Intel Ends 820 Delay

Intel has announced that its Camino chip set (see MPR 10/6/99, p. 30) is back on track, just in time for PC makers to introduce their RDRAM-based systems at Comdex, which starts today. Reacting to the news, which Intel CEO Craig Barrett confirmed in a speech on November 3, Rambus stock shot up $18 (≈25%).

Already unpopular with many DRAM and system vendors, RDRAM could have been put in serious jeopardy had the 820 delay dragged on for months. But Intel's Herculean efforts to fix the board layouts that caused the signal-integrity problems has made the event simply an annoying schedule blip that will not seriously impact RDRAM's future. —*K.D.*

Via Partners With S3 for PC Chip Sets

With its Apollo Pro133 chip set much in demand for high-end PC configurations (see MPR 10/25/99, p. 31), Via is hoping to strengthen its position in entry-level and midrange systems by teaming up with graphics vendor S3. A new joint venture of the two companies will produce PC chip sets with integrated graphics acceleration. Via has produced such products before (see MPR 8/24/98, p. 4), and similar chip sets are also available from SiS, Intel, and Acer/Nvidia.

Via and S3 both received P6 bus licenses from Intel last year (see MPR 12/28/98, p. 4), but Intel revoked Via's license when Via began offering what Intel regarded as unauthorized products compatible with the Pentium III's 133-MHz bus. S3's license from Intel is said to be broader, allowing the new joint venture to make products that Via alone may not.

The first fruits of the alliance are expected to be shown this week at Comdex, with customer shipments due early next year. Attendees will also see the first Via-branded processor based on Cyrix's Gobi, now renamed Joshua, a Socket-370 part with a 256K on-chip L2, giving Via a complete solution for motherboard and PC makers. —*P.N.G.*

SiS Rises to Via Challenge

Worried about being left in the dust by rival chip-set supplier Via Technologies and by Intel's fully integrated Timna processor, Silicon Integrated Systems (*www.sis.com.tw*) has licensed x86 CPU and related intellectual property from Rise Technology (*www.rise.com*). The terms of the transaction were not released, and Rise refuses even to acknowledge the deal.

Via, which recently purchased Cyrix from National (see MPR 7/12/99, p. 5) and Centaur from IDT (see MPR 8/23/99, p. 4), is apparently preparing to integrate x86-processor cores with its system-logic chip sets to attack the growing sub-$800 PC market. SiS, seeing that system logic might be subsumed into the processor, reacted by snatching Rise's technology before Via cornered the market on low-end x86 vendors.

Via may have gotten a better deal, however. Compared with Centaur's tiny WinChip cores, for example, Rise's mP6 core (see MPR 11/16/98, p. 1) is rather, well, distended. At 107 mm^2, the 0.25-micron mP6 is nearly twice size of the 0.25-micron WinChip 2. Moreover, WinChip 2 is 5% faster on Winstone 99 than the mP6 at the same frequency and has a 25% higher frequency to boot. The mP6 can legitimately claim some advantages in MMX and scalar floating-point performance, due to is wider issue, but it lacks 3DNow support, pretty much offsetting this advantage. The mP6 also has a measurable lead in power consumption, although hardly enough for SiS to write home to Taiwan about.

If Via's strategy pans out, SiS will need an x86 core to remain in the game; Rise's was the only one available. ALi seems to be odd man out, being the only major chip-set vendor left standing without an x86 core.

While the current Rise core may not be the ticket for SiS, it will certainly be better than starting from scratch. The mP6 was designed almost entirely in area-inefficient standard cells and, if properly funded, Rise could shrink the core significantly. If nothing else, Rise has accumulated valuable experience building x86-compatible cores. Perhaps SiS thought it was worth the investment just to capture that experience.

Given Rise's lack of revenue, the license may not have been very costly—certainly much less than the $200 million Via spent on Cyrix and Centaur. SiS—whose $265 million year-to-date revenues are up nearly 100% over last year's—may have thought the small investment in Rise was a gamble it couldn't afford not to take. —*K.D.*

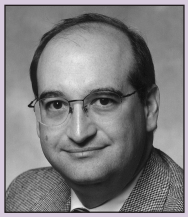
AMD Opens Fab 30

Thirty years after being founded, AMD has opened its latest state-of-the-art semiconductor manufacturing facility, Fab 30 in Dresden, Germany. Ground was broken for the fab in October 1996, and AMD says it will begin production of Athlon chips this quarter, with revenue shipments beginning 2Q00. Once complete, the fab investment will total $1.9 billion, about 25% of which will be footed by German federal and state governments. Along with the fab, AMD will open the Dresden Design Center, where it will employ approximately 60 engineers to design chip sets for Athlon.

The October 20 opening ceremony marked the completion of the "start-up" phase of the fab. Efforts now switch to the task of qualifying the fab to produce Athlon. Once in full swing, the facility will be able to crank out 5,000 200-mm (8-inch) wafers per week, which, by our estimate, is nearly 50 million Athlons per year—a capacity AMD isn't likely to need right away.

The new fab will run Motorola's advanced 0.18-micron copper HiP6L process (see MPR 9/14/98, p. 1). AMD acquired this process through a strategic agreement with

Leibson, Krewell Join Analyst Team



We are pleased to announce that Steve Leibson has joined the MicroDesign Resources analyst staff to lead our growing embedded efforts.

Steve has an enviable reputation in the high-tech industry as an award-winning journalist and innovator of consumer, industrial, and medical embedded-system products. He has held leadership positions at *EDN* magazine, Hewlett-Packard, and Cadnetix, and we look forward to his contributions to the MDR team. Steve is a graduate of Case Western Reserve, where he studied lasers, communications, and product development. He can be reached at *sleibson@mdr.cahners.com*.

We are also pleased to welcome Kevin Krewell to our analyst team. Kevin will be focusing his attention on PC processors and you'll be reading many stories under his byline in the near future.

Kevin's microprocessor experience spans more than 20 years, including positions with industry leaders AMD, Hazeltine, and Norden Systems Division of United Technologies. His experience in the defense, computer graphics, and semiconductor industries will bring new insights for the readers of MPR. Kevin holds a BSEE from Manhattan College and an MBA from Adelphi University. His email address is *kkrewell@mdr.cahners.com*.

Motorola, which also has the two companies partnering to develop future advanced logic processes. With HiP6L, AMD says it has already built preproduction versions of Athlon that run at more than 900 MHz. By the end of next year, the company expects to ship Athlons from Fab 30 running at 1 GHz. —*K.D.*

IBM to Ship PowerPC G4s

In a surprising turn of events, IBM has decided to make G4s for Apple after all. Last year (see MPR 6/22/98, p. 4), IBM handed the Macintosh market to Motorola when it packed its bags and walked out of Somerset. The split was inevitable, as the Apple market seemed too small and was shrinking too fast to support two giant semiconductor vendors.

Apple was never comfortable with the split, as it left the company dependent on a single supplier for all G4 and future processors. Its fears were validated when Motorola dropped the ball on early shipments of G4s and had to push the top-end 500-MHz versions into 1Q00. We suspect the fumble inspired Apple to apply new pressure on Motorola to license its G4 masks to IBM.

Although IBM and Motorola are both apparently bound by contract not to comment on the deal, both companies and Apple seem satisfied. Apple gets two sources and the security of having the world's most experienced vendor of copper microprocessors backing up its primary vendor. IBM gets to sell G4s to Apple, having invested little effort in developing the part. And Motorola, presumably, gets royalties from parts IBM sells. IBM will probably not be able to begin producing G4 parts until 1Q00.

The new agreement is probably far less threatening to Motorola than the previous "partnership" with IBM. This time Motorola owns the masks and controls the Somerset design team, giving it at least a fighting chance to stay out in front of technology-leader IBM. With Apple's market on the rebound, the agreement seems good for all parties to it, for Apple customers, and for PowerPC in general. —*K.D.*

Apple Buys Raycer Graphics

Apple Computer is purchasing Silicon Valley startup Raycer Graphics for an undisclosed sum, which we estimate at between $10 million and $20 million. Raycer was founded three years ago by its former president Dave Epstein, who left the company unexpectedly in February. Backed primarily by venture-capital firm Sevin Rosen Funds, Raycer was developing 3D-graphics chips for high-end CAD workstations.

Apple's rationale for acquiring the fledgling company is unclear. Apple is known to have been seeking to improve its in-house capability to design integrated system-logic chip sets for its Macintosh line of computers. Raycer is recognized as having a highly skilled VLSI design team that could fill Apple's needs in one fell swoop. Indeed, sources indicate that Bob Mansfield, vice president of engineering at Raycer, is preparing to take a seat at the head of Apple's internal VLSI design group, reporting directly to Jon Rubinstein, senior VP of all hardware development at Apple.

Whether Apple plans to use Raycer's chips or technology is the big question. About two years ago, Apple divested itself of all 3D-graphics hardware and software development. But this decision was made before Steve Jobs took the helm, so it may or may not represent the current strategy. If not, the purchase of Raycer could be an attempt to rebuild that capability.

Raycer's current chips, however, are targeted far above the level of 3D capability appropriate for the markets Apple is pursuing, and it could be several years before Raycer's chips would be suitable for those markets. But Raycer's personnel and experience in 3D might well be valuable to Apple, especially if the company intends to integrate graphics into its chip sets in the same way that Intel and other chip-set vendors are doing in the x86-PC market.

Sources indicate that Apple has succeeded in attracting about half to two-thirds of the Raycer team to join the company. Raycer's staff, however, is primarily composed of high-powered CPU-design and 3D-graphics experts. It is unlikely that many of those experts will stay unless Apple has some

interesting and challenging projects that go well beyond traditional north- and south-bridge chip sets. —*K.D.*

Alpha 21464 Targets 1.7 GHz in 2003

Determined to maintain leadership performance well into the next century, Compaq disclosed plans for its futuristic 21464 processor at last month's Microprocessor Forum. Work on the forthcoming Alpha design, code-named EV8, is already under way, but the chip is not scheduled to appear in systems until early 2003.

According to Compaq's Joel Emer, the 21464 will achieve single-thread performance leadership using an eight-way superscalar processor core running at speeds of up to 1.7 GHz. The new core's instruction-reordering capabilities will be enhanced significantly over those of the current 21264 to accommodate the greater issue width. As a result, Emer expects per-clock performance to nearly double compared with the 21264.

The high clock speed will be delivered by a 0.13-micron CMOS process with advanced features such as copper, low-*k* dielectrics, and SOI. Compaq did not name the fab, but we expect the 21464, like current Alpha chips, will be built by Samsung and possibly another foundry. Emer said the design will achieve clock speeds of 2.0 GHz and up, but these speeds will require more advanced IC process technology.

To further boost performance, the 21464 will implement four virtual processors on the chip, using a technique called simultaneous multithreading (SMT). This method allows instructions from up to four separate threads to share a common CPU core, filling dead cycles in one thread with unrelated instructions from another thread. Emer said SMT will increase performance by as much as 2× in a multithreaded environment, as is common in servers.

The system interface of the 21464 will be similar to that of the 21364 (see MPR 10/26/98, p. 12), which is due to appear in systems in early 2001. Like that chip, the 21464 will have a large on-chip L2 cache, several Rambus channels for main memory, and four additional ports for accessing other processors' memory. Presumably, the cache size and memory bandwidth will be increased from the 21364's to accommodate the more powerful core, but Compaq declined to provide additional details.

In 2002, the 21464 will compete against Intel's Madison, a 0.13-micron version of McKinley. We expect Madison to achieve similar clock speeds, and its IA-64 design may offer a performance advantage on single-threaded programs. Both chips are likely to deliver in excess of 130 SPECint95 (base). The 21464, however, could have an edge in servers, due to its multithreaded design; we expect the McKinley/Madison core will be single-threaded.

When discussing processors so far in the future, the biggest question is whether the vendors will be able to deliver on schedule. We won't know that answer for quite some time, but, for now, Compaq's announcement shows it is not backing down from IA-64 in the performance race. —*L.G.*

Intel Trims Celeron Prices for Christmas

Fine-tuning for the holiday selling season, Intel sliced 5–16% from its Celeron prices, as the table below shows. This marks Intel's fifth price cut in seven months for the Celeron line, which is most popular in consumer systems that reach their peak popularity in the fourth quarter. No further prices cuts or product introductions are expected until after the new year.

	List Price as of			Change from	
	8/1/99	9/12/99	10/24/99	9/12/99	8/1/99
Celeron-500	$177	$153	$143	-7%	-19%
Celeron-466	$137	$99	$94	-5%	-31%
Celeron-433	$103	$79	$73	-8%	-29%
Celeron-400	$79	$64	$64	0%	-19%

Although the company recently introduced a slew of new Coppermine products (see MPR 10/25/99, p. 1) at speeds up to 733 MHz, the fastest Celeron remains at 500 MHz, opening a large performance gap between the two lines. Earlier this year, that gap was as small as 33 MHz. The larger gap should help convince holiday buyers to seek a new Pentium III system for top performance. —*L.G.*

GigaPixel Describes First 3D Core

After a secretive two-year development effort, 3D-graphics startup GigaPixel has announced the availability of its first product, a 3D accelerator design offered by GigaPixel as an IP (intellectual property) core. Pricing was not disclosed.

The GP-1 core is based on GigaPixel's Giga3D architecture, which is similar to the PowerVR architecture (see MPR 3/9/98, p. 4). Like PowerVR, Giga3D renders each screen one region at a time, using on-chip memory.

Like other region-based rendering architectures, Giga3D renders only visible pixels. In typical scenes, where some objects are hidden behind others, this feature multiplies the actual pixel-drawing rate by the average amount of object overlap—which GigaPixel says is about 2.7:1 for today's 3D games—to achieve a faster effective rate.

GigaPixel's GP-1 test chip, based on the new core, renders 100 Mpixels/s, comparable to the effective speed of a conventional 3D chip with a fill rate of 270 Mpixels/s. This effective rate is slightly lower than that of today's best shipping 3D chips, but the GP-1 is far less complex than those chips and works with less-expensive commodity SDRAM.

Giga3D also excels in image quality. The GP-1 can perform full-scene antialiasing with no performance penalty. This results in 3D displays that look much better than those of competing chips operating at the same screen resolution. Other designs can perform antialiasing, but usually with a 75% reduction in pixel-drawing speed.

Unlike PowerVR and other region-based renderers, Giga3D hides all traces of its region-based nature from the host system. GigaPixel says that Giga3D is fully compatible with standard APIs and all existing PC 3D applications.

Several companies, including PowerVR partners VideoLogic and NEC, Oak, Stellar, and Microsoft have previously

introduced unconventional 3D-rendering architectures for mainstream PCs. None has succeeded. GigaPixel is the first to promise the performance benefits of region-based rendering with none of its hazards. If it can deliver on this promise, it will find a ready audience for its products. —*P.N.G.*

Real3D Absorbed by Intel

Real3D, the former Lockheed Martin division that provided the 3D technology for Intel's 740, 752, and 810 products (see MPR 5/10/99, p. 17), has been purchased by Intel. Real3D never developed as an independent business and had ceased operations shortly before Intel acquired it. Though Real3D was working on PC-graphics chips of its own, it lacked the resources to bring them to market.

Intel's purchase of Real3D for an undisclosed sum reflects the value of Real3D's intellectual-property portfolio, which includes many fundamental patents in the area of 3D graphics. Intel already had a license to these patents (see MPR 4/20/98, p. 1), but now that it owns the patents outright it may be able to use them against other companies in the 3D industry. Intel will also rehire some of the Real3D engineers who were laid off prior to the purchase, but other 3D companies are said to be bidding for the same personnel.

Though Intel has yet to recoup its considerable investments in 3D graphics, it now has perhaps the most substantial patent portfolio in the business, plus important cross-license agreements with companies such as SGI and S3. That Intel would invest additional money in Real3D suggests that it remains committed to 3D, and Intel can afford to be patient. Perhaps future Intel 3D products will be more successful than those it has produced to date. —*P.N.G.*

Equator Intros MAP1000A, Updates Roadmap

Equator has boosted the speed of its original MAP1000 media processor (see MPR 12/7/98, p. 1) and updated its roadmap for future products. The new MAP1000A, which began shipping in August, is a 0.18-micron shrink of the original 0.25-micron design. The new chip operates at 220 MHz, up from the 150-MHz clock rate of its predecessor. The MAP1000A is priced at $110 in 10,000-unit quantities.

Equator expects to begin shipping the MAP-CA, a device optimized for digital-television applications, by the end of this year. The MAP-CA will operate at 300 MHz and cost just $40. The MAP-CA2 will follow by the end of 2000 with a 450-MHz clock speed and a $25 price tag.

The company recently received $27 million in third-round financing. Equator's investors now include major cable-TV operators, telecommunications companies, and video-equipment makers. Some of these investors will also be Equator's customers. With money, products, and customers, Equator (*www.equator.com*) has the chance to prove that it can succeed where previous media-processor makers have failed—in consumer products. —*P.N.G.*