



News Fact Sheet

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Intel Developer Forum Manufacturing Keynote Disclosures

Sept. 22, 2009 — Below are summary and news highlights from Bob Baker's Tuesday keynote at the Intel Developer Forum, Sept. 22-24 in San Francisco.



Bob Baker, "Silicon Leadership – Delivering Innovation"

Senior Vice President General Manager, Technology and Manufacturing Group

Bob Baker today described Intel's relentless pursuit of Moore's law through materials and research, innovation in silicon technology and manufacturing capabilities.

- ***World's first working 22nm test circuits:*** Intel continues to relentlessly pursue Moore's Law and provide its benefits to end users. The company has announced the next breakthrough in semiconductor process technology to pack more features and performance onto a single chip, the world's first demonstration of working 22nm test circuits. Marking the third generation of high-k metal gate transistors, this event comes 2 years after Intel demonstrated working test circuits on the previous 32nm generation, and validates that Moore's Law continues well past the point when experts had predicted that the industry would hit a scaling wall.
- SRAMs are used as test vehicles to demonstrate technology performance, process yield and chip reliability prior to ramping processors and other logic chips that will use the given manufacturing process.
- Intel is now in full development mode on its 22nm technology and on pace to continue the company's "tick-tock" model into the next generation.
- The 22nm test circuits include both SRAM memory and logic circuits to be used on 22nm microprocessors.
- SRAM cells of 0.108 and 0.092 square microns function in an array totaling 364 million bits. The 0.108 square micron cell is optimized for low voltage operation. The 0.092 square micron cell is optimized for high density and is the smallest SRAM cell working in circuits reported to date. The test chip packs 2.9 billion transistors, at approximately double the density of the previous 32nm generation, in an area as small as a fingernail.

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- This 22nm technology continues to deliver the promise of Moore's Law: smaller transistors, improved performance/watt and lower cost per transistor.
- **High-k metal gate prevails, more than 200 million shipped:** Intel began shipping 45nm CPUs with high-k + metal gate transistors in Q4'07 and remains the only company to do so. Intel has shipped >200 million 45nm CPUs using high-k + metal gate transistors. Intel's 32nm CPU process is now certified and Westmere CPU wafers are moving through the factory in support of planned Q4 revenue production. Intel's 32nm technology features second-generation high-k + metal gate transistors for improved performance and reduced leakage.
- **R&D pipeline – MIT special guest:** Professor Jesus Del Alamo of the Department of Electrical Engineering at MIT talked about the promise of compound semiconductors, specifically the so-called III-V materials, in future logic processes. He pointed out that transistors based on III-V materials can run much faster than today's silicon transistors, yet operate at half the voltage in use today (potentially leading to much lower power consumption). While cautioning that there are serious challenges ahead, he noted that a growing community around the world is working on the problems and making very fast progress.
- **32nm for system-on-chip:** For the first time, Intel has developed a full-featured SoC process technology to complement the CPU-specific technology. This version offers a rich set of features for such applications as cell phones, MIDs and embedded products; it also provides a broader range of performance and power as required in those markets
- **Optimizing the Platform with NAND:** Intel SSDs deliver great performance on existing platforms and software. Rick Coulson, Intel senior fellow and director of storage technologies group, discussed Intel's research on future improvements to Intel's SSDs as well as on co-optimizations of SSD and platforms to yield even better performance, at lower cost and lower power.
- **Manufacturing capability:** Intel has made significant improvements in its supply chain. Manufacturing cycle times have been reduced by 62%. Our ability to respond to customer change orders – both positively and quickly – has improved 300 percent. Our turnaround time for customer order placement to delivery has improved 25 percent just in the past 12 months.

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