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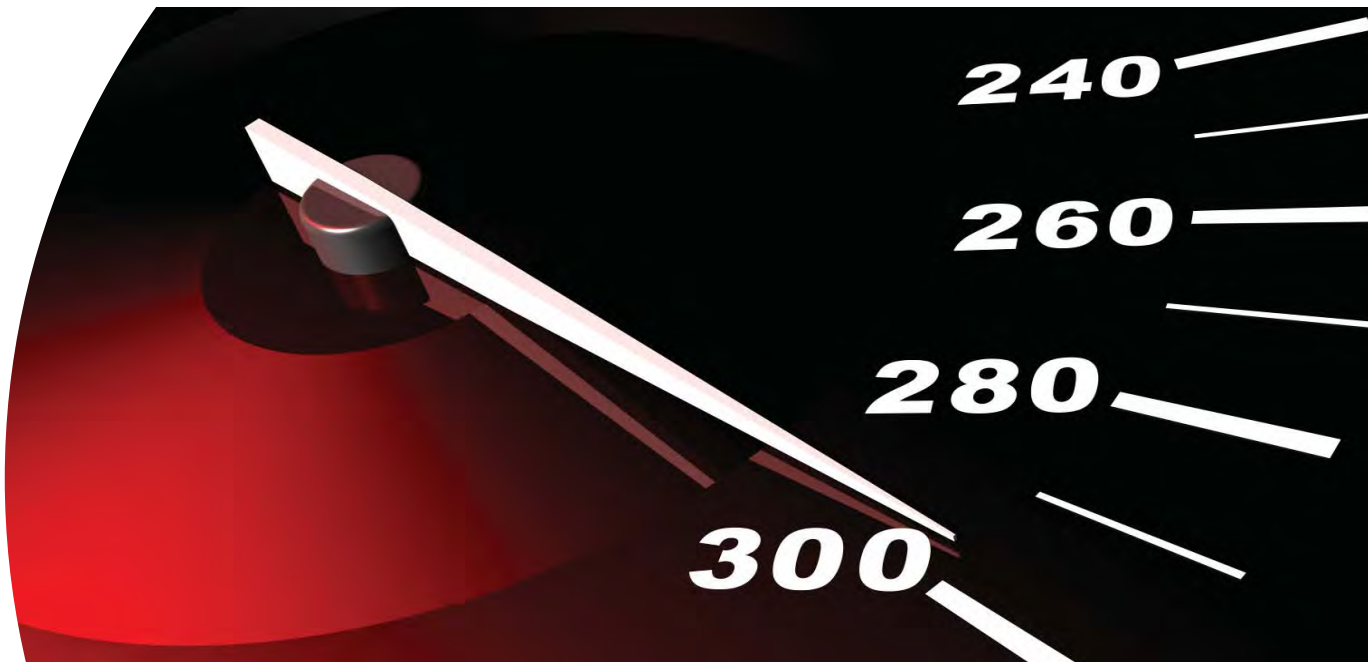
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8GB FIBRE CHANNEL RAID

ENABLING THE NEXT GENERATION DATA CENTRE

8Gb Fibre Channel has arrived - So what's the story?

Fibre Channel technology has been advancing at a pace in keeping with Moore's Law and infrastructure vendors have been rapid to offer solutions at price parity to the previous 4 Gb standard. Industry analysts, customers and manufacturers agree that by the end of 2010, 8 Gb Fibre Channel technology will be widely adopted by organizations around the globe.

With over 90% of today's SAN applications and devices ticking over nicely on 4Gb Fibre Channel you may wonder why we need another speed bump right now. This paper will highlight key application areas that can gain immediate benefit from 8 Gb Fibre Channel technology and examine some of the factors customers will need to consider when determining the right time to upgrade.

4Gb is serving us fine - what can 8Gb do for us?

So we now have 8Gb FC available to all of our Edge applications and devices, what are the application areas that can immediately benefit and how do you determine the right time to upgrade? As new communications technologies emerge it is important to evaluate their position and impact on the entire IT infrastructure before embarking on any upgrade plan. Customers will initially need to determine if their current infrastructure is stable, delivering adequate performance and whether storage growth and bandwidth requirements have stabilized or are anticipated to grow significantly in the near future. Even in unlikely cases where the current infrastructure appears to meet future needs we need to explore the fundamental benefits that 8Gb technology can bring in terms of business continuity.

New Performance Levels for Disaster Recovery

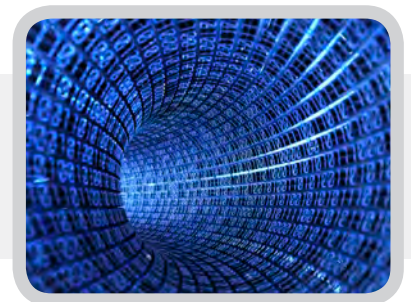
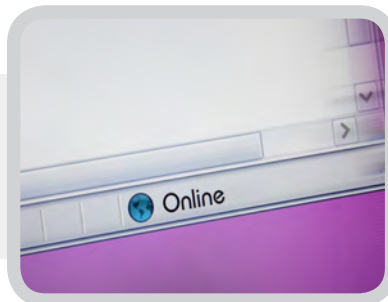
When business revenue depends on system and data availability rapid system recovery is more important than backup, and the time it takes to recover is becoming more important every day as business processes are tightly integrating throughout all stages of product and service delivery. Systems based on 8Gb Fibre Channel technology can offer a 2X or more increase in communications performance between servers and storage with little or no increase in price, delivering the high bandwidth performance required to enable short data recovery times and high productivity. Furthermore, conversion to 8Gb will not require any significant staff retraining.

What are the ideal applications for 8Gb FC?

Although 4Gb FC has generally provided sufficient bandwidth for today's data centre, the digital information and server/storage virtualization explosion continues to drive the need for a higher-performance infrastructure. The exponential growth in the amount of data being created plus the need to comply with regulatory requirements concerning data storage is also driving the demand for higher speed networking. Aside from the infrastructure growth required to keep pace with technology advancements there are a group of increasingly data-intensive applications that can take instant advantage of 8Gb Fibre Channel in order to improve productivity and reduce time to market:

• Urgently needed throughput for Server Virtualization

You may argue that application servers which require and drive Fibre Channel bandwidth to the limits are in the minority. However, the fact that the average application server is under utilizing its hardware provides a key application area which can benefit immediately from 8Gb Fibre Channel. Virtualization servers using operating environments such as VMware® and Hyper-V™ combine multiple application servers into one box in order to maximize utilization of the server hardware. This also means that current Fibre Channel speeds that would be more than adequate for a single application server can suddenly become inadequate for the virtualized group. So where a single email or database server might not need 4Gb per second throughput, a group of virtualized email and database servers certainly could saturate the available bandwidth and immediately take advantage of 8Gb Fibre Channel.



- **Maximizing performance for Storage Virtualisation**

Similar to application server virtualisation, there is yet another group of servers that can take immediate advantage of 8Gb Fibre Channel: Storage Virtualization servers. These servers consolidate the functions of multiple storage arrays by abstracting logical storage from the underlying physical storage. So even if there are legacy storage arrays in your SAN infrastructure that still employ 2/4Gb Fibre Channel, the storage virtualization server can use 8Gb Fibre Channel ports to aggregate access to all arrays within the SAN infrastructure. Also, since the 8Gb Fibre Channel ports are compatible with existing 4Gb and 2Gb Fibre Channel, the storage virtualization servers can be used by the application virtualization servers at 8Gb while still being used by individual application servers at 2/4Gb, or even at 1Gb using iSCSI without change. Storage Virtualization products can take advantage of 8Gb Fibre Channel today such as those from FalconStor, DataCore and many other vendors.

- **High Performance & Grid Computing (HPC)**

With advancements in processor and server backplane performance, driving an 8Gb Fibre Channel infrastructure is well within the capabilities of today's blade servers. As these servers typically have little I/O expansion, the greater fan-out offered by 8Gb Fibre Channel allows for blade consolidation and a welcome performance boost.

- **Tiered Storage & Disk-to-disk backup (D2D)**

As implementations of tiered storage become more prevalent, data will need to be routinely migrated from primary to secondary storage across the SAN. Depending on the amount of data being relocated, this can be a time-consuming process placing a tremendous strain on the storage network with potential data access disruption during the migration. 8Gb Fibre Channel provides a massive pipe through the SAN allowing data to be quickly moved from one storage system to another, enabling this to happen at up to 2X the speed of 4Gb Fibre Channel.

- **SAN/Campus Area Network (CAN) Replication**

While remote replication across a wide area network (WAN) can help provide protection against regional disasters, SAN/CAN replication can be just as beneficial. When replicating across the 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 mining, migration testing and backup. Synchronizing the local and remote sites can be a lengthy process that monopolizes a large portion of the SAN's bandwidth. 8Gb Fibre Channel provides these environments with a high-bandwidth infrastructure well suited for SAN/CAN replication.

- **Video Post Production and Streaming Video Applications**

Video based applications typically involve large block sequential I/O workloads that could take immediate benefit from 8Gb Fibre Channel. The increased performance will deliver improved productivity for workflows such as content creation, post production editing, animation modelling and rendering, and final publishing.

- **Medical Imaging, Seismic Data Acquisition and Analysis**

Further applications that have large block sequential I/O workload characteristics include medical imaging, seismic data acquisition, data analysis and data mining, all of which will benefit from the added bandwidth that 8Gb Fibre Channel provides. These applications can all monopolize a large portion of the SAN bandwidth, and 8Gb offers a great performance improvement that allows data to be moved quickly.

Investment protection eases the upgrade path

To simplify and accelerate the introduction of this evolutionary technology, 8Gb storage products are backward and forward compatible, making it possible to deploy 8Gb products seamlessly into existing 2 and 4Gb SAN environments. This allows users to immediately benefit from any improved functionality, provides investment protection of their current environment and future protection when their infrastructure eventually makes a complete transition to 8Gb. Today's organizations must weigh any decision to upgrade to a 8Gb SAN infrastructure against their current and future business process requirements in terms of functionality, scalability, performance metrics and strategic growth. Another factor to consider is whether the HBAs, servers, switches and storage systems in the SAN eventually will be upgraded to 8Gb technology. Although the components will be backwards compatible, in order for the SAN to meet its full potential the end-to-end infrastructure should be based on 8Gb. An 8Gb upgrade decision might also be based on the desire to implement specific new product features and technology available only with 8Gb offerings. SAN performance monitoring tools can also help determine the appropriate time to upgrade by collecting usage statistics and performance data to indicate network bottlenecks and saturation levels.

Lower costs through decreased port counts

Even if application server rates are not saturating an existing 4Gb SAN infrastructure, 8Gb storage can provide the ability to fan out to a greater number of servers. Upgrading the SAN infrastructure to 8Gb will also cut costs as the number of Inter-Switch links can be reduced to half assuming everything else stays the same. This will free up additional ports in the SAN fabric for new servers or storage systems. Customers must also evaluate future purchases of host bus adapters (HBAs), servers, and storage devices in the SAN that will inevitably be based on 8Gb technology. While these offerings will 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 8Gb Fibre Channel technology.

Conclusion

For most organizations the complete conversion to 8Gb technology can be gradual. The transition to 8Gb is a natural progression, just like the transition from 1Gb to 2Gb and 2Gb to 4Gb, with complete investment protection and no additional skills or training required. We have seen that 8Gb technology can benefit companies that run a variety of applications including scientific research, data acquisition, disk-to-disk backup, and post production video. Customers considering new storage components, expanding or upgrading their current 4Gb infrastructure, experiencing significant growth, or demanding the highest levels of performance, should carefully evaluate new 8Gb Fibre Channel storage technology. When a technology offers twice the performance with no obvious cost penalties with in-built investment protection, it is a difficult proposition to pass up.

