eSATA: the Optimal Interface for External Storage
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The Serial ATA (SATA) interface, now the most popular interface for PC applications, made its market debut in 2001. Transferring data at 1.5 gigabits per second (Gbps), SATA 1.0 soon began to displace the slower Parallel ATA (PATA) interface. Besides offering improved performance and quicker data transfers, the SATA interface brought to market new features, such as hot-plug capability, thinner cables and the ease of integration, for internal PC and consumer storage.

As SATA gained ground in the hard disk drive market, creative designers realized the innovative interface could potentially expand outside the PC, bringing the same performance features to external storage needs. At the same time, the digital storage industry was rapidly growing as consumers compiled ever larger data files and needed to back them up quickly and reliably to external storage devices. Consumers soon recognized the need for a faster, more robust interface to transfer data to storage devices.

To bring the advantages of SATA technology "outside-the-box," the Serial ATA International Organization (SATA-IO) released the SATA Revision 2.5 specification in mid-2005. The revised specification doubled SATA speeds to 3 gigabit per second and included an explicit overview and specification for the External SATA (eSATA) interface. eSATA is an extroverted version of the SATA interface that uses slightly different connectors designed specifically to withstand constant wear and tear and static electricity.

Applications for eSATA include external direct attached storage for notebooks, desktop, consumer electronics and entry servers, as well as support for multiple streams of content such as parallel write and read on a digital video recorder.

Benefits of eSATA include:
- Up to six times faster than existing external storage solutions
- High performance and cost-effective expansion storage
- Robust and user-friendly external connection
- Shielded cables and connectors up to two meters in length
- Port multiplication to attach multiple disk drives on a single eSATA cable

The new external interface is catching on. "eSATA penetration in retail PCs is about 15%, and there is a similar penetration into external storage boxes," reports Thomas Coughlin of Coughlin Associates. "Channel motherboard penetration (an indication of future developments) has eSATA penetration as high as 60%. By 2008, retail computer and external box penetration could increase to 25% or more."

Faster Speed

Lightening-fast speed is the key advantage that eSATA has over the other interfaces. As consumers create and collect ever-increasing amounts of high-res photos, videos, music, and other data, basic data transfer rates become crucial. Using an eSATA interface, end-users can back up their computing systems up to six times faster than existing external storage solutions.

Unlike existing storage solutions today, eSATA does not require the overhead of converting the signal between the internal IDE drive and the external interface. That's because SATA is the common standard interface of almost all new hard drives. Therefore, only a buffered direct connect is needed to extend the

PC's internal SATA ports outside the computer. Bridging interface solutions will always suffer from reduced transfer speeds due to the extra layer of hierarchy they introduce. eSATA is the only solution that fully utilizes the drives' full performance potential.

The figure below compares the maximum data rates of various commonly used interface and networking technologies."

Comparison of Maximum Data Rates of Various External Storage Interfaces
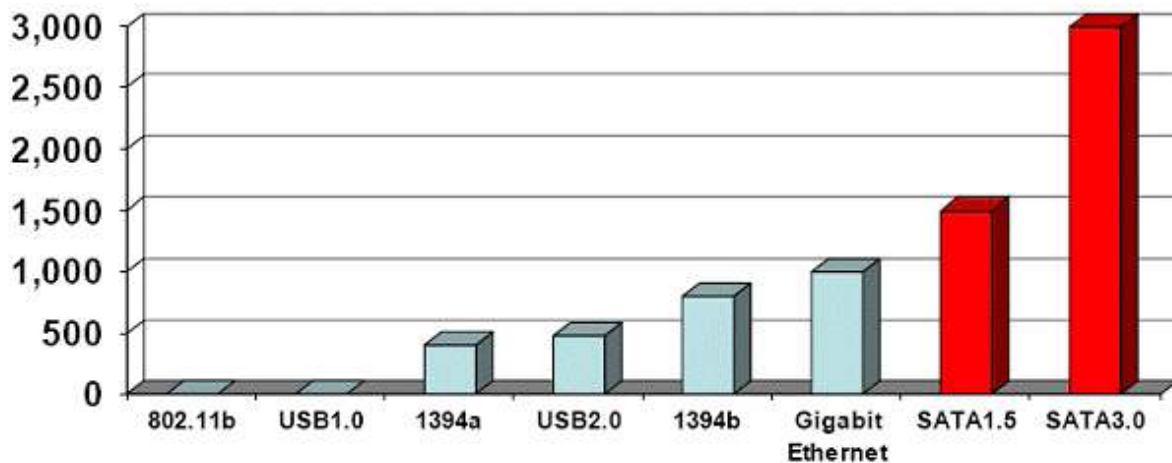
Source: Coughlin Associates, "eSATA Creates a New Storage Paradigm," 2007

Optimal Performance

Buying an external drive is the main way consumers add computer storage capacity and make data portable. Combo USB/FireWire drives also have a strong share of the market. While the current alternative technologies are here to stay, there's a growing trend to offer native eSATA ports, driven by consumer demands for high speed data transfer to a new generation of external storage products.

Although eSATA drives are still relatively new to the industry, extensive testing proves that it is unquestionably the fastest, best performing option for external storage needs today and tomorrow. Extensive testing proves that eSATA is unquestionably the fastest, best performing external option.

Cost Effective

Better yet, eSATA delivers a higher gigabyte transfer rate per dollar than existing storage interfaces today, making it a better value by providing a superior performance cost advantage. Because current interconnect technologies initially were designed as high-speed serial interfaces between laptops/PCs and external peripherals, they require a protocol translation when used for external storage purposes. Their overhead cost is increased by the need for a bridge chip or IP block to translate from the ATA protocol to the protocol of current alternatives used for the connection.

Because eSATA speaks the native language when transferring data, there is no need for additional protocol translation chips or IP blocks, and thus no additional overhead. This means that the physical cost and development effort is reduced for native eSATA drives, another bonus for suppliers. It's also important to point out that eSATA is still in its infancy. As the interface proliferates, costs are expected to come down. Most desktop drives available today already support both internal and external SATA.

Conclusion

As consumers continue to demand added storage capacity, eSATA is clearly the best choice for external storage needs based on speed, performance and price. As a new technology, eSATA still has market adoption to gain as PC makers have just begun to include eSATA ports in their systems. Once PCs begin shipping out with eSATA ports, consumers will recognize quickly the advantage of eSATA's speed and robust performance. For now, many drives come with a combination of eSATA/USB/FireWire ports.

eSATA is indisputably a superior interface for external storage connections on both speed and performance. SATA technology has not been tapped for even half of its total capabilities. Built for long life and to meet the ever-increasing demand for higher throughput, eSATA is expected to achieve even higher transfer rates—without compromising drive speeds—as it moves into the next generation.