More About IEEE 1394 and FireWire

What is IEEE 1394?

IEEE 1394 was conceived by Apple Computer and then developed within the IEEE 1394 Working Group. The IEEE 1394 standard is a scalable, flexible, easy to use, low-cost digital interface that will integrate the worlds of consumer electronics and personal computers. The IEEE 1394 standard defines both a backplane physical layer and a point-to-point cable-connected virtual bus implementations. The backplane version operates at 12.5, 25 or 50 Mbits/sec. The cable version supports data rates of 100, 200 and 400 Mbits/ sec. Both versions are compatible at the link layer and above. The Standard defines the media, topology, and the protocol. The balance of this document will focus on the implementation and advantages of the cable version of this interface.

What is FireWire?

FireWire is Apple's implementation of IEEE 1394. FireWire is :

- A digital interface - no need to convert digital data into analog for better signal integrity
- A physically small thin serial cable - replaces today's bulky and expensive interfaces
- Easy to use - no need for terminators, device IDs, screws, or complicated set-ups
- Hot pluggable - devices can be added and removed while the bus is active
- Scalable - the Standard defines 100, 200, and 400 Mbps devices and can support the multiple speeds on a single bus
- Flexible - the Standard supports freeform daisy chaining and branching for peer-to-peer implementations

- Fast, guaranteed bandwidth - the Standard supports guaranteed delivery of time critical data which enables smaller buffers (lower cost)

FireWire supports two types of data transfer: asynchronous and isochronous. For traditional computer memory-mapped, load and store applications, asynchronous transfer is appropriate and adequate. One of FireWire's key features is its support of isochronous data channels. Isochronous data transfer provides guaranteed data transport at a pre-determined rate. This is especially important for multimedia applications where uninterrupted transport of time-critical data and just-in-time delivery reduce the need for costly buffering.

This leads to perhaps one of the most important uses of FireWire as the digital interface for consumer electronics and AV peripherals. FireWire is a peer-to-peer interface. This allows dubbing from one camcorder to another without a computer. It also allows multiple computers to share a given peripheral without any special support in the peripheral or the computers. It is a result of all of these features that FireWire has become the digital interface of choice and its acceptance is growing.

Why another Bus?

Today when you "surf the web" for information and click on a "hot link" you must wait for the bit-mapped date to download. Imagine, selecting an icon and almost immediately that image is on your screen. FireWire is one of the technologies that will help make this future a reality.

Several key trends and requirements are emerging:

- Consumer electronics and computers are converging.
- There is a desire to keep data digital for as long as possible as a means to reduce system cost, complexity, and improve signal integrity.
- With the emergence of multimedia market, more and more data is video and audio. The ability to work with time sensitive data is growing in importance.
- Miniaturization is continuing. Small products are favored for portability, convenience, and material usage resources.
- Consumers are beginning to purchase computers the way they choose consumer electronics. Their criteria are: reliability, convenience, and simplicity.
- The need and desire for Peer to Peer computing is growing. The master-slave model is changing as computing becomes distributed.

FireWire meets these trends and requirements. FireWire provides a high performance, easy to use, real-time, interoperable (industry standard), multimaster solution to meet the needs of not only today's markets but tomorrow's.

Initially, FireWire will be the computer attachment of digital cameras and digital video applications. IEEE 1394 has been accepted as the standard digital interface by the Digital VCR Conference (DVC). The European Digital Video Broadcasters (DVB) have endorsed IEEE 1394 as their digital television interface as well. The VESA (Video Experts Standards Association) is evaluating IEEE 1394 for the digital home network media.

In the world of video editing, FireWire enabled cameras remove the need for costly analog video computer frame buffers to capture digital video. FireWire will gradually improve upon existing interfaces such as

SCSI. FireWire provides higher speed, lower cost, and is more user friendly than most existing interfaces. SCSI products such as scanners, CDROMs, disk drives, and printers are already evaluating when they will move to FireWire.

FireWire has the bandwidth capacity to replace and consolidate most other peripheral connection communication methods in use today. Hot plugging, power sourcing, and dynamic reconfiguration make FireWire a user-friendly alternative to today's interconnects. These features will allow "plugging in" of computer peripherals as easily as plugging in a home appliance.

FireWire promises to revolutionize the transport of digital data for computers and for professional and consumer electronics products. By providing an inexpensive, high speed method of interconnecting digital devices, FireWire is truly the versatile I/O connection. Its scalable architecture and flexible peer-to-peer topology make FireWire ideal for connecting audio, video, and computer devices. Its isochronous support allows low cost implementations of multimedia interfaces. Every month more digital electronics products are entering the market. These products will continue to evolve and FireWire will be evolving with them.

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