

Save

4 Gb Fibre Channel—a Step Up in
Business Performance

ULTAMUS™ RAID

Overland
STORAGE®
Simply Protected

Why 4 Gb/sec FC? Why Now?

The past few years have seen significant change in how and why data is stored. Beyond the obvious need to support the growing appetite of business applications, the business dynamics and requirements for on-line and near-line data storage have also changed. Global regulations and government mandates have further affected data retention and access policies and the raw growth of new data are driving the adoption of a new generation of storage and SAN technologies.

The following forces are the principal drivers behind the transition to 4 Gb/sec Fibre Channel:

- **New Business Dynamics**—Storage capacity continues to grow from 60-100% per year depending upon who your favorite industry prognosticator may be. It is undeniable that storage capacity has to keep pace with the growing numbers of on-line transactions, e-mails, instant messages, RFID tags and other data-generating applications. And while the volume of newly-created data is exploding, the number of data copies that are stored to meet regulatory requirements, business continuance demands and the data access demands of customers increases.
- **The Web and Interlinked Systems**—We have become accustomed to getting a data "fix" - 7 x 24 - for personal or business purposes. Data has to be online to link supply chains, perform online transactions and search for new music or streaming video. This not only requires vast quantities of data to be on-line, it requires that data be held in a "reference-able" or near-line state. Near-line or reference-able data not only needs to be constantly assessable and searchable it needs to be protected as enterprise mission critical data.
- **Compliance with Regulatory Requirements**—Around the world, government regulatory requirements are changing and these changes lead to greater demand for data to be online and rapidly accessible. The data specified in a wide range of U.S and international regulations must be tracked, protected and secured with accessibility requirements defined as well. Among the global regulations affecting data storage and protection are: SEC 17a-4, GDPdU and GoBS (Germany), Electronic Ledger Storage Law (Japan), HIPAA, FDA 21 CFR Part 11 11MEDIS-DC (Japan), ISO 18501/18509, BSI PD0008 (UK), NFZ 42-013 (France), Canadian Uniform Electronic Evidence Act, AIPA (Italy), Sarbanes-Oxley Act, PRO Government Standard (UK), European Union Regulations on Personal Data Processing and others.
- **Business Continuance**—Mother Nature continues to remind us that there are many things that are simply beyond our control. Ensuring that business continues without interruption is a leading priority for IT organizations worldwide. The requirements of business continuity have led to an increased use of disk-based, remote data replication as well as a groundswell in the use of disk instead of tape for backup and instantaneous recovery.
- **Business Value**—Every industry has benchmarks for competitiveness and performance. Information technology often takes a leading role in achieving industry-leading performance and competitiveness by improving supply chain logistics, customer service and employee productivity. Any business process that can be performed faster and at lower cost is desirable. The business-based bottom line is almost always the motivation behind a move to a next-generation technology.

The good news is that 4 Gb/sec FC is an industry standard, it is backward compatible with existing infrastructures based on 1 Gb/sec and 2 Gb/sec Fibre Channel and it can be added as needed without a forklift upgrade. The move to 4 Gb/sec Fibre channel is a natural outgrowth of our information driven economy.

The New Standard for SAN Storage

4 Gb/sec Fibre Channel is a new industry standard and doubles the data rate of the previous 2 Gb/sec Fibre Channel standard. Additional technical details can be found at www.t11.org or www.FCIA.org.

This discussion will focus on the business side of the 4 Gb/sec market. Most new technologies start with a few bleeding edge vertical markets or applications that demand the highest performance possible. Today's most demanding data intensive applications include:

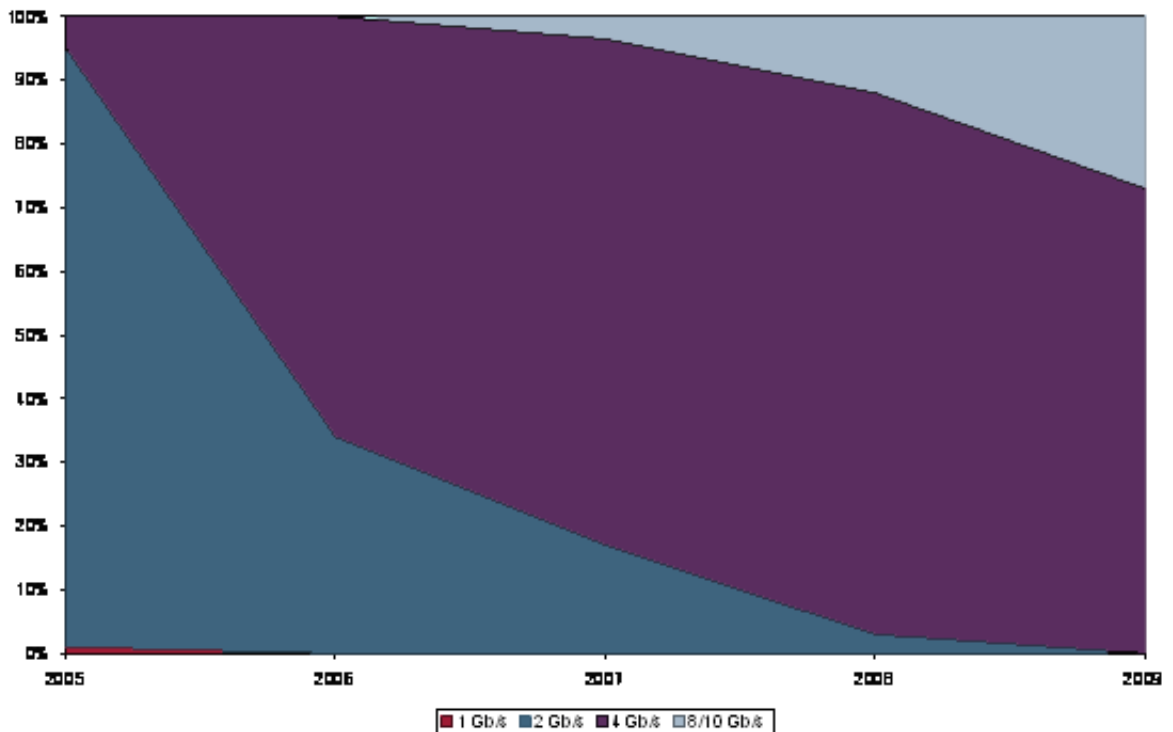
- High Definition Video—HD video uses up to 4X the bandwidth of standard broadcast data rates and can require double that requirement when multiple frames are displayed at once. (Think CNN with the news ticker on the bottom of the screen)
- OLTP/Databases—Very large database and transaction processing systems often use the highest performance solution as soon as they are stable to increase productivity.
- Data Protection and Migration—Is among the most demanding tasks. Early adopters of higher data transfer rates use them to shrink the time required to conduct these tasks. While everyone agrees that data protection is vital in IT organizations, the sooner it is done the better.

4 Gb/sec Fibre Channel is significant not only for the performance improvements it delivers, but it also sets the stage for a complete end-to-end performance enhancement without the need to change all the pieces of a SAN at once. Storage managers can choose to add 4 Gb/sec solutions to support key applications as the need is identified, with complete investment protection for their current infrastructure. 4 Gb/sec FC gives storage managers the best of all worlds: lower costs, higher performance, investment protection and a seamless migration path.

The Market is Moving to 4 Gb/sec FC

According to Gartner, 4 Gb/sec FC will reach 80% of new host port shipments by 2007. This growth will be driven by direct substitution of 4 Gb/sec FC ports for 2 Gb/sec FC ports at the same or lower costs. Second, every major vendor of SAN equipment is moving their new products to 4 Gb/sec as the base configuration and ending shipments of 2 Gb/sec ports.

Fibre Channel Host Connection



Source: Gartner 2005 SAN Report

The industry data for switch, RAID and other SAN devices will all show similar charts since the same economies of scale and competitive factors are driving the market in this direction.

Moving to 4 Gb/sec FC is Simple and Low Cost

The best news is that moving to 4 Gb/sec FC is simple and seamless. Since 4 Gb/sec FC is backward compatible with current switches the ability to plan a smooth transition is very manageable for IT departments. Most likely the next SAN component (switch, appliance, RAID system or library) that is added will be based on 4 Gb/sec technology.

Building a Migration Plan

As all IT managers know, vendor claims and reality can sometimes diverge. So, the best approach to any new technology is to build a plan to follow the "3 Ts" (Try, Test, and Transition). The first question is where to start?

Start with RAID or Data Storage Systems

Arguably, the best place to start is with a new RAID or other storage system. There are three reasons for this preference:

1. Safety—The ability to use test data on a new storage system is easier and safer than jumping directly into a production environment. 4 Gb/sec FC storage systems can be added to the SAN without having to change the entire SAN (HBAs, drivers, switches).
2. Performance—New storage systems designed to leverage the full performance of 4 Gb/sec offer improved performance in both IOPS and data rates. Storage managers can easily compare the performance benefits of their new storage systems using their existing infrastructures as a base.
3. Cost—The price of storage continues to go down. Testing 4 Gb/sec on a new high performance subsystem, like ULTAMUS RAID, is cost effective from human, management and capital perspectives.

Free Up the Fabric

The next step would be to look at the switching fabric. Since 4 Gb/sec FC pipes can reduce the number of ISLs (Inter-Switch Links) required to support the fabric and transport data, it is the next, and perhaps most beneficial place to start. Moving to 4 Gb/sec will reduce the cost of switching fabrics in two ways: 1) by reducing ISLs and 2) reducing the number of ports required to move data. This will also improve - double - the performance of the core of the SAN, improving existing application performance. The most obvious applications to benefit from a faster fabric are disk-to-disk backup, VTL and other data intensive applications that primarily move data through the core of the SAN from SAN device to SAN device. Additionally, most SAN fabrics can be upgraded without adversely impacting production applications.

HBAs and Drivers

The next step is to upgrade the HBAs and drivers in the servers. This is where business applications like OLTP, databases, video and other applications will see dramatic changes in performance. Obviously, any changes to production servers need to be tested and done once the rest of the infrastructure is stable and ready for this transition. Many of the new HBAs and drivers also provide new management tools such as SMI-S that ease the management and configuration of HBAs and the entire SAN. This is one reason we suggest upgrading SAN applications and management as the last step so that all of the tools are in place before you try to use the new software.

SAN Applications and Management

The final step is to add the latest SAN management and data protection applications. These storage software tools will bring all of the pieces together and make the 4 Gb/sec transition complete.

4 Gb/sec-Based RAID—The End-to-End Benefit

Moore's law is alive and well in the IT industry. Moore's law roughly states "The performance of silicon will double and the price will drop by 50% every 18 months." While IT departments do not change technologies every 18 months, the industry moves forward based on this notion and it is what continues to drive the improved operations of the information economy. In keeping with Moore's Law, the move to 4 Gb/sec FC is not just about upgrading path bandwidth. It is about using the improved performance and lower costs to improve the overall operations, transaction velocity and business performance.

To build new 4 Gb/sec FC RAID infrastructures, every link in the data transfer chain should be improved. This includes the pipes into the RAID box, the speed of the controllers, caching, the data rate of the drives and reducing drive latency.

| Link in the Data Chain | New Technology | Business Benefit |
|------------------------|--|--|
| HBAs | PCI-Express improves Server I/O performance over standard PCI by up to 8X | <ul style="list-style-type: none"> Application servers can process more business transactions at a lower cost |
| Switches | 4Gb Fibre Channel | <ul style="list-style-type: none"> Up to a 30% reduction in the number of switch ports required to build a SAN |
| RAID Interface | 4Gb Fibre Channel 3Gb SAS to the Host 1Gb iSCSI | <ul style="list-style-type: none"> Twice the transactions for half the cost |
| RAID Controller | Storage Network Processors RAID 6 | <ul style="list-style-type: none"> Improves application performance with faster responses Lowers costs by using fewer chips and less power to use storage RAID 6 enables array to sustain operations in the event to 2 drives failing |
| Faster & Larger Cache | Moore's law provides larger, faster and lower cost caching | <ul style="list-style-type: none"> Improved data rates and IOPS for a lower cost /per transaction |
| Faster Drives | New SAS and SATA drives with 3Gb/sec data transfer rates and improved IOPS with spindle speeds up to 15K RPM | <ul style="list-style-type: none"> Twice the performance for all applications IOPS intensive or streaming based |
| Data Protection | Snapshot | <ul style="list-style-type: none"> Provide Point-in Time copies of data to provide online backups, support data replication and DR requirements |

This good news for IT managers is that these benefits can be realized in small steps that can be managed and phased in over time. The key to successful migration to 4 Gb/sec FC is solid planning to make sure that the gains are right for the specific application or business. The key is to look at the application and then pick the right first step in the 4 Gb/sec migration.

ULTAMUS RAID is Right for 4 Gb/sec FC

ULTAMUS RAID is the right platform with which to begin a 4 Gb/sec FC migration. ULTAMUS RAID and 4 Gb/sec FC will provide an immediate performance improvement for key business applications. ULTAMUS RAID is not just a collection of new technologies, but rather a well balanced and flexible platform that can meet the performance, reliability and cost requirements of

your business. ULTAMUS RAID is a next generation RAID platform that incorporates the latest storage technologies based on the latest industry standards. It is a complete end-to-end performance and reliability solution that is ready to help storage managers make the migration to 4 Gb/sec.

Summary

The 4 Gb/sec transition is coming and will provide a wide range of benefits for storage managers. The keys are understanding the business drivers to find the right solutions, building the right migration plan so the solution provides immediate benefits without impacting production environments, and choosing the right platform with the end-to-end architecture that supports all application needs in a single solution.

Overland's industry leadership delivers investment protection to storage buyers through leading-edge, "future proofed" technology. ULTAMUS RAID arms storage managers with the tools they need to implement storage strategies and build IT infrastructures that align with today's and tomorrow's business and data management needs.

| Technology | Benefits | Overland Leadership |
|-----------------------------|---|---|
| RAID 6 Hardware Accelerated | <ul style="list-style-type: none"> Higher Availability | <ul style="list-style-type: none"> Better for mission-critical application availability. Overland's hardware accelerated RAID 6 allows storage to remain online in the event of two drives failing simultaneously. |
| SAS Drives | <ul style="list-style-type: none"> Higher Performance Lower Costs Investment Protection Higher Availability | <ul style="list-style-type: none"> Ideal for email, web serving, database and other performance-intensive applications provides the performance and reliability of Fibre Channel drives at 30% lower cost SAS and SATA II drives can be combined in the same RAID chassis to support applications with vastly different capacity and performance requirements. |
| Enterprise SATA II Drives | <ul style="list-style-type: none"> Higher Availability Higher Performance Better Price/TB Investment Protection | <ul style="list-style-type: none"> Better performance for D2D backup and media Built for 7 x 24 operating environments 1.4 million hour MTBF at 100% duty cycle—more than double the reliability of desktop SATA II drives Directed Offline Scan monitors every write and performance diagnostic tests when drives are idle, enhancing data availability Perpendicular Recording reduces the number of moving parts, for higher availability |
| SAS expansion & scalability | <ul style="list-style-type: none"> Grows with your application requirements | <ul style="list-style-type: none"> Effortlessly scales up to 60 drives in 12-drive/2U increments No performance penalty |
| 4Gb Fibre Channel | <ul style="list-style-type: none"> Higher Performance Investment Protection | <ul style="list-style-type: none"> Better performance for all applications. 4Gb FC improves IOP intensive applications with reduced latency and improves streaming applications with higher data rates |
| Snapshots | <ul style="list-style-type: none"> Disaster Recovery Data Protection | <ul style="list-style-type: none"> Snapshot technology offers the best value in data protection by creating low-impact copies of data that support point-in-time recovery |
| Pricing | <ul style="list-style-type: none"> Low Acquisition Cost | <ul style="list-style-type: none"> Excellent price/TB for RAID storage Integrated RAID ASIC technology reduces controller costs and an optimized supply chain reduces platform costs. |

ULTAMUS RAID Applications Benefits

ULTAMUS RAID is the right platform to make IT applications run faster, with higher availability and improved ROI.

| Applications | ULTAMUS RAID Features | Business Benefit |
|-----------------------------------|--|---|
| Database E-mail Web Servers | <ul style="list-style-type: none">• Multipathing for key operating systems• 4 Gb/sec host connection provides high data transfer rates and low latency• SAS drives provide maximum IOPS (based on 15k RPM) at a lower cost than 4Gb/sec FC drives• Hardware Accelerated RAID 6 improves data availability | <ul style="list-style-type: none">• More transactions• Lower cost per IOP• Improved operations and lower management cost with higher availability |
| Video D2D Backup | <ul style="list-style-type: none">• Multipathing for key operating systems• 4 Gb/sec host connection provides more consistent data transfers for streaming applications• SATA II drives offer the right performance with very high capacities• Hardware Accelerated RAID 6 improves data availability | <ul style="list-style-type: none">• More data protected online for regulatory requirements• Improved cost per TB• Improved operations and lower management cost with higher availability |
| ILM & Tiered Storage | <ul style="list-style-type: none">• Multipathing for key operating systems• Shared SAS/SATA II architecture allows for optimizing cost, performance, capacity, and access requirements• Single box, many uses• Snapshots provide efficient data protection on the right class of storage | <ul style="list-style-type: none">• Investment protection, asset management, and flexibility• Lower cost per IOP and TB• Improved operations and lower management cost with higher availability |

Save

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