The Future of Tape
(Far from Dead)

Media Trends Panel
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Data Growth and Storage Requirements

35,000 Exabytes in 2020

Information is growing at 50% a year *

80% of data is never used after 90 days

Cost to power and manage storage is increasing

Source: IDC Digital Universe Study, sponsored by EMC

800 Exabytes in 2009
Advantages Continue to Propel Investment in Tape

- Lowest cost per TB
- Lowest data security risk
- Lowest energy use
- Lowest migration frequency
Tape Usage Trends

Archive/Cold Storage
- High capacity storage (PBs)
- Data accessed infrequently
- Data reads do not require high availability
- Low cost

Cloud Storage
- Seeing higher adoption rate with cloud providers
- Low cost, archive tier
- 2\textsuperscript{nd} or 3\textsuperscript{rd} copy off premise
Areal Density Trends
Chart provided courtesy of the Information Storage Industry Consortium (INSIC)
INSIC Shows Technology Path to 248 TB per Cartridge
Media Vendors Demonstrate Technology Needed to Achieve Roadmap Goals

**2014**

- **SONY**
  - Sputtered Media demo
  - Proof of Manufacturing concept
  - Areal Density: 148 Gb/in²
  - Cartridge Capacity: “185 TB”

**2015**

- **FUJIFILM**
  - Advanced BaFe demo
  - Areal Density: 123 Gb/in²
  - Cartridge Capacity: “220 TB”

http://www.sony.net/SonyInfo/News/Press/201404/14-044E/
2015 – 2025 INSIC Roadmap Summary

• Tape will maintain its high areal density growth rate
  – Evolution, not invention
  – No fundamental issues, just scaling

• High confidence in ability to meet roadmap goals
  – Use knowledge from previous HDD development
  – Recent tape technology demos

• Tape in unique position to pursue 2 different media technologies to achieve high capacity cartridge
Continued Innovation in Enterprise Tape Drive Features

• Data Integrity
• Improved Read Access
• Media Migration
Data Integrity Features

**Data Integrity Validation** - Discover corrupted records before they are written to tape

In-Drive Media Validation – Saves network bandwidth and server resources
Read Access Ordering
StorageTek File Access Accelerator

Step 1: Generate Read Access Order (GRAO)*

30-60% faster access!

Step 2: Request Read Access Order (RRAO)*

*Supports T10 ANSI Standard 13-266r4

Step 3: Send Reordered File List
Easing the pain of Media Migration

Drive-to-Drive Copy

**without** Direct Copy

- Application & disk do heavy lifting
- Run production jobs OR migration

**with** Direct Copy

- T10000D does heavy lifting
- Run production jobs AND migration
Tape Technology Summary

Tape is the ideal archive media

• Tape will remain the most efficient, cost effective, and reliable technology for long term data storage

• Tape will continue to have the highest areal density/capacity growth rate
  – Evolution, not invention
  – No fundamental issues, just scaling

• Growing consensus that 1 technology will not ‘win’
  – Storage solutions will feature combo of flash, disk, and tape
  – HDD will not completely replace Tape