



## **HP Uses Half-Height Tape to Give SMBs Full Tape Functionality**

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### **Management Summary**

Shaving has been with us for centuries to satisfy the need to remove unwanted hair. In order to accomplish this task, man invented the razor, right after the wheel. The razor is a technological marvel. Starting with a straight edge, which looks like it could do a lot of damage, and often did, the razor has gone through many evolutions over the centuries, from straight edge to safety razor, from single-blade to two-, three-, four-, and now the five-blade Gillette *Fusion* system. Men try to making shaving easier and less messy by automating the process, inventing electric razors, and even putting batteries in manual systems, but somehow the shaving care industry continues to survive, in fact thrive, with ancillary products such as shaving cream and aftershave lotions bringing in significant revenue. They even give away the razors just to sell the blades.

There is a similar product, almost as old, which continues to thrive in the corporate data center: magnetic tape. It simply will not go away. Invented over 50 years ago (by dinosaurs) as a primary storage medium, magnetic tape continues to survive, not only as a primary storage medium, but also for secondary tier operations such as backup and archiving of mission-critical files. The need to store data securely and economically, and retrieve it quickly, in an energy-efficient manner, has led to the evolution of a variety of tape formats for different requirements, from high-performance, high-capacity enterprise environments to the more mundane needs of small businesses (SMBs) and departments or remote offices of major corporations. Low-cost, commodity devices have matured over the past decade, with higher capacity and faster throughput drives evolving every year. Linear Tape Open (LTO) technology has proven dominant, with native cartridge capacity scaling from 100GB to 200GB to 400GB, enabling any enterprises with minimal IT budget to protect the most vital resource of the enterprise – data. Not everyone can afford the investment in enterprise-level automatic tape encryption (\$30K), but with the cost of a new LTO-3 tape drive at under \$4K, who can afford not to protect his or her data.

The latest LTO-3 technology has been with us now since 2004, with native cartridge capacity of 400GB and a sustained throughput of up to 80 MB/second. Unfortunately, LTO-3 did not have the form factor convenience of LTO-2, which is available in both full-height and half-height models. That is no longer the case. Hewlett Packard (HP) has recently filled out their product set with half-height LTO-3 drives, supporting the same media options as the full-height devices. To see how half-height LTO-3 can help streamline the cost and shape of your IT environment, please read on.

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## Magnetic Tape in the Data Center: Alive and Kicking

The enterprise data center has been experiencing an explosion of data recently along with an upsurge in data movement, initiated by an effort to control the costs of storage through Information Lifecycle Management (ILM)<sup>1</sup> and the creation of multiple tiers of storage. The causes have come from a variety of sources, not the least of which are: *government regulation*, *security*, *archiving*, and last but by no means least, a *booming economy*. (See Exhibit 1, at right.)

In order to comply with recent federal regulations, or simply to try to adhere to industry norms, enterprises across the country, and around the world, have been forced to save more data. In an effort to protect themselves from possible prosecution, CEOs and CIOs are instructing the IT staff to save everything from financial records to emails in order to be able to reproduce them for examiners. Further, to produce them without a reasonable delay. Unfortunately, the costs associated with the acquisition, maintenance, physical space, and energy requirements of additional terabytes of data is placing an undue burden on IT budgets.

Ignoring the predictions of the doomsayers, magnetic tape continues to thrive in the 21<sup>st</sup> century data center. Continual improvements in both the capacity and throughput of tape devices makes tape the logical medium for most backup and archiving environments in the enterprise, whether Fortune 500 or SMB, where the costs associated with doubling or tripling the size of a SAN can be prohibitive when calculating all of the costs of implementing a storage network<sup>2</sup>. There is a place for short-term disk-to-disk backup and recovery in the mission-critical enterprise data center, but for most businesses, **tape has been, is, and will continue to be the recovery/archive medium of choice.**

The only question that remains is: *Which*

<sup>1</sup> See **The Clipper Group Explorer** dated August 29, 2002, entitled *Tiered Storage Classes Save Money – Getting the Most Out of Your Storage Infrastructure*, at <http://www.clipper.com/research/TCG2002030.pdf>.

<sup>2</sup> See **The Clipper Group Explorer** dated June 4, 2006, entitled *Tape and Disk Costs – What It Really Costs to Power the Devices*, at <http://www.clipper.com/research/TCG20062046.pdf>.

### Exhibit 1 – Data Explosion Factors

- **Government Regulation** – Recent laws governing SEC transactions require the preservation of all financial records;
- **Security** – In order to protect the enterprise from data loss, IT staff must backup mission critical information, often to more than one location, to ensure that it can be retrieved;
- **Archiving** – Some data becomes static after a specified period and needs to be archived in order to prevent continual backup and a waste of resources; and
- **Booming Economy** – Mergers and acquisitions, along with expanding customer lists, add to the volume of customer files that are the most valuable resource of the data center.

*tape format?* Over the decades, the data center has seen a steady stream of both proprietary and commodity formats appear with varying capacity and throughput capability, and varying costs, as well. Mainframe tape drives can cost in excess of \$30,000 with cartridge costs of over \$100 for 500GB of uncompressed data, while PC solutions can cost under \$100, complete. The typical data center today, however, requires a solution that can support backups of several hundred gigabytes at a time, even terabytes, and must complete them overnight, and unattended, so that enterprise operations are not impacted or financially burdened. This does not even address the problem of continued compatibility with legacy cartridges in the data center library. The CIO must be careful not to create the *Rosetta Stone* of the 21<sup>st</sup> century, a library full of cartridges and no means to read them. The CIO must protect the investment in the data center while ensuring that the enterprise has a viable path forward.

The battle for open systems supremacy between *Linear Tape Open (LTO)* and *Super DLT (SDLT)*, and other technologies, rages on.

### The Legacy Tape Environment

Before 2000, Quantum's *Digital Linear Tape (DLT)*, Exabyte's line of 8mm *Helical Scan* devices, and Sony's *Advanced Intelligent Tape (AIT)* shared the tape needs of a majority

of the open systems data centers. Unfortunately, their proprietors created a pair of *proprietary technologies*, closely managing both environments. In order to develop a more open, or commodity, architecture, HP, IBM, and Seagate (now Quantum) joined forces to introduce an open standard. These three companies combined their resources to introduce LTO-1 in 2000 as an industry standard. With an initial raw capacity of 100GB per cartridge and a throughput of up to 20 MB/second, LTO-1 was vastly superior to any of the other open systems solutions available, such as DAT or DDS, had 2.5 times the capacity of DLT8000, and more than three times the performance. HP introduced LTO-1 with twice the performance of SDLT 220 and comparable capacity.

LTO-2, with a native capacity of 200GB, a throughput of up to 40 MB/second, and backward compatibility with LTO-1, began to appear in the IT infrastructure in 2002, in many cases replacing DLT. The comparable DLT architecture in 2002 was SDLT 320, with a native capacity of 160GB and a throughput of 16 MB/second. Not including compression ratios that can vary widely depending upon the data, LTO-2 had 20% greater capacity and more than twice the throughput of SDLT 320. After the initial introduction of LTO-2 with a full-height format, a half-height drive was introduced, enabling the configuration of servers with half-height tape drives and the implementation of tape libraries with twice as many drives. With a similar pricing structure, it is no wonder that LTO made huge inroads on the DLT base.

The scalability of LTO is even more evident with the introduction of LTO-3 with a cartridge capacity of 400GB, twice the capacity of LTO-2, and a throughput of 80MB/sec, again twice that of LTO-2. LTO-3 maintains full read compatibility with LTO-2 media and provides further investment protection with the ability to read LTO-1 media. Following stringent guidelines set forth by regulatory agencies such as SEC and HIPPA, IT organizations must now integrate new solutions and policies that can verify the integrity of stored data for periods that can extend well beyond seven years. To meet these requirements, LTO-3 drives provide write-once, read-many (WORM) capability. These features compare

quite favorably to SDLT 600, introduced in 2005, with a cartridge capacity of 300GB, 25% less than LTO-3 and a throughput of 36 MB/second, less than half that of LTO-3.

### HP LTO-3 Solutions

Because HP is a co-developer of the technology, it should come as no surprise that they offers a full line of LTO products, including entry level libraries and autoloaders. Their LTO offer starts with internal and external configurations for LTO-1, protecting the investment made by HP clients six years ago, providing a very low cost entry point (under \$1,500) to the technology.

The latest entries into their LTO-2 and LTO-3 line-up, however, are the most newsworthy, making a significant impact within the SMB community, and for departments and remote offices of larger enterprises. HP is introducing their first half-height LTO-3 drive, the *Ultrium 920*, with both Ultra320 SCSI and 3 Gb/second SAS<sup>3</sup> interfaces for direct connect, and the first SAS LTO-2 tape drive, the *Ultrium 448*. These half-height drives will provide expanded configurability and performance for any HP *ProLiant* or *Integrity* server with an available half-height bay. In addition, HP has announced expanded configurability for the HP *StorageWorks 1/8 G2 Autoloader* and for the HP *StorageWorks MSL2024* and *MSL4048* Tape Libraries.

### New Ultrium Tape Drives

The Ultrium 448 Tape Drive is a low-cost, half-height LTO-2 device with a superior set of features and is suitable for protecting the data requirements of any SMB. It has the same 400GB capacity (compressed) as HP's full-height LTO-2 drive, the *Ultrium 460*, and the same Ultra160 SCSI (LVD) interface. Even though it has a slightly slower transfer rate at 173 GB/hour, it can still backup half a terabyte in less than three hours. In addition to SCSI, the Ultrium 448 also has a 3 Gb/second SAS interface, enabling a direct connection to enterprise servers with an embedded SAS controller or SAS HBA. An internal SAS drive costs \$1,899, almost 60% than the full-height SCSI Ultrium 460 at

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<sup>3</sup> Serial Attached SCSI eliminates the limitations of parallel SCSI and is particularly suitable for RAID server configurations.

\$2,999. The ROI of the Ultrium 448 is even better when you take into consideration power consumption. **In typical use, the 448 consumes 20 watts of energy, 25% less than the rate of the Ultrium 460 it is replacing.**

The Ultrium 920 is a low-cost, half-height LTO-3 device with a similar feature set to the Ultrium 448 and is ideal for protecting all enterprise data. It has the same 800GB capacity (compressed) as HP's full-height LTO-3 drive, the *Ultrium 960*, with the same Ultra-320 SCSI (LVD) interface. It too has a slightly slower transfer rate at 432 GB/hour than the full-height model, but it can still back up almost a terabyte of data in two hours. Like the Ultrium 448, it has a 3 Gb/second SAS interface, enabling a direct connection to enterprise servers with an embedded SAS controller or SAS HBA and is ideal for midrange and departmental servers. An internal 920 SAS drive costs only \$3,199, more than 20% less than the full-height SCSI Ultrium 960 at \$3,899. The ROI of the Ultrium 920 is also better when considering power consumption. **In typical use, the 920 consumes the same amount of energy as the 448, 20 Watts, 50% less than the rate of the Ultrium 960 it is replacing.** Both the 448 and the 920 can be rack-mounted in a 1U enclosure.

All HP tape drives come with HP's *StorageWorks Data Protector Express* software (single server edition) for backup and recovery, support for *StorageWorks One-Button Disaster Recovery (OBDR)* and *StorageWorks Library and Tape Tools*. LTO drives are also supported under Microsoft *Windows*, Novell *NetWare*, *HP-UX*, Red Hat *Linux*, United *Linux*, *IBM AIX*, and Sun *Solaris*, and other operating systems.

### ***Tape Library Configurability***

By qualifying the half-height Ultrium 920 in their tape libraries, HP has increased the throughput capability by doubling the number of devices contained in the library, within the same footprint, without reducing the cartridge count. For example, the *MSL2024*, a 2U library, can be configured with two Ultrium 920 drives rather than one Ultrium 960. This provides a potential transfer rate of 576 GB/hour, fast enough to backup more than 1 TB/hour, enhancing the data center's ability to

complete a mission-critical backup within a predefined backup window, and, more importantly, recover that data quickly enough to prevent the loss of thousands of dollars due to an unexpected, prolonged outage. The *MSL4048*, with twice the number of drives, can support 1.7 TB/hour in a 4U footprint, providing your data center with scalability previously available only with mainframe-quality drives at ten times the price. Adhering to the true definition of an autoloader, HP has maintained a configuration of one drive for the 1/8 device, although HP's customers can still achieve a savings by selecting the lower-priced half-height drive in their configuration.

### **Conclusion**

HP has been at the forefront in the definition and development of LTO technology from its inception. They have been shepherding this architecture into the open systems arena. Initially more common among the scale-up SMP environments such as *HP-UX* and *IBM AIX*, HP has been streamlining the technology to fit in more economically with the scale-out configurations found in SMB data centers. With the arrival of half-height LTO-3 devices, the cost of procurement and operation continue to fall, as the capacity and performance continue to rise. Any SMB concerned about backup/recovery and archiving needs to consider the advantages of LTO-3.



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