Achieving Continuous Availability for Mainframe Tape with Synchronous Tape Matrix

SHARE Pittsburgh 2014
Luminex Lunch & Learn

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Discussion Topics

- Innovations in mainframe tape

- What have these innovations affected?

- The next evolutionary steps

- Use cases

  - Customer experience

  - Example configurations

- What's the next innovation?

Innovations in Mainframe Tape

- Physical tape
  - Better recording technologies (3480, 3490, 3590)
- Robotics (automated tape loading)
  - Dual robotic arms
  - Higher slot counts
- Virtual tape (disk cache with physical tape back store)
  - Replication of disk cache
- Encryption
- Tapeless (no physical tape)
  - Deduplication
  - GRID
  - Synchronous replication
  - Cloud storage

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What Have These Innovations Affected?

Innovations

- Physical tape

- Robotics

- Virtual tape

- Encryption

- Tapeless

Effects

- Performance
- Capacity
- Media utilization
- Data Security
- Host devices
- RPO/RTO capabilities
- Copy creation
  - Number of copies
  - Number of locations
- Operational accessibility
- Impact of equipment failure
- Impact of media failure

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# What Have These Innovations Affected?

Innovations

- Physical tape
- Robotics
- Virtual tape
- Encryption
- Tapeless
- **Synchronous Tape Matrix**

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- Media utilization
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- Impact of equipment failure
- Impact of media failure

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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

LUMINEX™
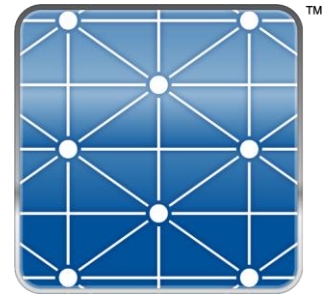
Simplified STM Configuration with *n*-Sites

LUMINEX
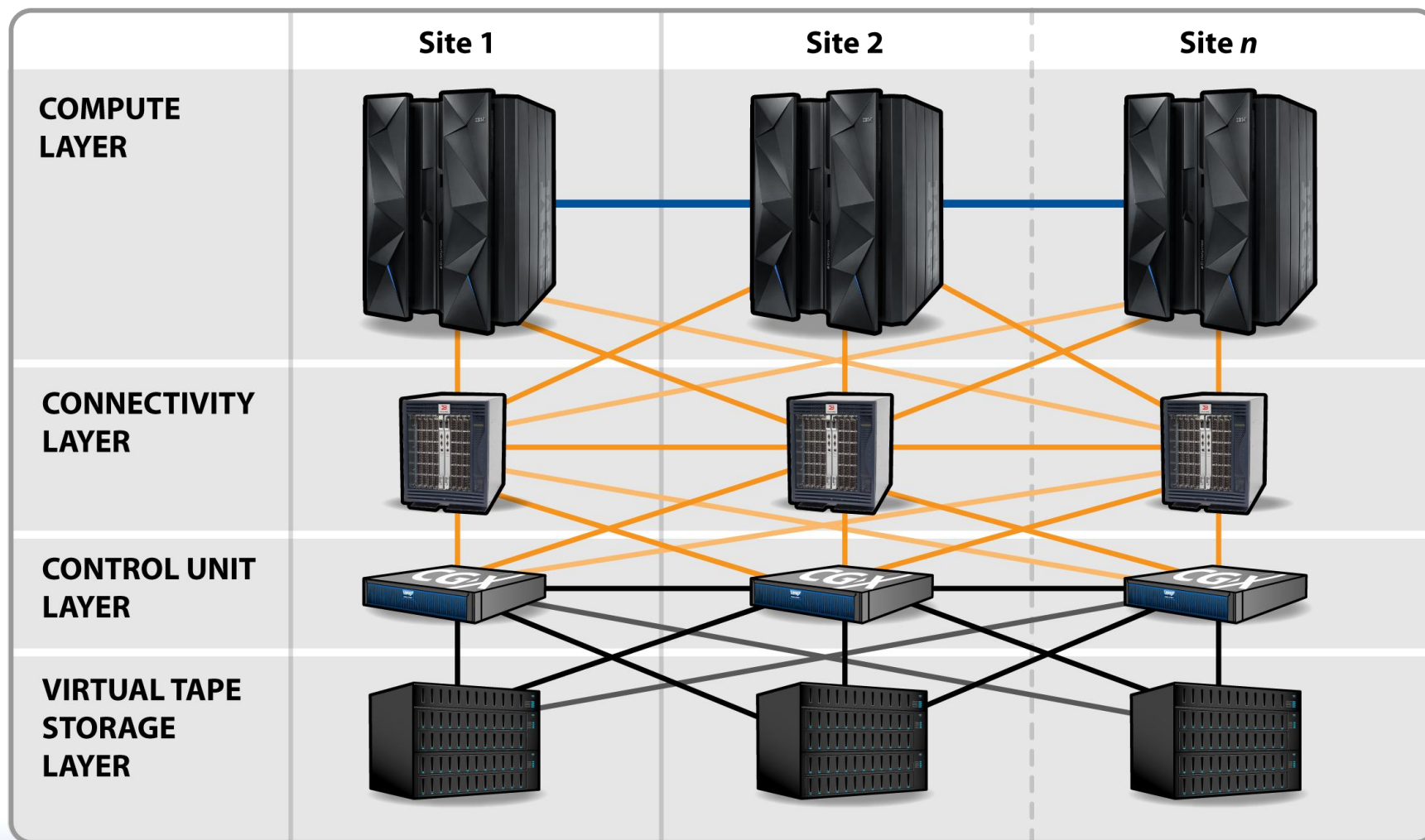
Operational STM Configuration with Multiple Failures Across Layers and Sites
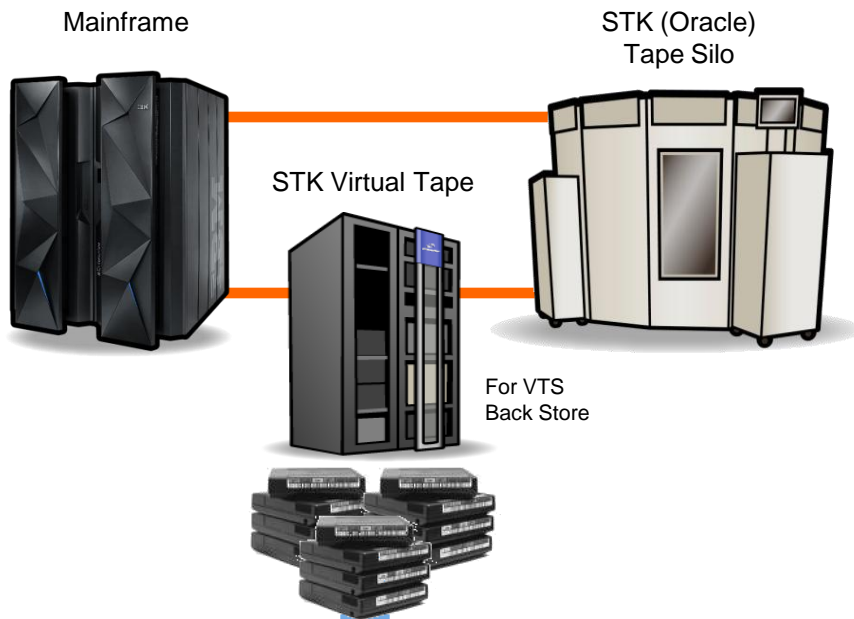
LUMINEX
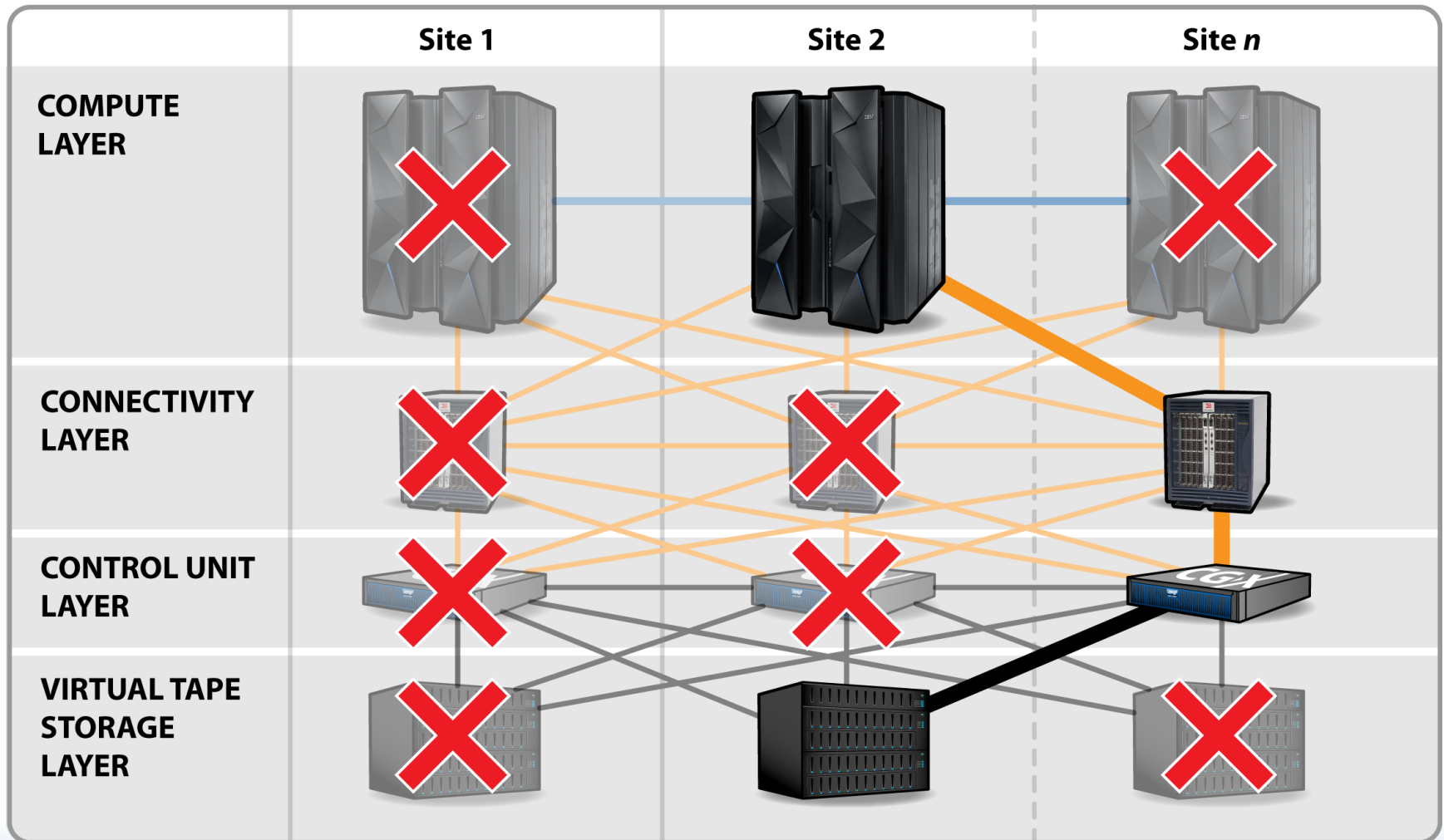
Customer Experience: Major U.S. Healthcare Provider
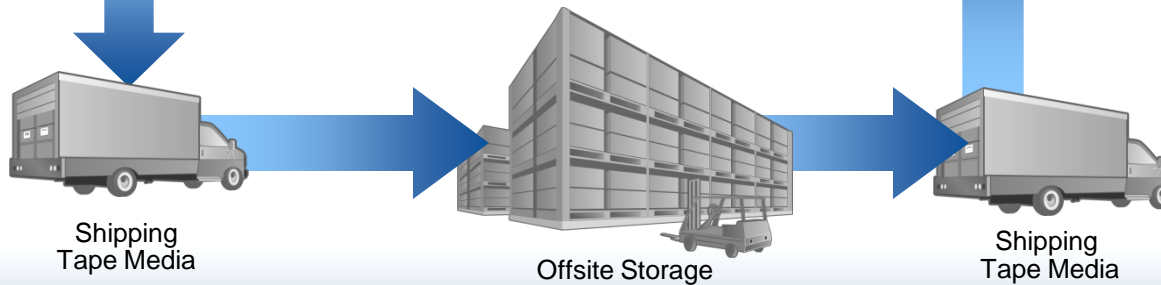
Andrew Graham
Production Control Manager

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Initial Mainframe Environment

Production Site

Mainframe

STK (Oracle)
Tape Silo

STK Virtual Tape

For VTS
Back Store

Shipping
Tape Media

Offsite Storage

Disaster Recovery Site

9840 Tape Drives

Mainframe

2 Pallets

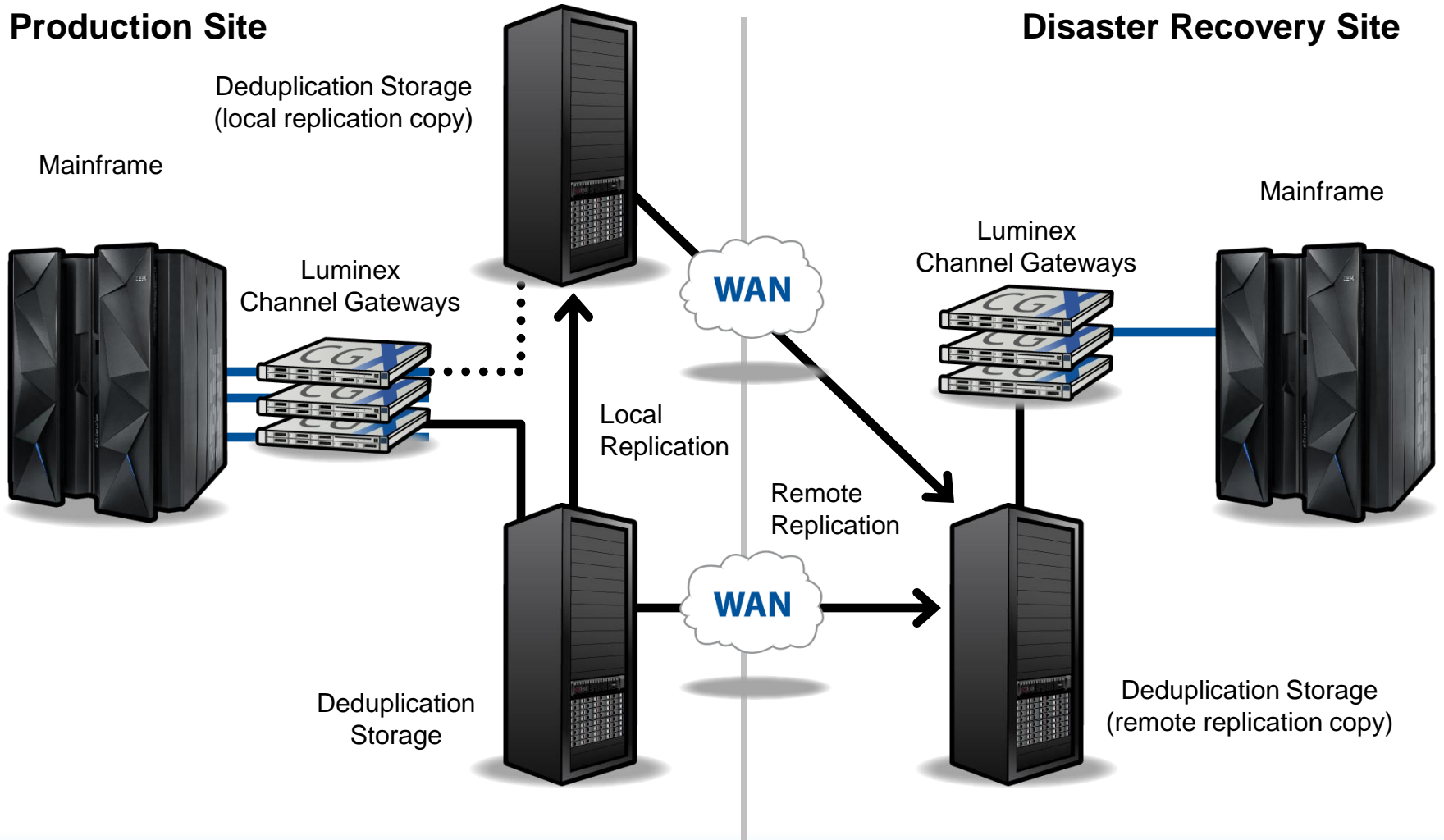Shipping
Tape Media

LUMINEX
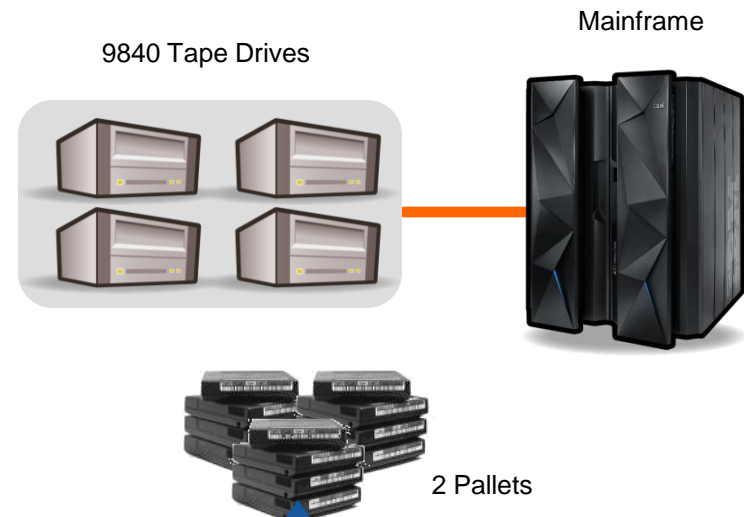
Goals And Objectives for Initial Mainframe Environment

- ❑ Address physical tape capacity limitations

- ❑ Improve performance

- ❑ Achieve uninterrupted service

- ❑ Completely tapeless environment

- ❑ Maintain "Belt and Suspenders" approach (3 copies of data)

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Intermediate Mainframe Environment

Production Site

Deduplication Storage
(local replication copy)

Mainframe

Luminex
Channel Gateways

Local
Replication

Remote
Replication

WAN

WAN

Deduplication
Storage

Disaster Recovery Site

Mainframe

Luminex
Channel Gateways

Deduplication Storage
(remote replication copy)

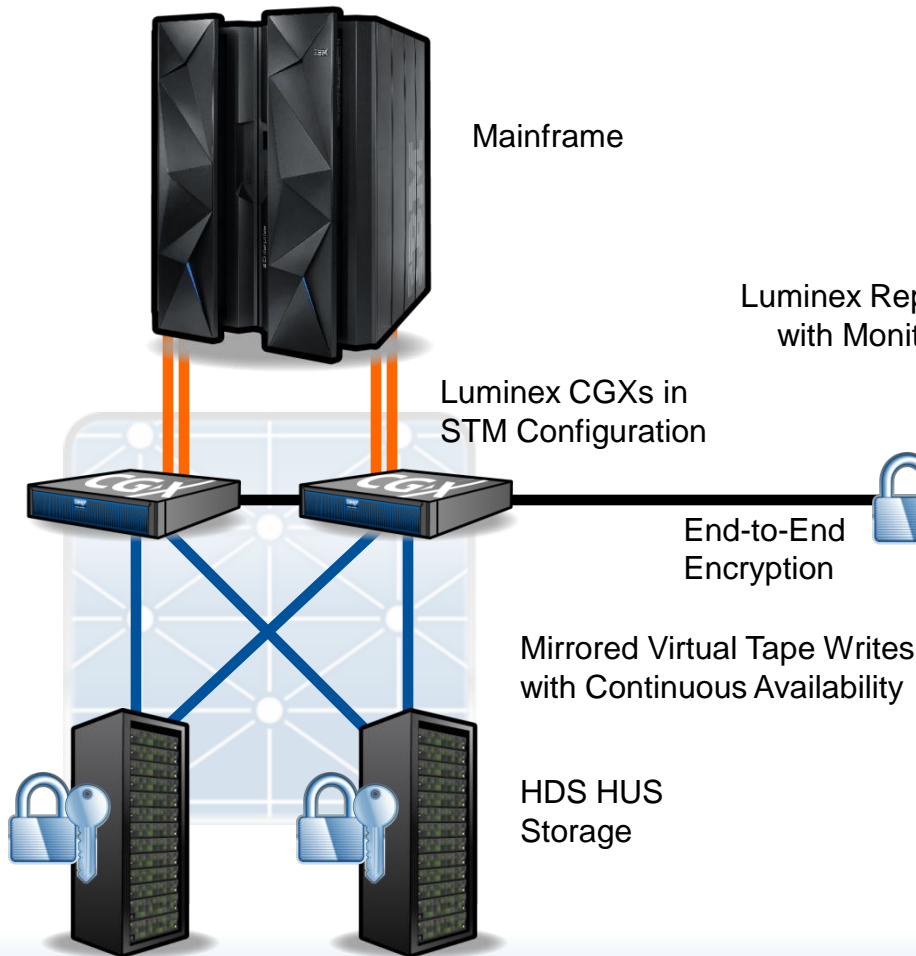**LUMINEX**

Intermediate Benefits and Achievements

- ☑ Eliminated physical tape
  - ☑ No longer shipping 2 pallets of tapes
  - ☑ Eliminated offsite storage of tapes
- ☑ All tape data available at DR site, not just a subset of critical data
- ☑ Expanded capacity
- ☑ Improved performance (initially)
  - ☑ 5x reduction in time to restore DASD farm at DR site
  - ☑ 20 hours down to 4 hours (1000 volumes)
  - ☑ Significant improvement in production run times

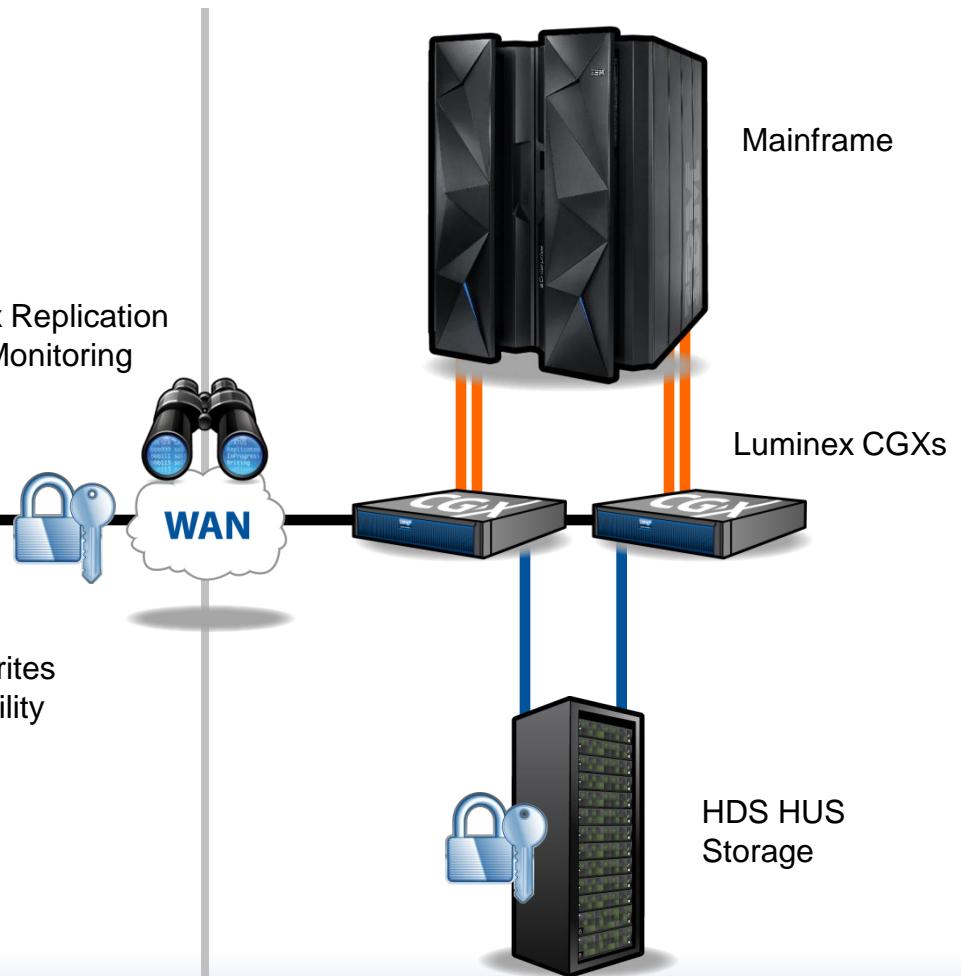# Goals And Objectives for Intermediate Mainframe Environment

- ❑ Address virtual tape capacity limitations
  - ❑ Tape data continued to grow
- ❑ Improve performance
  - ❑ Deduplication system "read" performance degraded over time
- ❑ Local replication still required an outage in the event of a disaster
  - ❑ Manually taking storage offline and putting copy online
- ❑ Manually managing 3 copies of data
- ❑ Managing multiple replication streams was a challenge with existing deduplication storage systems

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Current Mainframe Environment

Production Site

Disaster Recovery Site

Mainframe

Mainframe

Luminex Replication
with Monitoring

Luminex CGXs in
STM Configuration

Luminex CGXs

End-to-End
Encryption

WAN

Mirrored Virtual Tape Writes
with Continuous Availability

HDS HUS
Storage

HDS HUS
Storage

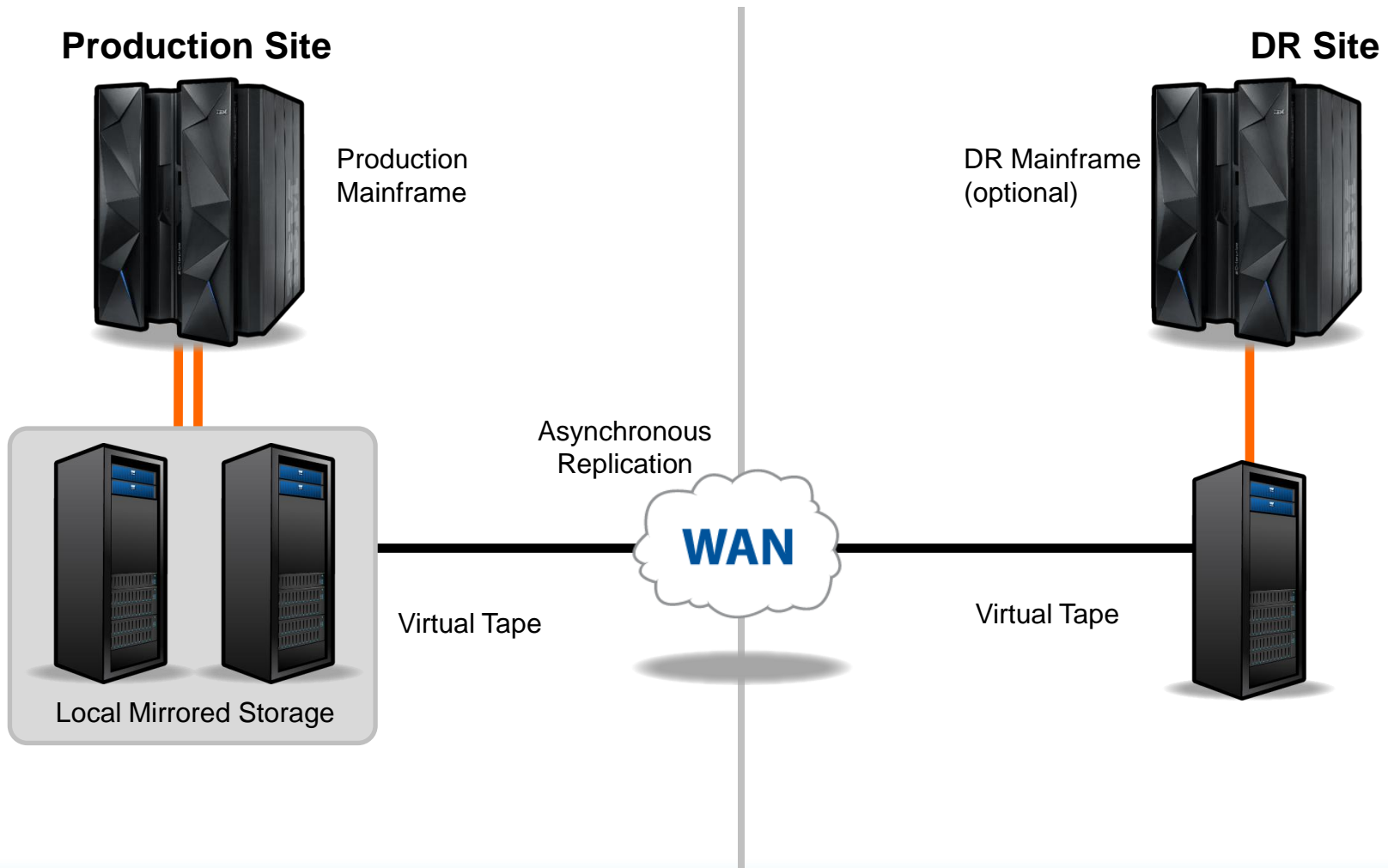**LUMINEX**

Current Benefits and Achievements

- ☑ Automatic management of multiple replication paths and copies
- ☑ Increased overall capacity
- ☑ Improved security by implementing CGSafe encryption
- ☑ Simplified DR testing with Push Button DR
- ☑ GUI-based monitoring of replication queues (RepMon)
- ☑ Improved performance (again)
  - ☑ 8-9x reduction in time for DASD restore over physical tape
  - ☑ Nearly 2x reduction over deduplicated virtual tape
  - ☑ Improved mainframe I/O performance and workload management
- ☑ Continuous availability for local data (STM)
  - ☑ Potential storage outages can be automatically managed

Use Cases

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STM Configuration Examples
Active-DR Host, Active-Active Local Storage with DR

Production Site

Production Mainframe

DR Site

DR Mainframe (optional)

Asynchronous Replication

WAN

Virtual Tape

Virtual Tape

Local Mirrored Storage

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STM Configuration Examples
Active-Standby Host, Active-Active Storage

Production Site

Standby Site

Production
Mainframe

Standby
Mainframe

Mirrored Writes

Virtual Tape

Virtual Tape

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STM Configuration Examples
Active-Active Host/Storage

Production Site A

Production Site B

Production Mainframe

Production Mainframe

Mirrored Writes

Virtual Tape

Virtual Tape

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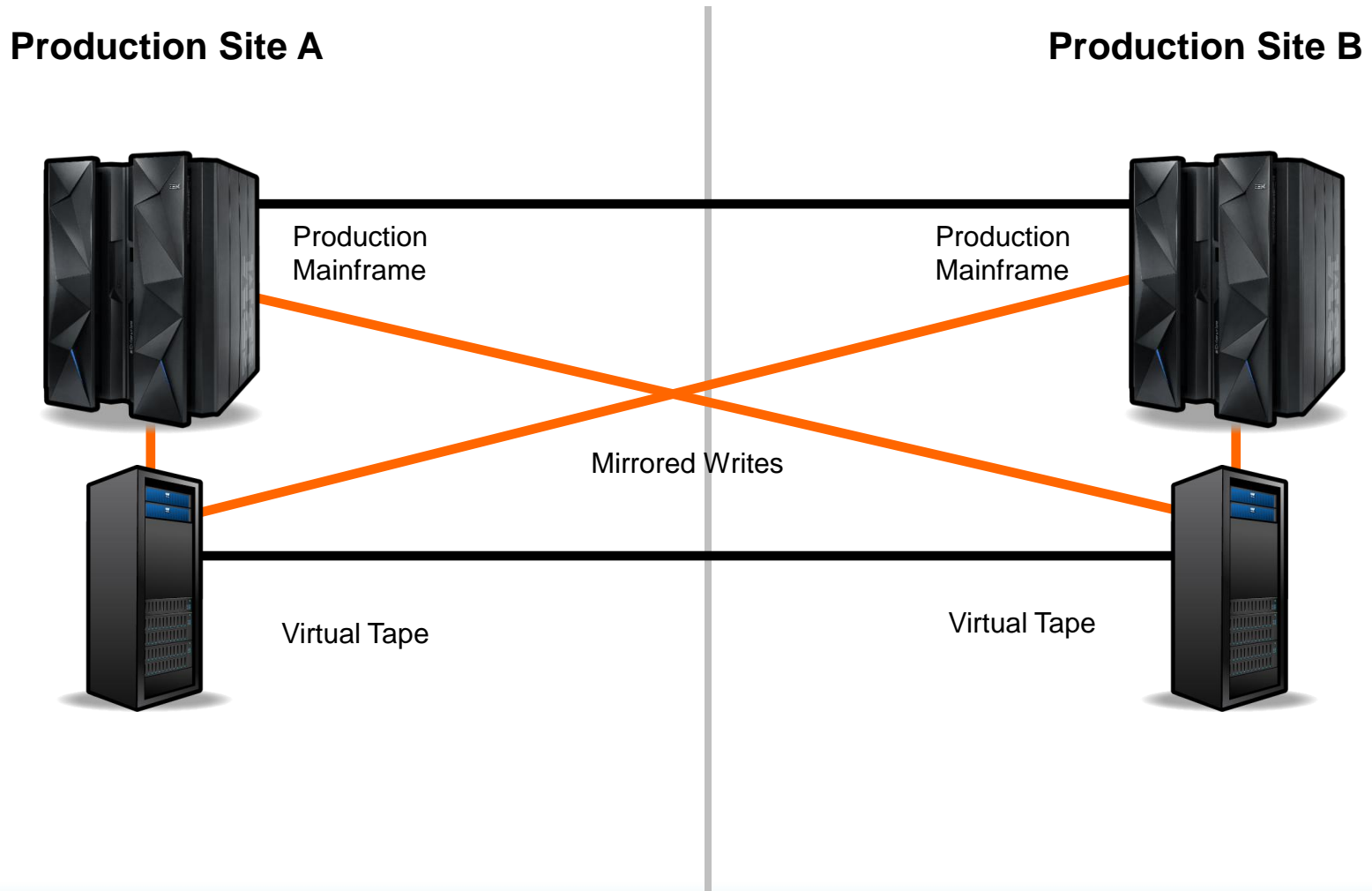
STM Configuration Examples
Active-Active-DR Host/Storage

Production Site A

Production Site B

Production Mainframe

Production Mainframe

Mirrored Writes

Virtual Tape

Virtual Tape

DR or Bunker Site

DR Mainframe (optional)

Virtual Tape

Asynchronous Replication

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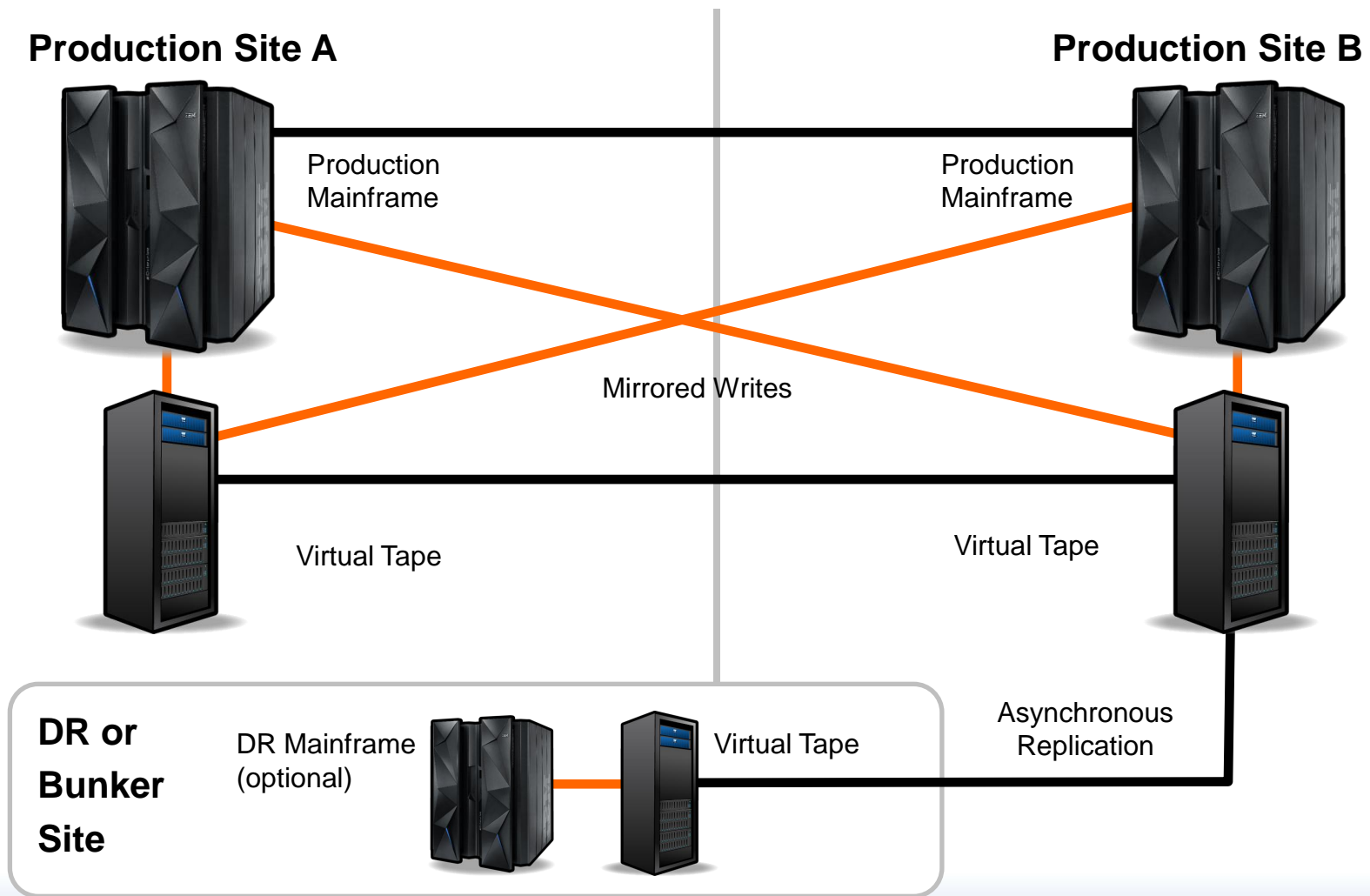
RepMon: Replication Monitor

Provides **real-time status monitoring and logging** of virtual tape data writes and replication to a remote disaster recovery site at the VOLSER level
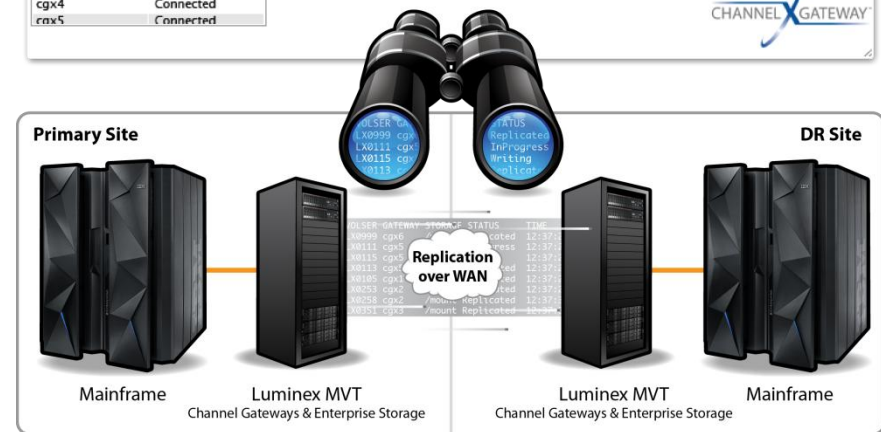
- Identifies Write and Replication Status of Mainframe Tape VOLSERs

- 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

Push Button DR Testing
Replication During Normal Operations
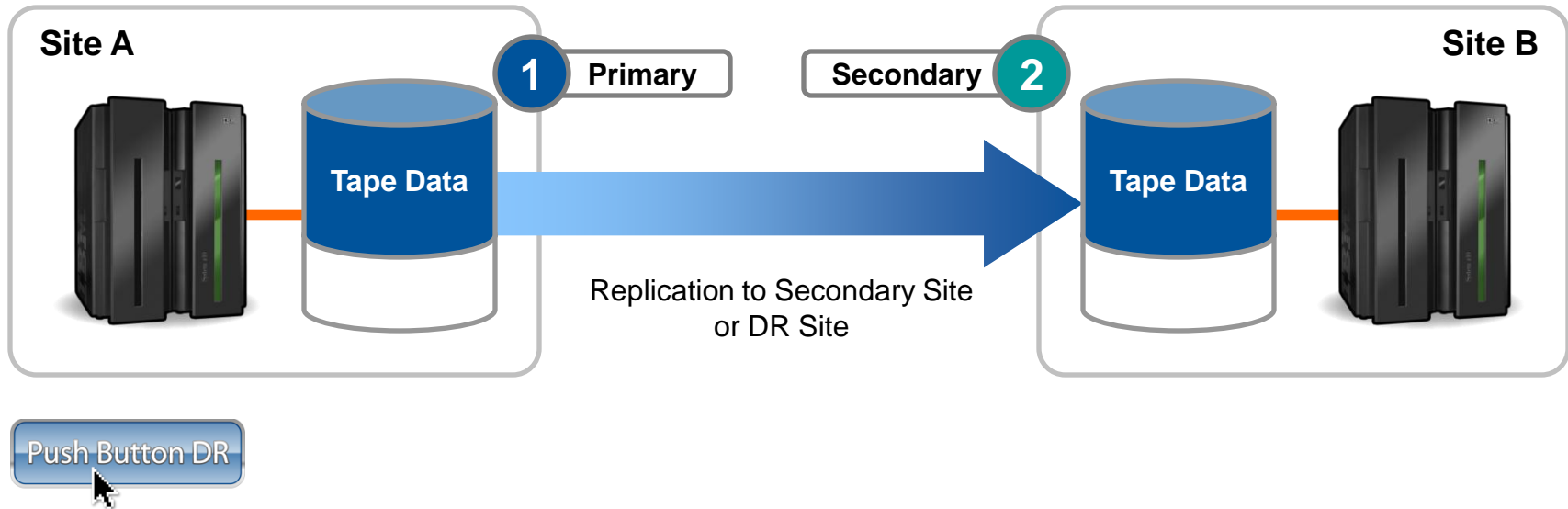
Push Button DR Testing
Replication During DR Testing

Site A

1 Primary

Secondary **2**

Site B

Tape Data

Tape Data

Replication to Secondary Site or DR Site continues uninterrupted

DR Test Data
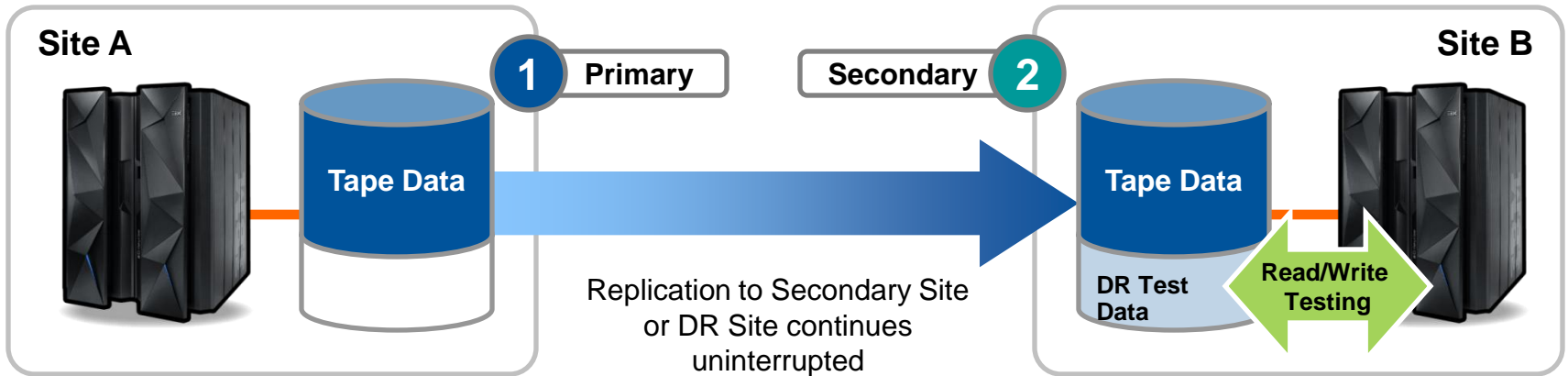
Read/Write Testing

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

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X 172.17.16.33/modules/support/site_methods.php?cg=1

CGX CHANNEL GATEWAY X ADMIN GUI

CGA2 | **CGA1**

Home

Operator

- Status monitor
- View scratch pool
- View volume
- Storage pool
- Knowledge Base
- Replication Monitor

User

Site Methods

Option: | ✓ Status | | Go
Promote Secondary
Force Promote
Start DR
Stop DR
Pause Replication
Resume Replication
Show Detailed Info

Start DR

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Push Button DR Testing
After DR Testing is Completed

Site A

1 **Primary**

Secondary **2**

Site B

Tape Data

Tape Data

Replication to Secondary Site
or DR Site continues
uninterrupted
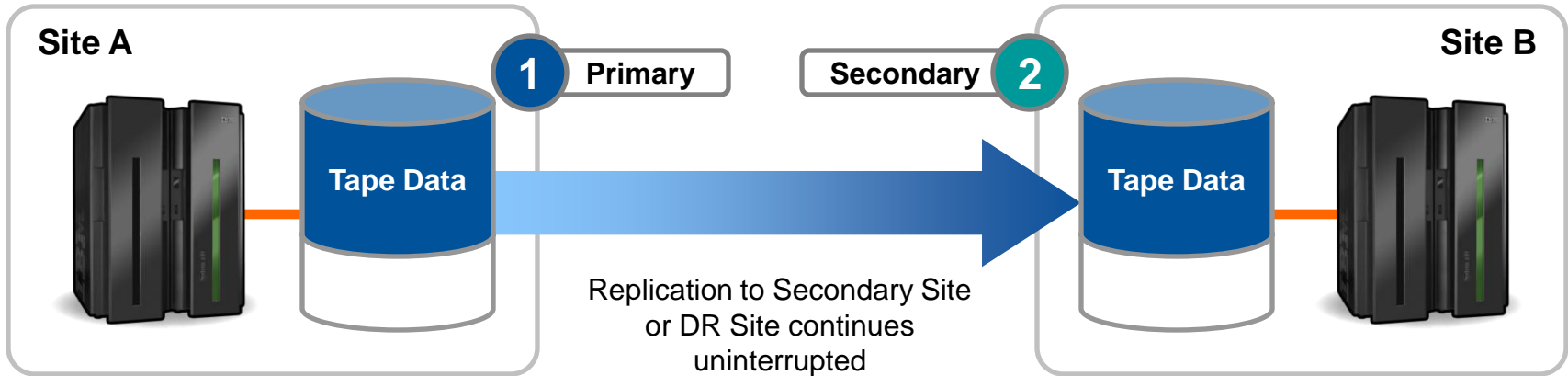
DR Test Data is purged
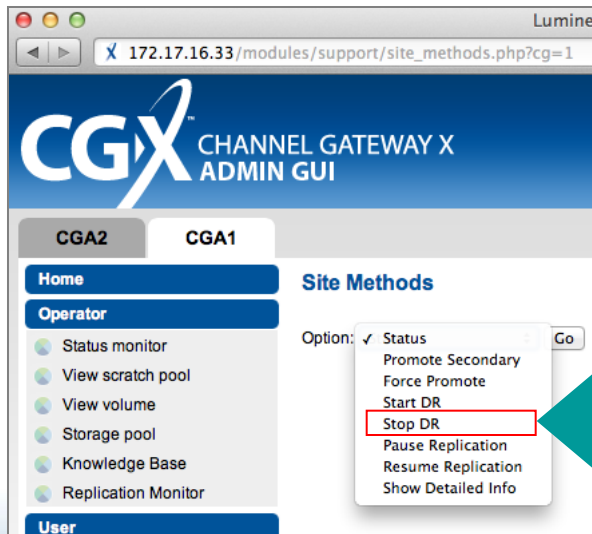
Optionally, DR Test Data can be
automatically replicated back to Site
A for auditing purposes

Push Button DR

Stop DR

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Tape Migration Services and Software

- **Luminex offers 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

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More Options… A Better Fit Makes A Better Solution

OPTIONAL FEATURES

Replication
at the control unit or storage level

RepMon
Monitor replication at the VOLSER level

Push Button DR
with non-disruptive DR testing

Multi-site Disposition Change
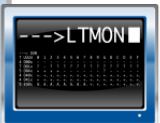with reverse replication

Synchronous Tape Matrix
Continuous Availability

CGSafe
Encryption and key management

LTMon
Integrated, centralized management from the mainframe console

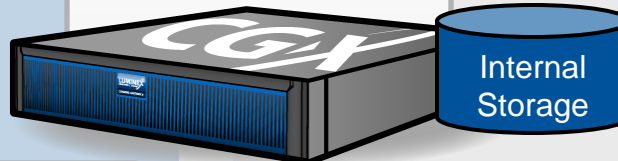**TAPE MIGRATION** SOFTWARE & SERVICES
Single source for Virtual Tape and Tape Migration

TMACS
Tape Monitoring (Device) and Allocation & Control System

CGX

Core product with up to 8Gb FICON, SMEs & hundreds of customers going tapeless

Internal Storage

STORAGE OPTIONS

Enterprise
storage options
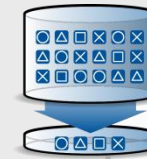
Modular
storage options

Compression
at the control unit level

Deduplication
DataStream Intelligence further reduces bandwidth & storage requirements
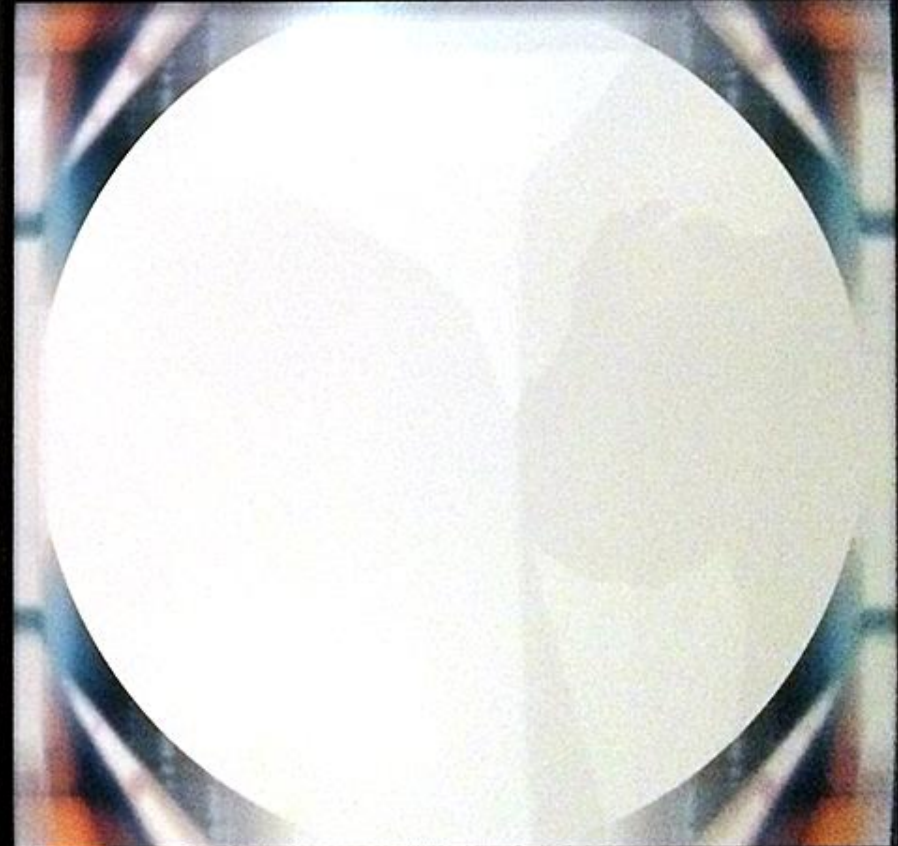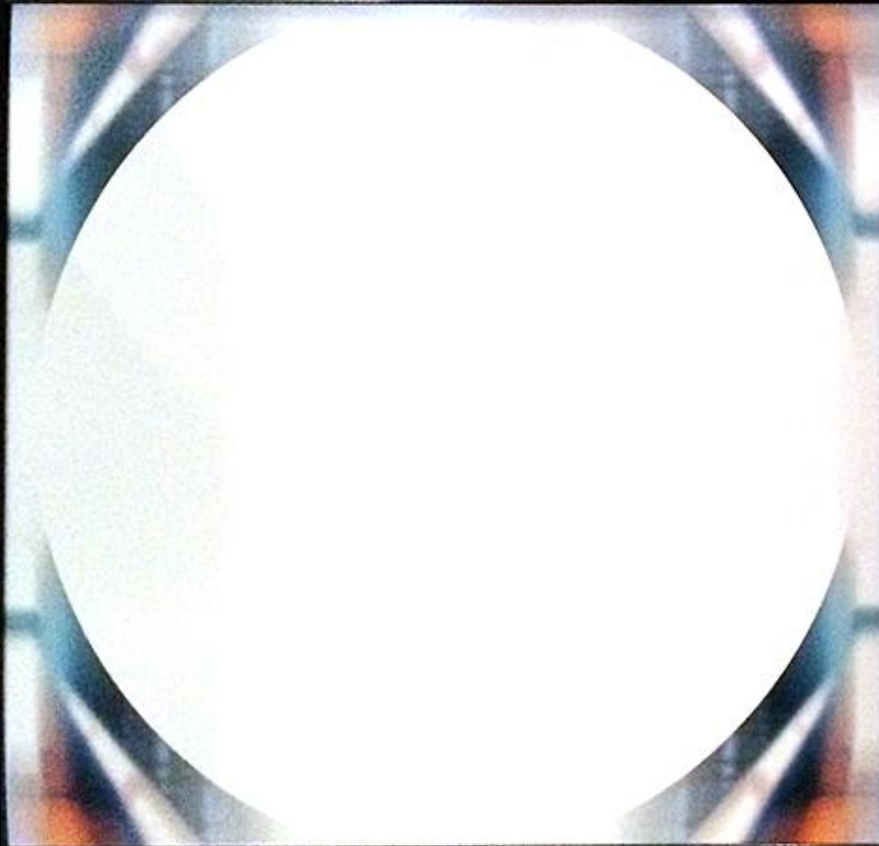
CloudTAPE
Cloud-based tape vaulting solution for mainframes

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What does the mainframe do today that you never thought possible?

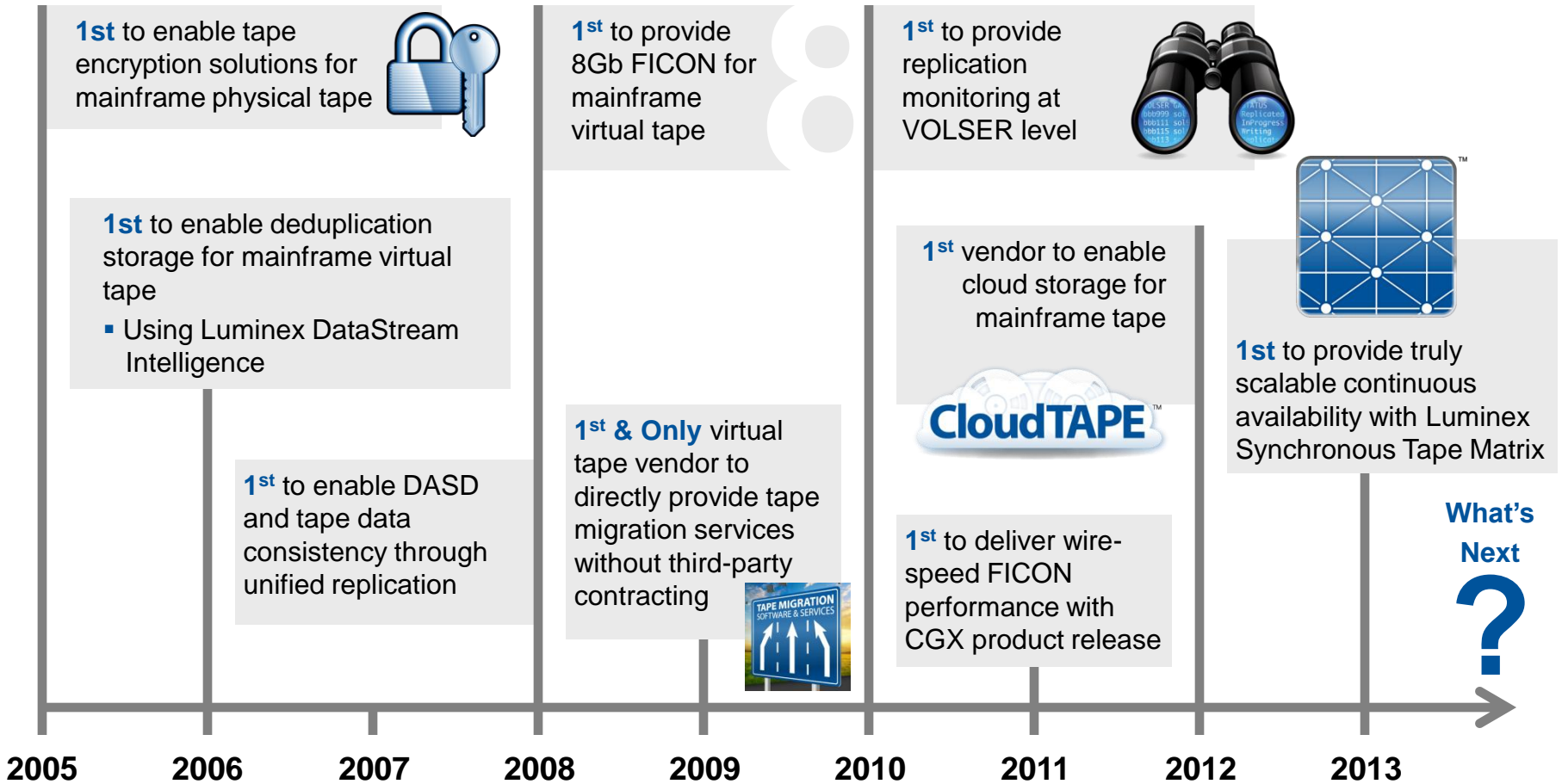What do you want the mainframe to do in the future?

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What does ~~the~~ mainframe tape
do today that you never
thought possible?

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What do you want ~~the~~
mainframe tape to do in
the future?

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Luminex's Heritage of Innovation

1st to enable tape encryption solutions for mainframe physical tape

1st to provide 8Gb FICON for mainframe virtual tape

1st to provide replication monitoring at VOLSER level

1st to enable deduplication storage for mainframe virtual tape
- Using Luminex DataStream Intelligence

1st vendor to enable cloud storage for mainframe tape

CloudTAPE™

1st to provide truly scalable continuous availability with Luminex Synchronous Tape Matrix

1st & Only virtual tape vendor to directly provide tape migration services without third-party contracting

TAPE MIGRATION
SOFTWARE & SERVICES

1st to enable DASD and tape data consistency through unified replication

1st to deliver wire-speed FICON performance with CGX product release

What's Next

?

2005	2006	2007	2008	2009	2010	2011	2012	2013

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Achieving Continuous Availability for Mainframe Tape with Synchronous Tape Matrix

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