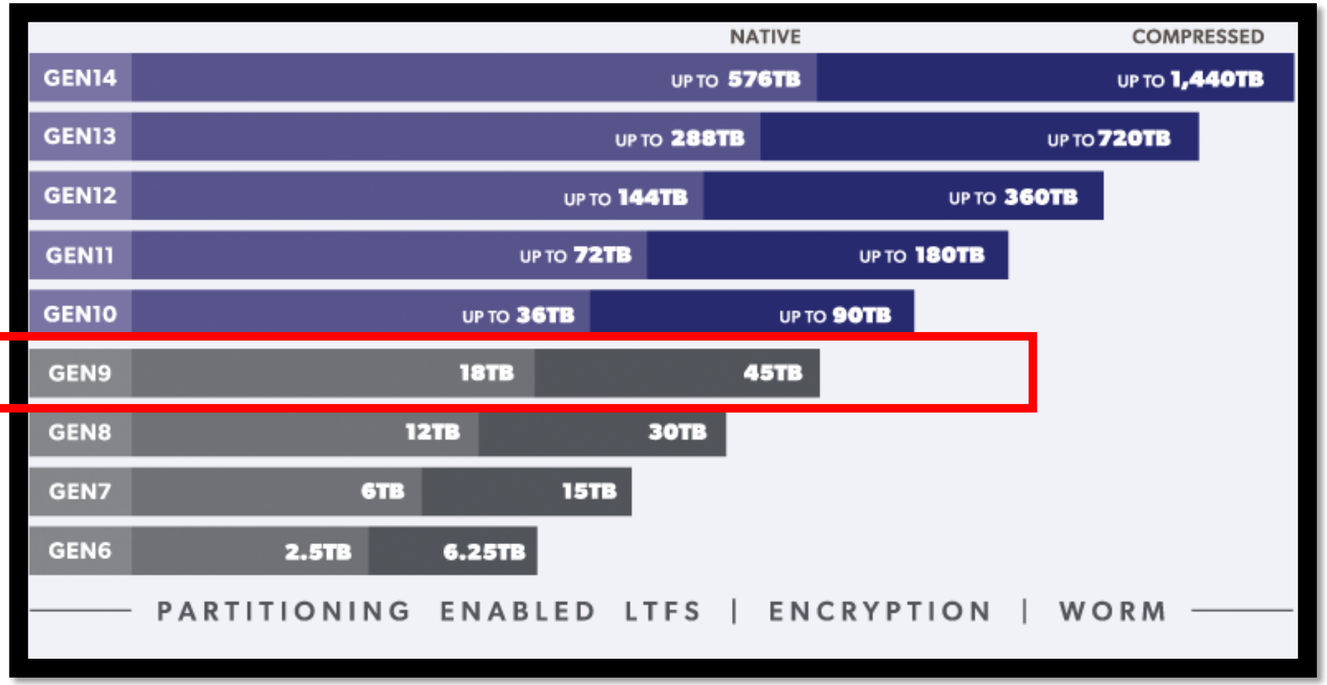
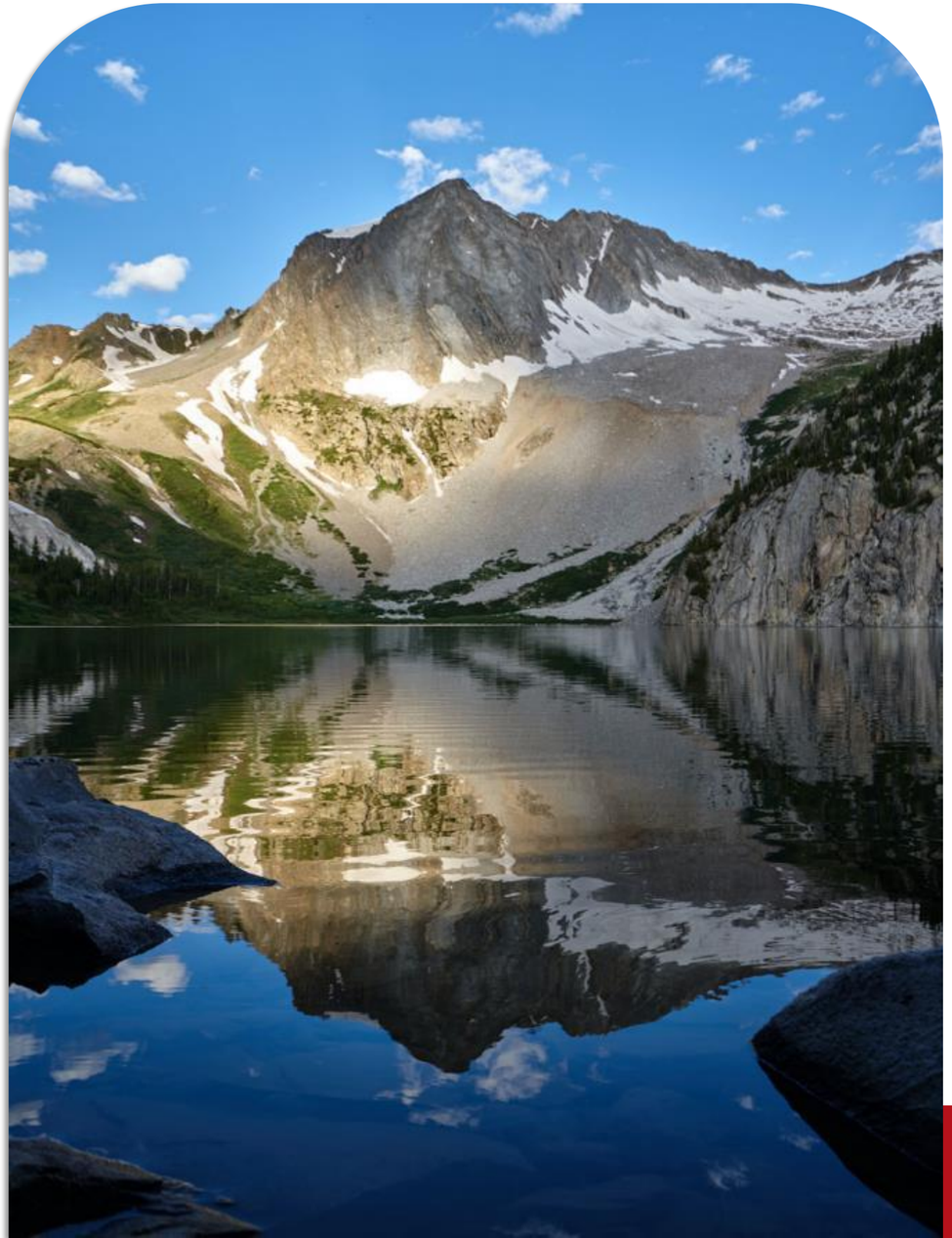
Future of Tape

SPECTRA®

LTO Tape Roadmap

- LTO tape technology has been in production since 2000 and has a roadmap that continues into the future for at least the next 5 generations





TS1170

- Released August 2023
- 50TB native capacity with JF media
  - Not backward compatible with prior generations of TS media
- 400 MB/s native throughput
- 16G fibre channel
- 12G SAS
- Strontium Ferrite media

LTO-9

- Released September 2021
- 18 TB native capacity
- 400 MB/s FH native throughput
- 8GB fibre channel
- 12Gb SAS FH now available
- Now with oRAO for better read performance like TS11XX
- Barium Ferrite media

TS1170 Environmental Specifications

- Huge jump in capacity with TS1170!
- Needed to tighten the environmental spec to make this work

All LTO drives, TS1150, TS1155, and TS1160					
Mode	Dry-bulb Temperature	Maximum Temperature Rate of Change	Relative Humidity (non-condensing)	Maximum Humidity Rate of Change	Altitude (max)
Allowable Environment	16°C to 32°C (60°F to 90°F)	5°C per hour 9°F per hour	20% to 80% 22°C dew point max	5% per hour with no condensation	3048 m (10,000 ft)
Recommended Environment	16°C to 25°C (60°F to 77°F)	5°C per hour 9°F per hour	20% to 50% 22°C dew point max	5% per hour with no condensation	3048 m (10,000 ft)

TS1170 drives					
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Storage Technology Roadmap

- Tape has a much larger surface area that HDD.
  - LTO-9 tape is 1,035 meters long and ½ inch wide – 20,374 square inches
  - HDD is 3.5 inch in diameter with 10 platters – 96 square inches
- This difference allows for a much higher capacity with standard magnetic recording technologies using tape while disk has already hit the superparamagnetic limit with conventional technologies.

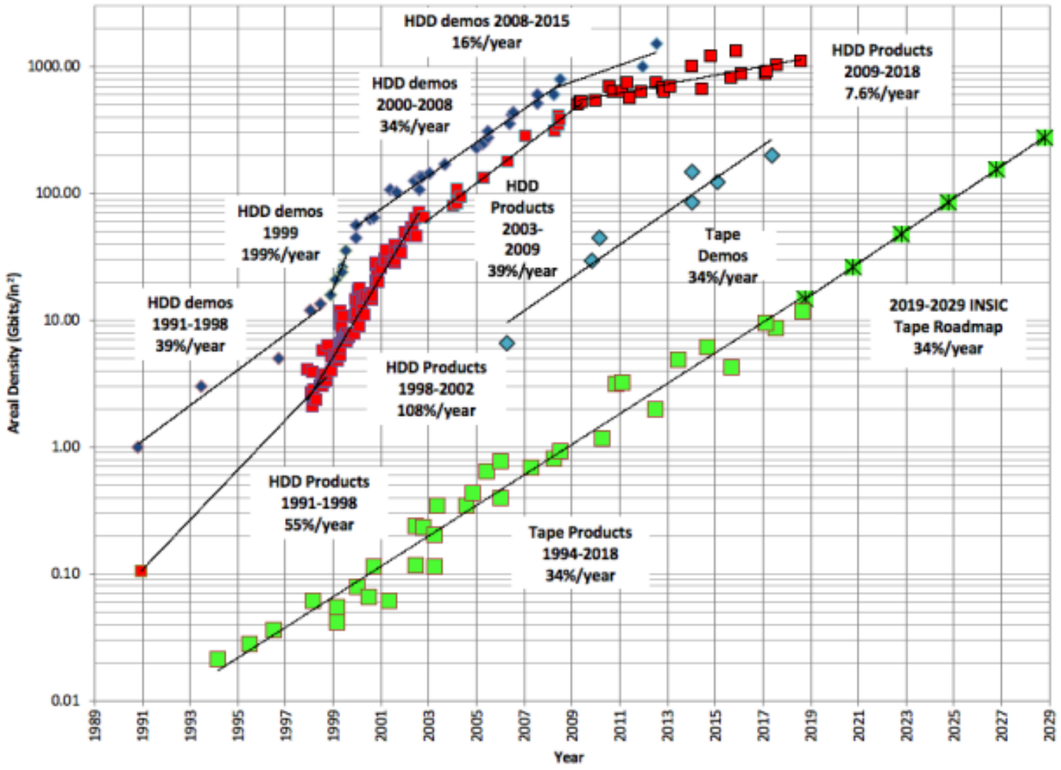
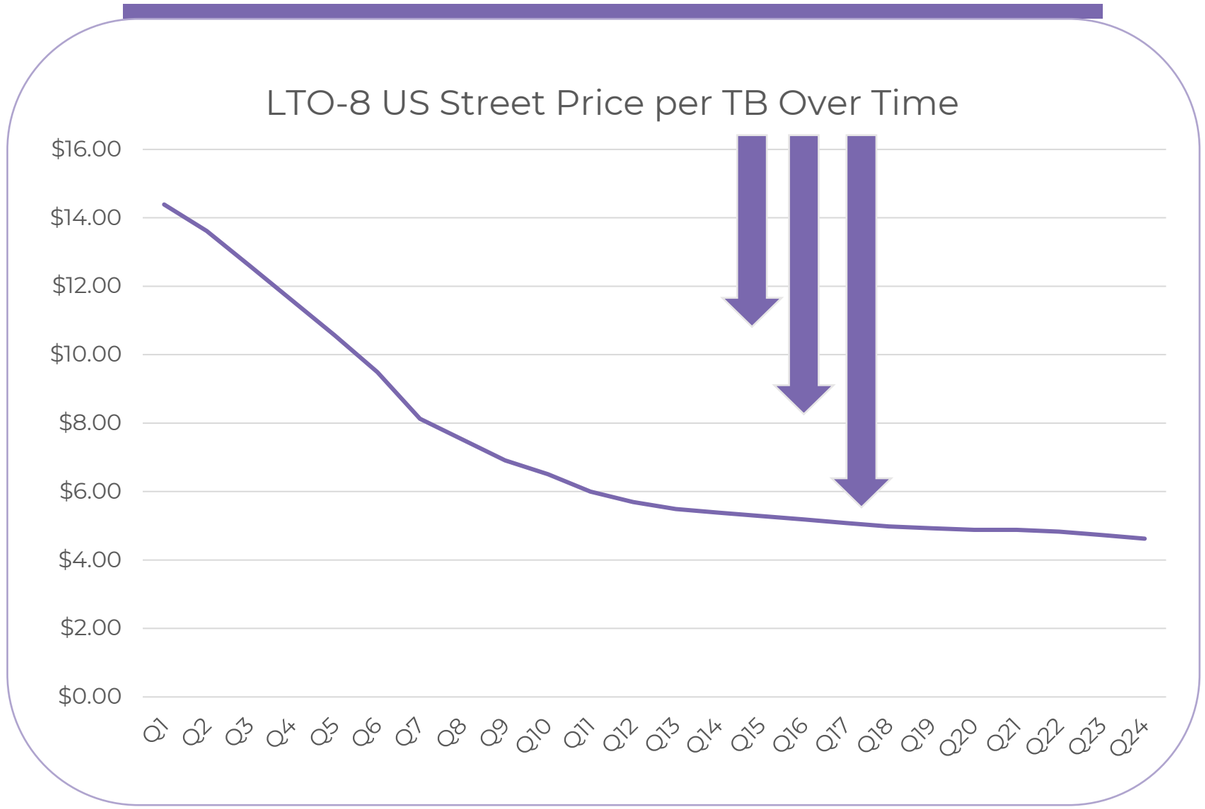
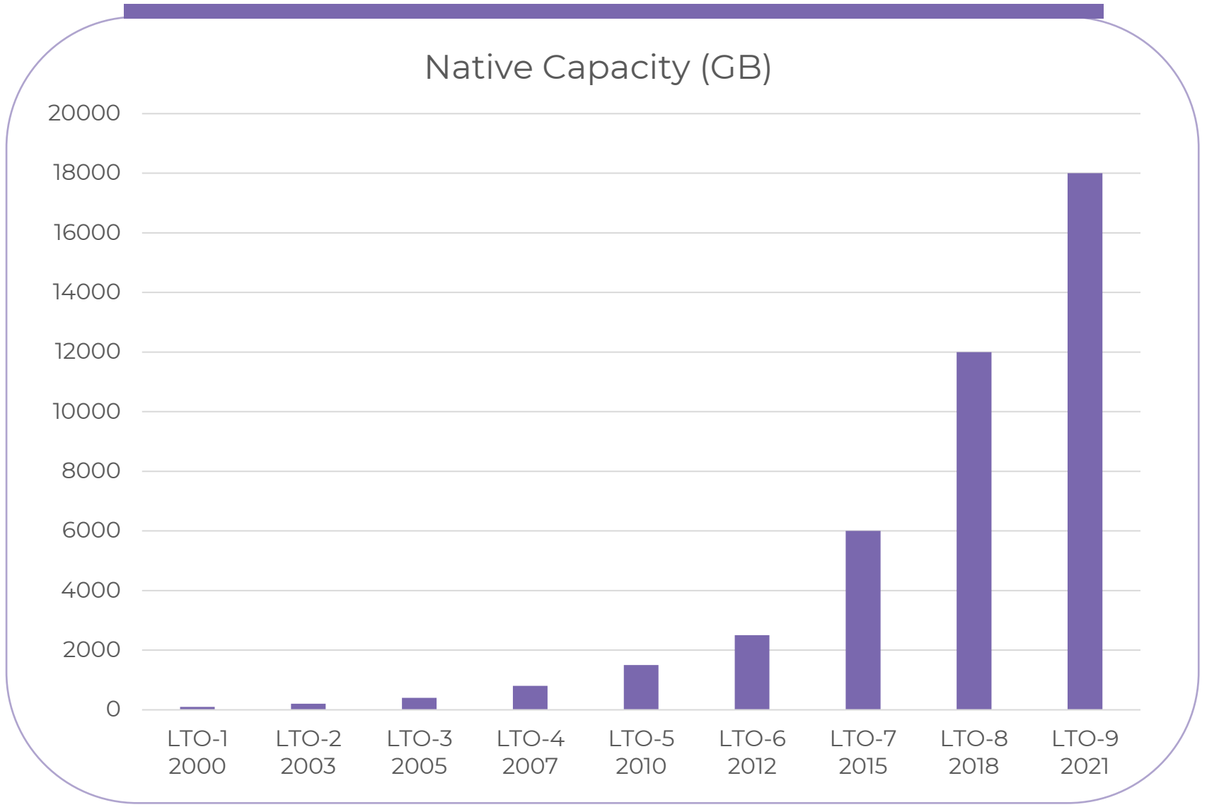


Figure 1: Areal Density Trends. Hard Disk Drive, Tape Product and Tape Technology Roadmap

INSIC 2019 Technology Roadmap
INSIC Technology Roadmap 2019 - SM

Street Price of Tape Media is Continually Decreasing Over Time While Increasing in Capacity





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An S3 interface to tape bridges the gap between traditional tape technology and modern cloud storage ecosystems

The Modern World of Storage is Now Being Extended by Tape

- **The power of S3**
  - **Object Tape**
  - **Object Disk**
  - **Object Cloud**

A universal interface combined with a non-proprietary data format make tape the ultimate archive media for decades to come

The Modern World of Storage is Now Being Extended by Tape

- The power of S3
  - Object Tape
  - Object Disk
  - Object Cloud
- **Self-describing tapes**

On-Prem Glacier Benefits

Easily scales with data growth

Scale from terabytes to 100’s of petabytes, accommodating data growth demands and allowing you to add capacity as needed.

Hybrid cloud architecture

Enables you to migrate workloads between on-premises and cloud environments

Strong ROI over public cloud

Achieve significant cost savings compared to storing data at scale in the public cloud

Supports sustainability initiatives

Choose from a range of options; optimizing for access time, cost, and power consumption.

Ransomware protection

Immutable storage and offsite air gap protect your data against ransomware attacks and data loss.

Multi-site replication

Replication enables the automatic asynchronous copying of objects across your multiple sites and clouds.

Future Tape Drive Interfaces and Libraries

- Fibre and SAS will continue
  - Do we need other interfaces?
  - 24G SAS?
  - 32G Fibre?
  - Ethernet
  - NVME?
- Large tape libraries or distributed systems
  - Cost?
  - Scale?

Questions ?

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