



32nm Westmere Family of Processors

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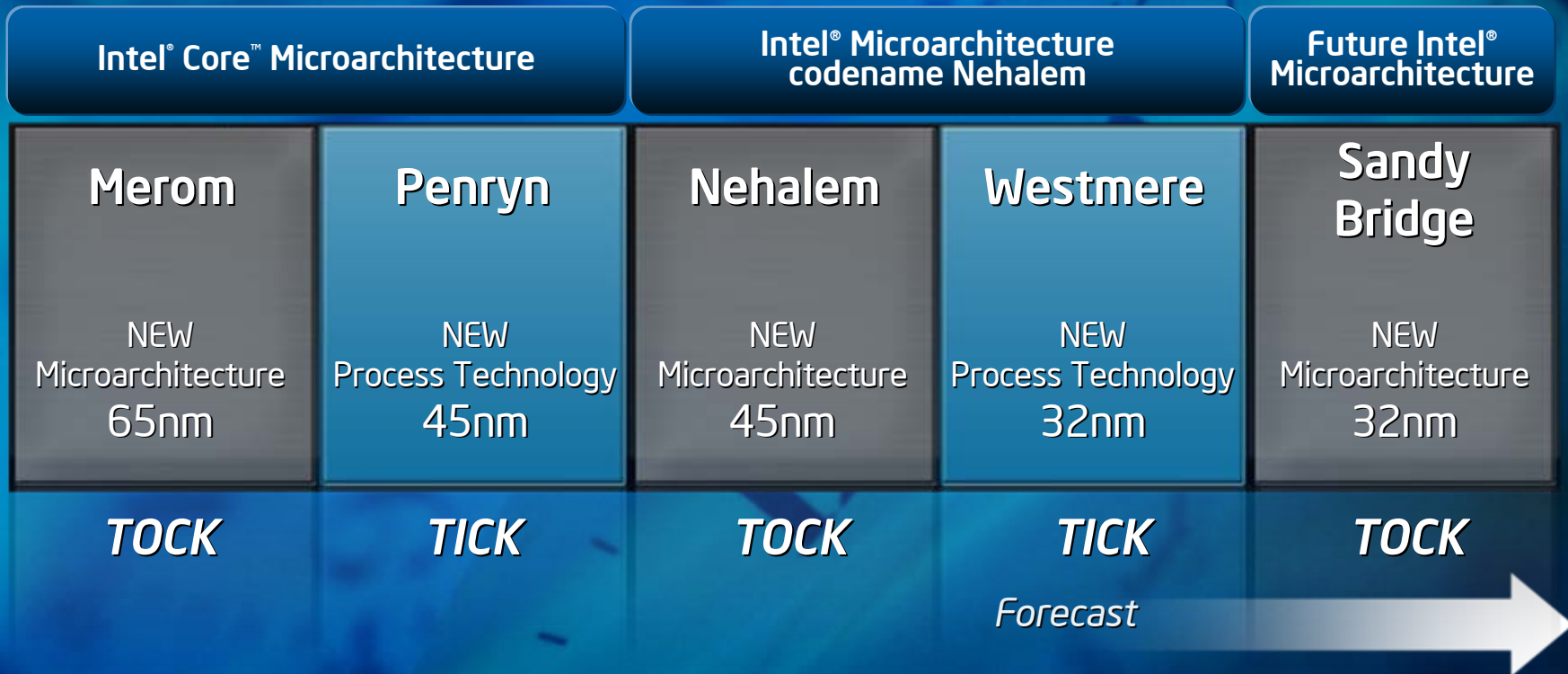
Highlights from Paul Otellini Speech Today

- Intel is making the largest-ever investment in a single process technology in the U.S. to support advanced manufacturing facilities upgrades, and the move to its next-generation, 32nm chip manufacturing technology.
- Intel is investing approximately \$7 billion this year and next on 32nm manufacturing technology, bringing our total by the end of next year to approximately \$8 billion (for 32nm investment in the U.S.).
- This new investment is made against the backdrop of Intel's combined capital and R&D investment in the U.S. of more than \$50 billion since 2002.
- This new multi-billion-\$ investment to upgrade facilities in New Mexico, Arizona and Oregon will ensure U.S. state-of-the-art chip technology manufacturing.
 - - Oregon (D1D, D1C, and AFO)
 - - New Mexico (Fab 11x)
 - - Arizona (Fab 22-32 megafab)

All dates, product descriptions, availability, and plans are forecasts and subject to change without notice.



Tick-Tock Development Model: Sustained Microprocessor Leadership



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Intel 32nm Production Ready in 2009

Today's News

- Intel is demonstrating the first working 32nm based microprocessor, in both mobile and desktop systems
- Great 32nm process and product health is enabling Intel to accelerate 32nm product ramp
 - Westmere mobile and desktop processor production in Q4'09
 - 32nm enables increased performance and power flexibility
- Intel® processors based on Westmere will ramp into mobile, desktop, and server segments over time, as the 32nm process ramps

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Westmere

Westmere: Nehalem migrated to 32nm process

Client: brings Nehalem through the mainstream

- Increased performance across single and multithread usages (vs. today's Intel Core 2 product family)
- Enables processors (Codenamed Gulftown) with 6 cores supporting 12 threads on the desktop roadmap
- Smaller processor core size
- New Multi-Chip Package with graphics integrated in processor

Server: extends leadership platforms

- Clarkdale*: refresh 1 socket servers
- Westmere based refresh for 2 socket servers
- Westmere based refresh for 4+ socket servers

Further Demonstrating Intel Product and Process Leadership

Transitioning to Mainstream

2008

2009+

High End Desktop



4 Cores /
8 Threads

2 Cores / 4 Threads with
Integrated Graphics

Mainstream
Desktop



Thin & Light
Notebook



45 nm High-K

32nm High-K

Repartitioned Client Platform Volume Ramp Vehicle

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Nehalem/Westmere Client Roadmap



Future Intel® micro-architecture codename Sandy Bridge



Desktop Extreme / High-End Desktop

Desktop Performance / Mainstream

Mobile Extreme / Performance / Mainstream

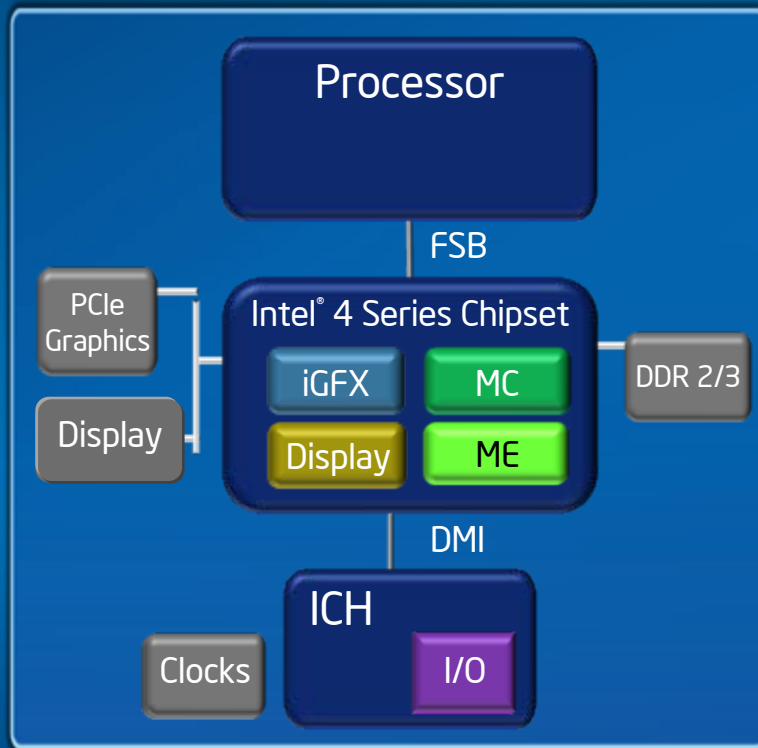
32nm Westmere extends Nehalem through the mainstream

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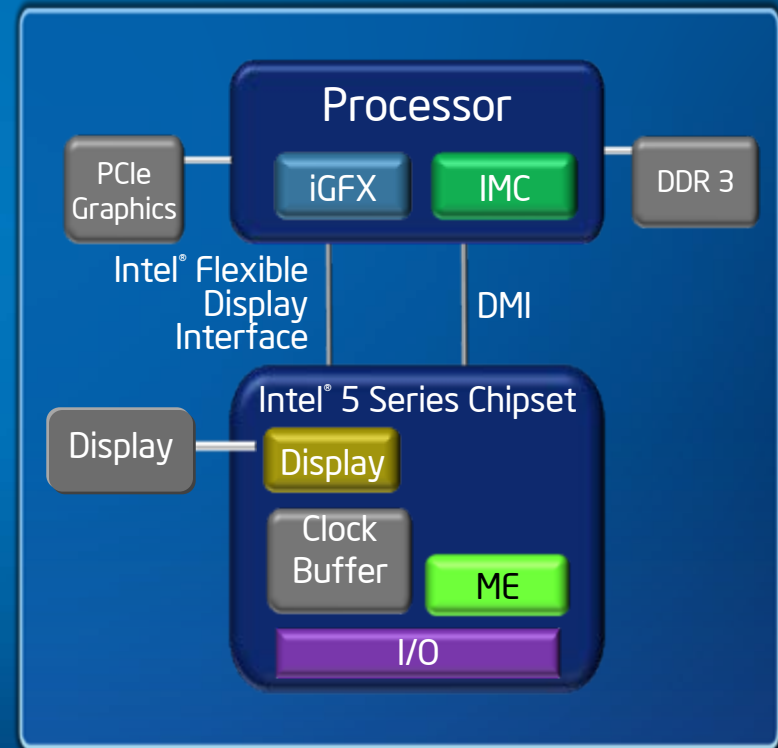


Mainstream Client Platform Repartitioning

Penryn based
3-Chip Solution



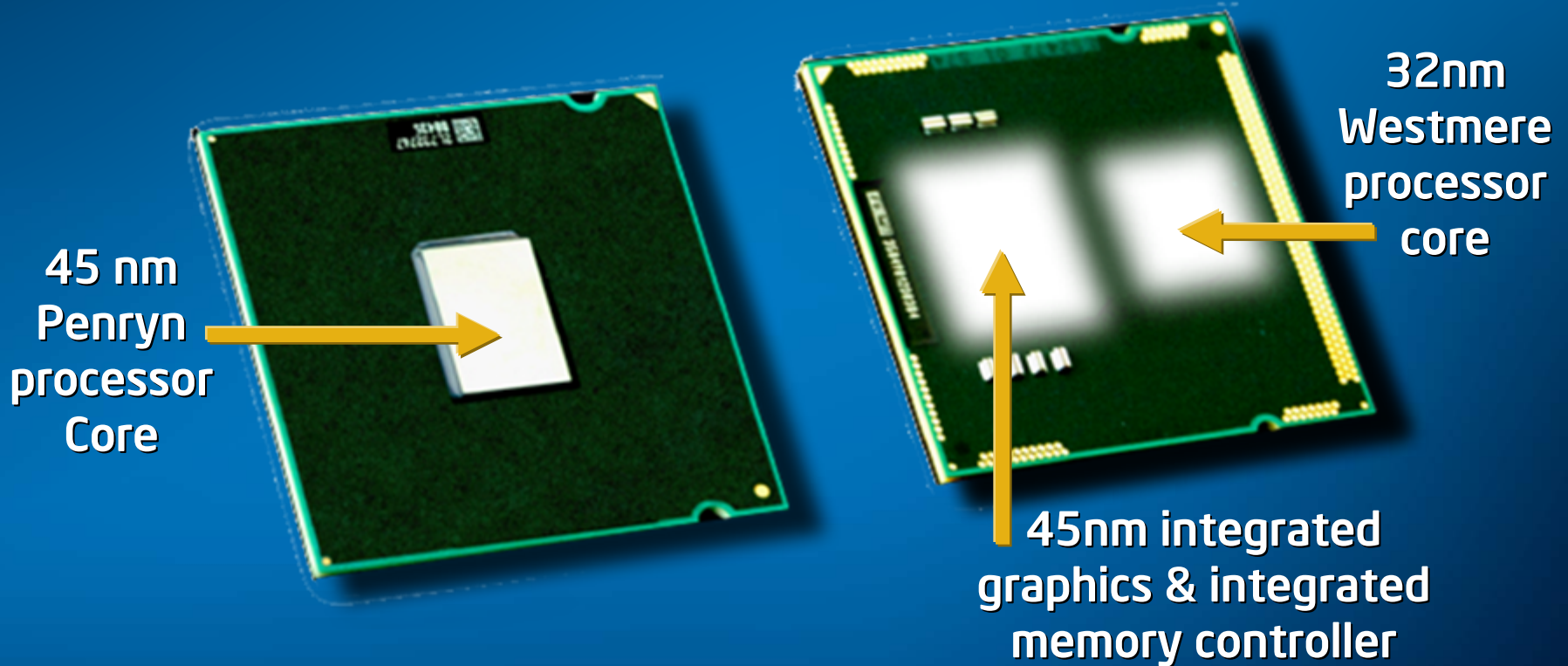
Westmere based
2-Chip Solution



*Repartitioning of the Client Platform
Greater Performance and Lower Power via Higher Integration*



First 32nm Westmere Products



Key Features

- Intel® Turbo Boost technology
- Intel® Hyper-Threading technology (2 Cores, 4 threads)
- Integrated graphics, discrete / switchable graphics support
- Integrated Memory Controller (IMC) - 2ch DDR3

Not all features are available on every processor line item







Westmere: AES New Instructions

- Use additional transistor budget to add new capabilities
 - Similar to adding SSE4.1 in Penryn (45nm tick)
- 7 new instructions for accelerating encryption/decryption algorithms
 - Carryless multiply (PCLMULQDQ)
 - 6 instructions for AES
- Example client usage
 - Enables full disk encryption

Early Intel Analysis shows significant Speedup on Encryption



Tick-Tock Development Model: Sustained Microprocessor Leadership

Intel® Core™ Microarchitecture		Intel® Microarchitecture codename Nehalem		Future Intel® Microarchitecture
Merom	Penryn	Nehalem	Westmere	Sandy Bridge
NEW Microarchitecture 65nm	NEW Process Technology 45nm	NEW Microarchitecture 45nm	NEW Process Technology 32nm	NEW Microarchitecture 32nm
 Done	 Done	 Done	On Track	On Track
TOCK	TICK	TOCK	TICK	TOCK
			<i>Forecast</i>	

Summary:

- 32nm process technology on track for Q4'09 production readiness
- 32nm enables increased performance and power flexibility
- Westmere-based processors will span across Desktop, Mobile, and Server

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Back-Up

Nehalem and Westmere Decoder Ring

	Segment	Nehalem (45nm)	Westmere (32nm)
Desktop	High-End	Bloomfield (4C / 8T)	Gulftown (6C / 12T)
	Mainstream	Lynnfield (4C / 8T)	Clarkdale (2C / 4T + iGFX)
Mobile		Clarksfield (4C / 8T)	Arrandale (2C / 4T + iGFX)
Server	Expandable Scalable (typically 4+ sockets)	Nehalem-EX (8C / 16T)	Future Westmere Based Processor
	Efficient Performance (typically 2 sockets)	Nehalem-EP (4C / 8T)	Future Westmere Based Processor
	Entry (EN) (typically 1 socket)	Lynnfield (4C / 8T)	Clarkdale (2C / 4T + iGFX)*

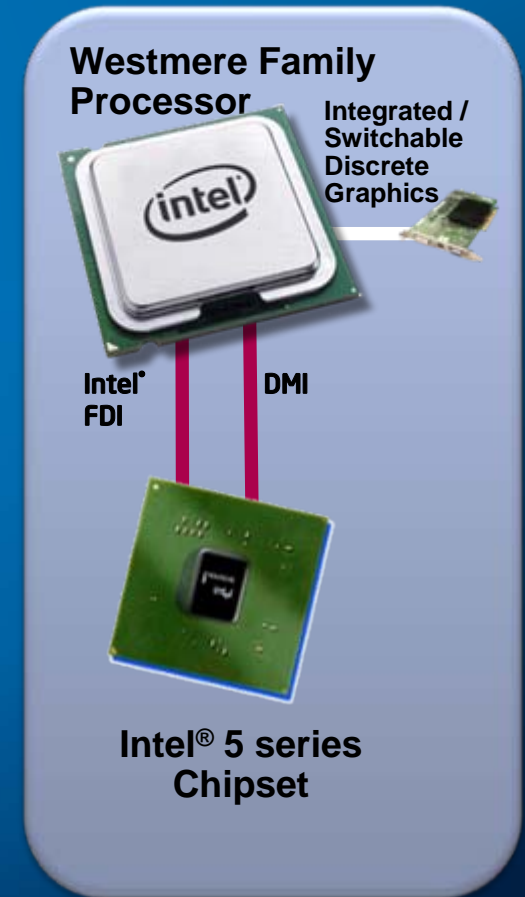
* Client branded product supported for servers



Westmere Family Mainstream Desktop / Mobile Processor

Key Features¹:

- Intel microarchitecture codename Nehalem on 32nm
- Multi-Chip Package (MCP) processor with:
 - processor cores built on 32nm 2nd generation high-k metal gate process
 - integrated graphics controller & memory controller built on 45nm high-k metal gate process
- Intel® Turbo Boost technology
- Intel® Hyper-Threading technology (2 Cores, 4 threads)
- Intel® Smart Cache
- Integrated memory controller (IMC)
- Integrated, discrete / switchable graphics support
- Advanced Encryption Standard (AES) acceleration
- Compatible with the Intel® 5 series chipset based platforms due to be released in 2H'09



Worlds First 32nm Based Processor

¹ Not all features are available on every processor line item

Intel® FDI: Intel Flexible
Display Interface



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