

# INTEL IMPROVES INTEGRATED CHIP SET

*New 815 Chip Set Supplants Venerable 440BX, Orphans 810*

*By Peter N. Glaskowsky {6/19/00-04}*

After major missteps with the 810 and 820 chip sets, neither of which has been especially popular with OEMs, Intel has taken a step in the right direction with the new 815. The 815 is derived from the 810 but offers two key features not found in the previous product—

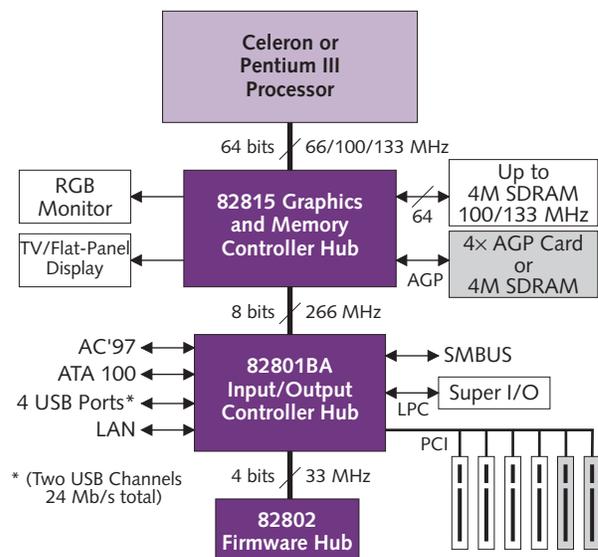
support for PC133 SDRAM and a 4x AGP interface that can be used to add a separate graphics card. Though simple, these features allow the 815 to cover a wide range of desktop PC designs, from sub-\$1,000 systems to entry-level PC workstations. Only the very cheapest or the very fastest desktops will use any of Intel's other chip sets, such as the 810, 820, and 840.

The 815 will come in two versions, with an E suffix denoting the set that includes Intel's new ICH2 I/O hub chip (see *MPR 6/5/00-02*, "Intel Expands I/O Options"). Figure 1 depicts the 815E configuration. The ICH2 includes several improvements over the original ICH found in the 810 and 820 (and still shipping with the non-E 815), including an ATA100 (100 MB/s) hard-disk controller; an integrated LAN controller that supports 1Mb/s home networks as well as 10/100Mb/s Ethernet; an improved AC97 controller that can drive a full six channels of audio; and four USB ports backed by two independent 12Mb/s controllers that deliver twice the effective USB bandwidth of previous Intel chip sets.

The 815 will be sold into the low end of the PC market, where it will compete effectively with Socket 7 chip sets, while the 815E will cover midrange and high-end PC sales. At the high end of the market, most OEMs will use add-in graphics cards via the 815's AGP interface to replace the 815's native graphics controller, which is only marginally improved over the trailing-edge graphics engine in the 810.

For most users, the best thing about the 815 and 815E is their support for a 133MHz processor bus and 133MHz

main memory. Intel is very late in supporting PC133, the result of a strategic error—mispredicting the price and availability of Direct RDRAM. Other chip-set vendors have been shipping PC133-compatible products for almost a year, and these products have taken away a large fraction of Intel's chip-set business. Though RDRAM is slightly faster than



**Figure 1.** Intel's new 815E chip set adds PC133 support, a 4x AGP interface, and an improved I/O controller hub chip to the earlier 810 design.

PC133, it is vastly more expensive. Until the cost of RDRAM comes down to affordable levels—no more than 50% over the cost of PC133—PC133 will be a much better deal.

### Graphics Not the Focus of the 815

Though its integrated graphics controller was the 810's most interesting feature, the 815's graphics support is of little importance. Current discrete graphics chips offer many more features and much better performance, while integrated-graphics chip sets from VIA and Acer are both cheaper and faster. Only customers that don't care about graphics will use the 815's graphics core—but such customers represent a large part of the market. For these buyers, integrated graphics saves some cost (about \$10) and inconvenience compared with putting a low-end graphics chip on the motherboard.

This market segmentation was true for the 810 as well, but the 810 was suitable for only such customers. The 815 is more flexible. For as little as \$20, OEMs or end users can add a third-party AGP graphics card and gain the ability to drive higher-resolution displays, render in 24-bit color, and play the latest 3D games at acceptable speeds. A graphics card will even make the CPU effectively faster by removing the extra load of display-refresh traffic from main memory. The 815's unified memory architecture (UMA) is borrowed almost unchanged from the 810, except that the 815's faster PC133 SDRAM is better able to tolerate the overhead of a UMA implementation.

Intel also borrowed from the 810 its optional display cache, a small (4M) memory array that stores the 3D depth (Z) buffer when installed. On the 810, the display cache required extra pins; on 815-based motherboards, the display

### Price & Availability

Intel's 815 chip set, which includes the 82815 graphics and memory-controller hub (GMCH), 82801 I/O-controller hub (ICH), and 82802 firmware hub (FWH), sells for \$41 in 1,000-piece quantities. The 815E uses the newer 82801BA ICH2 and is priced at \$46 in 1,000-piece quantities. Both are available now. For more information, see [developer.intel.com/design/chipsets/](http://developer.intel.com/design/chipsets/).

cache is implemented as a small card that goes into the AGP slot. When the display-cache card is present, the 815's AGP port is reconfigured as a standard SDRAM interface. Given the very low cost of some AGP add-in cards, we doubt the 815's display-cache option will be widely used.

For the record, the 815's 3D engine does incorporate a few minor improvements over that in the 810: support for true trilinear filtering, improved color-key support for Microsoft's DirectX 6.1, and full RGB specular lighting. Unfortunately, the fill rate is only 100 Mpixels/s, unchanged from the 810e. This makes it approximately a match for 1998-vintage graphics chips from ATI and NVIDIA.

The 815E is sure to become Intel's best-selling chip set, and we expect it will eventually eclipse the total sales of the 440BX to become the best-selling PC chip set in history. While its integrated graphics will no doubt be used by many OEMs for low-cost PCs, the new chip set's basic features—PC133 SDRAM, 4x AGP, and ATA100—are its true strengths and will form the foundation of powerful, affordable, and popular systems well into 2002. ♦

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