Serial Hard Drive Interface Compatibility

Introduction

Use of the parallel bus interface, which has long been the industry-standard storage interconnect, is on the verge of decline among the vast majority of system builders. Components that are based on the aging interface are increasingly being replaced by their evolved serial counterparts—Serial Attached SCSI (SAS) and Serial ATA (SATA).

The new serial interfaces are designed to address the bandwidth limitations of their predecessors. They will support faster data transfer rates and more devices per controller, as well as reduce the size and complexity of the cables and connectors (thus enabling smaller, more densely-packed disk arrays). Among the most significant benefits is that incompatibility between SCSI and ATA will finally be addressed.

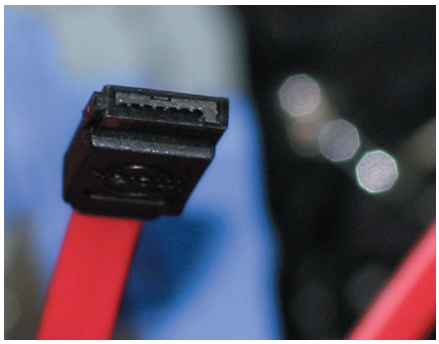
For the first time, system builders will be able to easily integrate SAS and SATA hard drives in a single enclosure. Plug compatibility is one reason for this, but a more substantial explanation lies with the system controllers themselves. The controllers have been designed to recognize both interface types and "talk" to each device in its own language and coordinate their respective activities and performance.

As a result systems can now be deployed using a combination of SAS drives (to provide the highest levels of system reliability) and SATA drives (to provide a high performance and low-cost-per-gigabyte solution for near-line storage, disk-to-disk backup and similar applications). This allows for a great deal of flexibility in designing disk arrays and other storage systems that provide exactly what the application requires for the least cost and maximum return on investment.

Because SAS- and SATA-based hard drives can now coexist within a system, it's important to understand each of their respective attributes and intended environments. The following is a brief overview of each serial interface and a set of recommendations for selecting a storage solution that is geared to meet your specific needs.

Serial Attached SCSI

SAS will continue to build upon the established SCSI technologies that are typically used in RAID and other enterprise environments. The emerging interface uses the existing SCSI protocol, while featuring serial point-to-point interconnections, dual porting, increased addressability and full duplex operation. SAS is set to deliver a maximum data transfer rate of 3Gbit/s, with a roadmap to 12Gbit/s. SAS will also simplify the design process for system builders because it uses simplified cable routing and shares similar physical attributes and interface transfer rates with SATA. The SAS feature set will enable the development of high performance and reliable solutions that can be deployed quickly and easily.



Serial ATA

SATA is an interface technology that was engineered to be the Parallel ATA replacement for PCs, workstations, and other ATA applications. Additional features have been developed into SATA to enhance enterprise ATA applications. SATA currently delivers a maximum data transfer rate of 1.5Gbit/s per second, and will have future speeds of 3Gbit/s followed by 6Gbit/s. The interface

has been designed to simplify device configuration and improve interface level data integrity. Like the SAS interface, SATA disk drives use a compact cabling structure and smaller connectors, which enable enhanced air flow and reduce system complexity.

Choosing the right hard drive

There are several factors to consider when selecting the right disk drive/interface for a given application. There are substantial differences between desktop and enterprise-class drives in terms of capacity, performance, reliability, scalability and cost. SATA drives are most commonly used in desktop applications because of their low cost-per-megabyte, extremely large capacities and performance features. Here, the focus is single-user applications. In some cases, SATA drives can be used in enterprise "entry-server" and other data-intensive applications.

SAS hard drives will be used in enterprise environments (e.g., server storage, high-end workstations), where multiple users are accessing a single system. These mission-critical installations will require the highest levels of system performance for applications such as online transaction processing, data analysis and storage virtualization.

Compatibility between the new serial interfaces benefits system builders and end users alike. The common serial interconnect will enable system builders to deploy systems that share common backplanes, connectors and cabling. This greatly simplifies the process of changing the "mix" of drives within an enclosure, enabling users to easily replace a SATA drive with a SAS drive if their needs change.

End users will have additional flexibility in buying systems that are optimally configured to address their target application. The ability to replace a SATA drive with a SAS drive also eliminates the need to replace entire systems when additional performance/reliability is required. These factors combine to substantially reduce the total cost of ownership for desktop and enterprise storage.

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