



FireWire[®] 800 – Technology Brief

Introduction

As the world has moved ever further into the digital lifestyle, one of the key technologies fueling this drive has been the serial input/output (I/O) standard IEEE 1394, also known as FireWire (Apple), iLink (Sony) and DV (used on video camcorders, Digital Video). This high-speed multimedia bus has enabled a reliable, cost-effective and efficient way to move audio and video files and large volumes of data.

Designed to facilitate the transfer and networking of large amounts of varying types of digital data between systems and individual users, FireWire has become an indispensable part of the consumer electronics and personal computer industries. Apple's contribution to FireWire has been recognized by the Academy of Television Arts and Sciences with an Emmy award for the creation of the standard, which has numerous applications in the television industry. And in the computer industry, Intel VP Anand Chandrasekher foresees digital video and FireWire becoming an even bigger part of PCs, and to "Expect to see a ton of 1394."

FireWire Environments

When the original FireWire standard was introduced in 1995, it was a revolution in and of itself. It provided thirty times the bandwidth of the Universal Serial Bus (USB) 1.1 peripheral standard, and enabled a whole new host of features and applications. FireWire 800 offers users data-transfer speeds of 800Mbps today, which is two times faster than the 400Mbps of original FireWire. All versions of FireWire offer Plug & Play connectivity, allowing users to simply plug in their drive and begin using it. They also allow up to 63 devices to be connected via a single bus and offer peer-to-peer connectivity, enabling multiple computers and FireWire devices to be connected at the same time. FireWire also supports both isochronous and asynchronous capabilities, meaning that it can guarantee real-time data delivery, so there is no danger of inaccurately ordered or delayed content.

Differences between FireWire 400 and FireWire 800

With the development of FireWire 800, the question on everyone's mind is, what is going to happen to your legacy devices? Existing peripherals and devices are going to continue to operate. The performance will remain the same for your legacy FireWire devices operating at the original FireWire 400 speed.

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Essentially, the main difference between FireWire 800 and FireWire 400 can be summed up in one word – speed. FireWire 800 offers impressive results, with speeds up to 100MB/s, though current drive technology limits this to 55MB/s (maximum sustained throughput) for a single drive, and up to 100MB/s (maximum sustained throughput) per bus in RAID 0 configurations.

Other key advancements include the support of increased cabling distances and newly enhanced arbitration architecture. Utilizing cables constructed of professional-grade glass optical fiber, when both devices are connected via a FireWire 800 hub, FireWire 800 can burst data across 100 meters of cable.

The new arbitration scheme greatly improves on the existing architecture by incorporating advanced 8B10B data encoding (based on codes used by Gigabit Ethernet and Fiber Channel), which reduces signal distortion, and also improves the arbitration time by prepping while the current data is being sent, allowing the data to be sent as soon as the current transmission is completed.

Legacy and Beta Devices Working Together

The new standard was designed to be backwards compatible, meaning that FireWire 800 devices will still operate via the original FireWire 400 port. To connect a FireWire 800 device to a FireWire 400 port, a specific adapter cable must be used. There are two types of FireWire 400 ports: 6-pin and 4-pin. For FireWire 800 devices to work, they must be connected by placing the 9-pin end of the FireWire cable into the FireWire 800 port of the device, and the opposite 6-pin or 4-pin end into the FireWire 400 port.

The same holds true for FireWire 400 devices being connected to a FireWire 800 host port. The 4-pin or 6-pin end of the FireWire cable must be connected to the FireWire 400 port of the device, and the 9-pin end must be connected to the FireWire 800 port.

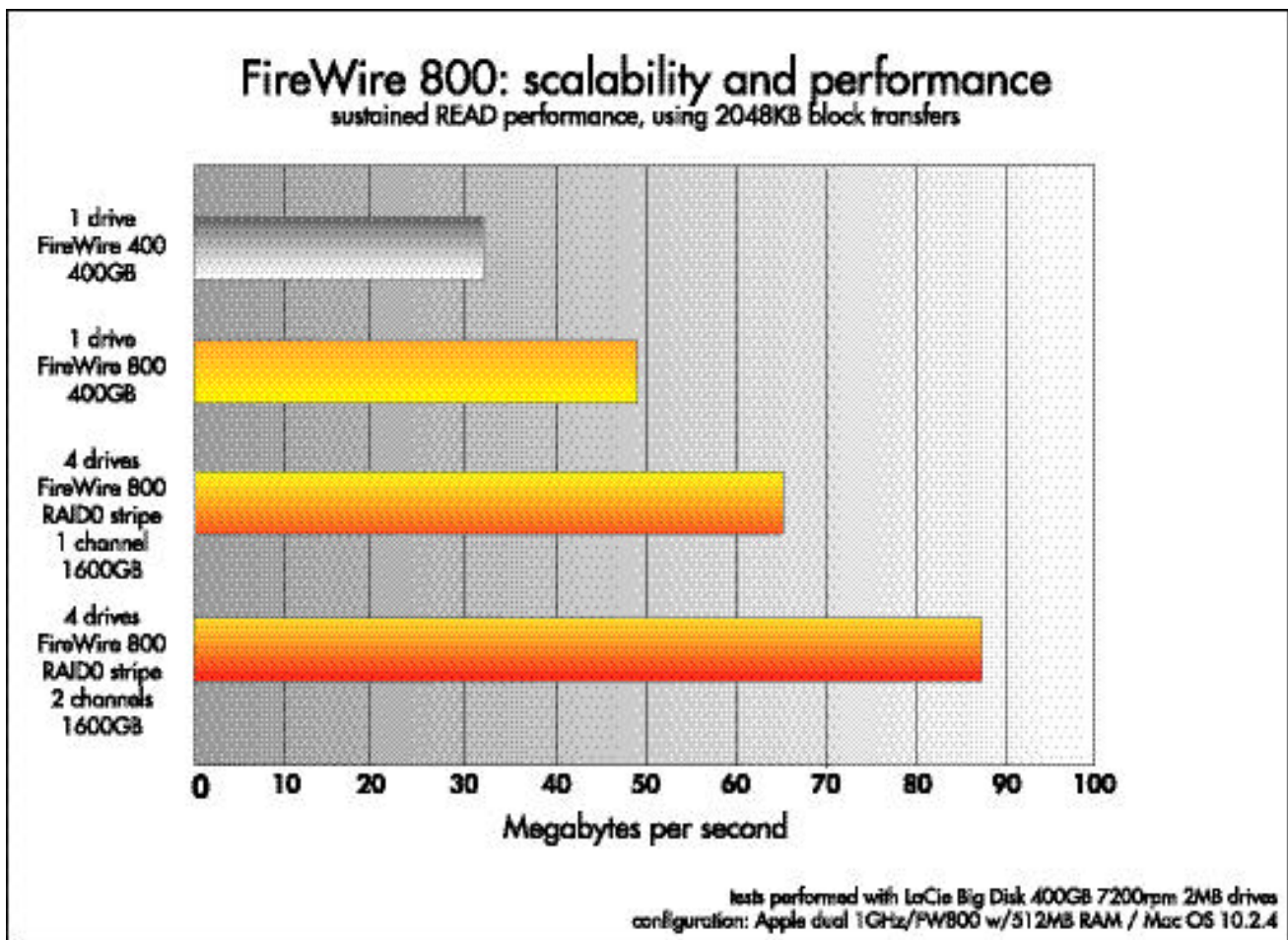
When FireWire 400 and FireWire 800 devices are mixed, all transfer rates revert to the original FireWire 400 speed.

Cable Type	Distance	100 Mbps	200 Mbps	400 Mbps	800 Mbps	1600 Mbps	3200 Mbps
Conventional Cable	4.5m	✓	✓	✓	✓	✓	
Plastic Optical Fiber	100m	✓	✓	✓	✓	✓	✓
Glass Fiber	100m	✓	✓	✓	✓	✓	✓
Twisted Pair	4.5m	✓	✓	✓			

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Optimum use for FireWire 800

FireWire 800 is not ideal for every device, but due to its high bandwidth and support of both isochronous and asynchronous data delivery, FireWire has found a very successful place in both the computer and consumer electronic industries. In the past year, we have seen disk drive performance bump into the limits of 400 Mbps FireWire, with most implementations in the range of 35-40 Mbytes/sec. Users should see better than 40 Mbytes per second for single drives and up to 80-90 Mbytes per second for striped drives. FireWire 800 is ideal for hard drives, video, digital audio and digital cameras to name a few, but is overkill for tape drives and CD/DVD burners.



FireWire 800 versus SCSI

The SCSI based system has a number of disadvantages to FireWire 800. SCSI based systems have a parallel interface, which cases it to have very limited connectability, unlike FireWire that can connect to almost all computer peripherals. SCSI is still a very expensive route for computer speed and has a maximum capacity per drive of 146GB compared to 500GB for LaCie's Big Disk. FireWire devices are truly plug and play, unlike SCSI devices which require a device ID, FireWire devices can be plugged or unplugged without the need to restart your computer.

FireWire 800 versus USB 2.0

USB 2.0 has a maximum throughput of 480 Mbps, so in theory it is faster than the 400 Mbps performance of FireWire 400. Due to transfer protocol differences, this isn't necessarily true depending on the peripheral. However, FireWire 800 clearly doubles the theoretical speed and immediately delivers better performance with modern drive technology. Additionally, FireWire is more suitable for time-critical isochronous data transfers that will be necessary for high definition video.

What to expect from FireWire 800 devices

FireWire 800 is ideal for anyone dealing with bandwidth-intensive projects, such as high-speed data storage or professional video capture and editing. For high-speed data storage, users will see double the transfer rate that they did with original FireWire and two times the usable bandwidth of USB 2.0. Users will also enjoy true plug and play connectivity, real-time data delivery and the ability to power external devices through the bus.

For those working with digital video, the new standard will enable new bandwidth-intensive applications, such as multiple-stream content. FireWire 800 will provide the speed that digital users require to quickly download digital video and digital images from your digital camera. It will also allow for additional flexibility for users because of its long-distance capability of up to 100 meters.

About LaCie

Established in the United States, Europe and Japan, LaCie is the world's leading producer of PC and Macintosh compatible storage peripherals. Through a specialized sales dealer network, LaCie offers innovative solutions for creative professionals in multimedia applications (graphics, audio, video, web design and digital photography). What differentiates LaCie is the design of its products, original creations by designers such as Philippe Starck, Porsche Design GmbH and Neil Poulton. LaCie is listed on the Paris Nouveau Marché (code 5431).

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