Beyond Legacy Tape: Expecting More from Mainframe Virtual Tape

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Luminex

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Session DA




Beyond: Expect More

- Do More. Expect More. Embrace More.
- Enterprise IT is being fundamentally transformed
  - Cloud computing is Driven by Agility and “Do More” and not “For Less”
- The IBM Mainframe remains critical on-premise Enterprise IT
- “It’s All about Integration” and “Significant focus to make the mainframe a seamless participant” – Jeff Magdall SHARE Phoenix Session March 2019

Luminex At A Glance

Delivering mainframe data solutions worldwide for 25+ years

- Enabling mainframes to leverage distributed systems resources via native I/O channels
- Renowned for its industry-leading, enterprise-class mainframe virtual tape solutions

MISSION STATEMENT

Luminex serves as a trusted advocate helping *enterprise customers* **protect**, **manage**, and **leverage** corporate data assets by developing and delivering high quality, innovative technology solutions.

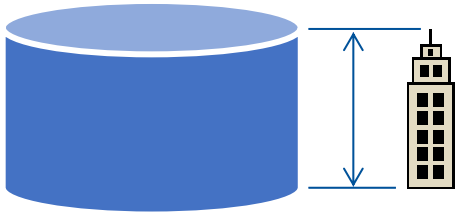
What are Luminex Customers Doing with MVT?

GUIDE SHARE EUROPE UK REGION

CAPACITY

5.7 PB

of host-view tape capacity for a single subsystem



OF VOLUMES

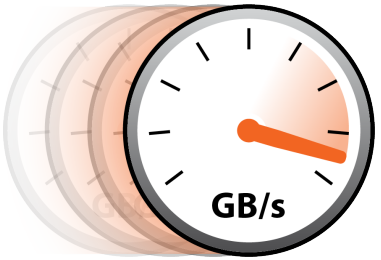
12 Million

in a single tape management catalog

THROUGHPUT

10.8 GB/s

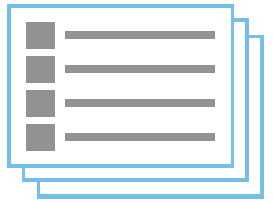
in a single site's tape subsystem



TAPE MANAGEMENT CATALOGS

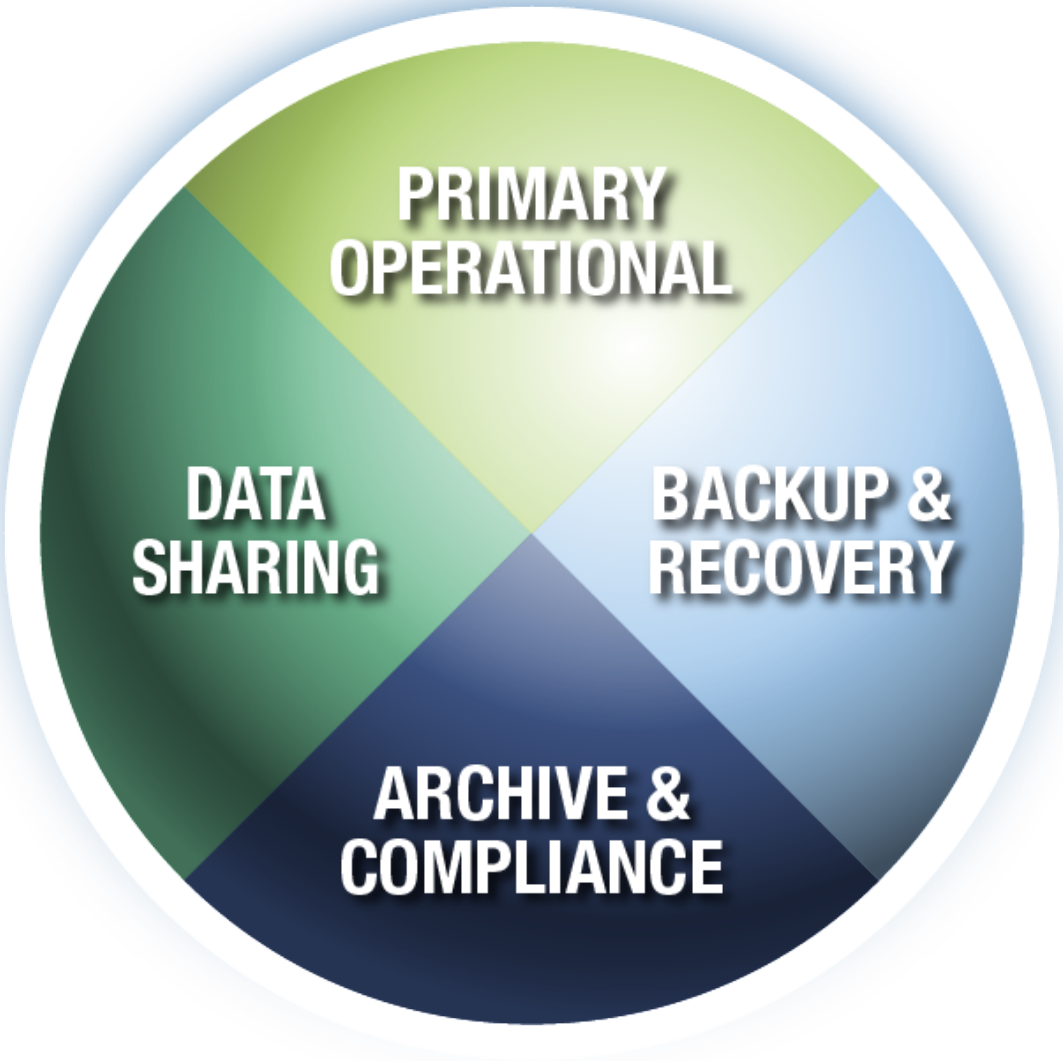
39 TMCs

in a single installation



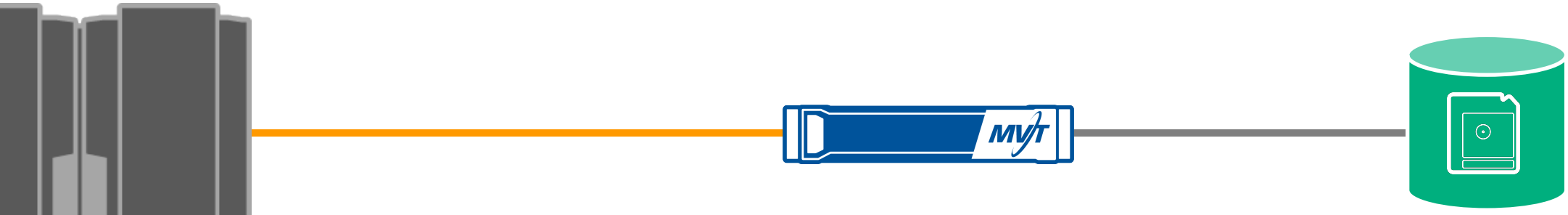
Traditional Tape Use Cases

- Primary operational
  - Batch workloads
- Backup and recovery
  - Ship tapes to an off-site warehouse
  - Ship from warehouse back to production or a DR site
- Archive & compliance
  - Ship tapes to an off-site warehouse
- Data sharing
  - Cut a tape and ship it to business partners



Components of a Virtual Tape System

Most major tape solutions use commodity hardware:



FICON

- Data movement
- Native I/O channels
- Fast, efficient, secure

Enterprise Servers

- Emulate tape control units
- Manage replication
- Encryption
- Compression

Enterprise Storage

- Internal SAS
- Fibre Channel
- NFS

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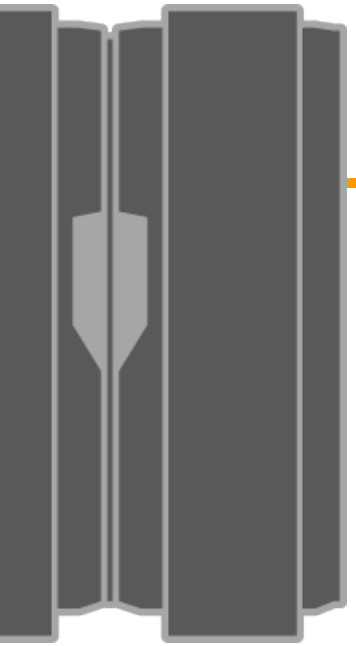

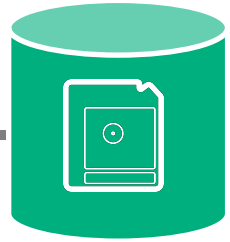

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“Beyond” Opportunity: Tape as a Co-Processor

Luminex Replication

- Tape controller based replication engine
  - Storage independent
- Asynchronous
- Flexible policies
  - Copies: One-to-Many, Cascading
  - Targets: DR, MVT Vault, Cloud Provider, Object Storage, etc.
  - Methods:
    - **On unload** of written tape
    - **Selectively** from a single VOLSER to a mainframe managed list
- Advanced DR functionality included
  - RepMon replication monitoring and auditing
  - Push Button DR

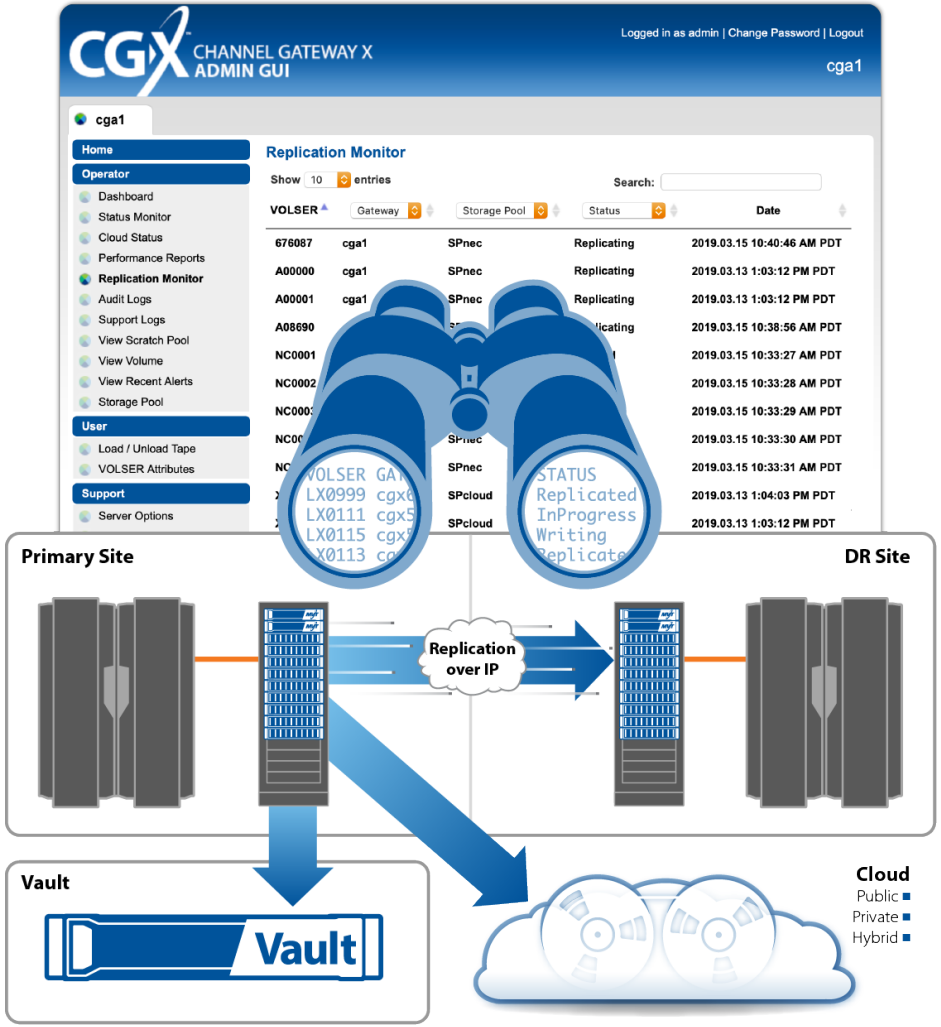
CloudTAPE™

Push Button DR

RepMon: Replication Monitor

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

- Identifies write and replication status of mainframe tape VOLSERs
- Identifies if off-site virtual tape data is still consistent with the primary datacenter
- Provides visual and audit capabilities to confirm when tapes are successfully protected off-site
- CloudTAPE Dashboard adds versioning and tiering status of VOLSERs in the Cloud

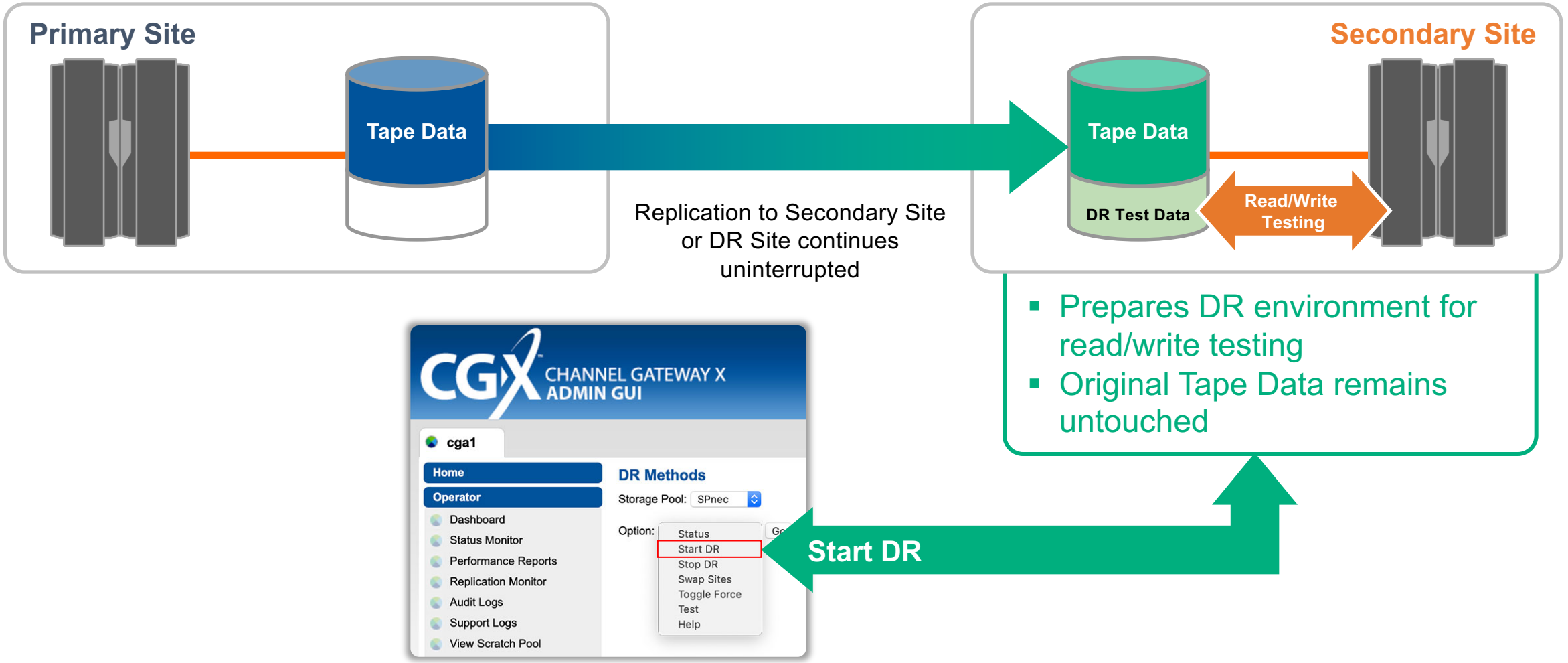


Push Button DR Testing

Replication During Normal Operations

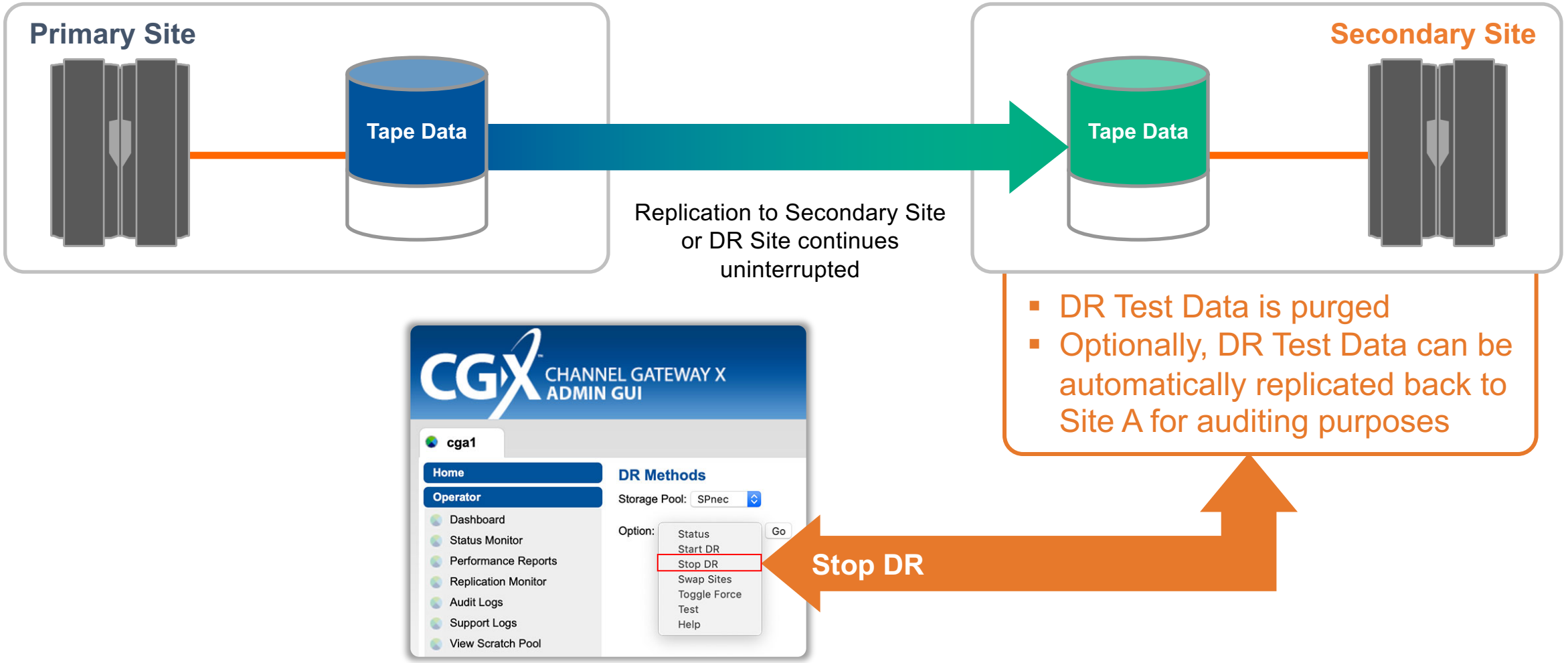
Push Button DR Testing

Replication During DR Testing

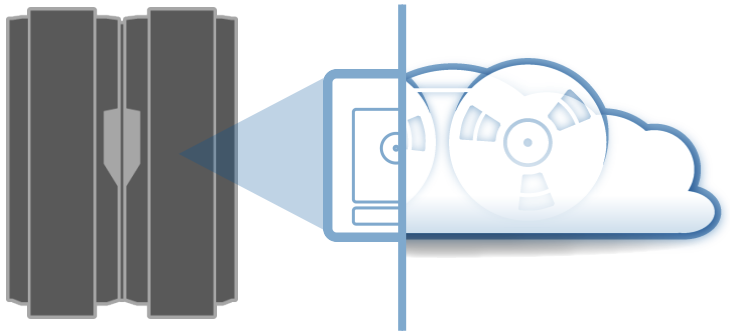


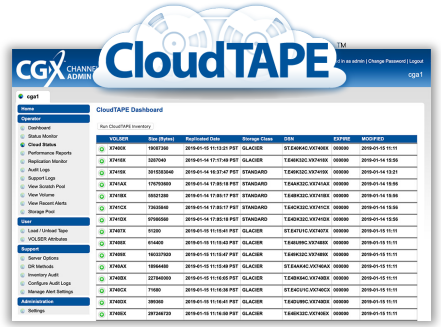
Push Button DR Testing

After DR Testing is Completed



CloudTAPE: Replication & Recall for Cloud & Object Storage





- Provides an **air gap** for virtual tape
  - Protect tape data with programmatic immutability
  - Support for cloud providers' versioning capabilities with reporting
- Reads/writes work the same from the mainframe perspective
- Support for cloud and object storage providers' standard APIs
  - AWS, Azure, Hitachi HCP, NetApp StorageGRID, etc.
- Transparent tape data movement
  - No additional mainframe resources required (encryption, movement & management)
  - Seamless support for cloud storage tiering / recalls (e.g. S3-to-Glacier)
- DataStream Intelligence support
  - Tape metadata added to the stored object's metadata (creation/replication dates, tape size, tape label)
  - Metadata can be leveraged by cloud-based applications
- Luminex GUI tracks and reports tape versions, status and metadata

Multitenant Views in Admin GUI

- Separate **Global** and **Storage Pool Level** views
- Storage Pool administrator can only see information for Storage Pools and devices assigned to them
- Global administrator can see all information for all Storage Pools
- Global administrator can assign capacity “quotas” for individual Storage Pools
  - These quotas are reported and alerted on but are not strictly enforced
  - E.g. a tenant can use 120% of their quota as long as there is enough backend storage

Storage Pool Level View

Restricts Display to Assigned Storage Pool

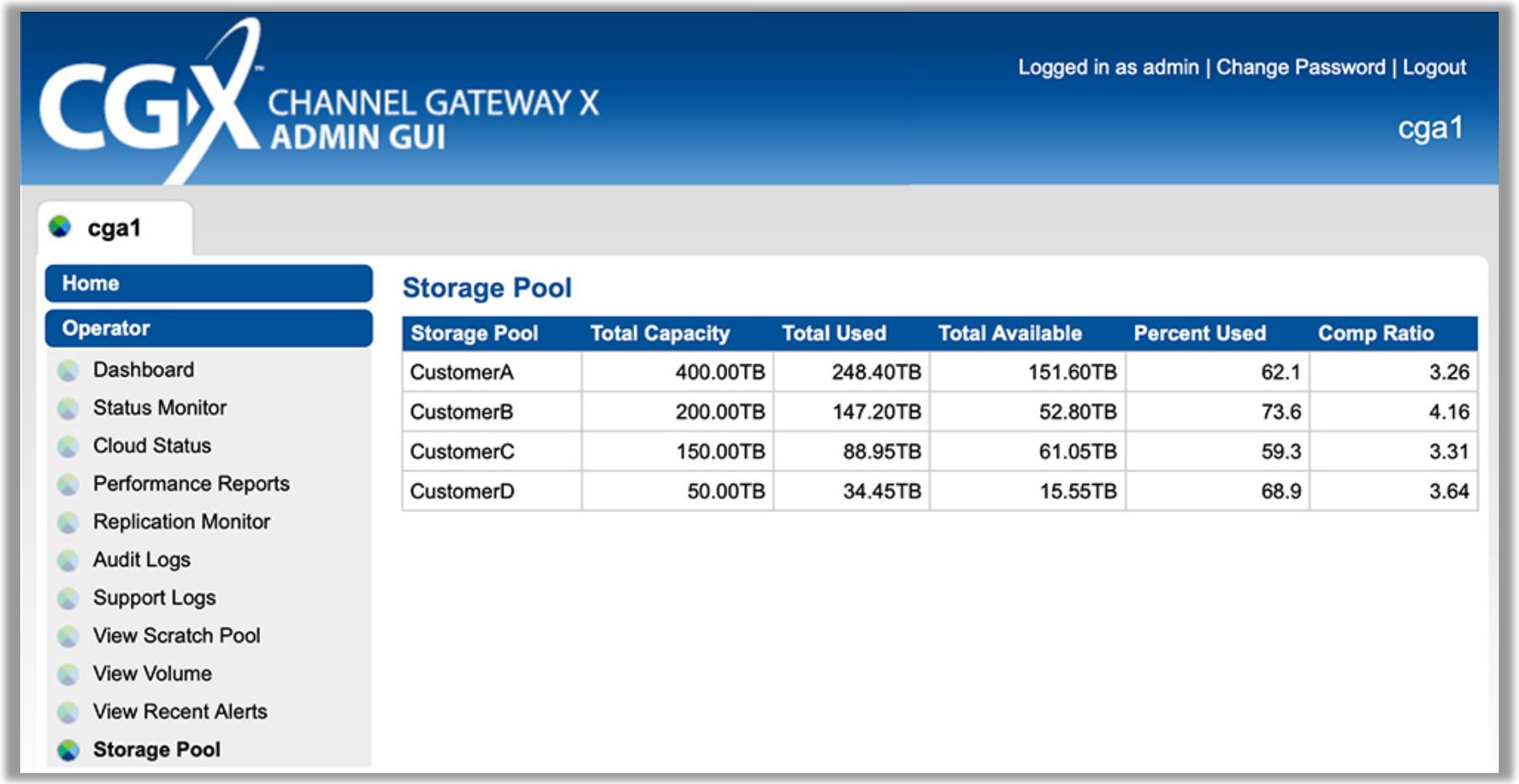
- Status Monitor for Associated Devices
- Replication Monitor
- Replication Audit Logs
- View Scratch Pools
- View/Search Volumes
- Capacity Information
- Compression Rates
- Load/Unload Tape
- VOLSER methods
- DR Methods
- Inventory Audit
- Admin Settings

Global View

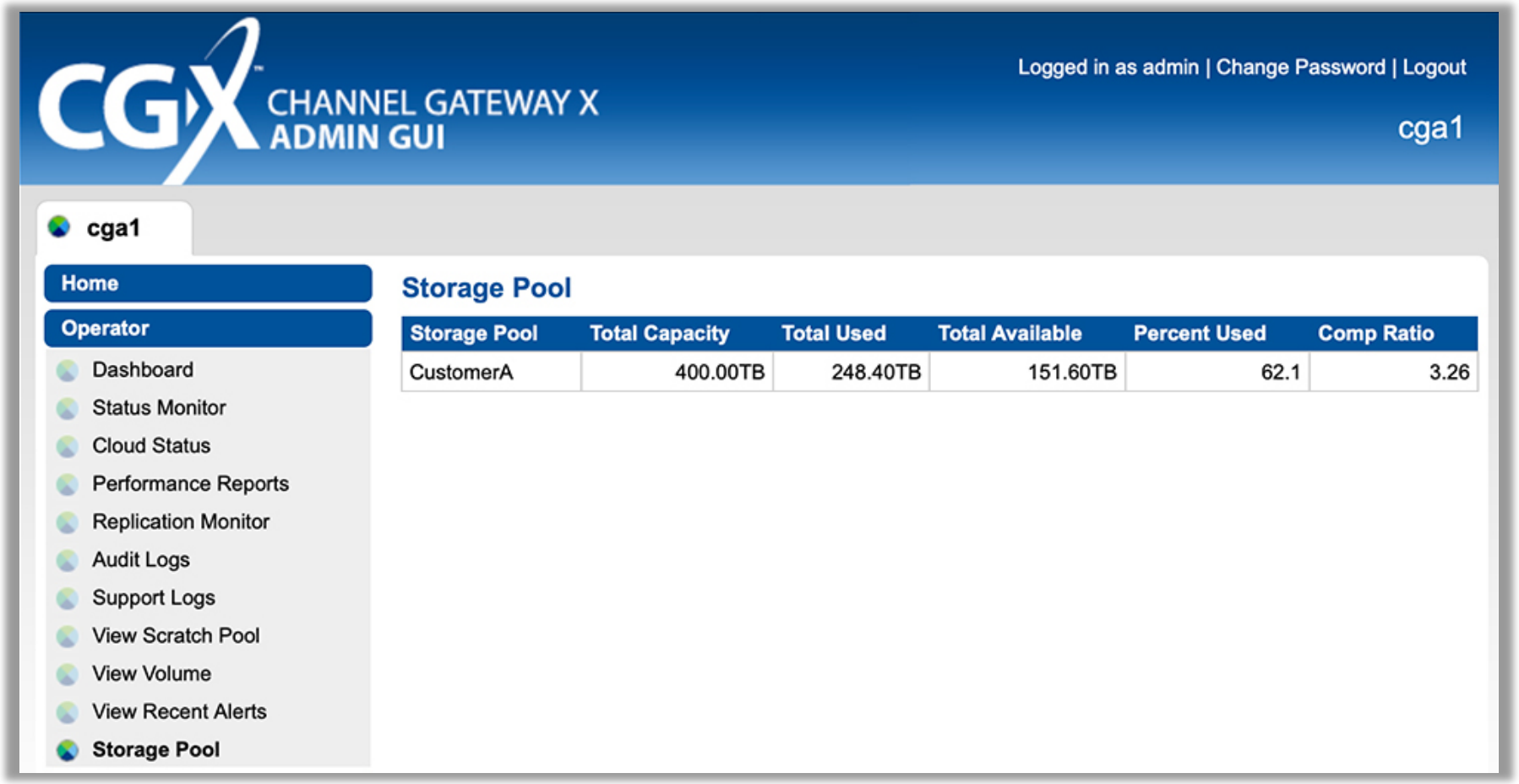
Display Extended to All Storage Pools

- All of the Storage Pool Level view functionality
- See all of the **storage pools** configured on the system
- **Execute operational commands**, such as restarting the MVT
- See **historical and real-time global performance statistics,** such as I/O or network rates
- Generate and download **support logs**
- View and modify **alert settings**
  - This does not imply that alert thresholds cannot be distinct among tenants, only that the management of alerts is done by the Global administrator

Multitenant GUI – Global View

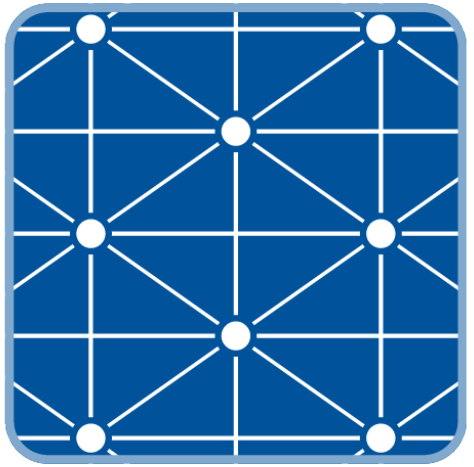


Multitenant GUI – Storage Pool Level View



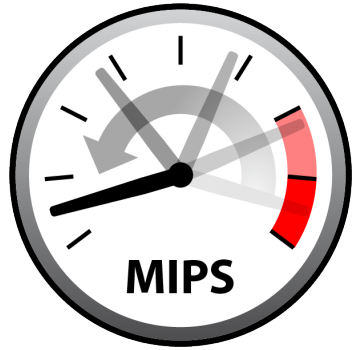
Synchronous Tape Matrix (STM)

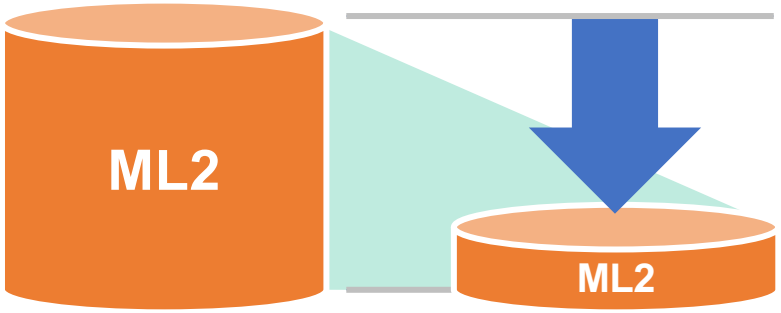
- Continuous Availability
  - Resilient architecture instantly and automatically adjusts to multiple failures without interruption
  - Data is always available for I/O
  - No downtime from failover or restore processes
- No mainframe components or processes to manage
- No idle components to buy
  - All 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 heterogeneous storage systems and data reduction technologies



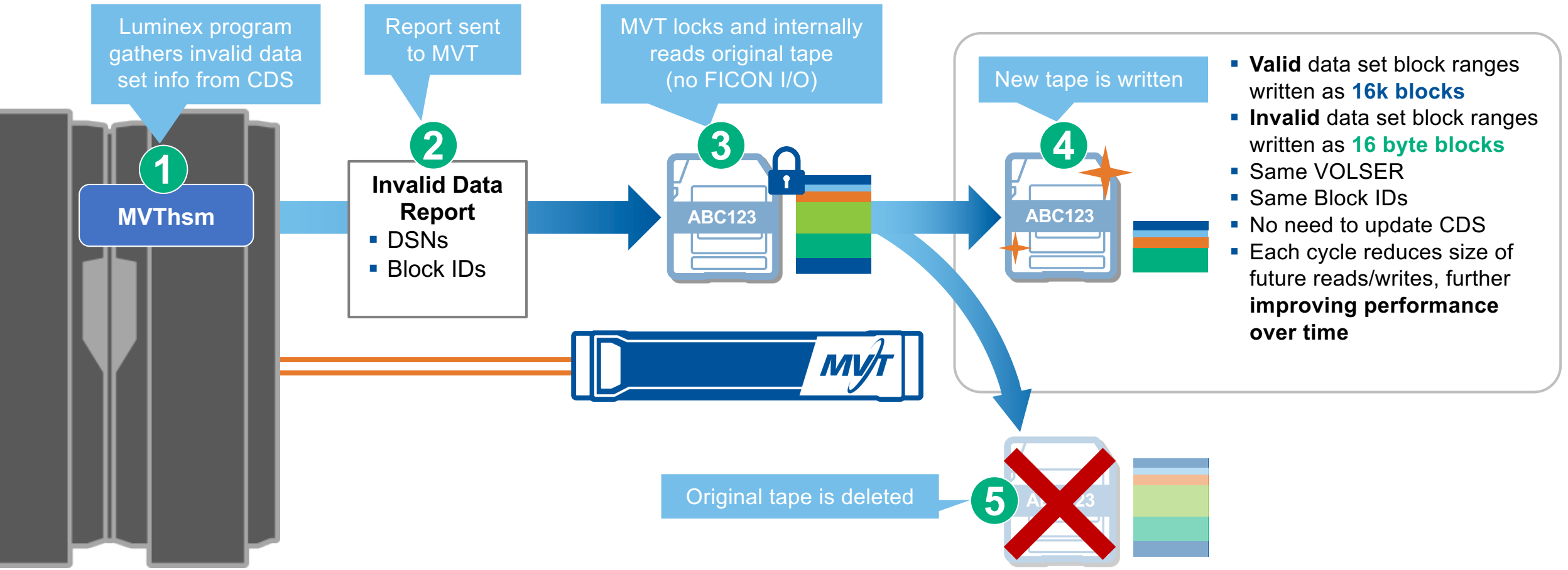
MVThsm: Off-Host HSM Recycle

- Optimize HSM ML2 tape capacity off-host
  - No FICON I/O, done entirely within the tape system itself
  - Reduces expired data set space usage by 99.9%
- VOLSER and block IDs remain the same
  - No need to update the HSM Catalog Data Set
    - The **most CPU-intensive aspect** of the HSM Recycle process
- Performance continues to improve
  - Tapes get smaller with each cycle
    - Faster cloning process
    - Smaller tapes replicate faster
- Effectively reduces tape storage capacity requirements
  - Reduced reliance on mainframe resources = more frequent optimization = less total capacity required
  - Existing users can delay storage upgrades
  - New users can move existing tape workloads into a smaller capacity/lower cost tape system





MVThsm: Process



MVThsm: Tape Layout Before and After

VOLSER ABC123: 1,000,000 blocks @ 16 KB each = 16 GB

BEFORE RECYCLE

50,000 blocks @ **16 KB** each
= **800 MB**

100,000 blocks @ **16 KB** each
= **1,600 MB**

VOLSER ABC123: 1,000,000 blocks @ 16 KB or 16 byte block sizes = 13.6 GB

AFTER RECYCLE

DSN1
50,000 blocks @ **16 bytes** each
= **0.8 MB**

DSN3
100,000 blocks @ **16 bytes** each
= **1.6 MB**

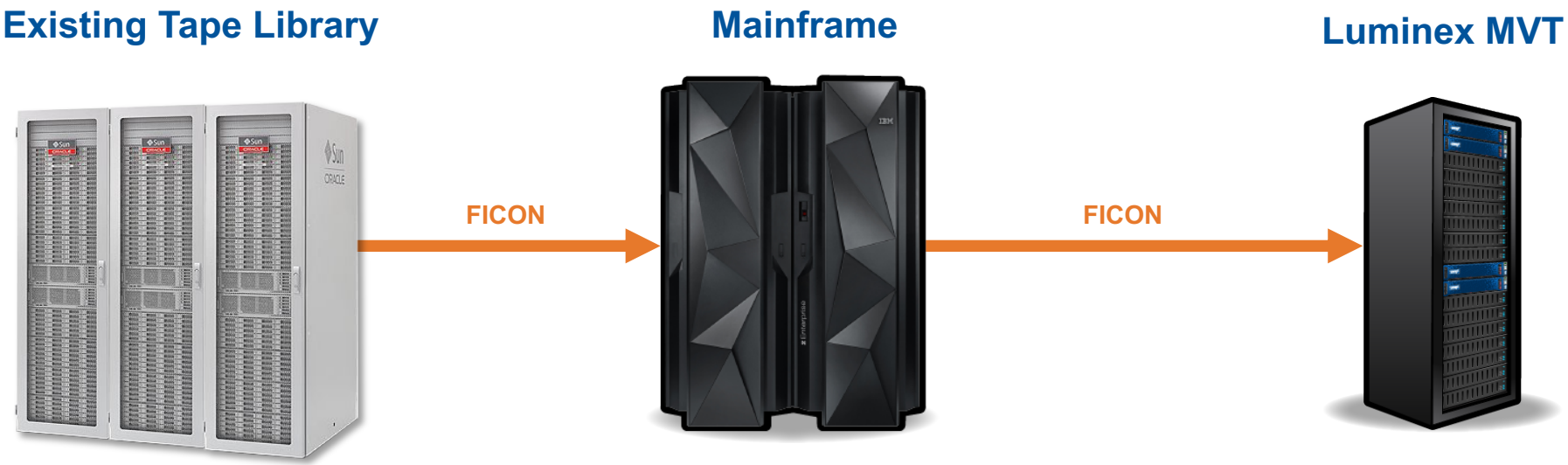
850,000*16 KB = 13.6 GB
150,000*16 bytes = 0.0024 GB

Total = 13.6024 GB

- Same VOLSER
- Same Block IDs

Luminex Tape Migration Services

Quick, efficient and non-disruptive tape migration with detailed reporting



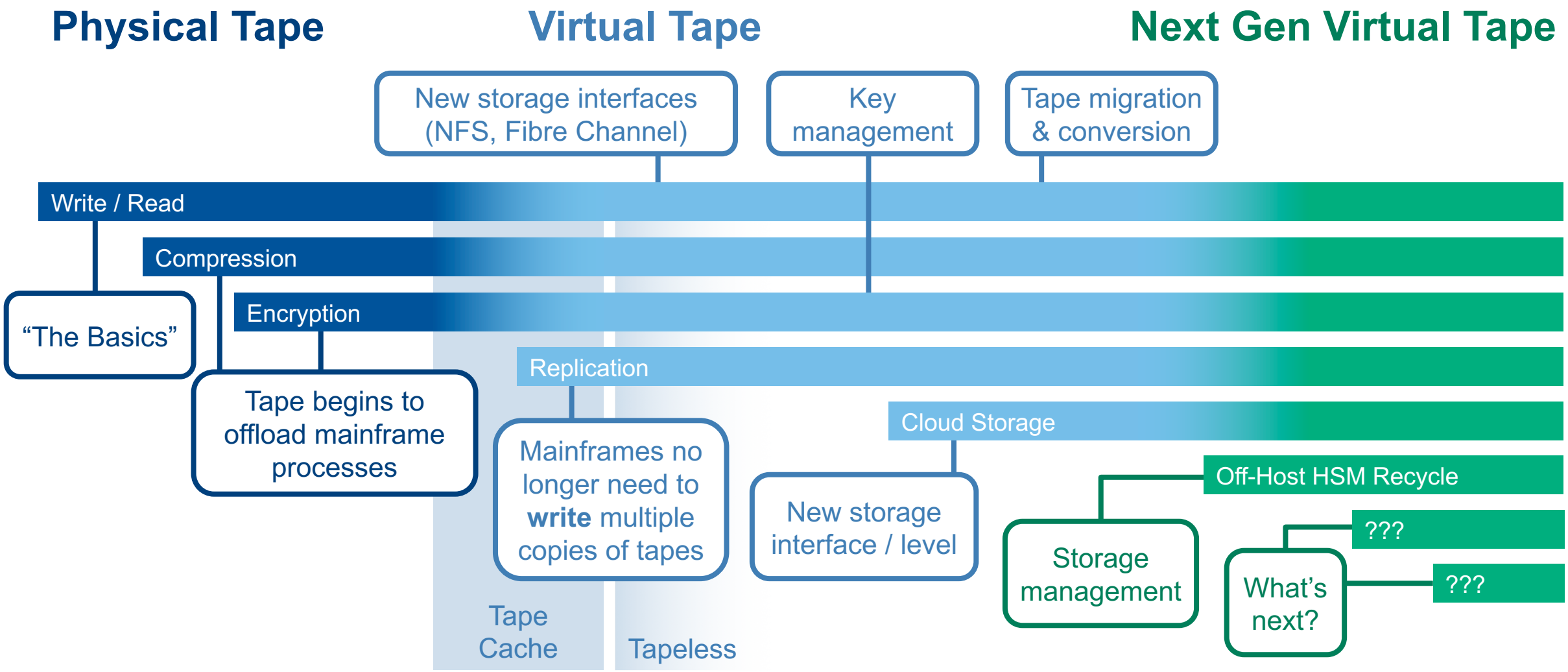
Migration Process

- Assessment
- Statement of Work
- Execution

- MIPS-friendly started task
- Fully compatible with existing MVS or tape management system catalogs
- Copies one or more tape volsers in parallel

- **Exact copies of original VOLSERs**, including labels, unusual tape mark combinations and any data beyond last tape mark
- Automatically tracks VOLSERs that have been copied, that have not, and that need to be re-copied
- Can be ramped up or down

Expect More: Mainframe Tape Continues to Take On New Workloads

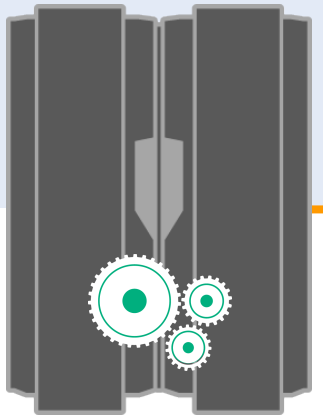


From Virtual Tape… *to Virtually Anywhere*

VIRTUAL TAPE

DATA INTEGRATION

Source



- Data Integration Control Software
- Listener

FICON

FICON

Controller

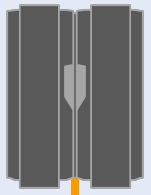
- Compression
- Encryption
- Replication
- Push Button Disaster Recovery
- Tape Migration & Conversion
- Cloud Connectivity
- HSM Recycle

- Data Movement
- Communications
- Translation / Conversion

Internal SAS, FC,
1 or 10 GbE

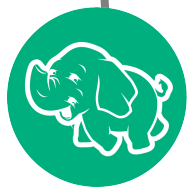
1 or 10 GbE

Target



MVT, CGX,
MVT Vault

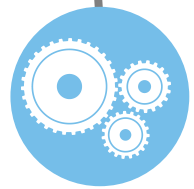
Object Storage/
Cloud



Hadoop

NFS

FTP/SFTP



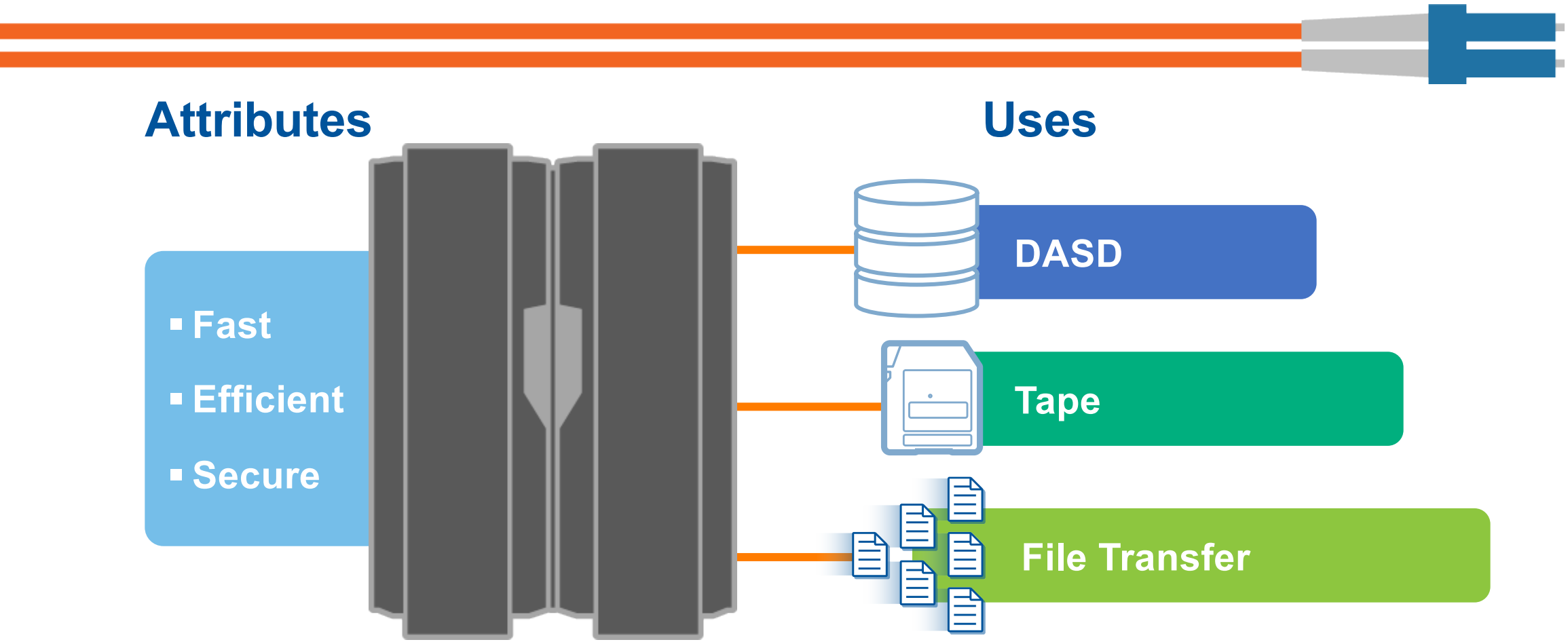
MXG

Kafka

Source / Target | **Controller** | **Source / Target**

MDI: FICON-based Data Movement and Communications

FICON was designed *specifically for the mainframe*



SecureTransfer: Using FICON as a Secure Data Path

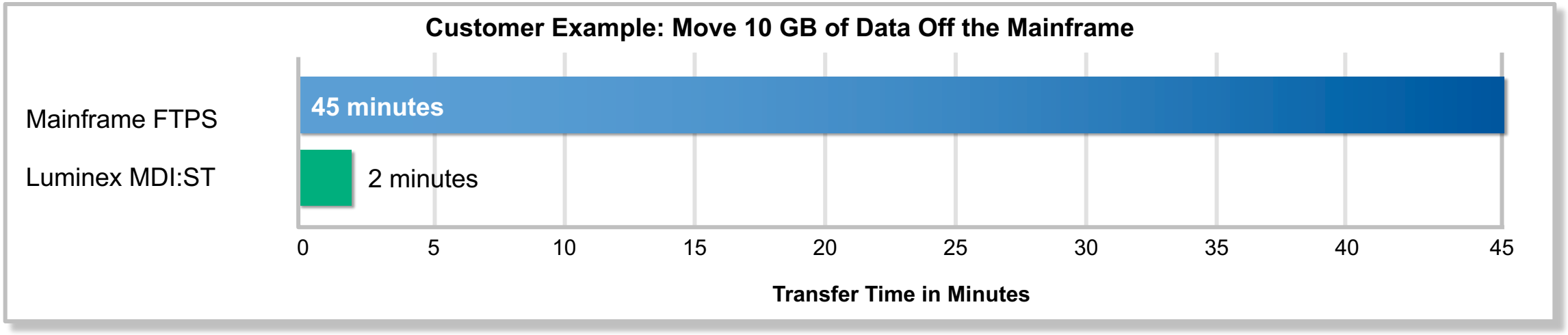
"If you replace mainframe FTP with a channel/**FICON** based solution, you can mitigate FTP security issues a great deal, if not remove them completely. This is the real benefit of a solution such as MDI SecureTransfer."

Mark Wilson
Technical Director
RSM Partners

www.rsmpartners.com

Top File Transfer Challenge: SPEED

- Faster Data Transfer Rate
  - The FICON connection between the mainframe and the MDI platform copies large data files off the host faster and more securely than TCP/IP based protocols



- Large files are no longer an issue

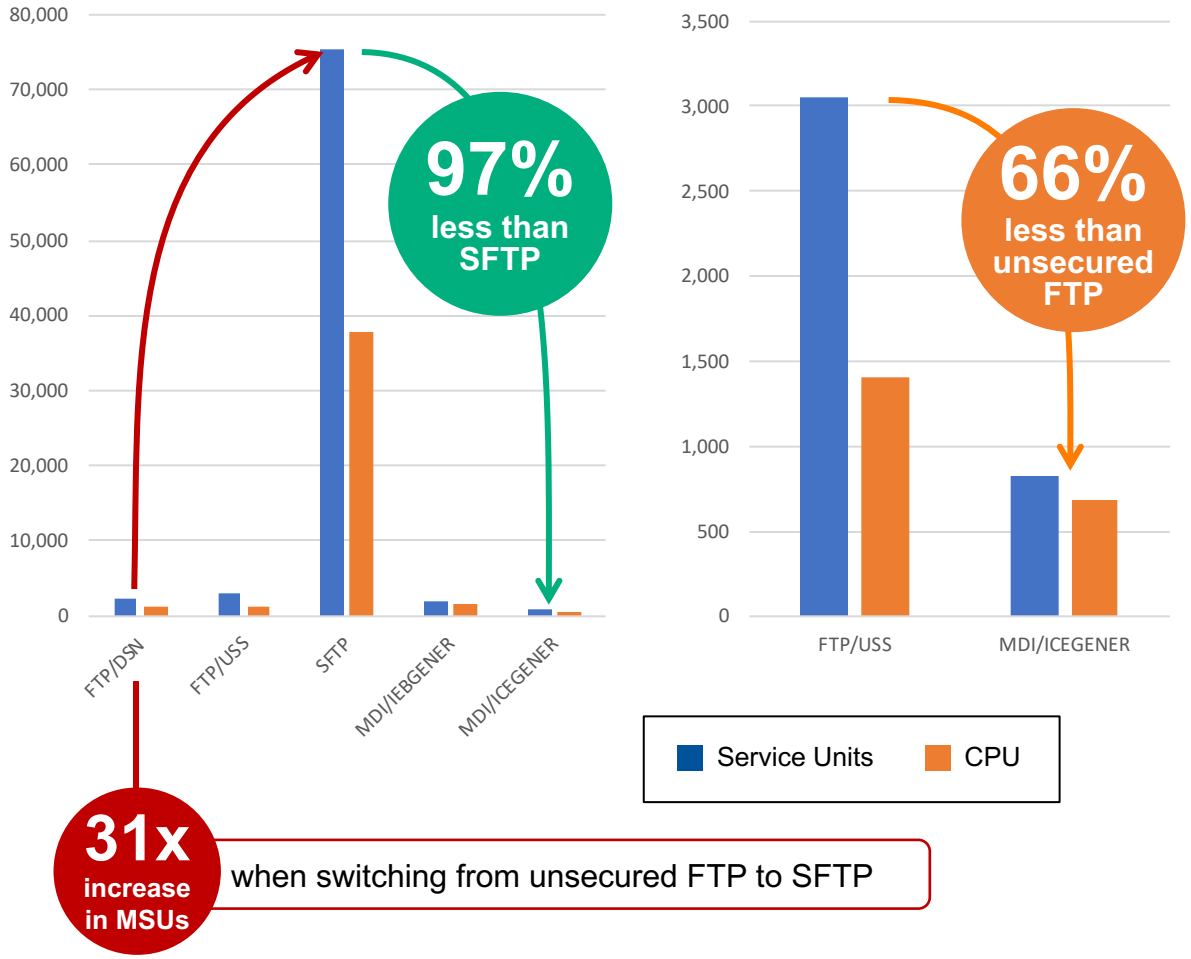
FICON vs. TCP/IP: Benchmark Testing

30 MB File

Method	Job	Program	Elapsed	Service Units	CPU
FTP from DSN	BNCHMRK1	FTP	0:00:15.32	2403	1280
(Clear Text)			**0:00:15.32**	**2403**	**1280**
FTP from USS	BNCHMRK2	FTP	0:00:13.96	3060	1409
(Clear Text)			**0:00:13.96**	**3060**	**1409**
SFTP	BNCHMRK3	login	0:00:00.10	150	135
(Encrypted)	BNCHMRK3	tty	0:00:00.02	140	119
	BNCHMRK3	sftp	0:00:00.14	340	317
	BNCHMRK3	ssh	0:00:06.27	68463	34493
	BNCHMRK3	sftp	0:00:08.41	6106	2363
	BNCHMRK3	SH	0:00:08.47	213	163
	BNCHMRK3	BPXBATCH	0:00:08.77	129	107
			0:00:32.18	**75541**	**37697**
MDI/IEBGENER	BNCHMRK4	IEBGENER	0:00:03.24	2010	1407
	BNCHMRK4	LUMXPROC	0:00:09.34	156	134
			0:00:12.58	**2166**	**1541**
MDI/ICEGENER	BNCHMRK5	ICEGENER	0:00:00.79	667	550
	BNCHMRK5	LUMXPROC	0:00:09.19	151	131
			0:00:09.98	**818**	**681**

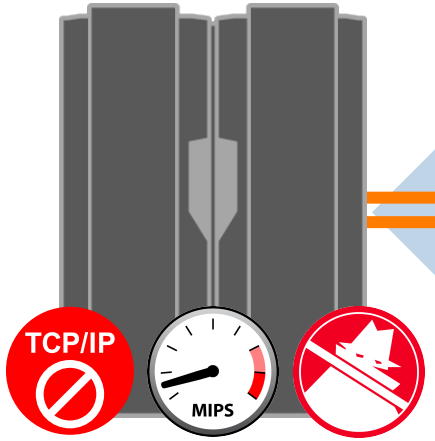
Benchmarks performed on z13 Model 2965-N10 using SMF Type 30 records

MDI System Resources Savings



MDI is a Data Transfer & Co-Processing Platform

Mainframe FICON

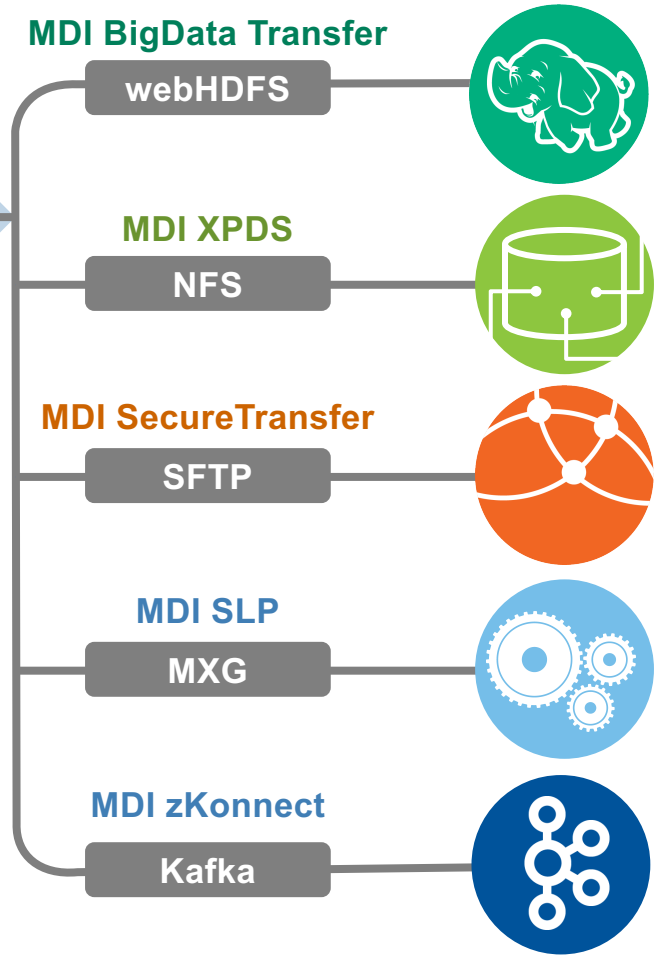


- Secure
- High speed
- Efficient, redundant I/O channels

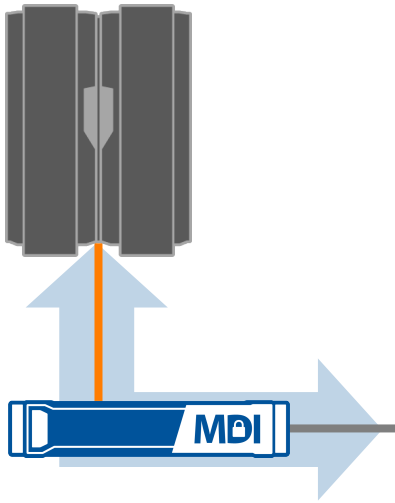
MVT or Dedicated MDI Platform

- Profile-based architecture for extending processing & interface capabilities
- High speed, scalable transfer rates
- SAF integration & protocol-based encryption
- Bi-directional movement and communication for multi-platform workflows and co-processing
  - Including data translation from EBCDIC to ASCII and between character sets

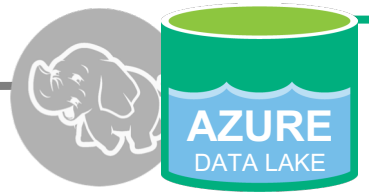
Data Sharing Targets/Sources



How MDI is Used

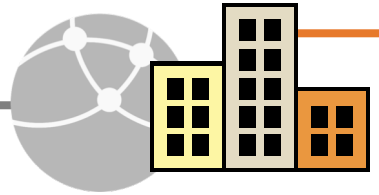


MDI BigData Transfer
webHDFS

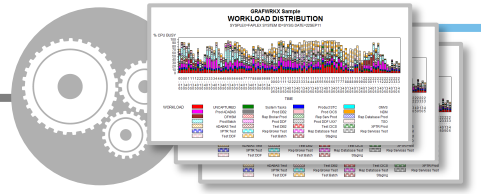


MDI XPDS
NFS

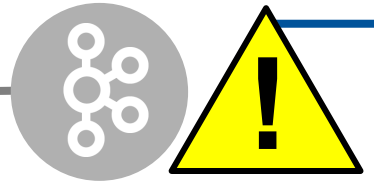
MDI SecureTransfer
SFTP



MDI SLP
MXG



MDI zKonnect
Kafka



SAMPLE USE CASES

Insurance Provider
Data aggregated into an Azure Data Lake with data from distributed systems, then used for risk analysis by actuaries

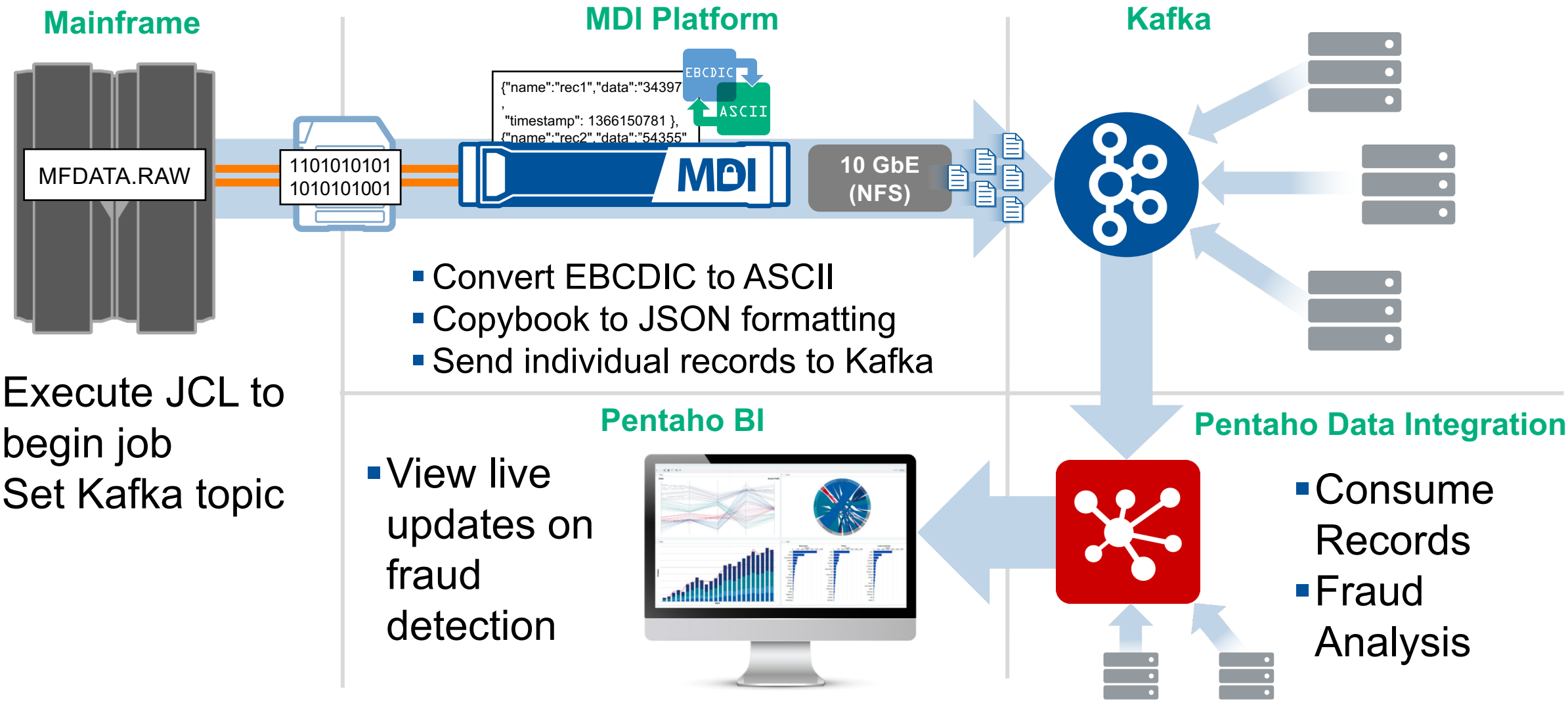
Financial Services
DB2 dumped into Apache Ignite, transformed/ sorted off-host, then imported back into DB2 on the mainframe

Bank
Files securely, efficiently and simply shared with business partners via off-host encryption, compression and data movement over SFTP

Transportation & Logistics Company
SMF data sent to MDI co-processor, reports generated with MXG off-host, then copies are sent back to mainframe ISPF and to Capacity Planning team via email

Transaction Processor
Credit card transactions sent to Kafka for near-real time fraud analysis and alert processing

MDI and Pentaho: Streaming with Kafka



What's Next

- Add Near-real-time processing in addition to batch with zKonnect Mainframe Kafka Producer
  - LUMXPROC - Batch output written to Kafka (tape volser vmethod)
  - XWRITER - JES2 spool files (output data) written to Kafka in near-real time
  - Log Receiver - System and Application log steams to Kafka in near-real time
  - SMF Receiver - SMF log streams sent to Kafka in near-real time
- Customer-driven integrations for off-host processing such as MDI with Hitachi Pentaho Analytics Platform
- Expand and Secure Integrated Processing to complex mainframe Actions that are not REST API enabled

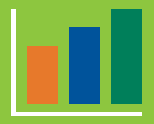
MDI: A Better Alternative for Mainframe Data Movement

Secure

- More secure than TCP/IP on the mainframe
- Reduce/eliminate open ports on the mainframe
- SAF integration

Fast

- Move data where, when and as often as you want it
- Unmatched transfer rates, scales to the largest data centers
- No bottlenecks or need to “time shift” workloads



Better Business Analytics

- No more silos
- On-demand access to data
- Include “Big Value Data” in enterprise-wide analytics, including Azure

Efficient

- Reduce CPU overhead for mainframe TCP/IP
- Reduce CPU overhead for encryption/translation

Cost-Effective

- Avoid expensive mainframe upgrades by offloading workloads
- Reduce software licensing costs
- Licensing not based on MIPS/MSUs

Luminex MVT: Expect More from Mainframe Virtual Tape

PROTECT

- **STM**: Continuous availability for tape
- **Replication**: One-to-many, cascading, cloud
- **Push Button DR** with non-disruptive testing
- **CloudTAPE**: Archiving and virtual air gap
- **CGSafe**: Encryption & key management
- **MVT Vault**: Standalone replication target
- **SecureTransfer Express**: Easy and secure alternative to mainframe FTP (Port 21)

MANAGE

- **RepMon**: Replication monitoring & reporting, including cloud versioning, tiering status & metadata
- **MVThsm**: Reclaim ML2 tape capacity without mainframe MSUs
- **Multitenancy**: Manage multiple, separate tape workloads at a global or tenant level

LEVERAGE

- **MDI Ready**: Off-host data movement and co-processing platform for a “Connected Mainframe”
- **SecureTransfer Express:** Managed file transfer between mainframes and distributed systems
- **DataStream Intelligence**: Metadata in the cloud

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This is the three digit number on the bottom of your delegate badge

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1 to 4 = "Too Short" 5 = "OK" 6-9 = "Too Long"

1 2 3 4 5 6 7 8 9

3. Did this presention meet your requirements?

1 to 4 = "No" 5 = "OK" 6-9 = "Yes"

1 2 3 4 5 6 7 8 9

4. Was the session content what you expected?

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1 2 3 4 5 6 7 8 9