# Intel® WiFi Link 5000 Series



Up to **50%** Faster<sup>#</sup>



Up to **40%** Better Power Efficiency



~**1/2** the Size

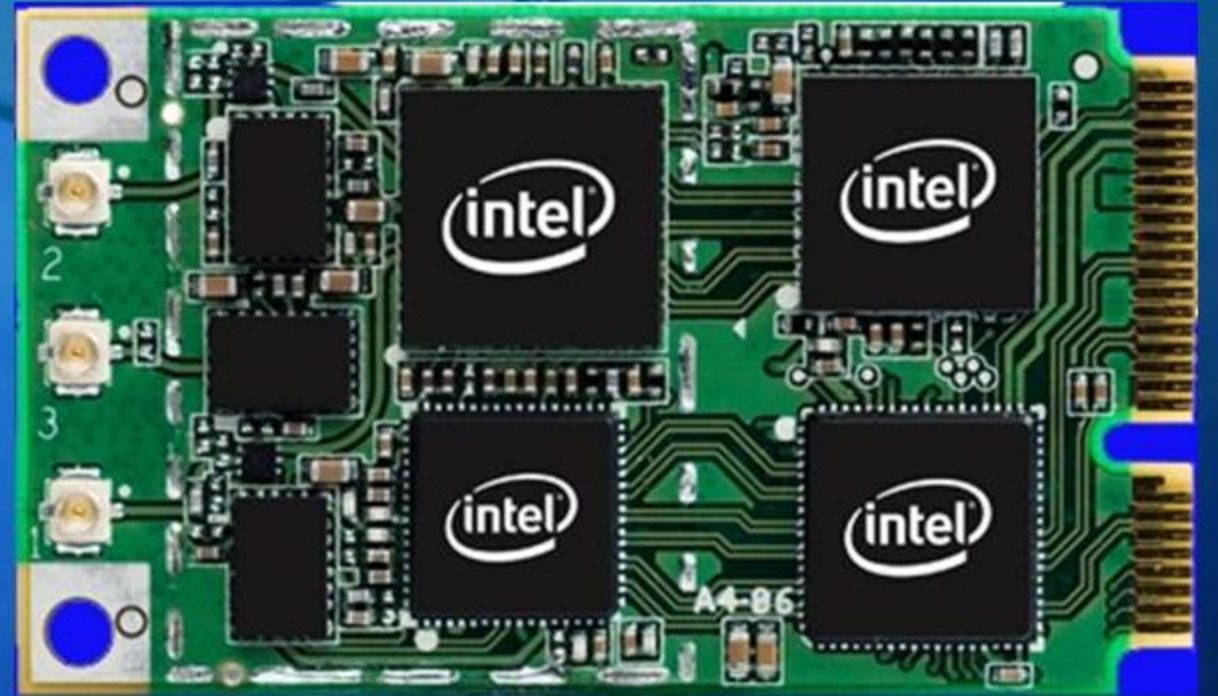
<sup>#</sup> Requires an 802.11n 450Mbps access point



# Intel® WiMAX/WiFi Link 5350

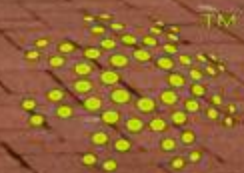
World's 1<sup>st</sup> WiMAX/WiFi Combo with MIMO

Available for Intel® Centrino® 2 Processor  
Technology Notebooks In 2H 2008



CENTRINO 2 — CARRIER VIEW  
WIMAX IMPLEMENTATION UPDATE  
THE BALTIMORE DEBUT

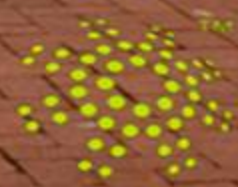
BARRY WEST,  
PRESIDENT



XOHM<sup>TM</sup>

HISTORY IN THE MAKING

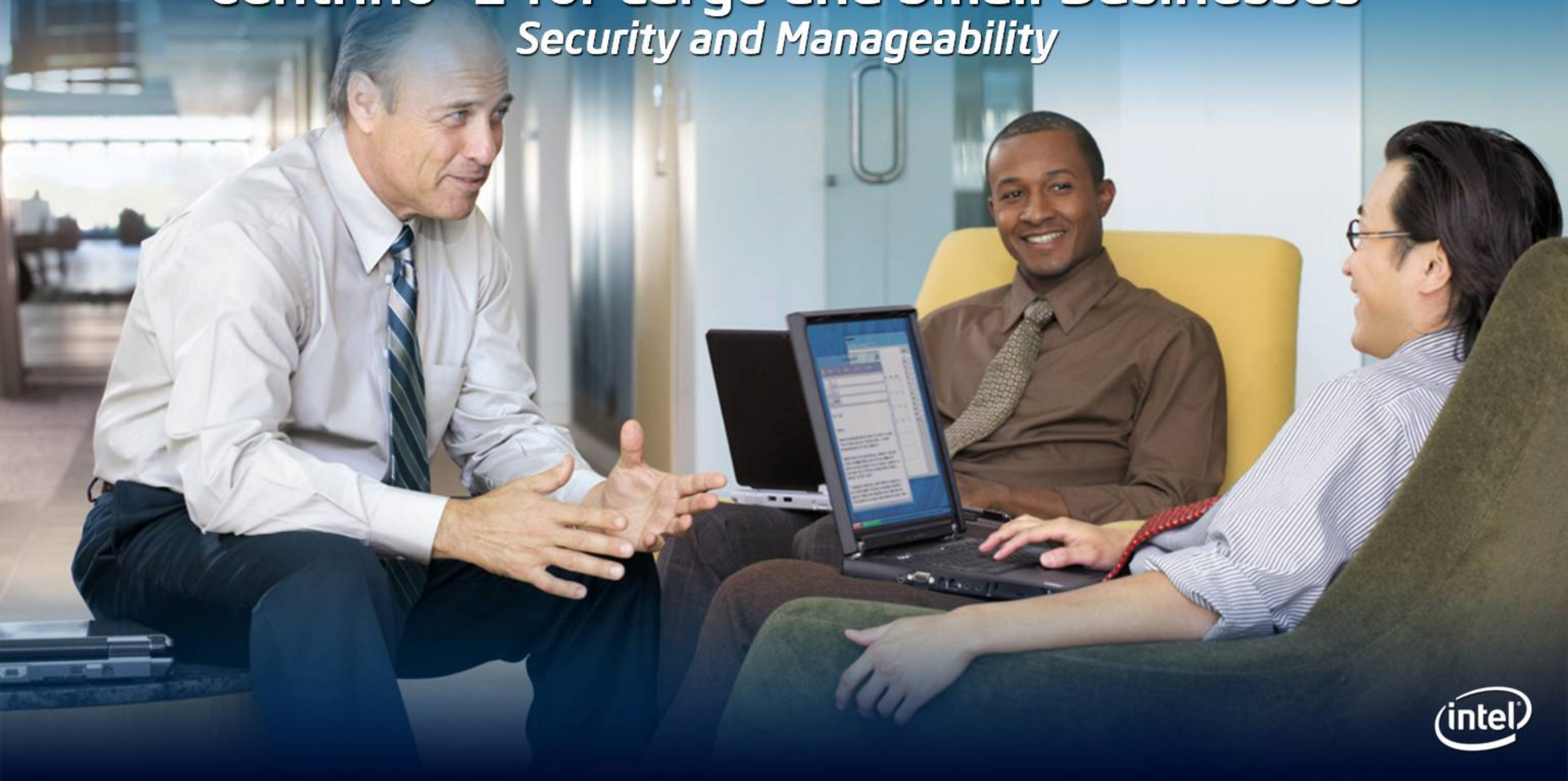
XOHM.  
BALTIMORE.  
SEPTEMBER 2008.



XOHM™

# Centrino<sup>®</sup> 2 for Large and Small Businesses

*Security and Manageability*

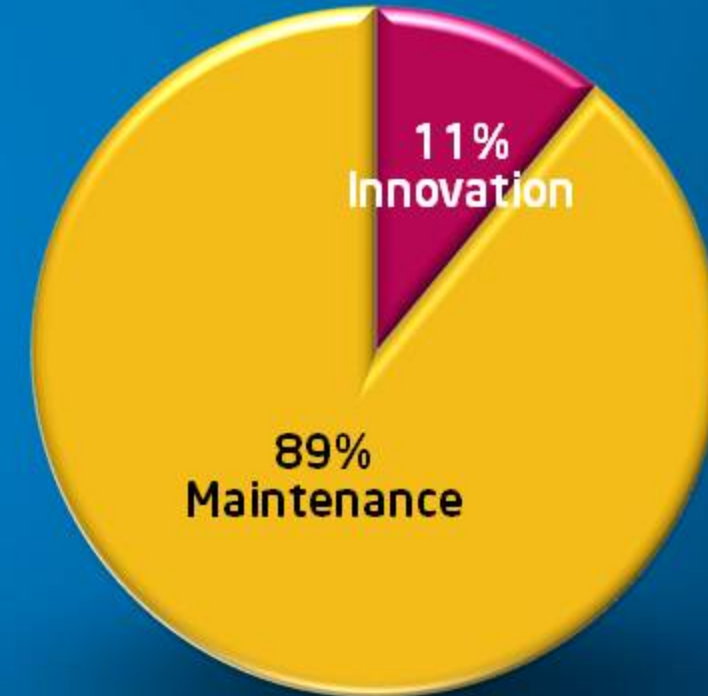


# IT Challenges Increasing

## Need to Increase Security



## Reduce Manageability Costs



Globalization



Regulatory Compliance



Energy



Data Explosion





# It Gets Better in 2008 with Intel® Centrino®2 with vPro™ Technology

*Optimized for Business  
Proactive Security & Built-in Manageability*



**Improved Wireless Manageability**  
*Even When Notebook Is Asleep!*  
**Remote Configuration**



**Secure IT Access**  
*Even Outside the Business Network!*





**BROAD SUPPORT FROM SYSTEM MANUFACTURES  
AND INDUSTRY PARTNERS...**





Qosmio

TOUGHBOOK

FUJITSU





> 240  
Design  
Wins

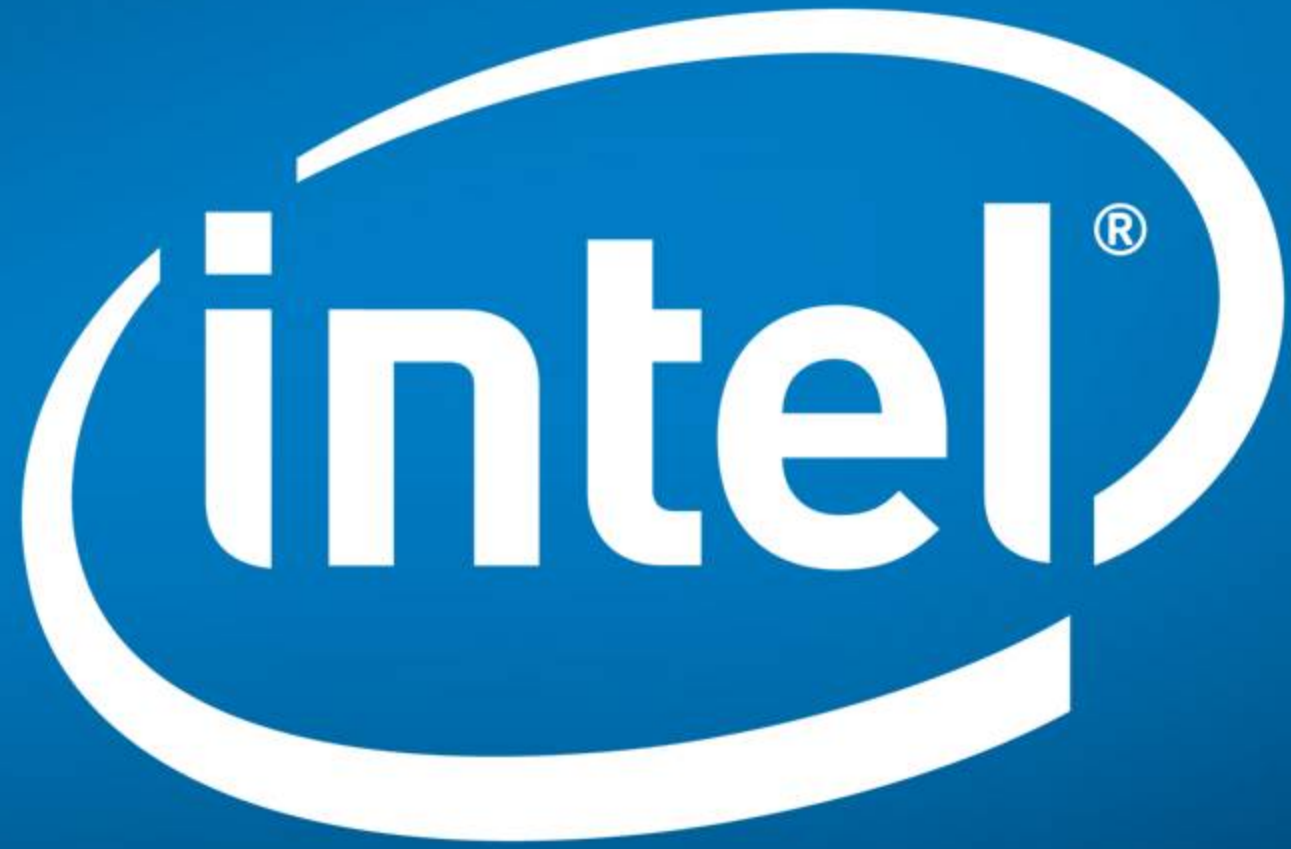


# Summary: Mobile Revolution Continues!



- Strong mobile growth continues
- Intel® Centrino® 2 processor technology and Intel® Centrino® 2 with vPro technology deliver breakthrough performance
  - Outstanding HIGH DEFINITION multimedia
  - New levels of MANAGEABILITY & SECURITY
- Ready to ramp with broad industry support





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Intel, processors, chipsets, and desktop boards may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are available on request.

WiMAX connectivity requires a WiMAX enabled device and subscription to a WiMAX broadband service. WiMAX connectivity may require you to purchase additional software or hardware at extra cost. Availability of WiMAX is limited, check with your service provider for details on availability and network limitations. Broadband performance and results may vary due to environment factors and other variables. See [www.intel.com/go/wimax](http://www.intel.com/go/wimax) for more information.

System performance, battery life, power savings, high-definition quality, video playback and functionality, and wireless performance and functionality will vary depending on your specific operating system, hardware, chipset, connection availability and rate, site conditions, and software configurations. References to enhanced performance including wireless refer to comparisons with previous generation Intel technologies. Wireless connectivity and some features may require you to purchase additional software, services or external hardware. See <http://www.intel.com/products/centrino/index.htm> and <http://www.intel.com/go/consumerbenchmarks> for more information on performance, wireless, power savings and energy efficiency.

Up to 5x better performance (compared to 802.11 a/g) with Intel® Centrino® 2 processor technology enabled notebooks. Faster Wireless N performance requires Intel® Centrino 2 processor technology-based notebooks with optional Intel® WiFi Link 5300, and a 450 MBPS wireless router. Actual results may vary based on your specific hardware, connection rate, site conditions, and software configurations. See <http://www.intel.com/performance/mobile/wireless/index.htm> for more information. Wireless N standard is not available in all countries. Check with local PC and access point manufacturers for details and availability.

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.

Intel® Active Management Technology requires the computer system to have an Intel(R) AMT-enabled chipset, network hardware and software, as well as connection with a power source and a corporate network connection. Setup 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 of 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 [www.intel.com/technology/platform-technology/intel-amt/](http://www.intel.com/technology/platform-technology/intel-amt/)

Wireless N standard currently not available in all countries. Check with your PC and access point manufacturer for details.

Systems using Client Initiated Remote Access require wired LAN connectivity and may not be available in public hot spots or "click to accept" locations. For more information on CIRA visit <http://www.intel.com/products/centrino2/vpro/index/htm>

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- Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.



# Notebook PC Configurations Used for SPEC\*CPU 2006 and SYSmark\* 2007 Preview

Intel® Mobile Platform	Intel® Centrino®2 Processor Technology	Intel® Centrino®2 with vPro™ Technology	Intel® Centrino®2 with vPro™ Technology
OEM Laptop	Lenovo ThinkPad* T60	Lenovo ThinkPad* T61	Lenovo ThinkPad T400
Processor Name	Intel® Core™ Duo processor T2700	Intel® Core™2 Duo processor T7800	Intel® Core™ 2 Duo processor T9600
Processor Speed	2.33 GHz	2.60 GHz	2.80 GHz
Processor Secondary Cache	2MB Level 2 Cache	4MB Level 2 Cache	6MB Level 2 Cache
Front Side Bus	667 MHz	800 MHz	1066 MHz
Processor Secondary Cache	2MB Level 2 Cache	4MB Level 2 Cache	6MB Level 2 Cache
Chipset	Mobile Intel® 945GM Express Chipset	Mobile Intel® GM965 Express Chipset	Mobile Intel® GM45 Express Chipset
Chipset INF File	Intel® INF 8.1.1.1010	Intel® INF 8.2.0.1012	Intel INF 8.7.0
Platform BIOS	Lenovo* 79ETD7WW 2.17 with default settings	Lenovo* V.7LETA4WW 1.14 with default settings	Pre production Lenovo V.7UET15TE 0.12 with default settings
System Memory	Micron* PC5300 DDR2 667 2x1GB 5-5-5-15	Micron PC26400 DDR2 800 2x1GB 5-5-5-15	Elpida* PC3-8500 DDR3 1067 2x1GB 5-5-5-15
Hard Disk	Hitachi* Travelstar* HTS721010G9SA00 SATA 100GB 7200RPM	Hitachi Travelstar HTS721010G9SA00 100GB 7200RPM	SATA Hitachi Travelstar HTS722020K9SA00 200GB 7200RPM
Video Controller	Intel® GMA 950	Intel® GMA X3100	Intel® GMA4500HD
Video Memory Size/Type	224MB Dynamic Video Memory Technology	384MB Dynamic Video Memory Technology	829MB Dynamic Video Memory Technology
Video Driver Version	6.14.10.4926	6.14.10.4926	6.14.10.4907
Graphics	1024x768 resolution, 32-bit color	1024x768 resolution, 32-bit color S	1280x800 resolution, 32-bit color S
Screen Size	14.1" XGA	14.1" XGA	14" WXCA
Sound Card	SoundMAX* Digital HD Audio	SoundMAX Digital HD Audio	Conexant* HD SmartAudio 221
Network Card	Intel® PRO/1000 PL	Intel® 82566MM Gigabit	Intel® 82567LM Gigabit
Wireless Network Card	Intel® PRO/Wireless 3945ABG with driver 11.5.0.36	Intel® Wireless WiFi Link 4965AGN with driver 11.1.1.11	Intel Wireless WiFi Link 5300AGN with driver 12.0.0.59
Screen Size	14.1" XGA	14.1" XGA	14" WXCA
Operating System	Microsoft* Windows* XP Professional, Build 2600, SP2 NTFS	Microsoft Windows XP Professional, Build 2600, SP2 on NTFS	Microsoft Windows XP Professional, Build 2600, SP2 on NTFS
DirectX* Version	DirectX 9.0c	DirectX 9.0c	DirectX 9.0c
Power Management Mode	High Performance	High Performance	High Performance



# Benchmark Disclaimer

- Performance is measured on pre-production T61 BIOS. Final benchmarks based on the final production BIOS may vary from these results. 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/>.
- SPECint\*\_rate\_base2006 and SPECfp\*\_rate\_base2006 are capacity-based metrics used to measure throughput of a computer that is performing a number of tasks. This is achieved by running multiple copies of each benchmark simultaneously with the number of copies set to set to the number of logical hardware cores seen by the operating system. SPEC\* CPU2006 provides a comparative measure of compute intensive performance across the widest practical range of hardware. The product consists of source code benchmarks that are developed from real user applications. These benchmarks depend on the processor, memory and compiler on the tested system.
- SPEC, SPECint, SPECfp, SPECrate are trademarks of the Standard Performance Evaluation Corporation. For more information go to: [www.spec.org/spec/trademarks.html](http://www.spec.org/spec/trademarks.html).
- SYSmark\* 2007 Preview is BAPCo's latest version of the mainstream office productivity and Internet content creation benchmark tool used to characterize the performance of the business client. SYSmark 2007 Preview



# Notebook PC Configurations Used for 3DMark\* 06, iTunes\*, Sony\* Vegas, Adobe\*PhotoShop\* Elements

Intel® Mobile Platform	Intel® Centrino® processor technology	Intel® Centrino® processor technology	Intel® Centrino®2 processor technology
OEM Laptop	Sony* VAIO* VGN-SZ-440 (Modified)	Sony VAIO VGN-SZ640 (Modified)	Sony VAIO VGN-SR140E (Modified)
Processor Name	Intel® Core™ Duo processor T2700	Intel® Core™2 Duo processor T7800	Intel® Core™2 Duo processor T9600
Processor Speed	2.33 GHz	2.6 GHz	2.8 GHz
Processor Secondary Cache	2MB Level 2 Cache	4MB Level 2 Cache	6MB Level 2 Cache
Front Side Bus	667 MHz	800 MHz	1066 MHz
Chipset	Mobile Intel® 945GM Express Chipset	Mobile Intel® GM965 Express Chipset	Mobile Intel® GM45 Express Chipset
Chipset INF File	Intel INF 8.1.1.1010	Intel INF 8.2.0.1012	Intel INF 8.7.0.1007
Platform BIOS	Phoenix* Technologies LTD V.R0111N0	Phoenix Technologies LTD V.R0111S5	Pre-production Phoenix Technologies LTD V.R0260Y1
System Memory	Quimonda* 2x1GB DDR2-667 4-4-4-12	Quimonda 2x1GB DDR2-667 5-5-5-15	Quimonda 2x1GB DDR2-800 5-5-5-15
Hard Disk	Seagate* ST9160821AS SATA 160GB 5400RPM	Hitachi* HTS722020K9SA00 SATA 200GB 7200RPM	Hitachi HTS722020K9SA00 SATA 200GB 7200RPM
Video Controller	Intel® GMA950	Intel® GMAX3100	Intel® GMA X4500HD
Video Memory Size/Type	224MB Dynamic Video Memory Technology	358MB Dynamic Video Memory Technology	829MB Dynamic Video Memory Technology
Video Driver Revision	7.14.10.1129	7.14.10.1244	7.15.9.2.3.1493
Graphics	1280x800, 32-bit color	1280x800, 32-bit color	1280x800 32-bit color
Screen Size	13.25" WXGA	13.25" WXGA	13.25" WXGA
Sound Card	Sigma Tel* High Definition Audio	Sigma Tel High Definition Audio	Realtek* High Definition Audio
Network Card	Marvell Yukon* 88E8036	Marvell Yukon 88E8055	Marvell Yukon 88E8040
Wireless Network Card	Intel® PRO/Wireless 3945ABG with driver 10.6.0.29	Intel® PRO/Wireless 4965AGN with driver 11.1.0.110	Intel® PRO/Wireless 5100AGN with driver 12.0.0.73
Operating System	Microsoft* Windows* Vista* Home Premium, Build 6001 SP1 on NTFS	Microsoft Windows Vista Home Premium, Build 6001 SP1 on NTFS	Microsoft Windows Vista Home Premium, Build 6001 SP1 on NTFS
DirectX* Version	DirectX 10	DirectX 10	DirectX 10



# Benchmark Disclaimer

- Performance is measured on pre-production BIOS for Sony VAIO\* VGN-SZ640. Final benchmarks based on the final BIOS may vary from these results. 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/>.
- 3DMark\*06 from FutureMark\* is a benchmarking tool that combines DirectX\* 9.0 support with unique tests and graphics. The CPU Test measures the contribution of the processor on 3D graphical performance while the game test measures game simulation performance.
- Apple\* iTunes\* 7.6.2 is a digital media application that can be used to manage digital music such as converting from one digital audio format to another. In this case, Apple iTunes is used to convert 61 minutes 24 seconds of music from WAV to MP3 format with a bit rate of 160Kbps for listening on your iPod\*.
- Sony\* Vegas Movie Studio Platinum \* 8.0c is a video editing, audio production, and DVD authoring tool. Using the DivX 6.8 encoder this test shows how long it took to convert and compress a 1 minute 59 second 370MB 1440x1080 HD camcorder video file to a 108MB 1440x1080 HD video file in DivX\* format
- Adobe\* Photoshop\* Elements\* 6.0 enables users to organize, edit and enhance photos. This test was run using the "AutoSmartFix" function on 103 jpeg images with an average size of 600KB. Extrapolation used to calculate how many jpeg images you can correct / enhance using the AutoSmartFix function in 5 minutes.

