

■ Cyrix Boosts MediaGX Speed

Cyrix has begun volume shipments of 166- and 180-MHz versions of its entry-level MediaGX processor, keeping up with Intel's aggressive raising of the low-end speed grade (see MPR 7/14/97, p. 13). The enhanced speeds result from a move to IBM's 0.35-micron CMOS process. There are no functional changes from the original version (see MPR 3/10/97, p. 1).

List price (in 1,000s) for the new clock speeds are \$121 at 180 MHz and \$88 at 166 MHz. The prices of the 150- and 133-MHz versions have been cut to \$75 and \$63, respectively. These prices include the companion I/O chip. By comparison, a 166-MHz Pentium (without MMX, like the MediaGX) will cost \$106 after July 28, although this price does not include the graphics and system functions found in the Cyrix chip set.

Compaq has upgraded its 133-MHz Presario 2100, the flagship product using the MediaGX, to the 180-MHz Presario 2200. As it increases the speed, the new model cuts the price from \$999 to \$799 without a monitor or \$999 with a monitor. Part of the price cut is due to a decrease in the main-memory configuration from 24M to 16M. Compaq will no longer make systems at the lower clock speeds, but Cyrix expects other vendors to do so, pushing the entry-level price (without monitor) down to \$699.

Cyrix plans to continue rapid enhancements to the MediaGX line. Later this year, a new version of the companion chip will provide a USB interface and video acceleration. A 200-MHz version of the processor with MMX will debut around the end of the year, significantly boosting the chip's multimedia and 3D capabilities. —M.S.

■ Motorola, IBM Reach Mach 5

Meeting their previously announced schedule (see MPR 4/21/97, p. 1), Motorola and IBM have begun shipping their "Mach 5" processor, a 0.25-micron version of the 604e. The new process boosts the clock speed to 250 MHz while slashing power consumption by 65% to just 5 W (typical), compared with 14.5 W for the 200-MHz part. This huge reduction comes from lowering the core voltage from 2.5 V to 1.8 V; the pad ring still requires a separate 3.3-V supply. Available immediately, the new part is priced at \$395 in 1,000-unit quantities from Motorola; a 266-MHz Pentium II, which delivers similar integer performance, lists for \$775.

The 250-MHz chip is built in a true 0.25-micron process, the most advanced IC process yet used for a production microprocessor. The process, which Motorola calls PPC4 and IBM calls CMOS-6X (see MPR 9/16/96, p. 11), uses the same 0.25-micron transistor as in the companies' previous processes but has much smaller metal layers, providing a reduction in die size while boosting clock speed.

Like its power consumption, the size of the chip also shrinks by two-thirds. The new die measures just 47 mm²,

compared with 148 mm² for previous incarnations of the 604e. In all external respects, the 250-MHz chip is identical to its predecessors. It is housed in the same 255-contact ball-grid array (BGA) package and has the same 66-MHz system bus. Except for the change in core voltage, the 604e-250 is a drop-in replacement for earlier 604e devices.

The two vendors are the first to ship a true 0.25-micron microprocessor, but they can't rest on their laurels: Intel will reach this milestone later this quarter, and others by the end of the year. The new process, though on schedule, is not yet delivering the expected performance, as the vendors had predicted clock speeds of more than 300 MHz for Mach 5. IBM, in fact, is already yielding some 250-MHz 604e chips using an older process (see MPR 6/23/97, p. 5), diminishing the impact of the new part. The vendors expect faster versions of Mach 5 to appear soon. —L.G.

■ First U.S. Patent on Merced Issues

The first U.S. patent covering Merced, entitled "Processor Capable of Executing Programs that Contain RISC and CISC Instructions," issued to Intel on June 10, 1997. This patent, numbered 5,638,525, is the U.S. version of the international application described in MPR 3/31/97, p. 16. As expected, the description of the invention is identical to the international application, but the claims—the parts of a patent that count—are much more restrictive than in the initial application.

In the issued U.S. patent, Intel was forced to distinguish Merced from older processors that also process two instruction sets. One of the more significant changes is that the newly issued claims explicitly require the processor's two instruction sets to be a CISC instruction set and a RISC instruction set. Another restriction is that the processor must have at least one instruction cache. The last restriction is that the different instruction sets must use different register files.

The patent claims at least a few variations on how Intel and HP can implement Merced, perhaps because the actual implementation was undefined at the time the patent was filed, or perhaps to give the architecture scalability. Still remaining in the claims is the opportunity to implement Merced with a hardware x86 engine and a hardware RISC engine, or only a hardware RISC engine with on-chip translation from x86 to a RISC core. —R.A.B.

■ PowerPC 603e in Industrial, Military Grades

Motorola has struck a deal with two outside vendors to establish a supply of wide-temperature-range PowerPC 603e chips for industrial and military uses. Under the agreement, customers will be able to buy the 603e in 100-, 133-, 166-, and 200-MHz speed grades qualified for -40° to 85° C (industrial) or -55° to 125° C (military) temperatures. Motorola's 1,000-piece pricing in industrial temperature ranges starts at \$148 for the 100-MHz part and reaches \$219 for the 200-MHz ver-

sion. These prices represent a \$25–\$50 premium over the price of the equivalent commercial-grade devices.

Motorola will supply both bare die and packaged parts to Thomson-CSF (Paris) and to Chip Supply (Orlando, Florida), which will then test the chips at extended temperatures. Qualifying chips will then be sold through these two vendors; a portion of the industrial-grade (but not military) devices will also be returned to Motorola and sold through its normal channels. Chips failing the test are returned to Motorola and sold as commercial-grade parts.

The deal establishes the 603e as Motorola's fastest microprocessor, by far, to be available in extended temperature ranges. The company foresees increasing demand for high-temperature CPUs in relatively benign—but exposed—environments, such as cellular base stations, neighborhood cable hubs, and local relay stations. —J.T.

■ Sega 64 Dumps 3Dfx for PowerVR

Despite earlier rumors to the contrary, Sega's next-generation game platform will use NEC's PowerVR graphics technology instead of 3Dfx's Voodoo, *Microprocessor Report* has learned. The switch comes at a bad time for 3Dfx, which held a successful IPO just days ago, partly on the strength of the promised Sega contract.

As reported (see MPR 6/2/97, p. 5), the Sega system will use Hitachi's SH-4 microprocessor running Windows CE and Microsoft's DirectX APIs. The system is expected to have 16M of DRAM, a 12× CD-ROM, a PCMCIA slot, and a WebTV-like browser built in. When the system debuts in 3Q98, it is likely to come bundled with several games.

Sega maintained two relatively independent design teams for the upcoming system, one in Japan and one in the United States. The American project, code named Black Belt, favored the 3Dfx graphics technology for its superior performance. The Japanese project, called Dural, selected PowerVR on the strength of NEC's manufacturing capacity. The fact that 3Dfx's chips are manufactured by TSMC in Taiwan probably did not help Black Belt's backers, and the Dural team eventually won out.

Sega's move toward standard operating systems and interfaces reflects a shift in corporate strategy toward application development and distribution. Despite lackluster console sales, Sega is still the dominant player in coin-operated arcade game development. Selling hardware is not Sega's top concern: the profit is in franchising software titles. All three major console makers sell their hardware at (or in Sega's case, below) their actual cost to encourage game sales. By easing the transition between console games and PC games, Sega can greatly broaden its customer base. —J.T.

■ IBM to Provide NC Design Kit

IBM has released an NC reference design and design kit based on its 603e processor. The kit includes a processor, core logic, and software. Specifically, for \$199 OEMs get a 200-MHz 603e and IBM's 27-82660 chip set (which provides a

MDR Welcomes Peter Song



Peter Song has joined MicroDesign Resources as a senior analyst. He joins Jim Turley as a Senior Editor for *Microprocessor Report*; Peter will cover general-purpose processors while Jim focuses on embedded chips.

Peter joins us from Samsung, where he led the architectural development of the MSP media processor. Previously, he was the lead architect for the PowerPC 604 at IBM; he also designed microprocessors at AMD. Peter holds a PhD from the University of Texas at Austin. I hope you enjoy his first article (see MPR 7/14/97, p.13). —L.G.

DRAM controller, L2 cache controller, and PCI interface); the software bundle includes Microware's OS-9000 real-time OS, a Hot Java browser, a Java JIT compiler, and Java e-mail and calendar applications. To build a complete system, OEMs will need to add memory, input and output devices, and a network connection.

The included software supports, but the design kit does not include, an L2 cache, flash memory, Ethernet, a smart-card reader, PCI video and audio, two serial ports, and power management. Taiwanese PC and peripheral maker Umax has chimed in with its support; the company plans to release a commercial NC based on IBM's design late this year.

For the money, IBM's design kit is not particularly compelling. The price of the CPU and core logic amount to about \$199 at current prices; the OS-9000 license fee is small, and the value of the shareware Java tools is negligible. IBM does offer schematics and PCB placement information, however, which could shave a bit of time from an OEM's development schedule. —J.T.

■ LG Semicon Firms Up Java Plans

Korean semiconductor giant LG Semicon has made formal its agreement with Sun Microsystems to develop Java chips (see MPR 6/17/96, p. 4). Under the new contract, LG will cooperate with Sun in development; the Korean company will then manufacture the parts, which will be sold exclusively through Sun. The processors will include such functions as a CRT controller with flicker-free logic, a graphics controller, and a modem port.

By choosing LG as a foundry partner, Sun gets access to the Korean company's high-volume manufacturing capacity and chip-level experience in consumer electronics. LG will presumably also consume a fair number of these parts for LG-branded consumer applications, such as Internet-enabled televisions, kiosks, and NCs for the home. Sun expects the first chips to begin sampling in 4Q97, with products appearing in mid-1998. —J.T. ■