3590 Tape Drive End of Support: Transitioning from 3590 Physical Tape to Virtual Tape

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Discussion Topics

- 3590 Physical Tape Timelines
- Key Considerations
- What Can Virtual Tape Do For You?
  - TCO Considerations
- Virtual Tape Technologies Enable More Possibilities
  - Customer Examples
- Summary & Additional Q&A
3590 Physical Tape Timelines

May 1999
3590-E1A, & E11
General Availability

July 2002
3590 H1A & H11
General Availability

September 2006
Marketing (Sales Availability) Withdrawal

January 2015
U.S. Services Withdrawal
(End of Support)

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Key Considerations

Replacing 3590 Tape with Current Generation Physical Tape Requires:

- 3592 (Gen 1-5) tape drives
- New 3592 tape media
  - 3590 media is not compatible with 3592 drives
- Tape migration tools and services to transition from old, to new tape cartridges
- Stacking software to fill the space on the higher capacity cartridges
- A 3592 Compatible Mainframe Control Unit/Controller
Physical-to-Physical Tape Transition

- Still requires resources for
  - Media
  - Handling
  - Shipping
  - Off site storage
- Risk of lost, missing or damaged tapes remains
- Limits DR preparedness, RPO and RTO
- Limits access to the latest storage innovations (i.e. cloud)
What Can Virtual Tape Do For You?

- Reduce or eliminate physical tape
  - Save $ on maintenance, media, handling, shipping and off site storage
- Reduce security concerns and cost related to lost or missing physical tapes
- For HSM, reclaim CPU Cycles
  - Skip ML1 (DASD) and migrate from ML0, to ML2 (virtual tape)
- Improve disaster recovery preparedness by replicating tape data over the WAN
  - Tape data immediately available for use at the remote DR site
- Improve performance for all tape operations

Future-Proof 3590 Virtual Tape

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## TCO Considerations

Physical vs. Virtual Tape Replacement

<table>
<thead>
<tr>
<th>Mainframe Virtual Tape (MVT)</th>
<th>3592 Generation 1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 2x MVT systems</td>
<td>• Multiple 3592 Tape Drives (x @ Prod, x @ DR)</td>
</tr>
<tr>
<td>• (1 @ Prod, 1 @ DR)</td>
<td>• 2x 3592 Tape Controllers (1 @ Prod, 1 @ DR)</td>
</tr>
<tr>
<td>• MVT Replication</td>
<td>• Purchase new tape media</td>
</tr>
<tr>
<td>• MVT tape migration tools and services</td>
<td>• Continued expenses for tape handling, shipping and warehousing</td>
</tr>
<tr>
<td></td>
<td>• Tape migration services to migrate from 3590 to 3592 tape cartridges</td>
</tr>
<tr>
<td></td>
<td>• TS Tape library required?</td>
</tr>
<tr>
<td></td>
<td>• Stacking software?</td>
</tr>
</tbody>
</table>

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## TCO Considerations
### Physical vs. Virtual Tape Replacement

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<tr>
<th>Mainframe Virtual Tape (MVT)</th>
<th>Third Party Services</th>
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</thead>
<tbody>
<tr>
<td>▪ 2x MVT systems (1 @ Prod, 1 @ DR)</td>
<td>▪ Long term access to 3590 and 3590 CU parts that are no longer manufactured by IBM</td>
</tr>
<tr>
<td>▪ Or 1 MVT and 1 MVT Vault</td>
<td>▪ Continued cost of physical tape media (long term availability?)</td>
</tr>
<tr>
<td>▪ MVT Replication</td>
<td>▪ Continued cost of tape handling, shipping and warehousing (offsite vault)</td>
</tr>
<tr>
<td>▪ Network bandwidth</td>
<td>▪ Cost to business operations for frequent or extended repair times</td>
</tr>
<tr>
<td>▪ MVT tape migration tools and services</td>
<td>▪ Cost of travel 1 – 2x times per year for DR tests</td>
</tr>
</tbody>
</table>
Virtual Tape Technologies Enable More Capability & Possibilities

- Emulate 3590 tape drives
- Remote Replication and Monitoring
- Simplified DR Testing and Execution
- Data Deduplication
- Continuous Availability
- CU Based Encryption & Key Management
- Unique Tape Migration Tools and Services

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Emulate 3590 Tape Drives

- Transparent to mainframe applications and IOGEN definitions
  - Maintain “UNIT=3590”
- Stores tape VOLSERS on disk
  - Escape the limitations of the laws of physics
  - RAID protection from media failures
- Faster mounts
- Faster to first byte
- No capacity penalty for unfilled cartridges
Remote Replication Options

- Replication engine
  - Control unit-based
  - Storage-based
- Data synchronization
  - Asynchronous
  - Synchronous
- Flexible policies for number of copies and locations
  - Including vaulting to the Cloud
- Monitoring

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Remote Replication (Prod. to DR)

Production Site
- Production Mainframe
- MVT
- Ext. Storage
- MVT Control Unit

Disaster Recovery Site
- MVT
- DR Mainframe
- Ext. Storage
- MVT Control Unit

WAN
RepMon: Replication Monitor

Provides **real-time status monitoring and logging** of virtual tape data writes and replication to a remote disaster recovery site at the VOLSER level.

- Identifies Write and Replication Status of Mainframe Tape VOLSERs
- Identifies if virtual tape data at DR is still consistent with the primary datacenter
- Provides visual and audit capabilities to confirm when backups reach DR

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Luminex Replication Customer Example
Multi-National Food Product Manufacturer

Production Site

Production Mainframe

Local Asynchronous Replication

Luminex MVT

Disaster Recovery Site

DR Mainframe

Remote Asynchronous Replication

Luminex MVT

WAN

Luminex MVT

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Simplified DR & Execution: Push Button DR Testing
Replication During Normal Operations

1. Primary Site A
2. Secondary Site B

Replication to Secondary Site or DR Site

Tape Data

Site A

Site B
Push Button DR Testing

Replication During DR Testing

Site A

1 Primary

Site B

2 Secondary

Tape Data

Replication to Secondary Site or DR Site continues uninterrupted

Prepares DR environment for read/write testing; original Tape Data remains untouched

Start DR
Push Button DR Testing

After DR Testing is Completed

Site A

1 Primary

Site B

2 Secondary

Replication to Secondary Site or DR Site continues uninterrupted

DR Test Data is purged

Optionally, DR Test Data can be automatically replicated back to Site A for auditing purposes
CGX Configuration
Push Button DR Example - Automotive Manufacturer

Production Site

- Production Mainframe
- Luminex Channel Gateways
- Storage (234 TB)

DR Site

- DR Mainframe
- DR Mainframe
- Luminex Channel Gateway
- Storage (234 TB)

CGX Options in Use:
- Push Button DR, Admin+, LTMON, LumRep, RepMon, & TMIG

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When virtual tape solutions include data deduplication, the network bandwidth requirements for replication are dramatically reduced.

Data Deduplication: It’s not just for reducing storage requirements.
Start with a Tape Assessment
MVT Sizing & Modeling

- Sizing # of CGXs, Storage & Network Capacity
- Throughput Analysis (MBytes/sec)
  - RMF Channel Stats
  - SMF21 Records
- Storage Capacity Assessment
  - From Tape Management Catalog
  - By Category
  - By Application
  - By Last 45 Days of Activity
  - By Age

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Primary Storage Capacity Requirement

- 100 TB of Virtual Tape Data
- 33.3 TB
- 10 TB

Replication Bandwidth Requirement

- 1 TB of Daily Backup Data
- 1000 GB
- 333 GB
- 67 GB

DR Storage Capacity Requirement

- 100 TB of Virtual Tape Data
- 33.3 TB
- 10 TB

Note: Best Practice – Seed DR storage at the Primary Site before shipping
Shared Infrastructure
Common open and mainframe backup and disaster recovery solution
Customer Example
Leading Motor Vehicle Manufacturer

Production Site
- Mainframe
- ProtecTIER Mainframe Edition (ME)
- DS8870 Disk
- Open Systems

DR Site
- IBM ProtecTIER TS7620
- IBM ProtecTIER TS7620

DS3 Replication using WAN

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Continuous Availability: Synchronous Tape Matrix (STM)

- Continuous Availability
  - Resilient architecture instantly and automatically adjusts to multiple failures without interruption
  - Data is always available for I/O
  - No downtime from failover or restore processes
- No idle components to buy
  - All components contribute to day-to-day operations, not just during failure events
- Easy to implement
  - No host scripts or policies required
- Scalable
  - No limitations for throughput, capacity or degrees of redundancy
- Modular design ensures investment protection
- Supports dissimilar storage systems and compression/deduplication technologies

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Simplified STM Configuration with $n$-Sites

<table>
<thead>
<tr>
<th>COMPUTE LAYER</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site $n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONNECTIVITY LAYER</td>
<td><img src="image1.png" alt="Connection 1" /></td>
<td><img src="image2.png" alt="Connection 2" /></td>
<td><img src="image3.png" alt="Connection n" /></td>
</tr>
<tr>
<td>CONTROL UNIT LAYER</td>
<td><img src="image4.png" alt="Control Unit 1" /></td>
<td><img src="image5.png" alt="Control Unit 2" /></td>
<td><img src="image6.png" alt="Control Unit n" /></td>
</tr>
<tr>
<td>VIRTUAL TAPE STORAGE LAYER</td>
<td><img src="image7.png" alt="Virtual Tape 1" /></td>
<td><img src="image8.png" alt="Virtual Tape 2" /></td>
<td><img src="image9.png" alt="Virtual Tape n" /></td>
</tr>
</tbody>
</table>

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Operational STM Configuration with Multiple Failures Across Layers and Sites

<table>
<thead>
<tr>
<th>Layer</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compute Layer</td>
<td><img src="compute_layer.png" alt="Illustration" /></td>
<td><img src="compute_layer.png" alt="Illustration" /></td>
<td><img src="compute_layer.png" alt="Illustration" /></td>
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<tr>
<td>Connectivity Layer</td>
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<td>Control Unit Layer</td>
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<tr>
<td>Virtual Tape Storage Layer</td>
<td><img src="virtual_tape_storage.png" alt="Illustration" /></td>
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STM Customer Example
Leading U.S. HealthCare Provider

Production Site
- Production Mainframe
- Local Mirrored Storage
- End-to-End Encryption

DR Site
- DR Mainframe
- Luminex Replication with Monitoring
- Virtual Tape

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Tape Migration Services and Software

- Luminex offers unique Tape Migration Services to migrate to STM
  - Elegantly designed to work with TMACS to move tape data without touching the tape catalogs
  - Current VOLSER #s and all historical information are retained in the new environment as well
  - Supports all existing tape library and virtual tape environments for z/OS

- TMACS (Tape Monitoring and Allocation Control Software) is optional host-based software to automate device allocation steering for complex environments

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Media Migration Services & Software

For current Luminex virtual tape environments

- Luminex offers Media Migration to non-disruptively migrate to the new storage target
- Entirely off-host, no mainframe MIPS required
- Current VOLSER #s and all historical information are retained in the new environment (no changes to tape catalogs)
- Volumes will acquire the characteristics of the new configuration
Other Options - CU Based Encryption and Security: CGSafe

<table>
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<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Encryption &amp; key management at the control unit level</td>
<td>• Avoid risk of lost or stolen tapes</td>
</tr>
<tr>
<td>• Eliminate costly encryption solutions based on mainframe MSUs</td>
<td>• Protection from other data security issues</td>
</tr>
<tr>
<td>• AES 256-bit encryption using GCM</td>
<td>• Integrates into existing key management infrastructure for a single-point-of-management</td>
</tr>
<tr>
<td>• Compression, encryption, and authentication in a single pass</td>
<td></td>
</tr>
<tr>
<td>• Optionally integrates with existing encryption and key management infrastructure</td>
<td></td>
</tr>
</tbody>
</table>
Other Options: Tape Vaulting to the Cloud: CloudTAPE

Production Site

Production Mainframe

Luminex Channel Gateways

FICON

FICON

DR Site

DR Mainframe

Luminex Channel Gateway

No Cloud

sCloud
100% Local
100% Cloud

pCloud
0 – 100% Local
Managed Cache
100% Cloud

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Summary:
Long Live 3590 Virtual Tape

- Access to the latest technologies
- Reduce or eliminate cost & limitations related to physical tape
- Improve all aspects of your tape operations

Thanks for attending!
Visit us at Booth #400 in the Tech Expo

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