Achieving Continuous Availability for Mainframe Tape

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Luminex Software, Inc.

Discussion Topics

- “Needs” in mainframe tape
  - Past to present… small to big?
- How Have “Needs” Affected Technology?
- The next evolutionary steps
- Use cases
- What’s the next “Need”?

“Needs” in Mainframe Tape

Did Technology Define Needs, or Did Needs Define Technology?

- 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

How Have “Needs” Affected Technology?

Technology

- 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

How Have “Needs” Affected Technology?

Technology

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

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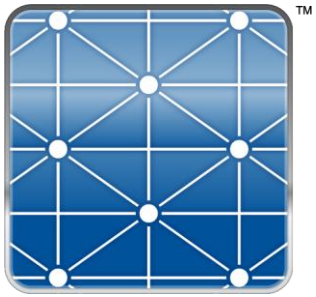
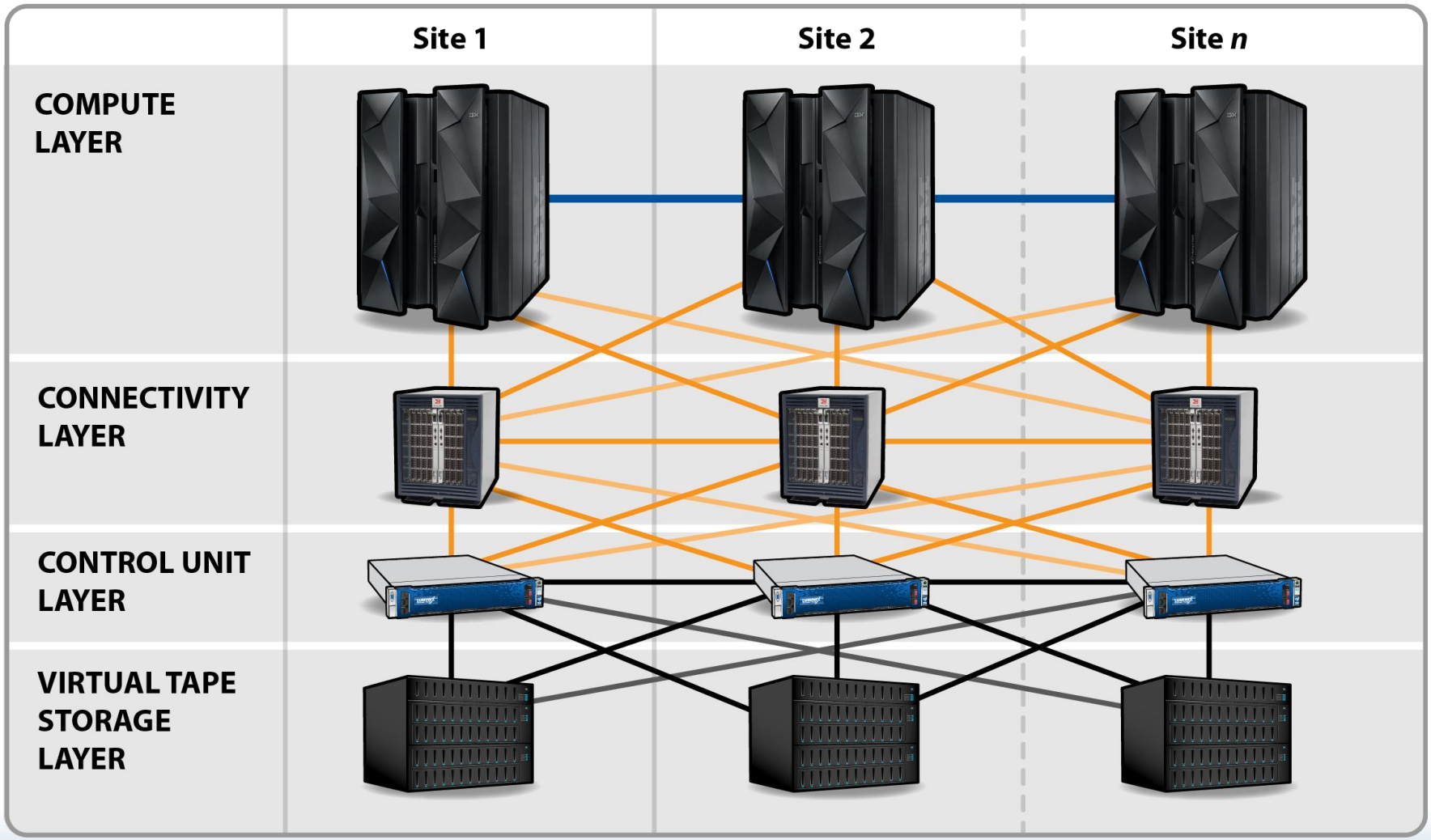
Synchronous Tape Matrix (STM)



- 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

Simplified STM Configuration with *n*-Sites



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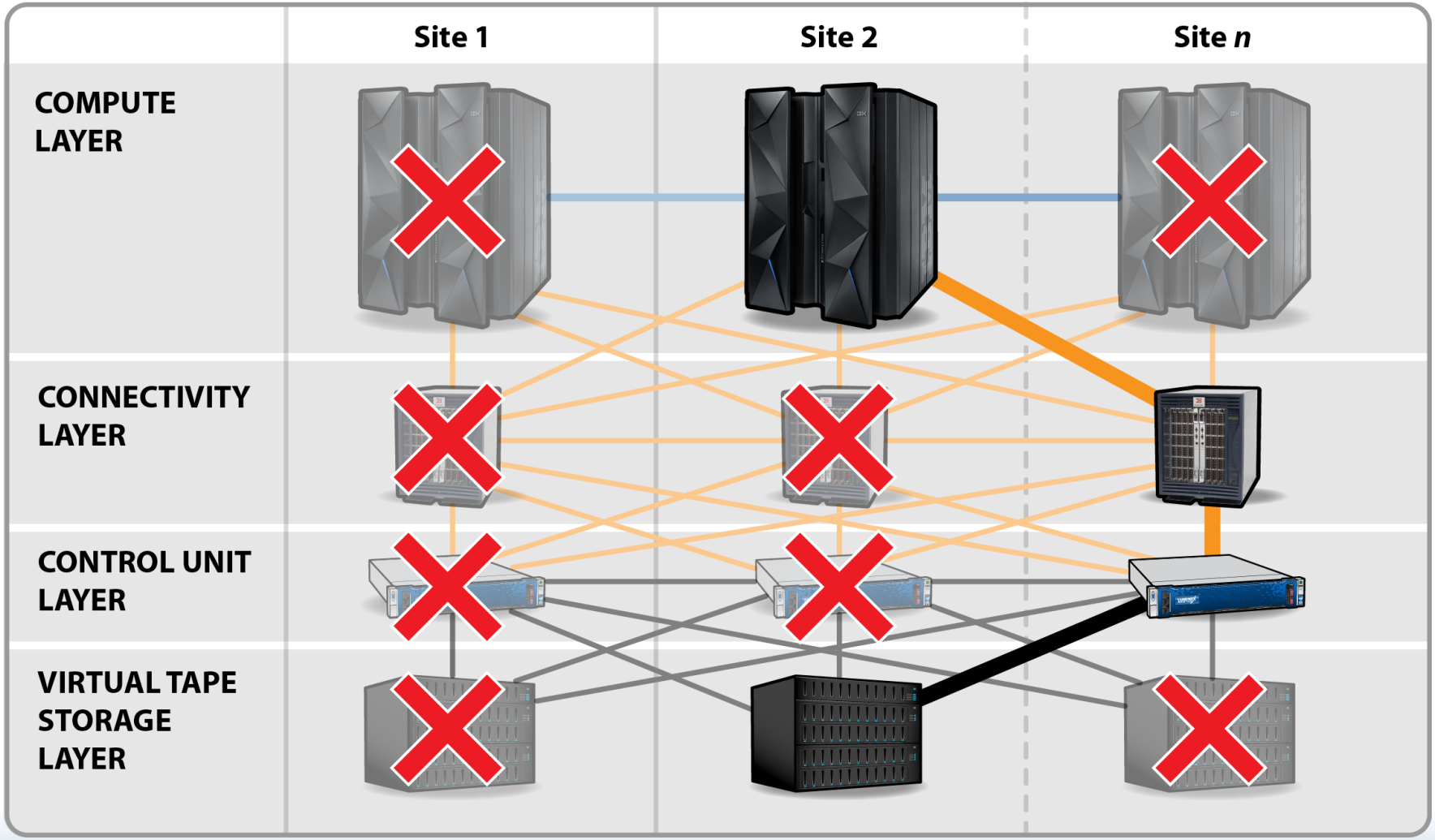
Operational STM Configuration with Multiple Failures Across Layers and Sites



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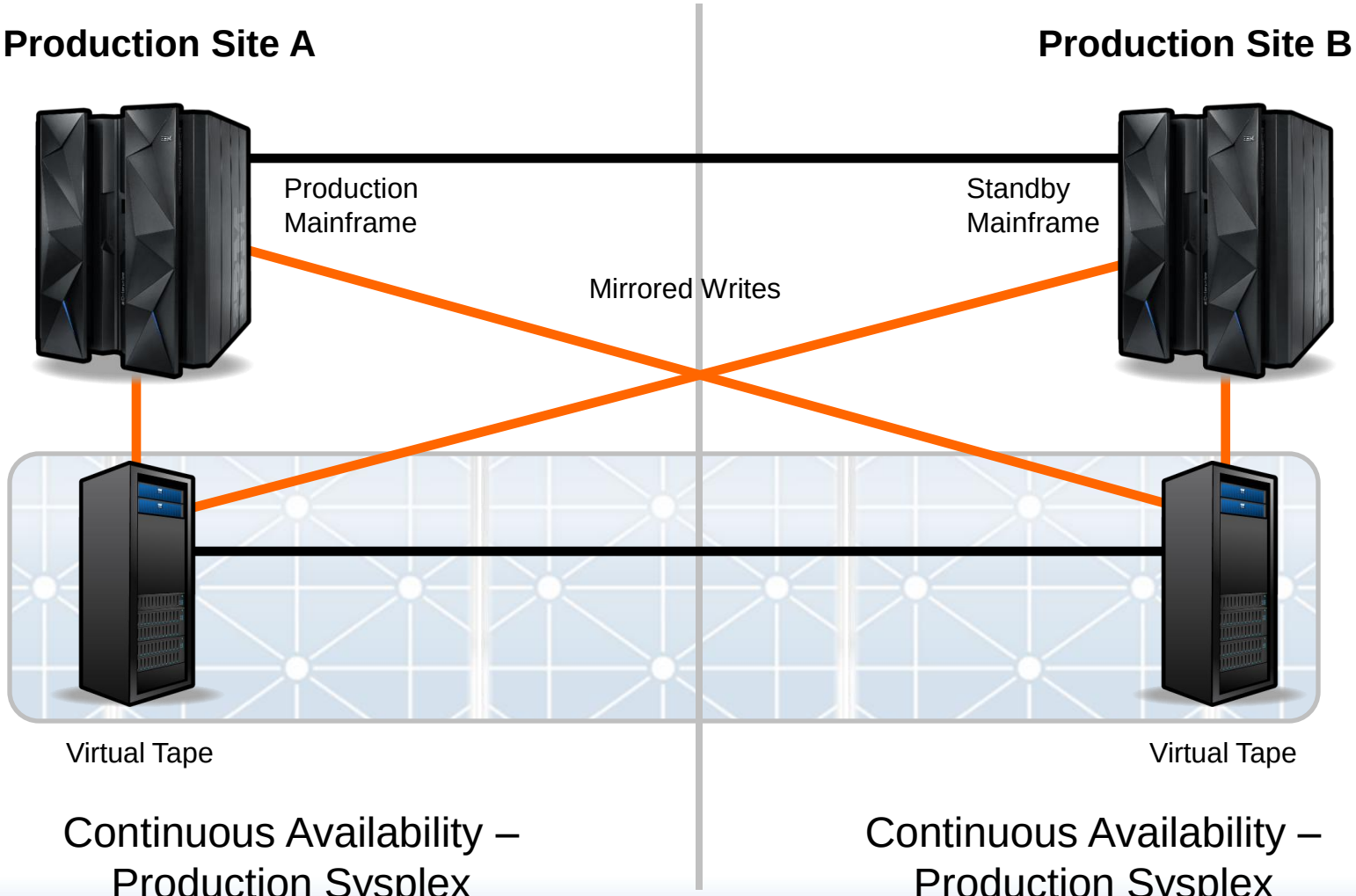
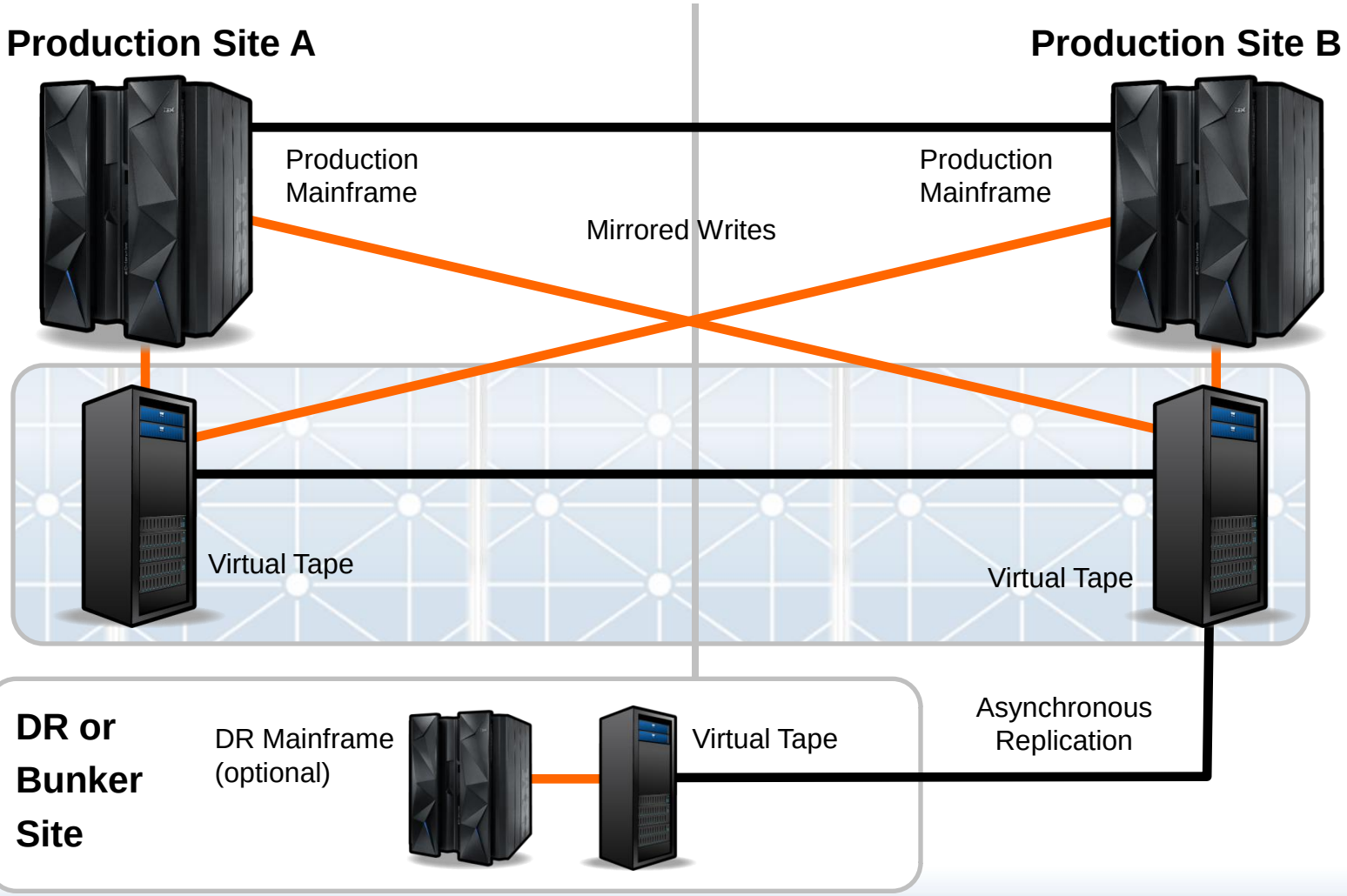
STM Configuration Examples

Active-Active Host/Storage



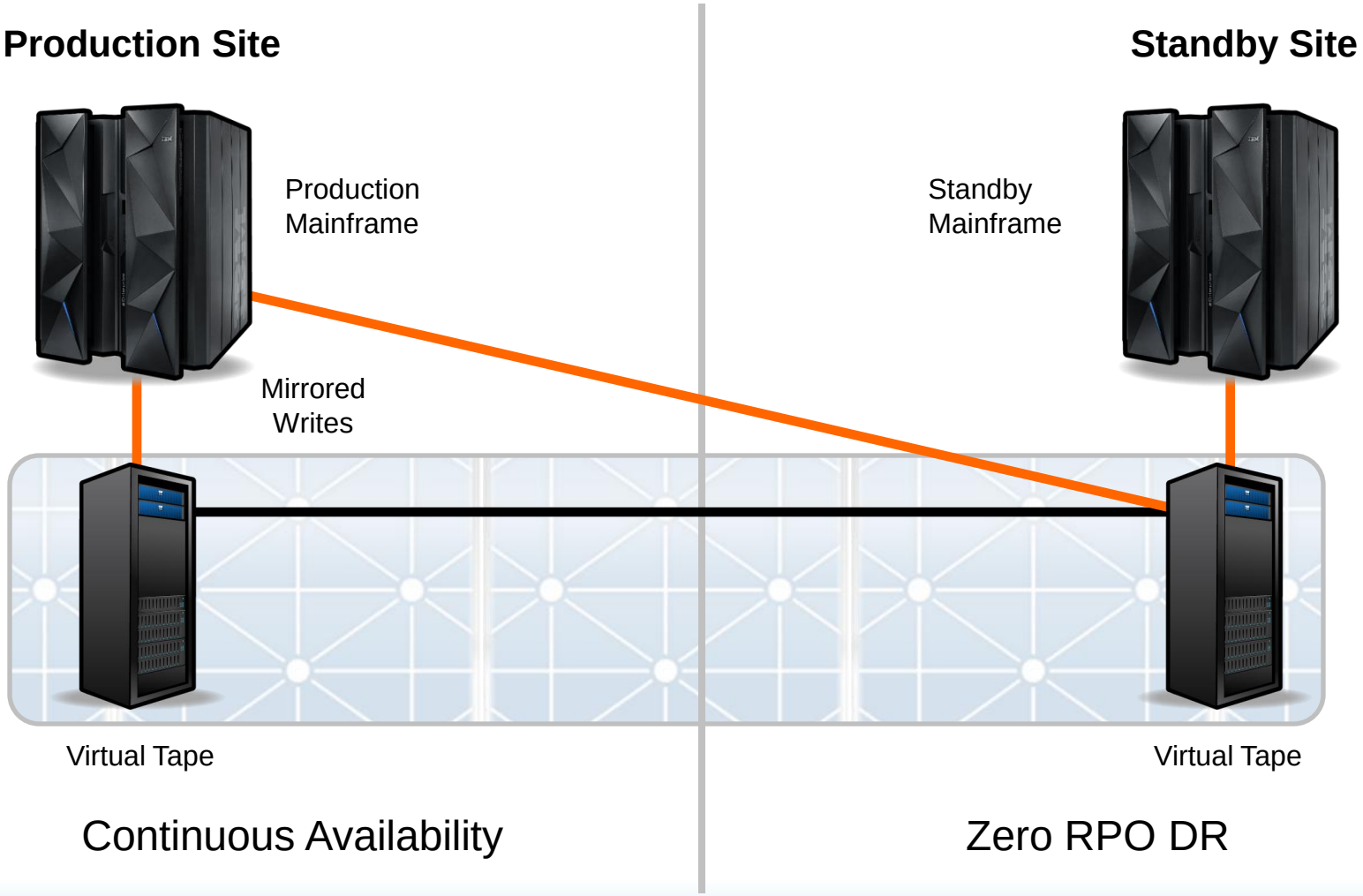
STM Configuration Examples

Active-Active-DR Host/Storage



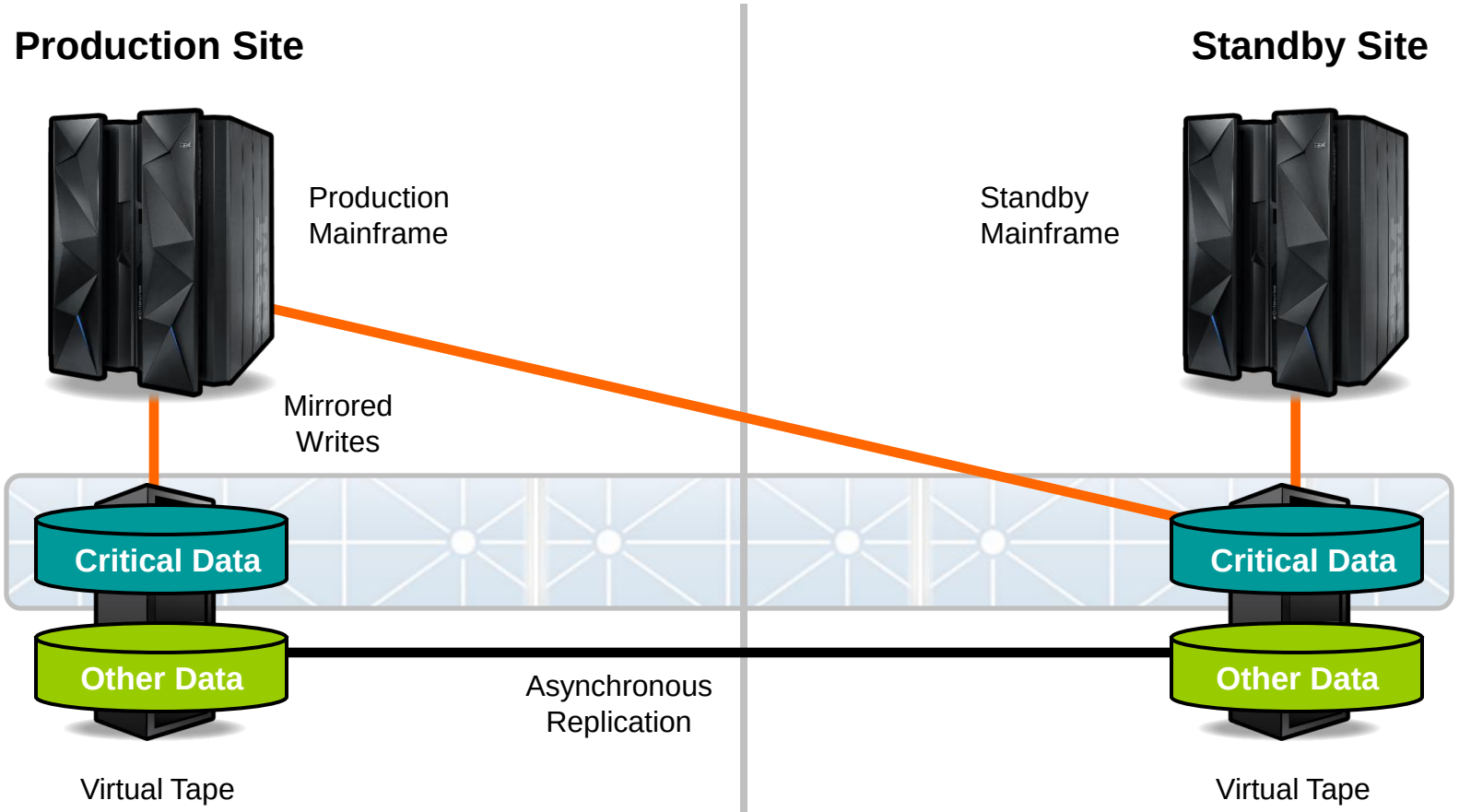
STM Configuration Examples

Active-Standby Host, Active-Active Storage



STM Configuration Examples

Active-Standby Host, Active-Active Storage



Continuous Availability (critical data)
Asynchronous Replication (other data)

Zero RPO DR

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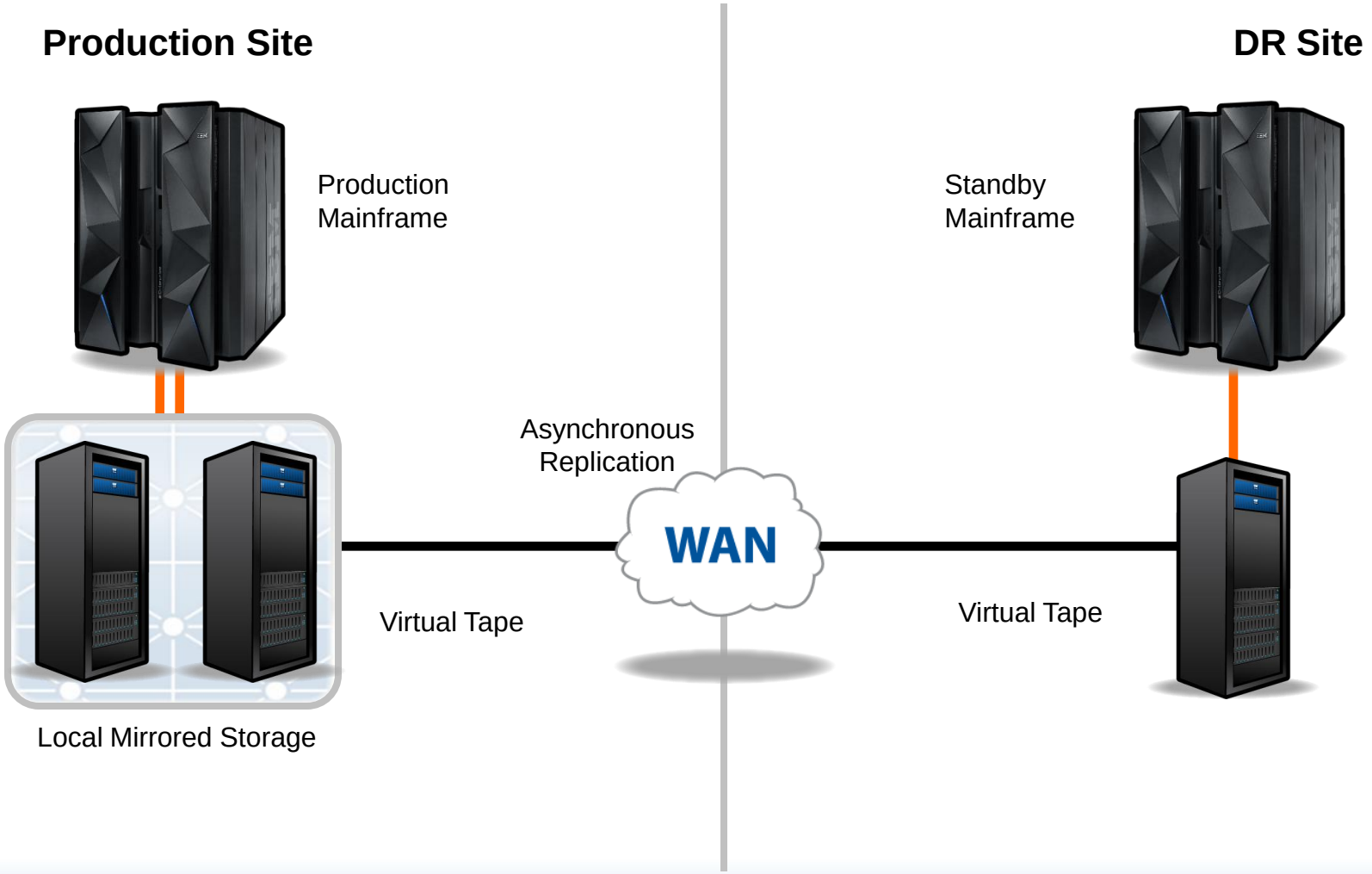
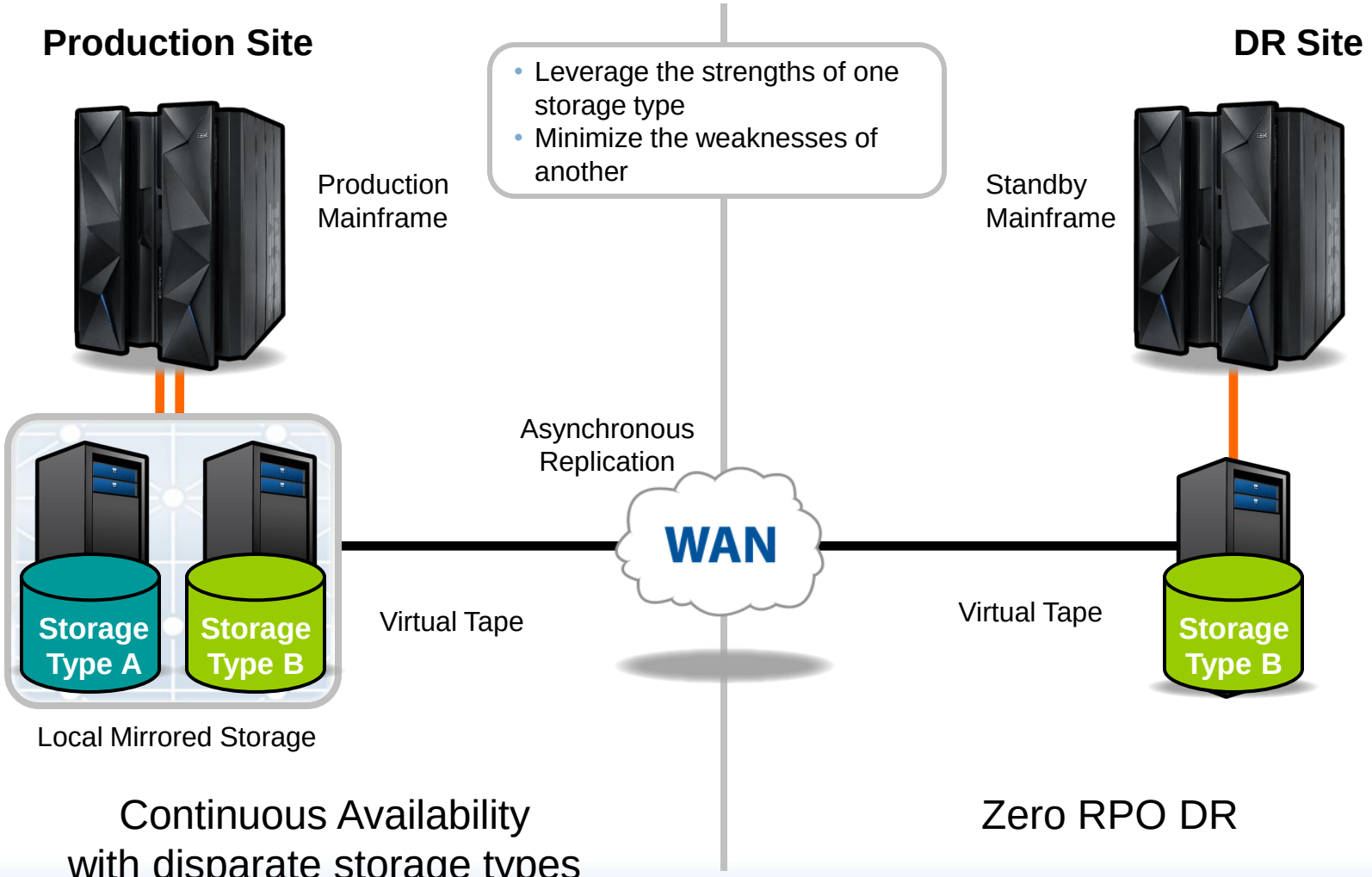
STM Configuration Examples

Active-DR Host, Active-Active Local Storage with DR



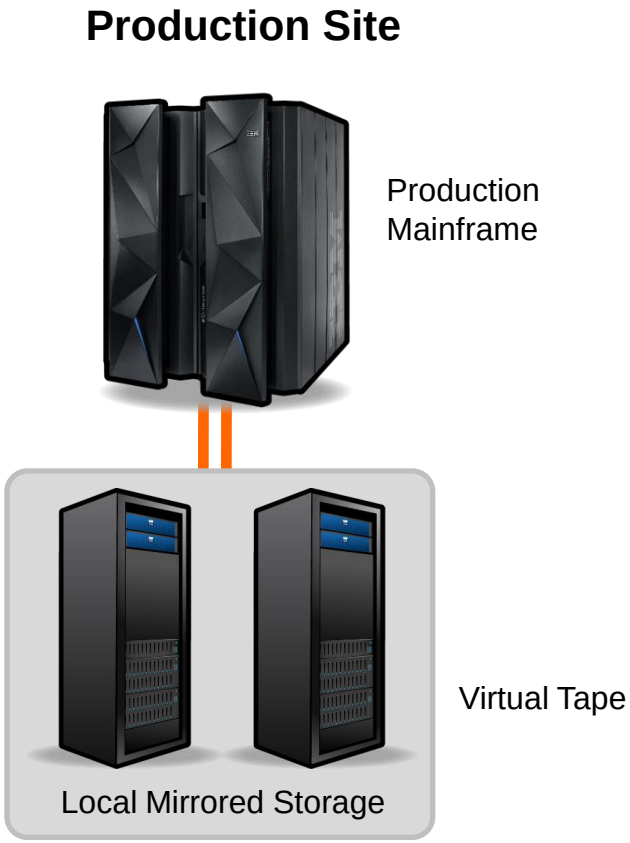
STM Configuration Examples

Active-DR Host, Active-Active Local Storage (Disparate) with DR



STM Configuration Examples

Active-Active Local Storage



Continuous Availability – Single Site

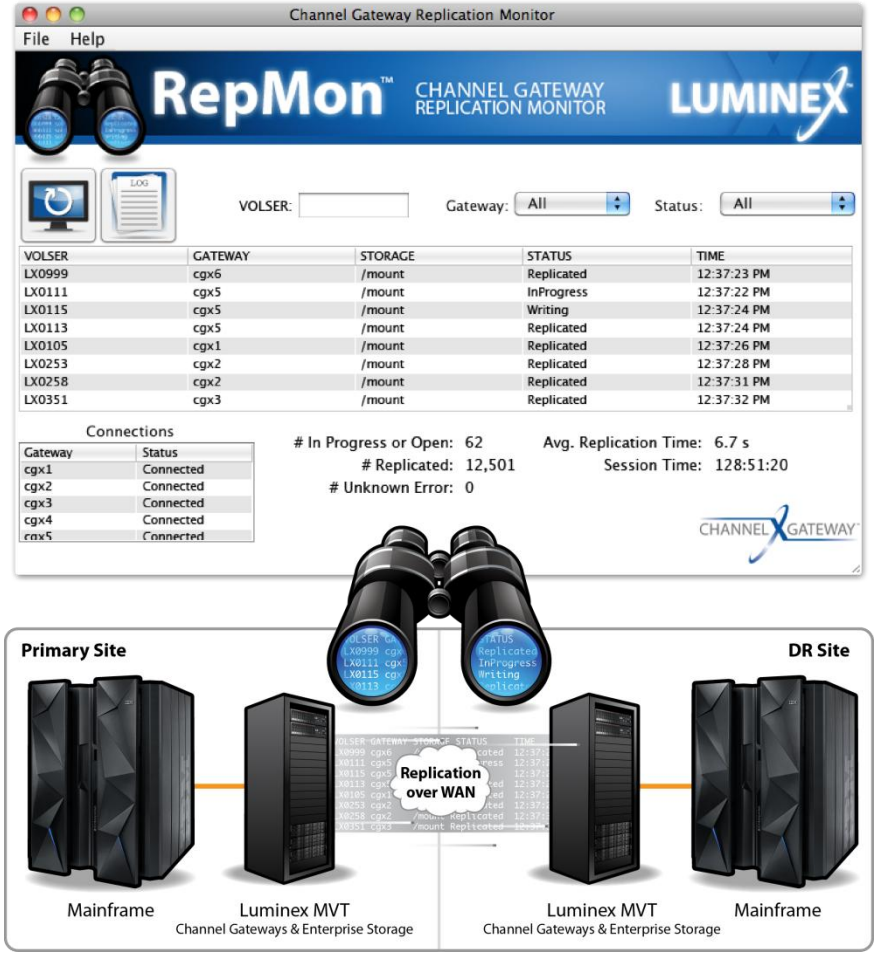
Prepare for the Future, Don’t Forget About the Past

- Disaster recovery preparedness
- Security (Encryption)
- Migrations

RepMon: Replication Monitor

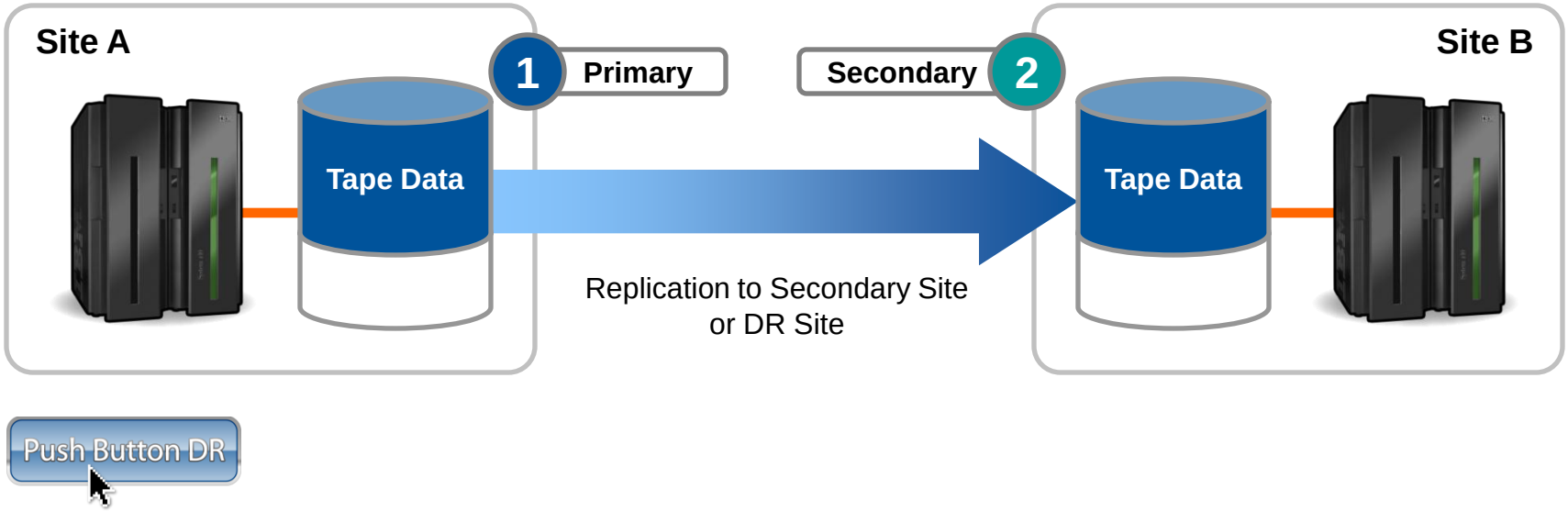
Provides **real-time status monitoring and logging** of virtual tape data writes and replication to a remote disaster recovery site at the VOLSER level

- 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



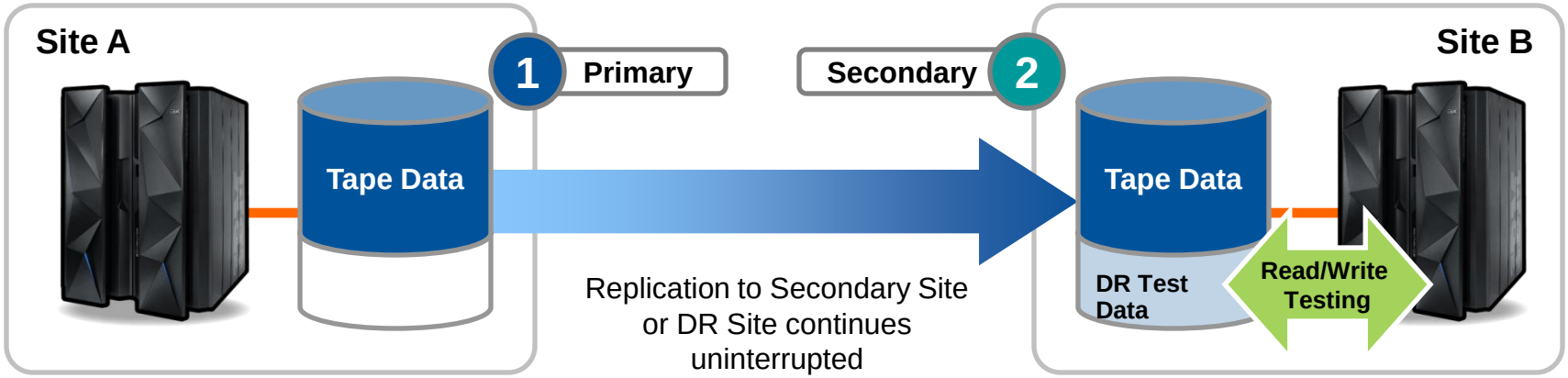
Push Button DR Testing

Replication During Normal Operations



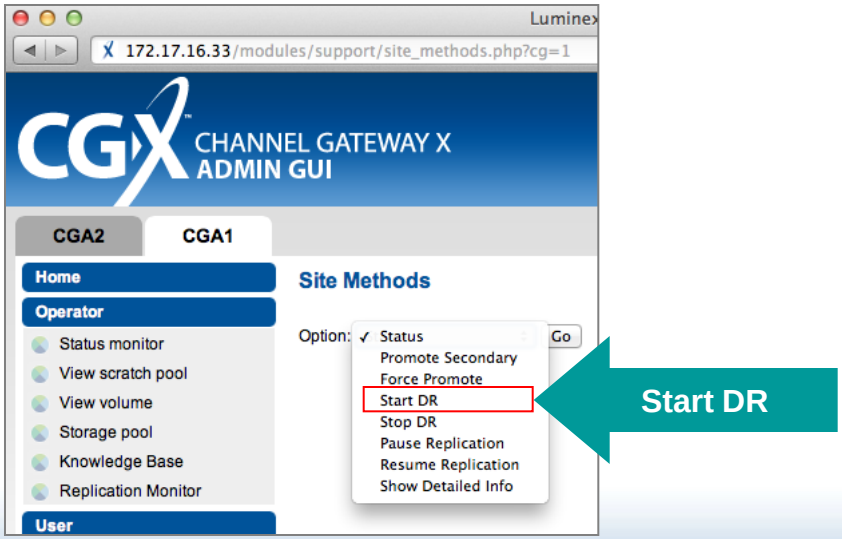
Push Button DR Testing

Replication During DR Testing



Replication to Secondary Site or DR Site continues uninterrupted

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



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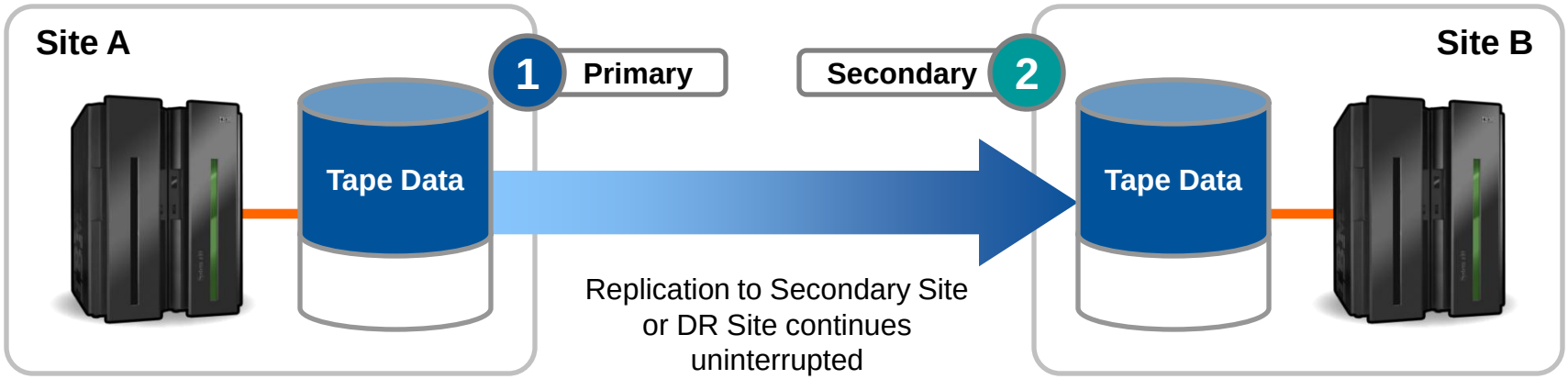
Push Button DR Testing

After DR Testing is Completed



DR Test Data is purged

Optionally, DR Test Data can be automatically replicated back to Site A for auditing purposes

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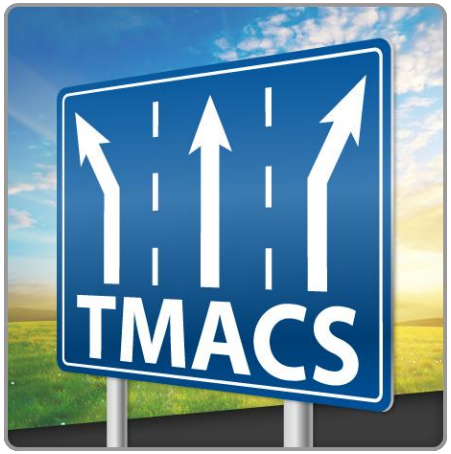
CGSafe
Encryption and Key Management

- **Encryption**
  - Encrypt Data At Rest and Data In Transit
    - Better than simple self encrypting drives, data remains encrypted for all local or wide area network traffic, including replication
  - AES-GCM or AES-ECB modes
  - CGSafe solutions use AES-256, AES-192 or AES-128
  - Encryption, compression, authentication and CRC in a single pass
  - Configurable for auto-hardware-to-software encryption failover
- **Key Management**
  - Full Key Lifecycle Management
  - Optionally Integrates into existing key management infrastructure for a single-point-of-management
  - Supports KMIP standard
  - Dynamic creation of keys
  - Master keys (KEKs) based on storage pools

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



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

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

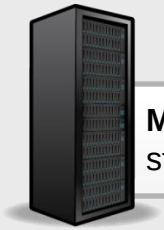
Single source for Virtual Tape and Tape Migration

Tape Monitoring (Device) and Allocation & Control System

STORAGE OPTIONS

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

Enterprise
storage options



Modular
storage options

Compression
at the control unit level

Deduplication
DataStream Intelligence further reduces bandwidth & storage requirements

Cost-effective replacement for physical tape vaulting

Cloud-based tape vaulting solution for mainframes

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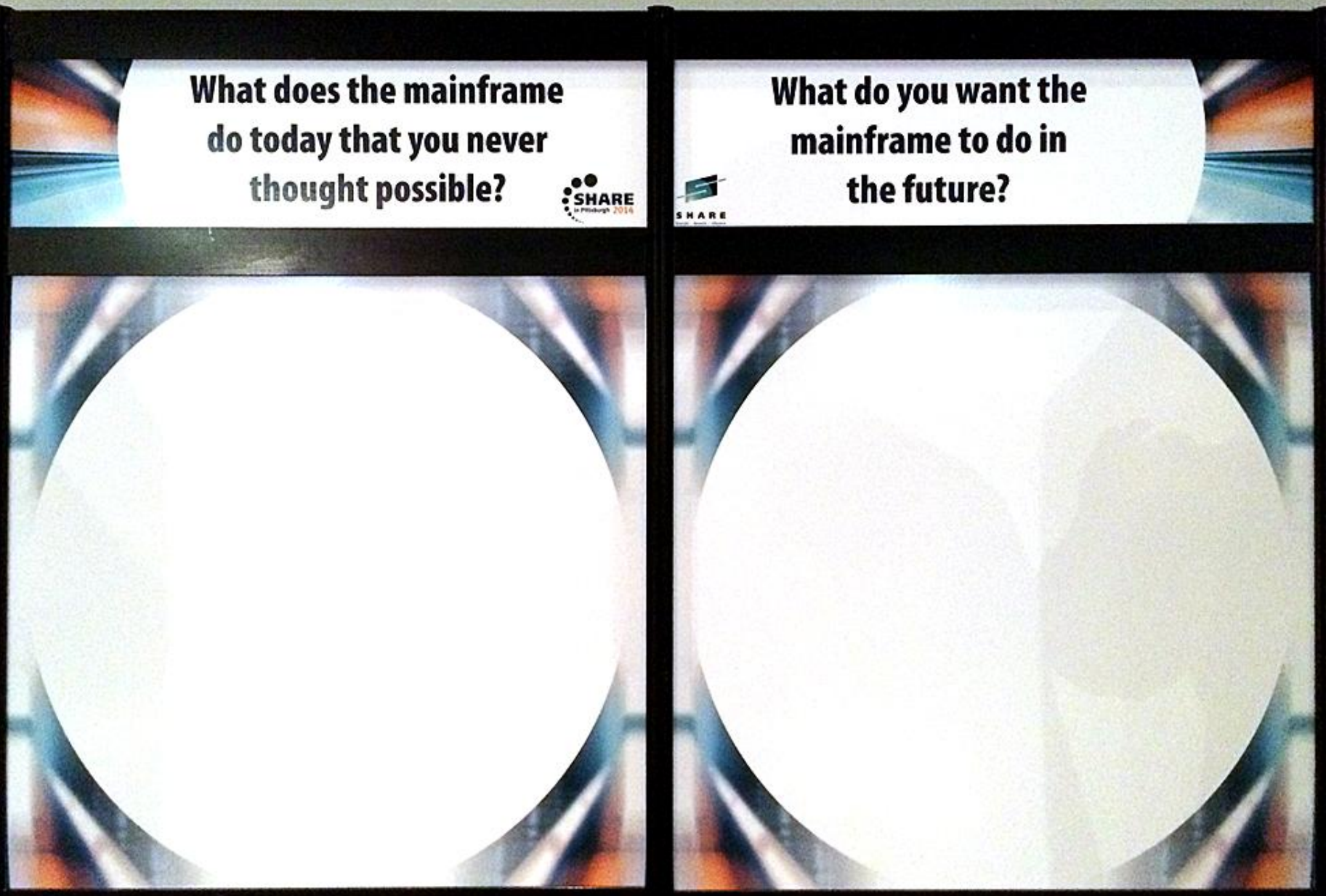
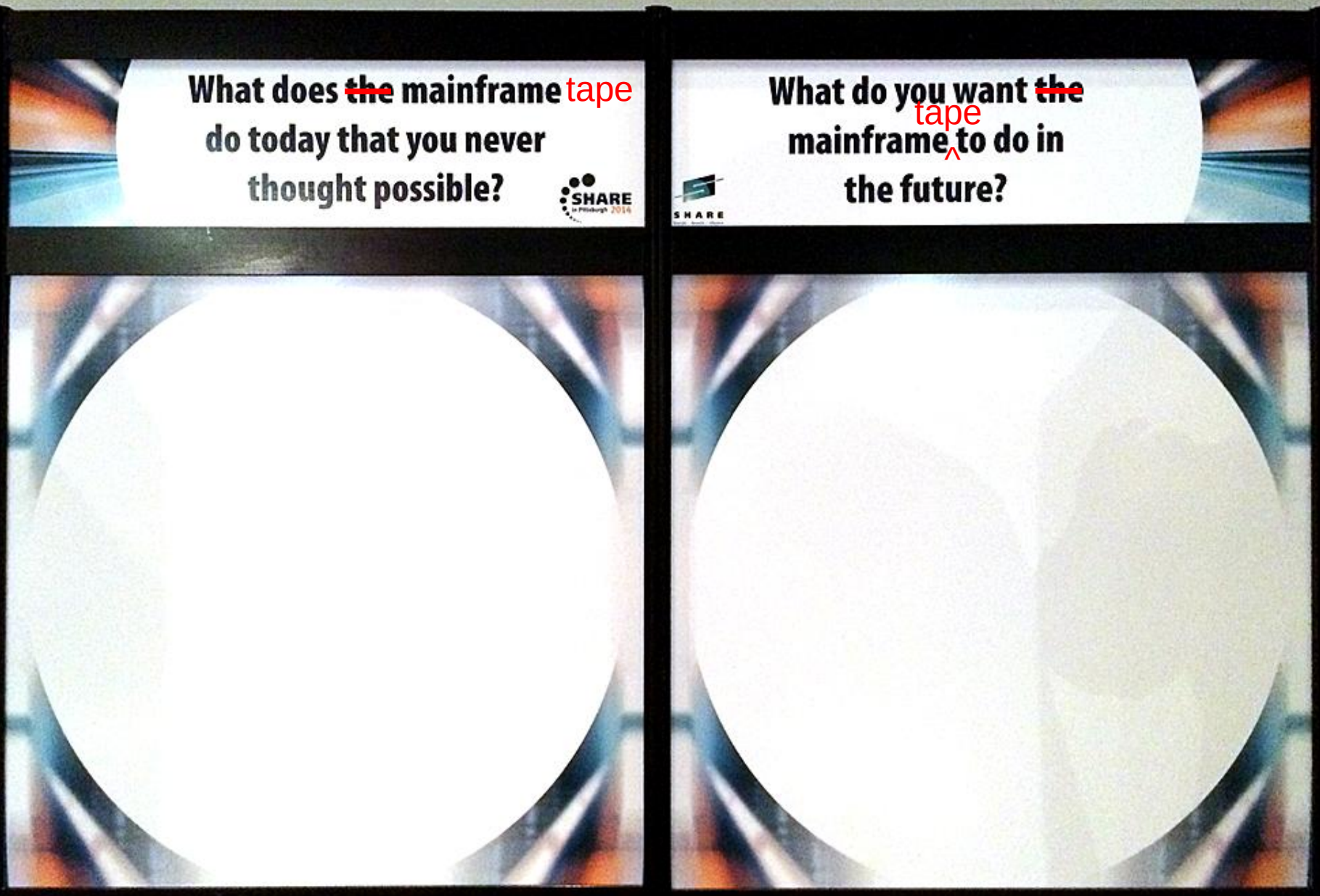

What does the mainframe do today that you never thought possible?
SHARE in Pittsburgh 2014
What do you want the mainframe to do in the future?
SHARE


What does ~~the~~ mainframe tape do today that you never thought possible?
SHARE in Pittsburgh 2014
What do you want ~~the~~ tape mainframe ^ to do in the future?
SHARE

Luminex's Heritage of Innovation

1st to enable tape encryption solutions for mainframe physical tape

1st to enable deduplication storage for mainframe virtual tape

- Using Luminex DataStream Intelligence

DATASTREAM INTELLIGENCE

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

1st to provide 8Gb FICON for mainframe virtual tape

1st & Only virtual tape vendor to directly provide tape migration services for z/OS w/o third-party contracting

TAPE MIGRATION SOFTWARE & SERVICES

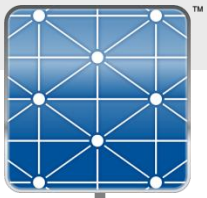
1st to provide replication monitoring at VOLSER level

1st vendor to enable cloud storage for mainframe tape

CloudTAPE™

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

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



1st to provide cost-effective mainframe virtual tape vaults as an alternative to physical tape vaults

2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

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