IBM and Cyrix Ink Five-Year Pact

IBM to Build Chips for Cyrix and Market Them Under IBM Name

by Michael Slater

IBM and Cyrix have entered into a five-year agreement for IBM to manufacture x86 microprocessors for Cyrix and to market them under the IBM Microelectronics name as well. This agreement could empower Cyrix to become a much more significant threat to Intel, and it puts IBM into direct competition with Intel. The IBM/Cyrix combination could also challenge AMD for the number two spot in the x86 market.

IBM Microelectronics, which has been making 486 chips for Cyrix since last September, plans to market the full Cyrix product line in the second half of this year. The new agreement will, for the first time, enable IBM to compete unfettered in the merchant market for x86 processors; its current 486SLC2 and Blue Lightning designs were developed using Intel's intellectual property, and IBM is contractually prohibited from selling them except as part of a system or subsystem (such as a CPU module). IBM is limited to selling no more chips than it supplies to Cyrix, ensuring that IBM gains no more than a 50% market share for the Cyrix-designed chips.

IBM said that it will continue to enhance the Blue Lightning product line, but that its focus for the Pentium-class market would be on the M1. Many of the engineers who had worked on Blue Lightning reportedly are now working on PowerPC, and it now appears that IBM's internal x86 efforts are focused on providing x86 compatibility for PowerPC chips.

IBM has been making Cyrix's 486 chips in an 0.8-micron, two-level-metal process. The two companies are now modifying the designs for a three-layer-metal version of IBM's 0.7-micron process, which should result in a considerable die size reduction and speed increase. Such chips, which Cyrix expects to have in production late this year, could be capable competitors to Intel's DX4 line—especially if the cache size were increased.

M1 to Challenge Pentium in 1995

The agreement will be most significant for Cyrix's forthcoming M1 processor, due late this year or early next, and for future high-end chips. Cyrix is designing the M1 for a 0.65-micron, four-layer-metal process similar to the CMOS-5L process IBM uses for the PowerPC 603 and 604. (IBM often calls this a 0.5-micron process, but we refer to it by its drawn gate length.) IBM is one of very few semiconductor makers in the world that offers foundry customers the leading-edge process technology needed for such a chip, and it also possesses the all-important Intel patent license.

Having IBM as its foundry partner removes the manufacturing uncertainty regarding the M1. In addition to providing the needed capacity, the IBM process should enable high clock rates and produce a competitively sized die. IBM declined to quantify its production capacity but claimed that it will not be production limited. Sources indicate that IBM could produce millions of M1 processors with less than 10% of its fab capacity.

Cyrix described its M1 microarchitecture at the Microprocessor Forum *(see **071401.PDF**)*, but many key details—including the cache size, pinout, bus configuration, performance, pricing, and availability—remain undisclosed. AMD has disclosed virtually no details about its K5 Pentium competitor. As a result, it is hard to evaluate just how much of a threat the M1 represents to Intel and AMD.

Cyrix claims that its chip delivers better integer performance than Pentium at the same clock rate. Whether Cyrix and IBM will be able to match Intel's 100-MHz clock rate remains unknown, however. Cyrix could offer the M1 core in a 486 or P24T pinout as an upgrade for the 486 market, similar to its strategy with its first microprocessor, the 486SLC. It might also offer the chip in a Pentium-compatible pinout or with its own high-performance pinout.

SGS Role Likely to Shrink

The IBM agreement signals a reduced role for SGS-Thomson, which was Cyrix's primary foundry until IBM began producing wafers for Cyrix last fall. (Texas Instruments also has served as a foundry for Cyrix, but was never its primary foundry, and the relationship has now dissolved into litigation.) Cyrix president Jerry Rogers said that 60% of its recent production has come from IBM.

SGS recently stated its intention to market Cyrix's designs under its own name, so there will be three sources (counting Cyrix) for Cyrix's 486-family processors. SGS gained the right to market the Cyrix chips as part of a deal to guarantee Cyrix a certain amount of fab capacity. SGS is unlikely to be able to produce the M1 processor, however, especially if the M1's design is tuned to IBM's process.

Even 486 chips produced by SGS's current process technology may have a hard time competing. Cyrix's 3-V, 50-MHz 486 cannot currently be built on the SGS process, for example, and once IBM and Cyrix move the designs to IBM's 0.7-micron process, their advantage will

increase. For its part, SGS says that it will equip its Phoenix fab with a 0.5-micron line, possibly giving a boost to SGS-produced Cyrix designs.

IBM's Opportunities

IBM also has rights to use the Cyrix CPU cores in ASICs, although its options to modify the cores themselves are limited. This capability could be valuable in building highly integrated chips for subnotebook and handheld computers, either for OEM customers or for the IBM PC Company. Some Cyrix technology might conceivably be used in the PowerPC/x86 hybrids rumored to be in development at IBM.

The Cyrix deal is with IBM Microelectronics, not the IBM PC Company, but the PC Company presumably will be more interested in the Cyrix designs now that they will be made by IBM—at least the stability and capacity of the manufacturer shouldn't be in question. As the largest maker of PCs, IBM would be a valuable design win for Cyrix's processors.

IBM's agreement with Cyrix sheds new light on its decision not to build Intel's Pentium design. The M1 is a CMOS device and is being designed for IBM's process technology, but the BiCMOS Pentium would have required IBM to make significant investments to provide a compatible process. In addition, Intel almost certainly refused to grant IBM a license to sell Pentium chips on the merchant market.

That IBM would depend on an outside supplier for its x86 processor designs is indicative of its strategic focus on PowerPC. The x86 processors represent an opportunity to produce considerable near-term revenue at high profit margins, while the PowerPC family will take longer to reach comparable volumes.

IBM's deal with Cyrix could, however, have an unintended negative effect on PowerPC. IBM's entry into the x86 market is likely to push prices down, making the x86 chips stronger competitors to the PowerPC family. When the M1 starts shipping, IBM's x86 chips could bring down the price of high-end x86 performance, thereby reducing the price/performance advantages of the PowerPC line. Given the immense size and high profits of the x86 market, though, IBM can't ignore it just to bolster PowerPC.

The agreement with Cyrix raises questions about whether IBM will continue to produce chips for NexGen. The M1 processor is likely to compete with NexGen's offerings, so IBM would be enabling a competitor by providing foundry services to NexGen. IBM is rumored to be interested in marketing the NexGen chip set under its own name, but it is not clear whether this would make sense along with the Cyrix products. NexGen is clearly ahead in completing its design, but the Cyrix agreement seems to indicate that IBM has chosen the M1 core as the horse it will ride in the Pentium-class market.

The Legal Challenge

It does not appear that Intel could challenge IBM's right to make the Cyrix chips and sell them under the IBM name, but Intel is questioning Cyrix's right to sell the chips. Intel claims that IBM's patent license does not cover chips made as part of a foundry relationship.

The question of IBM's patent license was raised in the recent legal settlement between Cyrix and Intel *(see **080202.PDF**)* as one of the remaining unresolved issues and is currently being reviewed by Judge Brown in Sherman, Texas. IBM has intervened in this case, and Cyrix now views it as a dispute between Intel and IBM. Brown is expected to issue a ruling this summer, which will surely be appealed by whichever side loses.

Intel's stance is based on the wording of its patent cross-license agreement with IBM. One of Intel's few legal victories in the foundry licensing area was in the Sanyo/Atmel case. The judge ruled that Sanyo could not build chips for Atmel using Intel's patents because Sanyo's license referred specifically to "Sanyo products." The SGS-Thomson and Texas Instruments licenses do not include a similar phrase; IBM's apparently does.

Despite Intel's assertions, IBM Microelectronics general manager Michael Attardo said that he believes there is "no basis for litigation" regarding IBM's agreement with Cyrix. IBM is a company that once outlitigated the U.S. government and now appears ready to play hardball with Intel.

Both IBM and NexGen executives declined to comment on the negotiations between the companies, but NexGen officials said that they believe their plans with IBM are on track and won't be affected by the Cyrix deal.

x86 Market Heats Up; Will Boil Next Year

Next year is shaping up to be a challenging one for Intel, with IBM and Cyrix marketing the M1, NexGen shipping its 586, and AMD offering its K5. AMD will have dramatically increased capacity for both 486 chips and the K5, thanks to its foundry agreement with Digital and its new Fab 25, which is expected to ramp up over the course of 1995. This combination of competitors will chip away at Intel's market share, and perhaps even more significant, it will put pricing pressure on Intel's high-end processors, which is where the company earns its most impressive margins.

With its large production capacity, advanced process technology, and established brand name now combined with Cyrix's designs, IBM Microelectronics is turning into Intel's worst nightmare. IBM is determined to reduce its dependence on Intel and is perhaps also motivated by a desire to blunt Intel's power. Without a partner like IBM, the damage Cyrix could do to Intel was relatively minor; now Cyrix is a major threat, provided it can deliver on its M1 promises. ♦

