Most Significant Bits

Pentium Prices Fall, 486 Prices Disappear

Intel has released its latest Pentium prices, effective May 1. The price of the 120-MHz Pentium, introduced just a month ago, dropped 22% to $734, making room for a 133-MHz Pentium to be introduced later this quarter. The 90- and 100-MHz parts also received price cuts of about 30%, as Intel continues to aggressively ramp its 0.5-micron production. The 75-MHz part, however, saw only a minor adjustment to its already low price. Intel claims to be phasing out its 0.8-micron 60- and 66-MHz parts but continues to cut their prices, this quarter by a relatively modest 10%.

While these price cuts, summarized in the table below, don't match the breathtaking 40% reductions seen last quarter *(see **0902MSB.PDF**)*, they show Intel's continued determination to drive Pentium into the mainstream PC market. These prices will make it difficult for AMD and others to charge premium prices for their Pentium-class processors.

Vendor	Processor (MHz)	1Q95	2Q95	%CHG
Intel	Pentium-120	$935	$734	-22%
	Pentium-100	$673	$479	-29%
	Pentium-90	$546	$377	-31%
	Pentium-75	$301	$275	- 9%
	Pentium-66	$289	$260	-10%
	Pentium-60	$273	$245	-10%
AMD	486DX4-100	$209	$170	-19%
	486DX2-80	$135	$110	-19%
	486DX2-66	$125	$110	-12%

In a policy change, Intel now refuses to release its prices for 486 processors, including DX4 chips. A spokeswoman described these chips as "commodities," acknowledging that 486 prices are now set by the market rather than by Intel. In its stead, we offer AMD's 486 pricing. (Note that AMD's "DX4" is really what we might call a DX3, as it lacks the expanded cache of Intel's DX4 processor.) We hope Intel's new policy won't cause Pentium prices to disappear when AMD begins shipping its K5 processor *(see **090602.PDF**)*.

Intel's lack of public pricing is apparently part of the company's plan to phase out its 486 PC business over the next 12 months. Intel is already reducing production of 486DX2 and slower chips to free wafer starts for its popular Triton chip set *(see **0902MSB.PDF**)*, which is used in many new Pentium system designs. This reduction has caused some shortages of 486 chips, as AMD is unable to increase production to fill the gap until its new Fab 25 comes on line this fall. By squeezing supplies now, Intel can motivate laggard PC vendors to accelerate their move to Pentium.

Despite Intel's efforts, the 486 remains strong for business desktop systems, although it is fading fast in the home market. Nearly all notebook systems today rely on the 486; many Pentium notebooks have been announced but few are shipping. By the end of this year, however, Pentium will be the mainstream processor for business, home, and notebook PCs, relegating the 486 to low price points that Intel is not interested in serving.

Intel's last stand with the 486 will be in the notebook market, supplying DX4 processors to those vendors who are slow to move to Pentium. The company will probably eliminate even this product line in early 1996, leaving other processor vendors to fight for the remaining scraps in the 486 market. Ultimately, Intel will hand its 486 product line to its embedded products group, which is already looking for new ways to support embedded customers who are tied to the x86 instruction set.

Ross Pushes HyperSparc to 125 MHz

Taking advantage of Fujitsu's advanced manufacturing capability, Ross Technology has increased the clock speed of its HyperSparc processor to 125 MHz. The new design uses a 0.4-micron three-layer-metal CMOS process to improve the clock speed by 25% over the previous 0.5-micron version *(see **0806MSB.PDF**)*. The new process also allows the L2 cache size to grow: the company now offers 512K and 1M caches in addition to the original 256K option. These larger caches become more useful as the CPU clock speed increases.

The new module is now shipping to OEM customers. Ross would not quote a list price for the new product. The company also has an end-user upgrade business but has not yet moved the new HyperSparc into this channel, although it will probably do so soon.

Fujitsu's new process is one of the most advanced in the world, slightly behind 0.35-micron processes from Intel and NEC. Fujitsu also builds Hal's Sparc64 processor *(see **090301.PDF**)* in the 0.4-micron process, although the Sparc64 uses a fourth metal layer. The new process has the same metal pitch as Fujitsu's 0.5-micron process; thus, HyperSparc's die size remains the same. Power dissipation is also fairly constant, as the smaller transistors compensate for the faster clock speed.

With the 1M cache, HyperSparc delivers 159 SPECint92 (peak) and 183 SPECfp92 at 125 MHz. The new processor thus offers slightly better integer performance than Sun's fastest chip, the 90-MHz SuperSparc-2, and significantly better floating-point performance. The new HyperSparc also outruns the fastest HP, MIPS, and PowerPC processors now shipping. Sun is currently shipping the HS-11 workstation, based on a 100-MHz HyperSparc processor, and will probably extend this line to the 125-MHz chip in the near future.

Sun expects its UltraSparc chip, due in 3Q95, to nearly double the integer performance of even the 125-MHz HyperSparc. Ross plans to continue enhancing its HyperSparc design over time but does not expect UltraSparc-like performance in the foreseeable future. HyperSparc probably will be eliminated from Sun's product line once UltraSparc is available, denying this high-volume account to Ross. The lack of the highest available performance could also limit Ross's upgrade sales. But Ross customers such as Force sell HyperSparc into the embedded VME market, for which the current HyperSparc performance is more than adequate.

Hitachi, VLSI Announce 0.4-Micron Process

Also pushing the boundaries of process technology are Hitachi and VLSI Technology. The two companies have jointly developed a 0.4-micron CMOS process for ASICs and other logic chips, based on Hitachi's 16-Mbit DRAM process. This process is the third developed by the two companies in partnership, allowing them to share development costs and second-source ASICs for each other. The companies will begin accepting ASIC designs late this year but don't expect volume production of 0.4-micron parts until mid-1996.

The companies label this process by its effective gate length, 0.35 microns, while we standardize on the drawn gate length, which is slightly larger at 0.38 microns. The new process uses a tight 1.4-micron metal pitch to increase density and allows up to five layers of metal. It is optimized for 3.3-V operation, which requires thicker gate oxides than those used by other 0.35-micron processes. These other vendors should get better performance out of their processes with thin gate oxides and 2.5-V supplies.

In addition to ASICs, both companies will use the new process to speed their embedded processors. Hitachi may move its SH-3 products, currently in 0.5-micron, to the new process, boosting clock speeds beyond 100 MHz. The forthcoming SH-4 products will probably debut in the 0.4-micron process. VLSI will probably shrink its ARM7 and future ARM8 devices to the new process as soon as it is available. Both companies plan to offer their processors as ASIC cores in the 0.4-micron process, allowing customers to build complex system-on-a-chip designs with up to five million transistors.

HP Discovers Flaw in Processors

Becoming another victim of a latent CPU bug, Hewlett-Packard revealed that as many as 20,000 systems it has shipped during the past eight months may contain a faulty processor. The affected systems use PA-7100 or PA-7150 chips. HP has informed the owners of these systems about the problem and will repair any system that contains a faulty CPU. All systems currently shipping have corrected processors. The company expects no significant financial impact from this problem.

The bug was created when HP tweaked its 0.8-micron process to improve frequency yields. Unfortunately, the changes affected a speed path in the 71x0 processors. Specifically, subword store instructions (STBx and STHx) can, under unusual circumstances, write incorrect data into the cache. The parity-checking logic on the CPU will generally detect the bad data and signal a machine check, preventing user software from seeing incorrect data. It is possible, however, for the chip to create bad data with correct parity.

The circumstances required to create the problem involve a complex series of instructions and occur only with certain data patterns, but at least one application is known to trigger the bug. HP has created a test program that determines whether a given processor contains this fault. The company refuses to reveal whether its processors have any other known bugs.

C-Cube Cuts Cost of Using MPEG

Continuing its leadership in MPEG encoding, C-Cube Microsystems has announced the CLM4400 MPEG-2 encoder. The four-chip set performs real-time encoding to MPEG-2 format in NTSC and PAL resolutions at up to 30 frames per second. The chip set will be available in volume in 3Q95 at a cost of $1,950 in 100-unit quantities.

C-Cube had previously announced the first real-time MPEG-2 encoder, the CLM4700, which uses eight video processors and costs about twice as much as the CLM4400. The cost reduction is achieved by eliminating support for the full CCIR601 resolution, which requires twice the horizontal resolution of NTSC or PAL. C-Cube claims that the less expensive system delivers "excellent perceived quality" and is adequate for digital ad insertion, electronic news gathering, and other applications that require low-cost encoders.

The same chip set can be used with different firmware for real-time MPEG-1 encoding. This format is often used for CD-ROM video; the new chip set reduces the cost of video-mastering systems. The four-chip set is compact enough to be included on add-in cards for PCs and workstations. Optivision (Palo Alto, Calif.) will be the first vendor to offer such products.

C-Cube also introduced a low-cost MPEG-1 decoder for PCs. The CL480PC partakes of a full MPEG-1 data stream and decodes both audio and video information. Using the new design, a complete MPEG decoding system consists of the 480PC chip, a 4-Mbit DRAM, and a bus-interface chip. Video data is provided in RGB or YCrCb formats that can be piped directly to many standard graphics controllers. Similarly, a variety of serial audio formats allows a number of standard audio DACs to be used with the 480PC.

The 480PC decoder is currently sampling. The company quotes a "high-volume" price of $31, competitive with that of video-only decoders, for 2H95 shipments. ♦

