

Linking Computers and Consumer Electronics

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The capabilities of our personal computers have increased dramatically over the past 15 years, and so has the number of connectors on the back of our systems. Originally, we needed a serial port for a modem and a parallel port for a printer. Now we also need ports for a mouse, audio input, audio output, video input, video output, Ethernet, and a camera. Also, ISDN modems are appearing, and even the most recent serial ports cannot support their 500-Kbps data transfer rates.

Enter the IEEE 1394 standard known as Firewire. This standard proposes to provide a single port on the back of our computers that can handle nearly all of the communication for which we now need eight to 10 ports. Along with connecting standard peripherals to computers, Firewire is designed for use with consumer audio, video, and television equipment. A few Firewire connections should replace the current mess of analog cables behind your stereo system. At the same time, with one connection, your PC will become part of your stereo (or vice versa).

If 1394 is successful, we may have a few new acronyms to add to our network terminology: DAN (desk area network), ECAN (entertainment center area network), or perhaps SCAN (stereo cabinet area network).

HERITAGE AND OPERATION

Much of Firewire's heritage comes from Appletalk networking. In the late 1980s Apple began developing Firewire as its next generation of Appletalk. With

Apple's blessing, it has since been developed by the IEEE 1394 working group, which is part of the IEEE Microprocessor and Microcomputer Standards Committee activity. Much like Appletalk, Firewire is designed as an easy-to-maintain local area network for the consumer. It supports an extremely flexible daisy-chain- or tree-based topology for complete flexibility in wiring layouts.

Firewire operates at 100, 200, or 400 Mbps. A gigabit version is also on the horizon. At 400 Mbps, Firewire can sustain an uncompressed high-quality digital video stream using roughly 50 percent of its bandwidth. The standard's protocols are called *isochronous*. With isochronous protocols, devices can negotiate for guaranteed bandwidth across a 1394 connection. The remaining bandwidth can be used for asynchronous data transfers, which are more typical of computer data traffic. Asynchronous data transfers occur during periods not reserved for synchronous traffic. This approach allows reliable delivery of audio, video, and computer data on the same medium.

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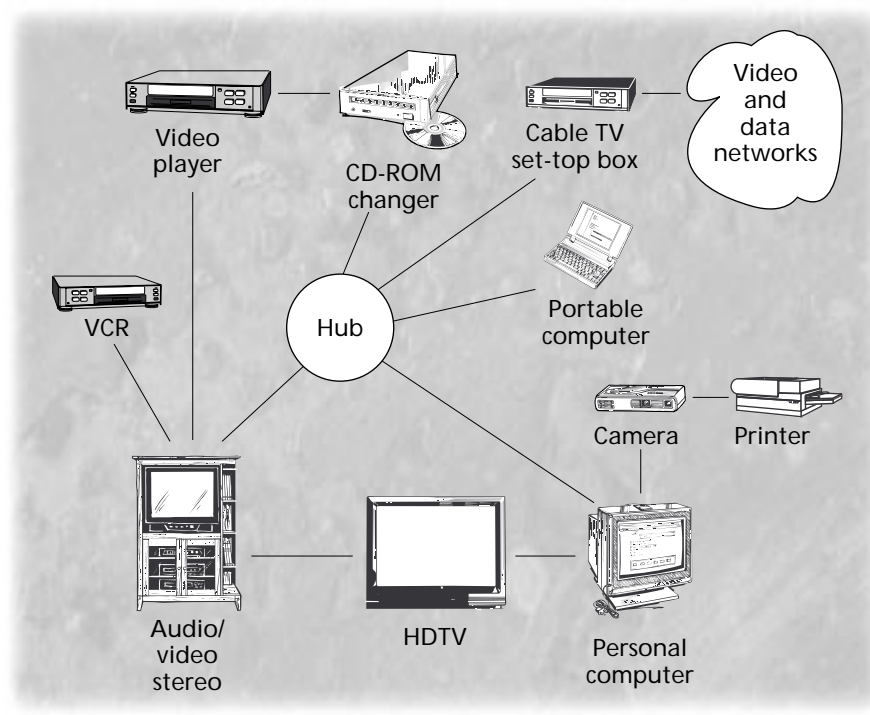


Figure 1. IEEE 1394 (Firewire) may prove to be just what is needed to conveniently link computer and home entertainment equipment in a small network that would replace most analog cables and reduce the number of computer ports needed.

Standards

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Firewire has several features that will attract consumers. First, it offers power inside the cabling. This lets small, low-power devices such as CCD (charge-coupled device) cameras draw their power from the Firewire cable, eliminating the need for a separate power supply for each piece of equipment. Second, the ability to "hot-plug" Firewall makes it easy for a designer or user to add or subtract systems and Firewire peripherals at any time, even while the equipment is running.

With 1394 technology a user can develop an "entertainment center area network" that integrates all residential video, audio, computer, and data communications equipment. Further, with a single 1394 connection, a portable computer can be easily docked into the network and gain high-speed access to all of the home equipment. Figure 1 shows such an arrangement, utilizing a hub that would interconnect the various devices.

Products that implement the 1394 standard are already available. Adaptec offers adapters for existing PC and Macintosh systems, Sony has developed a CCD camera that uses 1394, Skipstone provides PC adapters with a development environment, and Texas Instruments has a series of chips to support 1394 applications. The 1394 Trade Association (<http://www.1394ta.org>) is a good source for information regarding 1394's progress in the marketplace.

POSITIONED TO SUCCEED

The outlook for 1394 seems very bright. As the video game, stereo, home video, and computer markets converge, 1394 seems ideally poised to integrate all of these technologies into a single information/entertainment center area network. However, like all new technologies, its speed of adoption depends on the marketplace. Some observers say that 1394 will be available on all new Apple computers by the end of 1997 and on other PCs by the end of 1998. With the strong support of companies like Sony, this could very well happen.

While there are no technologies directly competing with 1394, a few products operate in roughly the same space. The closest technology is called Universal Serial Bus from Intel. Unlike 1394, USB is not designed for high speed and is better suited for connecting keyboards and mice. Perhaps a more direct competitor is the PCI (peripheral component interconnect) bus currently popular in the PC market. If a 1-Gbps version of 1394 becomes available, then 1394 might become the bus used inside PC systems as well as for connecting to peripherals. ♦

For More Information

<http://www.skipstone.com/compcon.html>—
an overview of IEEE 1394 presented at
Compcon 95.

<http://www.ti.com/sc/docs/msp/1394/1394.htm>
—Texas Instruments' introduction to
1394.

[http://www.sel.sony.com/SEL/consumer/
camcorder/lo/home.cgi](http://www.sel.sony.com/SEL/consumer/camcorder/lo/home.cgi)—Sony's 1394-
compliant DV camcorder.

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