

UCRL-JC-127334

PREPRINT

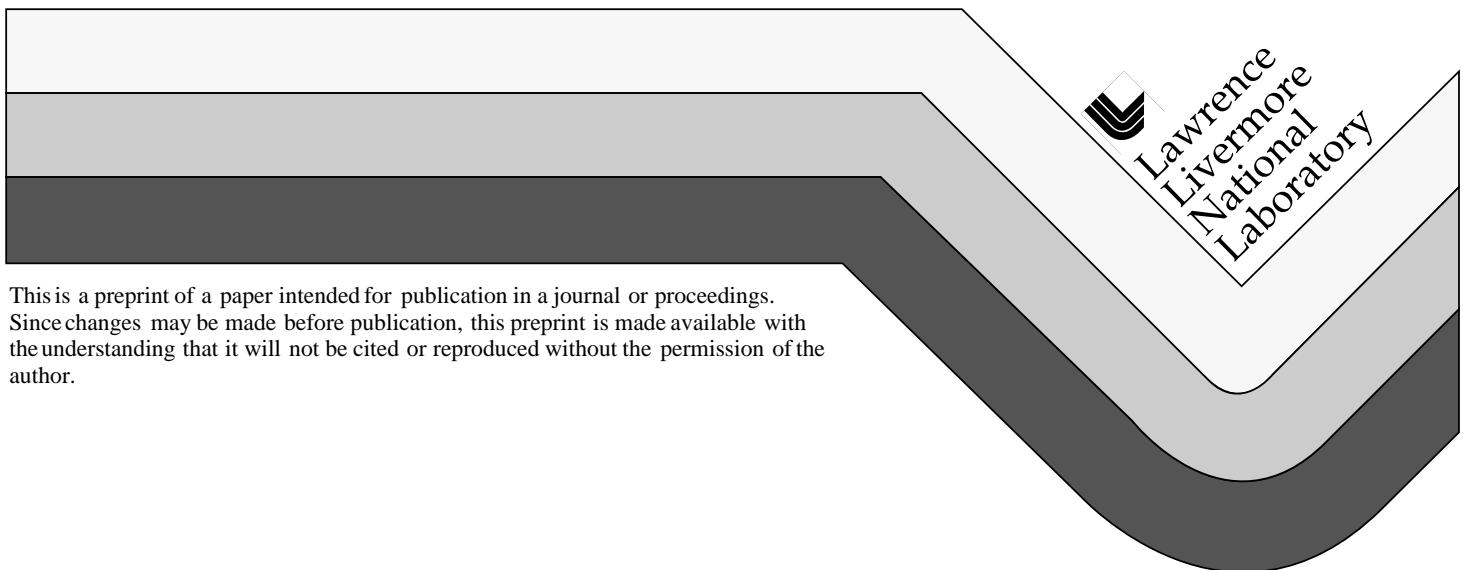
IEEE 1394/Firewire

A Low Cost, High Speed, Digital Serial Bus

R. Gaunt

This paper was prepared for submittal to the
Association for Computing Machinery
Special Interest Group on Computer Graphics (SIGGRAPH) '97 Conference
Los Angeles, CA
August 3-8, 1997

May 1997



This is a preprint of a paper intended for publication in a journal or proceedings.
Since changes may be made before publication, this preprint is made available with
the understanding that it will not be cited or reproduced without the permission of the
author.

DISCLAIMER

This document was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor the University of California nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or the University of California, and shall not be used for advertising or product endorsement purposes.

IEEE 1394/ Firewire

A Low Cost, High Speed, Digital Serial Bus

Ross Gaunt

Lawrence Livermore National Laboratory

Does the world need yet another I/O bus standard? If you need fast and cheap serial video communication, then the answer is yes. As technology advances, so too must data transport mechanisms advance. You can't expect RS-232 to support real-time digital video, and if you can't afford expensive professional serial video interfaces, (such as Sony's Serial Digital Interface), Firewire may be a good solution. IEEE 1394, or commonly known as Firewire, is a general purpose serial bus that meets many of the I/O needs of today's video and multimedia developers. For those of you who only read the first paragraph, here's Firewire in a nutshell: It provides a guaranteed transfer rate of 100Mbps or 200Mbps of digital data (such as video direct from camera to computer), over an inexpensive, non-proprietary serial bus. Here is a list of its features:

Digital interface: No analog converters to degrade the video signal.

Physically small, strong connector: A thin six wire (power + 2 signal pairs) shielded cable with a Nintendo GameBoy™ connector (kid tested).

Easy to use: No need to be a SCSI-expert. There are no terminators, device ID's, or complex setups. ID's are determined in real time, and up to 64 devices may reside on a bus.

Hot pluggable: You read that right! Up to 1023 buses may be bridged together, which may be daisy-chained or arranged in a tree structure.

Inexpensive: Priced for consumers, but used by professionals.

Scalable architecture: Mix 100, 200, 400Mbps (and beyond) devices on a bus.

Guaranteed bandwidth: For just-in-time delivery of video or data, eliminating the need for extensive buffering.

Non-proprietary: No licensing, stands a good chance of being here tomorrow.

Connect to various interfaces: Migration path to PCI-based cards, Centronix parallel ports (IEEE 1284), or SCSI-3.

Firewire has both asynchronous and isochronous data transfer modes. Desktop video systems use the isochronous mode to transfer real-time data at a guaranteed bandwidth, direct from camera into the computer, eliminating the need for a analog-to-digital capture card. Another data path might be from camera to digital video disk recorders, eliminating intermediate recording of the video to tape.

Products with Firewire connections are arriving on the market all the time. For example, Sony's DV line of newsroom video products deliver better quality video than Betacam-SP. Sony has a consumer grade camcorder available with a Firewire connection. Skipstone Inc. is offering a Macintosh version of its PC card. Along with Sony and Skipstone, Matsushita, Philips, IBM, Apple, Microsoft, Maxtor, and others are firmly behind IEEE 1394 as a standard for digital video exchange.

References:

G. Hoffman, D Moore, "IEEE 1394: A Ubiquitous Bus", Proceedings IEEE Compcon '95, pp 334-338.

B. Doyle, "FireWire 1394 Multimedia Bus Shows Off at Comdex", NewMedia, January 2, 1996, p. 20.

T. Dyke & P. Smolen, "Rallying Around IEEE 1394", TV Technology, September 1995, p. 60, p. 65.

D. Morgenstern, "FireWire field heats up; new peripherals on the way", MacWeek, 09.18.95, p. 1, p. 82.

"Quick Overview of IEEE 1394", <http://www.skipstone.com>.

M. Costello, "Consumer digital camcorders and FireWire blase new media pathways", Video Systems, December 95, P. 51.

S. Mullen, "Is DV a Beta Buster?", Video Systems, January 1996, pp. 56-61.

H. Wolf, "Apple Ties Firewire to DVC", TV Technology, March 22, 1996, p. 129.

This work was performed under the auspices of the U.S. Dept. of Energy at LLNL under contract no. W-7405-Eng.

Technical Information Department • Lawrence Livermore National Laboratory
University of California • Livermore, California 94551