HP Storage Media
LTO-4 Ultrium technology
Although disk-based backup is becoming a key element of any storage network, don’t assume that tape innovation is stagnating. The reality is quite the opposite. HP has never stopped developing innovative new tape technologies with faster backup speeds, larger capacities and exciting new features. That means the total cost of ownership of tape solutions is decreasing, while at the same time, tape is reducing costs and improving efficiencies in other areas, like regulatory compliance. Together, this gives you greater choice in designing and implementing the most successful backup plans for your business’ unique needs.

“We believe that the future of tape and tape automation is secure for off-site, backup copies and to meet legal requirements.”

IDC, Disk Based Data Protection Report, July 2006
In 2006, as part of HP’s media testing program, HP LTO Ultrium media was used to conduct in excess of 650,000 individual tests, equivalent to almost 2.5 million test hours!

**LTO-4 Ultrium offers 1.6 TB on a single cartridge**
1.6 TB is equivalent to 80,000 trees made into paper and printed. New media and drive technology have created a solution that is double the capacity and 25% faster than LTO-3, with built-in encryption capability and a Write Once Read Many (WORM) option.

**LTO-4 Ultrium—compact and fast**
The HP StorageWorks LTO-4 Ultrium 1840 Tape Drive can write or read data at a blistering 240 MB/sec, equivalent to over 860 GB per hour, making it ideal for large-scale, 24x7, mission-critical IT environments. Put another way, it only takes 4.2 seconds to back up 1 GB of data. Such is the increase in capacity that the amount of storage media required to backup a dataset is cut by 75% compared to LTO-2.

**Encryption enabled**
With HP LTO-4 Ultrium, AES-256 bit key encryption becomes a straightforward part of everyday backup and archiving, rather than some specialized function requiring extra devices, resource and cost.

As a co-inventor of the LTO Ultrium format, we not only offer HP StorageWorks hardware solutions, we design and test our media to be one of the most reliable data backup products available. This combination of hardware manufacturing and extreme media testing helps us create one of the most reliable storage solutions offered.

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**Dual formats**
Like generation 3, HP LTO-4 Ultrium not only comes in a read, write (RW) format but also write once, read many (WORM). This allows customers to create secure copies of all their data for legislative compliance—e.g., the Sarbanes-Oxley Act and SEC Rule 17a for companies operating in U.S. financial markets and services, along with other compliance regulations around the globe.

**100% compatibility**
When the LTO Ultrium technology was developed, it was created as an open platform. This means that HP LTO-4 Ultrium will work in approved LTO-4 hardware. With this technology, businesses have the opportunity to standardize all of their storage tape on HP regardless of the hardware.

**Other new features of HP LTO-4 Ultrium media**
- Smaller magnetic particles and a thinner magnetic layer—supports higher recording densities by reducing noise and demagnetization loss
- Improved dimensional stability—allows greater track density and increases the size of the recording area
- Improved position error signal—enables better tracking of the drive servo head and increases reliability
- New smart grabber mechanism and mechanical interlock—prevents leader loss and ensures proper connection producing fewer tape or media failures during backup and restore process
- New 8KB memory chip built into the cartridge—stores error rates, usage information, tape directory and application specific data reducing tape wear on leader and allowing faster access to data

Introducing HP LTO-4 Ultrium—faster, bigger and safer than ever
When it comes to archiving and compliance—nothing beats tape.

Tape-based backup remains unrivaled when you need to store large amounts of infrequently accessed content for long periods of time. But increasing awareness of the sensitive nature of business data has forced many companies to go to greater lengths to protect their data more stringently.

According to the Privacy Rights Clearing House (PRC), 89M people in the US were affected by the loss or theft of confidential data between February 2005 and July 2006. Around the world, authorities are tightening controls regarding how digital information must be stored.

In most cases, data protection can be far less costly than data breaches. A company with 10,000 accounts to protect can spend as little as €5 per customer account for data encryption (source: Gartner Inc). But the cost per lost record ranges from €20 to €115 to fund activities like customer notification, credit protection and account number changes (source: ESG).

And this doesn’t take into account the potentially fatal damage to a brand or organization’s reputation. HP’s LTO-4 Ultrium cartridges have the potential to be part of wider data encryption solutions up to FIPS 140-2 level 2. The media on its own incorporates AES-256 bit key encryption (the highest level of AES) capabilities to provide greater security. HP’s implementation meets the current draft of IEEE 1619.1 tape encryption standard giving you peace of mind that if a tape goes missing, the data it contains cannot fall into the wrong hands.
Green cartridge, green technology

LTO Ultrium is not only the fastest growing and most reliable tape technology for enterprise level data centers; It may also be environmentally friendly compared to other alternatives like disk.

A recent report from the Clipper Group¹ found that if electrical rates remain the same, the cost to acquire, power and cool disk systems for five years is almost eight times that of automated tape systems. And if electrical rates continue to rise, the potential savings will be even greater. With lower heat output, tape drives can be packed more closely together.

That saves space without causing cooling costs to go through the roof.

Factors like this may make tape especially attractive for businesses looking for more ways to “go green,” often in response to governmental or company leadership mandates.

¹ The report is from the Clipper Group, a research and consulting firm that specializes in data security and storage technologies.

Threats to storage security are real

Selection of Public Data Security Breaches and lost/stolen tapes in US/UK

- TriWest Healthcare Stolen disk
- Clearing Co. card #s stolen
- U of Georgia records stolen
- GMAC stolen laptops
- Tower Records stolen credit data
- Guess stolen credit info
- Lawson convenience stores names stolen
- Acxion customer data hacked
- Bank of Rhode Island - customer records stolen
- BJ’s Wholesale credit card info stolen
- Equifax lost tapes
- Los Alamos lost PC disks
- Arizona Biodyne loses tapes w/ 40K Blue Cross names
- CardSystems has 40M credit card numbers hacked
- Time Warner 40 tapes lost
- IGS lost thousands of tapes in Canada
- Choicepoint theft from unauthorised customers
- Bank of America last tapes while in flight
- Lexus Nexus consumer names stolen
- SAFIC disks stolen during break-in
- Ameritrade lost tapes
- HSBC/Ralph Lauren/GM consumer data stolen
- UNC loses PC hard drive with customer data
- Iron Mountain lost customers tapes

Source: www.privacyrights.org

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**HP extreme testing—Everest, Sahara, Atlantic.**

Does everyone test their media on Mt. Everest, in the Sahara desert and on the Atlantic Ocean? We don’t think so. But HP does. We look for the most extreme environments in which to test our products to ensure they’ll perform optimally in every condition.

Everyday usage is tested around the clock in 20 custom chambers. And over 650,000 individual test cycles are conducted per year—almost 2.5 million test hours.

By testing HP Storage Media far beyond industry standards, we ensure that your storage backup is always safe and sound.

**Continuing Innovation**

With a six generation roadmap LTO is a technology that medium and large enterprises can invest in with confidence. HP never stops developing innovative new tape technologies that feature faster backup speeds and larger capacity.

That means the total cost of ownership of tape solutions is decreasing— at launch, LTO-4 will be almost 15% cheaper in cost per GB terms than LTO-3— giving you a greater array of options in designing and implementing the most successful backup plans for your business’ unique needs.
At HP, we set the highest standards in the industry for our storage media.
As a drive and media specialist, we know the extremes to which end users put both hardware and tape.
In order to carry the HP brand, cartridges must pass exhaustive laboratory tests that go well beyond the requirements of the LTO Ultrium logo specification.

Having achieved these unrelenting standards, we continuously test and monitor the quality of every batch of media that is destined to bear the HP logo. The table opposite shows how HP sets better standards and tests more than any other company.

Our tests prove that, when compared with other leading brands, an HP LTO-4 Ultrium data cartridge can deliver twice the data capacity per backup and three times as many continuously successful backup and restore cycles over the life of the cartridge.

<table>
<thead>
<tr>
<th>HP variables tested versus competition</th>
<th>HP</th>
<th>Fuji</th>
<th>Sony</th>
<th>Maxell</th>
<th>Imation</th>
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<tr>
<td>Mean Time Between Failures (MTBF)</td>
<td></td>
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<tr>
<td>Operating environmental conditions (temp, humidity)</td>
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<tr>
<td>Number of full capacity backup and restores</td>
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<tr>
<td>Continuous testing using 100s of drives and 100s of storage media cartridges</td>
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<td></td>
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<tr>
<td>Drive based Q/A testing</td>
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</tbody>
</table>


“The main reason I use HP hardware and HP Ultrium tapes is because they work every time. My company trusts my decision to use HP solutions and I trust HP with my job.”

Jason Barrio, Director of Operations
Instant Capital Funding Group, Inc.
Exceptional value and performance

Ultimately, every business needs to ensure it is getting value for money, whether that be from servers, storage, PCs, printers or storage media. HP LTO-4 Ultrium data cartridges offer high capacity and performance, which means you receive exceptionally low cost per GB and maximum value for money.

The superb error rate of HP Ultrium media means that every inch of tape can be used to protect your data, providing full capacity (with native backup) every time. And consistent, error free performance is ensured by the rigorous standards of the HP branded media specification, where every batch of cartridges is put through exhaustive tests to ensure maximum reliability in saving and, more importantly, restoring your data. In comparison, the high error rates sometimes encountered with other leading brands may mean you need to spend far more money to backup the same amount of data.

Drive A : HP Cartridge 1 Error Rate

- Error rate estimates the reliability
- Affects the performance
- Truly reveals what is happening

Drive Swap UCC
“HP Ultrium has been a lifesaver. We use lots of HP products, but HP Ultrium hands down is our most important.”

Tonya Roser, Martin Yale Industries Inc.

In side-by-side testing, HP LTO tapes delivered twice the capacity in real life conditions compared to another leading brand. That means doubling the expense of your media budget and gross inefficiencies in the usage of your storage media.

For more information on HP Brand Specifications and Extreme Testing and Competitive Media comparisons, please go to http://www.hptapemedia.com and download the White Paper and other materials.

### Drive B : Other Leading Brand Cartridge 1 Error Rate

- Error rate of OLB is far higher than HP
- This could lead to backup failure and lost capacity
- Data is at risk
“Cheaper is not always better. We’ve tried other brands of storage media and we’ve been disappointed in the reliability of some of the tape cartridges. NetBank’s experience is that HP’s technology actually does work better together. It provides superior quality and reliability across the entire disk and tape storage line. We are comfortable that HP tape media has a strong future for many years to come.”

Todd Warnock, Director of Technology Services NetBank Internet

HP Custom and Non-Custom Labeled Media

Don’t waste your valuable resources labeling each data cartridge. HP LTO Ultrium labeled media cartridges come with a high-quality and professionally applied bar code label and now you have TWO ways to receive labeled media.

HP LTO Ultrium Custom Labeled Media (US and EMEA only)

Designed for
• Customers that need to customize the label type or define an exact label sequence printed on each label
• Compatibility with most tape automation products

Timing
• Leadtime of 10–14 days in Europe

HP LTO Ultrium Non-Custom Labeled Media (Worldwide)

Designed for
• Customers that require high-quality and unique bar code labels attached to each cartridge but DO NOT need an exact label sequence printed on each label

Off-the-shelf-availability
• No custom order forms, no waiting for custom labeled solutions

Timing
• Immediate—off-the-shelf

Compatibility
• HP LTO Ultrium Non-custom Labeled Media with Tri-Optic® bar codes for LTO-1, LTO-2, LTO-3 RW/WORM and LTO-4 RW/WORM are compatible with all HP automated tape devices and most leading third-party vendors.

HP LTO Ultrium reliability specs

Here are just some of the reliability specifications that we hold our HP LTO Ultrium products to:
• Mean time between failures (MTBF) — 250,000 hours at 100% duty cycle
• 1,000,000 head passes
• 20,000 end-to-end passes
• 260 full tape backups
• 20,000 unload cycles
• 30 years of archival storage

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<thead>
<tr>
<th></th>
<th>HP LTO-1 Ultrium</th>
<th>HP LTO-2 Ultrium</th>
<th>HP LTO-3 Ultrium</th>
<th>HP LTO-4 Ultrium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed storage</td>
<td>200 GB</td>
<td>400 GB</td>
<td>800 GB</td>
<td>1.6 TB</td>
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<tr>
<td>Transfer speeds (2:1)</td>
<td>30 MB/sec</td>
<td>60 MB/sec</td>
<td>160 MB/sec</td>
<td>240 MB/sec</td>
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<tr>
<td>Encryption enabled</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Worm availability</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Average cost/GB</td>
<td>€.27</td>
<td>€.17</td>
<td>€.16</td>
<td>Less than €.15</td>
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