Business brief: SAN next generation—moving to 4 Gbps

Executive summary

The Fibre Channel (FC) storage industry has begun the transition to the 4 Gbps interface standard. This is a natural evolution from the 1 and 2 Gbps standards that preceded it. The new standard doubles the speed of the storage communication interface and will lead over time to improvements in storage performance as organizations upgrade their end-to-end storage infrastructure to 4 Gbps.

Benefits of the new standard include immediate savings for infrastructure implementations due to the need to purchase fewer ports, investment protection through backward compatibility, support for longer distances, and reduced power consumption. As importantly, these benefits come without increased 4 Gbps infrastructure component costs or additional training.

Organizations need not rush to implement 4 Gbps technology immediately. They can continue to use existing 2 Gbps technology as the industry slowly transitions to the new standard over the next 6–18 months. HP, however, recommends that organizations begin planning a gradual overall migration to 4 Gbps technology where it makes the most sense, starting with switches, followed by FC host bus adapters (HBAs), and then disk arrays and tape systems.

Introduction: Welcome to the 4 Gbps world

FC storage area networks (SANs) have entered the 4 Gbps world, doubling the speed of the current 2 Gbps interface standard. Over the next 6–18 months, the entire industry will gradually make the shift to a 4 Gbps FC storage infrastructure. Companies that use FC storage and SANs should start planning and plotting the transition of their existing storage infrastructure to the new standard.

Besides the improved performance 4 Gbps can bring, the good news about this technology change is how painless and nearly transparent it will be. To begin, there is no higher cost for 4 Gbps infrastructure components today. Similarly, there will be no new skills to acquire or learning curve to climb. Backward compatibility ensures that new 4 Gbps components will work seamlessly with existing 1 Gbps and 2 Gbps components.

The transition will be as smooth and easy as the one most companies have already made when they migrated from 1 Gbps technology to the current 2 Gbps standard. Although most organizations today do not require the additional performance delivered by 4 Gbps technology, since they will get it at generally no additional cost for switches and HBAs, it makes sense to begin planning that transition now. History has shown that application and system performance demands always increase. Laying the groundwork now for 4 Gbps technology ensures that your storage infrastructure will be capable when you inevitably need it.

Application of 4 Gbps technology

The new 4 Gbps technology for storage arrays will have its most immediate impact with sequential operations, such as database backups, long database loads, and streaming media. These applications typically send data across the links in much larger chunks, making it more likely they will saturate existing, slower links.

On the other hand, applications characterized by random operations, such as electronic messaging and database transaction processing, which send bursts consisting of small chunks of data, generally do not send enough data fast enough to saturate the existing links. In general, these applications will not benefit immediately. Similarly, organizations using entry or mid-range storage systems that are not fully configured also are unlikely to saturate the existing storage links at present.

"Though products based on next generation 4 Gbps Fibre Channel SAN technology are beginning to be introduced, it may be some time before customers are able to take full advantage of its higher throughput. While customers in certain industries, such as media and entertainment, could benefit early as end-to-end solutions from host bus adapters to disk subsystems are made available to the market, most mission-critical applications use random I/O's where the current 2 Gbps is still more than adequate."

Greg Schultz, senior analyst, Evaluator Group

However, SAN implementations that make extensive use of inter-switch links (ISLs), or need to gang together multiple links to aggregate sufficient bandwidth thereby consuming additional ports, will benefit immediately from 4 Gbps technology. It can reduce the number of ISLs required and free up ports otherwise used for bandwidth aggregation. In such cases, 4 Gbps technology will allow the company to buy fewer ports initially, thereby saving money, or delay the need to buy additional ports in the future.

Benefits

Although the transition to 4 Gbps technology will be gradual as vendors introduce more 4 Gbps products and organizations add to or update their existing SAN infrastructures, some benefits can be experienced immediately. Where 4 Gbps switches are in place, organizations will see:

- Higher bandwidth
- Support for longer distances
- Higher port density
- Need for fewer ISLs, which frees up ports
- Increased capacity where FC links are over-subscribed or saturated now
- Lower operating costs due to reduced power and cooling requirements
- Investment protection through backward compatibility with existing technology
- Access to enhanced features of the latest firmware accompanying 4 Gbps technology

Organizations will experience additional benefits in the future as their storage requirements and performance demands grow. Companies will be better positioned to absorb continued storage growth, averaging 80 percent per year worldwide, without disruption. In addition, they are, in effect, future-proofing their end-to-end storage infrastructure by migrating to the next generation of technology. Finally, they will be able to make more efficient use of their FC infrastructure overall, fully leveraging that investment.

Recommended 4 Gbps implementation roadmap

To upgrade to the 4 Gbps standard, HP recommends this simple three-step approach:

1. Upgrade switches and directors first, which were the first products to implement 4 Gbps technology.
2. Upgrade FC HBAs, which are just starting to come to market.
3. Add 4 Gbps storage arrays and tape systems as they become more widely available and for applications where an actual return on investment can be realized (medical imaging, streaming video, data mining, and so on).

This approach allows organizations to gradually migrate to the new technology as they upgrade their existing storage infrastructure. It will ensure that the higher performance is there when, and if, organizations need it while still maximizing their investment in older technology even as they future-proof their new technology investments.

For most organizations, the wholesale conversion to 4 Gbps technology can and should be gradual. Given current disk and tape drive transfer rates, the existing 2 Gbps technology will suffice for most current needs. And due to backward compatibility and interoperability, 4 Gbps devices inserted into the SAN infrastructure will be compatible with the 2 Gbps and even 1 Gbps technology already in place.

Today organizations should begin planning the migration following the preceding three-stage roadmap. Even if the entire process takes 18 months or longer, a gradual migration will not present a problem.

The HP advantage

HP supports the early adoption of 4 Gbps SAN technology and was among the first offering 4 Gbps infrastructure products and services that deliver immediate customer value.

Specifically:

- HP is number 1 in the industry in SAN deployments.
- HP has shipped the largest number of FC switches.
- HP was first to market with 4 Gbps embedded switches for blade servers.
- HP offers 4 Gbps switches from embedded switches to FC chassis switches.
- HP is executing against a solid roadmap that leverages its entire portfolio and ultimately delivers complete 4 Gbps solutions ranging from industry-standard and business-critical servers to storage arrays and high-speed tape systems.
- The HP strategy ensures protection of its customers' current investments as they augment with 4 Gbps products now and into the future.
- Try-and-buy services offered through the HP IT Consolidation practice and other HP consulting and planning services reduces technology risk.
- HP is long established as a trusted advisor for planning and implementing the next generation of IT infrastructures.

Conclusion: Planning for 4 Gbps technology

HP recommends that customers begin evaluating 4 Gbps infrastructure technology now. They also should begin the planning and preparation for the migration of their FC storage infrastructure to 4 Gbps technology over the next 9–24 months. In the meantime, they can be assured that for most implementations they will continue to be well served by the current 2 Gbps technology, and can be confident that HP will protect their investment moving forward.

For more information

HP StorageWorks SAN infrastructure product family

http://www.hp.com/go/san

HP StorageWorks storage array systems

http://www.hp.com/go/storageworks/arrays

Fibre Channel Industry Association

http://www.fibrechannel.org

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