Can Tape Be Displaced by New Storage Technology?

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Introduction

- Could new technology disrupt the traditional physical tape market?
- Thought exercise on the business opportunities/challenges

- For Entertainment Purposes Only
  - Numbers are estimates
  - Not a Business Case Study

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Step 1 - Market Size

- Tape Market Size
  - No accurate reports are currently published
- Let's <u>estimate</u> the annual tape sales (Drives/Media) at $1 Billion
  - Excludes libraries, tape software, service contracts, networking, etc.
- Product margins are ok
  - Higher for drives/libraries; Lower for media
  - Higher on new releases; Lower for older products
- Future Revenue Forecast – Flat to Slightly Declining

Target Market (5 year time frame)

$1,000 M	**Total Annual Market Size**
-$100 M	Remove unique segments (Mainframe MVS, Fujitsu MSP, AS400, Unisys, etc.)
-$150 M	Drop the low-end market (server attach, autoloaders, small libraries less 100 slots)
-$25 M	Systems frozen in time (old technology, no plans to upgrade). Old software versions.
-$25 M	Customers with long-term, multi-year service contracts
-$100 M	Legacy read requirements. Media reuse.
-$100 M	No dual-sourcing. Proprietary technology.
$500 M	**Practical Annual Market Size**

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Reachable Market (5 year time frame)

$500 M	**Practical Annual Market Size**
Option 1: -40%	Option 1 – Plug into existing tape libraries Assume you get 3 out of the 5 major vendors to support
Option 2: -50%	Option 2 – Build your own library or have stand-alone solution Higher R&D More IP risks
$300 M	**Realistic Annual Market Size**

Reachable Market (5 year time frame)

No Charge	Sales and service coverage (60+ countries)
No Charge	Sales partners and resellers
No Charge	Full ISV software support (backup software, archive software, etc.)
No Charge	Full IHV support (networking, encryption key management, etc.)
No Charge	End-to-end solution bundling
No Charge	World-wide compliance (power, emissions, etc.)
No Charge	Company viability
No Charge	Fully open and competitive RFQ's

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How to Differentiate New Technology
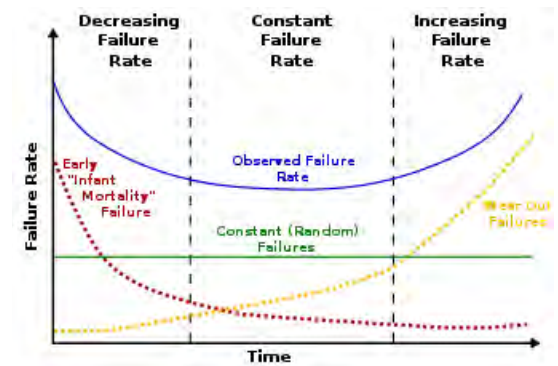
Big Factors

- Cost
- Performance
  - Streaming data rate
  - Time to data
- Reliability

**Other Factors
(niche factor or workarounds)**

- Environment
- Power usage
- Easily transportable
- High storage density

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New Technology Differentiator – Reliability?

Wikipedia – Bathtub curve

- Properly maintained tape systems generally meet reliability expectations

- Tape drives/media have been in production for over 60 years
  - Tape software and processes set up to handle known weaknesses

- 18 years of LTO (8 generations)
  - Millions of drives; 100's million cartridges
  - Iterative design cycle
  - Catastrophic failures are extremely rare

- Difficult to differentiate Enterprise tape drives based on higher reliability alone

- For the general tape market, positioning disruptive technology as theoretically more reliable would not be a good differentiator
  - In fact, early life of new platforms would be less reliable and more prone to catastrophic failures

New Technology Differentiator – Performance?
Data Transfer Rate

- Tape systems are actually very good at data transfer rate

- LTO8 supports native 360 MB/sec and up to 900 MB/sec compressed
  - Strong roadmap to increase data rate with additional channels

- Scale at library level with additional tape drives

- For most customer environments, the tape drive is not the limiting factor for bandwidth

- For the general tape market, positioning disruptive technology as higher bandwidth would not be a good differentiator
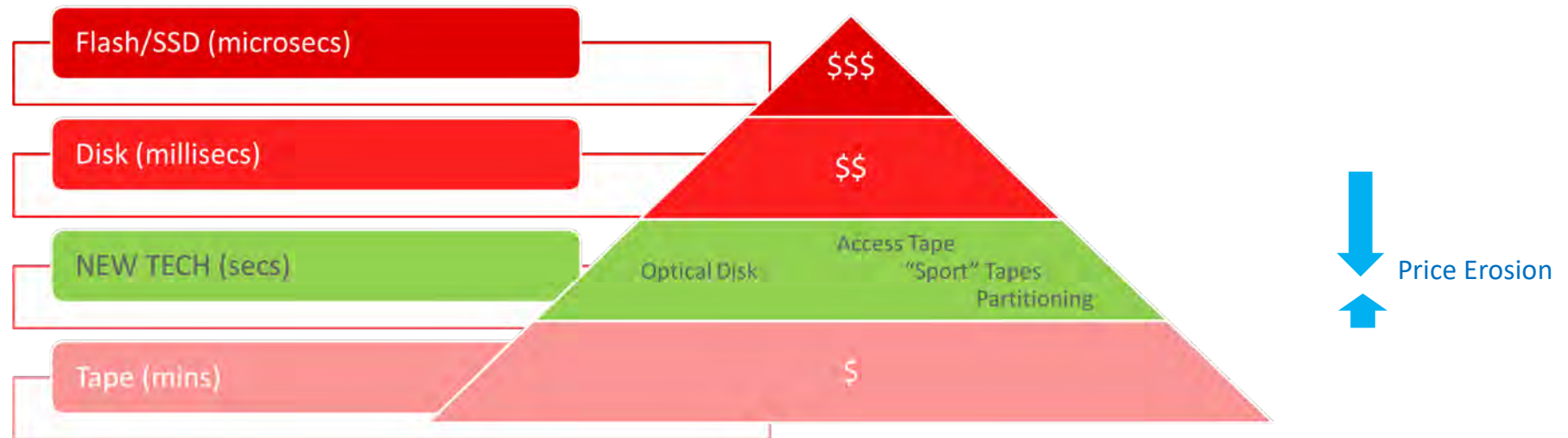 - In fact, most new technologies struggle to meet tape data rates

New Technology Differentiator – Performance?

Access Time

New Technology Differentiator– Performance?

Access Time

Flash/SSD (microsecs)

Disk (millisecs)

NEW TECH (secs)

Tape (mins)

$$$

$$

Optical Disk

Access Tape
"Sport" Tapes
Partitioning
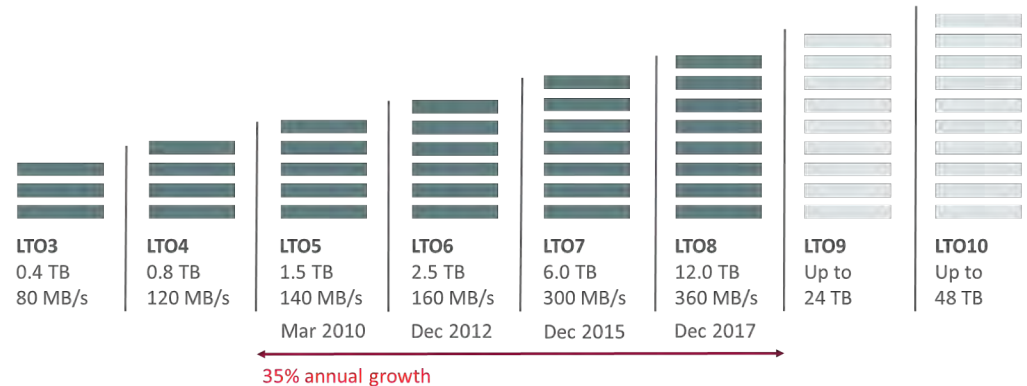
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Price Erosion

- For the general tape market, positioning disruptive technology as higher bandwidth would not be a good differentiator

New Technology Differentiator – Cost?

http://jcmit.net/diskprice.htm
http://jcmit.net/flashprice.htm
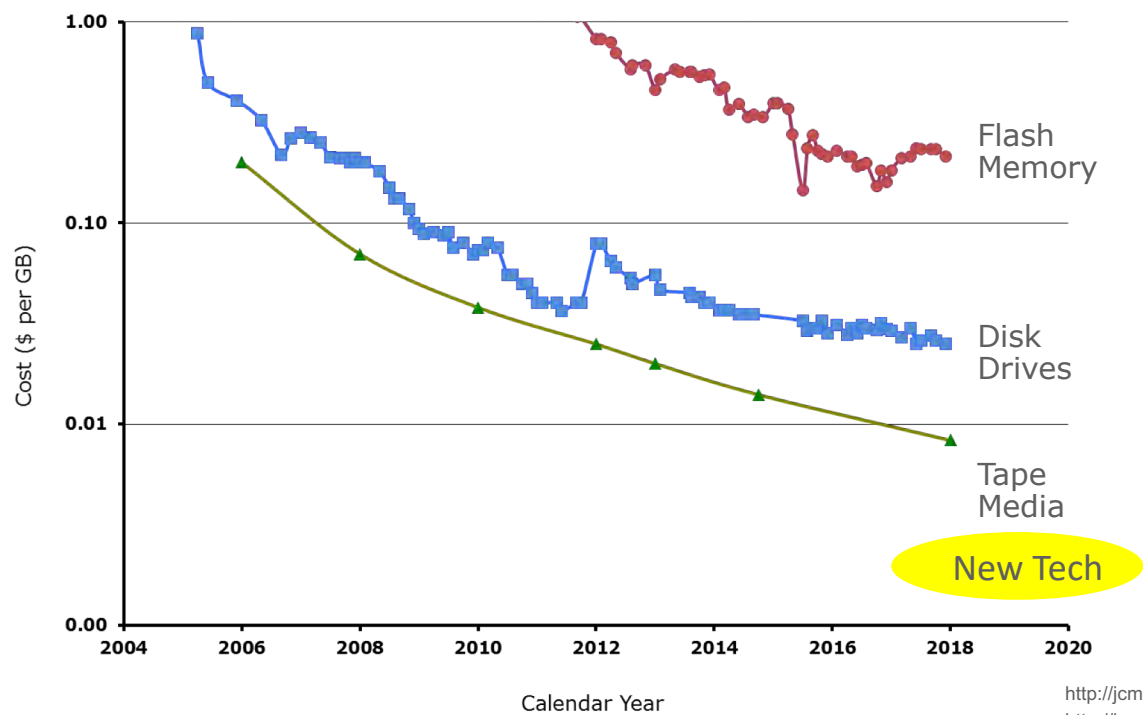
New Technology Differentiator – Cost?

- 50% the TCO price of tape to displace existing tape technology
  – At product release, no selling roadmap cost futures
- Must have roadmap that keeps you at 50% the cost of tape
  – Data rate improvements also required
  – New product releases every 2-3 years

LTO3	LTO4	LTO5	LTO6	LTO7	LTO8	LTO9	LTO10
0.4 TB	0.8 TB	1.5 TB	2.5 TB	6.0 TB	12.0 TB	Up to	Up to
80 MB/s	120 MB/s	140 MB/s	160 MB/s	300 MB/s	360 MB/s	24 TB	48 TB
		Mar 2010	Dec 2012	Dec 2015	Dec 2017		

35% annual growth

New Technology Differentiator – Cost?

What is a Reasonable $/TB Cost Target?

- ½ cost to displace tape

- ½ cost for 2 year development cycle (tape roadmap cost reductions)

- ½ cost in order to achieve 50 pts margin

- 1/8 cost of tape for design target (< $1 TB storage cost)

Good Business?

- Realistic Annual Market - $300M
- Business Strategy is 50% TCO
- Business Opportunity - $150M
  – Would lower cost storage shift more data from disk tier?
- Business Costs
  – R&D
  – Sourcing
  – Sales
  – Service
  – Legal, HR, Documentation, …

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Straw Horse P&L

Year	Market Share	Revenue $M	Profit $M	Company Budget $M	Comments
1 & 2	-	-	-	$20.0	Development
3	5%	$7.5	$3.75	$20.0	50 pts margin
4	10%	$15.0	$7.50	$20.0	
5	25%	$37.5	$18.75	$20.0	
TOTAL		$60.0	$30.0	$100.0	$70 million loss

Conclusion – Not impossible, but it is challenging

Other Ideas for Disruptive Technology

1. Leverage existing technology that is widely commercialized
   - Much less development cost
   - Lower cost structure

2. Bet exclusively target 5-10 hyperscale companies
   - Simplifies product requirements
   - Easier sales and delivery model

What Could Disrupt Traditional Tape Customers?

- Disk continues to be the most realistic long-term technology threat
  - Not near-term!
  - High unit volume
  - Significant R&D and roadmap to higher capacities

- Cloud storage for data protection and archive
  - Cloud companies deploying tape at hyperscale levels
  - Better cost structures. Low cost overhead.
  - Different ways to monetize their storage costs
  - Similar usage attributes for end-user customers

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Oracle Tape Portfolio

Open Software Stack
- Oracle HSM (SAM/QFS)
- Front Porch DIVA
- Tape Analytics
- LTFS-LE
- ACSLS
- Encryption

VSM

SL8500

SL4000
NEW!

SL150
NEW!

T10000

LTO8
NEW!

Cloud Environments
- Oracle Archive Cloud
- Storage Cloud Service