Tape Storage Systems, Now and Future

Tony Sasanuma, Ph.D.
Chief Marketing Strategist
Sony Broadband Communication Company
Phone: +81-3-5435-3194
Tony.sasanuma@jp.sony.com
Why Tape in 21st Century?

* High Data Capacity / Volume
  - Three Dimensional Recording (Tape) vs. Two Dimensional Recording (Disk)

* Low Media Cost
  - Removable Media

* More digital data to be archived

Storage by Sony
<table>
<thead>
<tr>
<th>Tape Drive Lineup</th>
<th>Storage Capacity</th>
<th>Transfer Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIT-1</td>
<td>36 GB</td>
<td>6 MB/s</td>
</tr>
<tr>
<td>AIT-2</td>
<td>50 GB</td>
<td>12 MB/s</td>
</tr>
<tr>
<td>AIT-3</td>
<td>100 GB</td>
<td>12 MB/s</td>
</tr>
<tr>
<td>S-AIT</td>
<td>500 GB</td>
<td>30 MB/s</td>
</tr>
<tr>
<td>DTF-1</td>
<td>45 GB</td>
<td>12 MB/s</td>
</tr>
<tr>
<td>DTF-2</td>
<td>200 GB</td>
<td>24 MB/s</td>
</tr>
<tr>
<td>DIR-240</td>
<td>200 GB</td>
<td>240 Mbps</td>
</tr>
<tr>
<td>DIR-1000 Series</td>
<td>100 GB</td>
<td>64-512 Mbps</td>
</tr>
</tbody>
</table>

**IT Tape Drive**

**Instrumentation Data Recorder**

*4mm Tape, 8 mm Tape, ½” Tape, 19mm Tape*
### S-AIT Main Specifications

#### (1st Product)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td>500 GB (native)</td>
</tr>
<tr>
<td></td>
<td>1.3 TB (compressed)</td>
</tr>
<tr>
<td><strong>Sustained Transfer Rate</strong></td>
<td>30 MB/sec (native)</td>
</tr>
<tr>
<td></td>
<td>78 MB/sec (compressed)</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>SCSI Ultra-160</td>
</tr>
<tr>
<td></td>
<td>Fibre Channel 2G</td>
</tr>
<tr>
<td><strong>Media</strong></td>
<td>Advanced Metal Evaporated</td>
</tr>
<tr>
<td></td>
<td>600 meter x ½” single reel</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>Average 25W</td>
</tr>
<tr>
<td></td>
<td>Non-operating 4W</td>
</tr>
<tr>
<td><strong>Dimension (w x h x d)</strong></td>
<td>146 x 82 x 300 mm</td>
</tr>
</tbody>
</table>
Tape Library Lineup

PetaSite

AIT

S-AIT

DTF

PetaSite 8400
26TB ~ 11PB

PetaSite 80 / 150 - DTF2
(5TB ~ 30TB)

S-AIT PetaSite Basic
(30 TB – 108 TB)

S-AIT PetaSite Max. Expansion 1.26 PB

PetaSite 150 - DTF2
Max. Expansion 120TB

LIB-162 1.6 TB

LIB-81 0.8 TB

Storage by Sony

PetaSite 80 / 150 - DTF2
(5TB ~ 30TB)
CSM-200 S-AIT PetaSite Line-Up

CSM-200B
Storage Management System (Basic Storage System)
Up to 12 S-AIT Drives/96 TB or 4 S-AIT Drives/108 TB Capacity

CSM-200D (Extension Drive Console)
Up to 12 S-AIT Drives/135 TB or 4 S-AIT Drives/145 TB Capacity

CSM-200C (Extension Cartridge Console)
Up to 168 TB Capacity

CSM-200R (Redundant Console)
Redundant Robot/Library Control Unit

Storage By Sony
Sample (Basic Storage System +2 Cartridge Consoles +1 Redundant Console)

Basic Storage System

Cartridge Console

Redundant Console

Redundant Console duplicates robot (mirroring system)

Usually, standby mode. (It does not operate with the main elevator simultaneously.)

Storage By Sony
PetaServe: High Performance HSM Software

Virtual Disk

User

Transparent

Auto Migration

Inactive Data

New Files
Small Files

Auto Reload

Old Files
Large Files

NFS or VXFS Files

Storage By Sony
Software Provider

EMC

Computer Associate

IBM

LSC/SUN

ADIC

Legato

Avalon

Network Appliance

Veritas

Kodak

Discreet

Storage by Sony
1Gbps Network (optical fiber)

Laboratory

RAID

Parallel Server

Super Computer

50GB/night

Sony PetaServe - Fujitsu SafeFile/Global

Telescope

PetaSite

Capacity: 650 TB

Fibre Channel SAN

File Sharing, LAN Free

Storage by Sony
FC-TAPE Management
(Volume Sharing on SAN environment)

FC-DISK Management
(File Sharing on SAN environment)
Data are copied between Tokyo and Osaka by EMC SRDF and back up each other.
Improvement of the work flow (Operation)

Media Asset Management Concept

Contents Creation

Acquisition

Production

Utilization

Rights Clearance

Ingestion

Cataloging

Storage

Browse

Retrieve

Remake

Rights Clearance

Re-purpose

Contents Distribution

Distribution E-Commerce

Storage by Sony
Using FSV or FC RAID as a secondary (duplicate) cache for HSM, quicker data access can be obtained.
Sony’s R&D

- Announced the demonstration of 11.5 Gb/in² of storage area density on May 1, 2002
- Continues to close the gap between HDD and current tape format roadmaps
Technologies for Breakthrough

11.5 Gb/in²

- Shielded spin-valve GMR-2 (Giant Magneto Resistive) read heads
- Lower magnetization layer of AME (Advanced Metal Evaporated) tape formulation
- High level TCPR (Trellis Coding & Partial Response) encoding technology

Storage by Sony
High Area Density Technology

Sony’s Lab

AIT-2: 2001

AIT-3: 2002

AIT-4: 2003

AIT-5: 2004

AIT-6: 2005

SAIT-1: 2006

SAIT-2: 2007

SAIT-3: 2008

SAIT-4: 2009

Storage by Sony
Sony continues to be a:

- Tape Drive Manufacturer
- Tape Media Manufacturer
- Robotics Manufacturer
- Key Device Developer & Manufacturer
- Software Manufacturer
- Worldwide Company

We work with many good partners in order to provide the solutions to our customers.

Storage by Sony
Thank you very much

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