



This paper describes the move to 4 Gb/s Fibre Channel, the benefits and the major applications that will benefit from this newest interconnect technology.

Introduction

Since the 2001 introduction of 2 Gigabit per second (Gb/s) Fibre Channel (FC) technology, engineers have been working on the next generation of Fibre Channel interconnection – 4 Gb/s. The new technology is now available, thoroughly tested and offered to enterprise customers.

4 Gb/s Fibre Channel systems are ideally suited for applications that need to quickly transfer large amounts of data – such as remote replication across a SAN, database in memory; streaming video on demand; medical imaging; data mining and data warehousing; and large databases supporting online transaction processing (OLTP). Additionally, large increases in online data, such as driven by radio frequency identification (RFID) applications, will leverage the benefits of 4 Gb/s Fibre Channel technology.

4 Gb/s Fibre Channel Storage System

The IBM® TotalStorage® DS4800 controller, features sixth generation system technology and offers the same extensive capabilities and functionality as other IBM DS4000 series Fibre Channel systems. These capabilities include broad support for operating systems and host types; advanced replication services such as Snapshot, remote volume mirroring and volume copying.



Why buy 4 Gb/s Fibre Channel technology?

The potential benefits of 4 Gb/s Fibre Channel technology include faster communication between servers and storage devices, the ability to more rapidly transfer data from storage to server or restore data from online backup media; high reliability due to the number of connections; and investment protection due to backward compatibility with 1 Gb/s and 2 Gb/s components – providing customers with state-of-the-art interconnection technology at about the same price and cost of ownership as current 2 Gb/s systems.

Some of the Killer Apps for 4 Gb/s Fibre Channel

The information explosion continues to drive the need for higher-performance communication. Performance improvements in processors, workstations and storage devices, along with the exponential growth in the amount of data being gathered and created, have spawned increasingly data-intensive and high-speed networking applications. 4 Gb/s Fibre Channel enables faster communication between servers and storage devices at about the same prices as today's 2 Gb/s Fibre Channel, helping IT administrators to effectively address the relentless needs of applications and end users.

Tiered Storage

As the concept of storage tiers becomes more prevalent and implementations become more common, data will need to be routinely migrated from primary storage to secondary storage across the storage network. Depending on the amount of data being relocated, this can be a time-consuming and costly process that can put a tremendous strain on the storage network and potentially disrupt access to the data during the migration. 4 Gb/s Fibre Channel provides a massive pipe through the SAN that allows data to be quickly moved from one storage system to another - enabling this bandwidth-intensive transfer to happen at up to twice the speed of 2 Gb/s Fibre Channel.

Campus area replication

While wide area network (WAN) replication can help provide outstanding protection against regional disasters, campus area replication can be just as beneficial. When replicating across the high-speed SAN, data can be mirrored synchronously, so the remote site has the same data as the local site at all times. The data at the remote site can then be used for a variety of purposes, such as data restoration, mining, analysis, testing and backup. Synchronizing and re-synchronizing the local and remote sites can be a lengthy process that monopolizes a large portion of the SAN's bandwidth. 4 Gb/s Fibre Channel provides these environments with a high-bandwidth infrastructure well suited for campus area replication.

4 Gb/s Fibre Channel enables data to be transferred from one system at up to twice the speed of 2 Gb/s Fibre Channel.

Streaming Video

4 Gb/s Fibre Channel is ideal for world-class broadcasting and rich media storage networks. Large block, sequential I/O applications that include content creation and delivery, modeling, rendering, and publishing, may benefit from the additional bandwidth that 4 Gb/s Fibre Channel provides.

Large Data Analysis

A 4 Gb/s Fibre Channel storage network can help companies accelerate and scale simulation, visualization, modeling and rendering applications simply and easily to help:

- Tremendously accelerate large dataset I/O rates;
- Share information across the organization for the highest level of collaboration;
- Enable shared file systems, via 3rd parties, to scale to higher levels of performance ;
- Simplify data management and consolidation to allow managing up to 90 terabytes, behind a single pair of controllers

Database in Memory

Customers running this emerging application need to have very large datasets in memory. Loading or refreshing these from disks becomes a time-critical effort. Large Linux™ clusters are an example of this type of computing complex, where loading as much as 12TB of memory from disk storage in less than seven minutes can be the requirement. 4 Gb/s storage systems can be used effectively for this demanding application as data can be loaded from the storage to the server in as little as half the time compared to 2 Gb/s Fibre Channel.

Quick Recovery

Recovery is more important than backup, and the time it takes to recover is becoming more important every day. Systems based on 4 Gb/s Fibre Channel technology are designed to deliver the high bandwidth performance required to enable short recovery time and high productivity.

Data Warehousing

Data warehousing presents a unique challenge for storage systems because both high bandwidth and high random I/O performance are required for effective solutions. The balanced performance of systems based on 4 Gb/s Fibre Channel technology helps address this challenge. They offer high levels of performance in both the bandwidth and IOPS dimensions.

Transitioning from 2 Gb/s to 4 Gb/s

According to a 2003 IDC report, 2 Gb/s Fibre Channel accounted for only six percent of the market in 2001, but by the end of 2002 2 Gb/s represented 70 percent of the market. IDC also predicted that by December 2003, 1 Gb/s technology would no longer be sold. The transition from 1 Gb/s to 2 Gb/s was simple and fast because it offered backward compatibility, no infrastructure change, and pricing was equal. The adoption of 4 Gb/s technology may follow a similar pattern, and offer backward compatibility, no infrastructure changes, and equal pricing. Since the industry has made this type of transition before, the transition to 4 Gb/s may be even faster. Four Gigabit per second Fibre Channel may be the dominant host interconnection for storage systems by December 2006.

Deciding when to upgrade to 4 Gb/s Fibre Channel

Deciding when to upgrade your infrastructure involves many factors. Customers need to evaluate if their current IT environment is stable, performing adequately and if growth has stabilized. If the answer to these questions is yes, then an infrastructure upgrade is probably not needed immediately.

However, those customers who answered “no” will probably want to consider 4 Gb/s technology when determining if the current rate of growth will overtake the current infrastructure, if new applications and solutions require higher performance levels and if bottlenecks in the current storage environment are preventing realization storage network potential.

Customers must also evaluate future purchases of host bus adapters (HBAs), servers, and storage devices in the SAN that will inevitably be based on 4 Gb/s technology. While these offerings will likely be backwards compatible, in order for the SAN infrastructure to meet its full potential and optimize performance, the full data path should be based on 4 Gb/s Fibre Channel technology.

Once the decision to upgrade has been made, the transition can take place quickly. Products are already being released based on 4 Gb/s Fibre Channel and as storage products continue to evolve, many will be designed based on 4 Gb/s standards.

Storage vendors know that customers rarely replace their entire infrastructure at once. As a result, 4 Gb/s may be introduced into customer environments in phases until 4 Gb/s Fibre Channel has a larger presence in the storage network than 2 Gb/s.

Additional factors driving the decision to purchase 4 Gb/s Fibre Channel technology today

A few years ago, products were rotated out of production every three years. Today, companies are extending the life of these products to four years or more. This means that products purchased in 2005 may still be in production when 4 Gb/s Fibre Channel is the norm. Does it make sense to purchase a new product that will be “outdated” before its production life is up?

Purchasing a product based on 4 Gb/s Fibre Channel technology can provide the best of both worlds. 4 Gb/s Fibre Channel’s backwards compatibility enables it to be integrated into existing 1 Gb/s and 2 Gb/s infrastructures. This allows users to immediately benefit from any improved functionality in their new 4 Gb/s Fibre Channel products, helps provide them with investment protection of their current environments, and provide future protection when their infrastructure eventually makes the transition to 4 Gb/s.

The value proposition for end-users is simple – equal cost; up to twice the throughput; helps protect investment; and less SAN infrastructure (fewer switches with fewer ports, fewer host bus adapters) helps increase SAN reliability, availability and serviceability (RAS).

Conclusion

Many industry analysts, customers and manufacturers agree that by the end of 2006, 4 Gb/s Fibre Channel technology will be widely adopted by organizations around the world. Four Gb/s Fibre Channel is backwards compatible, provides customers with state-of-the-art interconnection technology at the same price and cost of ownership as current 2 Gb/s systems.

Four Gb/s technology can benefit companies that run a variety of applications including scientific research, data warehousing and analysis, video on demand, and large databases.

Customers considering new storage components, expanding or upgrading their current 2 Gb/s infrastructure, experiencing relentless growth, or demanding the highest levels of performance, should carefully evaluate new 4 Gb/s Fibre Channel technology.

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