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

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Discussion Topics

- 3590 Transition Considerations
  - EOS Timeline
  - Media Types
  - Short-term and long-term implications
  - Benefits of virtual tape
- Examples of Recent Customer Experiences
  - Environment
  - POC
  - Implementation
  - Conclusions

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)

1995 2000 2005 2010 2015

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

3590

3592

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)

Trends Toward More Efficient Media…

Faster Access, Faster Site-to-Site Data Transmission & One-to-Many Capability:

Daily Activities	Then	…and Now
Correspondence and Documents	Letters, stamps & faxes	Email, PDFs
Banking	In-person, standing in line, ATMs	Online, dedicated smartphone apps
Presentations	In-person, poster boards, slide projectors	Web-based services (e.g. WebEx, GoToMeeting)
Keeping in Touch	Handwritten notes sent via US Mail	Social media, text messaging
Maps & Navigation	Printed atlases and gas station maps	In-car, smartphone or dedicated GPS
Archiving	Boxes, file cabinets	Cloud storage
Music	Vinyl, cassette or CD	MP3s, Streaming, Personalized Programming
Movies	BetaMax, VHS, LaserDisc, DVD,tube televisions	On-demand streaming to smartphones, computers & 3D TVs
Shopping	Retail stores, mail order catalogs, malls	Online, dedicated smartphone apps
Mainframe Tape	**Physical 3490 and 3590 tapes**	**Virtual tape**

What Are The Benefits Of Going Tapeless?

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Future-Proof 3590 Virtual Tape Solutions

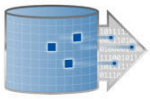
- Reduce or eliminate physical tape
  - Save $ on maintenance, media, handling, shipping and off site storage
- Reduce security concerns and cost related to lost or missing physical tapes
- For HSM, reclaim CPU Cycles
  - Skip ML1 (DASD) and migrate from ML0, to ML2 (virtual tape)
- Improve disaster 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

Tapeless 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
- Cloud Storage for Tape
- Unique Tape Migration Tools and Services

Tapeless Solutions – More Options… a Better Solution

Optional Features



Luminex Replication
Improve your disaster recovery plan with remote replication to one or more DR sites

RepMon
Replication monitoring and auditing at the VOLSER level

Push Button DR
Disaster recovery and testing with "push button" ease

Multi-site Disposition Change
Easily redirect source-and-target replication flow between multiple data centers

Synchronous Tape Matrix
Continuous availability with 1+n mirrored writes and non-disruptive auto failover/restore

CGSafe
Encryption and key management

LTMon
Integrated, centralized management from the mainframe console

Storage Options

Enterprise
Highly available & flexible

Modular
Cost-effective performance

Internal
Compact (2U) & power efficient

MVT Vault
Cost-effective virtual tape vaults for remote, off site storage

CloudTAPE
Cloud-based tape vaulting solution for mainframes

Deduplication/Compression
DataStream Intelligence further reduces bandwidth & storage requirements

Tape Migration Software and Services
Seamlessly transition physical and virtual tapes with exact copies of original VOLSER numbers and labels

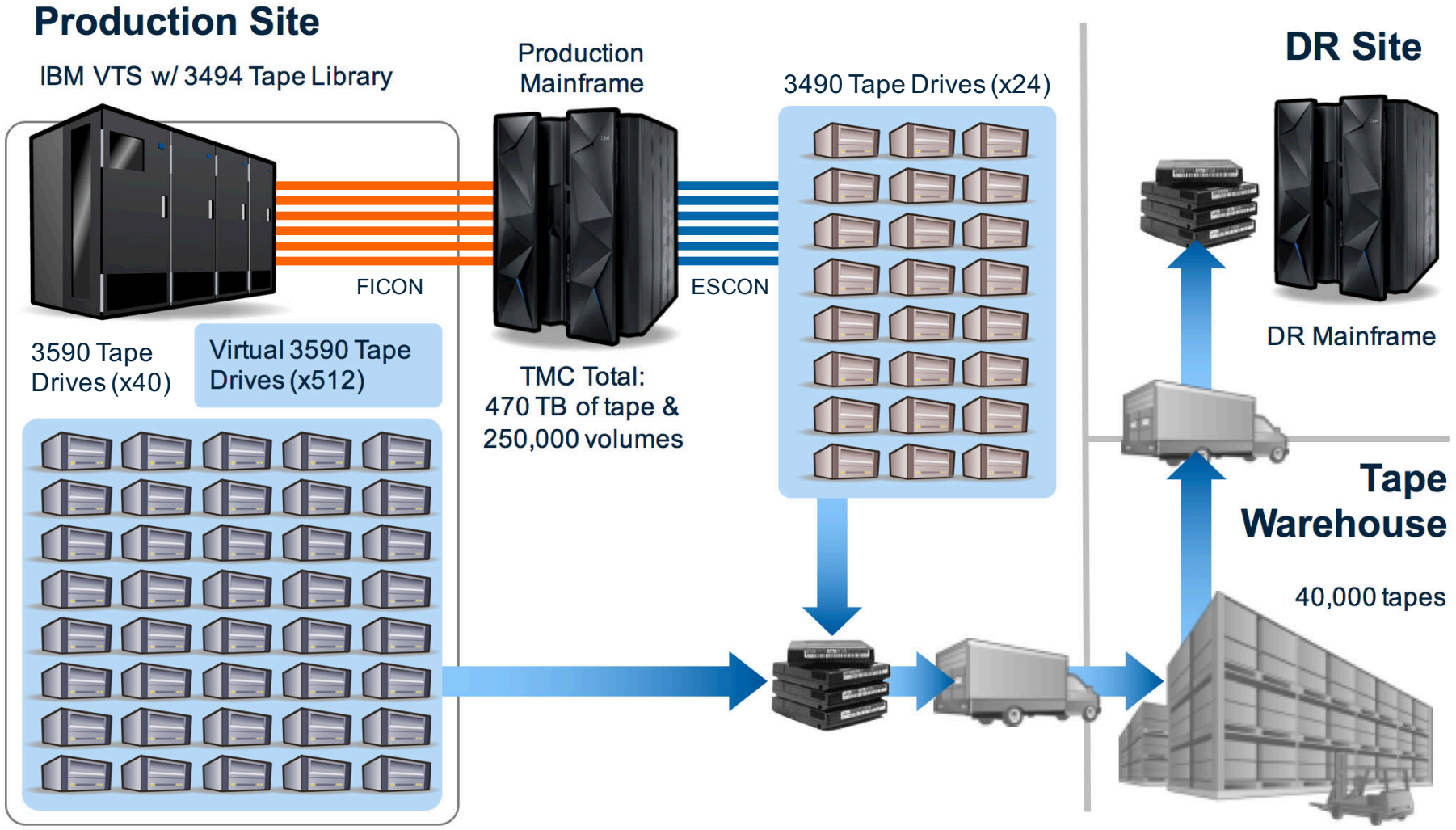
TMACS
Tape Monitoring and Allocation Control System intercepts tape device allocations and steers them to tape devices according to a customizable set of rules

Customer Example (Automotive Industry):

From Evaluation To Production

- Previous Configuration
- Vendor Selection Goals
- Sizing & Modeling
- Proof of Concept (POC)
- IOCP Statements
- Implementation & Testing
- Production Environment
- Tape Migration & Cutover
- DR Testing Using Push Button DR
- Summary

Previous Environment



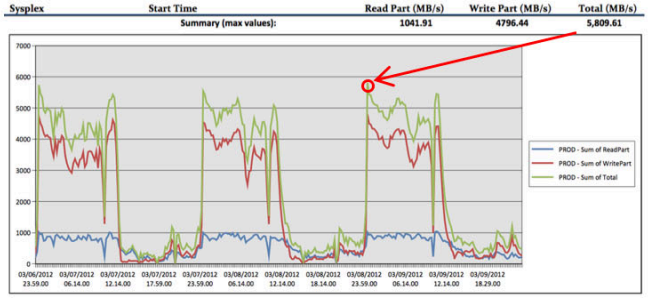
Vendor Selection Goals

1. Obtain the Best Value for Enterprise-Class Virtual Tape
2. Reduce or Eliminate Physical Tape Use
3. Reduce Disaster Recovery Time Requirements

Sizing & Modeling: Tape Assessment

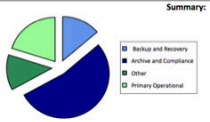
- Sizing # of Channel Gateways (CGX), Storage & Network Capacity
- Throughput Analysis (MBytes/sec)
  - RMF Channel Stats
  - SMF21 Records
- Storage Capacity Assessment
  - From Tape Management Catalog
  - By Category
  - By Application
  - By Last 45 Days of Activity
  - By Age

RMF (Type 73) Analysis – By Sysplex



TMC Analysis – By Application

Program	Description	Category	Capacity (GB)	Current Volumes	% of Total	Cumulative % of Total	Expected Compression Rate	Compressed Capacity(GB)
ARCTL	IBM DFSMS hsm migration/backup	Archive and Compliance	3,415,059.59	390,985.00	48.25%	48.25%	3.00	1,138,353.20
SYNCSORT	SYNCSORT Utility	Primary Operational	1,235,381.63	261,230.00	17.46%	65.71%	3.00	411,793.88
IDCAMS	IBM VSAM Utility (Define, Repro, Export, etc.)	Backup and Recovery	416,519.36	91,950.00	5.89%	71.60%	3.00	138,839.79
DSNUTILB	DB2 Utilities (Load/Unload, etc.)	Backup and Recovery	385,168.96	89,011.00	5.44%	77.04%	3.00	128,389.65
CAWABATC		Other	356,893.74	31,766.00	5.04%	82.08%	3.00	118,964.58
CBROAM	IBM OAM Archive/Retrieval	Archive and Compliance	158,500.25	14,629.00	2.24%	84.32%	3.00	52,833.42
ARCMAIN	Teradata DB Backup Utility	Backup and Recovery	120,173.70	12,003.00	1.70%	86.02%	3.00	40,057.90
ARCMOVER	ASG-Viewdirect (Infopac) Arcmover tape migration tool	Archive and Compliance	97,390.89	13,622.00	1.38%	87.39%	3.00	32,463.63
INFOPACP	ASG-Viewdirect (Infopac) report archiver	Archive and Compliance	93,861.11	29,226.00	1.33%	88.72%	3.00	31,287.04
IKJEFT1B	IBM Batch TSO	Primary Operational	87,994.17	23,865.00	1.24%	89.96%	3.00	29,331.39
Other		Other	710,248.61	265,449.00	10.04%	100.00%	3.00	236,749.54
		Summary:	7,077,191.99	1,223,736.00	100.00%	100.00%	3.00	2,359,064.00



Before Compression

After Compression

Sizing & Configuration Recommendations

- 702 TB w/ 3:1 compression (234 TB physical)
  - Based on 470 TBs in the TMC
  - RAID disk protection
  - Anticipated growth of up to 50% (next 5 years)
- FICON throughput requirements
  - (4) 8 Gb FICON channel interfaces at Production
  - (2) 8 Gb FICON channel interfaces at DR
- 100 Mb/s replication link for mainframe data

Configuration Statement Examples

IOCP (for FICON-attached 3590 drives)

```
RESOURCE PART=((CSS(0),(PROD1,1),(PROD2,4),(TEST,2),(DEV,3)))

CHPID PATH=(CSS(0),35),PCHID=1C3,TYPE=FC,SWITCH=2F,
              PARTITION=(CSS(0),(PROD1,PROD2,TEST),(=))

CHPID PATH=(CSS(0),44),PCHID=161,TYPE=FC,SWITCH=2F,
              PARTITION=(CSS(0),(PROD1,PROD2,TEST),(=))

CNTLUNIT CUNUMBR=2380,UNIT=3590,CUADD=0,UNITADD=((00,16)),
              PATH=(35,44),LINK=(28,28), X UNITADD=((00,16))

IODEVICE ADDRESS=(2380,16),UNITADD=00,UNIT=3590,CUNUMBR=2380,          STADET=Y
```

HCD

```
100,16   3590   OFFLINE=YES,DYNAMIC=YES,LOCANY=YES,
                LIBRARY=NO,AUTOSWITCH=YES,LIBRARY-ID=00001,
                LIBPORT-ID=01,MTL=YES
```

Implementation & Testing

Test LPAR Set Up:

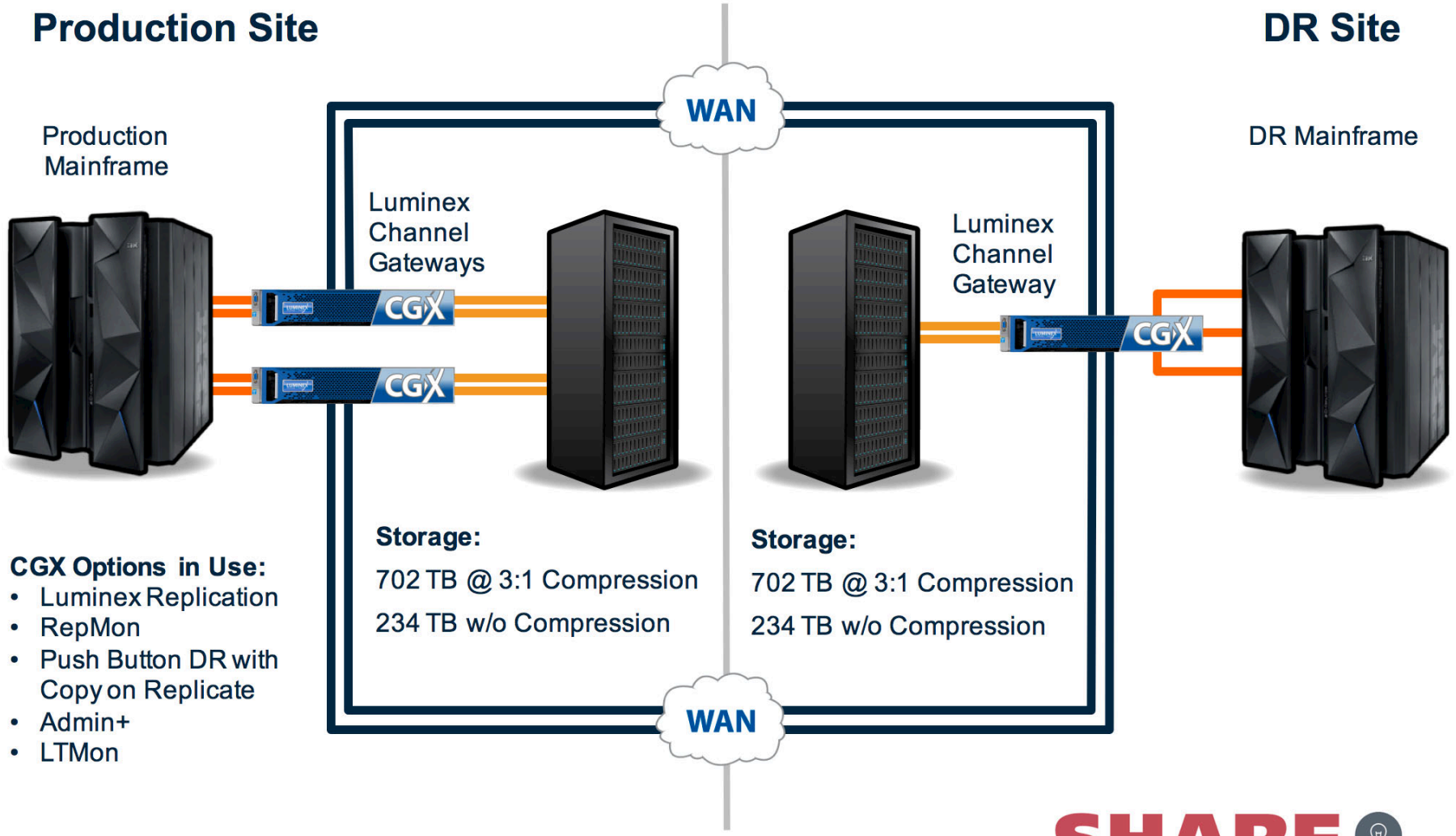
- New solution known by test LPAR only
- Verified MTL activated & up
- Verified TMC set up and operation
- TCDB readiness confirmed

Proof of Concept

Extensive Testing:

- Monitored replication speed by VOLSER
  - Small volumes and full volume dumps (MOD-27)
- DR testing, while continuously replicating from Prod.
  - High priority
- Observed mount times were considerably less
- Performed data writing comparisons (current vs. proposed)
- CGX performance test results were significantly better
  - Tapeless CGX vs. virtual tape w/3590 tape drives/library

New Mainframe Virtual Tape Configuration

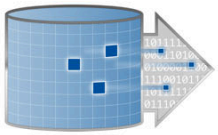


CGX Options in Use:

- Luminex Replication
- RepMon
- Push Button DR with Copy on Replicate
- Admin+
- LTMon

Production Environment

Options Used in Production:



Luminex Replication
Replication between Production and DR sites

RepMon
Replication monitoring and auditing at the VOLSER level

Push Button DR with Copy On Replicate
To facilitate disaster recovery testing, while site-to-site replication continues

Admin+
Management & reporting with customized scripts for Inventory Auditing

LTMon
Integrated, centralized management from the mainframe console also sends email alerts

Tape Migration & Cutover - 167,000 Volumes Migrated (Remainder by Attrition)

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Previous VTS

Migration Process:

- Luminex provided an Assessment, SOW, Software and Services

FICON & ESCON

Mainframe

- We applied a MIPS-friendly started task
- Compatible with our tape management system & catalog
- Migrated one catalog at a time
- 3490 to 3490, 3590 to 3590
- Ramped up or down as needed
- Audited to verify all tapes before and after

FICON

Luminex Virtual Tape Solution

- **Exact copies of original VOLSERs**, including labels, unusual tape mark combinations and data beyond last tape mark
- Automatically tracked VOLSERs that had been copied and needed to be copied or re-copied
- Cutover accomplished over a weekend

Disaster Recovery Testing

- They declared the day & time in advance
- Used RepMon & Admin+ to facilitate the process
- DR Start was activated remotely & the status was checked via status display to confirm DR mode
  - This verified access to all tapes & provided a snapshot, point in time of data
- LPARS were brought up at the DR site and we used the point in time data
- They wrote the new tapes, validated data & turned it over to the application team
- DR tests finished 12 hours earlier than before

Customer Example Summary and Q&A

- The customer went 100% tapeless!
  - Note - Regulations are for data protection, physical tape is not required
- All physical tape and libraries are powered off
- Performance has substantially improved
- They realized substantial cost reductions
- DR tests finished 12 hours earlier than before
  - This means they turned it over to the application team 12 hours earlier

Session Summary: Long Live 3590 Virtual Tape

Future-Proof 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!

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