



Need a Long-Term Archive Solution? Quantum Adds LTO-5 to Scalar Tape Libraries

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Management Summary

Advancements in digital technology surround us improving our lives in many ways. From the MRI in the hospital taking images of our bodies to help save lives to the GPS navigational systems in our cars that eliminate the necessity for us ever to have to stop to ask for directions, these new technologies have become pervasive. No where is that more apparent than in the entertainment industry where digital technology has given us movies, such as *Avatar* or *How to Train Your Dragon*, to amuse us. Even in our homes, digital technology enables us to watch television on screens that are wider than ever before, yet with a thinner profile than anyone could possibly have imagined. These new TV sets have a higher pixel density to improve the image, improved color palette to deliver those images “in living color”, and improved energy efficiency to satisfy even the most energetic ecologist. In fact, whether it is the MRI or the TV, this new digital technology enables us to replace the previous generation with something better.

The same thing is true in the enterprise data center; new technology is replacing the old to improve the IT infrastructure for the enterprise and to make it more energy efficient to help establish a “green image” for the enterprise. It should come as no surprise that the data being generated from thousands of MRIs and millions of digital images that make up a single movie, along with hundreds of mission- and critical applications, are causing a rapid and uncontrolled expansion of the primary storage systems that populate our enterprise data centers. Each and every one of these files has to be saved and protected. *Short-term* backup and restore has evolved from a disk-to-tape architecture to a disk-to-disk environment to order to take advantage of the random I/O capabilities of disk along with its high-speed throughput. *Long-term* backup and archive functions, however, have been completing the circle, evolving back to a disk-to-tape architecture in order to take advantage of the low-cost, high-capacity nature of tape, not to mention the energy efficiencies to be gained by putting your archive on a media than does not have to be constantly spinning. Downloading a movie, for example, does not require random I/O and can be accomplished very rapidly from tape, as well as disk. What is required now is a high-capacity tape library system with high-density cartridges, improved throughput, data security, and an easy-to-use interface.

The *Scalar i6000* tape library from Quantum, with the recent announcement of *LTO-5* technology by the LTO Program, addresses these issues and meets all of these criteria. With an increase in slot capacity of more than 50% from their previous high-end library, the *Scalar i2000*, and an increase in cartridge capacity of almost 100%, the *Scalar i6000* can handle the data retention and protection needs of the most demanding data center. Along with their *iLayer* software, Quantum has delivered an archive solution that reduces the total cost of ownership for the IT infrastructure while at the same time simplifying data protection. To learn more about the *Scalar i6000*, please read on.

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The Role of Tape in the Data Center

Today's enterprises are experiencing storage growth greater in scope than ever before, with expanded capacity being measured in petabytes. That growth comes from structured data from enterprise databases, or unstructured data from a variety of office productivity applications, such as images, video, and audio. Wherever it comes from, it must be preserved for business continuity, data retention laws, and to meet compliance requirements. Tape historically has been the primary media for backup and archive support for the data center. Even today, tape continues to be pervasive in data centers of all sizes. For backup, 20% of all enterprises use only tape, while another 65% use both tape and disk, with tape usually sitting behind disk.¹ This means that 85% of all enterprises use tape in some capacity for their data protection needs, with the primary role of tape evolving to long-term archive and data retention environments, with many enterprises using disk systems for short-term backup and recovery in order to take advantage of the speed of disk. It goes without saying that tape continues to be the primary storage media for most disaster recovery plans.

With primary data continuing to grow, doubling every 12 to 18 months, powering and managing that growth have moved into the top five of CIO concerns. All of that data needs to be backed up and retained for long periods of time. Keeping it on spinning media for years on end will eat away at the energy portion of your IT infrastructure budget². Moving long-term data retention to tape eliminates the requirement for electricity to store that data, enabling the enterprise to demonstrate sustainability via green initiatives that seek to reduce energy consumption. The length of time varies for each industry. However, government regulations from the SEC and the IRS, as well as regulations from HIPAA³ and the PCI⁴ Data Security Standard, demand lengthy, and secure retention periods. In the past few years, many companies under litigation have been forced by the courts using new e-Discovery laws to produce old e-mail, documents, digital voice mail messages, and

other files in order to defend themselves in court action, forcing these businesses to retain more digital information for even longer periods.

The data center needs to reduce the total cost of ownership (TCO) for their backup/archiving infrastructure. It must contain costs, manage data growth, improve the backup/archive process, and make it more efficient. There is also a legal responsibility to improve data security, mitigating risk in order to protect the enterprise from embarrassment, as well as from expensive, legal recourse for lost or stolen data.

One of the most significant areas for cost containment is in the media itself. With potentially thousands of cartridges being created every year, the cost of tape media has become the largest single aspect of the data retention budget⁵. The ability to store more data on a single cartridge is rapidly becoming the #1 requirement in any new storage acquisition. The density of a cartridge is followed closely by the need to increase data throughput in order to reduce, or at least contain, the length of the backup window, and correspondingly, the length of time for recovery. A third requirement is for encryption, in order to secure the privacy of information on the media in transit, to or from any remote facility being used as a storage vault. Failure to do so can be very expensive to mitigate, with the cost per individual involved reaching in excess of \$200 and with the cost per event now reaching to the many millions. One media that successfully responds to data center needs in all three areas is LTO-5.

Advantages of LTO-5

With a compressed capacity of 3TB per cartridge using a 2:1 compression ratio, LTO-5⁶ cartridges support almost 2x the capacity of LTO-4 media and almost 4x that of an LTO-3 cartridge. As a result, fewer cartridges are required to backup and archive the same volume of data. This reduces the data center's expense for tape and tape management. But the advantages of LTO-5 go beyond simply higher density. With a compressed throughput of 280 MB/s, LTO-5 has a higher data transfer rate than LTO-4, 40MB/s quicker, and up to 120MB/s faster than an LTO-3 drive. In addition, the

¹ According to Quantum.

² See the issue of *Clipper Notes* dated October 21, 2008, entitled *Disk and Tape Square Off Again – Tape Remains King of the Hill with LTO-4*, and available at <http://www.clipper.com/research/TCG2008056.pdf>.

³ Health Insurance Portability and Accountability Act.

⁴ Payment Card Industry.

⁵ Op. Cit., the issue of *Clipper Notes* dated October 21, 2008.

⁶ See *The Clipper Group Navigator* dated January 29, 2010, entitled *LTO Program Announces Next Gen Tape – LTO-5 Raises the Bar for Tier-3 Storage*, available at <http://www.clipper.com/research/TCG2010002.pdf>.

LTO-5 specification also supports 8Gb FC connections, enabling LTO-5 drives to be deployed into an 8Gb/s FC network, making it easier to stream data from high-performance storage systems to a tape library. Further, LTO-5 technology is read/write compatible with LTO-4 media, and read-compatible with LTO-3, protecting the enterprise investment in the existing LTO media inventory, and simplifying data migration projects.

LTO-5 is also continuing in the tradition of the preceding generations to add new critical functionality in support of innovative tape management. In addition to the WORM technology from LTO-3, LTO-5 also incorporates a 256-bit AES encryption capability in hardware from LTO-4, for the highest levels of data security without affecting performance. This technology employs encryption keys that are 256 bits long, making them nearly impossible to guess or break using the brute force techniques commonly used by hackers. Now, LTO-5 technology innovates with a new partitioning functionality, with two media partitions, to enable faster data access through the enhancement of file control and data indexing. This is especially critical in addressing the growing needs of applications, especially those involving rich media.

With the cost of media being the biggest expense in any tape library environment, implementing an LTO-5 environment can result in a media savings of over 60%, with maintenance savings of up to 67%, some resulting in an ROI in less than a year. In addition, for those data centers that did not make the move to LTO-4 from LTO-3, the risk of data theft or loss is too great to ignore the need for encryption. The move to LTO-5 might save your enterprise millions of dollars, if you had an unencrypted tape breach.

The tape drive is not the only element of the tape library; the robotics and the tape handling/management software are other major components that make up a total tape solution. One company that has historically led in the development and innovation of tape library systems is Quantum. They have announced the availability of the *Scalar i6000* with LTO-5 drives and their *iLayer* management software.

Introducing the Scalar i6000

The Quantum Scalar i6000 has been designed to solve the long-term archiving and data retention problems of the largest enterprise. Increased capacity enables the data center to sup-

port high growth environments and tape consolidation, to lower the TCO of the IT infrastructure. With innovative new features, such as *iLayer MeDIA* and a bulk load capability for the mass import and export of tape cartridges, the Scalar i6000 can help the data center protect and retain its mission- and business-critical data in the face of unpredictable data growth, ensuring the security and availability of that data for years to come. With *iLayer* intelligent software, Quantum has implemented efficiency improvements to simplify management, help contain costs by reducing administrative time, and thus improving the ROI for the i6000.

Designed with a modular architecture and continuous robotics, the Scalar i6000 provides flexible scalability in standard 19" racks, with expansion capability to 12 modules. The i6000 replaces the *Scalar i2000*⁷ at the top of the Quantum tape library family and enables the consolidation of older libraries into a single, easy-to-manage enterprise-level library. It enables the data center to reduce maintenance costs, floor space and energy consumption, lowering the TCO.

The Scalar i6000 scales up to 16PB of data storage in a single library, a 52% increase over the i2000, with 5322 slots, compared to 3492 slots for the older model. This represents a 185% increase when you factor in the higher capacity of an LTO-5 cartridge. The i6000 provides the data center with extremely flexible growth with a low entry point. Starting with a single 19" rack and 100 slots, the data center can use *capacity-on-demand* to grow the library in 100 slot increments (via software) supporting a fast, flexible and non-disruptive growth path. This dynamic storage capability provides the data center with support for very large archive projects.

With configurability for up to 96 LTO-5 drives, the Scalar i6000 can deliver the kind of performance required to meet the highest throughput needs. With a single drive delivering 280MB/sec of throughput with a 2:1 compression, the i6000 can provide the enterprise with 26,880 MB/s of performance. Each LTO-5 drive can operate at either 4Gb/s or 8Gb/s, with an integrated control and FC data path to the library. Each LTO-4 and LTO-5 drive supports

⁷ See [The Clipper Group Navigator](http://www.clipper.com/research/TCG2005021.pdf) dated April 14, 2005, entitled *The ADIC i2000 – More than Just Another Tape Library*, available at <http://www.clipper.com/research/TCG2005021.pdf>.

AES 256-bit encryption to provide data security to the enterprise whenever a cartridge needs to leave the data center. In support of LTO encryption, Quantum provides the *Scalar Key Manager* for enterprise proven security reducing the risk of lost data. It manages enterprise encryption keys across multiple Quantum libraries.

The i6000 can also support LTO-3 drives to retain read capability for LTO-1 media. It must be noted that if the data center configures all 96 drives, total slot availability is reduced, as cartridge and drive slots are mutually exclusive. In order to protect enterprise investment, Quantum has certified the LTO-5 drive for support in the Scalar i2000, as well.

The i6000 can support up to eight import/export (I/E) stations for the bulk movement of cartridges into and out of the library. The control module supports a single I/E station with 24 slots for LTO cartridges. Each of the next seven expansion modules can be configured with no I/E station, a 24 slot I/E station, or a single station supporting 72 cartridges at a time for bulk load/unload requirements, a 200% increase over the i2000. The i6000 can support a maximum of 528 LTO I/E slots at a time.

The i6000 also has an Extended I/E feature. This feature enables the IT staff to assign any number of logical I/O slots, up to 240 logical slots per partition, inside the library to become a virtual I/E station. The IT staff can assign all 240 slots on the front door and bulk load/unload up to 240 cartridges at a time.

In terms of high availability, the i6000 has been designed with features to reduce downtime and maintain business continuity, features required to be viable for the high-end data center. The i6000 has a redundant *Control Path Failover* to reduce host command failures due to SAN issues. There is failover for each virtual library partition. The library also has Data Path Failover, to reduce read/write issues due to SAN failure. The failover functionality operates regardless of configuration to overcome any network failure. In addition to failover functionality, the i6000 has the reliability demanded in the high-end data center. It has an MSBF⁸ greater than 2 million and an MTTR⁹ of 20 minutes.

iLayer Intelligent Software

A key feature for any data center deploying

a tape archive, iLayer reduces costs with:

- Partitioning and mixed media support;
- Proactive monitoring and management of thousands of library, drive, and media events;
- Alerts customer and service team via email;
- Data security;
- Advanced trend analysis reporting;
- Simplified SAN management, and
- The common management of disk and tape (more on this below).

iLayer saves administration time and helps to control TCO by minimizing downtime. It can be managed by remote log in or from the operator panel. It adds intelligence to the library, simplifies management and reduces management cost by up to 75%, with 50% fewer service calls and 30% faster trouble resolution. iLayer provides security enhancements such as *iLayer Media Security Notification* to alert the administrator of any unauthorized media removal and provides *LUN Mapping and Access Control* to control host access to specific native FC devices.

iLayer MeDIA

Along with the introduction of the Scalar i6000, Quantum is also introducing *iLayer MeDIA – Media Data Integrity Analysis*, a Quantum iLayer exclusive feature. iLayer MeDIA ensures the availability of enterprise data for long-term storage, archive, and disaster recovery. It scans archived cartridges for integrity issues and notifies administrators if any cartridge may be damaged, to enable the data center to migrate to new media before the data is corrupted. This is a feature specifically implemented for an archive or disaster recovery environment. It creates a special library managed partition to check media health proactively. There is no impact to operations as all checking is managed in the background to ensure that archived data is available when needed.

Quantum Vision 4.0 Management Software

The new Quantum *Vision 4.0 Management Software* is a centralized management facility that extends Quantum's management and monitoring benefits across Quantum's disk-based backup systems and tape libraries. It employs proactive monitoring, alerting the IT staff to potential problems, with extensive reporting capabilities to enable capacity planning, maximize performance, and assist in troubleshooting

⁸ Mean Swaps Between Failure.

⁹ Mean Time to Repair.

the library. It provides better customized reporting for Scalar tape libraries and *DXi* (disk-based) backup arrays. Pricing for the Scalar i6000 Library starts at around \$63,000 for a 100-slot library.

Conclusion

Quite clearly, today's enterprise data center is faced with significant problems in terms of data retention, especially in the area of creating and maintaining a long-term archive. Increased capacity with improved throughput is necessary to entertain larger enterprise projects in high growth environments.

In order to simplify the IT infrastructure, the data center needs to be able to consolidate multiple tape libraries onto a single, scalable library with the capability to secure the data within distinct partitions. At the same time, the data center must be able to control the TCO of that environment.

Quantum's Scalar i6000 does all of that. It reduces cost based upon its flexibility in terms of tape consolidation. The i6000 effects savings as a result of its scalability, the administrative efficiencies from iLayer, and the savings from deploying LTO-5 tape drives.

The i6000 not only gives Quantum visibility to the largest enterprise data centers requiring archive support, but it provides those data centers with a viable alternative to the traditional offerings from IBM and Oracle (formerly Sun/STK). If your data center is looking for some of the innovative features that are provided by Quantum, then you need to take a look at the Scalar i6000; it may change the way that you look at data retention.



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