

24Gb SAS: Performance, Flexibility, ROI

UPGRADE TO ATTO EXPRESSSAS® 24Gb SAS HOST BUS ADAPTERS

Challenge

The need to provide a better, faster and more efficient storage infrastructure without increasing cost continues to be a challenge for IT professionals. Upgrading to an ATTO ExpressSAS 24Gb SAS Host Adapter is an ideal way to enhance your storage infrastructure.

Solution

24Gb SAS is the next interface to come to market for Direct Attach high performance connectivity to storage. It effectively doubles the bandwidth from the existing 12Gb/sec generation storage connectivity. ATTO 24Gb SAS host adapters are not just twice the speed of the previous generation. The benefits go well beyond a simple increase in data transfers speeds. 24Gb SAS offers 128b/150b encoding for improved link efficiency and 20-bit Forward Error Correction (FEC) that allows errors to be corrected on the fly for optimal operation in noisy environments. In addition, a new adaptive PHY training algorithm (APTA) enables 24G SAS to better operate in environments with noisy signal lines. As expected, it is backwards compatible with 12Gb and 6Gb SAS and SATA devices

MAKE THE SWITCH to 24Gb

- Instant performance enhancement
- Seamless transition from 12Gb to 24Gb SAS
- Fewer link errors with FEC and APTA
- Reduce downtime and ease troubleshooting with ATTO cable management

Performance

Data transfer rates for 24Gb SAS are up to 2400 MB/sec per PHY connection. Simply put, it is twice as fast as 12Gb SAS. Pair this performance gain with x16 PCIe 4.0 host computer bus speeds and the adapter can obtain up to 32,000 MB/sec of throughput. This allows users to run faster backups, complete more On-Line Transactions in a given period of time or pass more streams of video concurrently.

The ability to move twice as much data means one 24Gb controller is required instead of two 12Gb controllers to accomplish the same tasks. Users will realize a lower total cost of ownership in reduced initial hardware costs, decreased management costs, lower power consumption, lower heat output, fewer cables and the use of fewer PCI slots.

Benefits can be realized even if your infrastructure consists of 12Gb Drives. The improved PCIe interface of the 24G adapter will allow 20% more throughput as shown in the chart below (using theoretical maximum throughput numbers).

	12Gb	24Gb	24Gb
SSD Speed	Using 12Gb SSDs	Using 12Gb SSDs	Using 24Gb SSDs
SAS PHY Link Speed	1200 MB/s	1200 MB/s	2400 MB/s
Total SAS Throughput for 16 PHYs	16x1200 = 19,200 MB/s	16x1200 = 19,200 MB/s	16x2400 = 38,400 MB/s
PCIe Speed	PCIe 4 x8 = 16,000 MB/s	PCIe 4 x16 = 32,000 MB/s	PCIe 4 x16 = 32,000 MB/s
Total Throughput to Drives	16,000 MB/s Limited by PCIe connection	19,200 MB/s Limited by SAS Interface	32,000 MB/s Limited by PCIe connection

Improved Efficiency & Useability

To ease the transition to 24Gb SAS, customers can take advantage of End Device Frame Buffering. A SAS host connection can physically connect to multiple SAS or SATA drives through a SAS Expander. 24Gb SAS adapters support multiplexing, which allows multiple 12Gb SAS drives to share a connection to a 24Gb SAS host adapter. This also works great for 6Gb SATA drives that tend to hold the connection to the host open until all of the data for a particular command is transferred, essentially starving the other SATA drives on that connection.

With 24Gb SAS, each link is capable of 2400 MB/sec. Most Solid State Drives will not be capable of saturating the link. With End Device Frame Buffering, more drives can work in parallel, increasing the overall performance of the system. This technology also protects your current investment in 12Gb SAS storage as you can continue to use existing 12Gb drives with a 24Gb host adapter and realize a significant performance increase as shown in the table above.

Here are the results of an actual performance benchmark comparing a 16-PHY 12Gb SAS HBA to a 16-PHY 24Gb SAS HBA when connected to 12Gb SAS drives in a Windows server with a Queue Depth = 8.

Transfer Size	12Gb HBA Write MBPS	24Gb HBA Write MBPS	% Improvement
64KB	12,761	15,977	25.2%
128KB	12,907	16,181	25.4%
256KB	12,957	16,245	25.4%
512KB	12,988	16,238	25.0%

SSDs also benefit from the improved line rate of the latest generation of SAS. These drives are capable of considerably higher performance than the 12Gb SAS interface allows. Kioxia, a leading manufacturer of 24Gb SAS SSDs, ran comparison tests between their latest PM6-R Series (read-intensive) SSDs and currently shipping 12Gb SAS SSDs from a leading vendor. You can see that the new 24Gb SAS interface allows the drives to perform as they were intended – without the 12Gb/s limiter.

Drive Size	3,840 GB	7,680 GB	15,360 GB
Sequential Read	+97%	+97%	+97%
Sequential Write	+22%	+85%	+117%
Random Read	+32%	+48%	+48%
Random Write	+27%	+72%	+33%

Reduced Downtime

In addition to the benefits of increased performance, migrating from 12Gb to 24Gb SAS brings a new link technology to reduce the number of errors in noisy environments. As can be expected, with faster clock speeds come more transmission errors. Using an ATTO 24Gb SAS adapter, operators can quickly troubleshoot cable and link problems. A cable that is generating errors or simply showing a lack of connectivity can be reported to operating system and the operator can quickly determine the defective cable, saving time and money.

The Bottom Line

This next generation of host adapters offers a variety of fresh new features that not only increase performance, but provides more flexibility for connecting storage, makes it easier to manage the overall storage infrastructure and improves connection diagnostic capabilities - all at a lower total cost of ownership. Upgrading to ATTO 24Gb SAS Adapters is not only a good investment for the future, but also a simple way to improve the overall value of a storage system at minimal cost.

ATTO – 24Gb SAS HBA Models

ExpressSAS H24F0	16 External PHYs	PCIe4 x16
ExpressSAS H240F	16 Internal PHYs	PCIe4 x16
ExpressSAS H240N	24 Internal PHYs	PCIe4 x16

How to Buy

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