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IBM, Infineon, UMC Gang Up On 0.13

By Keith Diefendorff {2/14/00-02}

Building on the long-standing and successful DRAM/logic partnership between IBM and Infineon (formerly Siemens Semiconductor), United Microelectronics (UMC) is joining the alliance to help develop new logic processes for the 0.13- and 0.10-micron generations.

The development work will be carried out at IBM's Semiconductor Research and Development Center in East Fishkill (New York) by a team of engineers having members from all three companies. The companies did not disclose the level of investment behind the project, but Jim Kupec, president of UMC (USA), said funding would be evenly balanced among the three players. The alliance agreement extends through 2003, but the companies are considering extending it beyond that date.

Apparently, IBM will jump-start the new alliance with some of its advanced processes. Bijan Davari, VP of advanced logic technology at IBM, said the agreement gives the partners access to IBM's copper interconnect, embedded DRAM, and some mask-development and back-end-design technologies. We find it unlikely that IBM would give away such precious technologies; indeed, sources indicate that the price of admission for UMC may have been as much as $250 million, although the companies have issued no official statements confirming that. But even if no money changes hands, IBM still hopes to benefit from the alliance: by joining forces with a huge foundry like UMC, IBM gets more companies to design products to its design rules, which could pay off in the long run. IBM was careful to point out, however, that it will not give up its crown jewels, silicon on insulator (see *MPR 8/24/98-02*, "SOI to Rescue Moore's Law") and silicon-germanium (SiGe), to the alliance.

Morris Chang, chairman of UMC archrival Taiwan Semiconductor (TSMC), was quick to downplay the announcement. Chang said his company was actually approached by IBM first, but TSMC declined to participate because IBM's price was too high; because it would not have accelerated TSMC's 0.13-micron plans; and because TSMC thought it could better serve its foundry customers' special needs by remaining in control of its own technology. IBM flatly denies that it seriously considered TSMC as a partner for this deal.

Although the new alliance has not yet disclosed details on the new processes, UMC chief technology officer Fu-Tai Liou projects that the 0.13-micron process will allow logic circuit densities of up to 80 million transistors per cm^2, more than 2.5 times the density of its current 0.18-micron process, and support circuit speeds of up to 1.6 GHz, 33% faster than its older process. Also, voltage will drop from the current 1.8 V to 1.2 V, cutting power consumption in half. In the 0.10-micron process, he projected that densities would approach 200 million transistors per cm^2, speeds would reach 2.0 GHz, and voltage would drop another 17%, to 1.0 V.

The companies said they would make the 0.13-micron design rules available so customers can begin designs next quarter (Q200). The triumvirate expects to put that process into early production at multiple fabs by the end of 2000. UMC will put it into production initially in its 8D and 8F fabs, both 200-mm facilities. The process will ramp into volume production during 2001 and achieve high-volume shipments in 2002. The 0.10-micron process is scheduled for early production by the end of 2002, with full production

before the end of 2003. UMC will market products based on the new processes under the brand name Worldlogic.

The announcement of the new alliance is significant in several ways. First, it will provide customers with multiple compatible sources of supply for 0.13-micron process. A set of design rules for a leading-edge IC process that is common across three of the world's largest semiconductor companies is unprecedented in the industry.

Second, by pooling resources, the companies can attack problems that no one of them could afford to solve alone. In fact, each of the companies will accelerate its plans for 0.13 micron, placing parts into production six months ahead of the date we expect Intel to deliver 0.13-micron parts and one year ahead of that projected in the SIA (Semiconductor Industry Association) International Technology Roadmap for Semiconductors.

Just at a time when many believe that process advances should be slowing, they in fact seem to be accelerating. With semiconductor-process doomsayers projecting a hard wall at 0.10 micron, or at best a significant slowdown in progress, the IBM/Infineon/UMC alliance is accelerating the 0.10-micron node two full years ahead of that projected by the SIA roadmap. We expect that this development is indicative of the way future process advances will go: obstacles that at a distance appear to be insurmountable will succumb to massive industry attacks as they are approached.