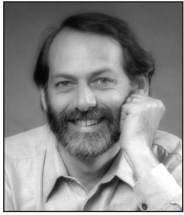


The Future of Serial Buses

IEEE-1394 Shines in Consumer Gear But Is Overshadowed by USB in PCs



For many years, it has been evident that PCs badly need a better way to connect peripherals. Serial buses, in the form of USB and IEEE-1394, are beginning to change the shape of PC I/O. As with so many things in the world of computing, however, the two standards are coexisting

less than harmoniously. There is considerable bitterness about USB from the 1394 camp—especially now that USB 2.0 is emerging with a promised data rate of 480 Mbits/s, squarely in 1394's turf.

IEEE-1394 predates USB by many years. It has its roots at Apple, which saw it as a successor to SCSI and a natural complement to the Mac's burgeoning multimedia capabilities. Its emergence into commercial reality was very slow, however, for many reasons. The glacial speed of the IEEE standardization process was one problem; another was that semiconductor technology wasn't quite ready to implement it at low cost. Years after Apple first demonstrated it, 1394—using Apple's trademarked name, FireWire—is now in many new Macs (though not in iMacs, except the DV models). But with Apple reduced to just a few percent of the computer market and few PCs incorporating 1394, its role in the computing world has been small.

IEEE-1394 has been very successful in digital video gear: it is the de facto standard interface for digital camcorders and related equipment. (Unfortunately, Sony, like Apple, uses its own trademarked name—I.LINK, which is the same as FireWire, which is the same as IEEE-1394. Great planning for a consumer marketplace, no?) Digital camcorders remain a small part of the overall camcorder market, however, and most owners of digital camcorders are unlikely ever to connect their camcorder to their PC. For most people, life is just too short to edit video.

Even without video connections to consumer PCs becoming common, 1394 had a chance to become the new interface for a wide variety of peripherals, including scanners, printers, and disk drives. Today, there is a small sampling of such products on the market. IEEE-1394's chance to play this role in mainstream PCs was ended, however, by USB—and, in particular, by the decision to create USB 2.0.

The initial version of USB, with a peak data rate of 12 Mbits/s, is no threat to 1394 in applications involving lots of data transfer, and for a while it seemed that the two interfaces would coexist nicely. USB provides a great interface for keyboards, mice, low-end scanners and video cameras, and low-speed storage devices—applications for which 1394 is

both overkill and too expensive. With the 480-Mbit/s USB 2.0 on the horizon, however, the window for 1394 in this role is closing.

Advocates of 1394 are angry about Intel's backing of USB 2.0—and it is hard to blame them. Had Intel made 1394 a standard part of its chip sets instead of pursuing USB 2.0, 1394 would have become the natural interface for new scanners, printers, and storage devices. This transition could have been well under way by now.

Intel says USB 2.0 is the only way it can ensure widespread deployment of a high-speed serial bus. PC makers weren't willing to spend the money, according to Intel, for a 1394 interface. Since USB has already achieved ubiquity, getting PC makers to move to the enhanced, backward-compatible version 2 will be easy. Getting them to add a second interface might have been harder. And there is a simplicity to having only one interface.

Other factors probably played a role as well. Intel bristled at the thought of PC makers having to pay a royalty to Apple for every system with a 1394 port, even though the amount was cut from \$1 to \$0.25. The ability to drive the standard probably also influenced the company's thinking: the USB group, while not entirely controlled by Intel, is Intel dominated. The hand-picked group of industry partners allows Intel to move the interface forward quickly, generally according to its own vision. The IEEE process of evolving 1394, in contrast, is slow and cumbersome, with a tendency to result in overly complex, poorly focused designs—and it is beyond Intel's, or any company's, control.

Intel no doubt also likes the PC-centric nature of USB. It requires a single host, making the PC the center of the action. IEEE-1394 is peer-to-peer, allowing peripherals to communicate directly with one another, something that Intel would just as well not see.

Recriminations aside, USB 2.0 is happening, and it should be a good thing for PC users once it is mature (which will probably take until sometime in 2001). IEEE-1394 will remain important for digital video, but it is likely to struggle in its attempts to broaden its role significantly beyond that domain. As the degree of contact between consumer gear and computers increases, more consumer PCs will need 1394 ports. At the same time, however, USB will creep into consumer electronics—initially USB 1.1, as a low-cost connection for keyboards and so forth. Just how the consumer-electronics world reacts to USB 2.0 remains to be seen. □

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