With Higher Performance, Capacity, Reliability, HP Lowers TCO for Tape Backup and Archive

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Management Summary

As consumers, we are constantly on the lookout for the best value. Whether it is a major purchase such as a new automobile, or a less significant acquisition such as a kitchen appliance, we want to get the most for our dollar. Many times, high quality and low price are mutually exclusive: to get the highest quality available, you most often have to pay more. In addition, some acquisitions have to be considered for the long-term, rather than the immediate, expense; you have to calculate on-going operating expenses in order to determine the total cost of ownership (TCO). When you shop for an automobile, for example, creature-comfort features will often drive up the acquisition cost, but that is only the fixed cost; variable costs such as the cost of gasoline on a per mile basis, maintenance, insurance, and others can add significantly to the total cost over a five-year, or longer, period. In fact, the more you drive, the higher the TCO, especially if you are driving a gas-guzzler as opposed to a more energy-efficient vehicle. Finding the right balance of quality and price can be a challenge.

This balance is nothing new for the enterprise data center where server sprawl has been rampant and storage capacity has been doubling every 12-to-18 months. The data center staff has been fighting a constant battle to live within the IT budget, by implementing consolidation and virtualization projects to get control of the TCO of the IT infrastructure. New multi-core processors have enabled the IT staff to replace an aging fleet of x86 servers, consolidating multiple applications on fewer servers to improve resource utilization, preserving energy and floor space, as well as reducing a significant amount of complexity. However, this does not address the issue of exploding storage requirements, a significant percentage of which is dedicated to data protection activities, including backup and archiving. Disk-to-Disk (D2D) backups have become popular recently for the short-term backup of data, in order to provide an immediate recovery process and maintain continuity for data center operations. However, in order to reduce the TCO of the IT infrastructure, long-term backup and archiving have used, and will continue to use, tape as a media in order to take advantage of its low cost, portability, energy efficiency, longevity (up to 30 years) and compliance features, such as WORM and encryption. **With a shrinking backup window and limited rack and floor space, there is a critical need for an automated tape solution with higher-capacity cartridges and drives capable of higher throughput.**

HP, a founding partner of the LTO Consortium, has a long track record for providing data protection solutions for the data center, which continues with the availability of new *LTO-5* tape drives in their *ESL* and *MSL* tape libraries. LTO-5 tape drives enable HP to provide the capacity and throughput required by data centers with serious data protection issues. With the availability of LTO-5 drives, HP has raised the data protection ceiling while protecting the IT investment. To learn more about HP's solutions, please read on.

Data Center Storage Issues

For decades, the enterprise data center has seen a variety of architectures come and go, and in some cases, come back and go away again. The *big glass house* has given way to *distributed computing*, which has given way to *scale-up architectures*, which has given way to *client-server*, which now has given way to *scale-out environments*. However, when all is said and done, **magnetic tape not only survives, but it thrives, providing the IT staff with the capacity, portability and longevity that it needs to preserve enterprise data and maintain business continuity.**

Recently, data center storage has undergone an era of unprecedented growth. Between mergers and acquisitions, consolidations and virtualizations, industry regulations and government compliance, the enterprise data center is storing more data, and more kinds of data, structured and unstructured, such as audio and video, and more copies of data in order to mitigate risk, than ever before. Storage needs are doubling every twelve to eighteen months. Floor space, energy, and administrative costs are consuming the IT budget, not to mention maintenance and other operational expenses. **The acquisition costs for much of this storage may be fairly stable, but the ancillary costs contribute heavily to the TCO of the IT infrastructure.**

Primary storage will continue to find a home on a heterogeneous mix of disk devices, from the highest-performing Tier-0 SSDs, high-availability Tier-1 Fibre Channel (FC), and high-capacity Tier-2 SATA, as will backup copies for data with immediate recovery requirements. Enterprise RPO and RTO policies will dictate which backup information needs to reside on disk. **Best practices for data retention in the data center dictate that long-term storage of email and other compliance documents and archiving environments, however, will continue to reside on tape in order to protect the enterprise and its officers from failure to comply with internal policies and government regulations.** A majority of enterprises currently use both tape and disk to store information, with many of them planning to increase their use of tape. **In the end, it doesn't matter where the information came from, it must be protected.** In fact, some data centers that may have evolved to a D2D[1] environment, now find themselves returning to tape in order to take advantage of its high capacity, portability, low-cost

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Exhibit 1 – Advantages of Tape in the Data Center

- **Lower TCO** – Tape provides the data center with a lower cost for acquisition and operational costs;
- **Energy Efficiency** – enabling the "green" enterprise to fulfill its corporate obligation;
- **Data Security** – through WORM and encryption;
- **Portability** – to enable off-site data protection;
- **Automation** – for high performance and to help eliminate human error;
- **Data Retention** – with up to 30 years of shelf life for the media; and
- **Scalability** – With a space efficient architecture via high capacity in a small footprint.

Source: LTO Program

WORM, and encryption technologies. These are all innovations introduced on tape - *LTO tape* - realizing the economies available in terms of energy and other environmental factors contributing to a lower TCO[2], as a result of a reduction in the number of cartridges required. For a full set of advantages available from properly deploying tape in the data center, see Exhibit 1, above.

LTO-5 Tape Technology

Tape has seen a variety of architectures come and go over the years. Currently, the accepted standard in the data center for attachment to both commodity and other server architectures is LTO technology. **With a decade of history in data protection, LTO technology has proven itself with multiple generations of increased performance and capacity, and even more significantly, multiple sources of both LTO tape drives and LTO media.** With January's announcement[3] of the release of the LTO-5 specification, the rationale for tape has increased – to provide the data center with even more capacity and performance, as well as additional functionality to enhance the long-term storage and archiving capability of the enterprise data center.

With LTO-5, the capacity for a single media

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[1] Disk-to-Disk.

[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] 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.

cartridge has increased to 1.5 TBs of uncompressed data. This is a fifteen-fold increase in capacity in only 10 years. The native data transfer rate also has increased, from 15 MB/second (MB/s) with *LTO-1* to 140 MB/s with LTO-5, almost ten-fold. Over that time span, we have seen the inclusion of an integrated WORM capability, beginning with *LTO-3*, and embedded encryption, AES 256-bit, with *LTO-4*. With LTO-5, we now see the inclusion of media partitioning, as part of the LTO-5 specification, improving data management and access through the enablement of self-describing media containers and structured data on tape.

The availability of the latest LTO specification provides tape library suppliers with a blueprint for the delivery of a commodity architecture to simplify the preservation of data and lower the TCO of the IT infrastructure. How that specification is translated into deliverable products is left up to the individual providers. One of those providers is HP, a company with decades of experience in delivering successful storage solutions to the IT industry. HP has once again proven its leadership position in the storage arena. With new LTO-5 drives, shipped with HP *TapeAssure* (see below), for their *StorageWorks ESL* and *MSL Libraries*, HP has enabled increased scalability and reliability for data centers of all sizes.

HP's StorageWorks Libraries

HP can provide tape storage solutions for any size enterprise data center. With scalability to 44 LTO tape drives and up to 3546 cartridge slots, the HP StorageWorks ESL Library with LTO-5 technology can protect up to 10,638TB of data (compressed at a 2:1 compression ratio). With an entry-level capacity of 322 slots, the ESL can be deployed in a higher-growth environment without concern for protecting enterprise investment. The HP *StorageWorks EML Library*, for a medium to large data center, supports up to 505 cartridge positions and up to 1,515TB of data (again with a 2:1 compression ratio). The ESL library has a maximum transfer rate of 44.4TB/hour, with a maximum of 16.1TB/hr for the EML library, with a host interface of 8Gb/s per Fibre Channel port.

HP also provides a lot of scalability for the SMB data center looking for a high-performance tape library with a low TCO. The HP *StorageWorks MSL Tape Library*, available in 2U, 4U, and 8U models, enables the SMB data center to deploy a data protection solution with up to four LTO drives and from 24 to 96 tape cartridge slots. This provides a capacity of 288TB of data with a 2:1 compression ratio and a throughput of 4TB/hour, when installed with LTO-5 tape drives. The MSL library can be configured with LTO-5 drives running at up to 8Gb/s with a FC interface or 6Gb/s with a SAS interface. In addition, unlike competitive models, HP's 2U *MSL2024,* 4U *MSL4048,* and 8U *MSL8096* libraries can be connected together with HP's *StorageWorks MSL Library Extender Kit* for a quick and affordable upgrade to both capacity and performance, with a maximum of 144 slots and up to six drives. The Extender Kit enables the two libraries to appear to the host as a single library. Moreover, the *MSL8048*, an 8U library, is available with 48 slots, requiring only a slot license upgrade to double capacity to 96 cartridges. No rack reconfiguration or additional hardware is required. The data center can deploy what is required today, protecting enterprise investment for future needs.

However, there is more to an HP library with LTO-5 drives that merely speeds and feeds. HP's MSL libraries offer an affordable encryption solution designed specifically for the SMB. With a low-cost *MSL Encryption Kit*, the data center can get up to 100 encryption keys used when either writing or restoring data to an LTO-4 or LTO-5 data cartridge. The kit does not require support from ISV or enterprise encryption solution. In addition, each tape library also comes with the HP *TapeAssure* utility for proactive management of

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Exhibit 2 – Benefits of HP LTFS

- **Faster access to data** – Files and directories stored on a mounted tape can appear on the desktop in the same way as a disk directory listing.
- **Simple drag-and-drop** – LTFS increase ease of use – simply drag-and-drop files to and from the tape.
- **Heterogeneous compatibility** – Tape media written using LTFS is self-describing, enabling data recovery from tape independent of hardware or software platform.
- **Increased data mobility** – Tapes written with HP LTFS can be exchanged more easily between users working in different operating environments.
- **A single storage media standard** – Tapes can move across libraries and vendors, enabling files on tape to be accessed using simple drag-and-drop.

the library, drives and media. This functionality adds more scalability, ease of use, and reliability to an already enterprise-tested platform.

HP's LTO-5 drives come with the HP *Linear Tape File System* (*LTFS*) that enables enterprise applications with an easy access to tape files and allows the data center to update and share files stored on tape.

HP Linear Tape File System

The *HP Linear Tape File System (LTFS)* is a tape-based file system designed to enhance file system management on tape, enabling a new era for tape applications. HP LTFS makes tape self-describing, file-based, and easy-to-use and provides users with the ability to use standard file operations on tape media for accessing, managing and sharing files with an interface that behaves just like a hard disk. In addition, LTFS provides the ability to share data across platforms, as you would with a USB drive or memory stick. Simply load a tape into the drive, mount it into the file system, and it becomes visible as a disk.

By upgrading to an HP StorageWorks library with LTO-5 Tape Drives, the enterprise data center can simplify and lower the cost for volume data exchange and long-term archival, enabling many application areas to cut storage space, reduce energy demands, and lower operational costs. Currently, LTFS is not supported in libraries; it works with a single drive inside a library if it has a cartridge loaded, but applications cannot, as yet, send commands to the library in order to move media inside the library. With the addition of the HP LTFS feature, users and IT staffers will be able to benefit from faster access to archived files and from greater data mobility, by simplifying the sharing of larger files. (See Exhibit 2, at the bottom of the previous page, for a list of some of the benefits that LTFS adds to LTO-5). Some examples of applications that can benefit from LTFS are:

- Media industry video archive;
- CAD/CAM files used in design and drawing content for manufacturing, architecture etc.;
- Hi-resolution images such as Medical x-rays or other health industry images;
- Surveillance video; and
- Information archival for e-discovery purposes.

HP Tape Assure

HP TapeAssure is a *no-charge* application that provides pro-active health monitoring for your tape environment, improving the utilization of your investment in tape resources and delivering peace of mind to an overworked IT staff that is tired of reacting to potential disasters. It enables the IT staff to manage a high performance data protection system, reducing an increasingly complex task, lowering the TCO and protecting your investment. It provides more value to the data center, enabling a more efficient IT staff and increasing the life of your tape drives and media.

TapeAssure delivers detailed performance and utilization data to identify lower-than-expected transfer rates. It pinpoint drives and tapes that are underutilized, enabling the data center to change backup schedules or target specific performance improvements to make better use of existing equipment. Proactive tape monitoring notifies you of any media issues that need attention before they can cause a disruption. The IT staff can then pro-actively perform recommended service actions in pre-planned maintenance windows. This, in turn, eliminates disruption to backups and enables the data center to meet SLAs. HP TapeAssure features include:

- **Utilization and performance** – to pinpoint configuration changes or specific upgrades;
- **Proactive health monitoring** – to learn about issues before they cause disruption;
- **Proactive maintenance** – to know when to clean your drives, retire your tapes and even retire your drives.
- **Consolidation tape monitoring** – to provide a single, consolidated view of tape storage solutions.

Conclusion

LTO-5 technology is an industry standard. The data center can acquire it from any number of vendors. HP's library technology is not; you can only get that from HP. If all that you are interested in are speeds and feeds, then any vendor's tape library solution probably will suffice. However, if you need to lower the TCO of the IT infrastructure in your data center, while also increasing the performance and reliability of your data protection systems, reducing tape media deterioration, then you need to look into an HP StorageWorks Library solution.

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