P55C Slips into 1997

After canceling its scheduled November price cut *(see* **1010MSB.PDF***)*, Intel dropped the other shoe, slipping the P55C introduction to next January. The company had previously admitted that few, if any, P55C systems would be on store shelves in time for the Christmas buying season, but it had still insisted on introducing the part this fall. PC makers, however, objected to Intel's announcing a new high-end processor during this critical season without systems being available for sale.

It would have been difficult for Intel to drop its processor prices in the fall without a new part to fill the high end. The delay in the P55C announcement means that the 200-MHz Pentium will be the only new desktop processor Intel will announce between the beginning of last January, when the Pentium-166 appeared, and next January—an unusually long drought. The P55C announcement, in contrast, will be followed by the rollout of Klamath (P6) parts at several clock speeds over the course of 1997.

We expect P55C to appear at clock speeds of 166 and 200 MHz, with a 150-MHz version likely for notebooks. With larger on-chip caches and an improved pipeline, the P55C should offer 10–15% better performance than a standard Pentium at the same clock speed. Intel has yet to indicate how it will name the P55C product.

VLSI Acquires Hitachi SuperH CPU Core

Hitachi's successful but proprietary SuperH family gained a second source as VLSI Technology acquired a license to the SH core. VLSI will now offer SuperH CPUs to its customers as part of its ASIC library; Hitachi gains more access to VLSI's function library and help in proliferating the SH architecture.

The two companies have worked together in the past, sharing ASIC library elements, design tools, and process details and acting as alternate sources for each other's designs since 1988. Under the terms of the five-year agreement, VLSI gains access to three generations of Hitachi CPUs: the SH-3 core (on which the SH7708 is based), the upcoming SH-4, and an as-yet-undisclosed third core.

VLSI and Hitachi will also exchange operating-system ports and "middleware" (firmware) for intelligent functions. One potential operating system may be Microsoft's Pegasus, making VLSI an alternate source for PDA vendors unwilling to rely on a single-source microprocessor.

VLSI was one of the earliest and staunchest licensees of ARM, producing ARM610 chips for Newton and the ARM7500 used in network appliances. VLSI is not planning to cut off its ARM products and recently renewed its licensing agreement with ARM. The company's position is that SuperH complements ARM at the high end rather than replacing it. Current ARM7-based designs are limited to about 40 MHz, even in advanced 0.35-micron processes. Hitachi's SH7708, in contrast, runs at up to 100 MHz *(see* **090302.PDF***)*. The ARM8 core *(see* **0917MSB.PDF***)* was designed to double that frequency, but of the 15 current ARM licensees, only VLSI and Symbios have licensed the new design. Digital's StrongArm is also available for licensing but so far has had no takers.

VLSI's decision may indicate the company is uninterested in acquiring StrongArm, or simply that Hitachi offered more attractive licensing terms. Because VLSI and Hitachi have similar fabrication processes and compatible tool chains, reaching higher clock rates would be much easier with an SH core than with Digital's highly tweaked StrongArm design. As an ASIC vendor, VLSI's position is to be "processor agnostic," delivering what its customers request rather than what it believes in. Should VLSI eventually acquire a StrongArm license, there would certainly be some overlap in performance ranges.

This deal marks the third such agreement in the span of only a week. Days earlier, IBM struck a deal with Mitsubishi, and Motorola granted a 68K and ColdFire license to Hewlett-Packard *(see* **1010MSB.PDF***)*. The ranks of single-source embedded CPUs are clearly shrinking, now limited to just Intel's i960 in the top tier and National's CompactRISC, NEC's V800, Thomson's ST20, and Patriot's ShBoom among the lesser-known designs.

Motorola Establishes PowerPC 801 at Low End

Motorola added the fifth and least expensive piece to its lineup of embedded PowerPC processors with the MPC801. The 801, due to begin sampling next month, is the least integrated member of the company's 800-series processors to date. The chip, which includes a pair of small caches and four simple serial I/O channels, will be available at both 25 and 40 MHz, with prices starting below $30 in volume.

The 801 is based on the more complex 860 *(see* **091202.PDF***)* but leaves out the 860's exotic communications-processor module. Instead, the 801 has just two UARTs, an I^2C interface, and a synchronous SPI channel. The 801 also reduces the 860's caches to just 2K for instructions and 1K for data. Still included are the DRAM controller, timers, and debug support of the bigger device. The new chip's part number is intended to indicate that the 801 is the simplest part Motorola will produce in its PowerPC 800 series.

At $30 for the 25-MHz part and $37 for the 40-MHz version, the 801 is about half the price of its predecessors. Motorola's price is on par with IBM's three 403Gx chips, which contain a similar amount of integration, but about twice as expensive as the new 401GF *(see* **100802.PDF***)*. Strategically, it gives Motorola a general-purpose, nonintegrated PowerPC that curious users can evaluate without paying for loads of on-chip logic. Coincidentally, the first customer application for the 801 is Mitsubishi's Diamond-

Web combination TV/browser, an announcement apparently unrelated to the recent IBM/Mitsubishi deal.

New 3D-RAM Adds OpenGL Blending Support

Mitsubishi has announced the third generation of its 3D-RAM graphics memory. The new 10-Mbit device has a more sophisticated ALU with support for all OpenGL blending modes and stencil tests, creating a "write-only" interface for these functions and the 16 raster operations described in the OpenGL specification.

The internal organization of the new device is similar to previous 3D-RAMs. Four 2.5-Mbit DRAM banks are connected to a 2-Kbit SRAM cache via a 256-bit internal bus. A 32-bit ALU takes operands from the SRAM and the external 32-bit bus interface, with results stored in the SRAM. In this way, operations such as blending and Z-buffer comparisons can be performed with a single write operation.

Mitsubishi claims eight design wins for 3D-RAM, including Sun's UltraSeries workstations and Lockheed Martin's R3D/PRO-1000. The 3D-RAM provides better deliverable performance than any other graphics memory on the market due to the multibank design, the elimination of most read-modify-write operations, the high bandwidth of its serial video port, and the SRAM cache.

The new 3D-RAMs are organized as 320K × 32 and are available in 128-pin QFP packages. They are manufactured in a 0.4-micron process and have about the same die area as Mitsubishi's 16-Mbit DRAMs. Announced speed grades are 100 and 125 MHz. Sampling begins this month; volume production is expected in 1Q97.

Pricing is estimated at $31 in 10,000-unit quantities, already below the per-bit cost of 4-Mbit VRAM. Mitsubishi expects the unit price of 3D-RAMs to decline to a 50% premium above 16-Mbit DRAMs by 1998. The company also recently signed a second-source agreement with an unnamed Japanese semiconductor company, which is expected to start shipping 3D-RAMs in late 1998.

NEC Casts Its Lot with Diba

NEC Japan has selected Diba's Application Foundation software *(see* **100804.PDF***)* as the basis for an undisclosed line of consumer "information appliances" due this fall. The devices will be based on NEC's V830 microprocessor, a product currently offered only in Japan.

NEC is the second major consumer-electronics manufacturer to buy into Diba's software strategy; Zenith is using the Diba software for Internet-enabled televisions, also slated for a 4Q96 rollout. The V800 is the second microprocessor architecture, after the 68K, to which Diba has ported its software. NEC has not revealed detailed plans for its information-appliance strategy, but the move shows that the company's V800 family still has followers, at least within NEC. M