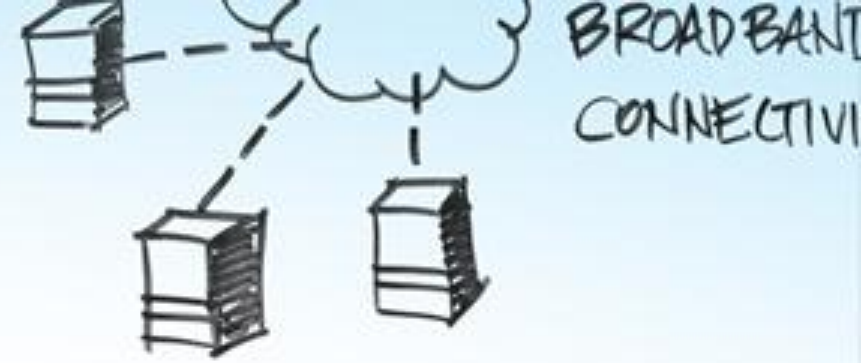


6 KW  
BOTTOM LINE

ENERGY COSTS  
87%

ENERGY SAVINGS  
\$53K



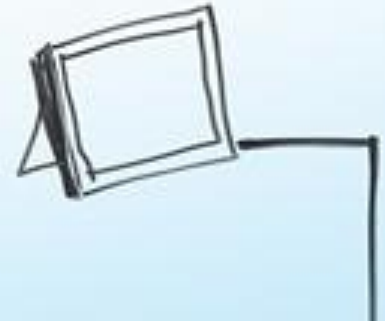
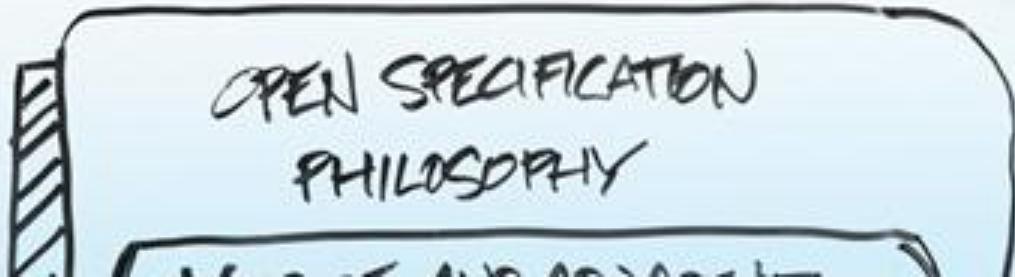
# DAVID PERLMUTTER

Executive Vice President

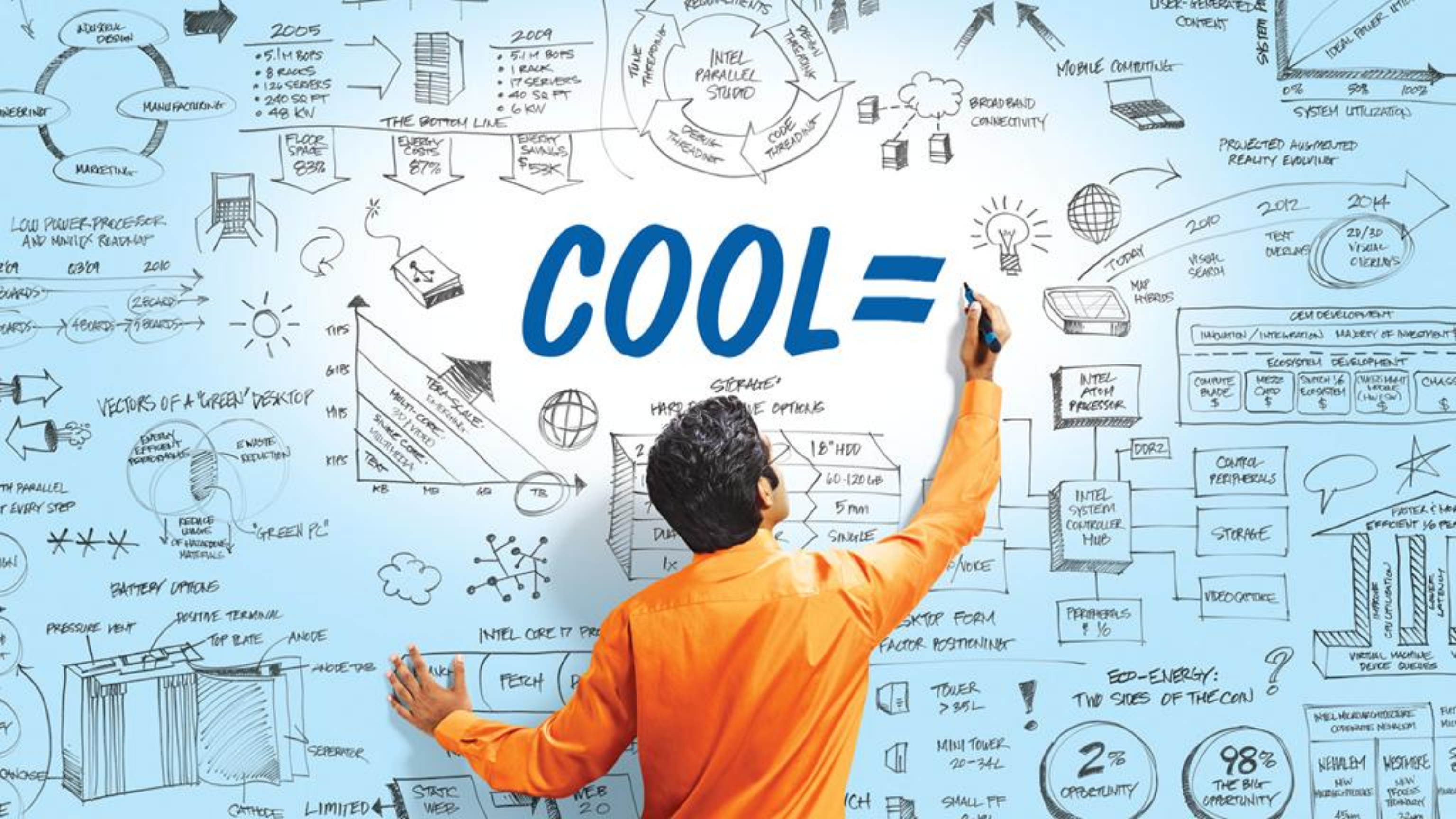
General Manager, Intel Architecture Group



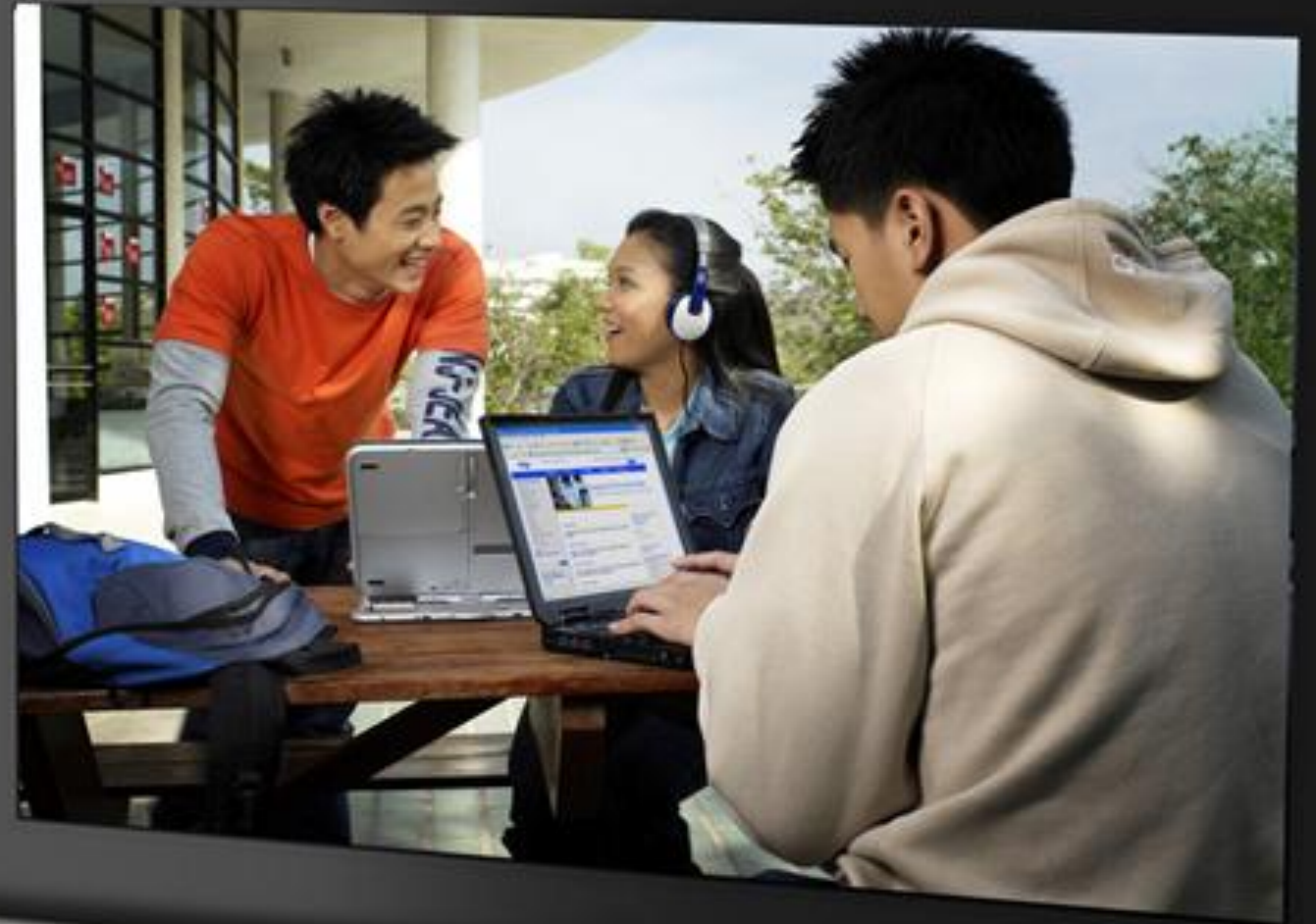
TERA-SCALE  
EMERGING  
7-CORE  
VIDEO



# COOL =



# Mobility Has Evolved From Convenient to Cool



TRA-T

cool = the total  
mobile experience



on m the switching f  
d capacitances to  
used, and multipl

# Cool Users Want A "Total Mobile Experience"

*"Sleek, Small  
and Fashionable"*

*"Long Lasting Battery"*

*"Every Application  
on Every Device"*

*"Secure"*

*"Connect Anywhere,  
to Anything"*

*"Fast Response Time"*

*"Good Media & Graphics"*

*"Within My Budget"*

# Obstacles to Cool

*"Too Big and Heavy"  
"Looks Boring"*

*" Battery Runs Out  
After a Couple of Hours"*

*"Slow Response Time"  
"Reduced Quality Graphics  
and Media"*

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*"Can't Use SW on All Devices",  
"Can't View Internet Content"*

*"Can't Connect",  
"Devices Not Synced"*

*"Cost Too Much"*

*"Easily Hacked"  
"Slow Boot"*

# The Different Priorities of Cool



The Musician's Netbook



The Designer's Laptop



The Model's Handheld

# Intel Designs The Right Combination of Cool for Every User Experience



Netbook



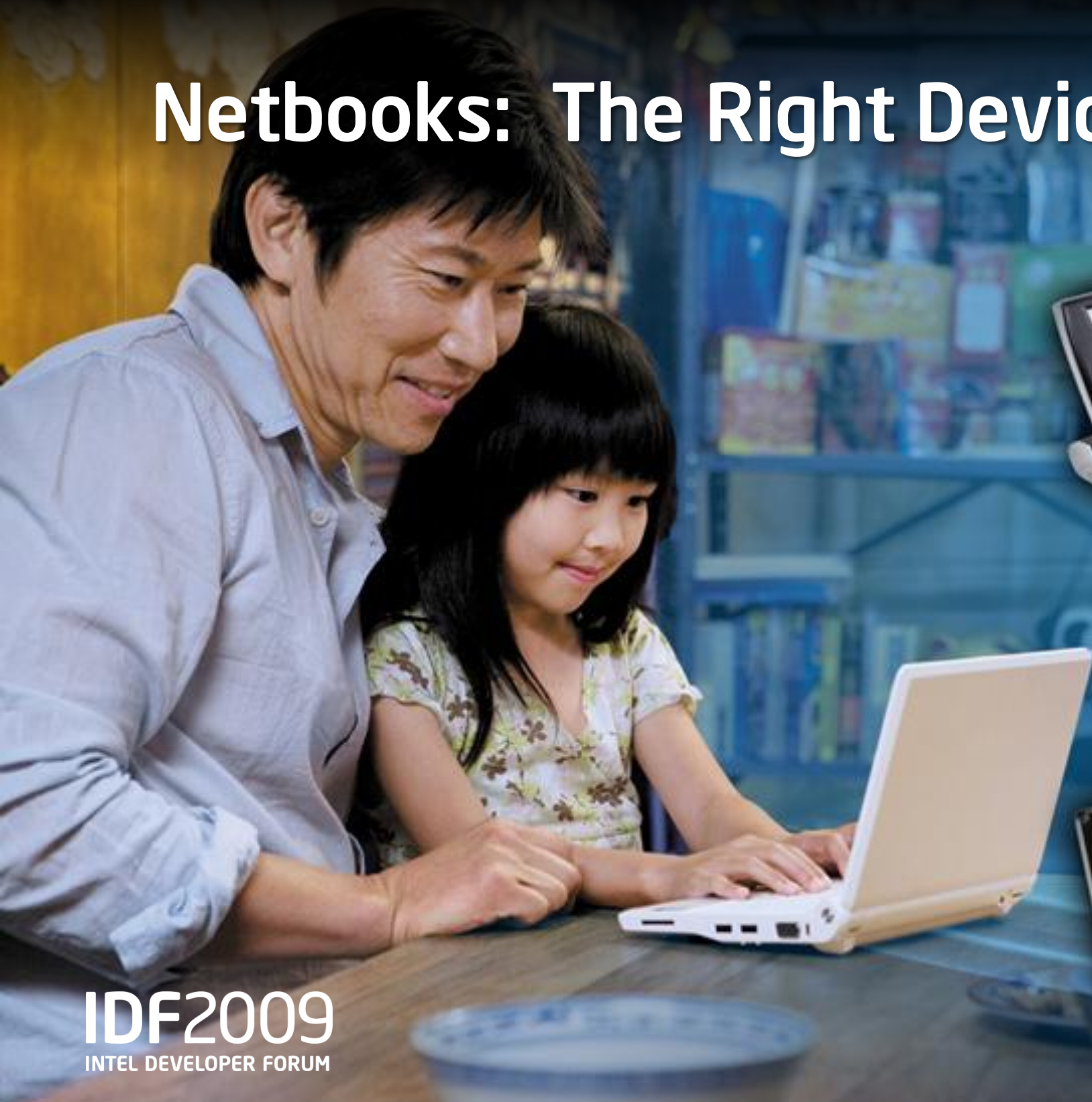
Ultra-thin Laptop



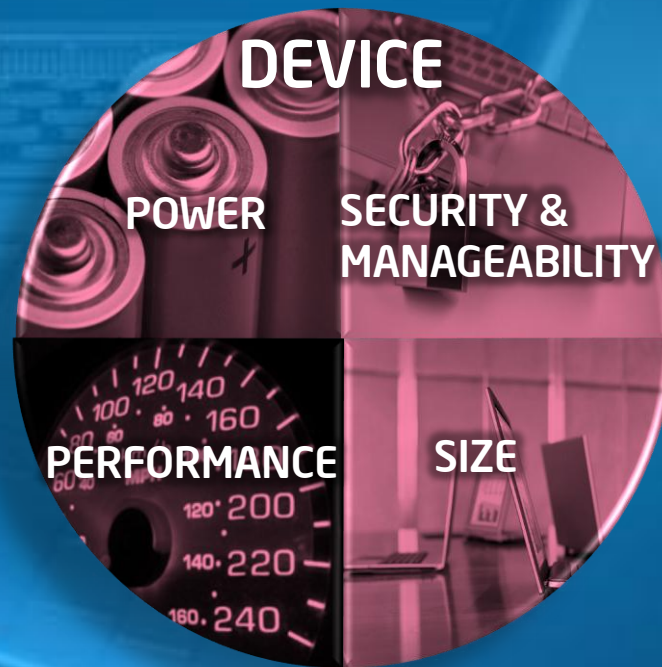
Performance Laptop



# Netbooks: The Right Device for the Right Priority



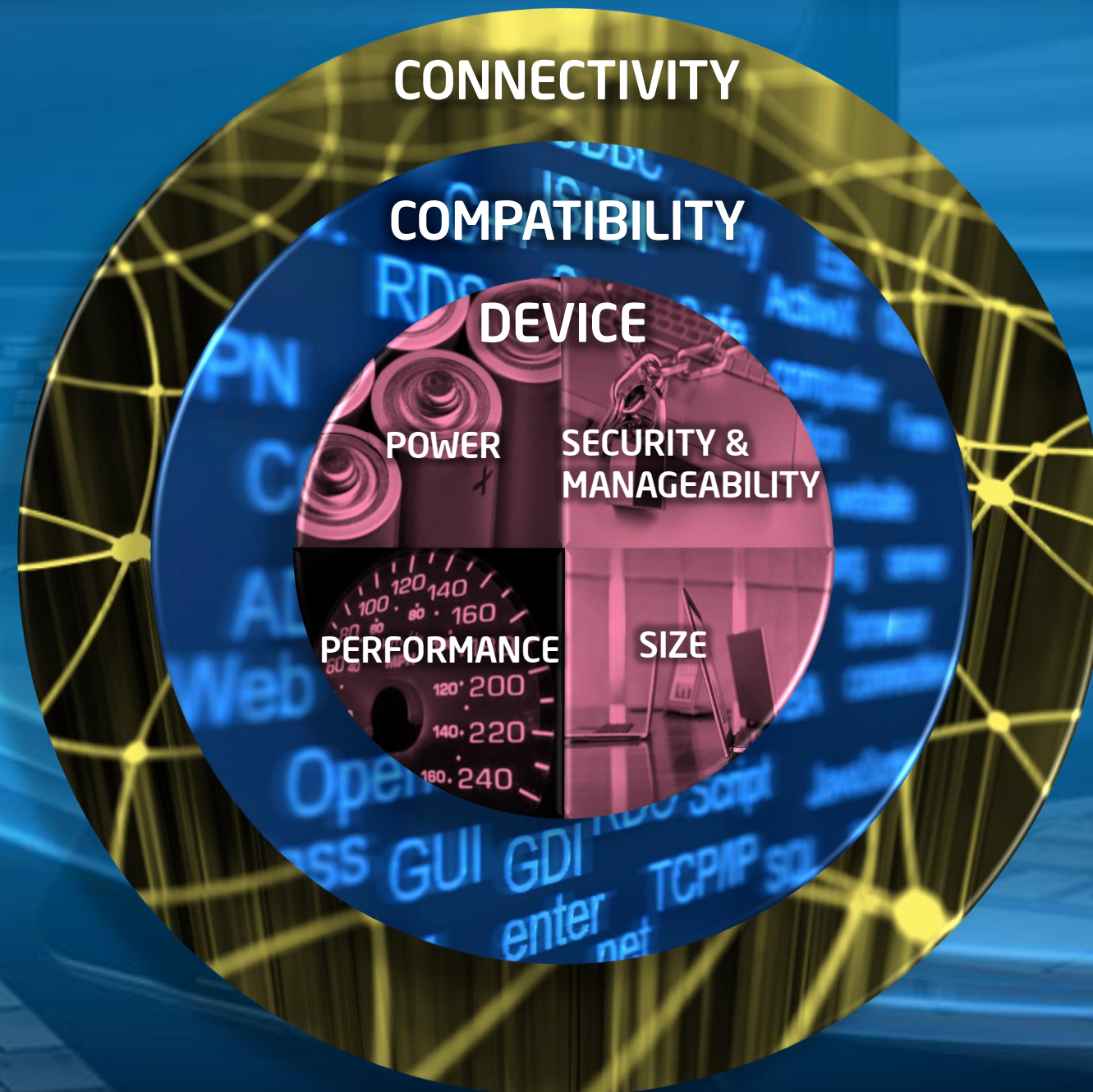
# Elements to Deliver the Cool Mobile Experience



# Elements to Deliver the Cool Mobile Experience

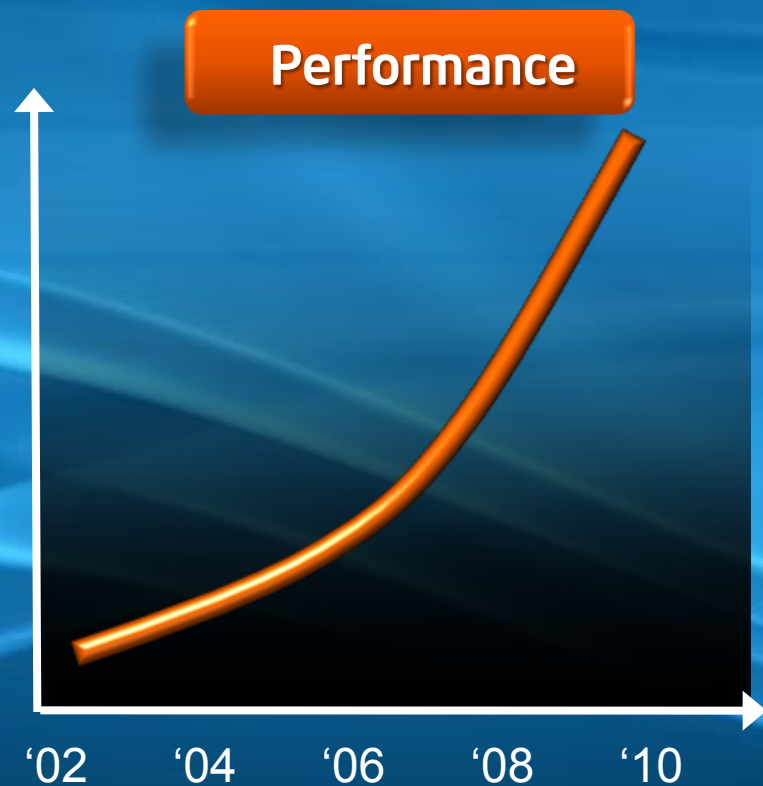


# Elements to Deliver the Cool Mobile Experience



# Intel Delivers Best-in-Class Mobile Device Technology

Increased Performance for  
Faster Computing & Better Graphics



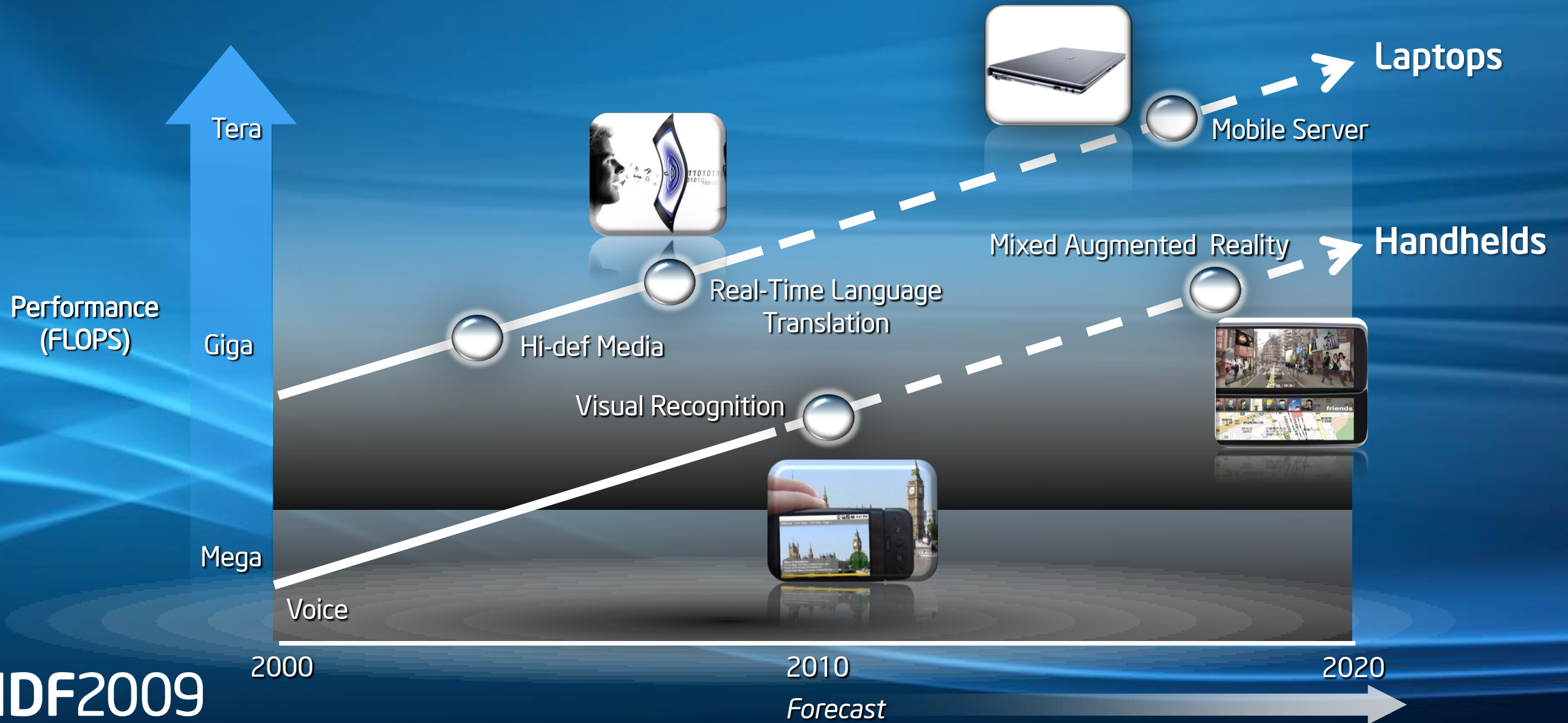
Decreased Average Power for  
Longer Battery Life



Reduced Thermal Power for  
Thinner, Sleeker Form Factors



# New Usages Require High Performance Processors



# Intel Platform Architecture

*Mainstream PC and Server*

Tick

Tock

Tick

Tock

Tick

45nm

32nm

22nm

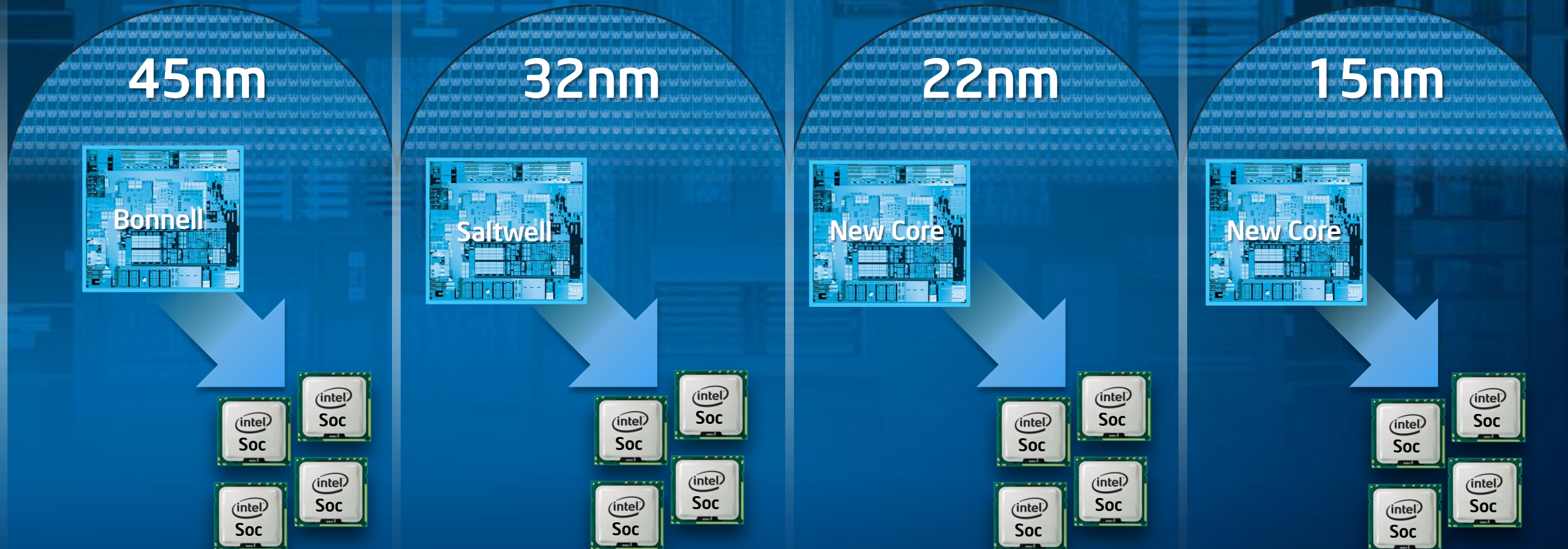


# Intel's Second Platform Architecture

*Internet Connected Devices*

Intel®  
ATOM™  
Processor Cores

System-on-Chip  
Products





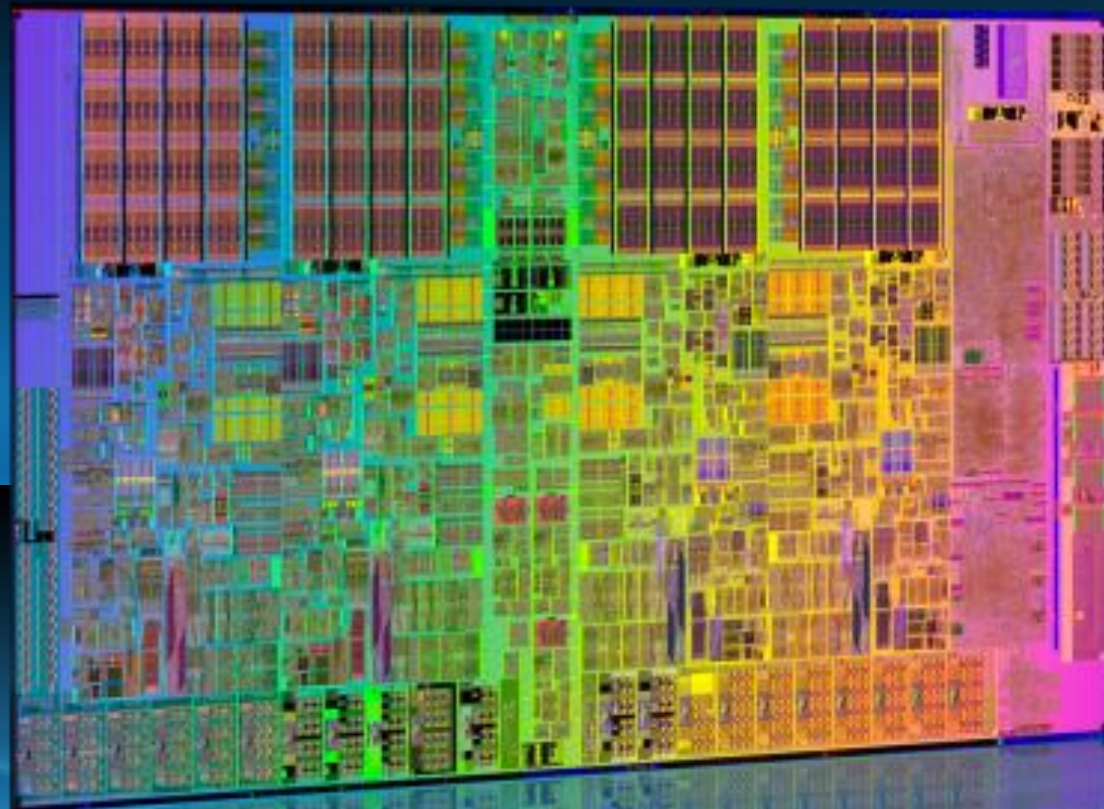
# The Coolest Laptops on the Planet



DEVICE

**IDF2009**  
INTEL DEVELOPER FORUM





**Nehalem:**  
**The Revolutionary**  
**Intel Micro-architecture**  
***Comes to Mobile!***

# Introducing the Fastest Mobile Processor on the Planet

Extreme



***The Fastest Notebook Processor  
On The Planet***  
*(Overclocking Enabled For Incredible Performance)*

Intel® Core™ i7-920XM processor 2.0 GHz  
**(Turbo up to 3.2 GHz\*)**  
8M/8 threads\*\*

Quad Core Performance



***The World's Best Family Of  
Laptop Processors***

Intel® Core™ i7-820QM Processor 1.73 GHz  
**(Turbo up to 3.06 GHz\*)**  
8M/8 threads\*\*

Intel® Core™ i7-720QM Processor 1.6 GHz  
**(Turbo up to 2.8 GHz\*)**  
6M/8 threads\*\*

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\* Maximum single-core frequency that can be achieved with Intel® Turbo Boost Technology  
\*\*\*Total number of threads that can be supported with Intel® Hyper-threading Technology



# Mooly Eden

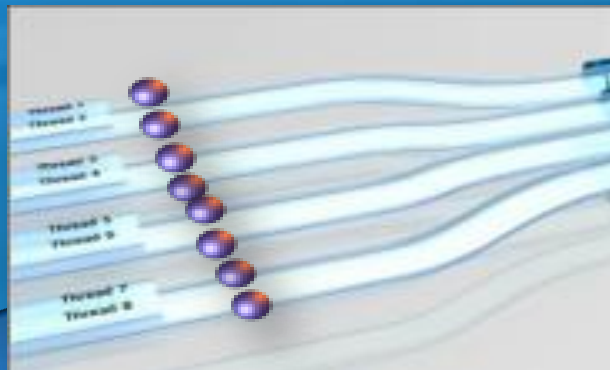
General Manager, PC Client Group  
Vice President, Intel Corporation

# Revolutionary, Adaptable, Intelligent Performance

Intel® Core™ i7 Mobile Processors



Intel® Turbo Boost Technology



Intel® Hyper-Threading Technology

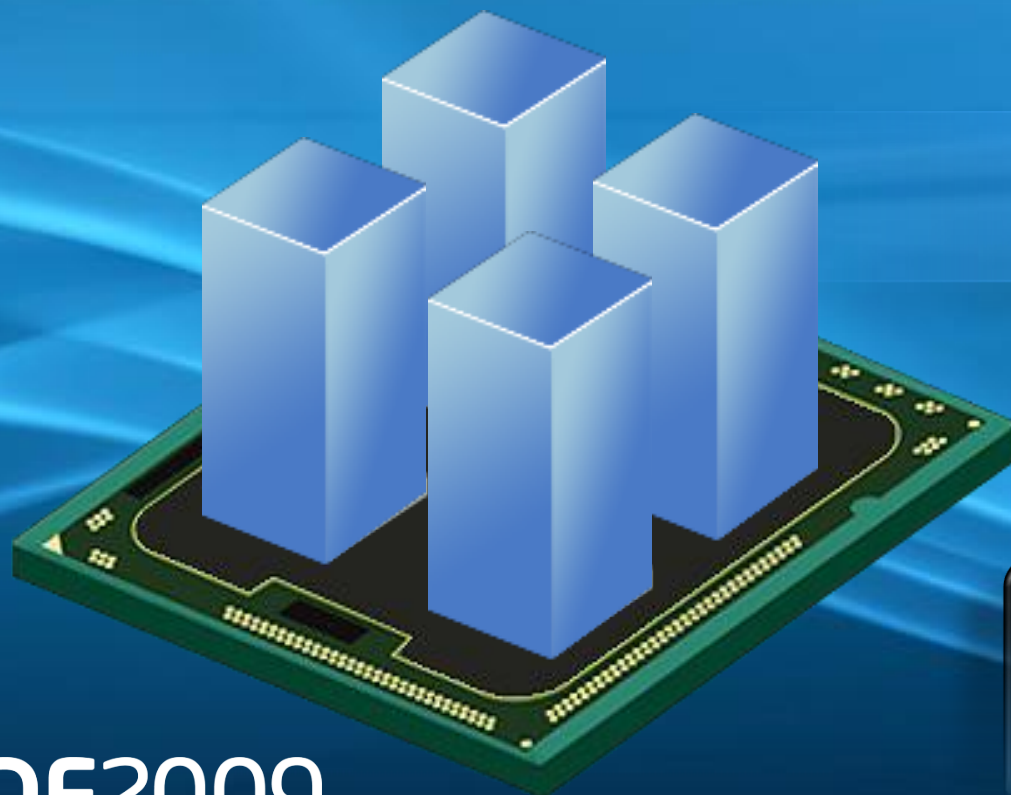


Integrated Memory Controller  
Up to 8M Shared Cache

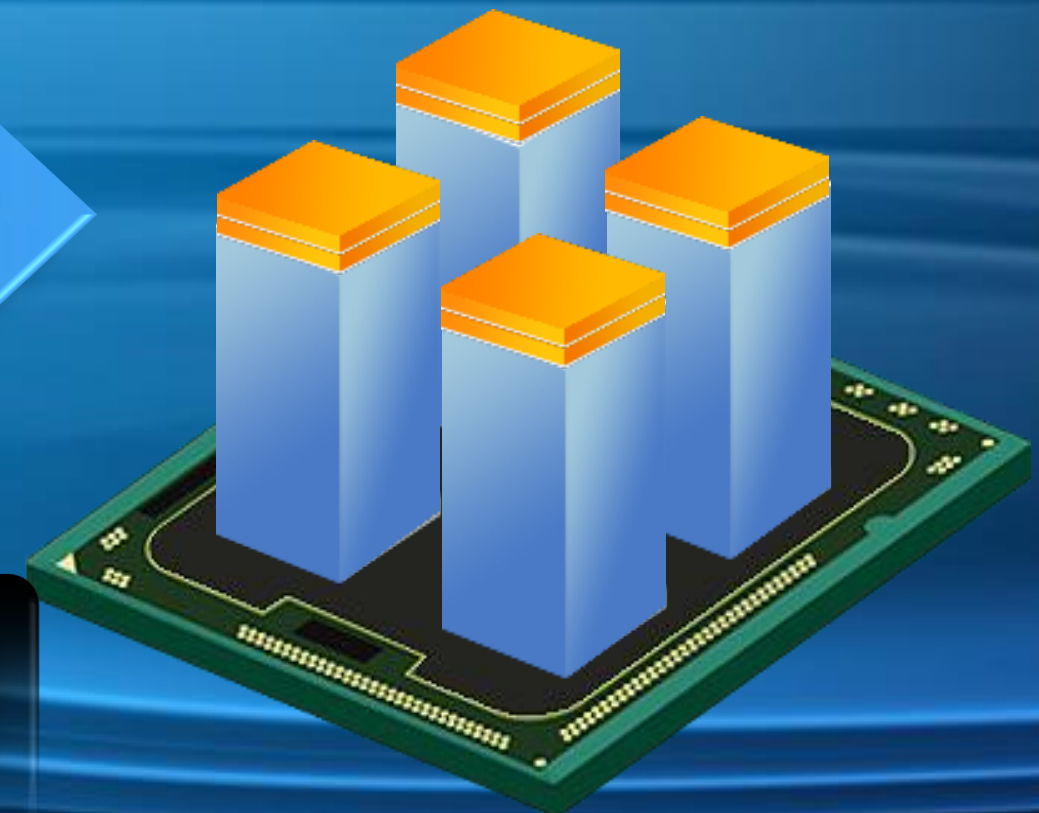
# High-Performance in a Low Power Envelope

## *Intel® Turbo Boost Technology*

**Previous Generation**  
*without Turbo*



**Clarksfield**  
*with Turbo*

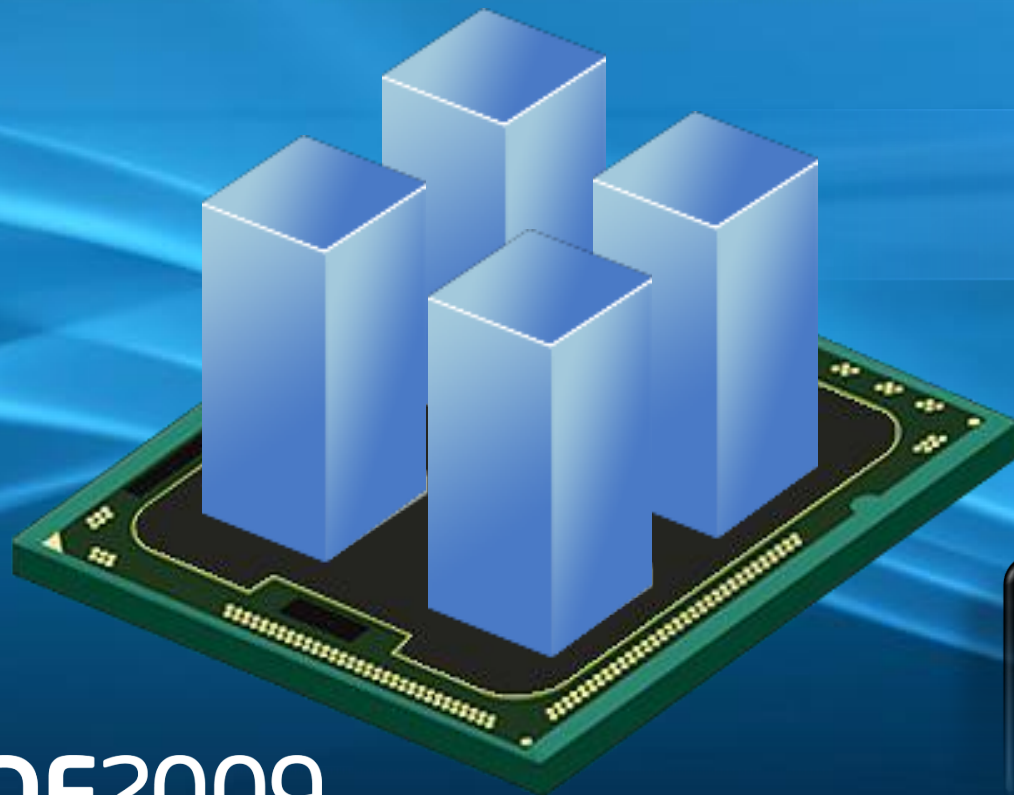


**Power Gates**  
Near Zero Power For  
Inactive Cores

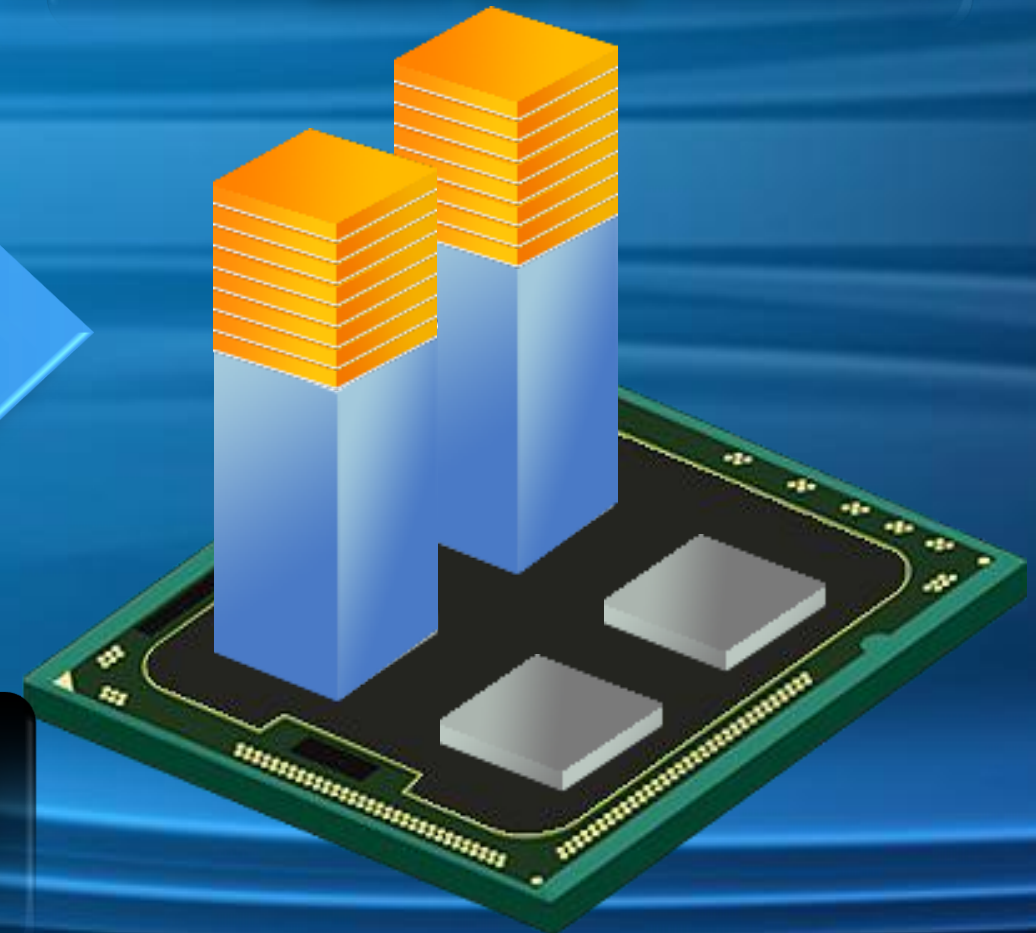
# High-Performance in a Low Power Envelope

## *Intel® Turbo Boost Technology*

**Previous Generation**  
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**Clarksfield**  
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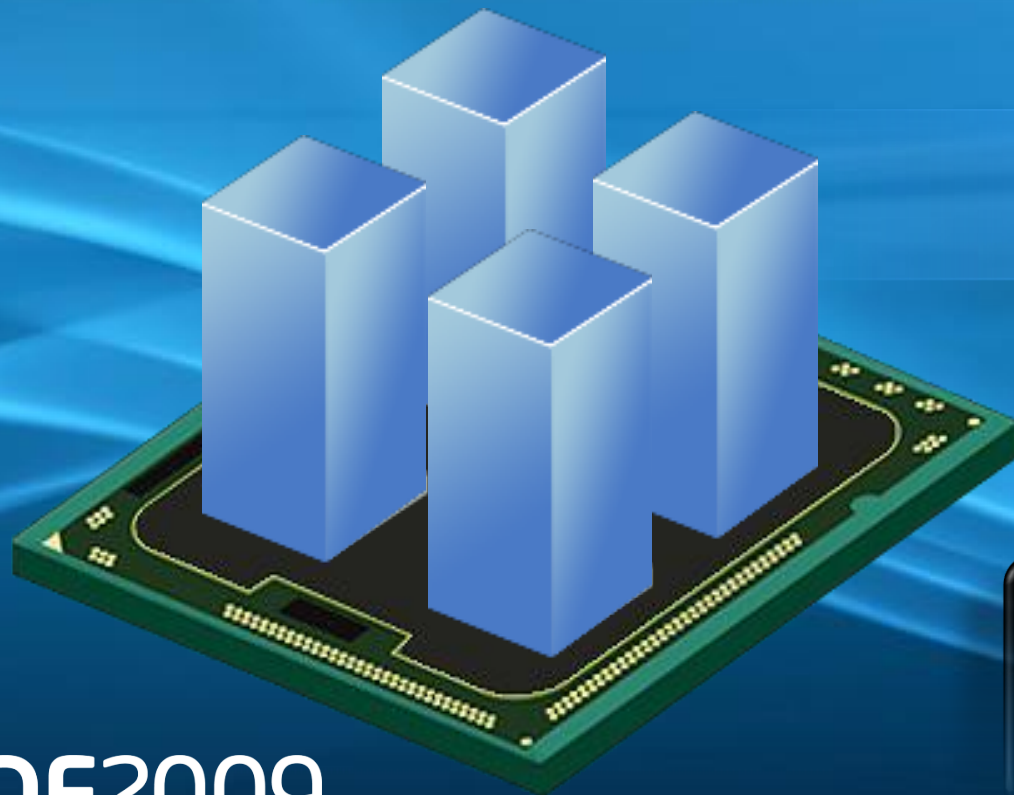


**Power Gates**  
Near Zero Power For  
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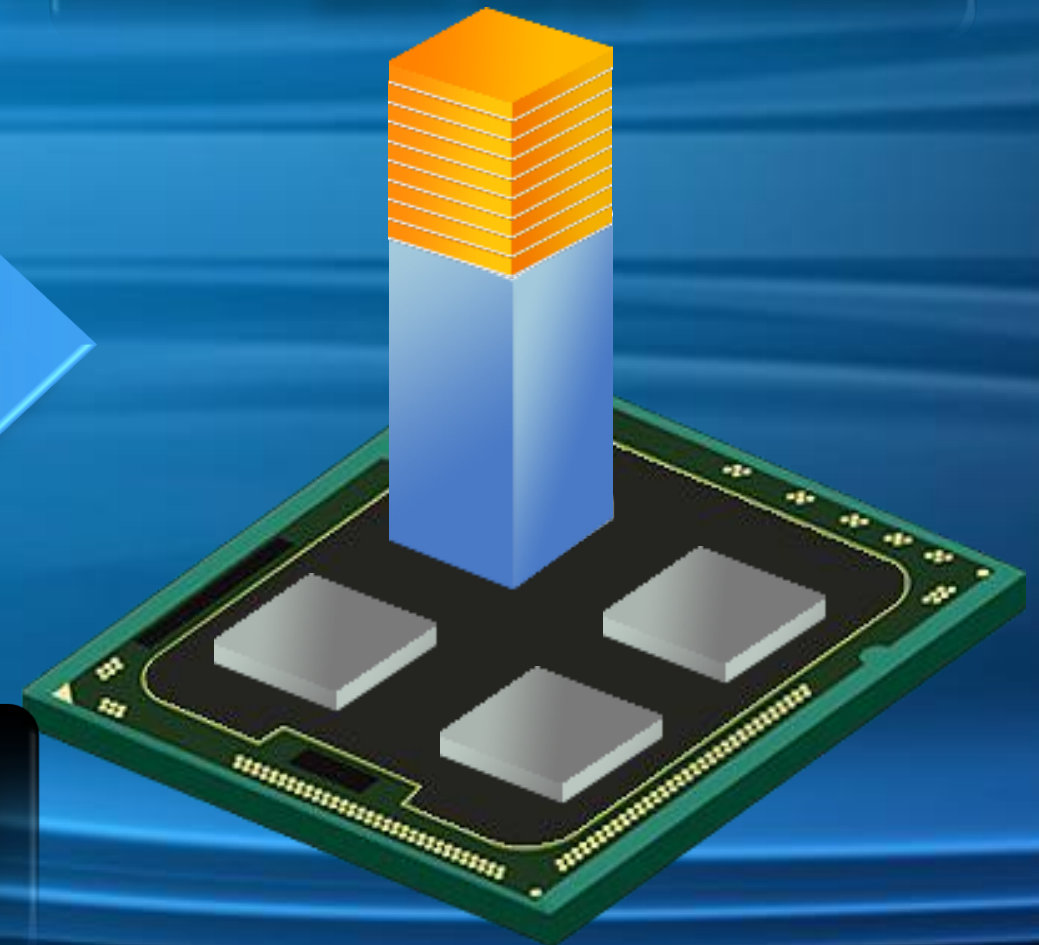
# High-Performance in a Low Power Envelope

## *Intel® Turbo Boost Technology*

**Previous Generation**  
*without Turbo*



**Clarksfield**  
*with Turbo*



**Power Gates**  
Near Zero Power For  
Inactive Cores



# Incredible Performance for Demanding Apps

Intel® Core™ i7 Mobile Processors



Gaming Elite:  
Stunning Realism

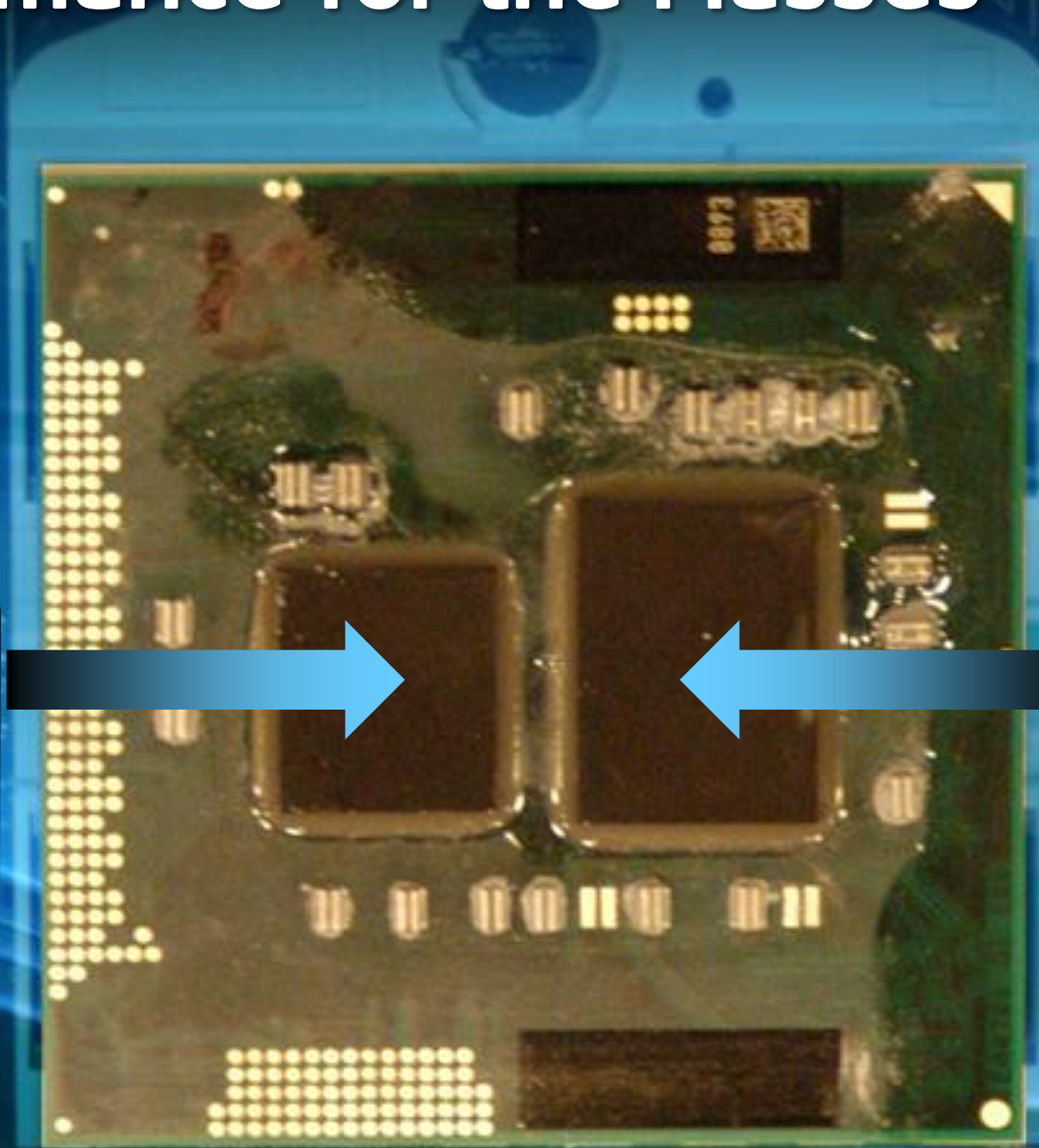


Multimedia Engine:  
Rich Digital Content Creation



Mobile Workstations:  
High Performance To Go

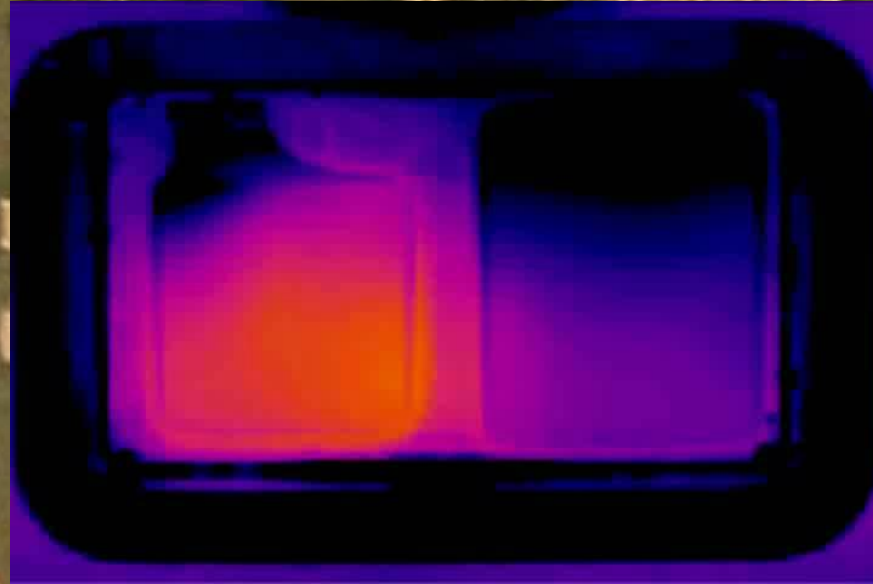
# High-Performance for the Masses — Arrandale



32nm  
Westmere Processor

45nm  
Integrated Graphics &  
Integrated Memory Controller

CPU



Graphics

# The Next Generation of Cool Processors

## *Sandybridge*



- On die integrated graphics on leading edge 32nm process
- Significantly better performance
- More sophisticated power management between CPU, Graphics and Chipset
- Better media and processor intensive software performance with Intel's AVX instructions

# Cool is Sleek and Fashionable



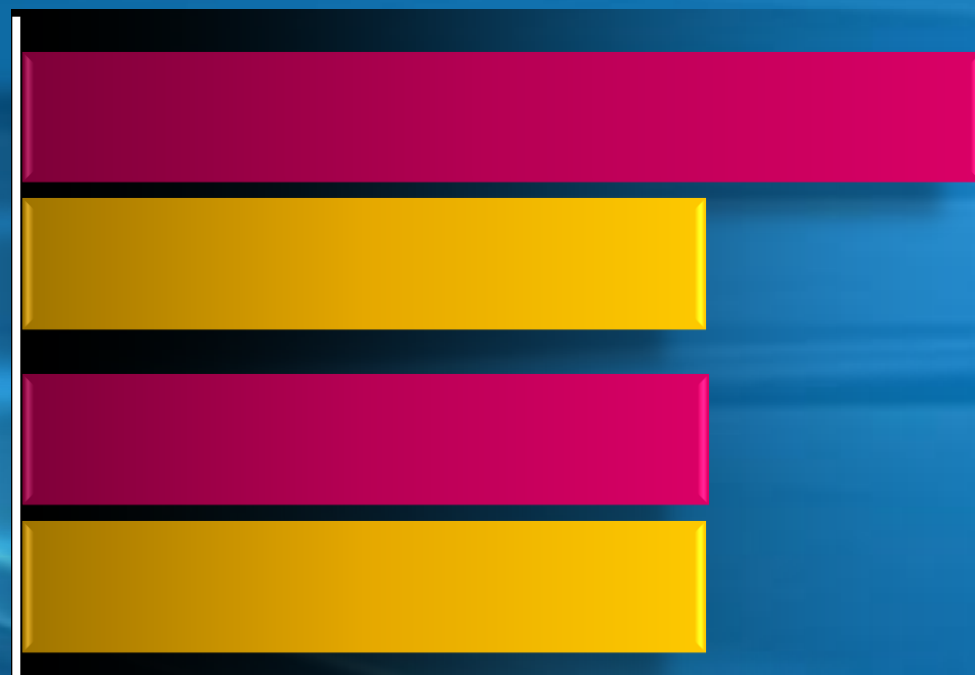
# Cool Cooling Technology

## Intel® Core™ i7: The Performance to Innovate

HPC Benchmark Average\* for Ansys Fluent® CFD  
(higher is better)

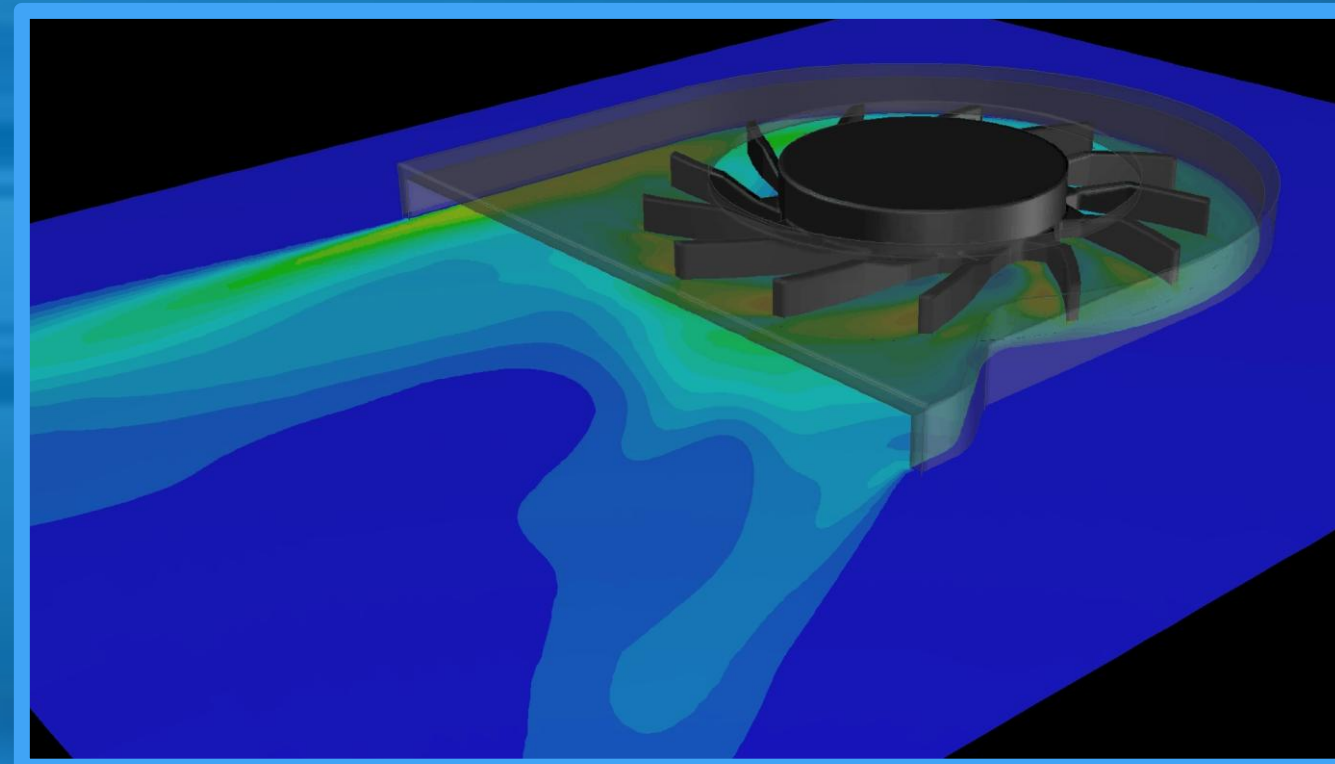
Single Process  
Performance

4 Core Parallel  
Performance

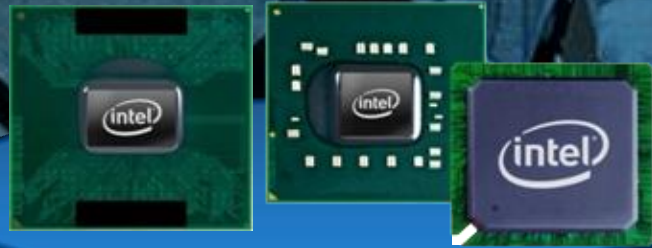


■ Clarksfield 1.7 GHz (45 W TDP)

■ Xeon X5482 3.2 GHz (150 W TDP)



# Sleek, Stylish Ultra-thin Laptops Are Here



**58%** Smaller  
**60%** Lower Power



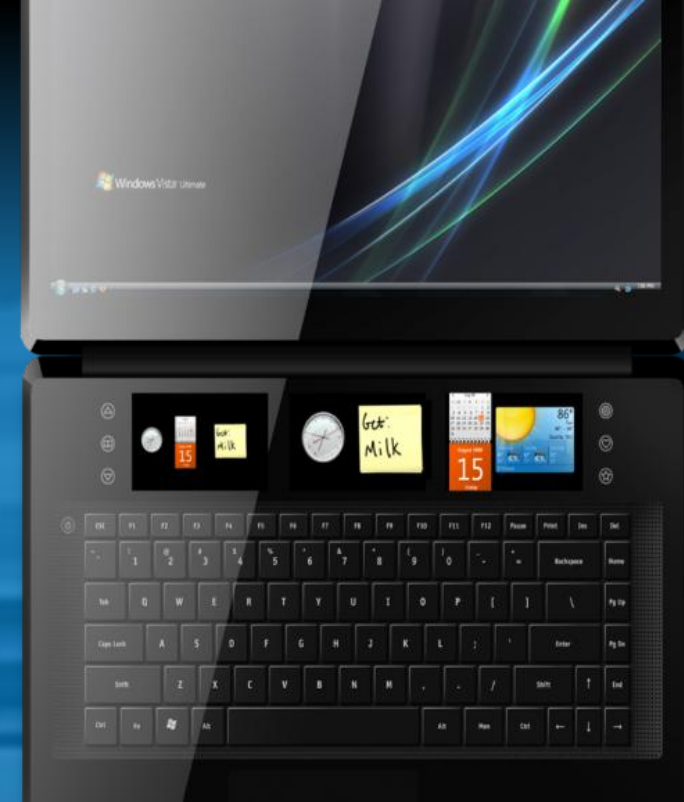
*From 3342 mm<sup>2</sup> to = 1415 mm<sup>2</sup>*

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Other brands and names are the property of their respective owners.

# Cool Concept Laptop Platforms



The McGraw-Hill Companies  
**BusinessWeek**    
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Tech Home CEO Tech Guide Computers Electronics Entertainment Internet Reviews Software S

NEWS ANALYSIS **May 24, 2007, 3:57PM EST** text size: T T

## The World's Thinnest Notebook

If it catches on, Intel's sleek laptop could be a game changer for PCs

by Olga Kharif



[View Slide Show](#) ▶

When Intel asked designers to build a better laptop, its instructions were simple, really. The machine has to be fashionable, able to connect to all manner of wireless networks, and full of the latest, fastest computing capabilities. Oh yes, and make it as thin as Motorola's Razr. Its own engineers in conjunction with Ziba Design in Portland, Ore., rose to the challenge.

The result, code-named Intel mobile Metro notebook, is less than 0.7 inches thick—about one-quarter of an inch thicker than Motorola's (MOT) iconic cell phone, making it the

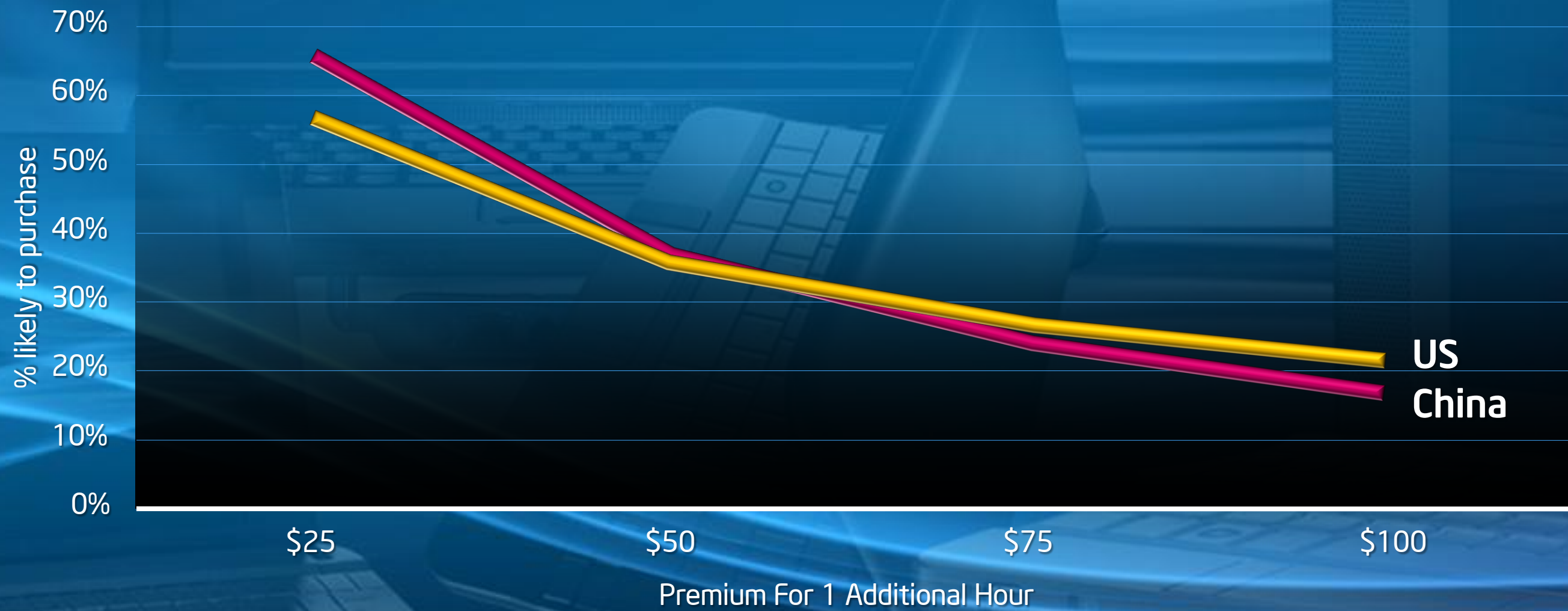
**TECHNOLOGY**  
**Microsoft's Last, Best Hope in Search**  
**The Worth of Open Source? Open Question**  
**Dell: Color It Competitive**  
**The Falcon Has Landed**  
**Dell Raises Its Stake in Intel**

**STORY TOOLS**  
post a comment  
e-mail this story  
post a comment



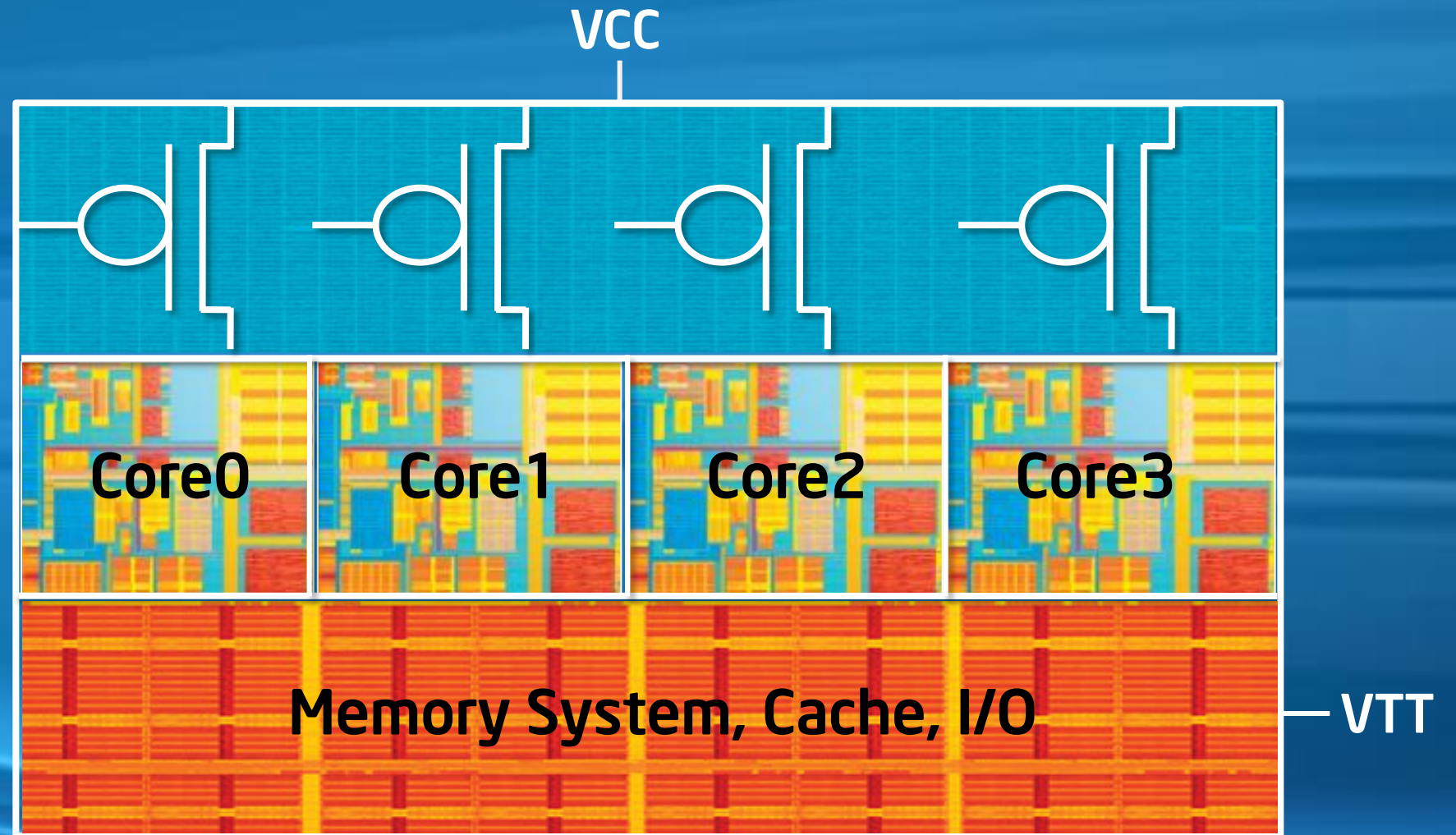
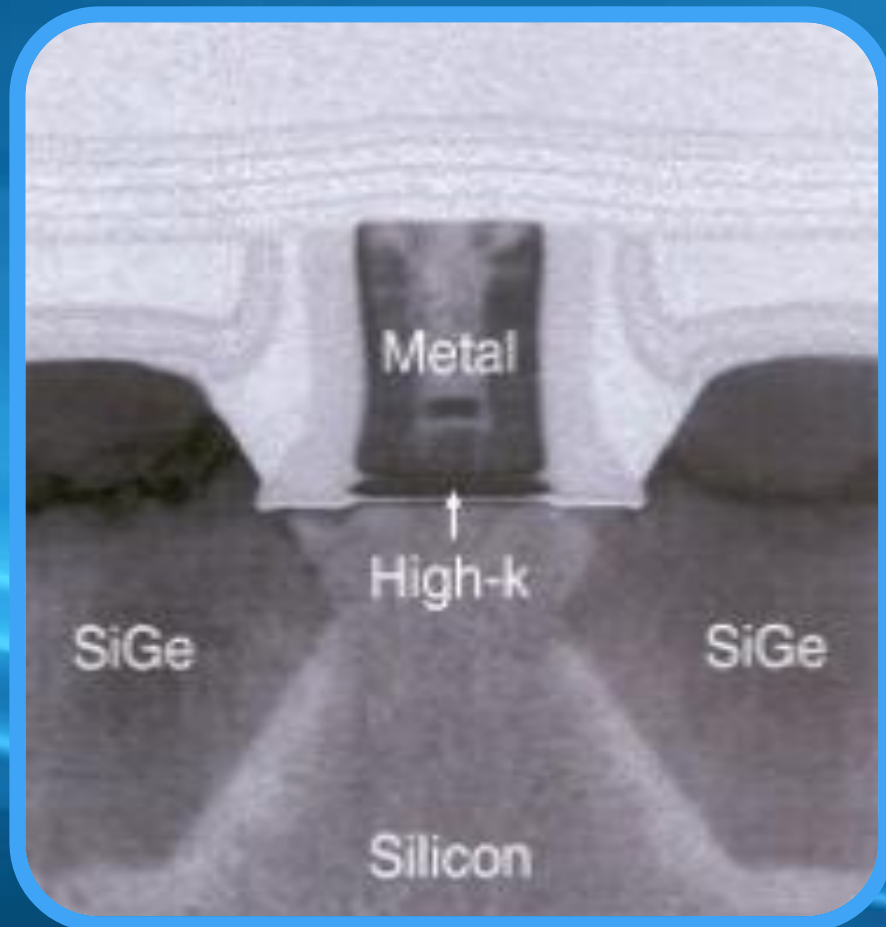
# The Value of Long Battery Life for Laptops

## Willingness To Pay For An Incremental Hour Of Battery Life



# Integrated Power Gate

*Enabling Energy Efficient Integration*



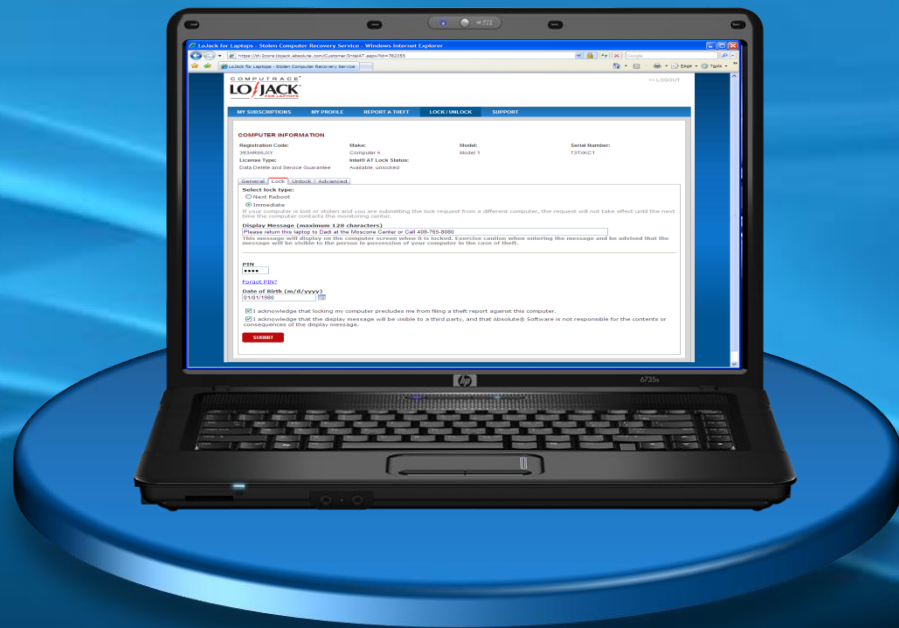
# Data Protection For Missing Laptops

Intel® Anti-Theft Technology v.2.0  
With Enhanced Data Encryption Solutions

**Absolute**® Software



# Anti-theft Protection for Consumers *Coming Soon*



# Intel® Anti-theft Technology Enabled Devices



*"Dell customers want an effective way to deter laptop theft, minimize business risk and protect their digital life. Intel's® Anti-Theft Technology provides an added layer of hardware security to existing anti-theft software programs that will give our customers more peace of mind. We are excited to introduce Intel AT capabilities to Dell's notebook lineup."*

**Bill Curtis,**  
CTO, Dell Corporation



*"Intel & Panasonic have a joint history of outstanding technology innovations around notebooks & we are very excited today to announce the introduction of Intel® Anti-Theft Technology built into the latest generation of CF-19, CF-30 Toughbook laptops from Panasonic"*

**Mr. Shigeo Okuda,**  
Director, ITPD, Panasonic Corp.



**acer**

**ASUS®**

**DELL**

**FUJITSU**

**lenovo**

**msi**

**Panasonic®**

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INTEL DEVELOPER FORUM

# Fast Response Time With Solid State

Ultra  
Responsive

Highly  
Rugged

More  
Battery  
Life

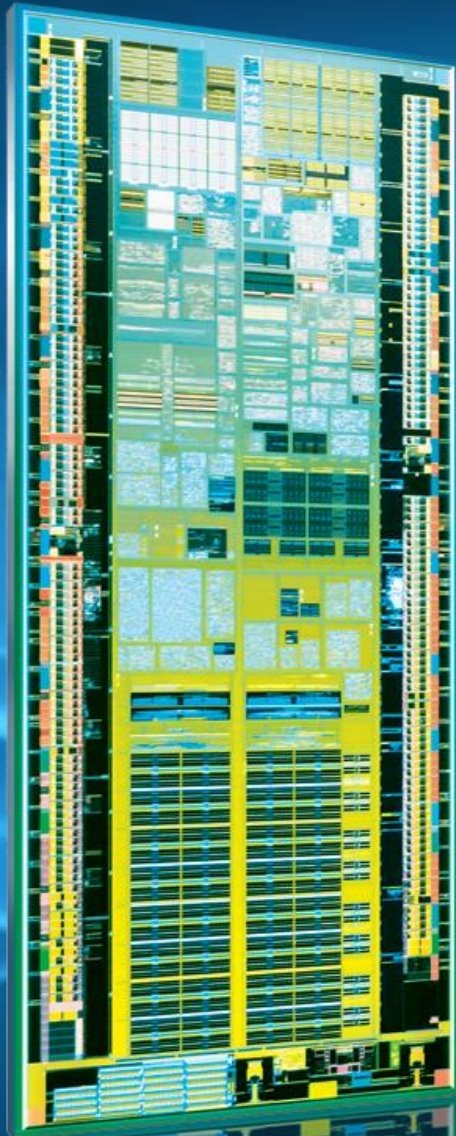
Lower TCO



# A New Era of Cool Handhelds



# The Evolution of Cool Handhelds



2008



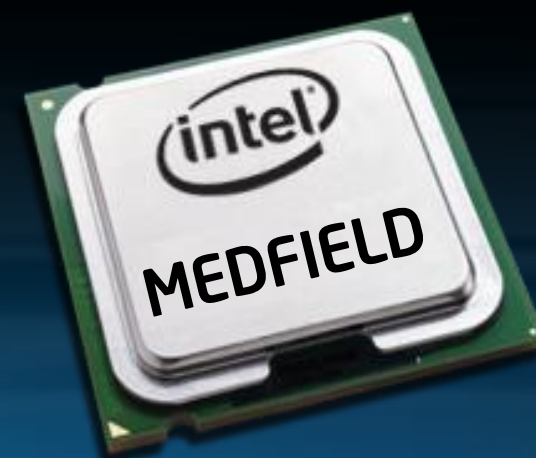
45nm

2010



45nm

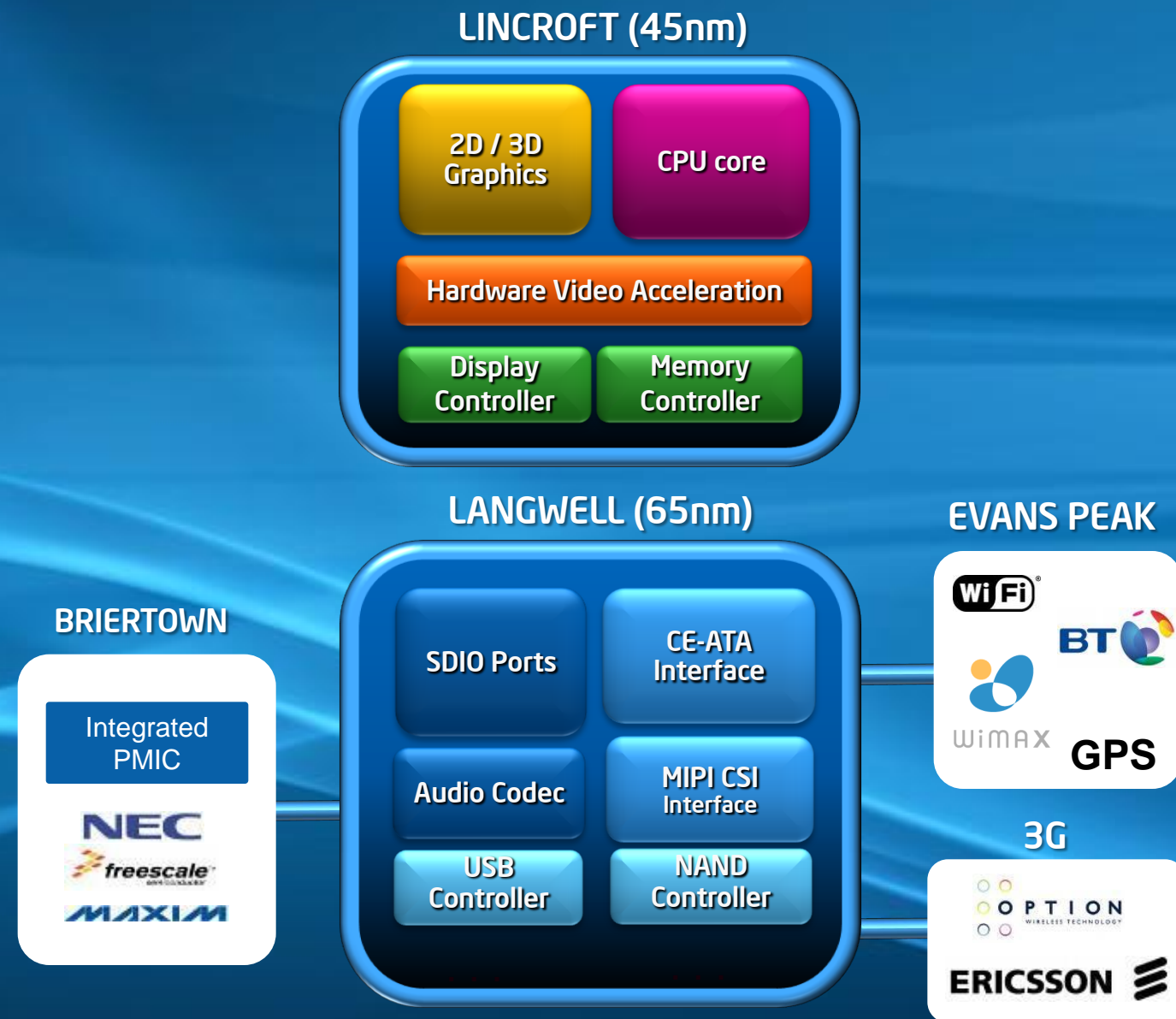
2011



32nm



# Dramatic Power Reductions On Handhelds



Distributed Power Gating

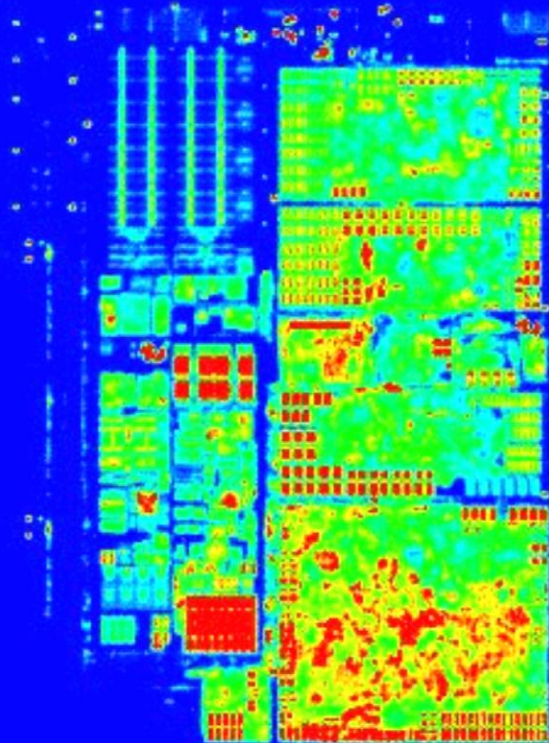
Dedicated Mixed Signal IC (MSIC)

Next Gen OS Power Management (OSPM)

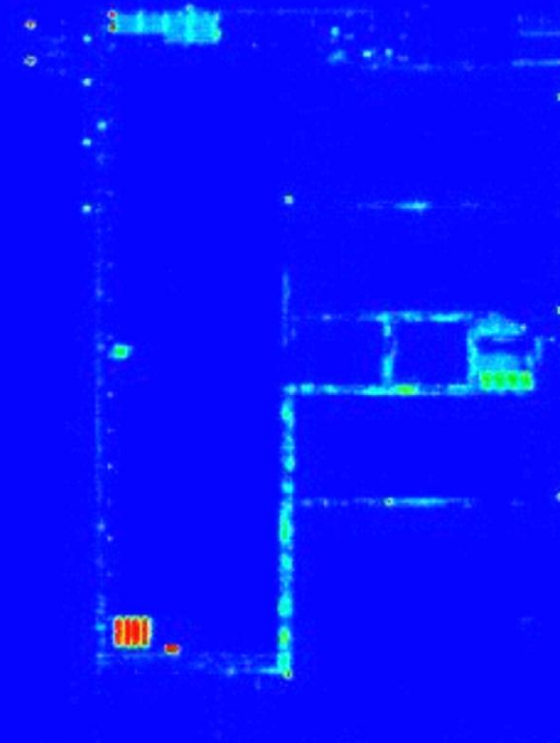
Low Power Handheld I/O

# Example: Power Gating Technology

All Power Islands Are On



Power Gated State

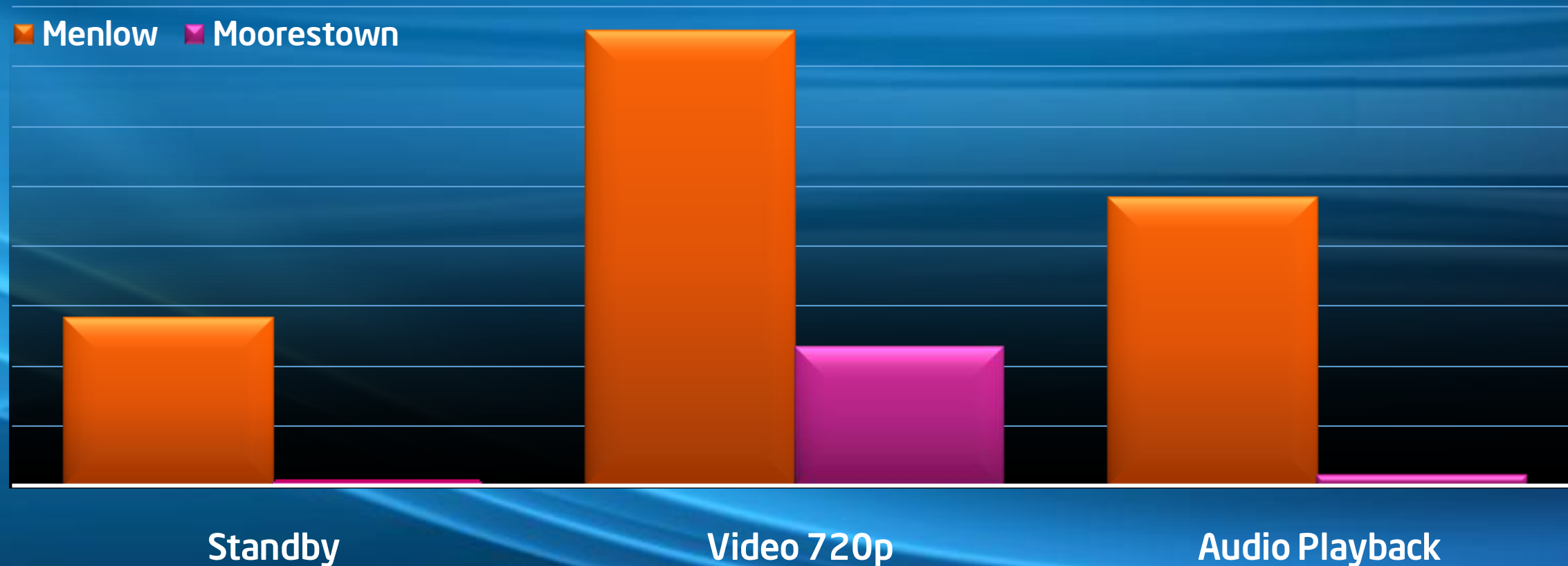


# Major Power Reductions Across Platform Usages *Up to 50X Improvement in Moorestown Over Menlow*

## Platform Power Progression

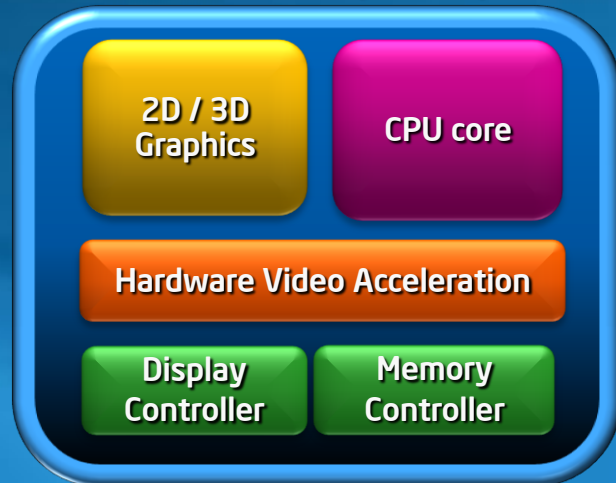
Power (mW)

Menlow Moorestown



# With Great Handheld Performance *Moorestown Platform*

LINCROFT (45nm)



LANGWELL (65nm)



EVANS PEAK



Highly Integrated Lincroft SoC

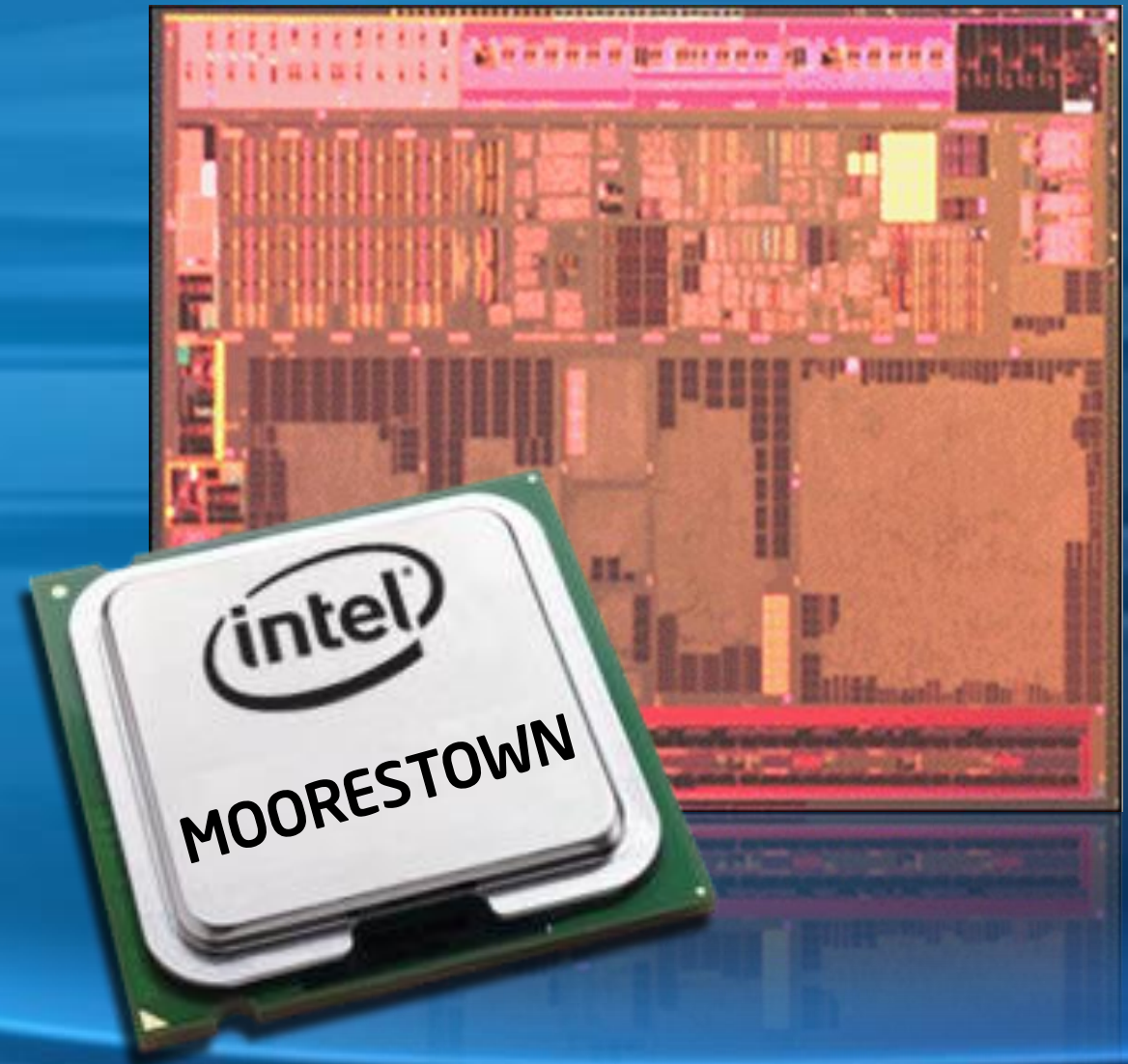
High Performance Techniques

Industry Leading 45nm  
Process Technology

BRIERTOWN



# Performance at Ultra-low Power



# Small & Sleek Handhelds

## *Enabled by Moorestown*



Compact  
Handheld

3"

Candybar  
Full Internet with  
Telephony



EB MID  
Reference

4"

Sleek, Media Centric  
3D & Haptic  
Touchscreen



Inventec  
X3 MID

5"

Cutting Edge UI  
Media-Rich  
Navigation Focused



Quanta  
Computer

Quanta  
M1

4.3"

Slider Keyboard  
Navigation &  
Entertainment



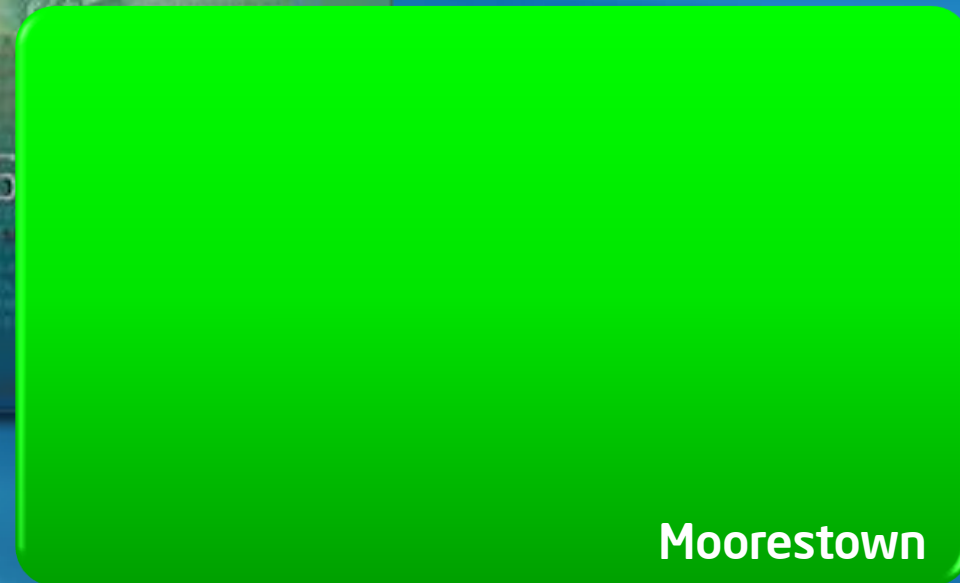
[www.aavamobile.com](http://www.aavamobile.com)

Aava Mobile  
Smartphone

4"

3G  
Telephony  
Messaging Services

# Ultra-low Power Gets Even Smaller



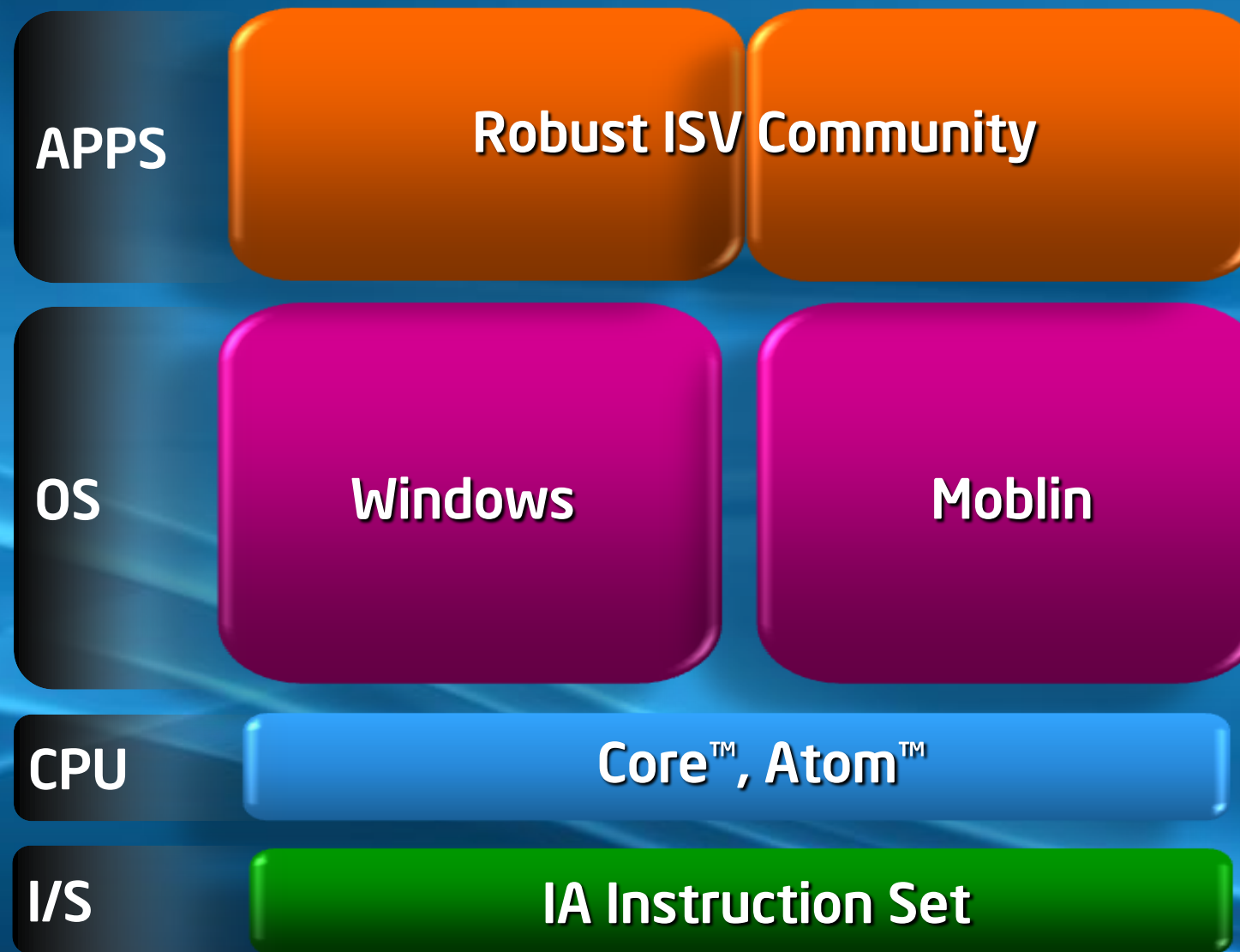
*Medfield On 32nm Enables Even Smaller, Sleeker Devices*

# Cool Compatibility





# IA Software Compatibility



## Compatibility at Multiple Levels

- IA Instruction set
- CPU implementations
- Apps binary compatibility

## Robust IA Ecosystem

- First platform for development
- Extensive set of tools, compilers, ...

## Easy Path to Broad Deployment

- Write on one PC, run on any PC
- Large installed base

# The Same OS Experience Across Any Device



# The Same Rich, Visually-Compelling Internet Across Any Device



# Cool Connectivity



# Mobile Internet Requires Broadband Connectivity

Traffic Equivalents\*

1 Laptop = 15 Smartphones = 450 Voice Handsets

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

## Customers Angered as iPhones Overload AT&T

"It's so slow, it feels like I'm on a dial-up modem"

"It's not exactly rocket science here. It's pretty standard stuff to be able to make a phone call."

*Customers reactions quoted by New York Times , 9/2/09*

# Commercial Mobile WiMAX is Here

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



ASUS<sup>®</sup> EPSON EXCEED YOUR VISION FUJITSU lenovo NEC Panasonic SONY  
acer<sup>®</sup> clarion<sup>®</sup> DELL hp msi ONKYO. IMAGINATIVE SIGHT & SOUND SAMSUNG SHARP. TOSHIBA

IDF2009  
INTEL DEVELOPER FORUM

# WiMAX Broadband Solutions For High Data Traffic

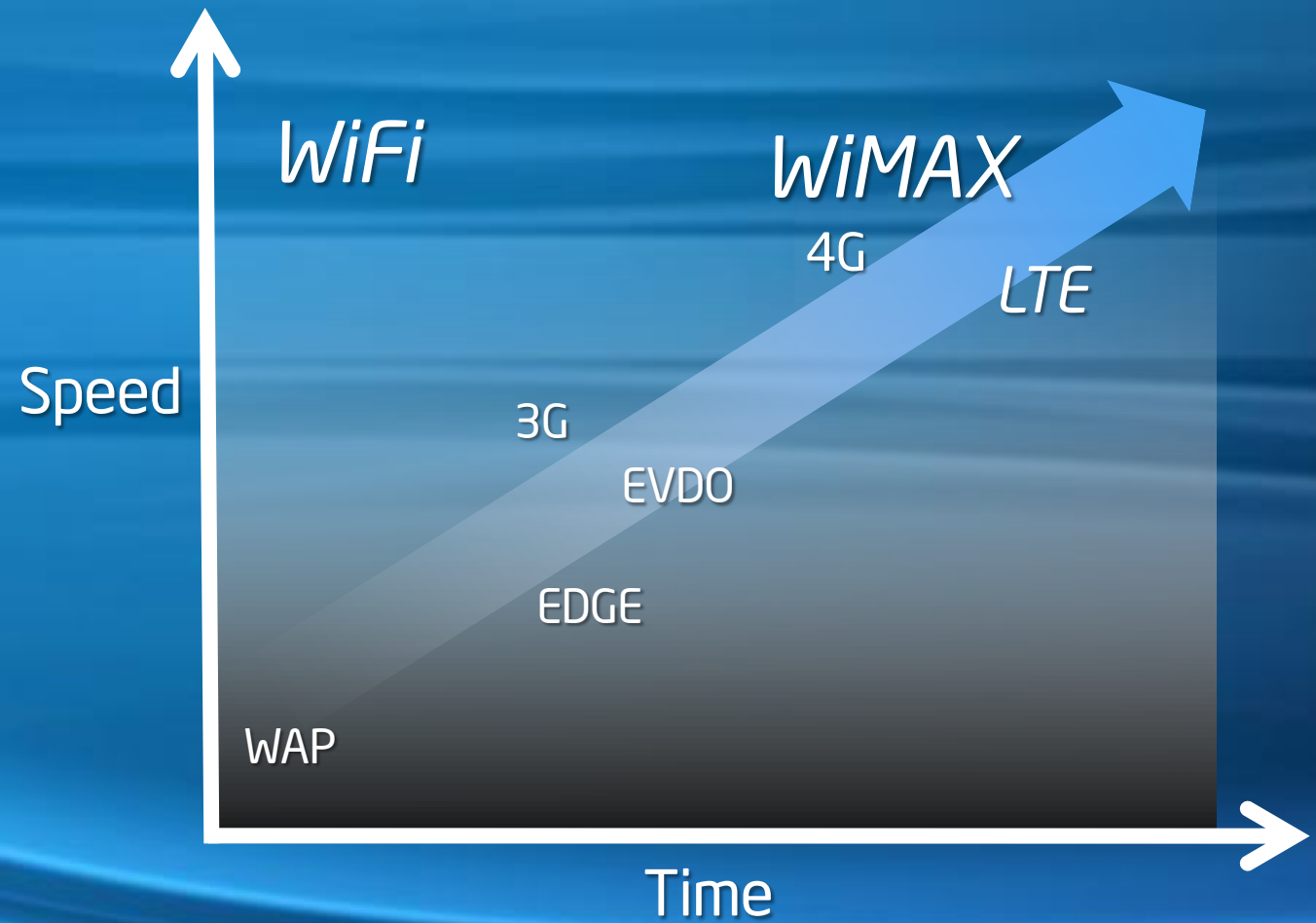


**Peter Cannistra**  
Vice President  
Embedded Devices  
Clearwire

**clearwire**<sup>®</sup>

# Devices Connected to All Wireless Access Types

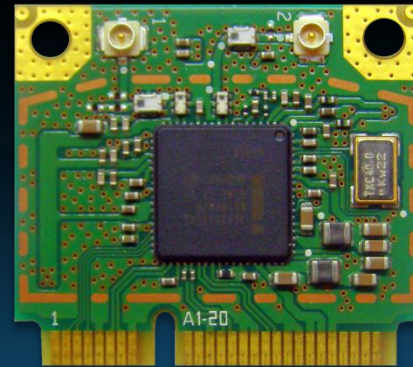
*Connected on every device, anywhere ... .. using many wireless access types*





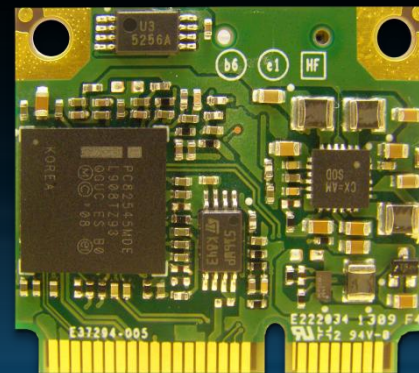
# Multi-Comm Products To Connect Anywhere

2009



Puma Peak  
WiFi

2010

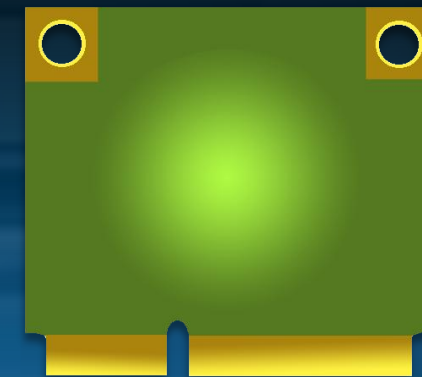


Kilmer Peak  
Integrated WiFi, WiMAX



Evans Peak  
Integrated WiFi, WiMAX, BT, GPS

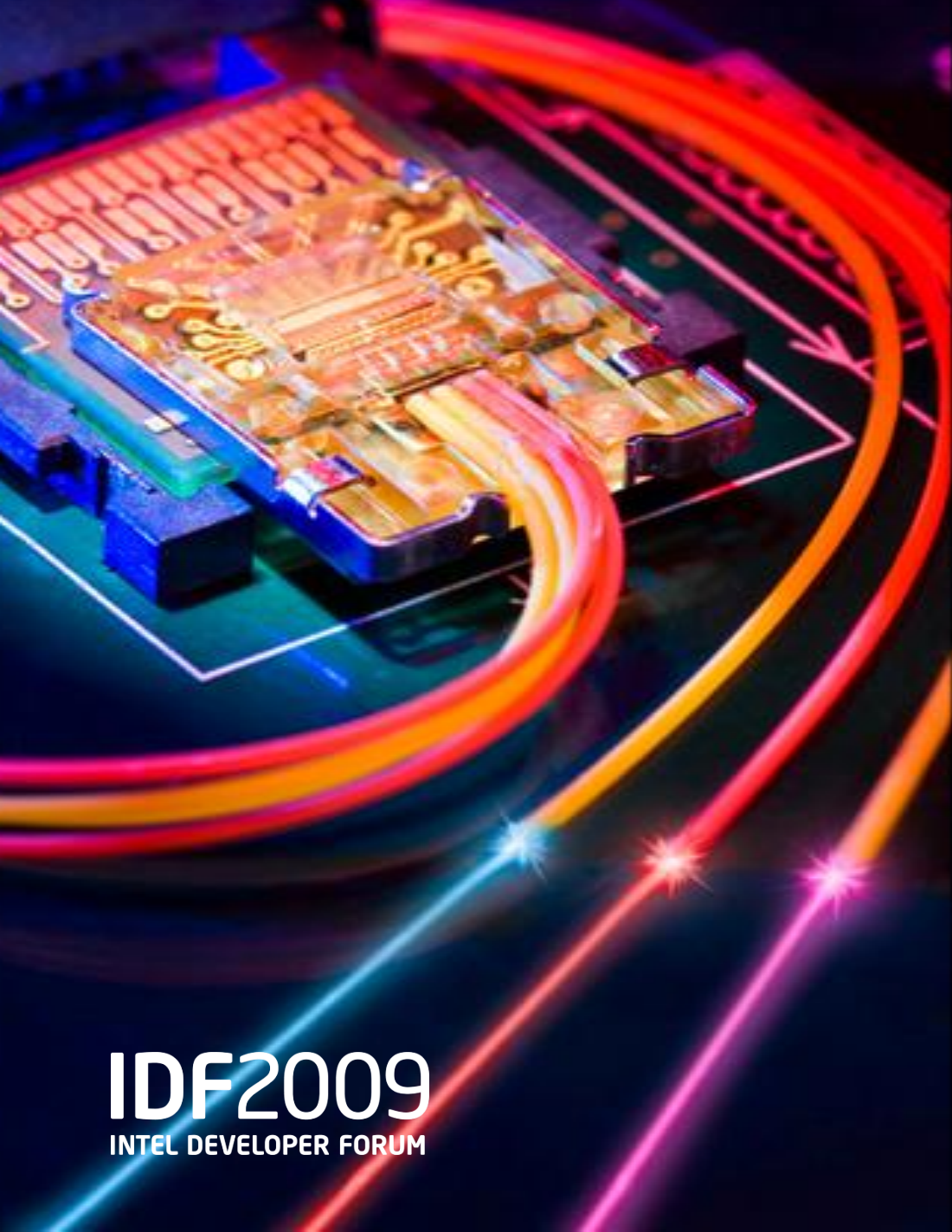
2011



Future Product  
Fully Integrated Comms

# Bringing Optical Connections to the Mainstream

## *Light Peak High-Speed Interconnect Technology*



Fewer, Smaller Connectors

Longer, Thinner Cables

Higher Bandwidth

Multiple I/O Protocols On Single Cable

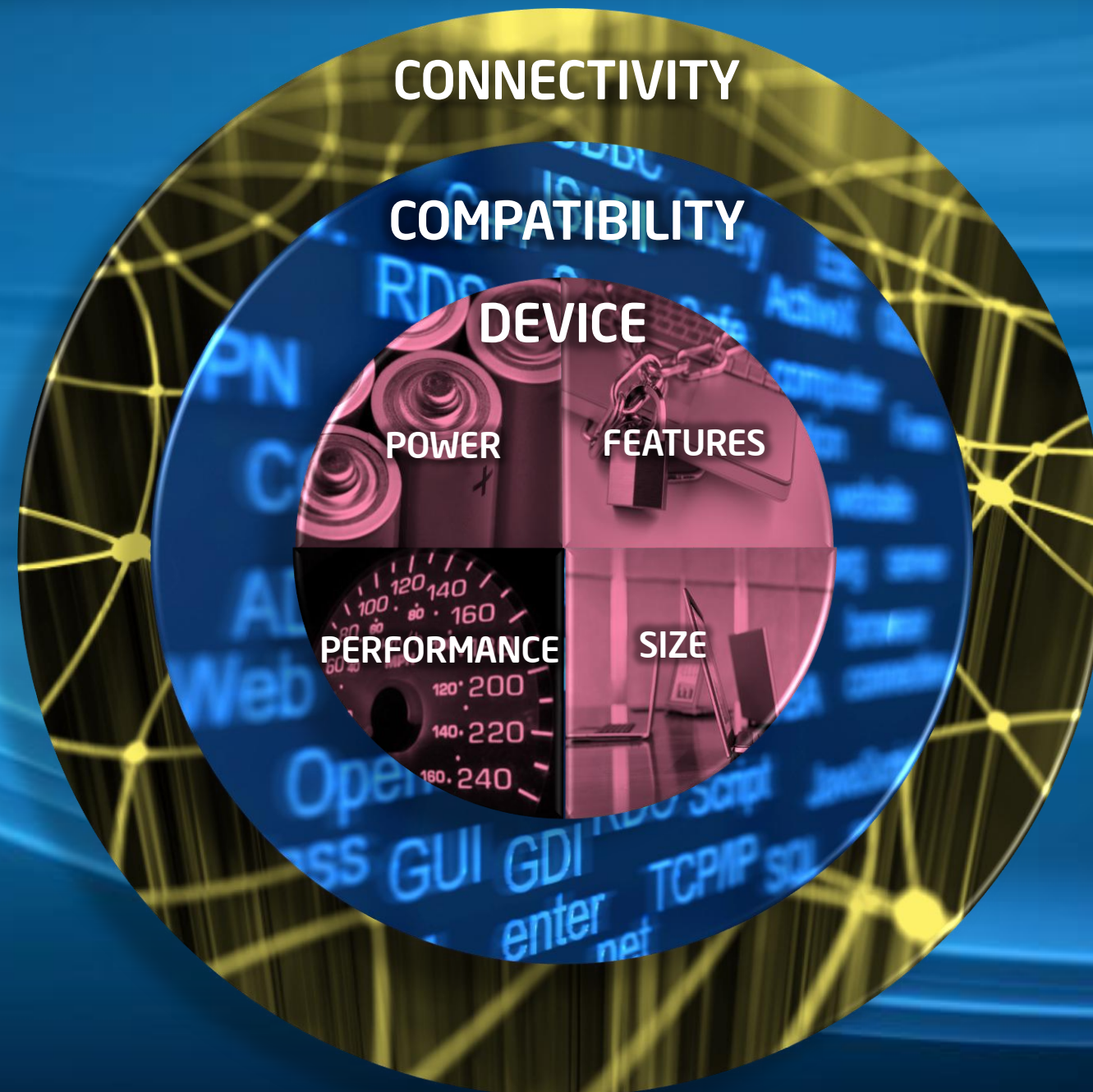
# *High-speed Optical I/O Architecture For The Next Decade And Beyond*

*"Sony is excited about the potential for Light Peak technology that Intel has been developing, and believe it could enable a new generation of high-speed device connectivity."*

**Ryosuke Akahane**

Vice President of VAIO business Group, NPSG, Sony

# Elements of the Total Mobile Experience





The Cool  
Mobile Experience

**DELIVERED**



**2005**

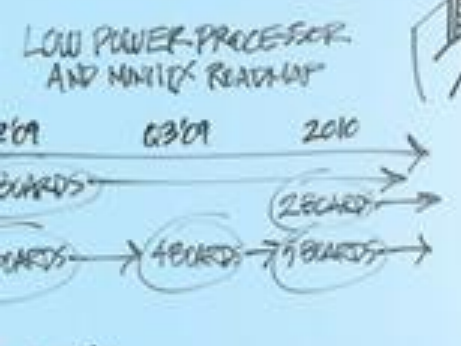
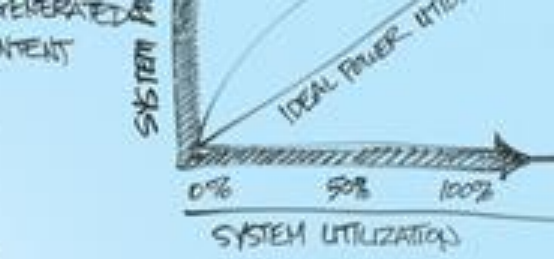
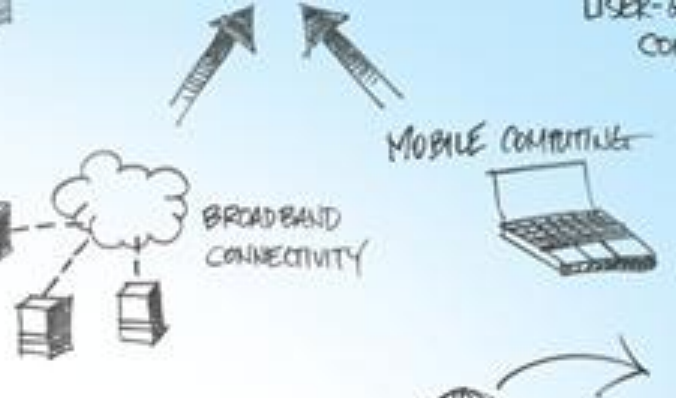
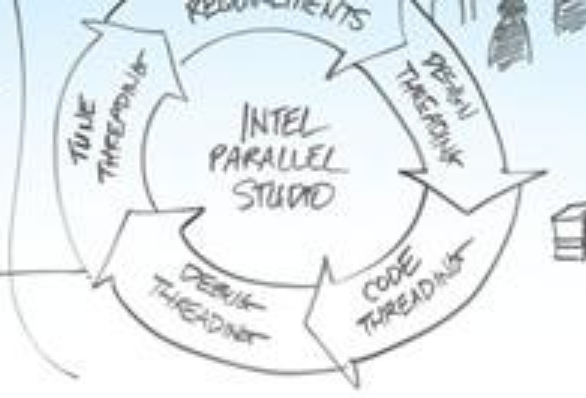
- 5.1M BOPS
- 8 RACKS
- 126 SERVERS
- 240 SQ FT
- 48 KW

**2009**

- 5.1M BOPS
- 1 RACK
- 17 SERVERS
- 40 SQ FT
- 6 KW

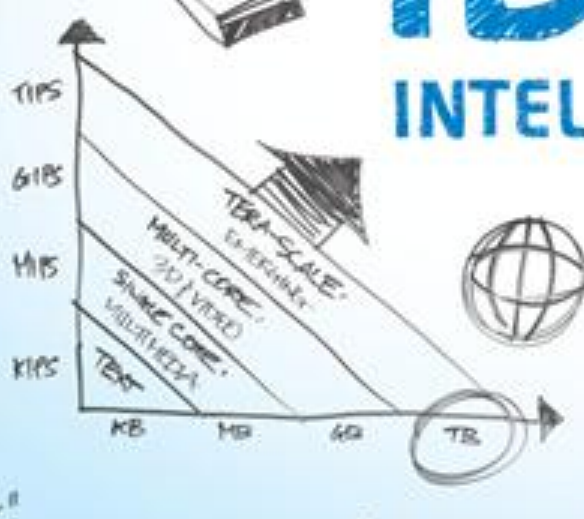
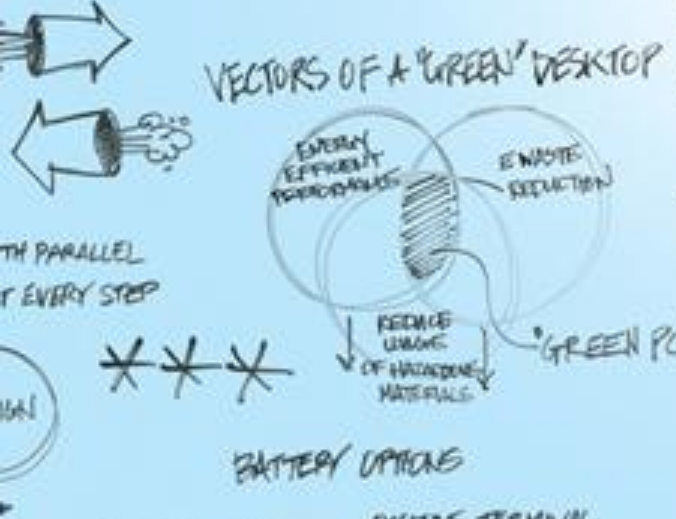
**THE BOTTOM LINE**

- FLOOR SPACE 83%
- ENERGY COSTS 87%
- ENERGY SAVINGS \$5K



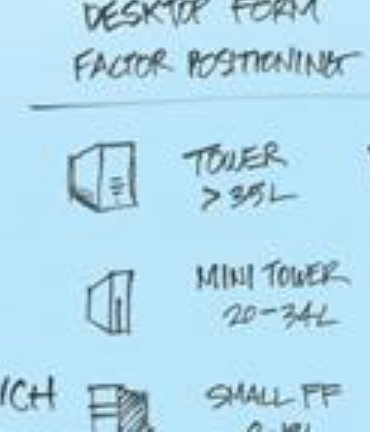
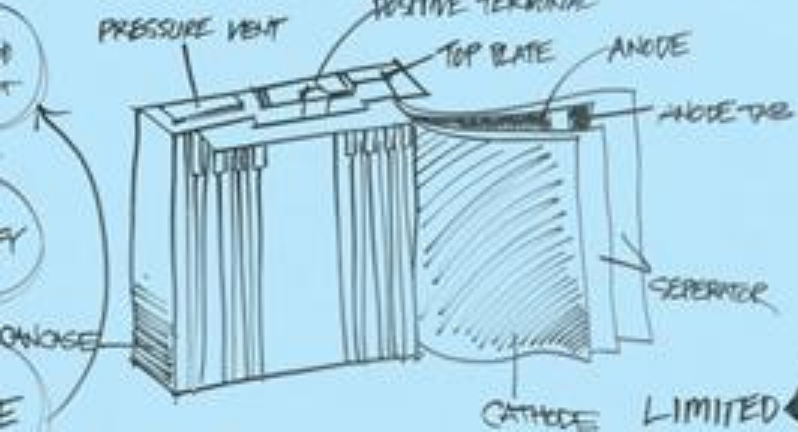
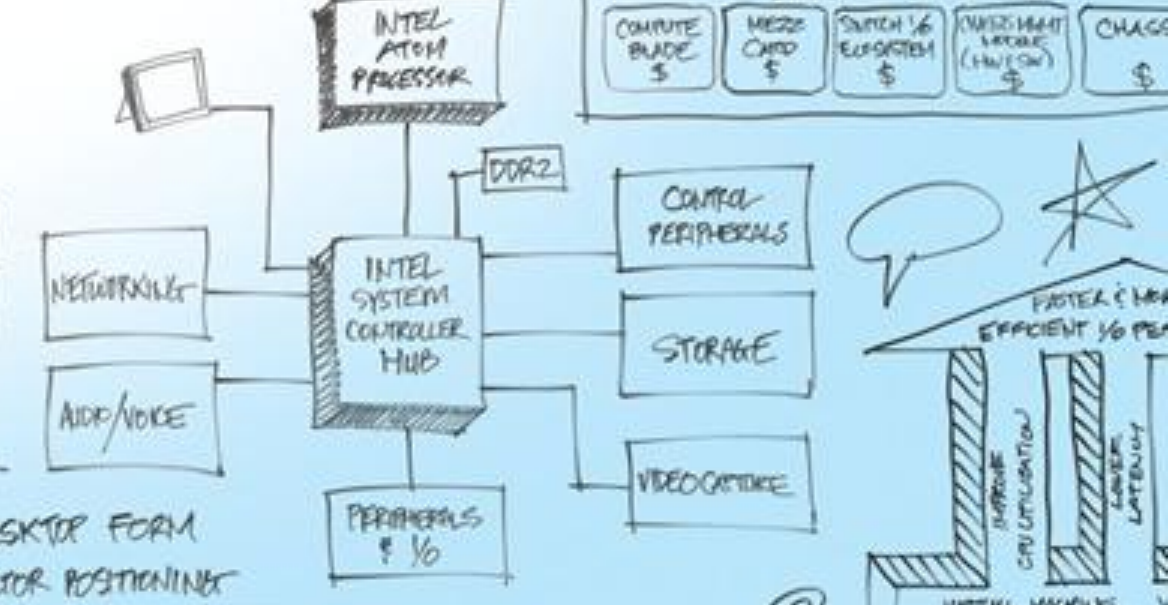
# IDF2009

## INTEL DEVELOPER FORUM



**STORAGE: HARD DISK DRIVE OPTIONS**

2.5" HDD		1.8" HDD
110-250 GB	CAPACITY	60-120 GB
7.95 mm	THICKNESS	5 mm
DUAL	PLATTER	SINGLE
1x	COST	2x+ SAME CAPACITY



**EOD-ENERGY: TWO SIDES OF THE COIN**

2% OPPORTUNITY

98% THE BIG OPPORTUNITY



**INTEL MICROPROCESSOR OPERATING NEARLY**

NEHALEM	WESTMERE
NEW MICROPROCESSORS	NEW PROCESSOR TECHNOLOGY
45nm	32nm