Intel Details Digital Radios, Solar-Powered CPUs

by Joel Hruska — Sunday, February 19, 2012, 04:53 PM EDT

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ARTICLE INDEX
Near Threshold Voltage, Claremont

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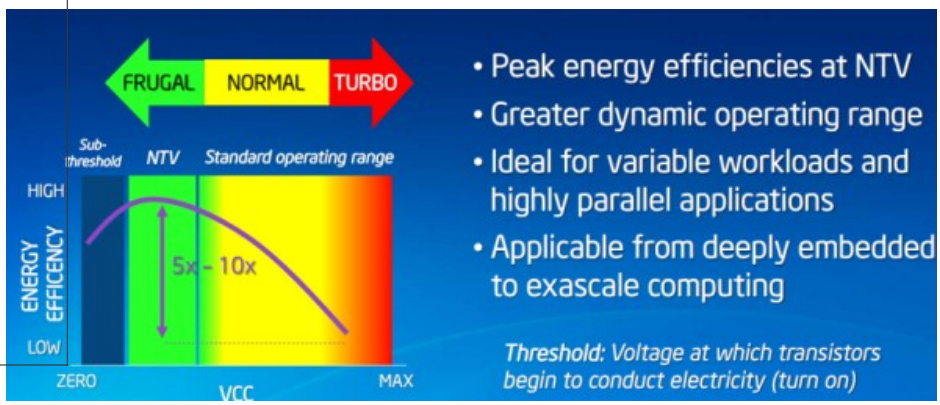
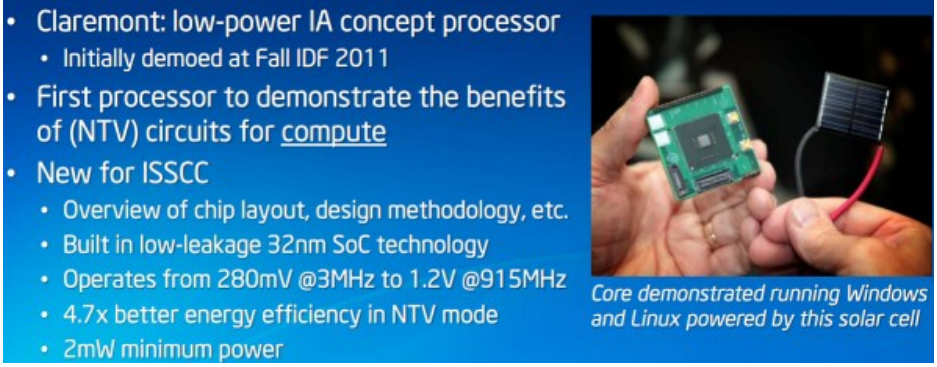
Intel's presentations at the International Solid State Circuits Conference (ISSCC) this year are focused on one of the biggest problems facing modern CPU designers—how to improve power efficiency without sacrificing compute performance. Intel isn't just tackling this problem through conventional process shrinks and smaller dies, however; the company detailed multiple new approaches. First up is Claremont, Intel's first chip built to run on Near Threshold Voltage (NTV) technology.



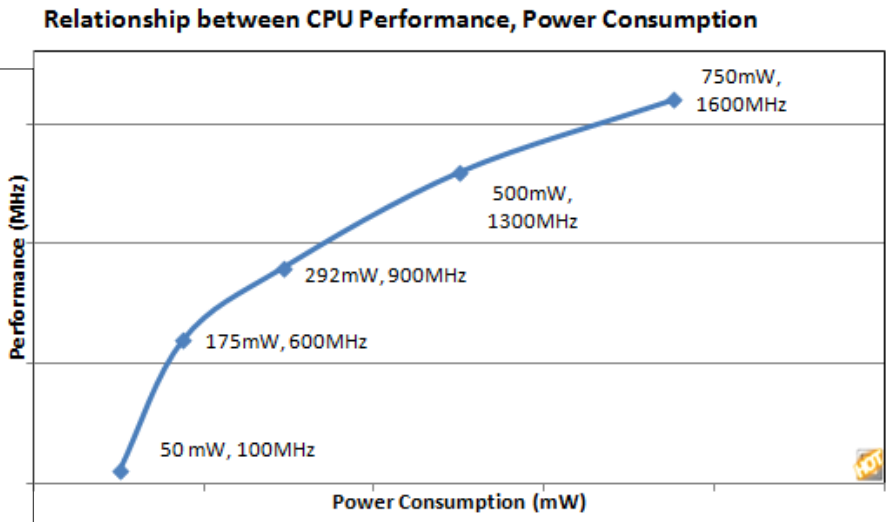
The term "Near Threshold Voltage" refers to the amount of voltage required to switch a transistor from 0 to 1. Normally, the voltage variation between the two states is significant in order to prevent transistors from activating when they aren't supposed to. An NTV processor is able to operate much closer to the On/Off point. The result is a significant level of power savings.

Claremont is a bog-standard Intel Pentium that's been transplanted from its original 0.8µm process (that's 800nm) to a 32nm architecture. Intel didn't set out to label Claremont a solar-powered processor; the demo shot below was simply meant to show that the chip could run on extremely small amounts of power. The CPU's operating parameters indicate such uses are an option; Claremont idles at 280mv at 3MHz and draws just 737mW of power at 915MHz and 1.2v.



Intel's "Solar-Powered Processor" - Claremont

For a pertinent example of why this matters, consider the tweaked graph below. The data is from our coverage of Medfield, Intel's first smartphone processor, but we've updated the original with hard figures rather than simply showing a trend line. The reason power consumption increases so sharply as frequency rises, is because higher clock speeds require higher voltages, and raising voltage has a huge impact on power consumption.



It's not clear yet if NTV would improve power consumption at maximum frequency or if its benefits are mainly confined to lower power modes, but the impact on mobile devices would be substantial. Much of what makes Medfield a huge step forward for Intel is the chip's ability to minimize its power consumption and rapidly return to standby mode once computational tasks are complete. Smartphones spend the overwhelming majority of time -- upwards of 90% -- in standby or low-power modes, and that's where NTV would deliver further improvements.

Intel's next step? Rethinking radio.

NEXT PAGE

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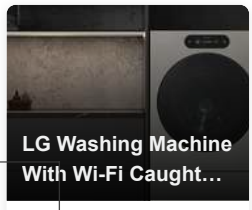

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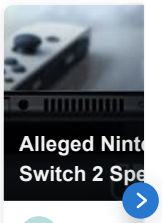

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I just hope they with the tablet

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JvanHummel

21 February, 2012

Wow, looks like intel is going to kick ass in the SoC department. I love intel for all their work, they have shown so much initiative and progress the past few years, they're really on a roll. It's kind of scary too though.

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epobirs

20 March, 2012

Sound very useful for rapid remote sensor deployment where power must be obtained from unconventional sources and a battery must be of minimal bulk.

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