

■ Intel Steps Back From Modules

Acknowledging that its module strategy is losing relevance, Intel now says it will sell future Celeron processors in a single-chip package rather than mounted on a PCB module. The company has confirmed that, starting with the forthcoming Mendocino processor, it will supply these chips in a 370-pin plastic PGA package as well as on the same module as the current Covington-based Celerons (see MPR 4/20/98, p. 14). Although Mendocino is due in 4Q98, the PGA version is not expected until 1H99.

When Intel first introduced the SECC (single-edge contact cartridge) module (see MPR 12/9/96, p. 4), it expected to use this type of packaging for most, if not all, of its processors in the future. Combining the L2 cache and CPU chip on a PCB allows Intel to optimize this high-speed interface without burdening motherboard designers. But the move to chips such as Mendocino, which incorporates 128K of L2 cache on the CPU itself, eviscerates the module strategy, leaving Intel to backpedal. Instead of forcing PC makers to buy bulky daughtercards holding essentially nothing other than the CPU chip, Intel will supply the CPU directly, as it does with Pentium.

The new socket, which Intel has not named, is quite different from Pentium's Socket 7; the Nameless Socket uses the P6 bus protocol and thus works with all current P6-bus chip sets. Nor is the new socket compatible with Pentium Pro's 387-pin socket, known as Socket 8. The Nameless Socket has slightly fewer pins, as it eliminates a few multiprocessing signals. Since Mendocino requires less power than Pentium Pro, the new socket also saves on power and ground pins.

We estimate the cost savings to Intel at about \$3 per unit compared with mounting Mendocino on a module. Intel could pass this savings on to its customers, but it probably won't. PC makers will still save a bit by using the socketed version, as the PGA socket is less expensive than the current SECC connector.

Instead of a smaller, less expensive BGA package, Intel chose a PGA package to allow socketability. To reduce the time the costly CPU is in inventory, PC makers prefer to install it into the motherboard at the last minute, so socketability is required. Intel will probably continue to use an LGA package for chips that are mounted on modules. We also expect Intel to deploy a BGA version of Mendocino's big brother, Dixon, for the mobile market, also in 1999. —L.G.

■ Silicon Spice Cooking Up New Processor

A new startup appears to be eying the media-processor market. Silicon Spice is not auditioning to replace Ginger Spice; according to the company's Web site (www.silicon-spice.com), it is "designing a revolutionary new signal-processing architecture" for high-performance telecommunications applications. Officially, Silicon Spice is not disclosing any

details of the products it is developing. We don't expect the company to ship its first product until some time in 1999.

Sources indicate Silicon Spice is designing a highly parallel DSP-like processor based on an instruction set of its own design. The company is also developing an aggressive C++ compiler to support the new instruction set. The processor is designed to support xDSL and possibly other network protocols. It may have a PCI interface and, in at least some applications, will work in a Windows NT environment.

One possibility is a single-chip DSL modem that would plug into a Windows NT system via the PCI bus. If this is the sole purpose of the device, however, it is unclear why the company would need an aggressive C++ compiler; a small set of drivers could be coded by hand, perhaps augmented with a simple compiler. If the company wants to support a broader range of algorithms on the part, through its own or third-party efforts, a good compiler would be a necessity.

Silicon Spice has been in operation for more than a year. It has received a total of \$10.3 million in venture capital from leading firms, including Kleiner Perkins, New Enterprise Associates (NEA), and World View Technology.

Vin Dham, formerly at AMD and Intel, signed on at Silicon Spice in April as president and CEO. He was recently joined there by John Nickolls, formerly the SPARC architecture manager at Sun. The mercurial Dham left AMD after leading the development of the K6 processor, reportedly due to cultural differences with other managers there. He previously led the Pentium development effort at Intel. Dham's controversial but successful management style may be the right recipe for a young, aggressive startup. —L.G.

■ KryoTech Ships Chilled Alpha at 767 MHz

Giving new meaning to the phrase "cool system," KryoTech (www.kryotech.com) has announced an Alpha-based PC that uses the company's vapor-phase cooling system to accelerate the 21164 CPU to 767 MHz. This is 28% faster than the fastest systems from Compaq or any other Alpha vendor, as these companies rely on conventional air cooling. The company is also selling a K6-2 system accelerated to 450 MHz. While demonstrations of chilled CPUs have been popular at conferences for years, this is the first time such a system has been offered for sale.

The KryoTech cooler is relatively small—less than 12" × 12" × 18"—and fits underneath a standard minitower system, adding about 50% to its height. A compressed liquid coolant (similar to Freon, but more environmentally friendly) circulates from the cooler to the CPU, where the heat converts it to a gas. This gas is then piped back to the base, where a compressor removes the heat. This method removes 50 times more heat than conventional air cooling, according to the company. As a result, the CPU temperature is reduced to -40°C.

At such low temperatures, CMOS circuits operate considerably faster. In this case, a 600-MHz 21164 runs at 767 MHz using the KryoTech cooler. The 450-MHz K6-2 system is based on a 333-MHz AMD chip, a 35% speedup.

Although vapor-phase refrigeration is common in other industrial applications, KryoTech has made it small and affordable. The K6 “system” sells for just \$1,695 and includes the cooler, case, motherboard, and CPU, but no memory, disk, etc. This implies a price of less than \$1,000 for the cooler. The 767-MHz Alpha PC has an entry price of \$16,995 in a full system with 4M L3 cache, 256M SDRAM, 4.3G disk, 12× CD-ROM, PowerStorm graphics, a 17" monitor, and Windows NT. It is also available with Digital Unix.

Given its elevated clock speed, the KryoTech Alpha system should achieve in excess of 24 SPECint95 and 32 SPECfp95 (base), making it by far the fastest workstation on the planet. Similarly, a 450-MHz K6-2 should outrun Intel's fastest Pentium II on some benchmarks. There is always a market for the fastest systems, and \$1,000 doesn't seem like too much to pay for the ultimate in performance.

Despite these benefits, no major system maker has adopted KryoTech's cooling technology, although the small company has been trying to license it for years. Cooling has its problems. For one, no microprocessor maker tests its processors at -40°C . While everything should simply run faster at low temperatures, some paths may get too fast and create timing problems. There may also be long-term reliability issues due to the intense thermal cycling.

System design also becomes challenging, as the bus setup and hold times may not meet their original specifications. KryoTech has tested the systems it is selling to ensure that they function properly, but long-term reliability may still be an issue. Going into the systems business was not its original plan, but if KryoTech can demonstrate that it has solved these problems, major system vendors may become more interested in chilling their CPUs. —L.G.

■ Micron Buys Rendition

Ending a long period of speculation over Rendition's future, the 3D-graphics company has agreed to be purchased by Micron Technology (www.micron.com). Rendition (www.rendition.com) had been seeking additional funding to bring its next-generation graphics chip to market. Sales of the company's current V2000 (see MPR 6/23/97, p. 1) are not providing the necessary revenue.

The next-generation chip will use embedded DRAM (see MPR 8/4/97, p. 14) and will be built in Micron's DRAM fab. Micron decided to step in and fund Rendition rather than let a key customer falter. Both companies expect the new graphics chip to showcase the embedded-DRAM technology in the 3D market. Combining the companies may reduce the manufacturing cost of the new chip and facilitate the development of other embedded-DRAM graphics products that are part of Micron's recent Socket X initiative (see MPR 6/1/98, p. 27).

The deal, in which Rendition's shares will be exchanged for 3.7 million shares of Micron stock, is valued at roughly \$90 million. Rendition, based in Silicon Valley, says it will operate as a subsidiary of the Idaho-based Micron and will continue using the Rendition brand name. Personnel changes should be minor, since there is little overlap between the two companies.

With more than 40 companies designing or selling 3D graphics chips, further consolidation is a certainty. In a crowded market, Rendition paid the price for missing the market window for its first product. Other companies that misstep will probably be seeking a white knight like Micron or simply a face-saving exit from the business. —P.N.G.

■ Intel Countersues Intergraph

After an adverse decision (see MPR 5/11/98, p. 16) in Intergraph's suit against it, Intel has filed a countersuit claiming that Intergraph has violated seven Intel patents. (Intergraph's initial suit accused Intel of patent violation, among other nastinesses.) The countersuit echoes Intel's actions when it was sued by Digital last year; Intel quickly filed a countersuit in that action as well (see MPR 8/25/97, p. 8).

In this case, Intel cleverly avoided suing on microprocessor patents, as Intergraph could have argued that it is implicitly licensed to those patents by its purchase of Intel processors. In addition, three of the patents in the suit were purchased by Intel from third parties. This tactic could prevent Intergraph from invoking the “first sale” doctrine.

Intergraph, of course, dismisses Intel's patent claims as “not very material” to its business. At this point, little is likely to happen with Intel's suit until there are further rulings in the original Intergraph case.

Intel's appeal of Judge Edwin Nelson's initial injunction was denied by a federal appeals court, leaving the company to argue its case before Judge Nelson, who has already indicated that he believes Intel is a “monopolist.” In the meantime, Intel appears to be fulfilling the terms of the injunction, which require it to treat Intergraph as it would similar customers. Indeed, Intergraph was one of the featured vendors at the recent Xeon introduction (see MPR 7/13/98, p. 1).

The basis of the Intel/Intergraph dispute is Intel's desire to license Intergraph's patents, eliminating that company's ability to sue either Intel or Intel's customers over these patents. The countersuit appears designed to force Intergraph into a patent cross-license agreement that would provide Intel with what it wants. This tactic worked in the Digital case, as those two companies eventually agreed on a cross license (see MPR 11/17/97, p. 1).

As with Digital, Intel might throw in a small amount of cash (say, \$100 million or so) to sweeten the pot. Although Intergraph clearly has deep feelings on this issue, a bit of cash might be enough to settle this case and allow both companies to get on with their lives. Intergraph could decide to acquiesce in the courts and let the FTC (see MPR 6/22/98, p. 8) fight the good fight against Intel. —L.G. 