

HP LTO Ultrium Storage Media

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



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.

HP LTO-4 Ultrium—faster, bigger and safer than ever

Three generations of LTO Ultrium technology have made it the format of choice for organizations with vast automated tape libraries and billions of files to store and protect.

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.

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!

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



When it comes to archiving and compliance—nothing beats tape.

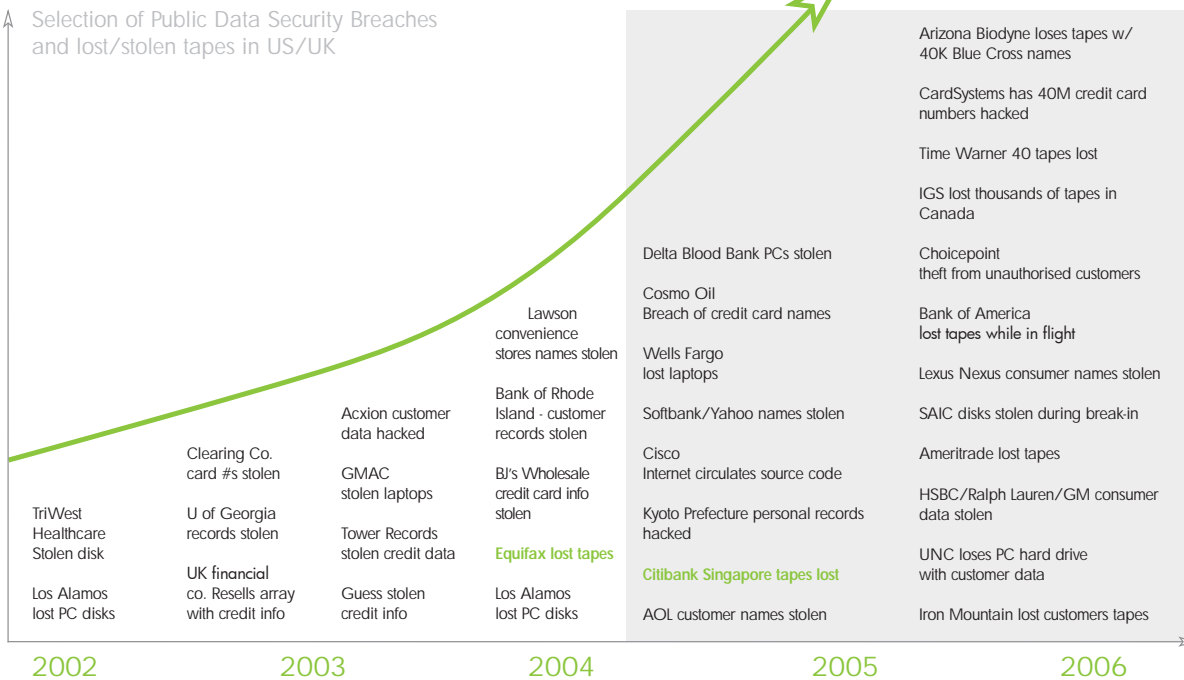
Increasing awareness of the sensitive nature of business data has forced many companies to go to greater lengths to protect their data more stringently.

In the wake of scandals and data security scares, government and industry regulators have pursued an aggressive strategy that compels organisations to file almost everything, in perfect order, forever. Compliance and archival data demand is estimated to grow between 20-70% a year and is now the fastest growing segment of the storage industry. Analyst IDC estimates the costs of compliance with data privacy laws will skyrocket to approximately \$21 billion by 2011.

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

Threats to storage security are real



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.

LTO-3 and LTO-4 WORM tape technology wins over other storage options because it offers the lowest price per gigabyte and a durable archival medium. Future tape roadmaps will ensure that this advantage continues for the foreseeable future.

Green cartridge, green technology

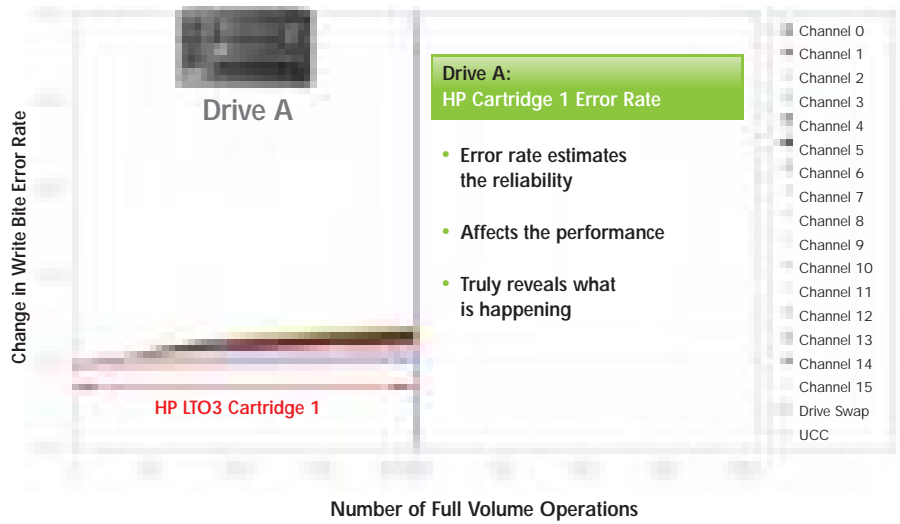
LTO Ultrium is not only the fastest growing and most reliable tape technology for enterprise level data centers; It may also be environmentally friendly compared to other alternatives like disk.

A recent report from the Clipper Group 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.

Chart showing HP LTO3 Cartridge performing consistently within tolerance

“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.



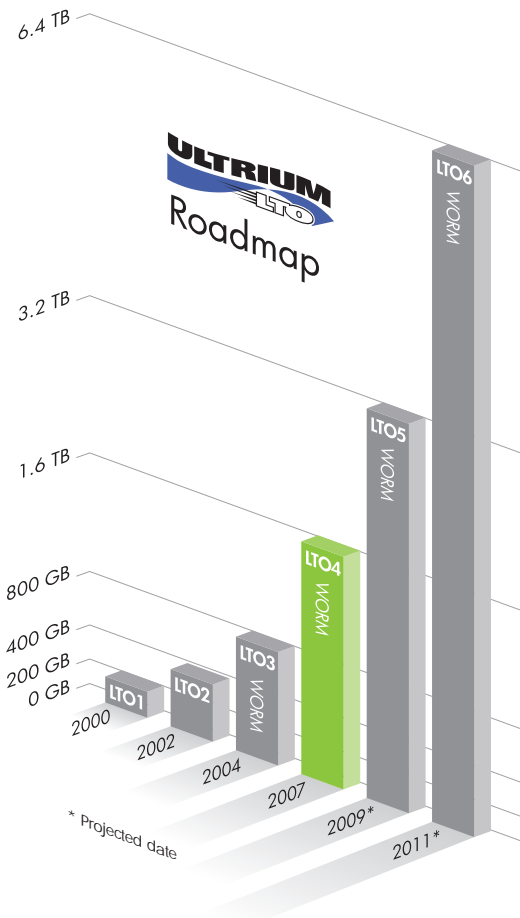
Continuing Innovation

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, giving you a greater array of options in designing and implementing the most successful backup plans for your business' unique needs.

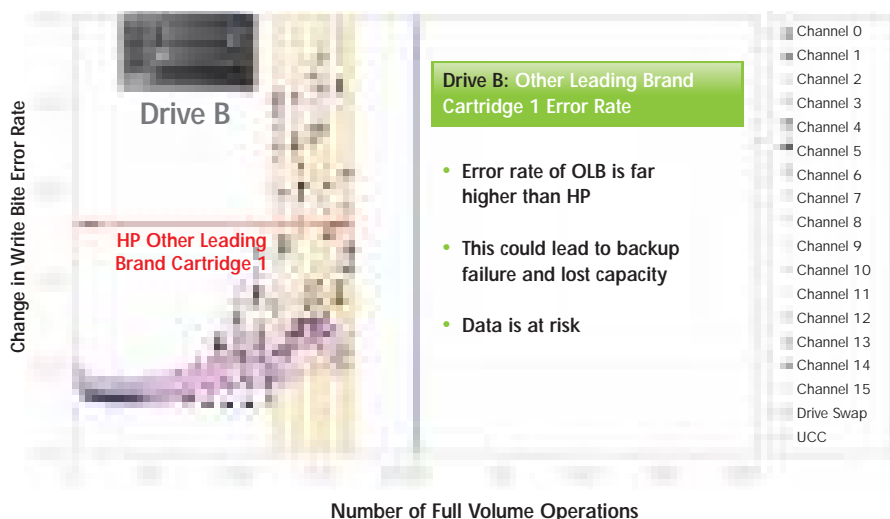
HP LTO Ultrium: reliability is our value proposition

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.



Other Leading Brand Cartridge showing massive error rates throughout test



“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**

Our tests prove that, when compared with other leading brands, an HP LTO-3 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.

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.

HP variables tested versus competition

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.

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

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.

Two simple checks to guarantee 100% compatible media

Compatibility is crucial for businesses to be able to protect their investments in a particular storage technology, while taking full advantage of new generations of media. HP branded media will work to specification on any non-HP drive, but will achieve superior performance on the HP drive for which it has been specifically developed. HP designs, builds and tests media and drives together to provide lasting solutions that customers can depend on, even in the most intensive, automated environments. Ultrium deserves a special mention here. Because it is an open standard that requires independent qualification, compatibility is something you can take for granted.

Ultrium compatibility – separating fact from fiction

Unfortunately, rumours are spreading that one manufacturer's LTO Ultrium is not the same as another's. True or false? Well – it's both if you're talking about HP LTO storage media. Here are the facts:

- All Ultrium-branded media, such as HP, is legally certified for use in any Ultrium drive, such as IBM or Quantum. Compliance is verified by MAC, the independent company that regulates the Linear Tape Open (LTO) format. No product is permitted to bear the Ultrium logo unless it passes all the tests required by the specification – and all products that do are independently tested to ensure they are compatible with other logo'd products, regardless of who makes them. This is your guarantee that HP LTO storage media is 100% read/write compatible with any LTO Ultrium drive. In other words, HP branded media is guaranteed to work in any ADIC library or IBM drive. If anyone tells you otherwise, they couldn't be more wrong.
- LTO Ultrium is very tightly specified. As well as the cartridge shell and other physical features, the standard covers the format of how information and data is written to the media. Like Coca Cola, the 'recipe' is very tightly controlled. And like Coca Cola, wherever you buy an Ultrium cartridge, whoever makes it, and whatever drive you run it on, it's 100% Ultrium. Unlike Coca Cola, the format's inventors have no right to set or alter the rules to gain competitive advantage.
- HP, along with its LTO partners IBM and Quantum (formerly Certance/Seagate), assured the integrity of LTO by developing a robust LTO Ultrium specification and verification procedure passing all responsibility for policing it to an independent Compliance and Verification Entity (CVE) – MAC -

administered by the LA law firm, Ladas and Parry. We couldn't change the format, even if we wanted to.

- MAC is highly qualified for the role and as co-developers we have taken great care to administer and execute a compliance test process that is equitable to all licensees. The LTO Ultrium Generation Logo Certification requires that each manufacturer must demonstrate read/write format compliance with 17 different tapes on all three drives (HP, IBM and Quantum) to qualify for the logo.

For more information on CV testing and LTO Open Standards, go to http://www.lto.org/about/wp_cve.html

Mere compliance may be enough to guarantee interchange, but is that enough to guarantee business continuity?

All LTO-formatted media may be compatible with all LTO drives. But they are not the same. Compliance testing only relates to what is required for interchange. HP's qualification process for its own branded LTO Ultrium media goes deeper and wider than this. And in that respect. Yes. There's a world of difference and one manufacturer's Ultrium is clearly different from another's.

That's why more customers choose HP Ultrium than any other brand.



"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.

HP LTO Ultrium technology recap

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

HP LTO Ultrium product lineup

HP LTO-1 Ultrium

- 200GB Data Cartridge
SKU — C7971A
- 200GB Custom Labeled Data Cartridge (20pk)
SKU — C7971AL
- 200GB Non-custom Labeled Data Cartridge (20pk)
SKU — C7971AN
- 200GB Storage Media Kit
SKU — C8013A
- 200GB Bar Code Label Pack (100 data labels/10 cleaning labels per pack)
SKU — Q2001A

HP LTO Cleaning Cartridge

- HP LTO Ultrium Universal Cleaning Cartridge
SKU — C7978A

HP LTO-2 Ultrium

- 400GB Data Cartridge
SKU — C7972A
- 400GB Custom Labeled Data Cartridge (20pk)
SKU — C7972AL
- 400GB Non-custom Labeled Data Cartridge (20pk)
SKU — C7972AN
- 400GB Storage Media Kit
SKU — C8014A
- 400GB Bar Code Label Pack (100 data labels/10 cleaning labels per pack)
SKU — Q2002A

HP LTO-3 Ultrium

- 800GB RW Data Cartridge
SKU — C7973A
- 800GB WORM Data Cartridge
SKU — C7973W
- 800GB RW Custom Labeled Data Cartridge (20pk)
SKU — C7973AL
- 800GB WORM Custom Labeled Data Cartridge (20pk)
SKU — C7973WL
- 800GB RW Non-custom Labeled Data Cartridge (20pk)
SKU — C7973AN
- 800GB Storage Media Kit
SKU — C8017A
- 800GB RW Bar Code Label Pack (100 data labels/10 cleaning labels per pack)
SKU — Q2007A
- 800GB WORM Bar Code Label Pack (100 data labels/10 cleaning labels per pack)
SKU — Q2008A

HP LTO-4 Ultrium

- 1.6TB RW Data Cartridge
SKU — C7974A
- 1.6TB WORM Data Cartridge
SKU — C7974W
- 1.6TB RW Custom Labeled Data Cartridge (20 pk)
SKU — C7974AL
- 1.6TB WORM Custom Labeled Data Cartridge (20 pk)
SKU — C7974WL
- 1.6TB RW Non-custom Labeled Data Cartridge (20 pk)
SKU — C7974AN
- 1.6TB RW Bar Code Label Pack (100 data labels/10 cleaning labels per pack)
SKU — Q2009A
- 1.6TB WORM Bar Code Label Pack (100 data labels/10 cleaning labels per pack)
SKU — Q2010A

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