



Managing your Digital Data Explosion

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Spectra Logic

DEEP STORAGE EXPERTS

Company Overview

- Celebrating Over 3 Decades of Innovative Technology
 - Privately held corporation founded in 1979
 - Debt free from since conception
 - 100% employee owned
- Storage Industry Leadership
 - Founding member: Active Archive Alliance
 - Founding member: Tape Council
 - Standard member: SNIA
- Worldwide Presence
 - HQ's located in Boulder, CO – Bracknell, UK – Melbourne, AUS
 - Over 450 employees in 11 countries
 - 20,000 libraries installed in over 50 countries



Proven By The Largest Data Users In The World



We design, build and deliver reliable, efficient and cost effective archival storage solutions

- Digital Tape Libraries
 - Low cost archive
 - LTO and TS11xx
- Bulk NAS Disk Storage
 - HDD SAS / SMR
 - CIFS / NFS
- Black Pearl
 - Object Store Archive
 - Private/Hybrid Cloud
 - Tape & Disk



TFinity∞

Verde
Verde DPE



Black Pearl

Tri-media - Three Different Tape Technologies in the same library

- Spectra began with dual-tape technology combining LTO with IBM® TS technology in the same library.
 - Now including Oracle® T10000D technology.
- Spectra's ExaScale Edition Tri-Media feature now allows migrating or integrating your existing T10000D media & drives.

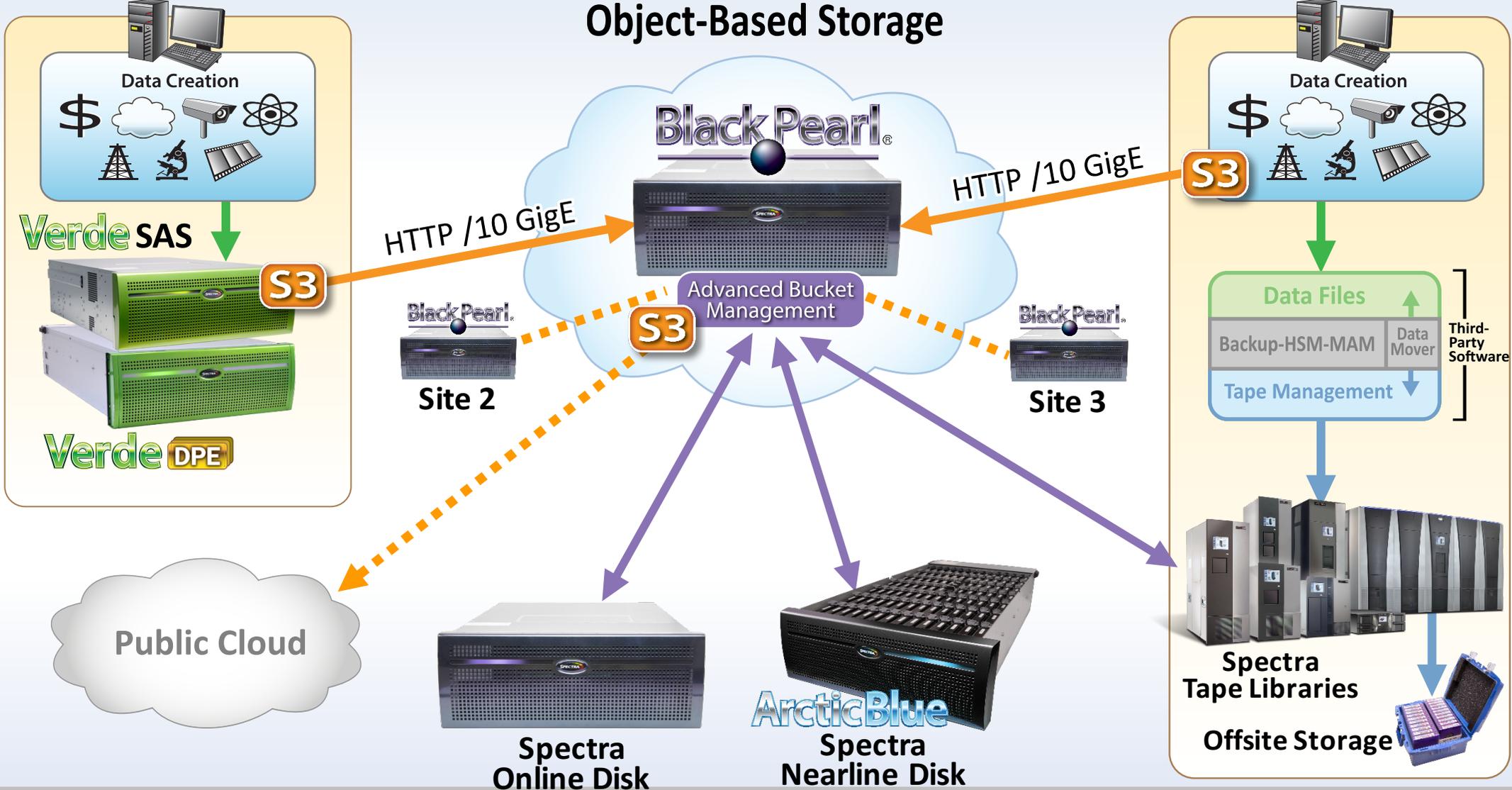


Spectra's Hybrid Storage Ecosystem

Traditional File-Based Storage

Traditional Tape Storage

Object-Based Storage



Data created each year growth
40% annually

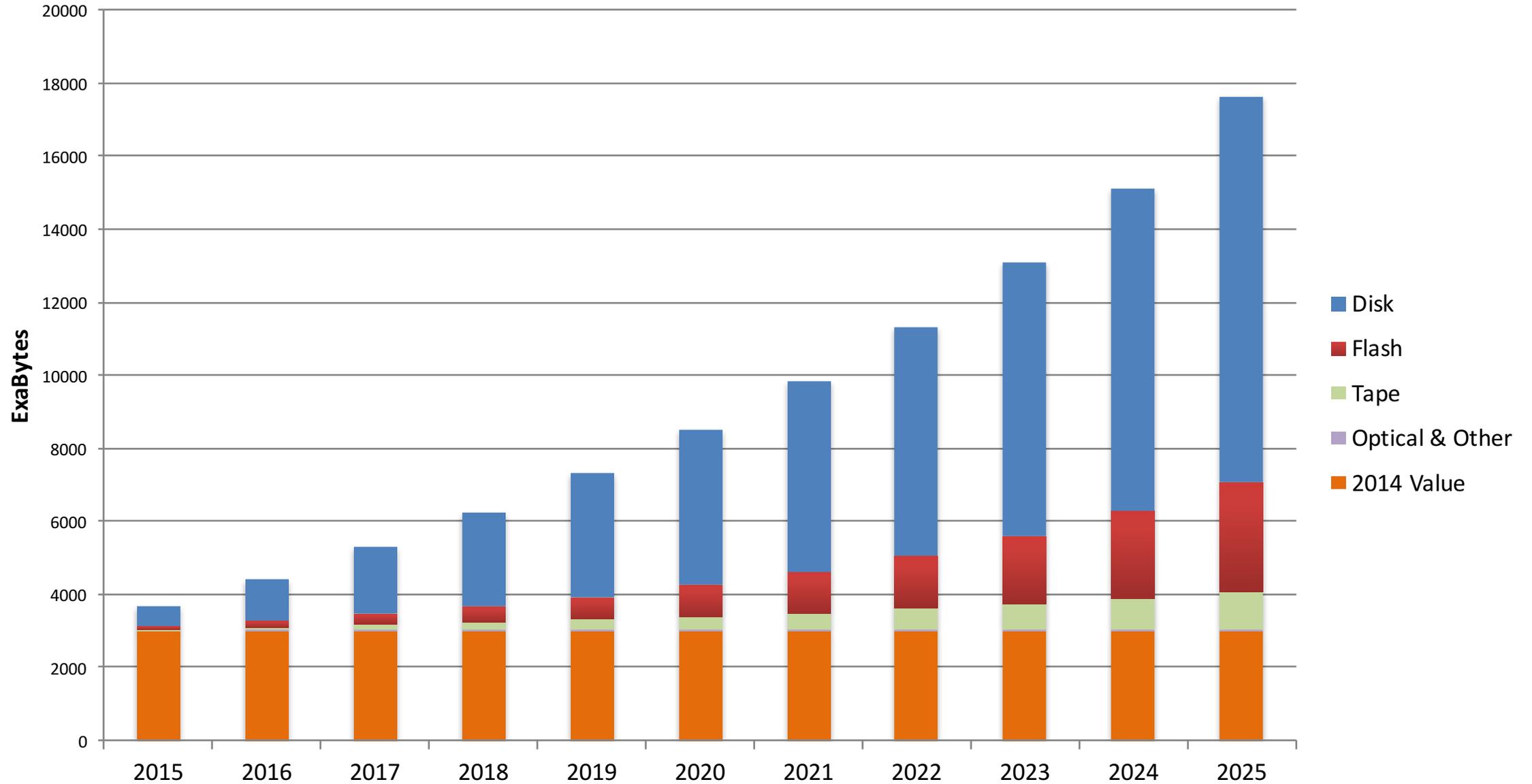
2020
 $6.6 \times 6.6 = 40+$ Zettabytes

2015
 $2.8 \times 2.8 = 6.5$ Zettabytes

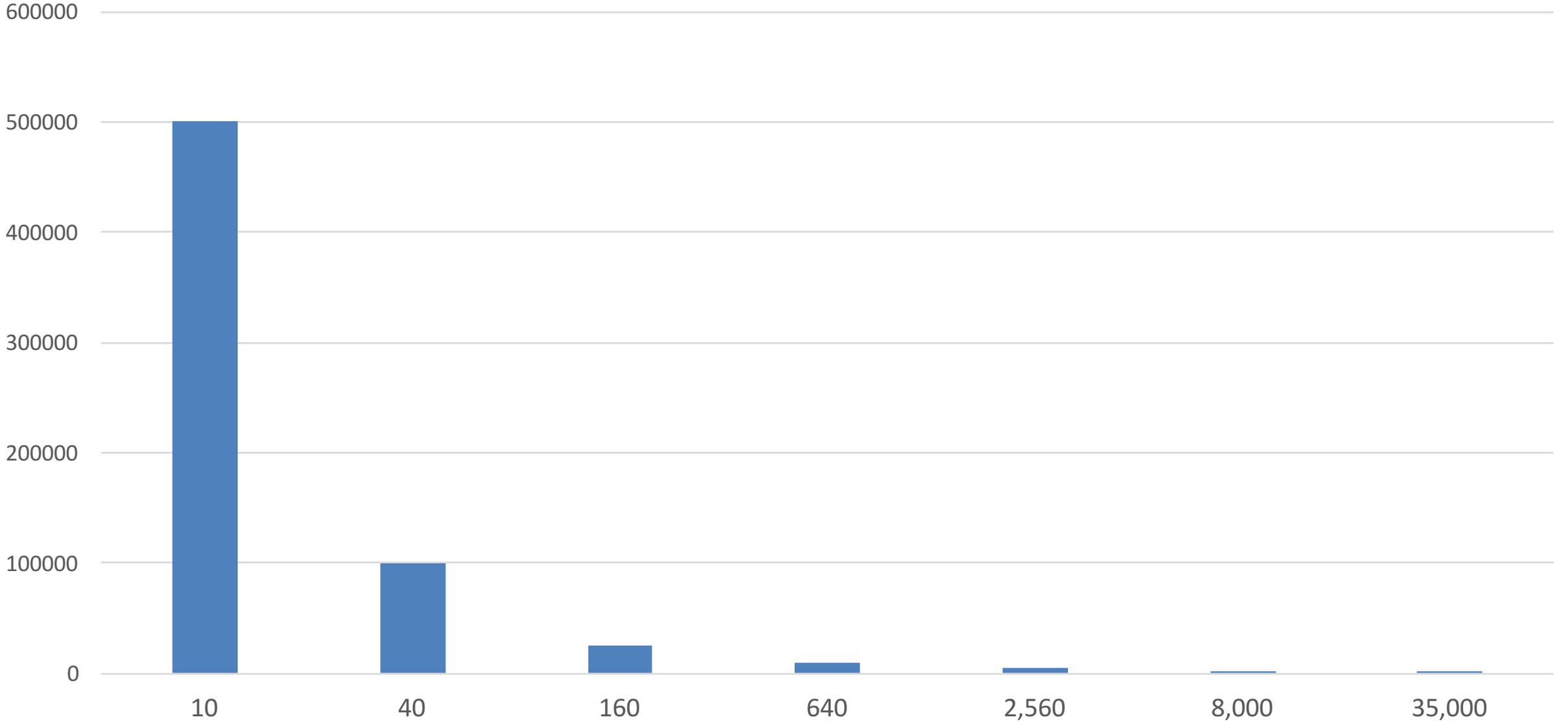
2009
 $1 \times 1 = 800$ Exabytes

IDC data 2014

Total Stored Digital Universe



TB per Company





Where is it all coming from?



DEEP STORAGE EXPERTS

Formula1, more data analytics than racing

- The Average car
 - The average car has 2000 sensors reporting data
 - HPC is running simulation up to 2 hours ahead of the race
 - The driver has at least 20 different controls to adjust the car
- Forbes reports:
 - At the US Grand Prix race, teams collected 243 terabytes during the event
 - In 2015 there were 19 races – 4.6 PB
- Lotus
 - “...Collecting Petabytes of data per year from their cars”

Sao Paulo, Brazil



MLB Network Facts



- Largest debut in cable TV history
- 50 Million Households on Launch – January 2009
- 65 Million Households – September 2011
- 71 Million Households – July 2013
- 2,000 hours per week of HD content archived in 2010 season
- 2,500 hours per week of HD content archived in 2011 season
- 2,900 hours per week of HD content archived in 2012 season
- 3,600 hours per week of HD content archived in 2013 season
- HD video is ~200GB/hour 8K can be as high at 8.5 TB per hour



20 DIAMOND Logger Workstations

The Power of DIAMOND



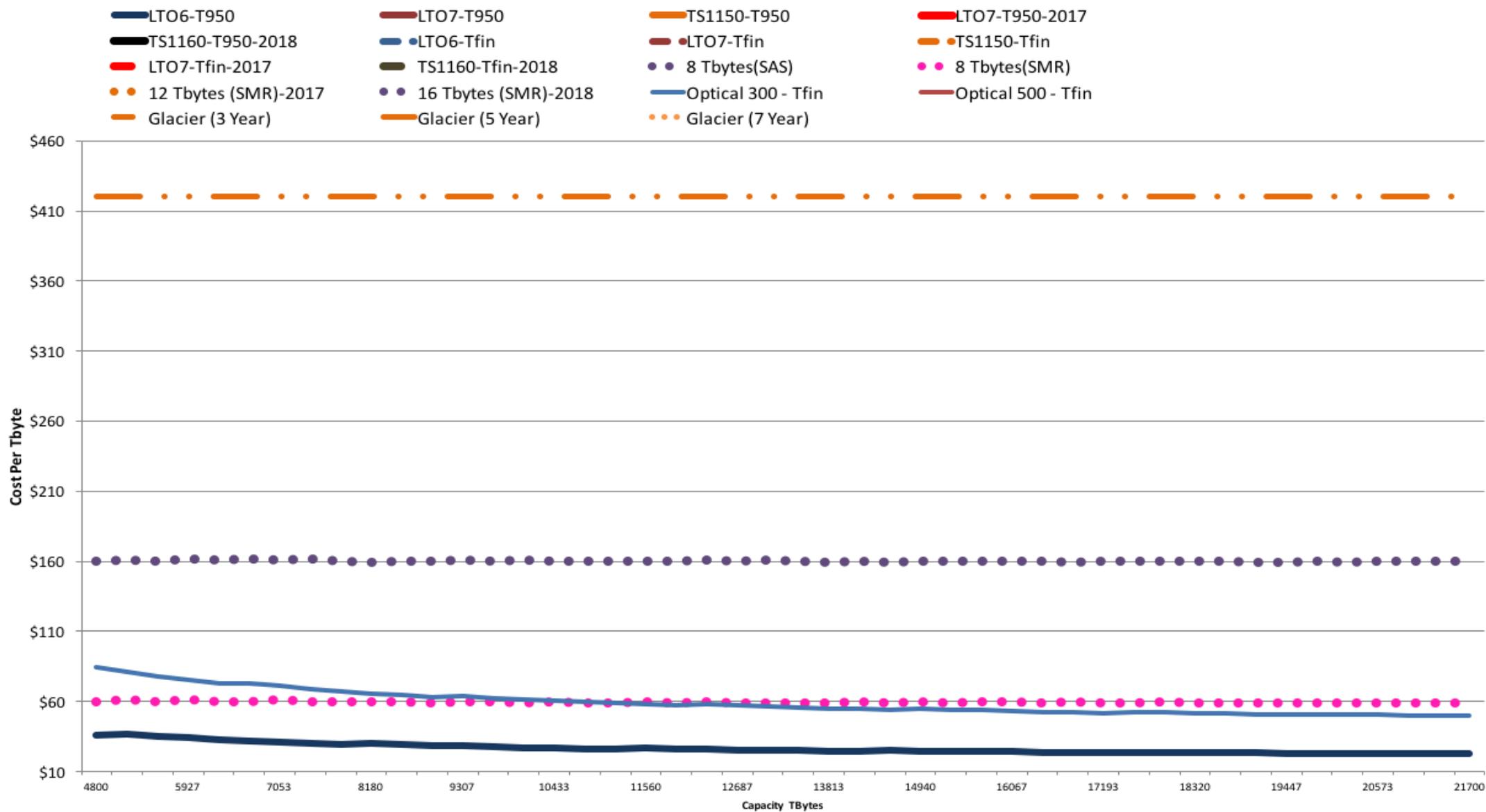
20 DIAMOND Logger Workstations

MLB Data sizes

- 70,000– 80,000 hours of new content per year
 - Depending on bit rate, each stream per hour is ~11-13 GB per hour
 - 4K video will be 260GB per hour or more
- Over 30 million meta data tags
- Last two seasons online
 - With DR copy
- All games kept forever

- What is the Cost to store it ALL

Storage ASP Comparison





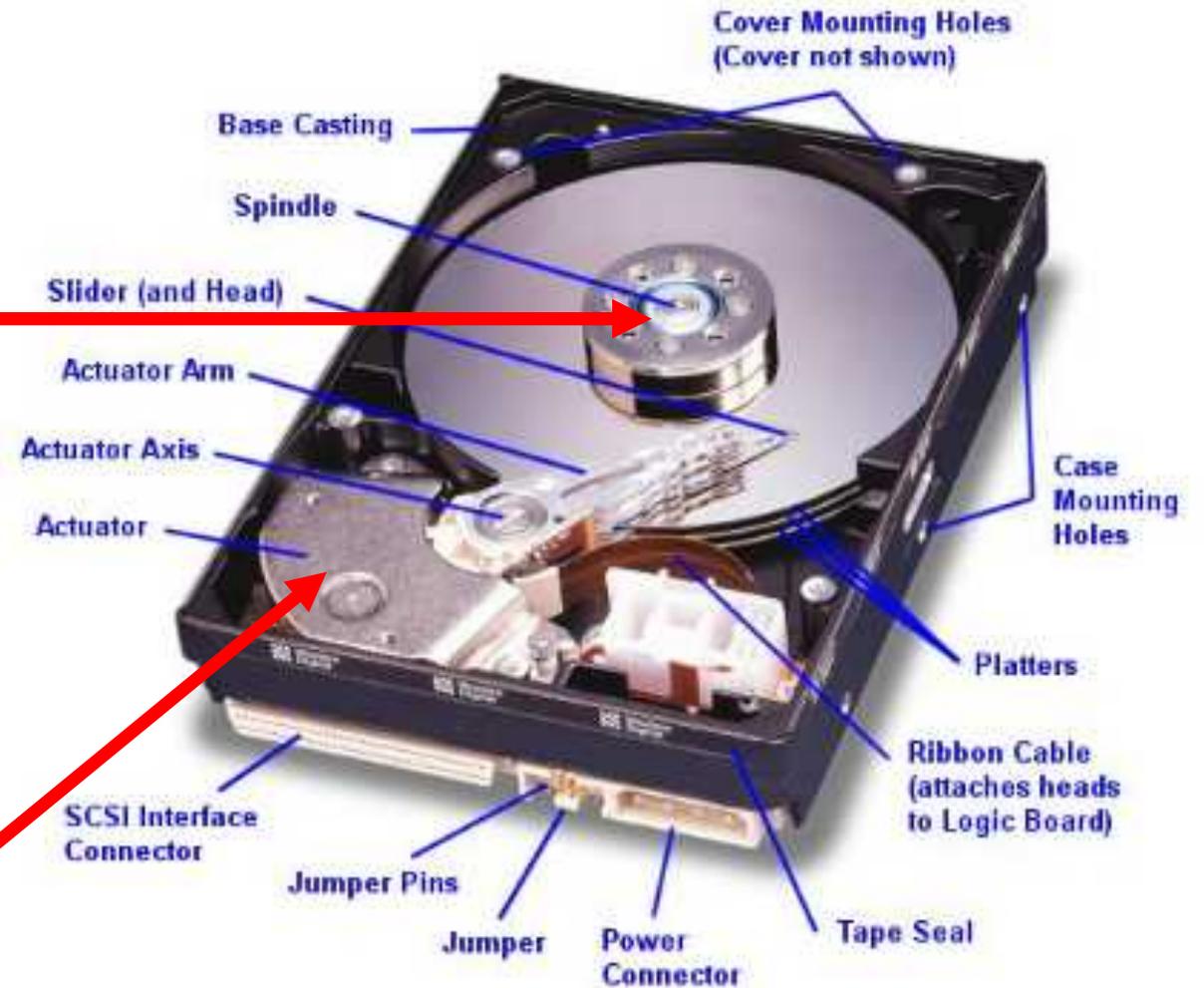
STORAGE TECHNOLOGY TRENDS

SMR Archive Drive

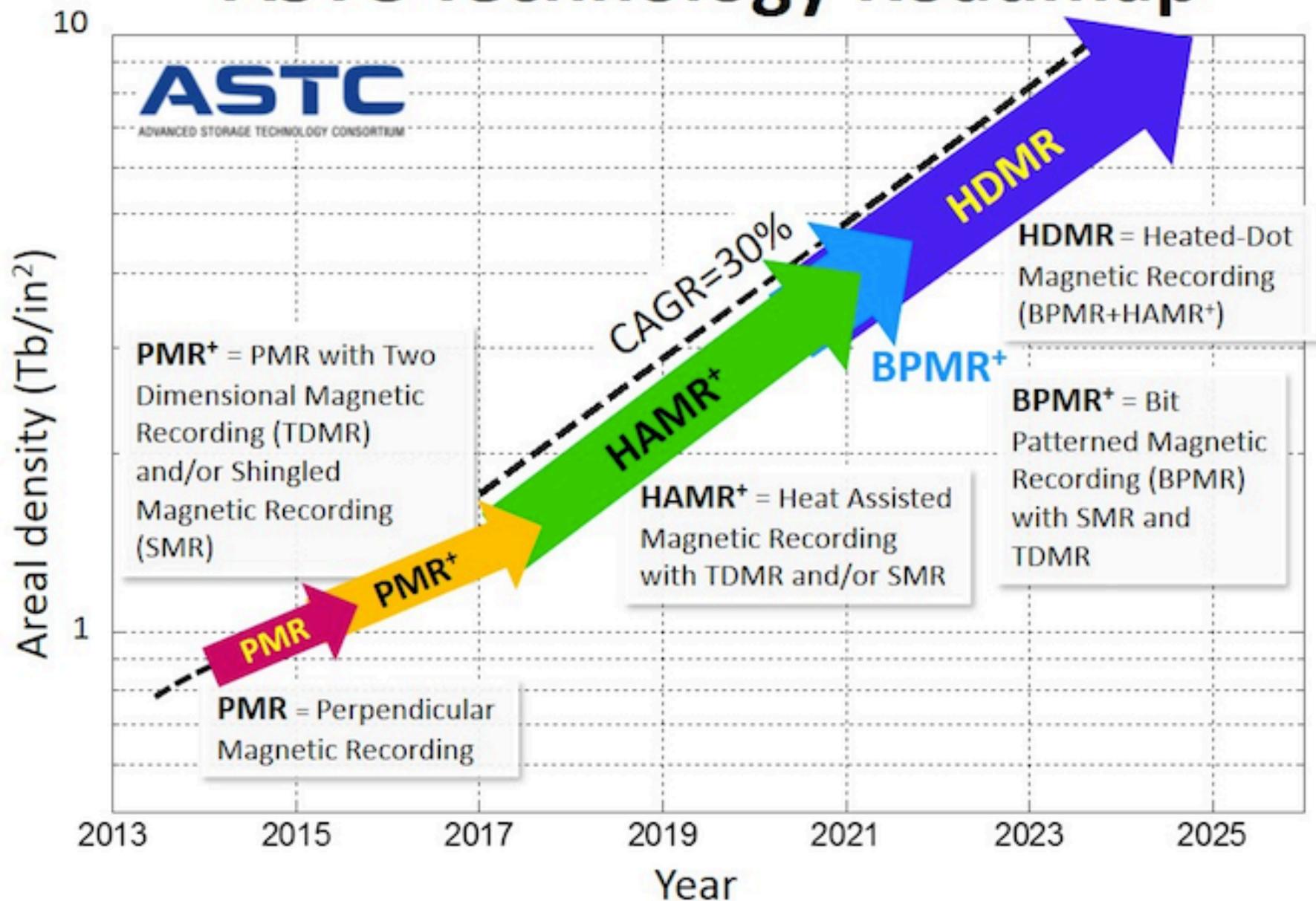
Gimbaled at both the top and bottom of the spindle

Enterprise features with a consumer base interface

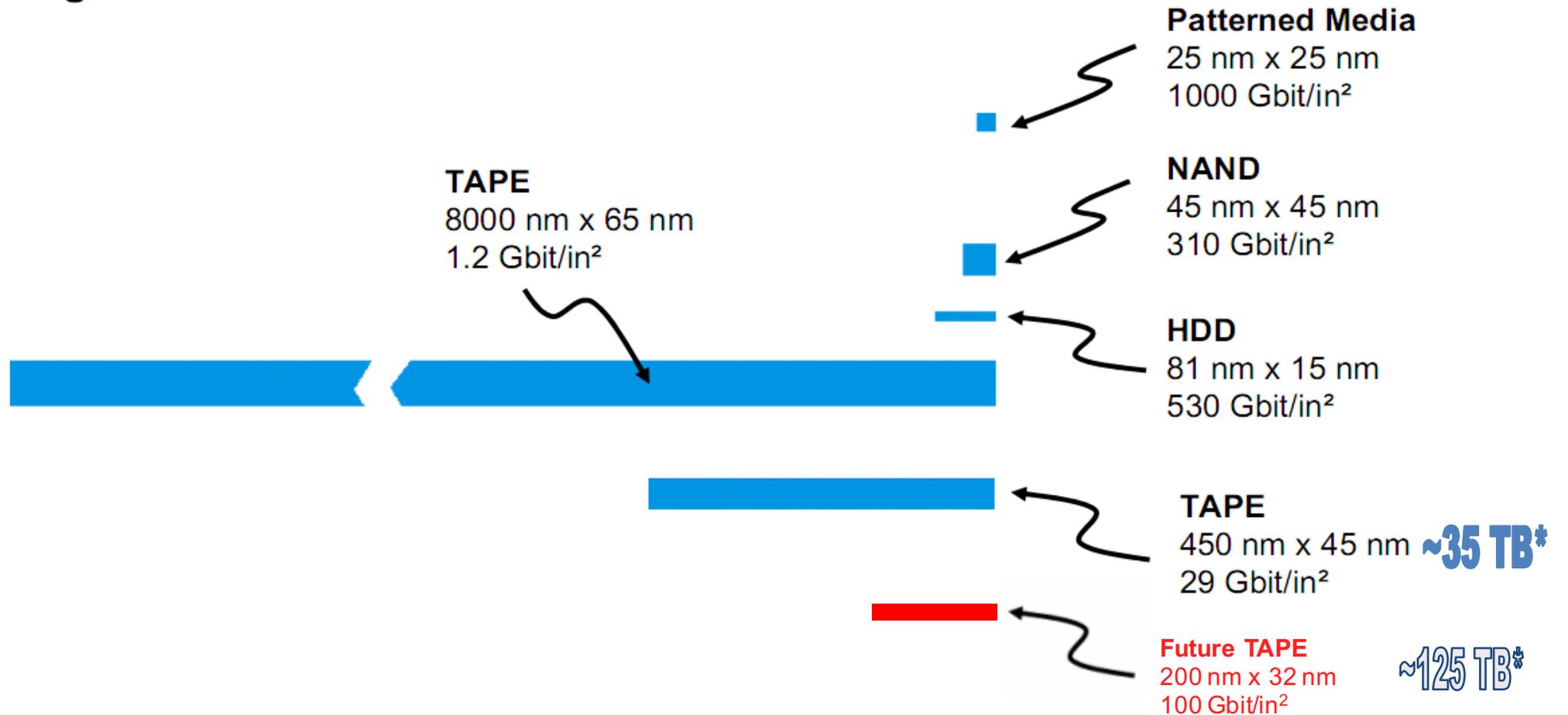
Same vibration magic as the Enterprise drives do



ASTC Technology Roadmap



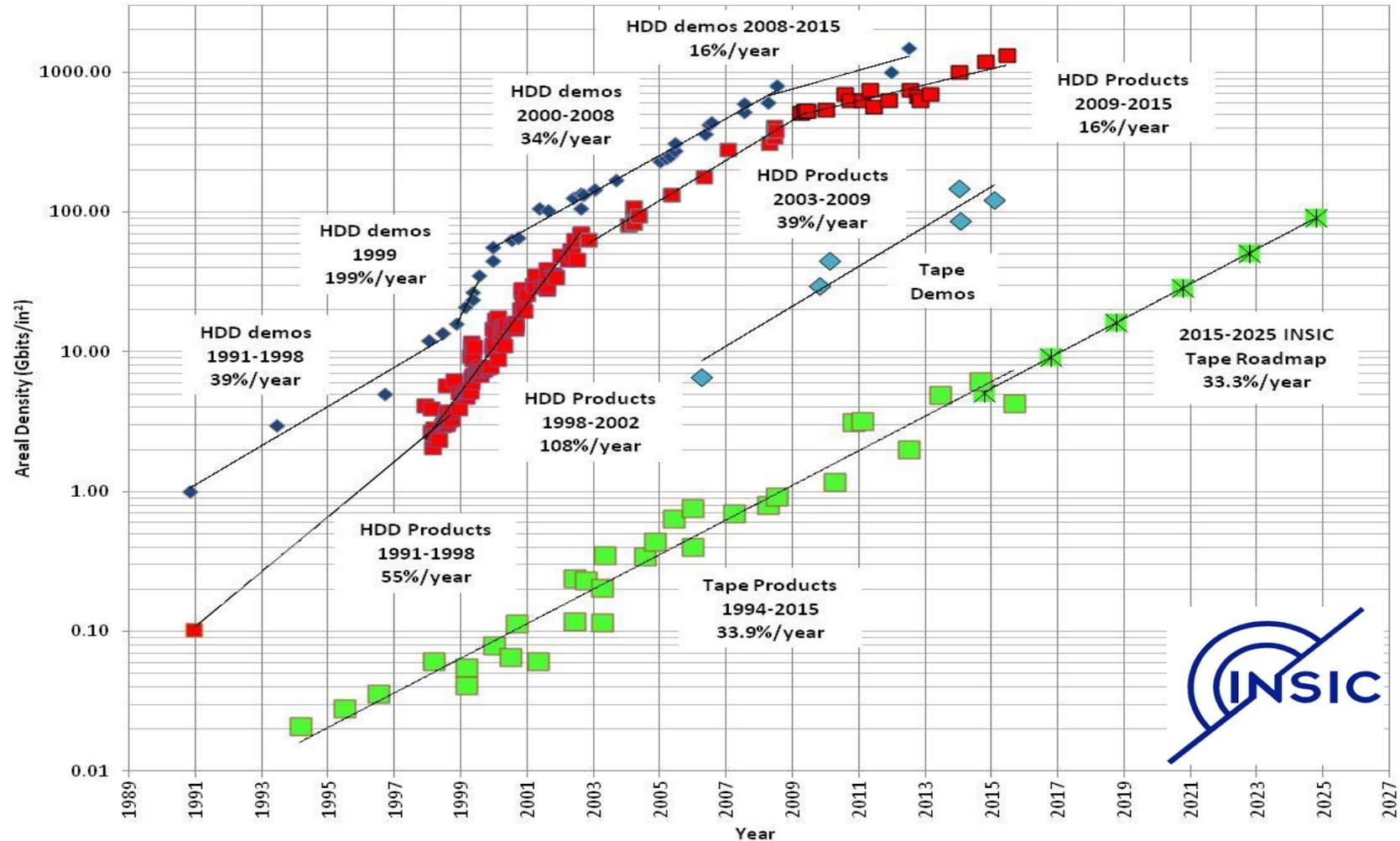
■ Magnified View of Scaled Bit Cells



http://www.digitalpreservation.gov/meetings/documents/storage13/GaryDecad_Technology.pdf

Areal Density Trends

Chart provided courtesy of the Information Storage Industry Consortium (INSIC)



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ARCHIVE COST over 5 years



25-35%
Of total cost



35-55%
Of total cost



16-20%
Of total cost



Disk Short Term Road Map

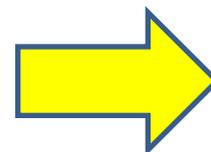
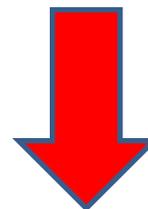
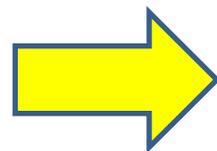
- Today Enterprise drives are at ~10TB and SMR drives are at 8TB.
- It's true that the disk physics have nearly reached the super paramagnetic limits using perpendicular recording. But....
- By tweaking the track pitch, adding a 7th platter and making the shingle recording a little more efficient (35-40% vs. 20-25%) you could get to 16TB...maybe 20TB
- Beyond that you need HAMR or Bit Patterned Media
- Our guess is that in late 2016 we will see 12TB drives

Moving forward

- File systems vs Object Storage
 - Object Storage is better positions for storing massive amounts of data
- NAS vs RestFul
 - NAS good scratch/working disk
 - RestFul, great for archive/parking data
- New customers to archiving
 - Bio Science
 - Digital records management
- Better strategies for heating data up
 - ERP approach

Storage outlook

- Multiple layers of Flash as tier 1
- Disk price per Gigabyte will not decline as fast
- Tape capacities growth rate will increase
- Tape price per Gigabyte will improve faster
- Optical storage will still be “a few years away”





FOR MORE ON SPECTRA'S STORAGE OUTLOOK

www.spectrallogic.com

Storage outlook