AMD Irongate Leads to Slot A

But New AMD-750 Chip Set May Weigh Down Athlon

by Peter N. Glaskowsky

The new AMD-750 complements the Athlon processor (see MPR 8/23/99, p. 1), providing all the basic features of today's mainstream core logic. With Intel about to introduce Camino, however, AMD appears to have weighed down its next-generation processor with a previous-generation chip set.

As Figure 1 shows, the 750 is very similar in structure to Intel's 440BX chip set (see MPR 4/20/98, p. 18). Though Athlon and the 750 support a 200-MHz front-side bus (FSB) with 50% more potential throughput than the 133-MHz FSB expected on Intel's Pentium III processor and Camino chip set, the 750 has less bandwidth to main memory and graphics. Supporting only PC100 main memory and 2× AGP vs. Camino's Direct RDRAM and 4× AGP, the 750 is likely to create a bottleneck for memory-intensive tasks, such as image manipulation and 3D graphics.

Early Origin Limited Design Options

AMD started work on the 750 chip set at least two years ago, when it decided to equip Athlon with a Slot A bus interface borrowed from Digital's Alpha 21264. The 750's feature set was likely frozen in 1998. Direct RDRAM and 4× AGP were on Intel's roadmap by that time, but their effect on system performance was unknown. Also, AMD could not afford to tie the timing of its Athlon announcement to the release of these Intel-controlled technologies.

Somewhat less easily explained is the 750's lack of support for higher SDRAM clock rates and more advanced features such as double data-rate (DDR) transfers. Some graphics chips and non-Intel core-logic products have these capabilities already; the 750 needs them to take better advantage of its high-speed front-side bus interface.
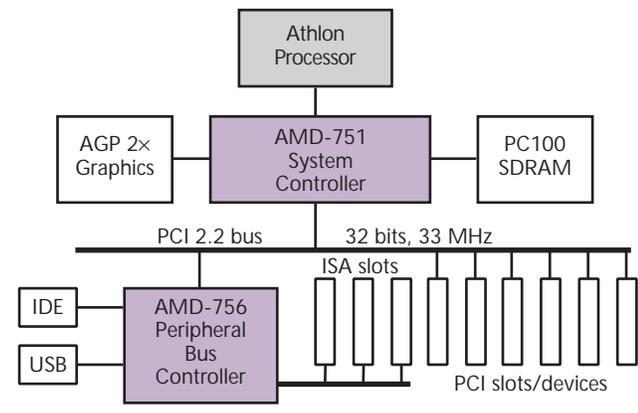

Figure 1. The AMD-750 uses a conventional bus-bridge structure like that found on older Intel chip sets.

The 750 falls between Intel's offerings in memory capacity. It supports up to 768M of memory on three SDRAM DIMMs, a slightly lower capacity than that of Intel's 440BX, which supports up to 1G on four DIMMs. Camino will have a much more serious limit, however, supporting only 384M of Direct RDRAM on its single-channel memory interface. This limit will not be eased until 256-Mbit DRDRAMs become available later next year.

Two-Chip Set Provides Desktop Solution

The AMD-750 chip set consists of two chips. The AMD-751 system controller is a conventional north-bridge device with CPU, AGP, SDRAM, and PCI interfaces. Because the Alpha 21264 processor interface is a point-to-point connection rather than a shared bus, the 751 supports only one processor. Intel's 440BX supports two CPUs, a feature that allows extra processing power for PC workstations.

South-bridge functions are handled by the AMD-756 peripheral-bus controller, which has a PCI-ISA bridge, a USB host controller, and an UltraDMA-66 disk interface. (The 440BX has a slower UDMA-33 disk interface.) The 756 works with commodity flash memory chips rather than a proprietary flash device, a la Intel's 810 and Camino chip sets, but lacks the random-number generator found in those devices—an omission that is unlikely to affect sales.

The 751 comes in a 492-contact PBGA package, while the 756 is packaged in a 272-contact PBGA. AMD has priced the set at $32 in quantity, making it more affordable than the 440BX and well below the price we expect Intel to charge for Camino. Camino-based systems will incorporate an additional price penalty for their Direct RDRAM memory, which is likely to cost at least 50% more at retail than PC100 SDRAM. As a result, Athlon systems will offer end users superior performance as well as lower prices—definitely a formula for success in the PC market.

For many applications, including the most popular PC benchmarks, the key performance limiters are the CPU core, the hard disk, and the graphics chip. Athlon's impressive showing on PC benchmarks of all kinds shows that the 750's shortcomings are no obstacle to high performance, but a faster chip set would surely permit even better results.

Better Athlon chip sets are on the way. AMD says that Acer, SiS, Trident, API, Micron, and Via are all working on Athlon core-logic products for mainstream desktops. We expect most of these chip sets will support PC-133 main memory, and some of them will have 4× AGP support as well. HotRail's server chip set is also due next year (see MPR 7/12/99, p. 12). In the long run, chip sets are not likely to have much effect on Athlon's success. Ⓜ