



hp LTO Ultrium
tape drive

LTO versus SAIT

10 attack points for positioning LTO-3 versus SAIT in the mid-range tape space

1. LTO is the market leading tape technology in the mid-range space. S-AIT is a niche player.
 - According to IDC LTO commanded **65.8%** unit shipment market share of the mid-range space in 1H 2004 versus AIT-3/SAIT's **combined** market share of 5.0%. According to Gartner DataQuest LTO out-shipped S-AIT by a factor of almost **260:1** in CY03 (260,000 LTO drives versus 900 SAIT3 drives).
2. LTO is the market leading tape drive technology in automation. S-AIT is a niche player.
 - 40 cartridge plus LTO based tape libraries out-shipped 40 cartridge plus 8mm libraries by a factor of ten in CY2003 (*source: Freeman Reports May 2004*)
3. LTO tape drive shipments are forecasted to eclipse SAIT tape drive shipments during 2004-2008.
 - LTO tape drives are forecasted to out-ship SAIT drives by a factor of **143:1** in 2004 (359,000 LTO drives versus 2,500 S-AIT drives) – *source: Gartner DataQuest, June 2003*
 - LTO is forecasted to command an installed base of **3 million** tape drives by 2008. SAIT is forecasted to have an installed base of 26,000 drives by 2008. – *source: Gartner DataQuest June 2004*
4. LTO commands universal system and automation OEM adoption. SAIT has niche system and automation OEM adoption. Volume



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OEM adoption is critical to the long term success and viability of any tape format in the mid-range market.

5. LTO is an open standard with multiple sources of supply for drives and media. AIT is a proprietary single source format.
 - An open standard guarantees a highly competitive marketplace. For customers, that means *choice* which delivers value, guaranteed availability, better products and constant feature innovation.

6. LTO offers a more robust and deliverable roadmap than SAIT.
 - The LTO format roadmap specifies known and achievable technology steps to deliver on each generation's capacity and performance points. The roadmap is backed by three of the biggest players in tape storage (HP, IBM, Certance) and offers media backwards compatibility between generations. This provides investment protection security as well as assurance of product delivery. To date the LTO roadmap has not changed and has been delivered on schedule.
 - The SAIT roadmap is based on an as yet unproven combination of ½" tape and helical scan recording technology. SAIT offers no media backwards compatibility with AIT-3. The SAIT roadmap shows a path to 4TB capacity by 2010, but there are no technological details about how this will be achieved and there is this disclaimer: "The above roadmap is a projection of SAIT product development and is subject to change. There is no guarantee or warranty, expressed or implied, that future generations will be developed or brought to market. The above roadmap is a projection of SAIT product development and is subject to change. There is no guarantee or warranty, expressed or implied, that future generations will be developed or brought to market."



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7. LTO offers more *inherent* reliability than AIT and more *proven* reliability than SAIT for enterprise class applications.
 - LTO leverages best of breed technologies (including enterprise proven linear multi-channel recording technology) and is therefore inherently reliable. SAIT offers an as yet unproven combination of ½" tape and helical scan recording. It should be pointed out that for enterprise applications; all major vendors except Sony have chosen a linear format for their tape drives. These formats include, but are not limited to LTO, DLT, SDLT, STK 9840/9940, IBM 3590 and the IBM 3592. Traditionally helical scan has been reserved for low duty-cycle applications (e.g. DDS)
 - LTO utilises MP media which, with its double layer tape, has demonstrated proven and unrivalled historical durability and performance over 50 years. MP media was successfully used in IBM Magstar, Travan, DDS and DLT tape formats prior to adoption by the LTO Technology Provider Companies (TPCs).
 - AIT uses ME/AME media. Testing has shown that ME/AME media can become brittle over time and can be prone to "flaking" with large areas of evaporated media breaking away from the binding. As such ME/AME media's long term archiving properties are not yet fully proven. ME/AME media has sufficient durability for low use or low cycle storage applications but in high duty cycle apps may pose some data integrity risk. This is why the LTO TPCs have no plans to use this media type at this time.

8. LTO provides easier integration for libraries than SAIT.
 - LTO has a standard 5.25" form factor. SAIT is currently available in an extra deep form factor only and is almost 50% longer than a normal full height device.

9. LTO delivers lower total cost of ownership than SAIT.
 - LTO-3 will have a lower \$/GB media cost than S-AIT (LTO3 - \$0.36/GB, SAIT \$0.45/GB). This is of particular significance in automation where higher media consumption represents a significant on-going cost. – SAIT *source CDW June '04*



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10. LTO delivers superior performance than S-AIT

- LTO 3 offers a **2.6X** faster transfer rate than SAIT. This means that a full backup – one cartridge's worth of data – takes more than three times longer on an HP LTO Ultrium 3 drive. It takes 4 hours 45 minutes to fill an SAIT cartridge and less than 90 minutes for an LTO Ultrium 3 cartridge.
- HP LTO has a unique data rate matching feature which negates the impact of shoe-shining by dynamically adjusting the speed of the tape to match the speed of the data coming from the host. Data Rate matching serves to optimise the performance and reliability of the HP LTO tape drive.



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APPENDIX - Rebutting Sony SAIT's "silver bullets"

1. SAIT (500GB) has 1.25x the capacity of LTO3 (400GB).

This capacity advantage comes at a price. SAIT drives are **twice** the price of LTO2 drives, deliver a very deep form factor, offer no backward compatibility with AIT-3 media and are based on an as yet unproven combination of ½" tape and helical scan recording technology. SAIT is very late to market in the super-drive space and is forecasted to command only niche market adoption.

2. The SAIT roadmap promises higher capacity than LTO

The current published SAIT roadmap shows SAIT generation 4 out at 4 TB. The current LTO Roadmap goes to 1.6TB. However, it should be noted that:

- The SAIT roadmap is not robust – Unlike the LTO roadmap, there are no specific dates and no technical detail beyond feeds and speeds on the SAIT roadmap. Sony has delivered only one generation so far and they have a disclaimer on their roadmap that says:
"The above roadmap is a projection of SAIT product development and is subject to change. There is no guarantee or warranty, expressed or implied, that future generations will be developed or brought to market."
- SAIT has not been accepted in the market. It accounts for less than 1% of tape market share. The future of the technology is dependent upon greater adoption rates regardless of what is specified in the roadmap
- The LTO roadmap is robust and has a proven track record of delivering on time. The open standard ensures that competition for getting drives out to market is intense and in turn speeds development cycles.
- An extended edition of the LTO roadmap – to encompass LTO-5 and LTO-6 is under development.

3. I have a large number of existing AIT drives. Doesn't that mean I must upgrade to SAIT for compatibility?

There are many advantages for switching strategically to LTO in the long term that need to be weighed against the need to continue to access an installed base of AIT media. Note:

- Cost of ownership, LTO-3 has advantage, especially when media costs are considered.
- Roadmap stability – AIT-4 was delivered late. LTO has always been delivered on time.

If the customer is considering going to SAIT then point out that SAIT and AIT are not compatible media types. You cannot read AIT media in SAIT drives. One alternative is to keep an old AIT drive on hand for reading AIT media, and then decide which tape technology to move to on its own merits.



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4. Isn't AIT's compression ratio better than LTO's?

This is simply not true. First of all, the data compression ratio achieved is very much dependent upon the data set being compressed and therefore the actual compression ratios achieved vary a great deal. Throughout the industry, compressed capacity is normally quoted at a ratio of 2:1. The Sony literature references a data compression ratio of 2.6:1 which is more of a theoretical average than a real performance advantage. Sony also claims AIT has more efficient packing density of data on the tape and faster time to data.

Both Sony AIT/SAIT and HP LTO Ultrium use the same data compression algorithm – Advanced Lossless Data Compression (ALDC) which will give the same compression ratio on the same set of data.

It is also worth pointing out that data that has already been compressed can actually “expand” when compressed again. HP LTO Ultrium drives have a performance advantage over AIT in this area as they have been enhanced to enable ALDC to be “turned off” when the data has already been compressed. Compressing already compressed data can actually expand it.

5. S-AIT offers WORM support.

HP LTO-3 provides WORM support.

6. SAIT offers faster file access time than LTO.

Rapid time to data is a requirement in niche HSM tape applications but for mainstream “off-line” backup/restore and archive applications, cost effective capacity, intelligent transfer rate, inherent reliability and overall cost of ownership are more important considerations.