

# ***Tape-challenges and its future***

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- Reliability of media
  - Hard error rate for LTO-6 with FujiFilm media is 1000x nearline 6 TB disk drives
    - Enterprise rates are even higher
- Transportability
  - Turtle packs for tapes have been used for years
- Longevity
  - Tape claims 30 shelf life but we know that is (diplomatically) factually incorrect
    - But still has longer life than disk
    - Interfaces last 10 years at maximum
      - Software is an issue as most write proprietary formats
      - LTFS is being used but it is a new standard
- Power and cooling

- Migration costs
  - Additional hardware and software infrastructure
  - Support and person-hour costs
- Connectivity
  - Limited connectivity options: 8 and 16 Gb FC, 10 Gb FCoE (likely dead), 6 Gb SAS (LTO-6 only)
  - Much more expensive on GB/s basis than disks
- Bandwidth
  - Limited by connectivity options
  - No native tape striping
  - Tape is very expensive \$ per MB/sec compared to disk
    - If you need your data back quickly tape is very costly, even LTO
- Software ecosystem limited to a small number of vendors software and hardware
  - Backup market is small today
  - Tape HSM market is shrinking especially commercial market
  - Not much tape talent left for HSMs or development

- Shrinking LTO media sales

Source  
<http://www.sccg.com/tapetracker.html>

Year	2008				2009				2010			
Qtr	1	2	3	4	1	2	3	4	1	2	3	4
LTO Market size in \$M	254.89	244.65	240.22	226.58	202.40	197.68	172.06	188.65	171.67	158.13	174.66	182.23
Change Q/Q		-4.19%	-1.84%	-6.02%	-11.95%	-2.39%	-14.89%	8.79%	-9.89%	-8.56%	9.46%	4.15%
Overall Decrease from 1Q08		4.02%	5.76%	11.11%	20.59%	22.44%	32.50%	25.99%	32.65%	37.96%	31.48%	28.51%
Year	2011				2012				2013			
Qtr	1	2	3	4	1	2	3	4	1	2	3	4
LTO Market size in \$M	192.06	162.98	158.89	168.07	169.25	153.94	141.96	143.84	138.54	134.25	134.35	134.33
Change Q/Q	5.12%	-17.84%	-2.57%	5.46%	0.70%	-9.95%	-8.44%	1.31%	-3.83%	-3.20%	0.07%	-0.01%
Overall Decrease from 1Q08	24.65%	36.06%	37.66%	34.06%	33.60%	39.61%	44.31%	43.57%	45.65%	47.33%	47.29%	47.30%
Year	2014											
Qtr	1	2	3	4								
LTO Market size in \$M	136.50	126.40	125.96	117.42								
Change Q/Q	1.59%	-7.99%	-0.35%	-7.27%								
Overall Decrease from 1Q08	46.45%	50.41%	50.58%	53.93%								

– LTO media market decrease impacts the whole tape ecosystem

File Size in GB	Tape Compressed Access Rate 763 MB/sec in hours	Tape Uncompressed 240 MB/sec in hours
100	0.036406	0.115740741
500	0.182029999	0.578703704
1000	0.364059997	1.157407407
8000	2.912479977	9.259259259

Item	Performance with w/o compression MiB/sec	Performance with compression MiB/sec	Cost Estimate	\$/MB/sec w/o compression	\$/MiB/sec with compression	Tape Cost difference w/o compression
T10000D	240	763	\$22,000	\$91.67	\$28.83	38.19
TS1150	360	763	\$19,000	\$52.78	\$24.90	21.99
LTO-6	160	400	\$2,400	\$15.00	\$6.00	6.25
Enterprise 6TB drive**	175	175	\$420	\$2.40	\$2.40	
** Specs from Seagate product release						
Google search Just now						

- Lack of capital investment
  - Shrinking market provides limited revenues for tape ecosystem development
  - Contrast to disk market with healthy ecosystem and growth in both volume and market size
- Fewer vendors
  - Only enterprise tape drives are from IBM and Oracle
    - Currently only 1 media vendor FujiFilm
  - LTO 3 drive vendors and currently
    - Small number of media vendors but only FujiFilm uses BaFe needed for reliability and density
  - Lack of tape talent
    - What young people want to work on tape HSMs?
- It does not matter what HPC wants it matters what others are doing