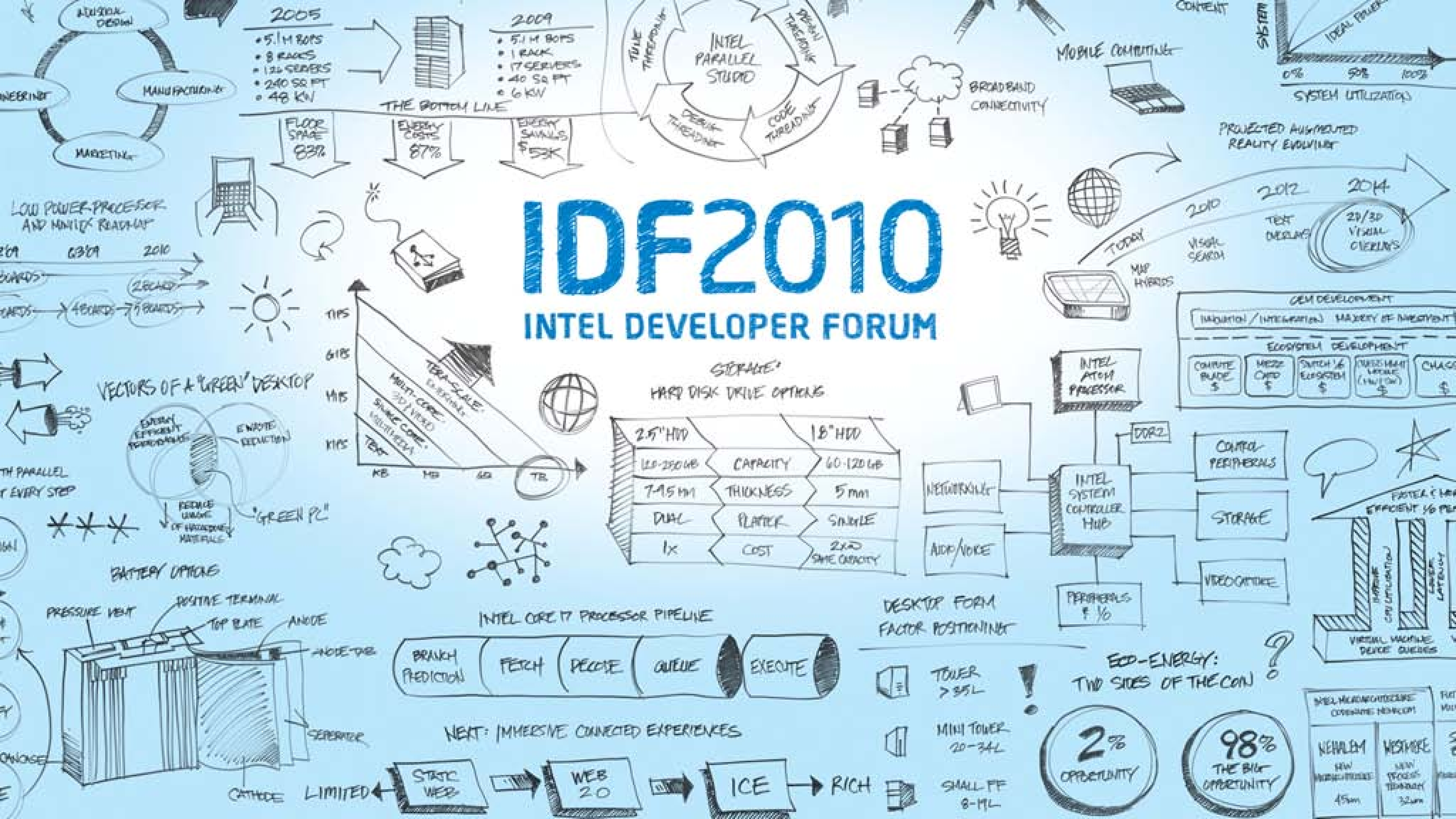
IDF2010
INTEL DEVELOPER FORUM
INTEL PARALLEL STUDIO
THE BOTTOM LINE
2005
2009
FLOOR SPACE 83%
ENERGY COSTS 87%
ENERGY SAVINGS $53K
BROADBAND CONNECTIVITY
MOBILE COMPUTING
SYSTEM UTILIZATION
PROJECTED AUGMENTED REALITY EVOLUTION
TODAY
2010
2012
2014
VISUAL SEARCH
TEXT OVERLAYS
3D/3D VISUAL OVERLAYS
MAP HYBRIDS
LOW POWER PROCESSOR AND MOBILE ROADMAP
VECTORS OF A "GREEN" DESKTOP
"GREEN PC"
BATTERY OPTIONS
PRESSURE VENT
POSITIVE TERMINAL
TOP PLATE
ANODE
ANODE TAB
SEPARATOR
CATHODE
STORAGE: HARD DISK DRIVE OPTIONS
2.5" HDD
1.8" HDD
CAPACITY
THICKNESS
PLATTER
COST
INTEL CORE I7 PROCESSOR PIPELINE
BRANCH PREDICTION
FETCH
DECODE
QUEUE
EXECUTE
NEXT: IMMERSIVE CONNECTED EXPERIENCES
LIMITED
STATIC WEB
WEB 2.0
ICE
RICH
INTEL ATOM PROCESSOR
INTEL SYSTEM CONTROLLER HUB
DDR2
NETWORKING
AUDIO/VOICE
CONTROL PERIPHERALS
STORAGE
VIDEO/OFFICE
PERIPHERALS & I/O
DESKTOP FORM FACTOR POSITIONING
TOWER >35L
MINI TOWER 20-34L
SMALL FF 8-19L
ECO-ENERGY: TWO SIDES OF THE COIN
2% OPPORTUNITY
98% THE BIG OPPORTUNITY
NEHALEM
WESTMERE
45nm
32nm

# Realizing the Potential of Connected Computing

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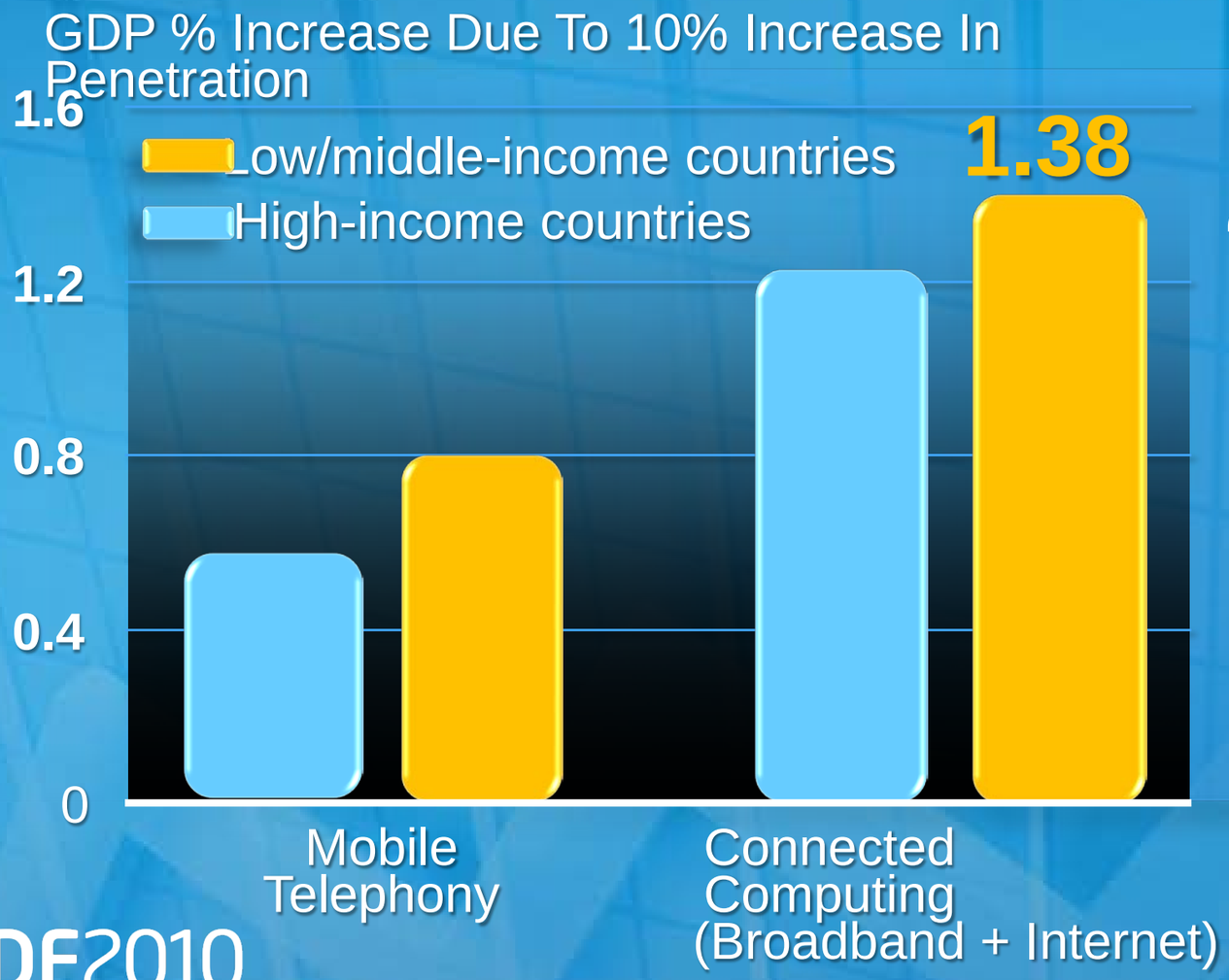
# The Connected Computing Potential




"In low and middle-income countries every 10% increase in broadband penetration accelerates economic growth by 1.38%"

— World Bank

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Source: Yongsoo Kim, Tim Kelly, and Siddhartha Raja, GICT, World Bank, Building broadband: strategies and policies for the developing world, January 2010

# More Users

1 Billion
New Connected Users
by 2015

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Source: IDC “Server Workloads Forecast” 2009 and IDC “The Internet Reaches Late Adolescence” Dec 2009, extrapolation by Intel for 2015

# More Computing Devices

Traditional Computing


Everything Computing

*>10 Billion Connected Devices By 2015*

IDF2010
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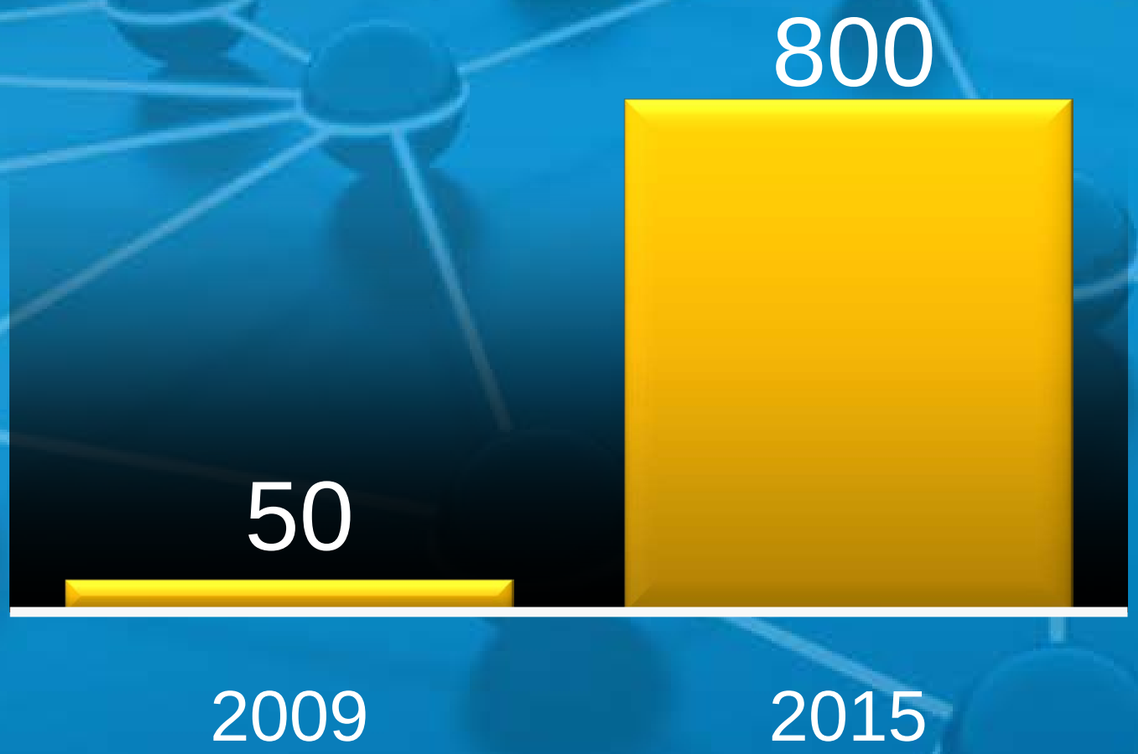
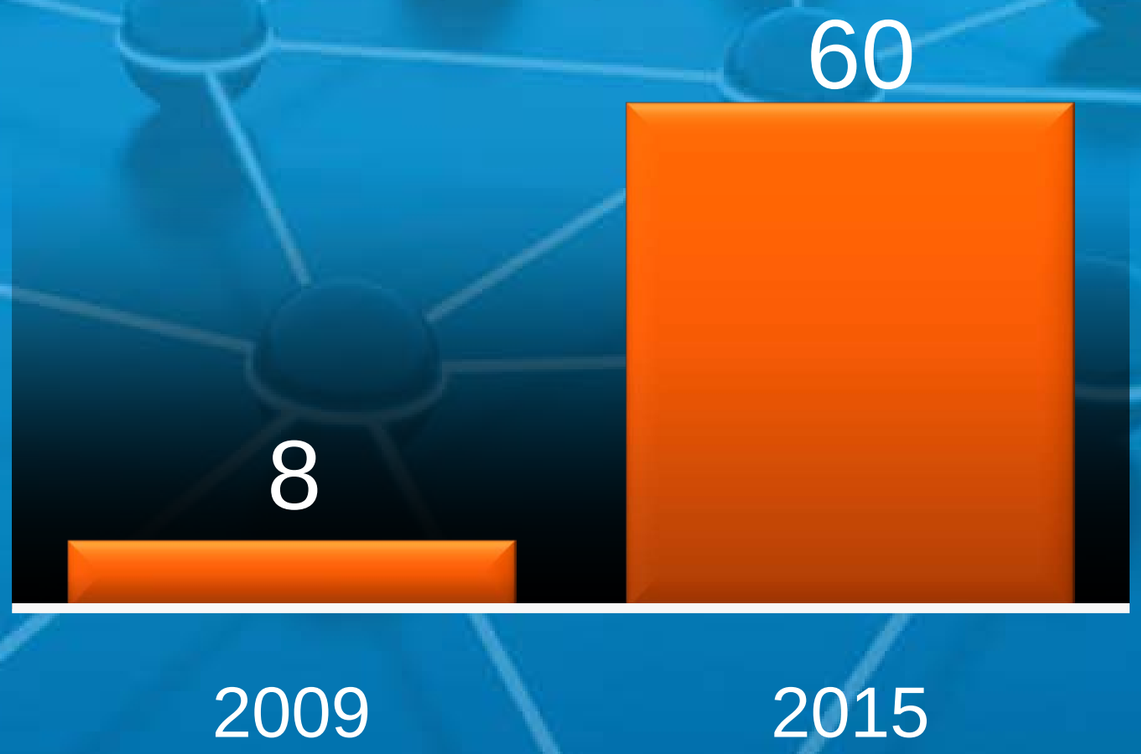
Source: IDC Embedded Internet Project, 2009; Intel estimates Nov 2009

# More Data

## Peak IP Traffic
(Terabytes per second)




## Data Stored
(Exabytes)

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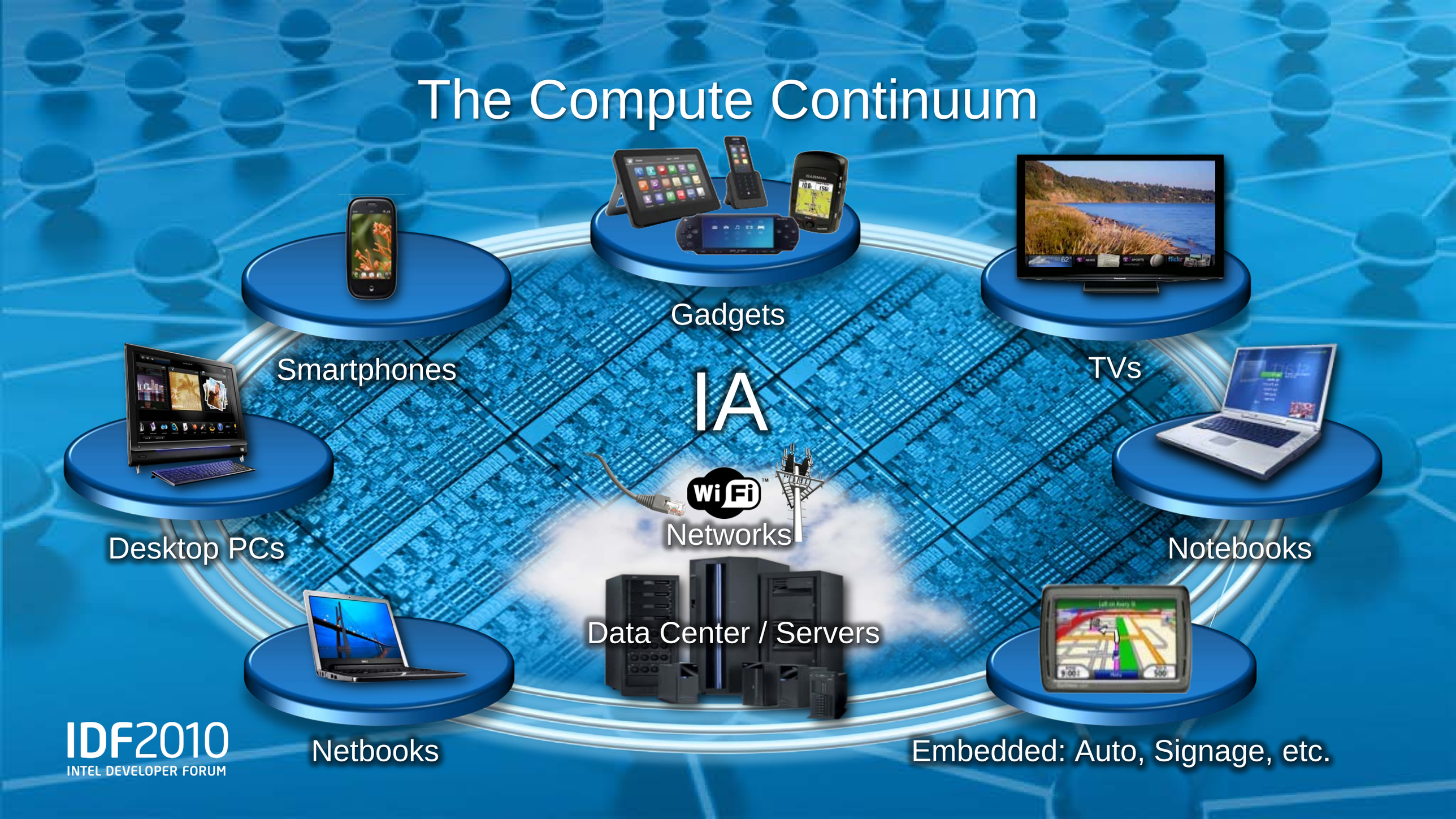
Source 8x Network: 800 Terabytes / second of IP traffic estimated on Internal Intel analysis “Network Supply/Demand 2010-2020” forecast . 16x Storage: 60 Exabytes of data stored from Barclays Capital “Storage Bits” Sept 2009, extrapolation by Intel for 2015; 20x Compute: Intel Internal LRP forecast. Extrapolated to 1 billion virtual servers using 1 vm/core

# The Compute Continuum

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# A Common Ecosystem Built on A Common Architecture

Common Services Development

Common Application Development

Integrated Network Layer

Customized Usage Models

Handhelds

PC Clients

Auto

Embedded

Television

Common Software Stack

Common Architecture

intel Xeon inside 英特尔 至强

intel CORE inside 英特尔 酷睿

intel Atom inside 英特尔 凌动

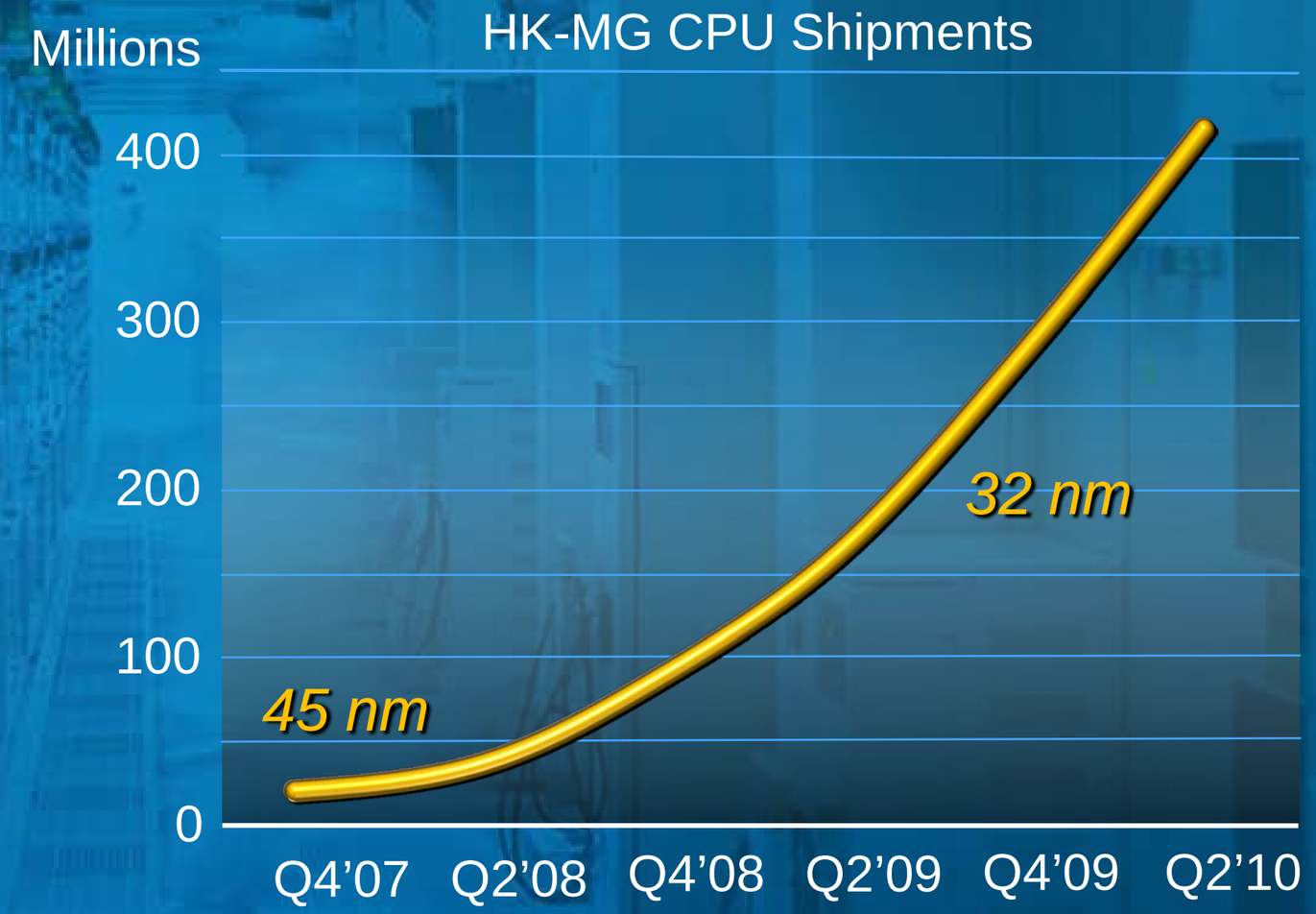
# A Common Architecture With Uncommon Performance

# It All Starts With A Leadership Process

Revolutionary High-k + Metal Gate Transistors

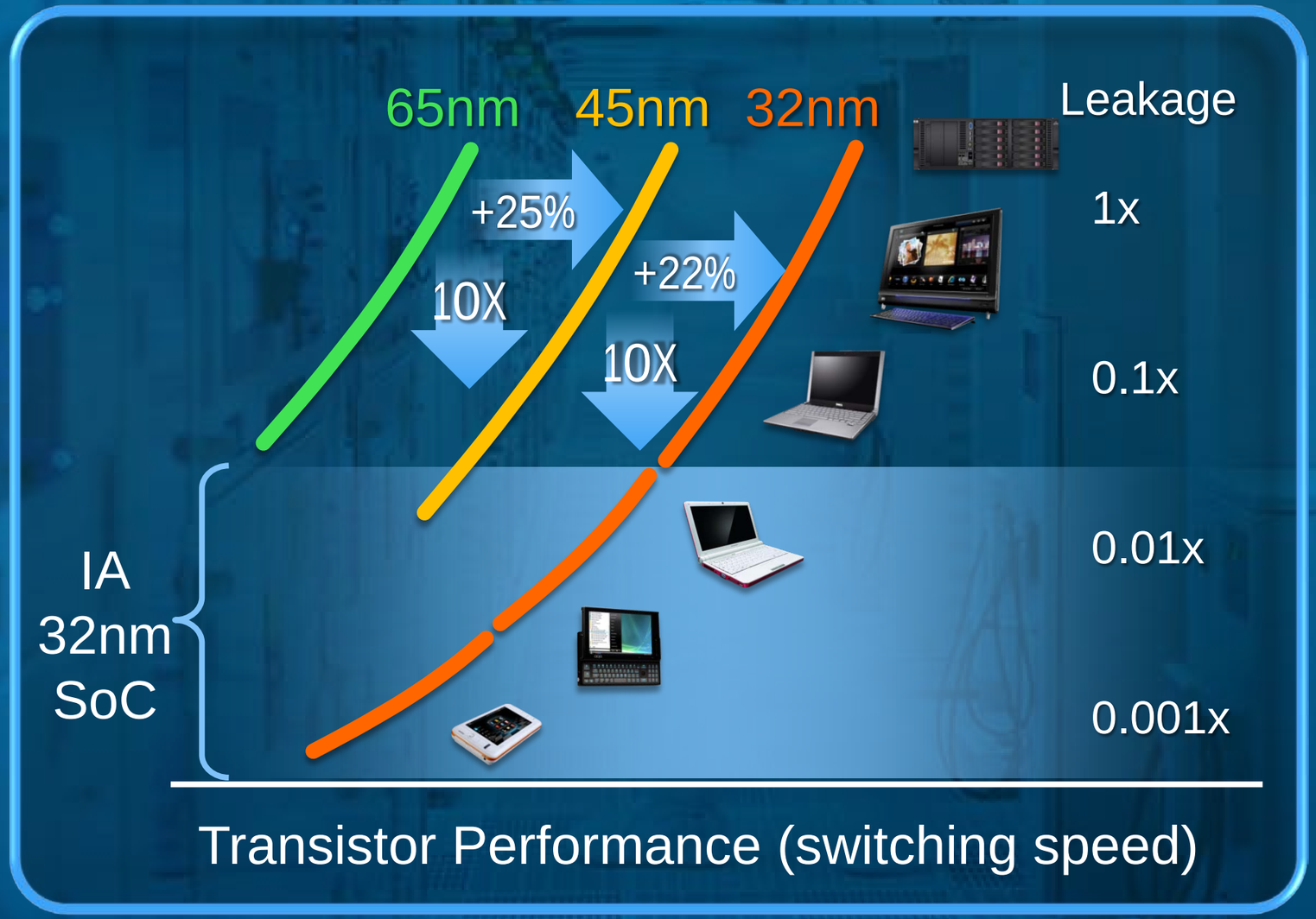
High-volume 32nm and 45nm Process

>400 Million Units Shipped




Source: Intel

# Best-in-class Process Optimized For Many Products




Source: Intel

# The Best Architecture Enables The Best Products


The Best Performance for Each Segment


Segment-specific Technologies such as Security, Manageability, Audio/Video and More


Power Efficiency for Better Energy Consumption


Low Thermal Profiles for Less Cooling and Sleeker Form Factors

# IA Processor Cores Built On A Common Architecture

INTEL ARCHITECTURE

45nm | 32nm | 22nm

Optimized Power Performance Microarchitecture


英特尔™ 至强™


英特尔™ 酷睿™

*Nehalem* *Westmere* Nehalem Microarchitecture

*Sandybridge* *Future* Sandybridge Microarchitecture

*Future*

Low Power Microarchitecture


英特尔™ 凌动™

Bonnell Microarchitecture

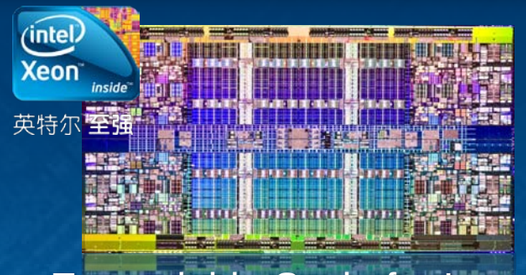
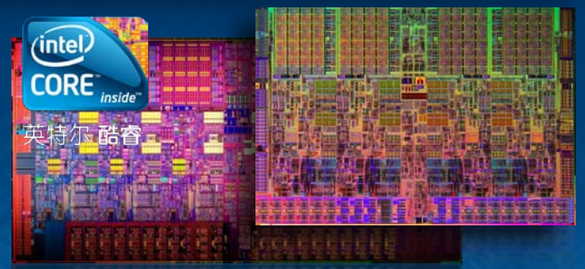
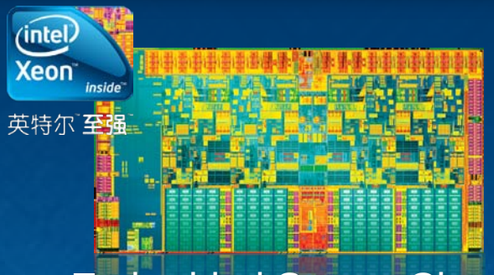
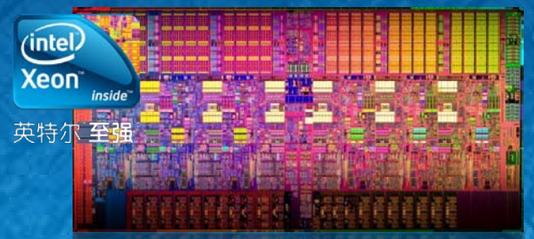
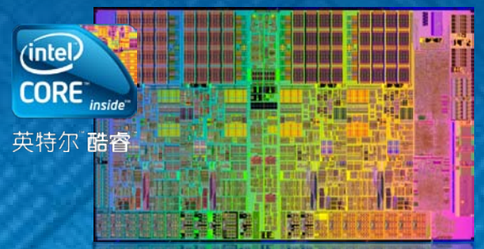
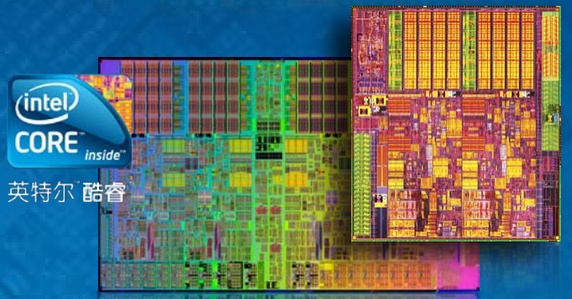
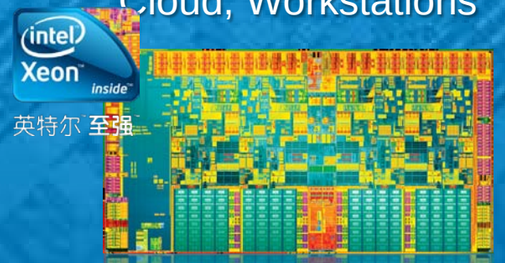
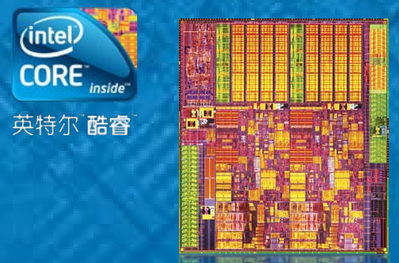
Saltwell Microarchitecture

Future Microarchitecture

IDF2010
INTEL DEVELOPER FORUM

# One IA Architecture, Many Products


Nehalem-based Microarchitecture Product Family

| Servers | Desktop & Laptop Clients | Embedded |
|---|---|---|
|  Expandable Scale for Large Enterprise, Mission Critical, HPC |  Extreme Performance |  Embedded Server-Class |
|  Efficient Performance for Cloud, Workstations |  Mainstream Performance |  Embedded Client-Class |
|  Entry Performance for Small-Medium Business |  Entry Performance | |

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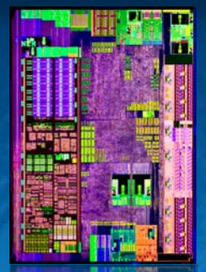
Not Actual Die Size

# Same IA Architecture, Even More Products


Bonnell-based Microarchitecture Product Family

## Netbooks



### N-series Atom™

Low Power and Small Footprint, Affordable PC Companion Experience In New On-the-go Form Factors

## Handhelds

### Z-series Atom

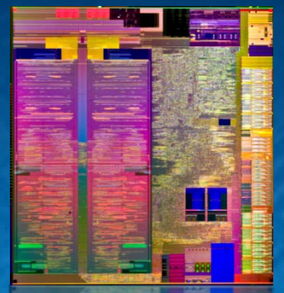
Pocketable Power and Form Factor with Breakthrough Performance

## TV

### CE-series Atom

Performance with High-end TV Features

## Entry Desktops



### D-series Atom

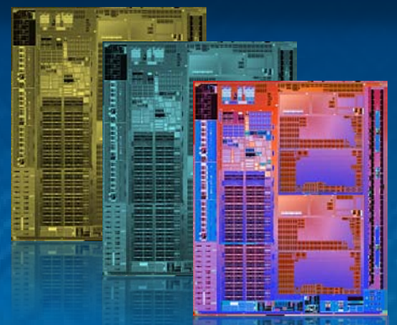
Affordable, Basic PC Experience In New Desktop Form Factors

## Embedded

### Embedded Series Atom

Scalable and Flexible Designs with Rich I/O for Embedded

## Gadgets And More



### Future Atom SoCs

Scalable and Flexible Designs for Multiple Connected Computing Market Segments

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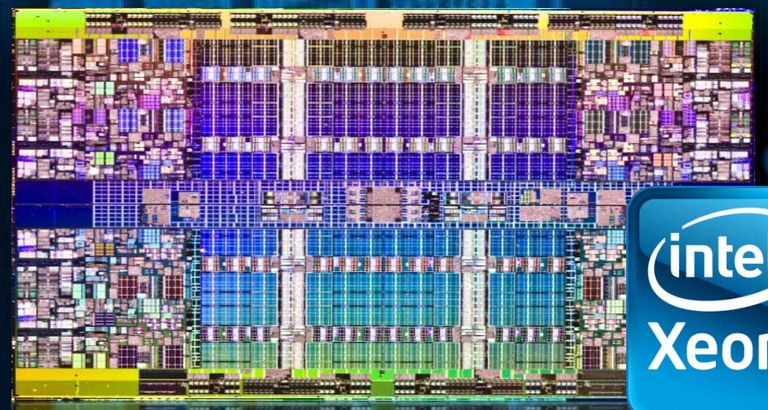
INTEL DEVELOPER FORUM

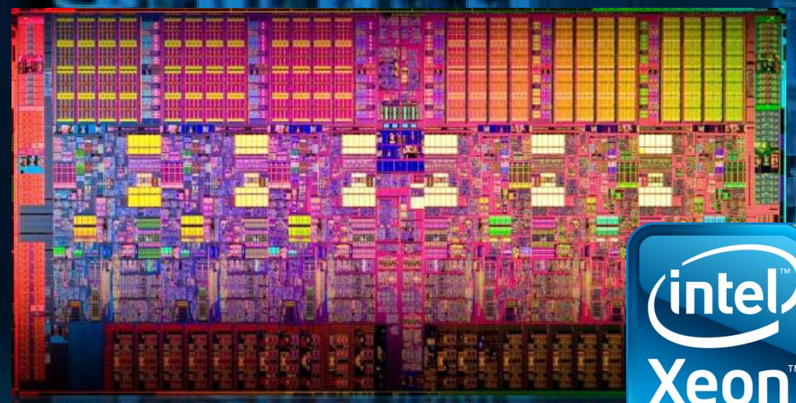
Not Actual Die Size

# Intel Architecture Optimized Power Performance Solutions

Intel® Xeon® 7500



Intel® Xeon® 5600



# IA Solutions for the Data Center

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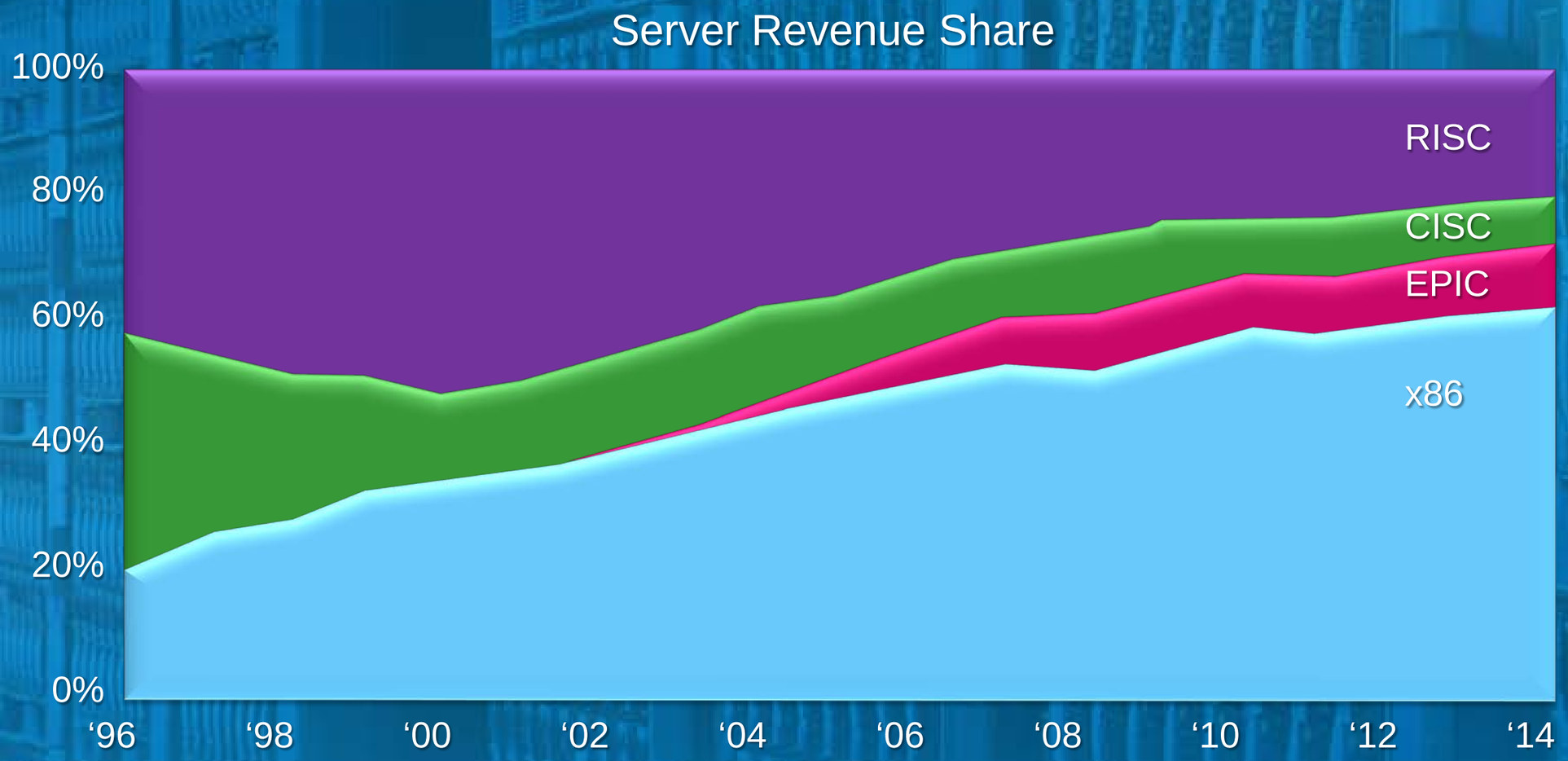
Not Actual Die Size

# Data Center Growth

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Source: IDC Tracker, IDC Forecast Q1’10

# Cloud Data Center Requirements

| | |
|---|---|
| Efficient | World Class Energy Efficiency |
| Simplified | Flexible IA Infrastructure and A Unified Network |
| Secure | Data Protected at Rest and In Flight |
| Open | Multi-vendor Innovation and Solution Compatibility |

# Cloud Computing in China

*"The growth of cloud computing is critical to China's economic growth. Virtualization, High performance computing and Efficiency are required for this infrastructure evolution."*


Mr. Jianping Jiang

VP of 21ViaNet Group

CTO Cloud Computing Division


世纪互联

www.21vianet.com


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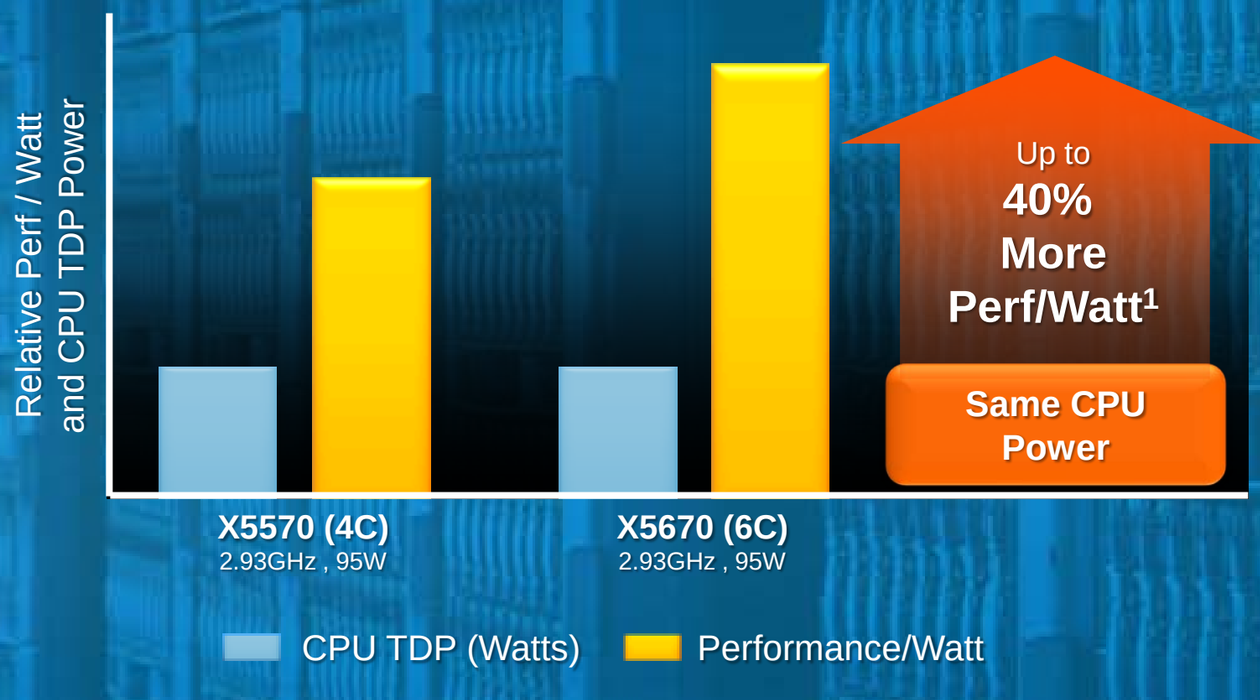
# Greater Data Center Energy Efficiency

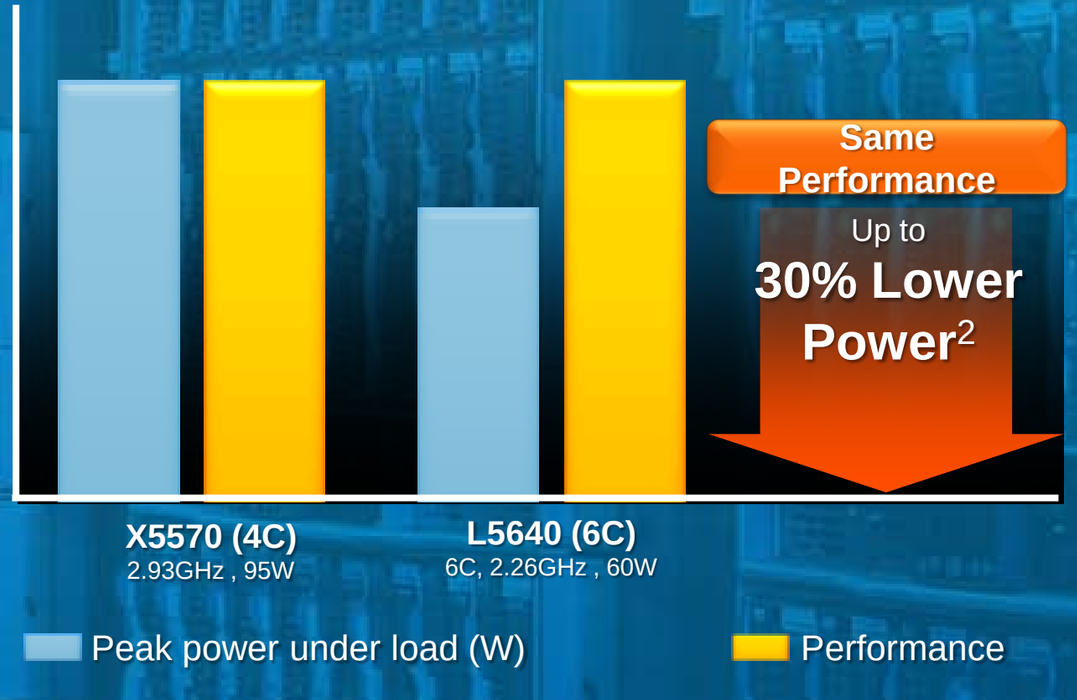
## Xeon® X5570 vs. Xeon X5670

*Power and Performance Comparison*




## Xeon 5570 vs. Xeon L5640

*Power and Performance Comparison*




*Maximize Performance or Energy Efficiency*

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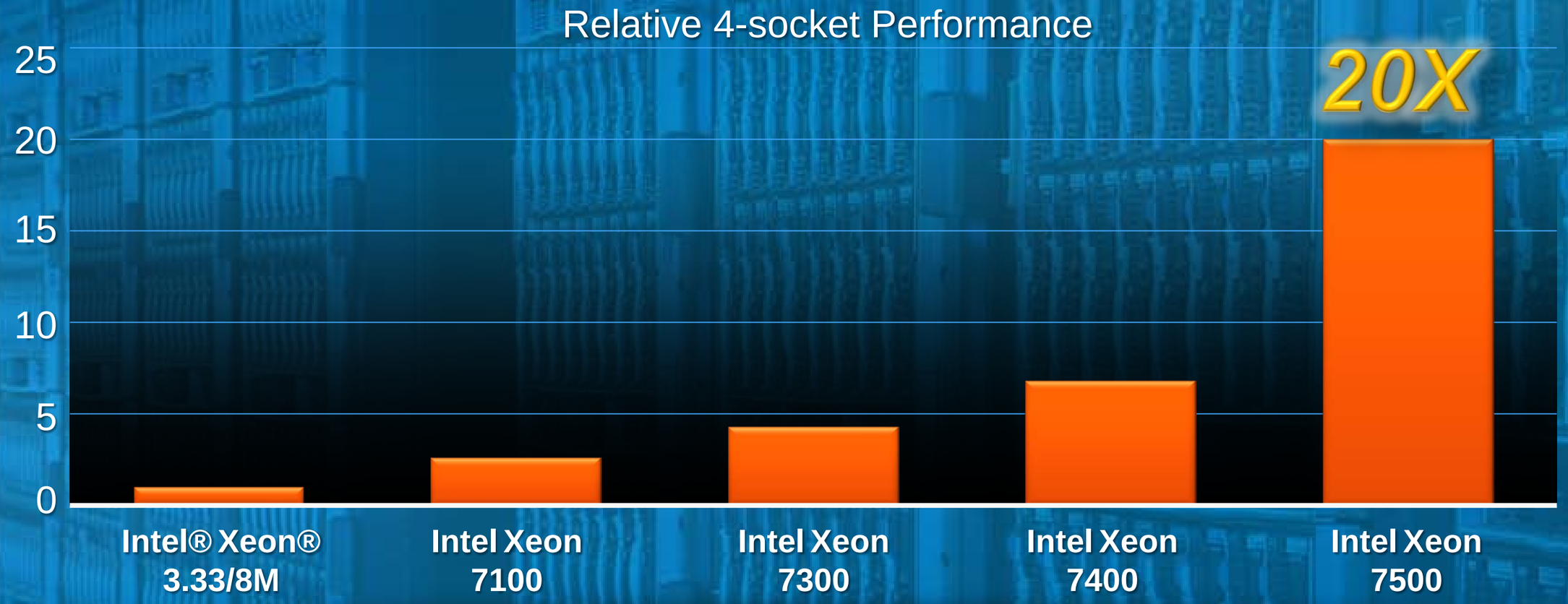
1 Source: Internal Intel estimates comparing Xeon® X5670 vs. X5570 SKUs using SPECpower. See backup for system configurations.
2 Source: Internal Intel estimates comparing Xeon® X5570 vs. L5640 SKUs using SPECint_rate_2006. See backup for system configurations.

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/resources/limits.htm

# The Intel® Xeon® Revolutionary Performance




*The Biggest Performance Leap in Xeon History*

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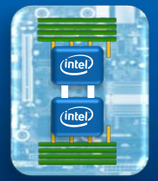
Source: Intel internally measured results 15 January 2010. Each bar represents the score or estimated score of best measured/estimated results on the geometric mean of internal benchmarks (server-side Java*, integer throughput, floating-point throughput, ERP, and OLTP). Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance. 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, Go to: http://www.intel.com/performance/resources/benchmark_limitations.htm.
Relative performance is calculated by assigning a baseline value of 1.0 to one benchmark result, and then 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.

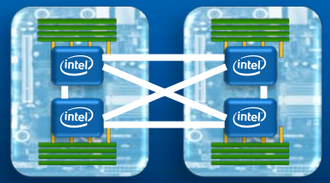
# Intel® Xeon® Modular Scaling Innovation

***2-sockets***
***32 DIMMs***



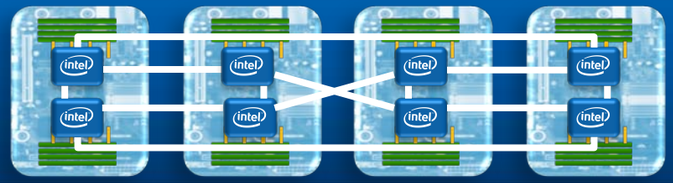
**First Ever Systems**

***4-sockets***
***64 DIMMs***



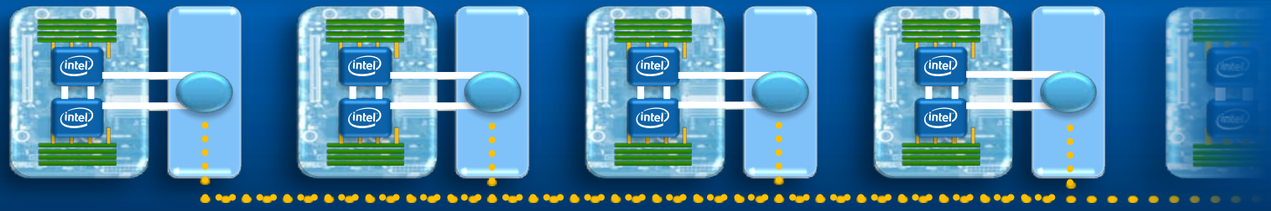
**Rack/Blade/Workstation**

***8-sockets***
***128 DIMMs***



**5X Increase in 8 Socket & Higher Platform Choice**

***Ultra-Scaling with OEM Node Controllers***
***2+2+… up to 256s***



**>15 Product Offerings Up to 256 Sockets!**

*Xeon® 7500 CPU Socket* — *Intel QuickPath Interconnect* — *Memory* — *OEM Node Controller*

Source: Industry data on Intel® Xeon® Processor 7400 Series based designs shipping today and Intel data on Xeon 7500 designs expected to ship beginning today and in the future. Not all OEM system designs shown.

# Intel® Xeon® 7500 Performance Records

- sgi #1 64S SPECint*_rate_base2006
- sgi #1 64S SPECfp*_rate_base2006
- NEC #1 8S TPC Benchmark* E
- FUJITSU #1 8S SAP* SD 2-Tier (Unicode)
- FUJITSU #1 8S SPECjbb*2005
- FUJITSU #1 4S SAP BI Datamart
- IBM #1 4S TPC Benchmark* E
- IBM #1 4S SAP* SD 2 Tier (Unicode)
- DELL #1 4S SPECjAppServer*2004
- CISCO #1 4S LS-Dyna* Crash Simulation
- IBM #1 4S VMmark* v1.1
- CISCO #1 4S SPECint*_rate_base2006
- IBM #1 2S SPECint*_rate_base2006
- DELL #1 2S SPECjbb*2005

*Over 20 New x86 Expandable Server World Records!*

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[1]World record claim based on comparison of like socket server platforms based on x86 architecture unless otherwise stated. Performance results based on published/submitted results as of March 29, 2010. See http://www.intel.com/performance/server/xeon_mp/summary.htm for details.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/resources/limits.htm 

* Other names and brands may be claimed as the property of others. ± Submitted or published Topcrunch.org

2. NEC: Availability is June 24,2010.

3. IBM x3850 X5 server is planned to be generally available March 31, 2010. The total solution availability for the TPC-E benchmark is July 30, 2010.

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# Huge Opportunity to Refresh Old Servers

**2005**


**EP Refresh**

**2010**

**Xeon® 5600 Efficiency Refresh**


英特尔™ 至强™

**95% Annual Energy Cost Reduction** (estimated)

**5 Month Payback** (estimated)

**– OR –**

**2010**

**Xeon 5600 Performance Refresh**


英特尔™ 至强™

**Up to 15x Performance**

**8% Annual Energy Costs Reduction** (estimated)

**2005**


**EX Refresh**

**2010**

**Xeon 7500 Efficiency Refresh**


英特尔™ 至强™

**92% Annual Energy Cost Reduction** (estimated)

**12 Month Payback** (estimated)

**– OR –**

**2010**

**Xeon 7500 New Uses**


英特尔™ 至强™

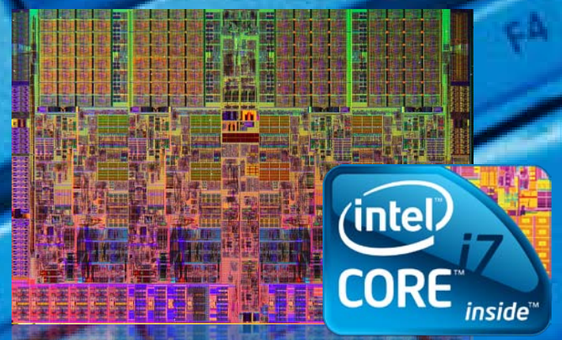
**Mission Critical VMs (>8GB)**

**Greater Flexibility**

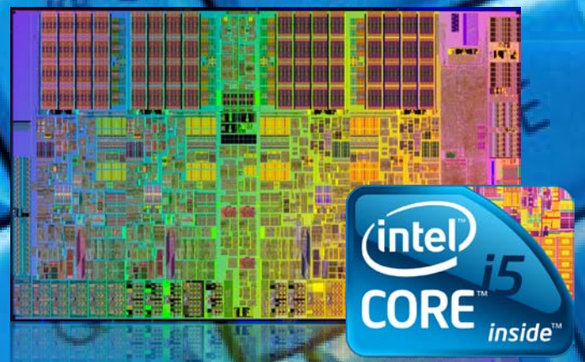
**Multi-Tier Consolidation**

IDF2010
INTEL DEVELOPER FORUM

Source: Intel estimates as of Jan 2010. Performance comparison using SPECjbb2005 bops (business operations per second). Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance. For detailed calculations, configurations and assumptions refer to the legal information slide in backup.




英特尔™ 酷睿™ i7




英特尔™ 酷睿™ i5


英特尔™ 酷睿™ i3

# IA Solutions for Performance Clients

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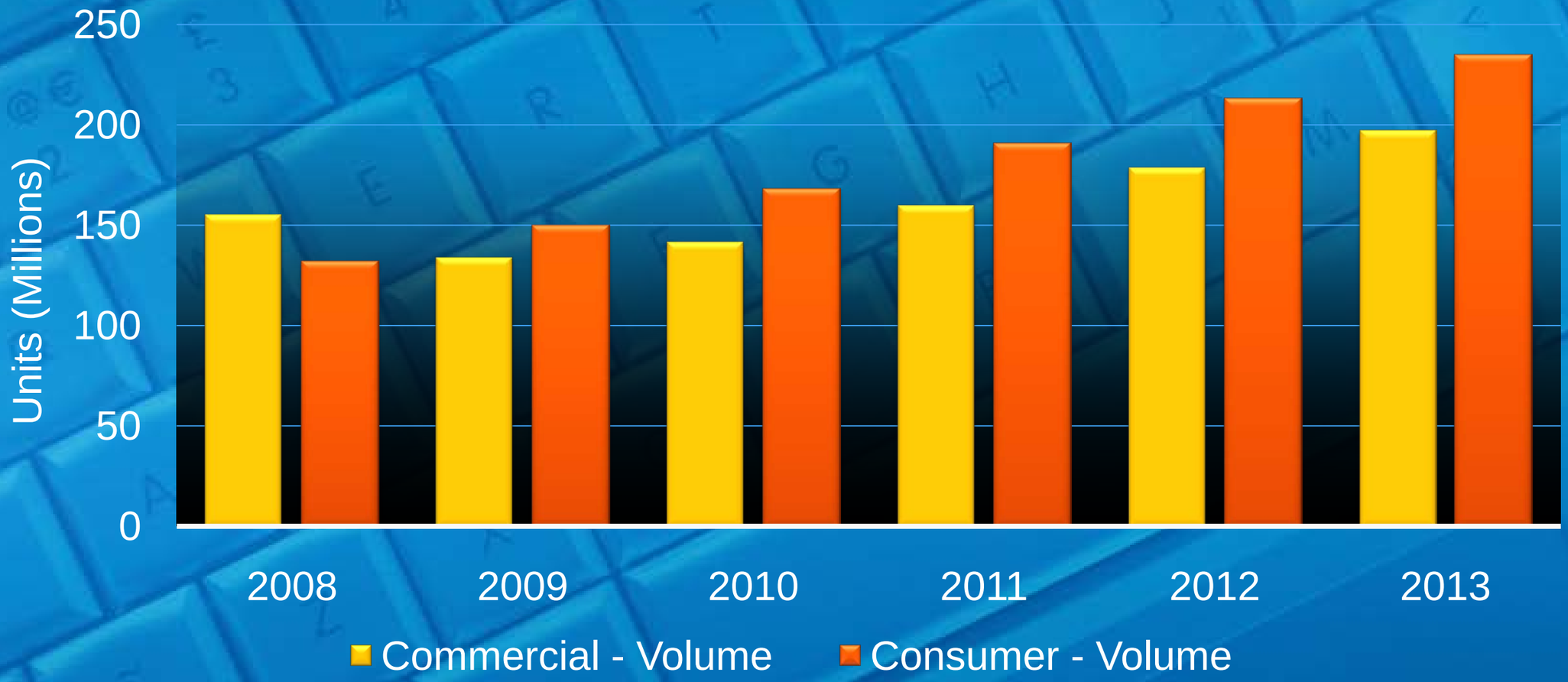
INTEL DEVELOPER FORUM

Not Actual Die Size

# Commercial and Consumer PC Forecast

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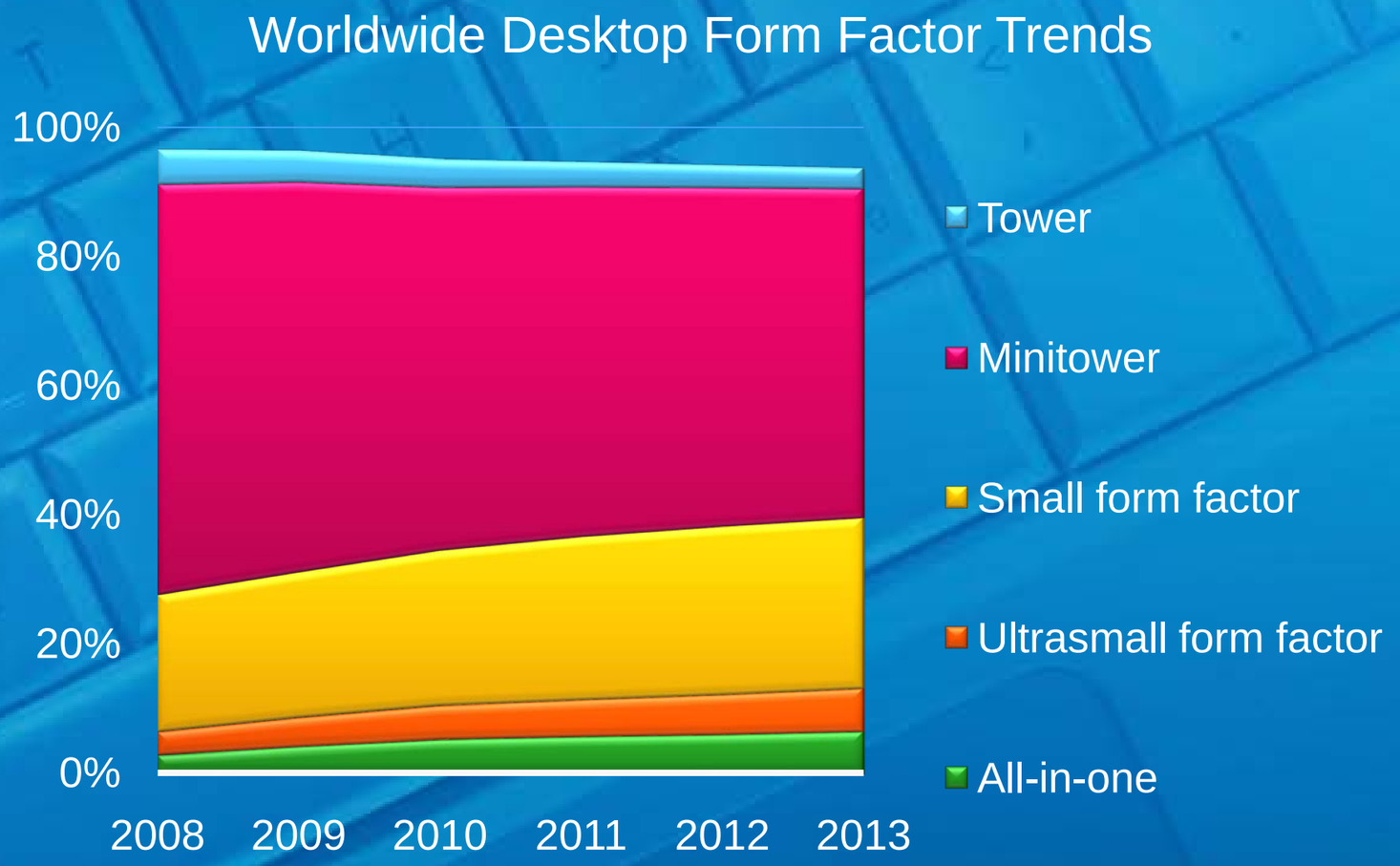
Source: IDC Worldwide Quarterly PC Tracker August 2009

# Strong Desktop Growth In New Form Factors

Enthusiast

Business

Lifestyle and
Small Form Factor

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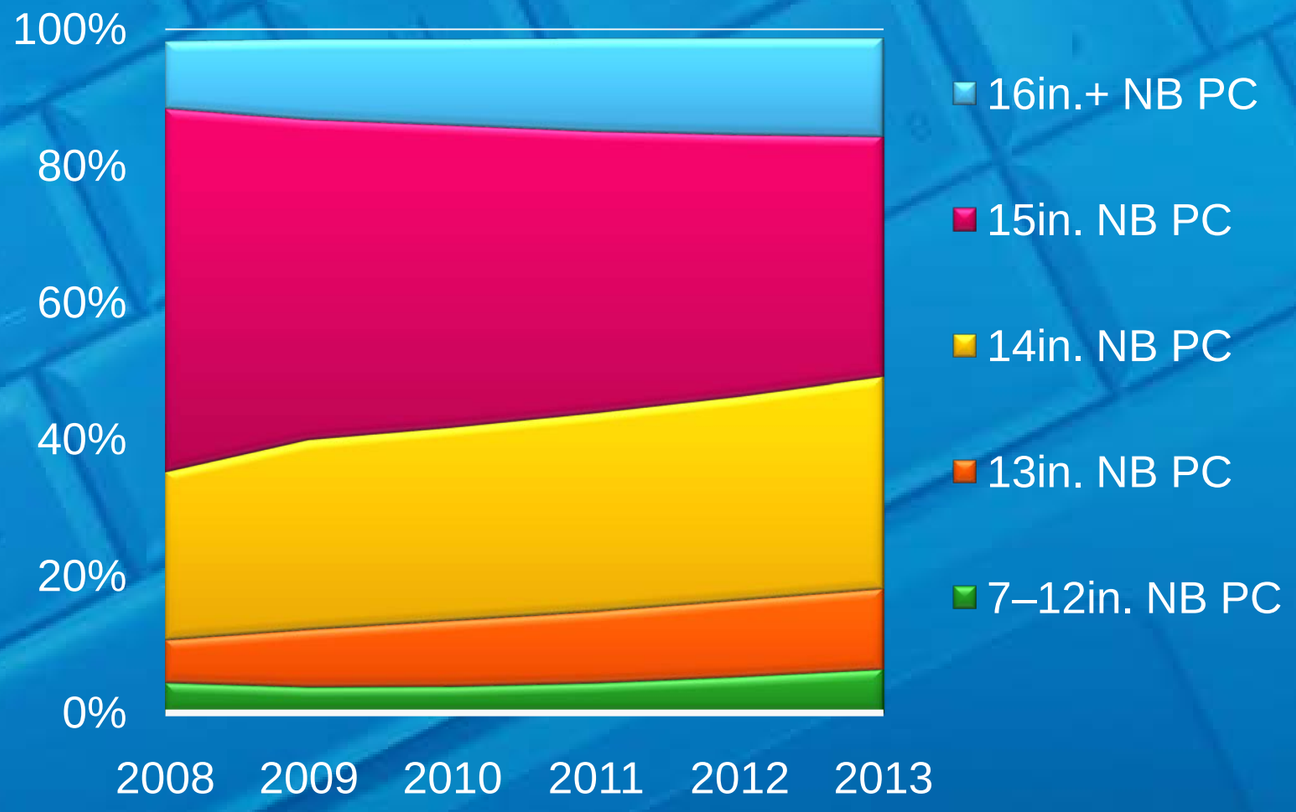
Note: Figure does not equal 100% because not all sub form factors are represented.
Source: IDC Worldwide PC Client Form Factor 2006–2013 Forecast, September 2009

# Strong Notebook Growth In Key Segments

Ultra-thin Laptops

Performance Laptops

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Note: Figure does not equal 100% because not all sub form factors are represented.
Note: Mini Notebooks (netbooks) excluded from data set.

Source: IDC Worldwide PC Client Form Factor 2006–2013 Forecast, September 2009

# Intel® Core™ i7-980X Processor Extreme Edition

*The World's Fastest, Smartest PC Processor*

英特尔™ 酷睿™ i7

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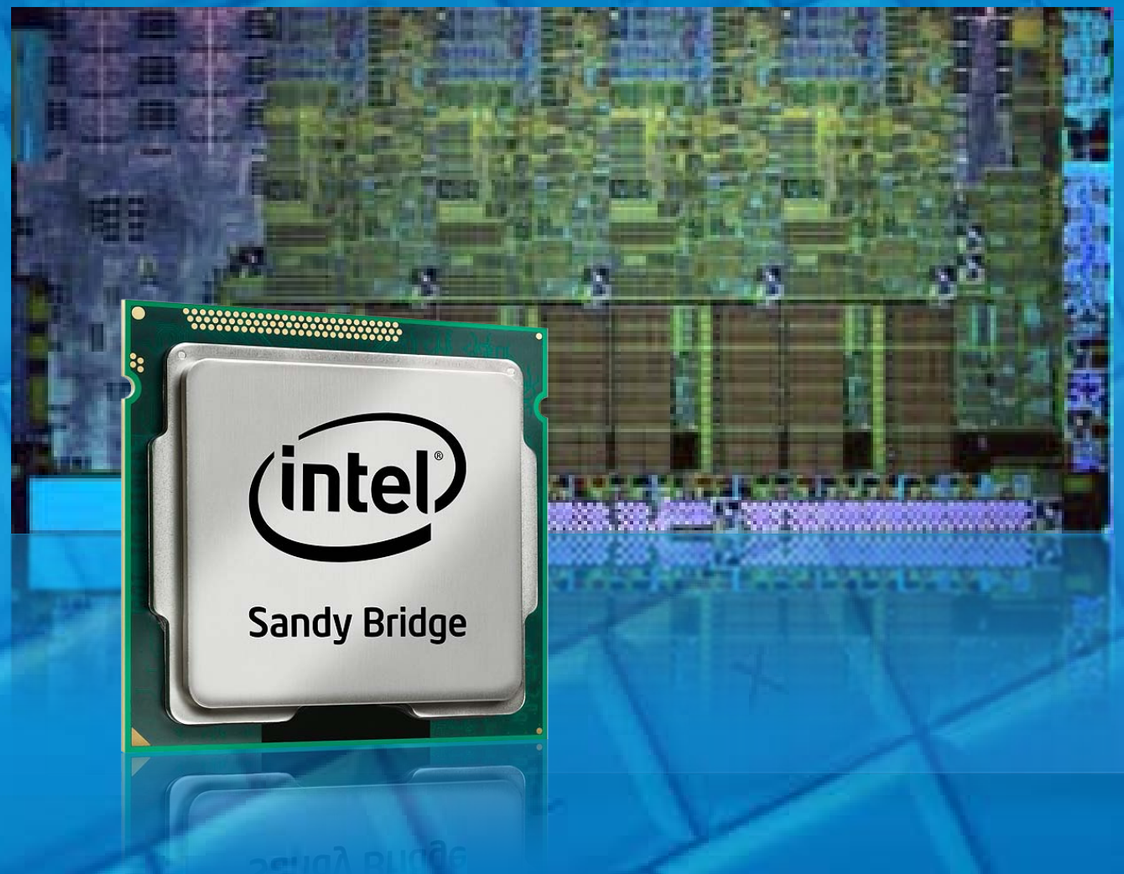
Not Actual Die Size

# The Next Generation Intel® Core™ Processor

## *Code Name Sandy Bridge*




- New 32nm Intel microarchitecture
- Impressive leap in energy-efficient performance
- Significant advances in media and 3D graphics capabilities
- New Intel® AVX instructions for enhanced floating point intensive application performance

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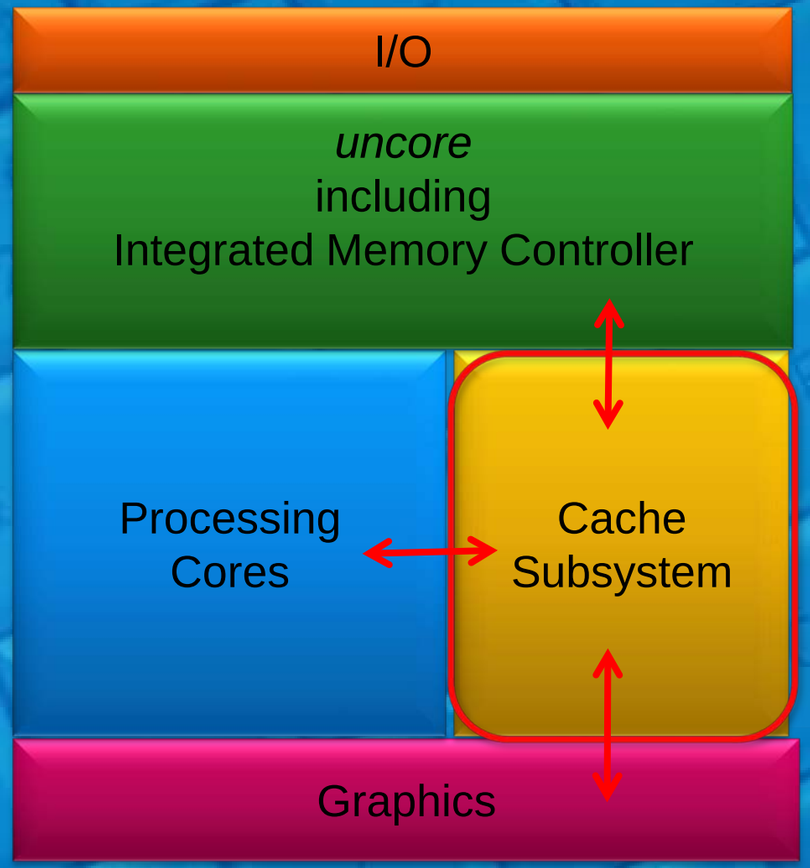
# New Sandy Bridge Microarchitecture




More instructions per clock (IPC)

Enables increased bandwidth and reduced latencies for internal data transfers

Enables improved Graphics architecture using integration and shared cache

Sophisticated Power Management


14

# Wei Deng

Vice President & Chief Technology Officer

Dayang Technology Development Inc.

DAYANG®

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WITH AVX
WITHOUT AVX


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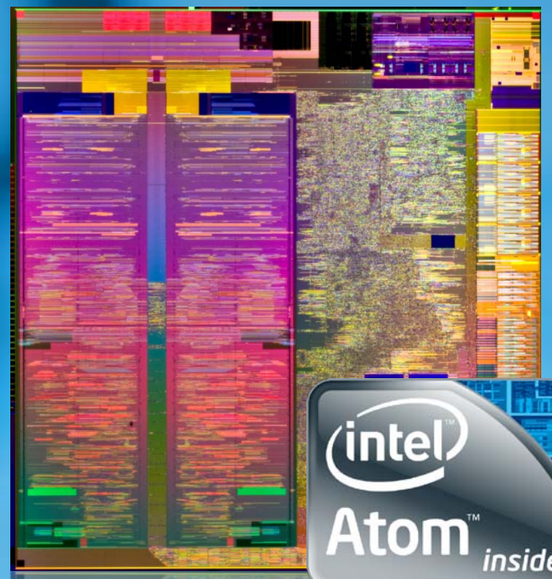
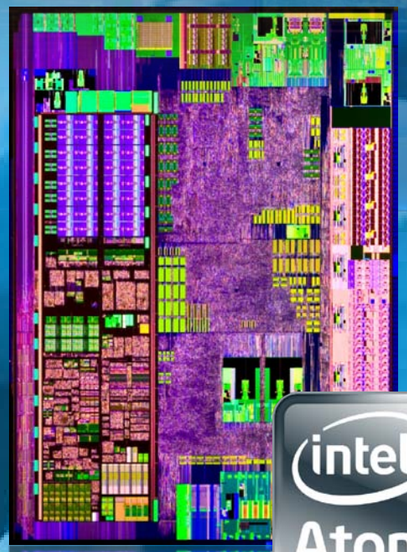
# Intel Architecture Optimized Low Power Solutions

# IA Solutions for Netbooks and More

Intel® Atom™ Processor D510



Intel® Atom™ Processor N450 and N470



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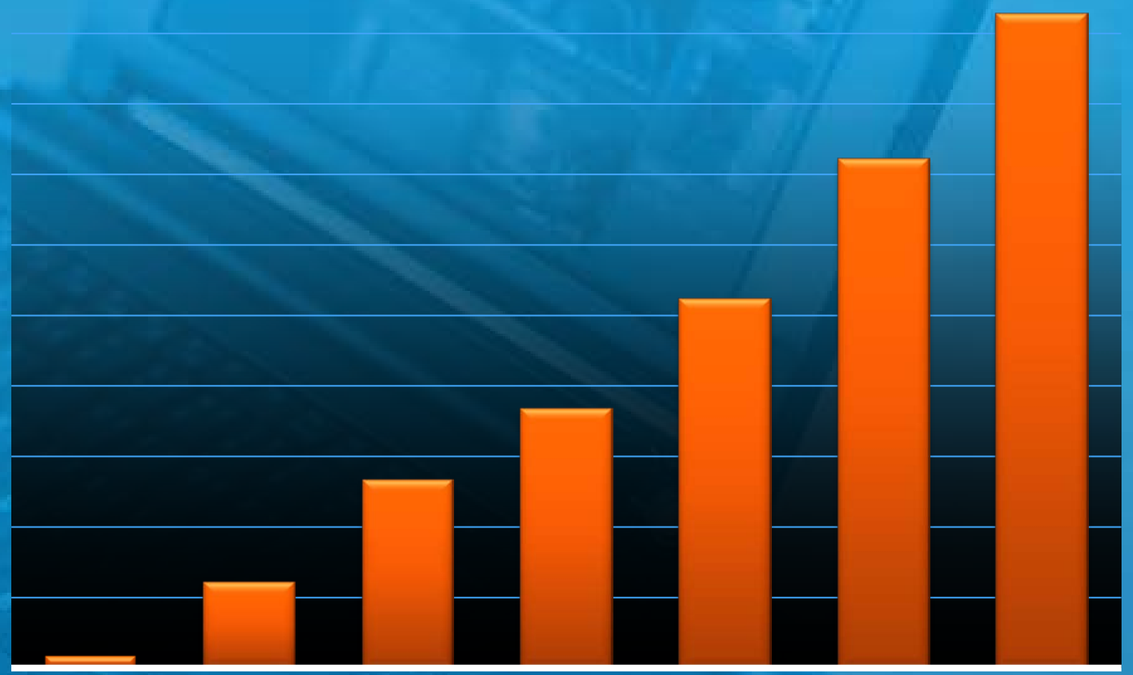
# Intel® Atom™ Netbooks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Source: Intel internal data, April 2010

# Introducing the Intel-powered convertible classmate PC

清华同方 汉王 Hanvon

*An Integrated Hardware and Software, Purpose-Built Solution for eLearning*

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JAO TECH

Obie® Smart Terminal

# Multi-function, Purpose-built Embedded Devices

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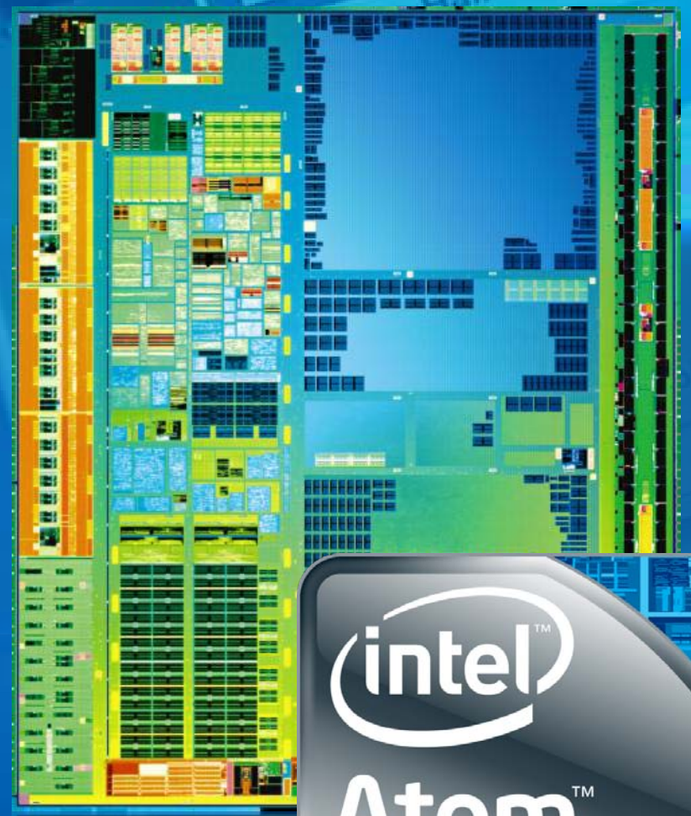
Intel® Atom Processor
Codename: Lincroft



# IA Solutions for Handhelds

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英特尔™ 凌动™

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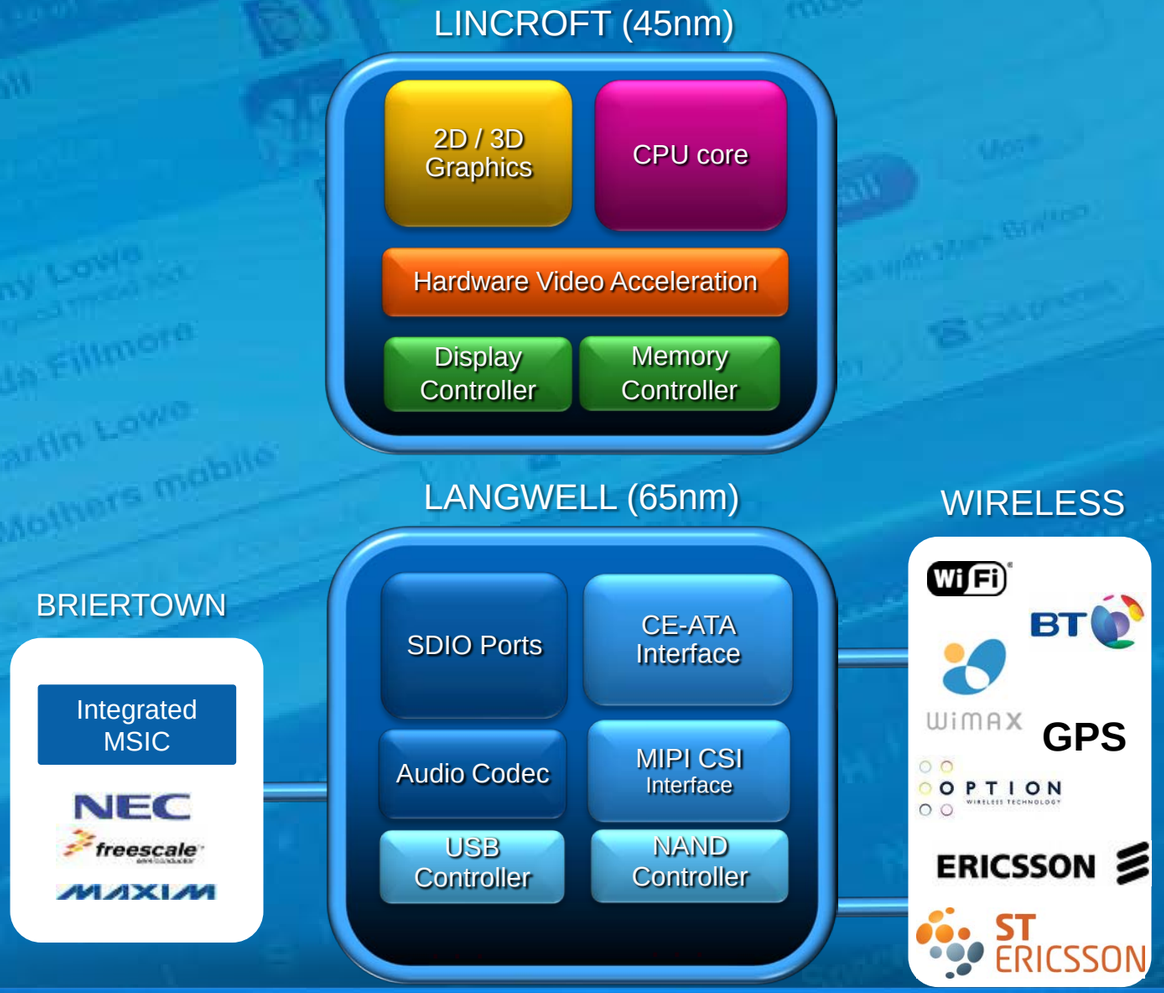
# Intel Handheld Platform – Codename: *Moorestown*




*Platform Power and Performance Innovation Through Design, Architecture, and Process Techniques*

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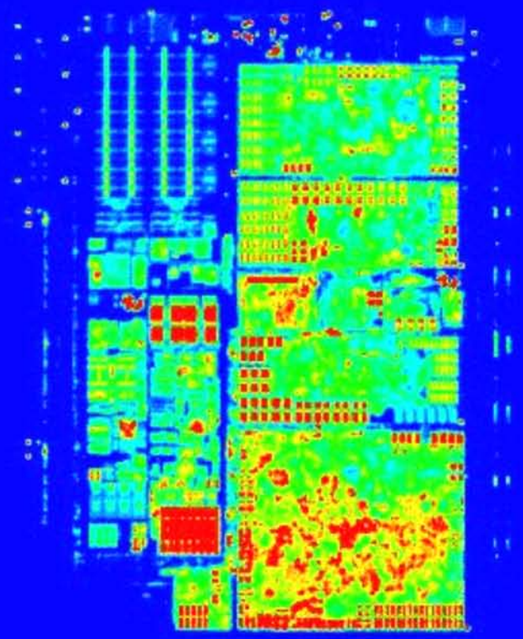
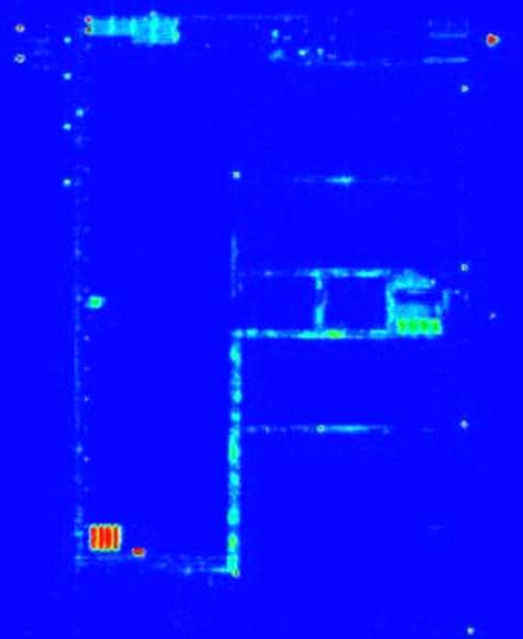
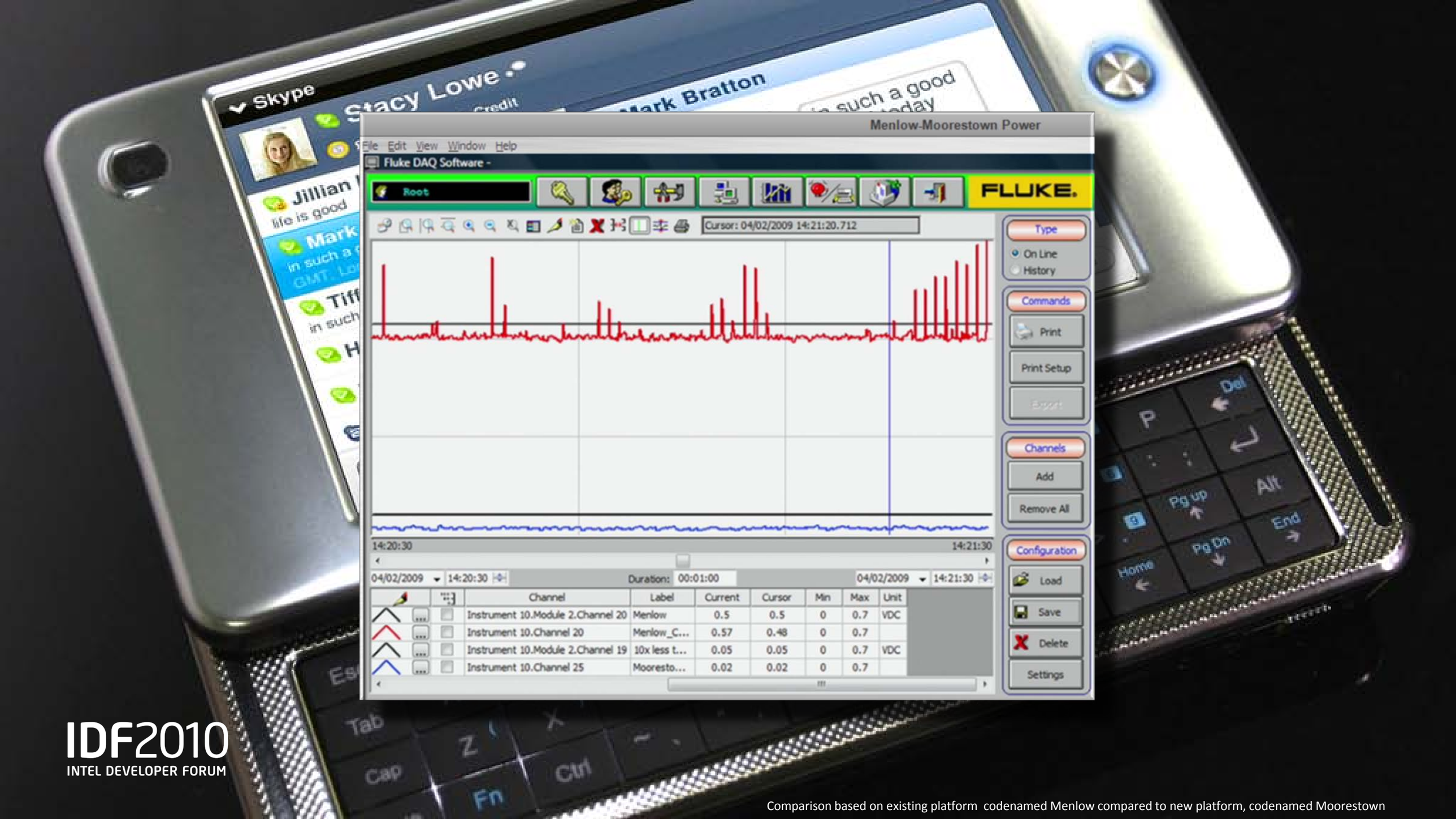
# Power Gating Technology

## All Power Islands Are On



## Power Gated State



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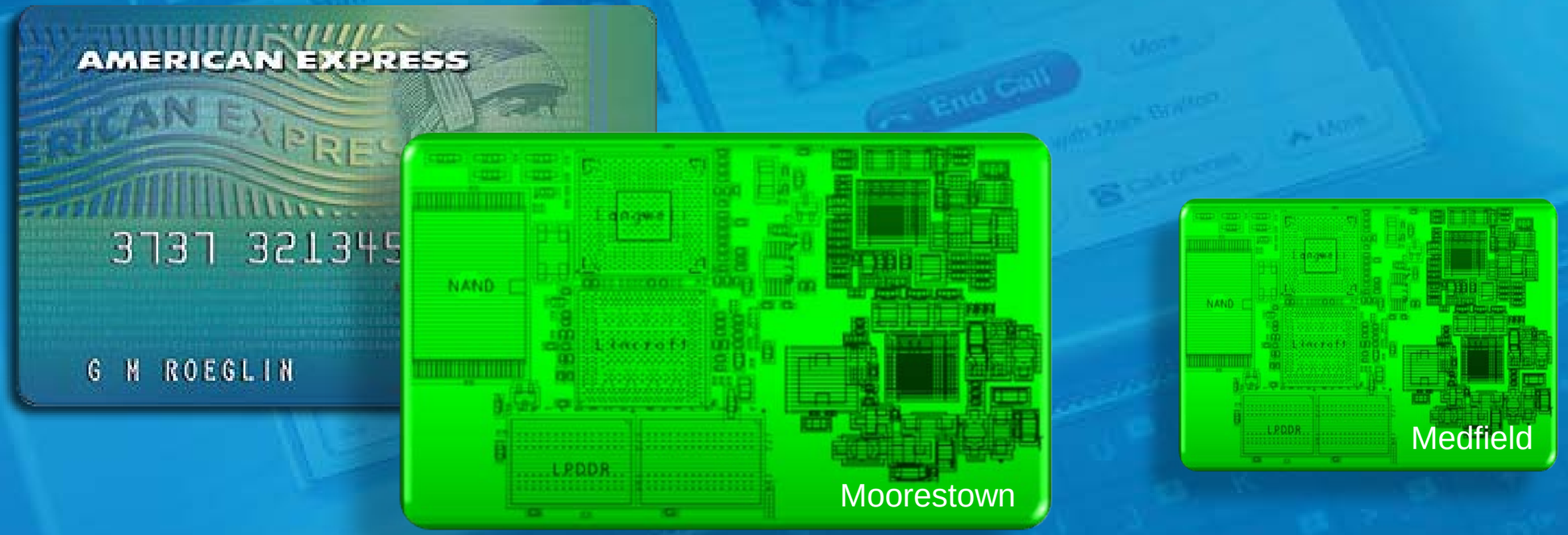
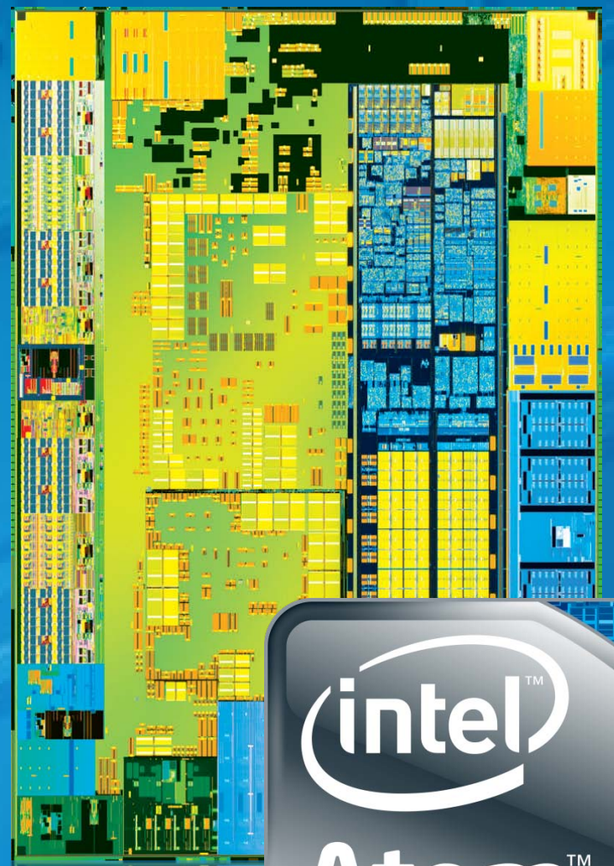
Comparison based on existing platform codenamed Menlow compared to new platform, codenamed Moorestown

# Ultra-low Power Gets Even Smaller




*32nm Enables Even Smaller, Sleeker Devices*

Intel® Atom™ Processor CE4100



# IA Solutions for TVs

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# IA Enabling New TV Experiences
## Smart TV

Advanced Search & Content Choices


Advanced User Interfaces

New Content & Services  On TV

Social Networking


Advertising


Discovery Engine


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Broadband for
Connected Computing
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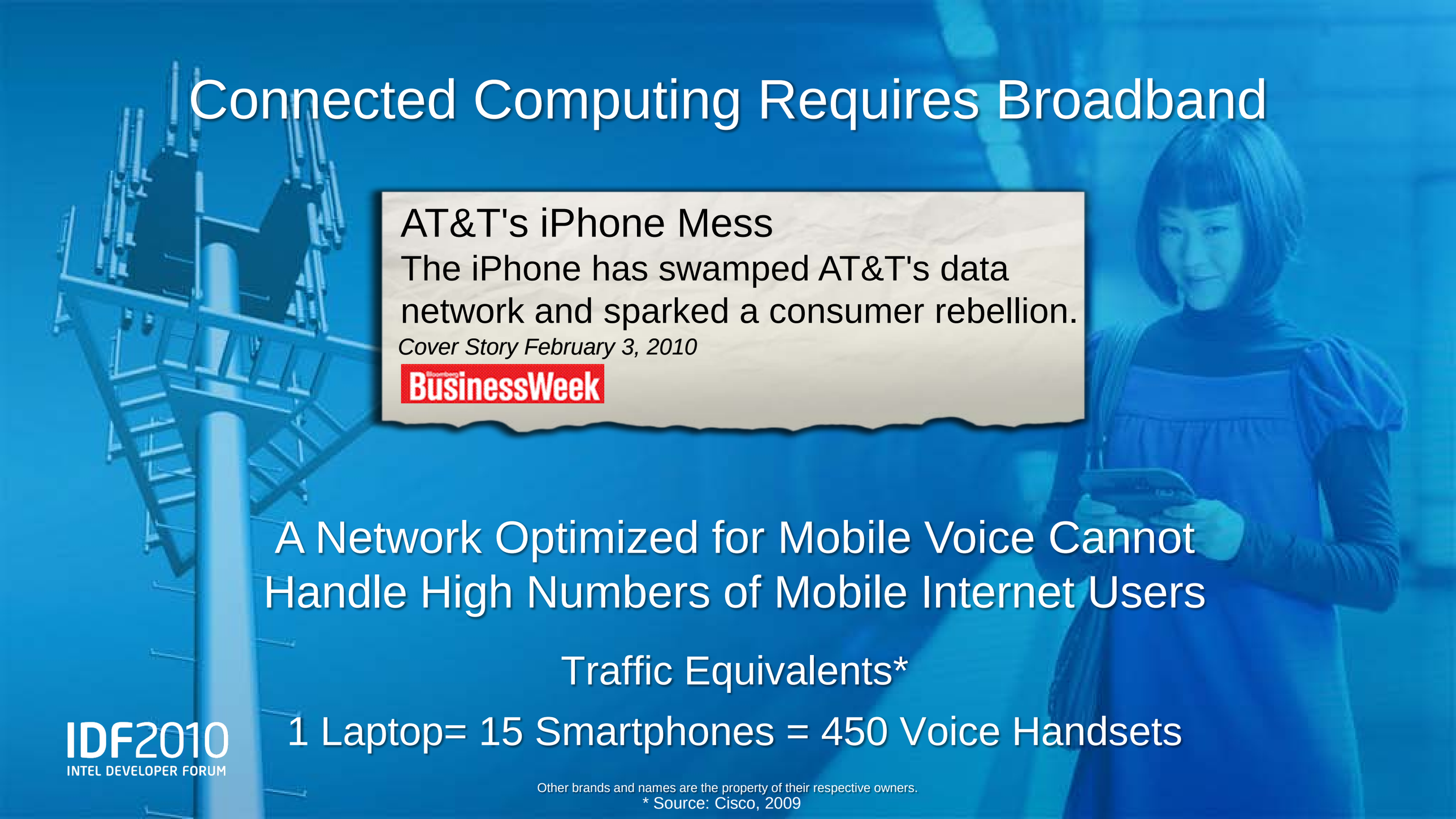
# Connected Computing Requires Broadband



AT&T's iPhone Mess

The iPhone has swamped AT&T's data network and sparked a consumer rebellion.

*Cover Story February 3, 2010*

Bloomberg BusinessWeek

## A Network Optimized for Mobile Voice Cannot Handle High Numbers of Mobile Internet Users

Traffic Equivalents*

1 Laptop= 15 Smartphones = 450 Voice Handsets

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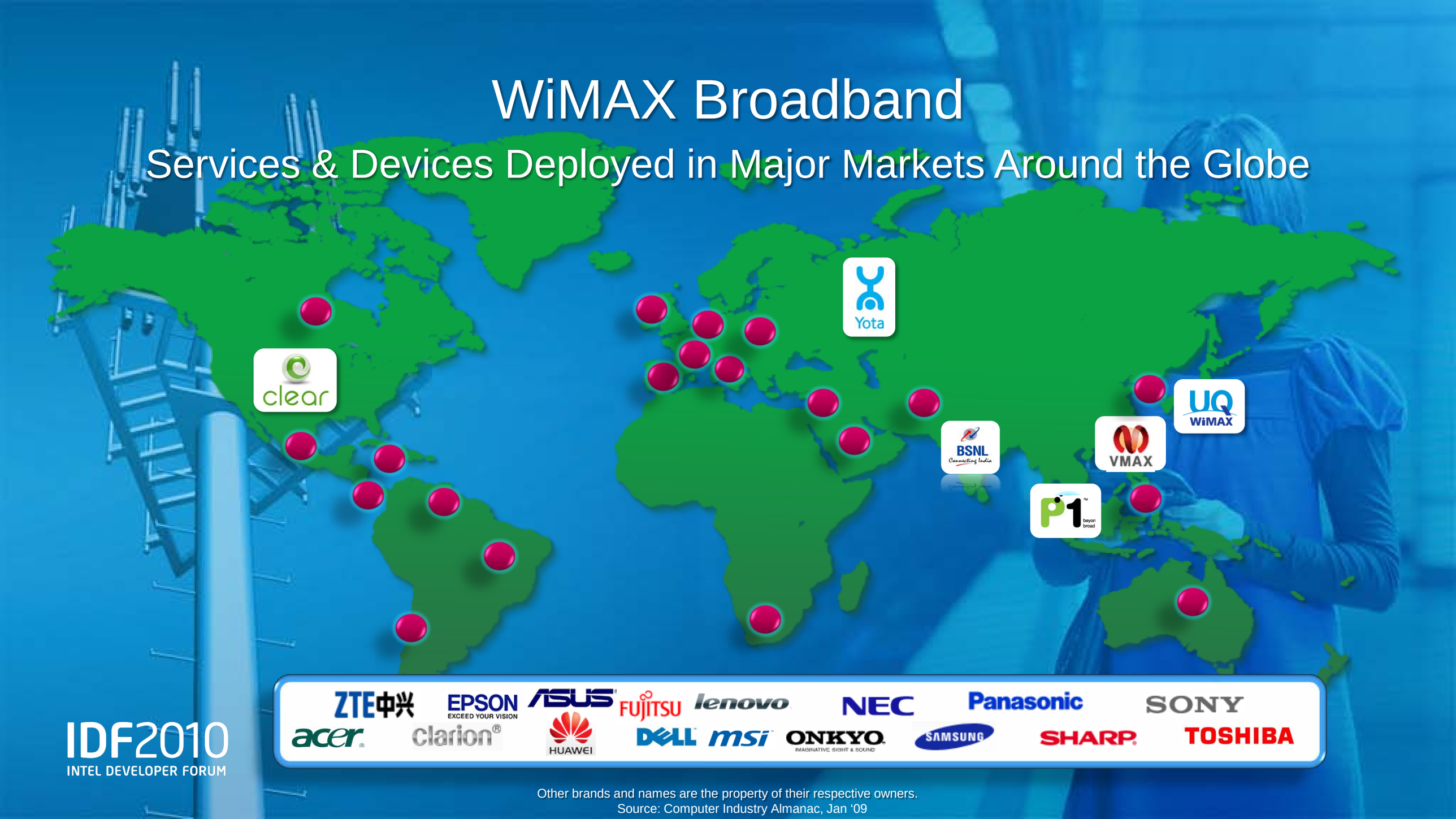
* Source: Cisco, 2009

# WiMAX Broadband

## Services & Devices Deployed in Major Markets Around the Globe




ZTE中兴 EPSON EXCEED YOUR VISION ASUS FUJITSU lenovo NEC Panasonic SONY
acer clarion® HUAWEI DELL msi ONKYO IMAGINATIVE SIGHT & SOUND SAMSUNG SHARP TOSHIBA

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Source: Computer Industry Almanac, Jan '09

# Broadband Unlocks The Potential of Connected Computing

Tourism


City Guide

Traffic

Crime Prevention

Government

Airports/ Harbors


IPTV, eSNG
(Satellite News Gathering)

Long Distance Learning

Campus Safety

Museums Libraries

Healthcare

*M-Taiwan has 30+ Projects Using Wireless Broadband Services*

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# The Connected Computing Potential, Realized

## *iWorld eLearning Program – Over 200 eClassrooms Built*

"The computer allows me to browse the internet, play games, draw drawings, learn Chinese, math and foreign languages - allowing me do things I otherwise could not have done."

—Li Fengqing, Child in iWorld Program

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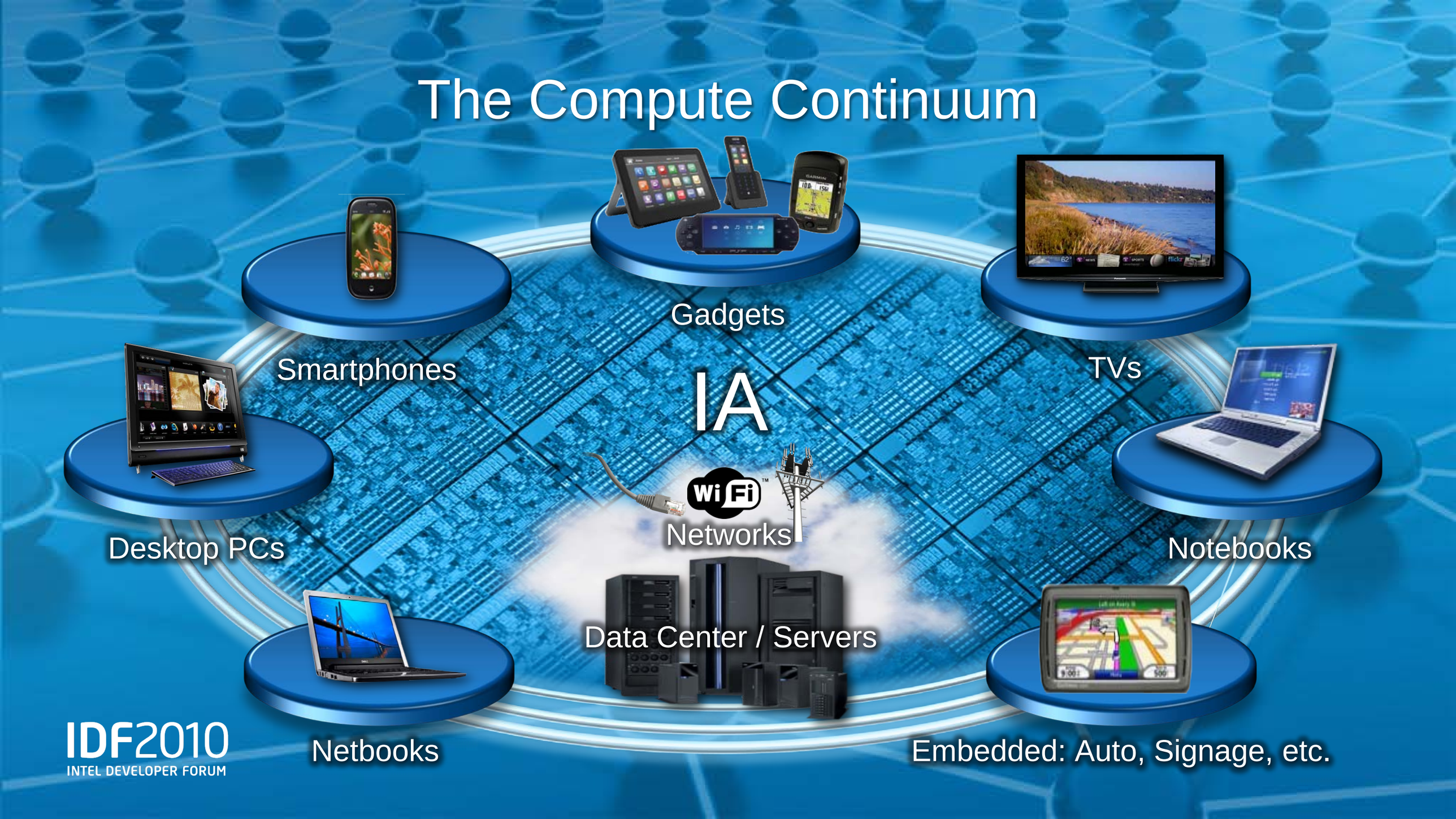
acer DOYEN 道洋 DELL FOUNDER 方正 Haier 润眼电脑 和诚佳业 Hasee 神舟 Great Wall 长城 lenovo hp TCL 清华同方 TSINGHUA TONGFANG

# The Compute Continuum

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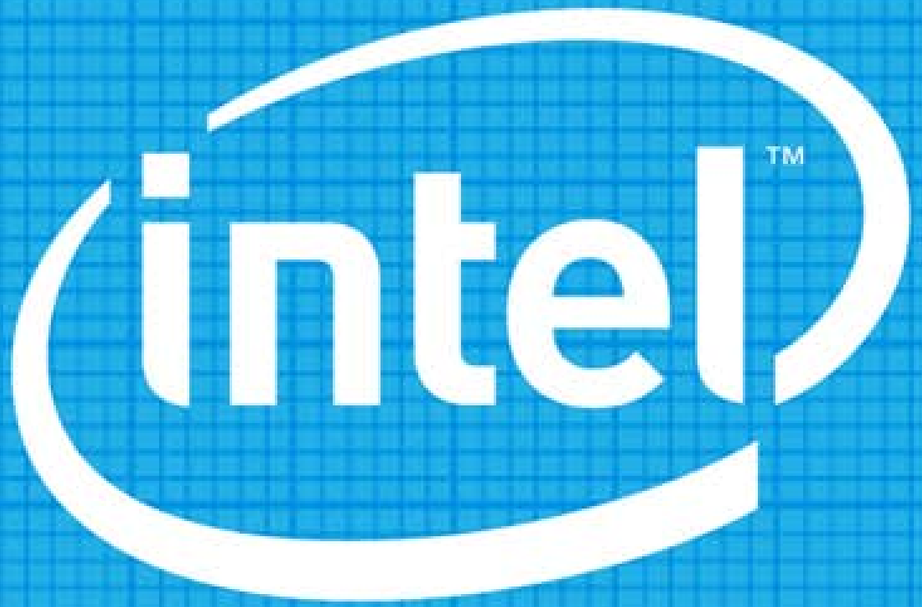


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# Performance Claim Backup

- Up to 1.6x performance compared to Xeon 5500 series claim supported by a CPU intensive benchmark (Blackscholes). Intel internal measurement. (Feb 25, 2010)
  - Configuration details:  - Blackscholes*
  - Baseline Configuration and Score on Benchmark:- Intel pre-production system with two Intel® Xeon® processor X5570 (2.93 GHz, 8 MB last level cache, 6.4 GT/sec QPI), 24GB memory (6x4GB DDR3-1333), 4 x 150GB 10K RPM SATA RAID0 for scratch, Red Hat* EL 5 Update 4 64-bit OS. Source: Intel internal testing as of February 2010. SunGard v3.0 source code compiled with Intel v11.0 compiler. Elapsed time to run benchmark: 18.74 seconds.
  - New Configuration and Score on Benchmark:- Intel pre-production system with two Intel® Xeon® processor X5680 (3.33 GHz, 12 MB last level cache, 6.4 GT/sec QPI), 24GB memory (6x4GB DDR3-1333), 4 x 150GB 10K RPM SATA RAID0 for scratch, Red Hat* EL 5 Update 4 64-bit OS. Source: Intel internal testing as of February 2010. SunGard v3.0 source code compiled with Intel v11.0 compiler. Elapsed time to run benchmark: 11.51 seconds.
- Up to 40% higher performance/watt compared to Intel® Xeon® Processor 5500 Series claim supported by performance results on a server side java benchmark in conjunction with power consumption across a load line. Intel internal measurement (Jan 15, 2010)
  - Baseline platform: Intel preproduction server platform with two Quad-Core Intel® Xeon® processor X5570, 2.93 GHz, 8MB L3 cache, 6.4QPI, 8GB memory (4x2GB DDR3-1333), 1 PSU, Microsoft Windows Server 2008 Enterprise SP2. Intel internal measurement as of January 15,2010.
  - New platform: Intel preproduction server platform with two six-Core Intel® Xeon® processor X5670, 2.93 GHz, 12MB L3 cache, 6.4QPI, 8GB memory (4x2GB DDR3-1333), 1 PSU, Microsoft Windows Server 2008 Enterprise SP2. Intel internal measurement as of January 15, 2010.
- Intel® Xeon®  processor 5600 series with Intel microarchitecture Nehalem delivers similar performance as previous-generation servers but uses up to 30 percent less power
  - Baseline Configuration and Score on Benchmark: Fujitsu PRIMERGY RX300 S5 system with two Intel® Xeon® processor sX5570 (2.93 GHz, 8MB L3, 6.4 GT/s, Quad-core, 95W TDP), BIOS rev. R1.09 , Turbo Enabled, HT Enabled, NUMA Enabled, 5 x Fans, 24 GB (6x4GB DDR3-1333 DR registered ECC), 1 x Fujitsu MBD2147RC 147GB 10K RPM 2.5” SAS HDD, 1x800W PSU, SLES 11 (X86_64) Kernel 2.6.27.19-5-default. Source: Fujitsu Performance Lab testing as of Mar 2010. SPECint_rate_base2006 score: 250. http://docs.ts.fujitsu.com/dl.aspx?id=0140b19d-56e3-4b24-a01e-26b8a80cfe53
  - New Configuration and Score on Benchmark: Fujitsu PRIMERGY RX300 S6 system with two Intel® Xeon® processors L5640 (2.26 GHz, 12MB L3, 5.86 GT/s, Hex-core, 60W TDP), BIOS rev R1.00A , Turbo Enabled, HT Enabled, NUMA Enabled, 5 x Fans, 24 GB (6x4GB DDR3-1333 LV DR registered ECC), 1 x Fujitsu MBD2147RC 147GB 10K RPM 2.5” SAS HDD, 1x800W PSU, SLES 11 (X86_64) Kernel 2.6.27.19-5-default. Source: Fujitsu Performance Lab testing as of Mar 2010. SPECint_rate_base2006 score: 250 http://docs.ts.fujitsu.com/dl.aspx?id=4af74e10-24b1-4cf8-bb3b-9c4f5f177389

# Performance Summary Backup

## *Performance Summary and World Record Benchmarks*

42% gain on Single Node server SPECpower*_ssj2008 over previous generation processors supported by the following:

- Baseline configuration and score: Referenced as published at 2,053 overall ssj_ops/watt www.spec.org/power_ssj2008/results/res2009q4/power_ssj2008-20091023-00205.html.
- New configuration and score: IBM x3650 M3* was configured with the Intel Xeon processor X5670 (2.93GHz, 256KB L2 cache per core, 12MB L3 cache per processor—12 cores/2 chips/6 cores per chip) and 12GB of PC3L-10600R (6 x 2GB) memory and ran IBM Java 6 Runtime Environment* and Microsoft Windows Server 2008* R2 Enterprise x64 Edition. Score: 2,927 overall ssj_ops/watt. Submitted and in review at www.spec.org

33% gain on SPECjEnterprise2010 over previous generation processors supported by the following:

- Baseline Configuration and Score: 1194. 8 EjOPS http://www.spec.org/jEnterprise2010/results/res2010q1/jEnterprise2010-20100210-00005.html
- New Configuration and Score: 1599.5 EjOPS IBM BladeCenter HS22 server was configured with the Intel® Xeon® Processor X5670 (2.93GHz, 256KB L2 cache per core, 12MB L3 cache per processor—12 cores/2 chips/6 cores per chip) and 24GB of memory, and ran WebSphere Application Server V7, IBM J9 Java™6 Runtime Environment, and Novell SUSE Linux® Enterprise Server 10 SP3. An IBM System x3650 M2 system was used as the database server, which used two quad-core Intel Xeon X5570 (2.93GHz) processors and ran IBM DB2 9.7 Enterprise Server and Novell SUSE Linux Enterprise Server 10 SP2. Submitted and in review at www.spec.org

27% boost on SAP enhancement package 4 for SAP ERP 6.0 Unicode over previous generation supported by the following:

- Baseline Configuration and Score: 3800 Number of SAP SD benchmark users http://download.sap.com/download.epd?context=40E2D9D5E00EEF7C259FFE6AB54898440C838DED66684AFD7D58B23A917F4C0D
- New Configuration and Score : Fujitsu PRIMERGY RX300 S6 system with two Intel® Xeon® processor X5680 (3.33 GHz, 12MB L3, 6.4 GT/s, Hex-core, 130W TDP), 88 GB main memory, Windows Server 2008 Enterprise Edition, SQL Server 2008, SAP ERP 6.0 (Unicode). Source: www.sap.com Score: 4,860 Number of SAP SD benchmark users (See www.sap.com/benchmark for Certificate #2010007 ).

10% gain on SPECint_base2006 over previous generation supported by the following:

- Baseline Configuration and Score: 35.4 base score Referenced as published at: http://www.spec.org/cpu2006/results/res2010q1/cpu2006-20100209-09620.html
- New Configuration and Score: 39 base score Referenced as published at: http://www.spec.org/cpu2006/results/res2010q1/cpu2006-20100301-09740.html

42% gain on VMmark* over previous generation supported by the following:

- Baseline Configuration and Score: Cisco result referenced as published at 25.06 at 17 tiles. For more information see www.vmware.com/files/pdf/vmmark/VMmark-Cisco-2010-01-12-B200M1.pdf
- New Configuration and Score on Benchmark:- Cisco UCS B250 M2 platform with two Intel® Xeon® processor X5680 (3.33 GHz, 12MB L3, 6.4 GT/s, 6-core, 130W TDP), Turbo Enabled, HT Enabled, 192GB memory (48x4GB DDR3 1333), EMC CLARiiON CX4-240 storage system with 25x73GB SSD, 20 x 450GB 15K RPM, 5 x 300GB 15K RPM, VMware vSphere 4,0 U1 Source: www.cisco.com. Score of 35.83@26 tiles. For more information see: www.cisco.com/en/US/prod/ps10265/at_work_promo.html#~industry_benchmarks.

# Performance Summary Backup

## *World Record Benchmarks (continued)*

31% gain on Multi-Node server SPECpower*_ssj2008 over previous generation supported by the following:

- Baseline Configuration and Score: 2,316 overall ssj_ops/watt
- http://www.spec.org/power_ssj2008/results/res2009q4/power_ssj2008-20090908-00195.html
- New Configuration and Score: IBM dx360 M3 system with the Intel® Xeon® Processor X5670 (2.93GHz with 256KB L2 cache per core and 12MB L3 cache per processor—2 chips/12 cores/6 cores per chip), 12GB of memory, one 50GB solid state drive, and IBM J9 Java 6 (using a 1500MB heap), and Microsoft® Windows® Server 2008 R2 Datacenter Edition2. Source: IBM testing as of Mar 2010. SPECpower_ssj2008 score: 3,038 overall ssj_ops/watt. Submitted and in review at www.spec.org

25% boost on SPECweb2005 over previous generation supported by the following:

- Baseline Configuration and Score: SPECweb2005 Score 83,198
- http://www.spec.org/osg/web2005/results/res2009q4/web2005-20091202-00144.html
- Fujitsu PRIMERGY TX300 S6 system with two Intel® Xeon® processors X5680 (3.33 GHz, 12MB L3, 6.4 GT/s, Hex-core, 130W TDP), Turbo Enabled, HT Enabled, NUMA Enabled, 96 GB (12x8GB DDR3-1333 DR registered ECC), 8 x Seagate 73GB 15K RPM 3.5” SAS HDD (internal) plus 48 x Seagate 146GB 15K RPM 3.5” SAS HDD (storage subsystem), Red Hat Enterprise Linux 5.3 (2.6.18-128.el5 x86_64), Accoria Networks Rock Web Server v1.4.8 (x86_64). Source: Fujitsu Performance Lab testing as of Mar 2010. SPECweb2005 score: 104422 (SPECweb2005_Banking = 162000, SPECweb2005_Ecommerce = 177000, SPECweb2005_Support = 88000)
- http://docs.ts.fujitsu.com/dl.aspx?id=2ce10d43-bc0a-4479-bd2b-a67387d57959

20% gain on SPECompM*base2001 & 17% gain on SPECompL*base2001 over previous generation supported by the following:

- Baseline Configuration and Score: http://www.spec.org/omp/results/res2009q2/omp2001-20090413-00350.html
- http://www.spec.org/omp/results/res2009q2/omp2001-20090413-00349.html
- New Configuration and Score: Cisco UCS B200 M2 platform with two Intel® Xeon® processor X5680 (3.33 GHz, 12MB L3, 6.4 GT/s, 6-core, 130W TDP), Turbo Enabled, HT Enabled, 48 GB (12x4GB DDR3-1333 registered ECC), 1x73GB 15K RPM SAS HDD, RHEL 5.4 Operating system, SPEC binaries were built with Intel Compiler 11.1. Source: Cisco internal measurement as of March 2010. SPECompMbase2001 score of 52,314;SPEC ompLbase2001 score of 278,603 or more information see: www.cisco.com/en/US/prod/ps10265/at_work_promo.html#~industry_benchmarks.

30% gain on SPECjAppServer2004 over previous generation supported by the following:

- Baseline Configuration and Score: 3975.13 JOPS@Standard http://www.spec.org/osg/jAppServer2004/results/res2009q1/jAppServer2004-20090310-00128.html
- New Configuration and Score: Cisco UCS C250 M2 platform with two Intel® Xeon® processor X5680 (3.33 GHz, 12MB L3, 6.4 GT/s, 6-core, 130W TDP), Turbo Enabled, HT Enabled, H/W Prefetcher Disabled, Adj. Cache Line Prefetch Disabled, DCU Prefecher Disabled, DCU IP Prefetcher Disabled. 96 GB (24x4GB DDR3-1333 registered ECC), 2x73GB 15K RPM SAS HDD, Oracle Enterprise Linux 5 Update 3 x86_64, Oracle WebLogic Server Standard Edition Release 10.3.3, Oracle JRockit(R) 6.0 JDK (R28.0.0-587) (Linux x86 64bit). EMC CLARiiON CX4-240 storage system with 60 x 450GB 15K RPM. Source: Result submitted to www.spec.org as of Feb 24, 2010. 5,185.45 SPECjAppServer2004 JOPS@Standard

# 5 Month Single Core Refresh ROI Claim

- 5 month ROI claim estimated based on comparison between 2S Single Core Intel® Xeon® 3.80 with 2M L2 Cache and 2S Intel® Xeon® X5680 based servers. Calculation includes analysis based on performance, power, cooling, electricity rates, operating system annual license costs and estimated server costs. This assumes 8kW racks, $0.10 per kWh, cooling costs are 2x the server power consumption costs, operating system license cost of $900/year per server, per server cost of $7200 based on estimated list prices and estimated server utilization rates. All dollar figures are approximate. Performance and power comparisons are based on measured server side java benchmark results (Intel Corporation Feb 2010). Platform power was measured during the steady state window of the benchmark run and at idle. Performance gain compared to baseline was 15x.
  - Baseline platform: Intel server platform with two 64-bit Intel Xeon Processor 3.80Ghz with 2M L2 Cache, 800 FSB, 8x1GB DDR2-400 memory, 1 hard drive, 1 power supply, Microsoft* Windows* Server 2003 Ent. SP1, Oracle* JRockit* build P27.4.0-windows-x86_64 run with 2 JVM instances
  - New platform: Intel server platform with two Intel® Xeon® Processor X5680 (12M Cache, 3.33 GHz, 6.40 GT/s Intel® QPI), 24 GB memory (6x4GB DDR3-1333), 1 SATA 10krpm 150GB hard drive, 1 800w power supply, Microsoft Windows Server 2008 64 bit SP2, Oracle* JRockit* build P28.0.0-29 run with 4 JVM instances
- 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 Intel Performance Benchmark Limitations.

# 12 Month Single Core Refresh ROI Claim

- 12 month ROI claim estimated based on comparison between 4S Intel® Xeon® MP CPU 3.3Ghz (Single core w/ HT, 1MB L2, 8MB L3, Potomac) and 4S Intel® Xeon® X7560 (8 core, 2.26GHz) based servers. Calculation includes analysis based on performance, power, cooling, electricity rates, operating system annual license costs and estimated server costs. This assumes 42U racks, $0.10 per kWh, cooling costs are 2x the server power consumption costs, operating system license cost of $900/year per server, per server cost of $36,000 based on estimated list prices, and estimated server utilization rates. All dollar figures are approximate. SPECint_rate_base2006* performance and power results are measured for X7560 and Xeon 3.3GHz based servers. Platform power was measured during the steady state window of the benchmark run and at idle. Performance gain compared to baseline was 20x.
  - Baseline platform (measured score of 33.8): Intel server with four Intel® Xeon® MP CPU 3.3Ghz (single core w/HT, 1MB L2, 8MB L3) processors, 16GB memory (8x2GB DDR2-400), 2 hard drives, 1 power supply, using Redhat EL 5.3 x86_64 operating system
  - New platform (measured score of 709): Intel internal reference server with four Intel® Xeon® Processor X7560 (24M Cache, 2.26 GHz, 6.40 GT/s Intel® QPI, Intel Hyper-Threading Technology, Intel Turbo Boost Technology), 128GB memory (64x 2GB QR DDR3-1333), 1 hard drive, 2 power supplies, using SuSE* LINUX 11, cpu2006.1.1.ic11.1.linux64.binaries.nov242009.tar.bz2 binaries.
- 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 Intel Performance Benchmark Limitations.



Source: Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance.

# Single Core Energy Efficient Refresh Calculation Details

| | 2005 | 2010 | Delta / Notes |
|---|---|---|---|
| Product | Intel® Xeon® 3.8GHz with 2M cache | Intel® Xeon® X5680 (3.33GHz) | |
| Performance per Server | 1 | **Up to 15x increase** | Intel internal measurements on a server side java benchmark as of Feb 2010 |
| Server Power Idle / Active Power | 228W idle / 382W active | 117W idle / 383W active | Server idle for 16 hours per day and active for 8 hours per day |
| # Servers needed | 315 | 21 | ~ 15:1 server consolidation |
| # Racks needed | 15 racks | 1 rack | **15:1 Rack Consolidation** |
| Annual Server kWh | 772,904 | 37,938 | **Up to 95% lower energy costs** |
| Total Annual Energy Costs | $154,581 | $7,588 | $146,993 electricity cost reduction per year. Assumes $0.10/kWhr and 2x cooling factor |
| Operating System Licensing Costs | $283,500 | $18,900 | $264,600 less per year<br>Assumes a RHEL 1yr license at $900<br>Source www.dell.com as of 12/16/08 |
| Estimated Annual Cost Savings of $411,593 | | | |
| Cost of new HW | n/a | $151,200 | Assume $7,200 per server |
| **Estimated Payback Period of 5 months** | | | |

# Risk Factors

The above statements and any others in this document that refer to plans and expectations for the first quarter, the year and the future are forward-looking statements that involve a number of risks and uncertainties. Many factors could affect Intel's actual results, and variances from Intel's current expectations regarding such factors could cause actual results to differ materially from those expressed in these forward-looking statements. Intel presently considers the following to be the important factors that could cause actual results to differ materially from the corporation's expectations. Demand could be different from Intel's expectations due to factors including changes in business and economic conditions; customer acceptance of Intel's and competitors' products; changes in customer order patterns including order cancellations; and changes in the level of inventory at customers. Intel operates in intensely competitive industries that are characterized by a high percentage of costs that are fixed or difficult to reduce in the short term and product demand that is highly variable and difficult to forecast. Additionally, Intel is in the process of transitioning to its next generation of products on 32nm process technology, and there could be execution issues associated with these changes, including product defects and errata along with lower than anticipated manufacturing yields. Revenue and the gross margin percentage are affected by the timing of new Intel product introductions and the demand for and market acceptance of Intel's products; actions taken by Intel's competitors, including product offerings and introductions, marketing programs and pricing pressures and Intel's response to such actions; defects or disruptions in the supply of materials or resources; and Intel's ability to respond quickly to technological developments and to incorporate new features into its products. The gross margin percentage could vary significantly from expectations based on changes in revenue levels; product mix and pricing; start-up costs, including costs associated with the new 32nm process technology; variations in inventory valuation, including variations related to the timing of qualifying products for sale; excess or obsolete inventory; manufacturing yields; changes in unit costs; impairments of long-lived assets, including manufacturing, assembly/test and intangible assets; the timing and execution of the manufacturing ramp and associated costs; and capacity utilization;. Expenses, particularly certain marketing and compensation expenses, as well as restructuring and asset impairment charges,  vary depending on the level of demand for Intel's products and the level of revenue and profits. The majority of our non-marketable equity investment portfolio balance is concentrated in companies in the flash memory market segment, and declines in this market segment or changes in management's plans with respect to our investments in this market segment could result in significant impairment charges, impacting restructuring charges as well as gains/losses on equity investments and interest and other. Intel's results could be impacted by adverse economic, social, political and physical/infrastructure conditions in countries where Intel, its customers or its suppliers operate, including military conflict and other security risks, natural disasters, infrastructure disruptions, health concerns and fluctuations in currency exchange rates. Intel's results could be affected by the timing of closing of acquisitions and divestitures. Intel's results could be affected by adverse effects associated with product defects and errata (deviations from published specifications), and by litigation or regulatory matters involving intellectual property, stockholder, consumer, antitrust and other issues, such as the litigation and regulatory matters described in Intel's SEC reports.  An unfavorable ruling could include monetary damages or an injunction prohibiting us from manufacturing or selling one or more products, precluding particular business practices, impacting our ability to design our products, or requiring other remedies such as compulsory licensing of intellectual property.  A detailed discussion of these and other risk factors that could affect Intel's results is included in Intel's SEC filings, including the report on Form 10-Q.

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