Alternative Slot 1 Chip Sets Emerge

VIA's Apollo Pro, SiS's 5600 Take On Intel's 440EX in Celeron PCs

by Linley Gwennap

Suddenly, not one but two vendors are offering an alternative to Intel chip sets for Slot 1 processors. Both VIA and SiS, two of the few remaining system-logic vendors outside of Intel, have leapt into the Slot 1 market after years of focusing on Pentium motherboards. The new chip sets are comparable to Intel's products in feature set but, not surprisingly, sell for much less.

Neither company has a P6 bus license from Intel. At the recent PC Tech Forum, Intel VP Paul Otellini disclosed that Intel has licensed a merchant chip-set vendor for the P6 bus. He did not identify the recipient, but sources indicate that it is Standard Microsystems (formerly Efar), not one of the major system-logic vendors.

VIA Apollo Pro Delivers High Performance

VIA *(www.via.com.tw)* announced the Apollo Pro chip set, consisting of the usual north and south bridges. The north bridge connects to Slot 1, AGP 2×, PCI, and up to 1G of SDRAM. Like Intel's 440BX (see MPR 4/20/98, p. 18), it supports 100-MHz operation on the CPU bus and the SDRAM, although 66-MHz parts are also allowed.

The south bridge supports the new UltraDMA-66 interface for faster hard-drive access. (Intel's chip sets include only UltraDMA-33.) It is compatible with the ACPI power-management standard and connects to USB. Apollo Pro can be used in notebooks as well as desktops, as it includes mobile features such as suspend-to-DRAM and independent clock controls for the various buses.

The Apollo Pro north bridge (VT82C691) uses a 492-ball BGA package, and the south bridge (VT82C596) uses a 328-ball BGA package. The chip set is currently shipping and carries a list price of $39, well below the $52 price of Intel's 440BX but a few dollars more than the price of the low-end 440EX, as Table 1 shows. Since VIA is mainly targeting low-cost PCs that would otherwise use the 440EX, it is likely to sell Apollo Pro for much less than its list price, despite some of the added performance points of the chip set.

	VIA	SiS		Intel	
	Apollo Pro	5600	5601	440EX	440BX
System Bus	100 MHz	66 MHz	100 MHz	66 MHz	100 MHz
Memory Bus	100 MHz	66 MHz	100 MHz	66 MHz	100 MHz
DRAM Type	SDRAM	SDRAM	SDRAM	SDRAM	SDRAM
Max Memory	1G	768M	1.5G	256M	1G
AGP Support	AGP 2×	AGP 2×	AGP 2×	AGP 2×	AGP 2×
Mobile Support	Yes	No	Yes	No	Yes
USB Support	Yes	Yes	Yes	Yes	Yes
UltraDMA	66 MHz	33 MHz	33 MHz	33 MHz	33 MHz
Packaging (North/South)	BGA-492 BGA-328	BGA-487 PQFP-208	BGA-556 PQFP-208	BGA-492 BGA-324	BGA-492 BGA-324
Availability	Now	June	June	Now	Now
List Price (10k)	$39.00	$19.00	$29.00	$34.75	$52.00

Table 1. The Apollo Pro and SiS 5601 match up well against the 440BX but cost much less. (Source: vendors)

SiS Deploys Two New Chip Sets

SiS *(www.sis.com.tw)* actually announced two chip sets, positioning its 5600 against Intel's 440EX and the 5601 against the 440BX. The 5601 north bridge is similar to Apollo Pro's, supporting the same four-port architecture (including AGP) and 100-MHz bus speeds.

The 5600 is designed for Celeron processors and thus supports only 66-MHz buses, just as the 440EX does. It includes AGP but reduces the maximum memory size to 768M (still three times more than the memory supported by the 440EX). The 5600 is packaged in a 487-ball BGA, slightly smaller than the 5601's 556-ball BGA.

Both SiS north bridges are coupled with the same 5595 south bridge, which provides basic disk, keyboard, SMBus, and USB interfaces. The chip supports UltraDMA-33 but not UltraDMA-66, as the VIA chip set does.

Both SiS products are sampling now, with production slated for June. The high-end 5601 chip set carries a list price of $29, barely more than half the list price of the 440BX. The entry-level 5600 chip set lists for just $19, again barely half the 440EX's list price. With these prices, we expect many low-end system vendors to take a good look at the SiS chip sets, particularly the 5600.

Intel Raises IP Barriers

One barrier to these new products is Intel's legal stance regarding the P6 bus (see MPR 4/20/98, p. 3). The company claims to hold patents that prevent any unlicensed vendor from legally producing compatible products. These patents cover both the electrical aspects of the GTL+ interface (see MPR 5/30/95, p. 1) and certain bus protocols.

VIA claims that it has never been threatened by Intel's lawyers regarding P6-bus patents, but the company has been prudent enough to use an Intel-licensed foundry for its P6-bus chip set. VIA would not disclose its foundry, but presumably it is either IBM, SGS-Thomson, or Texas Instruments. While this foundry strategy provides some legal protection, Intel could still attempt to use system-level patents to sue PC makers that buy the VIA chip set.

SiS is pursuing a different strategy. The company believes it has worked around all Intel patents surrounding the P6 bus. Eliminating multiprocessor support simplified the task, but the company still needed two years to complete its design. Given the broad nature of some of Intel's patents, however, it seems unlikely that SiS's design does not infringe at least one of Intel's patents. SiS may be hoping it can overturn these patents in court, if required.

Intel must now decide whether to ruthlessly pursue its intellectual-property claims or to offer VIA and SiS an olive branch in the form of a P6-bus license. Letting these companies compete in the Slot 1 chip-set market may slightly reduce Intel's chip-set sales, but the existence of Slot 1 chip sets that sell for less than the 440EX could spur sales of Celeron processors and dampen interest in Socket 7, helping Intel achieve key strategic goals. In addition, allowing competition could stave off a rumored lawsuit expected to be filed soon by the U.S. Federal Trade Commission (FTC).

Chip-set vendors such as VIA and SiS have little choice but to pursue the Slot 1 market. With Intel dominating the bulk of the chip-set market, its smaller competitors have been forced into the low-end PC market, where Socket 7 has lasted the longest. But Intel's Celeron processors (see MPR 3/30/98, p. 1) are pushing Slot 1 into even low-cost PCs. With Socket 7 under attack from Intel, the alternate chip-set vendors are watching their main market disappear.

VIA and SiS have countered by disregarding Intel's bluster and jumping into the Slot 1 market. Acer Labs, the only other remaining system-logic vendor, is likely to follow soon with its own Slot 1 chip set. These vendors can play the same niche role in the Slot 1 market that they have for the Socket 7 market, selling system logic for less than Intel cares to. Intel would be well-advised to let them have this role instead of trying to crush them completely. M