VOLUME 11, NUMBER 15
NOVEMBER 17, 1997

MICROPROCESSOR REPORT

THE INSIDERS' GUIDE TO MICROPROCESSOR HARDWARE

Digital Sells Its Chip Business

Intel Gets Fab, StrongArm in Settlement of Legal Battle

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As part of an agreement to settle the patent litigation between the two companies, Intel has agreed to buy Digital's entire semiconductor operation, including its Hudson (Mass.) fab, for approximately $700 million. Intel will also pay Digital a smaller amount to set up a 10-year patent cross-license between the two companies, effectively ending the litigation. The deal reportedly improves Digital's discounts on future purchases of Intel processors as well.

Under the agreement, Intel will build Alpha chips for Digital, since the latter will no longer have a fab. Digital will continue to be responsible for developing and marketing Alpha microprocessors; Intel's role will be solely as a foundry. But as part of the deal, Digital has endorsed Intel's IA-64 technology, and we believe that, over time, IA-64 will supplant Alpha within Digital's product offerings.

In addition to the fab, Intel gets Digital's non-Alpha chip business, including the company's networking chips and its StrongArm microprocessor family; Digital will no longer market these products. Intel says it will offer jobs to all affected Digital employees, but it isn't clear how long it will maintain these product lines. Intel plans to fit out the Hudson fab for its new 0.25-micron process and to manufacture a variety of Intel products there, but it must await government approval, which could take months.

Alpha Products Remain on Track—For Now

Digital claims it remains committed to the Alpha architecture and that the Intel deal has no effect on its Alpha plans. Like Silicon Graphics and Sun, Digital will simply have its processors built by an external fab.

Relying on Intel as a foundry could have advantages. In the short term, the Hudson fab will continue to run Digital's 0.35-micron process, and in the future, Digital's 0.25-micron process. Under Intel's management, the fab will also run Intel's 0.25-micron process, which is slightly different from Digital's (see MPR 9/16/96, p. 11). Intel believes that both 0.25-micron processes will run on the same production line, however, so it will simply switch from one process to the other, depending on the type of chip being manufactured.

In the 0.18-micron generation, Digital will design its chips for Intel's process, eliminating this bifurcation. Digital has often lagged Intel by as much as a year in deploying a new process generation; the deal could allow Digital to ship 0.18-micron Alpha processors well before it could have without Intel. On the other hand, Intel's process may lack some of the performance-enhancing features included in Digital's current designs, but Intel's 0.18-micron process will unquestionably be faster than Digital's 0.25-micron process.

The downside for Digital may be a lack of responsiveness from the fab. Today, the Hudson fab can tweak the process to achieve maximum clock speed and select a handful of parts from the far end of the yield curve to fill Digital's fastest speed grades. Under Intel, the fab will be managed to achieve high volume, not the maximum possible performance, and exceptions for the Alpha parts may be more difficult to make. Digital says it has contractual guarantees that Intel will produce Alpha chips at the same speeds they are today, but we would not be surprised if the transition made it more difficult for Digital to achieve industry-leading clock speeds in the future.

Interest in Alpha Will Wane

In the long term, we suspect Digital will phase out its Alpha line. Once the company begins selling Merced systems in 1999, interest in the Alpha boxes is likely to wane. Digital said it will port Digital Unix to IA-64, and Microsoft has already announced plans for Windows NT on Merced, so nearly all of Digital's workstation customers and at least half of its server customers will be able to move easily to the new Intel-based systems. (Digital's other customers use OpenVMS, which will probably remain on Alpha only.)

Digital insists its Alpha chips will maintain a performance edge over Merced on at least some applications, and this may be true at the very high end. But we expect Merced to match or beat Alpha's performance on most applications (see MPR 10/27/97, p. 1), leaving little space for Alpha. With Merced in the mix, sales of Alpha systems have nowhere to go but down from their already modest levels.

Digital could ease its customers' conversions by developing an Alpha-to-IA-64 binary translator. This would be much simpler than the company's current x86-to-Alpha product, FX!32 (see MPR 3/5/96, p. 11), because of the more straightforward nature of Alpha code. Digital executives would not commit to developing such a product, but the company clearly has the expertise to do so.

Digital denies any plans to phase out Alpha and in fact has not given up its quest to move Alpha into the high-volume PC market. But the company's inability to deliver the low-cost 21164PC and the market's unenthusiastic response to FX!32 have left Digital unable to sign any significant PC makers for Alpha, despite the support of chip makers Mitsubishi and Samsung. Without Digital Semiconductor, the company will have no sales force dedicated to Alpha chips, making it even more difficult to find new chip customers.

Intel must be counting on Digital to move away from Alpha: the company has agreed to provide leading-edge fabrication technology to a chip that will be Merced's toughest competitor on performance, an arrangement that doesn't make sense in the long term. Although Digital CEO Robert Palmer has been an Alpha champion, Digital's board of directors is reportedly in favor of jettisoning Alpha, a stance that may have enabled the settlement (see sidebar, next page).

StrongArm May Slip Through Intel's Grasp

Since Digital dumped its entire semiconductor operation in Intel's lap, Intel is now trying to decide what to do with the various pieces. Digital's lesser-known products include PCI-to-PCI bridge chips and 10/100-Mbit Ethernet interfaces, some of which have become popular in some circles. These devices should easily fit into Intel's existing product lines and support Intel's objective of supplying silicon for high-end systems based on Intel processors.

StrongArm is a different story. This inexpensive chip (see MPR 2/12/96, p. 1) is one of the fastest embedded processors available, but its power consumption is low enough for many portable devices. As such, it is a perfect complement for Intel's current embedded offering, the i960, which is expensive, slow, and power hungry. Whereas the i960 made its name in laser printers and other office equipment, StrongArm is ideal for PDAs, set-top boxes, and network computers.

There's the rub. Intel's corporate strategy is that every product should enhance the PC. Even the i960 has recently been recast as an I/O processor for high-end x86 servers. Adding another embedded processor that isn't PC compatible could be a needless distraction for Intel.

Worse yet, StrongArm conflicts with some of Intel's existing PC-based initiatives. For example, Intel is promoting x86-based reference designs for network computers and set-top boxes, products where StrongArm-based chips such as the SA-1100 (see MPR 9/15/97, p. 1) are technically superior to the x86 offerings.

A third strike against StrongArm is its use of a non-Intel architecture. Among the assets being acquired by Intel is Digital's ARM license; although Intel says some details must be worked out, we expect ARM would be happy to let Intel build StrongArm chips. But Intel has never used an instruction set it didn't own, and NIH (not invented here) is the prevailing mentality at the microprocessor giant.

If Intel decides it is interested in making an aggressive move into emerging consumer-electronics markets, however, StrongArm is the perfect vehicle. An Intel StrongArm (two words that seem natural together) could dominate the market for Windows CE devices, creating a new Wintel axis. These products could offer incremental revenue growth to the company, albeit with smaller margins than for x86 processors. Intel must decide whether to maintain its shaky position that the PC is the solution to all problems, or take advantage of a fortuitous opportunity to launch a new processor product line.

New Fab Could Aid Intel's Graphics Initiative

Intel plans its fab capacity years in advance, so a sudden decision to buy a fab is unusual. In fact, Intel has never purchased a fab before, although it has relied on external foundries for cache and other peripheral chips. The initial idea for Intel to purchase the Hudson fab probably came from Digital, but Intel could have simply resold the excess fab capacity or used it as-is for older products (chip sets, etc.). Instead, Intel says it hopes to ramp the Hudson fab to full capacity after upgrading it to the company's leading-edge 0.25-micron process.

One theory is that Intel underestimated the demand for its 0.25-micron capacity during its initial planning cycle and needed a quick fix. Certainly, the company has been capacity constrained recently (see MPR 4/21/97, p. 3), but those limitations appear to be easing already. The Hudson fab probably won't start producing 0.25-micron Intel chips before 3Q98, too late to help accelerate the conversion to Pentium II.

Another use for the new fab could be for Intel's graphics initiative. Intel's initial 0.25-micron fab plans may have neglected graphics chips, assuming they could be built on older fabs. It is now apparent that competitive 3D graphics chips will require 0.25-micron technology. If Intel is able to grab 10% of the PC graphics market in 1999, these chips could consume up to half the capacity of the Hudson plant, with at least some of the rest devoted to Digital's needs.

In any case, the new plant gives Intel an enormous amount of 0.25-micron capacity. The plan now includes five fabs running the 0.25-micron process (Santa Clara, Chan-

dler, Albuquerque, Leixslip, and Hudson), compared with just three for the current 0.35-micron process. One benefit of the Hudson purchase is that Intel can delay the build-out of its planned Ft. Worth (Texas) fab from 1999 to 2000. That plant was originally planned as a 0.25-micron fab but will now start at the 0.18-micron level.

Getting Approval May Be Dicey

The settlement is on hold until it is approved by both the U.S. Federal Trade Commission (FTC) and the judges presiding over the suits. To gain FTC approval, the parties must show that the new arrangement does not diminish competition in the microprocessor market. If Digital were to admit that it plans to phase out Alpha, the FTC would almost certainly refuse to let the deal go through.

Thus, the dichotomy between Digital's public statements and private comments. In particular, Palmer and other Digital executives have taken a strong public position that Alpha will continue well into the future and is actually helped by this deal. Of course, this stance is necessary to protect Digital's Alpha business until Merced systems are available, but it also paints a picture that the FTC wants to see. Similarly, Intel will undoubtedly refuse to make any negative comments about the future of StrongArm until the deal is complete, a process that the companies expect will take up to six months.

The FTC is already investigating Intel's business practices, in part because of the heavy-handed way it originally responded to the Digital suit, and has a separate investigation of Intel's agreement to purchase Chips and Technologies (see MPR 8/25/97, p. 4). Its examination of the new agreement may take several months, but given the agency's unwillingness to hold up such deals in the past, this one seems likely to ultimately get a green light.

Although Intel will not admit guilt, of course, the form of the settlement implies the company was concerned that Digital could prove patent infringement. Typically, patent cross-license deals are not royalty bearing: both companies simply exchange patents. In this case, however, Intel reportedly agreed to pay Digital $200 million over four years in addition providing access to its patents. Intel has also granted Digital the prestigious Tier 1 discount status; because of its moderate x86 volumes, Digital has been in Tier 2, although the companies would not confirm any such details of the agreement. Intel doesn't want any royalty payment to be reported, since it might encourage other lawsuits.

The settlement clearly weakens a threat to Intel's product line and strengthens IA-64's hold on the high-end system market. Digital characterizes the change as a win for Alpha, but in fact it is likely to ultimately remove Digital from the processor business, a tragic fall for the company that invented the minicomputer more than 30 years ago. And so, we move one step closer to a world in which all significant computers are built using Intel microprocessors. M

The Making of The Deal

When Digital first sued Intel (see MPR 6/2/97, p. 26), Intel's motivations were obvious: make the suit go away before it jeopardized the enormous revenue stream from Intel's Pentium and Pentium II products. Yet the company was eager to avoid appearing to make a large payment to settle the suit, since that might seem to be giving in to patent blackmail and thus encourage similar suits.

Digital's motivations for its suit were less apparent. Obtaining some payment from Intel is clearly a benefit for the financially weak company. The patent cross-license gives Digital more flexibility in its future processor designs and settles Intel's counterclaim of patent infringement.

At some point in the talks, Digital's semiconductor operations came into play. Digital has long maintained its own fabs to build high-performance chips for its computer systems, but the Hudson fab was too large for the modest number of chips that Digital currently requires. Digital set up its semiconductor business in 1993 to develop and sell chips on the open market, hoping to create enough demand to fill the fab. Unfortunately, neither the Alpha processors nor Digital's other chips became big sellers, leaving the semiconductor operation losing as much as $100 million a year, according to one report.

Furthermore, Digital's board of directors, along with some executives in the systems group, had allegedly become disenchanted with Alpha. Despite its technical superiority, Alpha has not caused Digital's system sales to surge, and no other large computer vendor has adopted the architecture. Substituting Intel's IA-64 technology for Alpha would cut Digital's costs while providing access to industry-standard hardware and software.

Digital can't convert to IA-64 immediately, since Merced won't ship for two years, and Digital has a large installed base of Alpha customers. Thus, Intel had to commit to building Alpha chips during a potentially lengthy transition period. Sources indicate Intel is required to supply Alpha chips for up to seven years.

Thus, the agreement lets Digital get rid of its unprofitable semiconductor operation and focus on its primary mission of providing high-performance computer systems and service. The lawsuit had chilled Digital's relations with Intel, but now Digital has unfettered access to all of Intel's products again.

Intel has managed to both eliminate a threat to its revenue stream and bring Digital on board as an IA-64 customer, a move that, before the first IA-64 chip even ships, almost guarantees Merced will become the leading processor for high-end systems (see MPR 11/17/97, p. 28). Intel also gains a useful fab for merely book value. Compared with Intel's $8 billion cash hoard, the cost of settling the suit is, in the words of Intel president Craig Barrett, "not material."