■ **Intel Counters Athlon With Pentium III-800**

Unable to let the year end with AMD in the speed lead, Intel announced 750- and 800-MHz versions of Pentium III. In the past, Intel generally ignored AMD, but it has been forced to respond to the 750-MHz Athlon. But Intel's announcement is more smokescreen than a strong response.

Intel hadn't planned to go beyond 733 MHz until 2000, but it suddenly decided to pull in the 750-MHz part. Then, in an unusual move, Intel announced a Pentium III-800 without shipping any significant quantities to OEMs. Although the company is now starting production shipments at 800 MHz, systems with the faster part aren't likely to appear until January. Intel already has problems yielding Pentium III at 700 and 733 MHz, so supplies of the new speed grade are likely to be quite limited.

In fact, shortages of the 0.18-micron Pentium III have been reported at all clock speeds. Gateway and other Tier 1 vendors haven't been able to increase their original allocation of parts, despite higher demand, and some smaller PC makers aren't getting as many parts as they originally requested. The fourth quarter has seen a stronger-than-expected surge in overall PC demand, with which Intel hasn't been able to keep pace using its limited 0.18-micron production.

Not helping the problem, on December 12 Intel reduced the prices of most of its Coppermine (Pentium III) processors by $20. This price cut was originally scheduled last summer to continue to boost demand for the new 0.18-micron part. At this point, trimming Pentium III prices is superfluous at best, but Intel followed through with the cut to meet previous commitments. The new Pentium III-750 lists for $803, while the 800 is at $851.

The latest price move does not affect any mobile or Celeron products and should have a negligible effect on Intel's average selling price. It merely sets the stage for a rapid conversion to Coppermine in 1H00. The current processor shortages should ease in the first quarter as the 0.18-micron process continues to ramp and demand slackens in its normal seasonal pattern.   —*L.G.*

■ **BIST Bug Bites Coppermine**

Demonstrating once again that even the mighty aren't immune, Intel's newest Pentium III processor, code-named Coppermine, has come down with a bug. Unlike many of the more benign bugs that routinely afflict modern microprocessors, this one was serious enough to cause Dell to temporarily halt shipments of its GX110 PCs. With workarounds in place, however, Dell quickly resumed shipments.

According to Intel's published errata, the problem occurs because Coppermine intermittently reports a built-in self-test (BIST) failure, even though no failure actually occurred. The indication that it passed the test is normally posted as a zero value in the EAX register when the self-test procedure completes. But some Coppermines occasionally report a nonzero result even when they pass self-test.

Intel did not disclose the source of the bug. This type of bug, however, is not uncommon. It is often caused by a failure to supply a guaranteed reset to an important flip-flop or register at power up. Normally, flip-flops tend to power up in the same state each time, which, if it happens to be the correct state, can cause the problem to go undetected during factory tests. But once in a while, in some chips, the flip-flop can flop the wrong way. This explanation, or some variation of it, is consistent with Coppermine's misbehavior.

According to Intel, only 1–2% of its Coppermines are affected, indicating that most of the chips are naturally biased to come up in the correct state. Intel could use this fact to screen out parts that are susceptible to the bug before they leave the factory. This would not be a long-term fix, of course. Given the high demand for Coppermines, Intel can ill afford to have 1–2% more of the chips fall out as scrap. Furthermore, given the intermittent nature of the problem, factory testing cannot possibly catch all chips that may fail in the field; it can only reduce the likelihood of field failures to a lower level.

The workaround Intel suggests is for the BIOS to ignore the BIST result in EAX. While this would indeed eliminate the problem of failing to boot, it would also defeat the purpose of the self-test—a proposition that probably doesn't thrill those concerned with reliability. As a result, Intel has indicated it will fix the problem in the next stepping of the chip.

In the big scheme of things, the bug will present no major problems for Intel: the number of chips affected is small; the problem occurs only infrequently, even in affected parts; no data loss or corruption occurs; factory testing and BIOS patches should be effective; and the problem should be fixed quickly. It is highly unlikely that this bug is symptomatic of any serious underlying problems with the Coppermine design or with Intel's 0.18-micron P858 process.

Although this bug isn't serious, we did hear a faint cheer go up from the direction of 1 AMD Place. Although the bug will not give any significant direct boost to Athlon sales, it may have a small psychological effect on the market. In the past, many PC vendors have shied away from AMD parts in favor of the security offered by Intel. Although AMD surely has bugs of its own, each bug that infects an Intel part erodes Intel's veneer of infallibility, lowering AMD's barrier to entry another notch.   —*K.D.*

■ **Direct RDRAM Directions Disclosed**

Rambus plans to double the speed of its Direct RDRAM memory technology, quadruple the speed of its memory modules, and expand into new markets, all within the next 12 months. The upgraded memory channel will perform 1.6 billion transfers per second. We believe the further doubling of module bandwidth will be achieved by the creation

of new dual-channel modules. With 6.4 GBytes/s of peak bandwidth each, such modules would simplify memory expansion in high-end systems, such as servers and workstations.

Rambus said both enhancements will be upward-compatible with today's Direct RDRAM products, which suggests that Rambus is going to a 400-MHz quad-pumped design (four transfers per clock). The new technology will be described in 1H00 at "a major technical conference" and released to Rambus licensees in 2H00. The first products are expected to ship in 2001.

Rambus also disclosed that it is working with partners in the communications industry to develop new applications for the chip-to-chip communications technology used to create Direct RDRAM. These applications will echo one of Rambus's first design wins, where the original RDRAM channel was used to communicate between ASICs on an SGI graphics board. The first fruits of this work are expected to be announced in 1H00.

Now that Direct RDRAM has been adopted by most of the players in the DRAM and PC markets, Rambus expects a decline in licensing and development activity in these markets. The channel enhancements and new applications give the company new technology to sell, expand the company's potential customer base, and make Rambus less dependent on the success of Direct RDRAM.　　*—P.N.G.*

■ Compaq, Samsung Commit to Alpha

Aiming to dispel uncertainty surrounding Alpha's future, Compaq and Samsung announced an effort aimed at making Alpha the processor of choice for Internet servers and appliances. Under new CEO Michael Capellas, Compaq sees Alpha as the core of its business-critical server strategy, providing high-performance, high-reliability 64-bit computing in both its legacy Digital and Tandem lines. Compaq continues to invest heavily in Alpha CPU, system, and software development.

Compaq positions its Intel-based servers for the price/performance market, where 32-bit addressing is adequate. Clearly, IA-64 will change this positioning, but the company has a wait-and-see attitude. As of now, it expects Alpha to continue to outperform Intel's best processors over time.

Although Compaq could fund Alpha as an in-house architecture if it had to, the company continues to seek incremental business to defray the cost of developing and supporting Alpha processors. Its new strategy focuses on server appliances and network infrastructure, areas where performance matters and instruction set doesn't. After dropping support for Windows NT on Alpha, Compaq favors Linux for these new applications.

Samsung and its Alpha Processor (API) subsidiary will take the point in advancing Alpha in this market. Adding to its 21264 license, Samsung/API has licensed the 21364 design (see MPR 10/26/98, p. 12) for use in servers and other gear. API also has a license to develop derivatives of these Alpha

chips, customizing them for specific markets, but it has no announced plans to do so at this time.

Compaq and Samsung together have committed to spending $500 million on Alpha over the next year, not including Compaq's existing R&D budget. This investment is not as large as it sounds, as it consists partly of $200 million that Samsung is spending to develop IC process technology that it can use on a variety of Alpha and non-Alpha products.

The remaining $300 million (split between the two companies) is for "market development" for the new server appliance strategy. This money will fund the development of tools and application software for these new devices, as well as sales and marketing efforts. The strategy builds on the success of Network Appliance *(www.netapp.com),* which sells Alpha-based network file servers.

The companies also confirmed that Samsung will be Compaq's primary Alpha foundry in 2000, displacing reluctant partner Intel. Compaq continues to explore the use of IBM as a foundry but will probably not do so until 2001. Samsung plans to have its 0.18-micron copper process in production by 3Q00.

The announcement indicates that Compaq and Samsung remain committed to Alpha and are striving to make it more successful. The network-appliance strategy has a much better chance of success than the old PC strategy, as these new products aren't closely tied to Windows and x86 software. But to succeed, the companies must develop the necessary infrastructure; API must find a way to sell processors for much less than the current $1,982 low-end price; and, most important, they must find some customers that haven't already committed to another platform. But don't expect Alpha to give up without a fight.　　*—L.G.* Ⓜ