

Intel Countersues Digital Over Patents

New Motion Aimed at Forcing Patent Cross-License

by Rich Belgard and Linley Gwennap

As we expected, Intel has filed a countersuit against Digital, claiming it infringes on 14 of Intel's patents. The countersuit was filed on August 12 as an amendment to Intel's original response to Digital's May 12 patent-infringement lawsuit against Intel (see MPR 6/2/97, p. 26). As Table 1 shows, the patents cover a range of technologies—including CPU design, system design, and semiconductor fabrication—such that products ranging from Digital's Alpha chips and servers to its x86-based PCs and even its service business are affected.

From a public-relations standpoint, this suit is clearly a tit-for-tat exchange. To "prove" its superiority, Intel asserted four more patents than Digital. The allegedly infringing products make up the bulk of Digital's revenue, just as Digital's suit targeted the key revenue producers in Intel's product line. To accomplish this task, Digital merely alleged infringement by Pentium and Pentium II; Intel was forced to claim infringement by Digital's Alpha microprocessors and systems, its x86-based PCs, and even its service organization.

Filing the complaint as an amendment to the Digital suit, rather than as a separate suit, is a tactic aimed at forcing a settlement and avoiding a large damage award to Digital. If Intel had filed a separate suit in a California court, any action in that suit would not have prevented Digital from winning its case, which is being heard in Massachusetts. With both claims being evaluated together, any Digital victory is likely to be tempered by an Intel victory. Now, Digital must not only prove Intel infringement but also disprove that its products infringe on Intel's patents.

In fact, with a single judge viewing both sets of infringement claims, the likely outcome is that the judge will order the sides to negotiate a cross-license agreement. A similar event happened in March 1990, when a long-running dispute between Motorola and Hitachi ended with a judge ruling that both companies infringed on each other's patents and enjoining both from shipping the infringing products (see MPR 4/18/90, p. 1). The companies quickly negotiated a patent cross-license agreement.

In the case of Intel and Digital, however, such an agreement may not occur for years, after the judge has had time to evaluate all of the claims and counterclaims. Intel has both the legal muscle and the fat wad of cash to better withstand such a drawn-out process.

Intel Patents At Suit

Since the original suit was filed, Intel has been combing its patent portfolio in preparation for this countersuit. With more than 1,100 patents on microprocessor technology

alone and close to 1,800 total patents in its portfolio, it has taken Intel a while to line up its ducks.

The 14 patents over which Intel countersued Digital, listed in Table 1, include six patents that relate directly to microprocessors, two that cover specific semiconductor manufacturing processes, three that relate to system and motherboard issues, two that relate to video compression and decompression, and one that covers mechanical design. Because one of the patents, 5,579,522, covers a technique used to update systems in the field, Intel claims Digital's extensive service organization is in patent violation.

One of the microprocessor patents, a very early patent originally covering the 8086, has been seen before in other lawsuits. In case simply asserting this patent does not make the point clearly enough, Intel's filing reminds the judge that "since it introduced the world's first microprocessor, Intel has been the recognized worldwide leader in the development and manufacturing of microprocessors."

The six microprocessor patents asserted, listed at the top of Table 1, bear directly on Digital's Alpha microprocessors. As can be seen from the titles, most of these patents relate to cache memories. Of the processor patents, the two most probable infringers are 4,449,184 and 5,367,660.

4,449,184 Patent Has Been Asserted Before

The 8086 patent is 4,449,184, an early patent that Intel has used against several products, including Chips and Technologies' Super386 and Cyrix's 486. Intel also sued UMC on the foreign equivalents to the '184 patent when UMC released its Green486 product outside the United States. In none of these cases, however, has the patent actually been litigated.

Chips and Technologies settled its lawsuit with Intel in the early 1990's before actually going to court. In its settlement, Chips agreed to stop selling its Super386 product. The leverage that Intel used with this microprocessor patent and others forced Chips to change its global strategy, a change that until only recently had Chips on its knees. Ironically, Intel recently acquired Chips and Technologies (see MPR 8/25/97, p. 4).

Cyrix was preparing for trial on the '184 patent, but Intel led its offensive with 4,972,338, the so-called Crawford patent. After millions of dollars in legal fees, the court, in a historic ruling (see MPR 2/14/94, p. 8), gave Cyrix the rights to Intel's patents through the Intel cross-license agreements held by its manufacturing partners, SGS-Thomson, Texas Instruments, and IBM.

UMC, although never accused of infringing the '184 patent, was accused in five other countries of infringing the corresponding foreign counterparts. UMC never sold or

imported its Green486 into the U.S., so it could not infringe a U.S. patent. Like Chips and Technologies, however, UMC ultimately agreed to stop manufacturing the Green486.

So, although the '184 patent arguments have never actually been heard in a courtroom, there is plenty of history and discovery about the patent, and Intel knows how to defend it.

'184 Claims Are Broad

The title of '184 does not tell the story of the claims, which describe a microprocessor chip with two asynchronous, overlapped units: an "upper control means" that is responsible for fetching instructions and data from memory, and a "lower control means" for executing instructions from the upper control means. The upper unit is required to have a FIFO to hold instructions for delivery to the lower control unit.

This claim covers a microprocessor with at least a two-stage pipeline where the first stage asynchronously fetches and holds instructions for execution in the second stage. Since the Alpha chips (and virtually every other microprocessor today) has at least these pipeline stages (and many more), Digital will have an uphill battle showing that its chips do not infringe this patent. The noninfringement arguments may target the FIFO.

Since this patent, originally filed in 1981, has been through so much anticipated litigation, it will be very unlikely that Digital will be able to invalidate the patent in light of prior art. Intel has seen prior art in the discovery process of the other lawsuits and would not have asserted this patent against Digital unless it believed the patent would stand up.

The 5,367,660 Patent

The '660 patent is a result of work on the Intel i860. The patent was filed in 1994 but is a result of a patent originally filed in 1991. It calls for a line buffer between the processing elements of the microprocessor and the cache. The line buffer is unique in that it contains valid bits for portions of the buffer. By incorporating the valid bits on a granularity smaller than the line as a whole, data may be transferred to the processor when the line buffer is not completely filled. This mechanism allows requested data (or instructions) to be read when the buffer, for example, is being filled from memory. Conversely, the valid bits allow for the transfer of data from the line buffer to the cache in subunits, so a write to the cache may be completed in steps.

This patent may not be quite as bulletproof as '184, since it has not gone through the litigation process. It appears to be fairly similar to an implementation used in Intergraph's Clipper processor, which would predate this work.

Cyrix Is Safe for Now

Cyrix also filed a patent-infringement suit against Intel on the same day as Digital. Intel has not yet countersued Cyrix for two reasons. Cyrix is currently selling x86 chips manufactured by IBM under an existing Intel patent license. Previous court rulings have held that this license is applicable to the Cyrix

chips. The pending acquisition of Cyrix by National Semiconductor (see MPR 8/25/97, p. 1) would put Cyrix's chips under the protection of National's own Intel patent license.

In spite of this, Intel could countersue Cyrix in an attempt to better define the scope of the license rights granted via a foundry agreement. The original foundry-license ruling was made when Intel sued ULSI for infringing Intel's floating-point patents. ULSI successfully argued that because Hewlett-Packard was manufacturing its 387-compatible coprocessor and HP was licensed to Intel's patent portfolio, the resulting coprocessor was licensed. Since that decision, Intel has been plagued with this argument.

The countersuit against Digital, while expected, was filed in an interesting way. By combining its countersuit with the original suit, Intel seems to be signaling its willingness to negotiate a patent cross-license pact with its foe. Neither side likely wants the costly distinction of participating in one of the largest patent trials in history. The question is whether the terms and conditions Intel might place on a license agreement will be acceptable to Digital. ☐

Patent No. Issue Date	Title	Alleged Infringer
4,449,184 5/15/84	Extended Address, Single and Multiple Bit Microprocessor	21064, '164, '264
5,155,816 10/13/92	Pipelined Apparatus and Method for Controlled Loading of Floating-Point Data in a Microprocessor	21164
5,467,460 11/14/95	Method and Apparatus for Minimizing Data Transfer to Main Memory from a Writeback Cache During a Cache Miss	21164, 21264, StrongArm
5,561,780 10/1/96	Method and Apparatus for Combining Uncacheable Write Data into Cache-lined Write Buffers	21164, 21264
5,455,924 10/3/95	Apparatus and Method for Partial Execution Blocking of Instructions Following a Data Cache Miss	21164
5,367,660 5/11/94	Line Buffer for Cache Memory	21164
5,091,332 2/25/92	Semiconductor Field Oxidation Process	21164
5,278,105 1/11/94	Semiconductor Device With Dummy Features in Active Layers	21164
5,579,522 11/26/96	Dynamic Nonvolatile Memory Update in a Computer System	Servers & PCs*
5,333,276 7/26/94	Method and Apparatus for Priority Selection of Commands	Servers & PCs*
5,630,094 5/13/97	Integrated Bus Bridge and Memory Controller That Enables Data Streaming to a Shared Memory...	Venturis FX PCs
5,134,478 7/28/92	Method and Apparatus for Compressing and Decompressing a Digital Video Signal Using Predicted and Error Images	21230/1 video codec
4,823,201 4/18/89	Processor for Expanding a Compressed Video Signal	21230/1 video codec
5,513,070 4/30/96	Dissipation of Heat Through a Keyboard Using a Heat Pipe	VP650 notebook

Table 1. Intel claims that Digital infringes on 14 of its patents. *including Alpha motherboards and servers as well as Venturis PCs