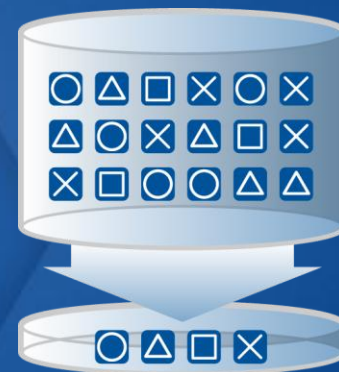# SHARE Lunch & Learn #15372

Data Deduplication Makes It Practical to Replicate Your Tape Data for Disaster Recovery

Scott James
VP Global Alliances
Luminex Software, Inc.

Randy Fleenor
Worldwide Data Protection Management
IBM Corporation

Mike Soursby
Systems Operations Supervisor
Kawasaki Motors Corp., U.S.A.

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Discussion Topics

- Data Deduplication: "It's not just for reducing storage requirements"

- Typical Customer Goals & Requirements

- Luminex Tape Analysis & Sizing
  - For Tape Data Replication

- ProtecTIER Mainframe Edition (ME)
  - ProtecTIER Configuration Options
  - Here Is How It Works…
  - Replication Monitoring (RepMon)
  - Push Button DR
  - Tape and Media Migration

- Kawasaki Motors Corp., USA
  - A User's Perspective

- What Can ProtecTIER ME Do For You?
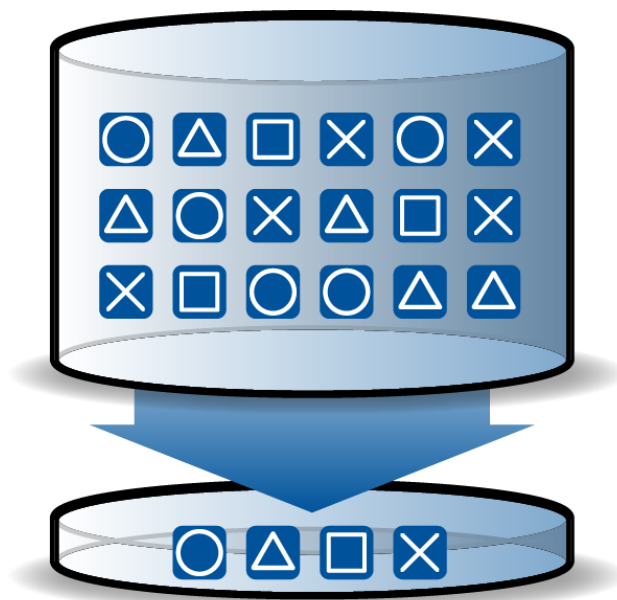
Data Deduplication: It's not just for reducing storage requirements

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

Host Activity   **Deduplication**   **Replication**

Host Data

Replicated Data

WAN

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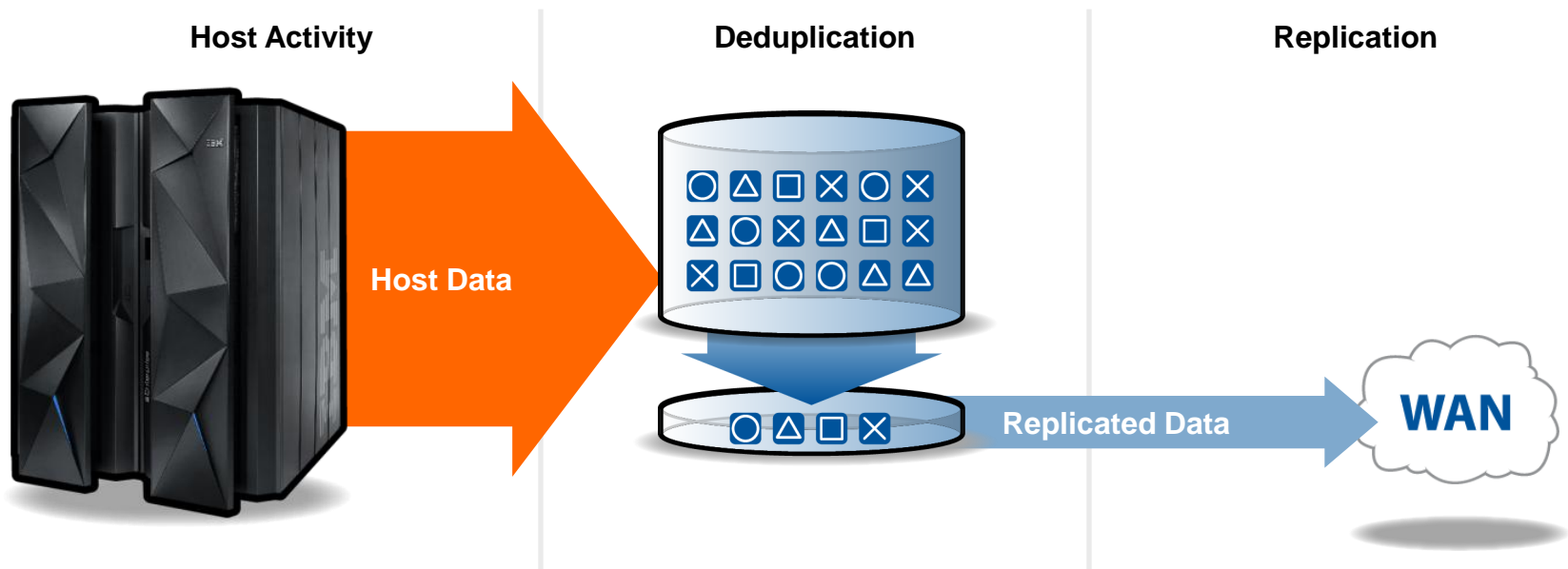
Customer Goals and Requirements
Virtual Tape Solutions with Deduplication
It's Not Just for Replication for DR

Replication of Tape Data for DR	**Replace Aging Infrastructure**	**Improve Data Security**
Reduce or Eliminate Physical Tape	**Increase Performance/ Efficiency**	**Higher Availability**
Reduce Costs	**Improve Disaster Recovery Plan**	**Common Storage Infrastructure**

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Luminex At-A-Glance

- Enterprise-class solution vendor focused on mainframe virtual tape

- 25+ years delivering mainframe virtual tape solutions worldwide

- Installed in all major industries on 6 continents

- Solutions scale seamlessly from entry level to multi-PB data centers

- ***The clear majority*** of mainframe deduplication customers rely on Luminex Channel Gateways/CGX

Sizing – Storage Capacity Requirements
TMC Analysis

Program	Description	Category	Capacity (GB)	Comp. Rate	Comp. Capacity (GB)	Dedupe Rate	Dedupe Capacity (GB)
ARCCTL	IBM DFSMShsm Migration	Archive and Compliance	27,018.30	3.00	9,006.10	8.00	3,377.29
IDCAMS	IBM VSAM Utility (Define, Repro, Export, etc.)	Backup and Recovery	22,177.91	3.00	7,392.64	15.00	1,478.53
ADRDSSU	IBM DFSMSdss Full Volume / File Disk Backup Utility	Backup and Recovery	3,559.18	3.00	1,186.39	15.00	237.28
IFASMFDP	IBM SMF Data Offload Utility	Archive and Compliance	3,413.77	3.00	1,137.92	8.00	426.72
SAS	SAS Institute, Inc. Statistical Analysis Program	Primary Operational	1,829.80	3.00	609.93	8.00	228.73
DSNUTILB	DB2 Utilities (Load/Unload, etc.)	Backup and Recovery	1,805.20	3.00	601.73	15.00	120.35
IEBGENER	IBM Sequential File Copy Utility	Primary Operational	919.44	3.00	306.48	8.00	114.93
BAKPROD8		Other	431.96	3.00	143.99	8.00	54.00
DRCPYDAT		Other	302.47	3.00	100.82	8.00	37.81
SORT	IBM SORT Utility	Primary Operational	291.78	3.00	97.26	8.00	36.47
Other		Other	1,943.64	3.00	647.88	8.00	242.96
		Summary	**63,693.45**	**3.00**	**21,231.15**	**10.02**	**6,355.05**

Legend:
- Archive and Compliance
- Backup and Recovery
- Primary Operational
- Other
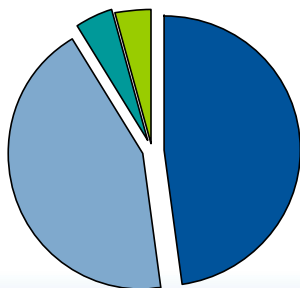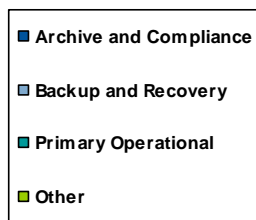
Uncompressed Capacity   Compressed Capacity   Deduplicated Capacity

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Sizing – Network Bandwidth Requirements
TMC & SMF Analysis

Gigabytes Created by Day
Host versus Compressed versus Dedup

2,099 GB

700 GB

140 GB

2,099.26

1,171.77

699.73

390.58

139.95

88.27

Host_GB
Compressed_GB
Dedup_GB

<-- Least Recent -- Date Created -- Most Recent -->

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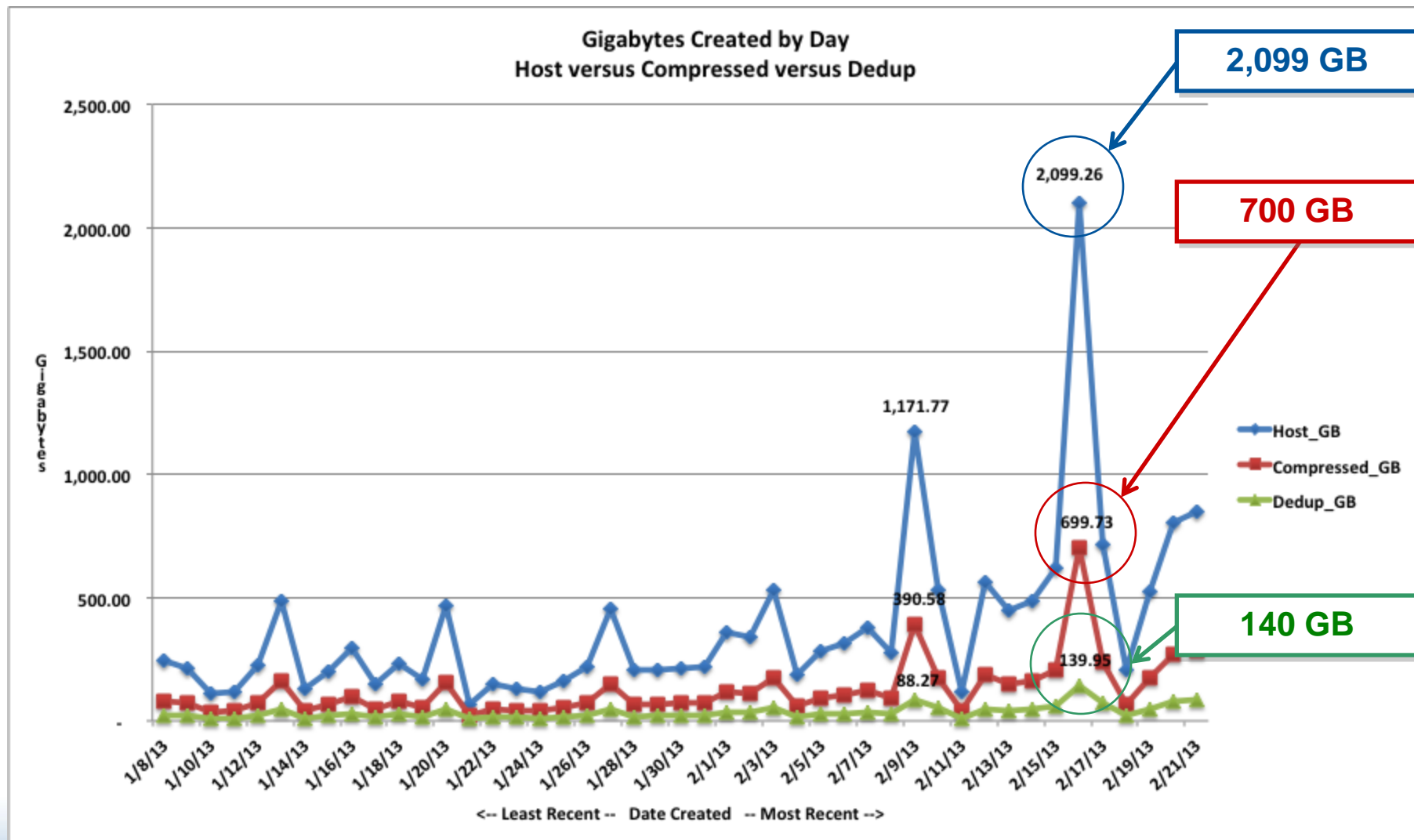
What Can Dedupe Do For You?
100 TB Tape Catalog Example

100 TB of Virtual Tape Data

1 TB of Daily Backup Data

100 TB of Virtual Tape Data

WAN

Primary Storage Capacity Requirement

Replication Bandwidth Requirement

DR Storage Capacity Requirement

100 TB	1:1
33.3 TB	3:1
10 TB	**10:1**

1000 GB	1:1
333 GB	3:1
67 GB	**15:1**

100 TB	1:1
33.3 TB	3:1
10 TB	**10:1**

- No Compression
- Compression
- Deduplication

Note: Best Practice – Seed DR storage at the Primary Site before shipping

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How Much Bandwidth is Required?

Example: Replicate 1 TB daily

WAN Class	MB/s	GB/hr	Replication Time w/ 3:1 compression	Replication Time w/ 15:1 deduplication
DS3	5.59	19.66	16.95 hours	3.39 hours
OC-1	6.48	22.78	14.63 hours	2.93 hours
OC-3	19.44	68.34	4.88 hours	0.98 hours

If replication begins at midnight, a DS3 line will complete replication long before a courier would show up to begin transporting a physical tape.

ProtecTIER Mainframe Edition
Luminex CGX with ProtecTIER

ProtecTIER ME

- **The solution makes it practical to replicate tape data over a WAN**

- **Deduplication Tuned for the Mainframe**
  Offering performance for both reading and writing mainframe tape data

- **High Dedup Ratios**
  Coupling Luminex's DataStream Intelligence with HyperFactor allows customers to achieve much higher data deduplication rates for all mainframe data (not just full volume dumps…)

- **Open and Mainframe Synergy**
  Offers a common virtual tape storage target for both mainframes and open systems

- **Floor Space Savings**
  Utilizes existing customer racks for minimal floor space utilization.

IBM ProtecTIER Mainframe Edition

Enterprise class deduplication powered by Luminex

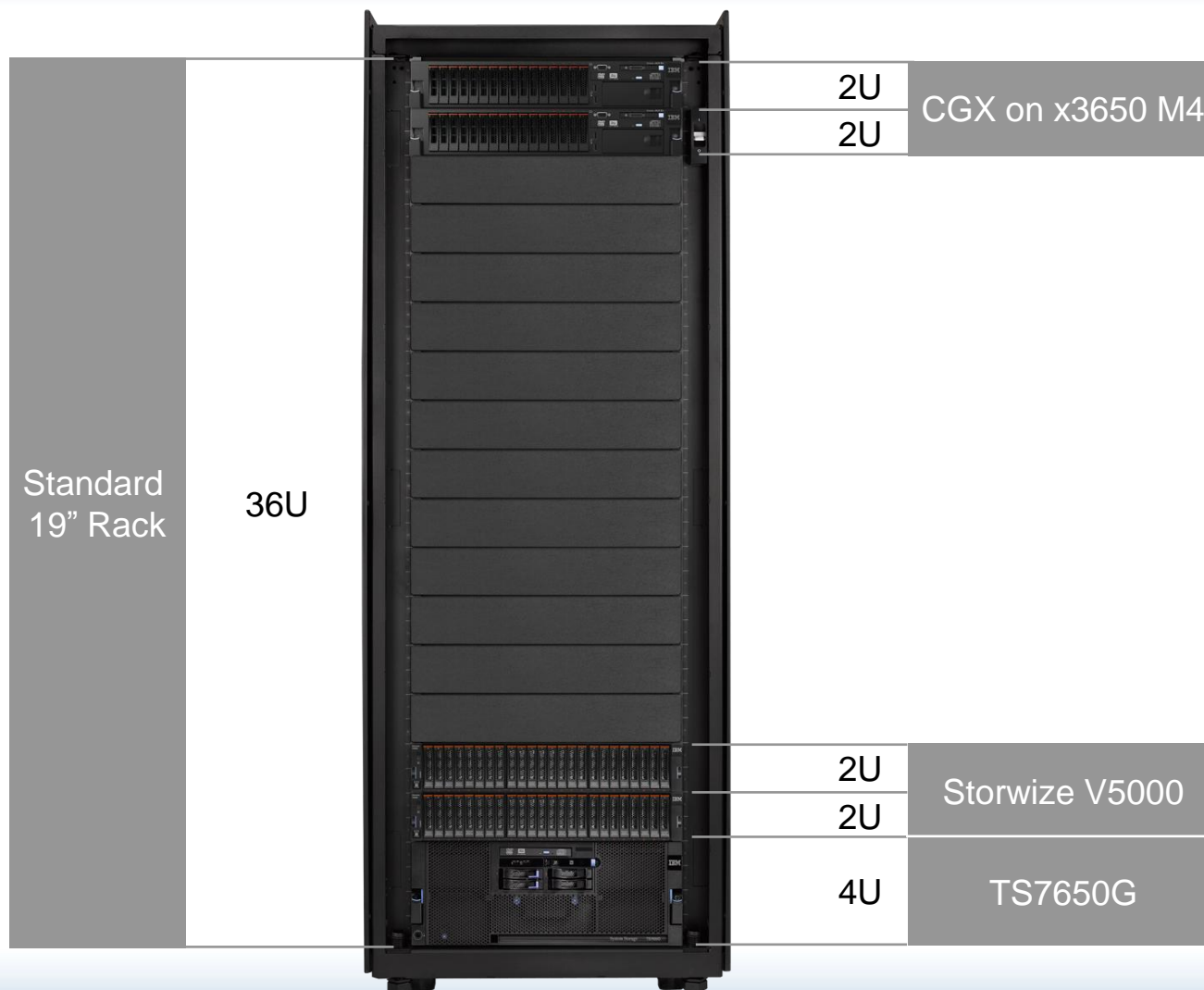| Specifications per cluster	ProtecTIER ME
Number of Virtual Devices	Up to 8192
Usable Physical Cache	Up to 1 PB
Effective Cache Capacity (15:1)	up to 15 PB
Number of Virtual Volumes	unlimited
FICON channels	1 or 4
Logical paths per FICON channel	256
8 GB FICON support	Yes

CGX with IBM System Storage ProtecTIER TS7620 Appliance

- In-Line Data Deduplication

- Automated replication capabilities

- TS7620 Appliance can provide 35TB of physical storage capacity per system

  - Up to 525TB of backup capacity with 15:1 deduplication

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CGX with IBM System Storage ProtecTIER TS7650G

- In-Line Data Deduplication

- Replication Options:

  - One-to-One, One-to-Many and Many-to-Many

- TS7650G can provide up to 1PB of physical storage capacity per system
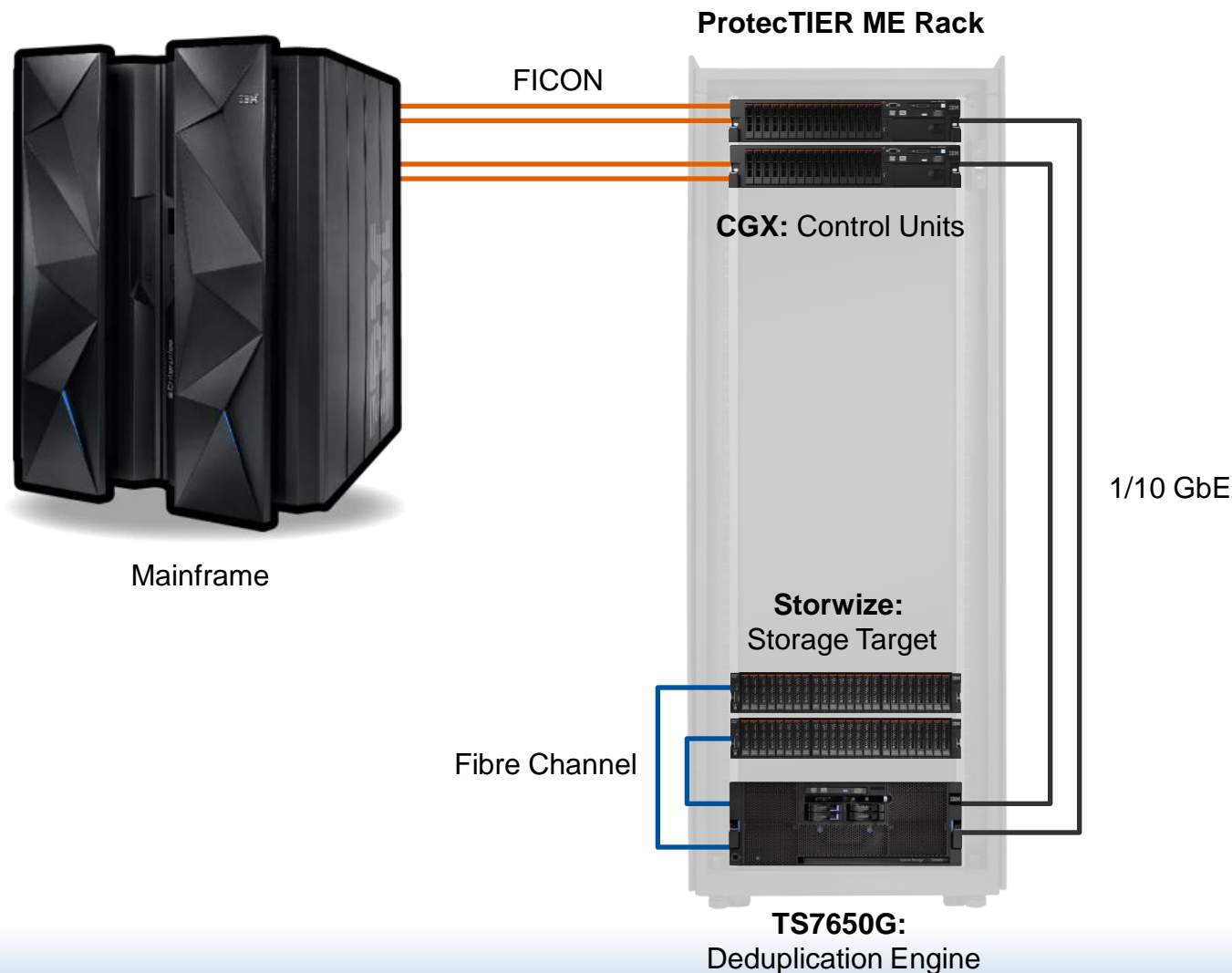
  - Up to 15PB of backup capacity with 15:1 deduplication

IBM ProtecTIER ME Rack Space
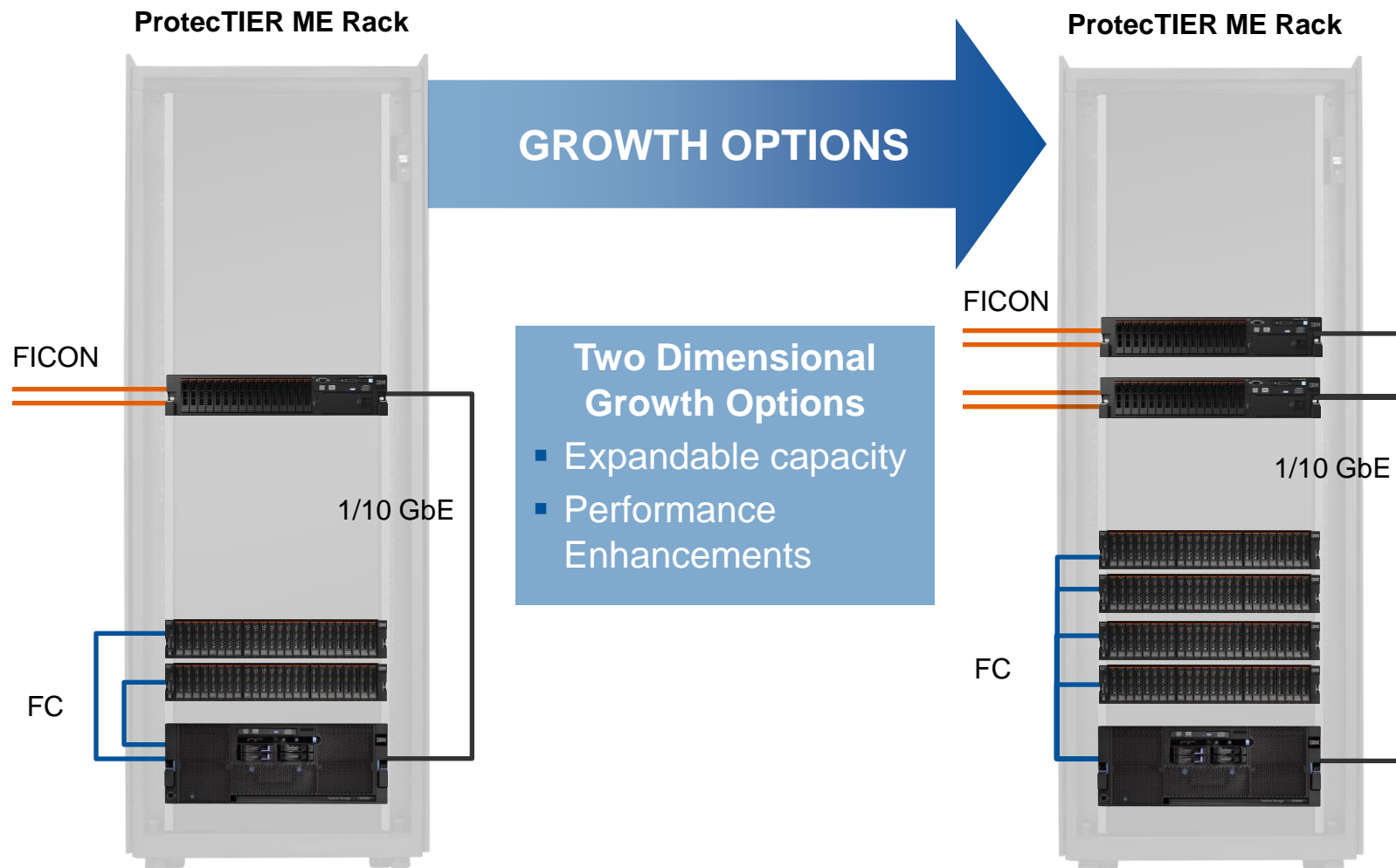## Smaller Footprint for Floor Space Savings

Standard 19" Rack

36U

2U — CGX on x3650 M4
2U

2U — Storwize V5000
2U

4U — TS7650G

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IBM ProtecTIER ME Configurations
Multiple CGXs for Redundancy

ProtecTIER ME Rack

FICON

CGX: Control Units

1/10 GbE

Mainframe

Storwize:
Storage Target

Fibre Channel

TS7650G:
Deduplication Engine

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IBM ProtecTIER ME Configurations
For Increased Capacity & Throughput

ProtecTIER ME Rack

ProtecTIER ME Rack

GROWTH OPTIONS

Two Dimensional Growth Options

- Expandable capacity
- Performance Enhancements

FICON
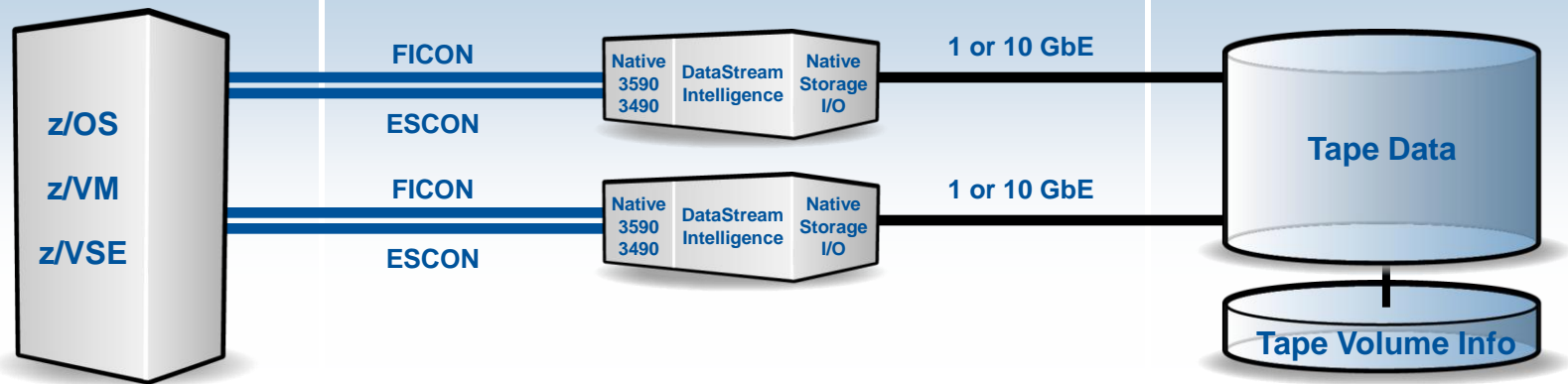
1/10 GbE

FC

FICON

1/10 GbE

FC

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Shared Infrastructure

Common open and mainframe backup and tape processing solution
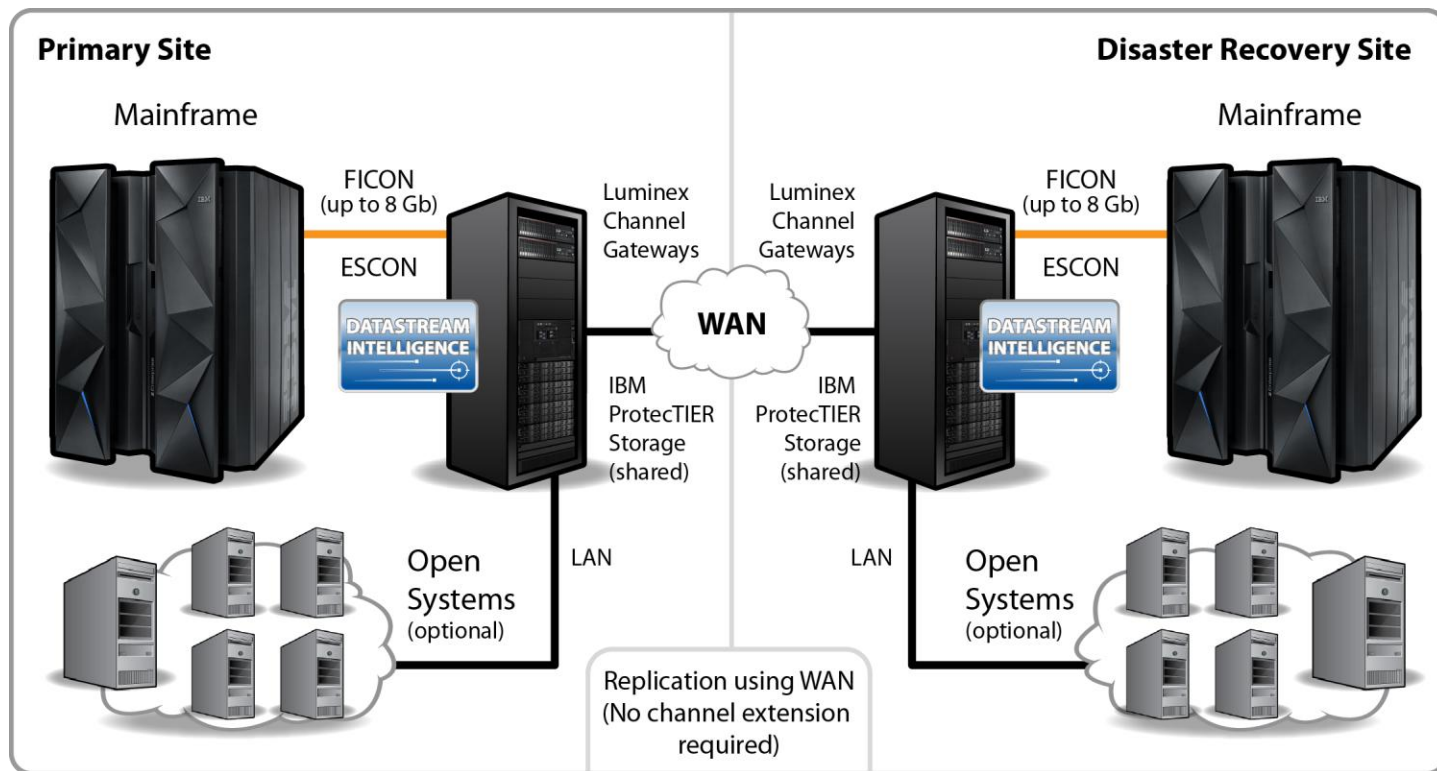
How the Solution Works
IBM ProtecTIER ME

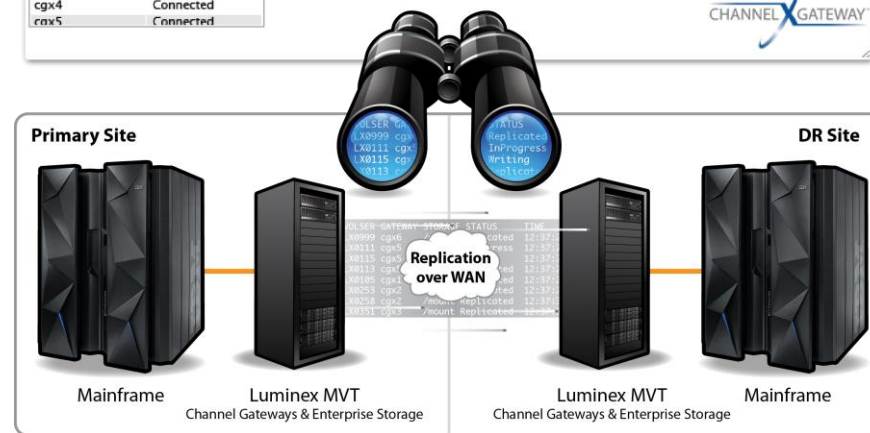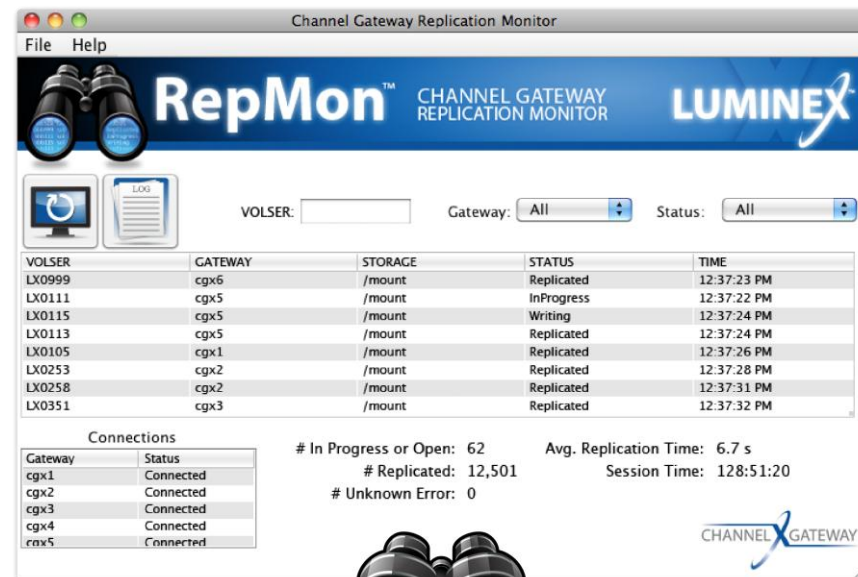| Mainframe	Luminex Channel Gateways	IBM ProtecTIER Storage
▪ Application transparent – non-intrusive	▪ Emulates 3490 or 3590 mainframe tape drives	▪ Network Attached Storage (using NFS over 1 or 10 GbE)
▪ No MIPS required	▪ "Wire Speed" up to 8 Gb FICON	▪ Mainframe tape volumes stored as standard files
▪ z/OS, z/VM and z/VSE supported	▪ DataStream Intelligence™ optimizes compression and deduplication	▪ Replication for backup/DR
▪ Works well with all major tape management systems	▪ No dependencies on separate code to modify a backup VOLSER	▪ RAID Data Protection
▪ SMS via MTL or Esoterics can be used	▪ Active – Active with NSPOF	▪ Other enterprise and modular storage systems are supported (including FC attached storage)
▪ Optional host-based software for management	▪ Modular design makes scaling throughput and/or capacity easy and cost effective	

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RepMon: Replication Monitor
(Integration with ProtecTIER ME - Q2 CY14)

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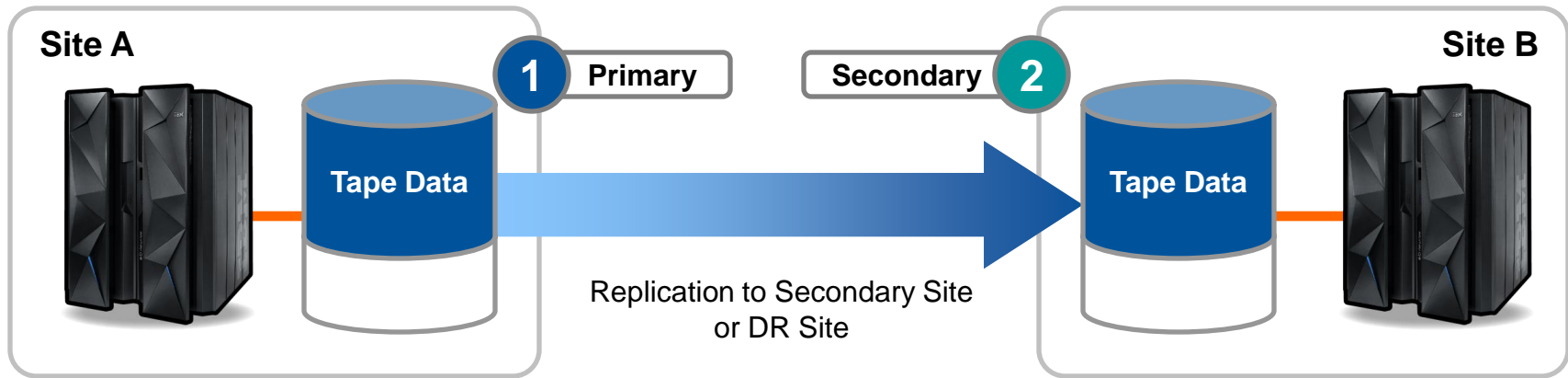
- Identifies Write and Replication Status of Mainframe Tape VOLSERs

- 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

Site A

1 Primary   Secondary **2**

Tape Data

Tape Data

Replication to Secondary Site
or DR Site

Site B

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Push Button DR Testing
Replication During DR Testing

Site A

1 Primary   Secondary **2**

Tape Data → Tape Data

Replication to Secondary Site or DR Site continues uninterrupted

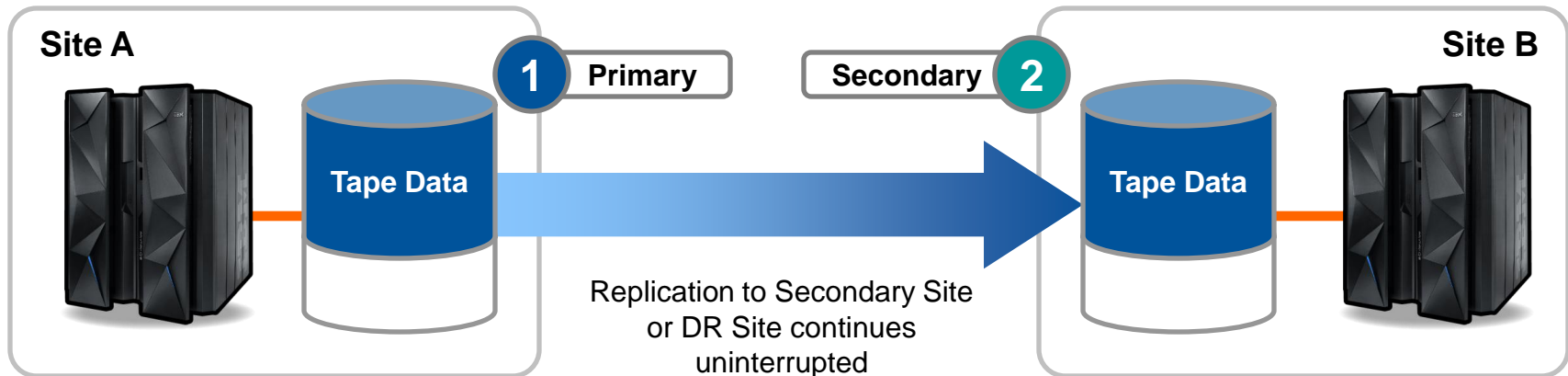DR Test Data ⇄ Read/Write Testing

Site B
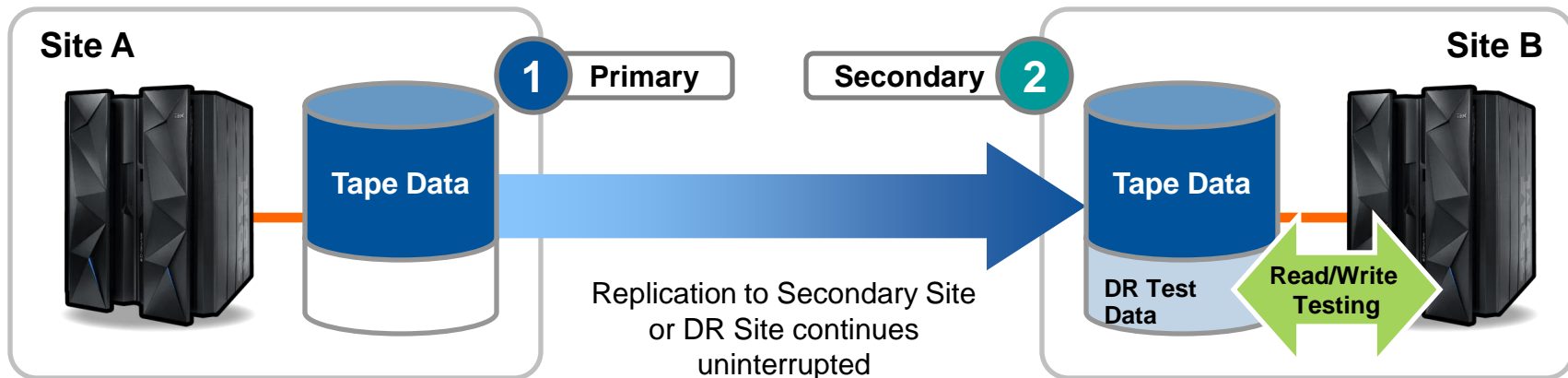
A temporary storage directory is created for read/write testing; original Tape Data remains untouched and protected.

Start DR
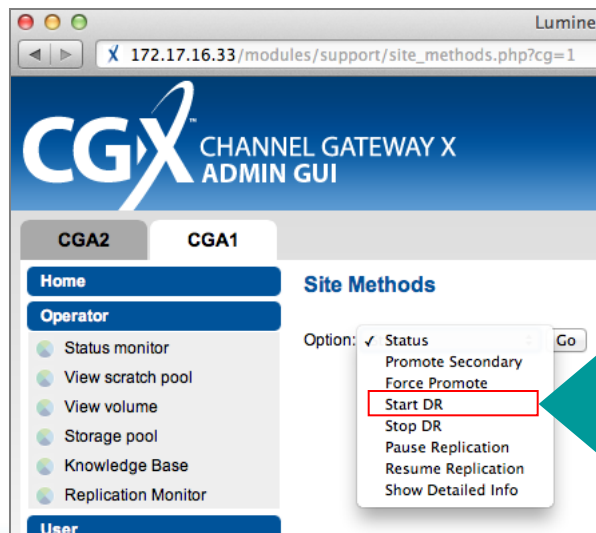
Push Button DR Testing
After DR Testing is Completed

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

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

Site Methods

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

Stop DR

User

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Tape Migration Services and Software

- **Luminex offers Tape Migration Services to migrate to ProtecTIER ME**
  - 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
- **For other Luminex virtual tape environments**
  - Luminex offers Media Migration to migrate non-disruptively to ProtecTIER

Media Migration Services & Software

For other 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

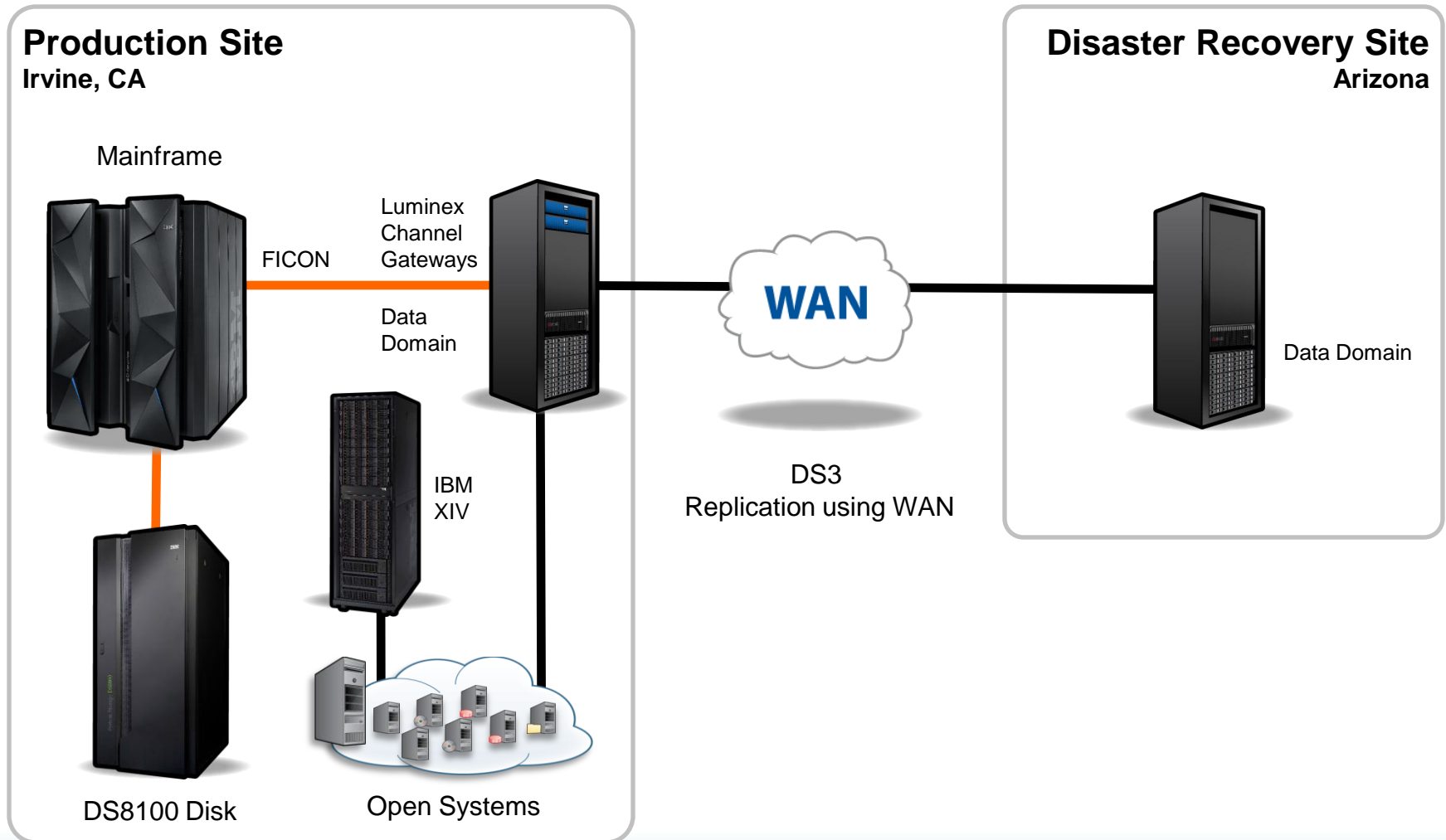# Customer Experience:
Kawasaki Motors Corp., U.S.A.

Mike Soursby
Systems Operations Supervisor
Kawasaki Motors Corp., U.S.A.
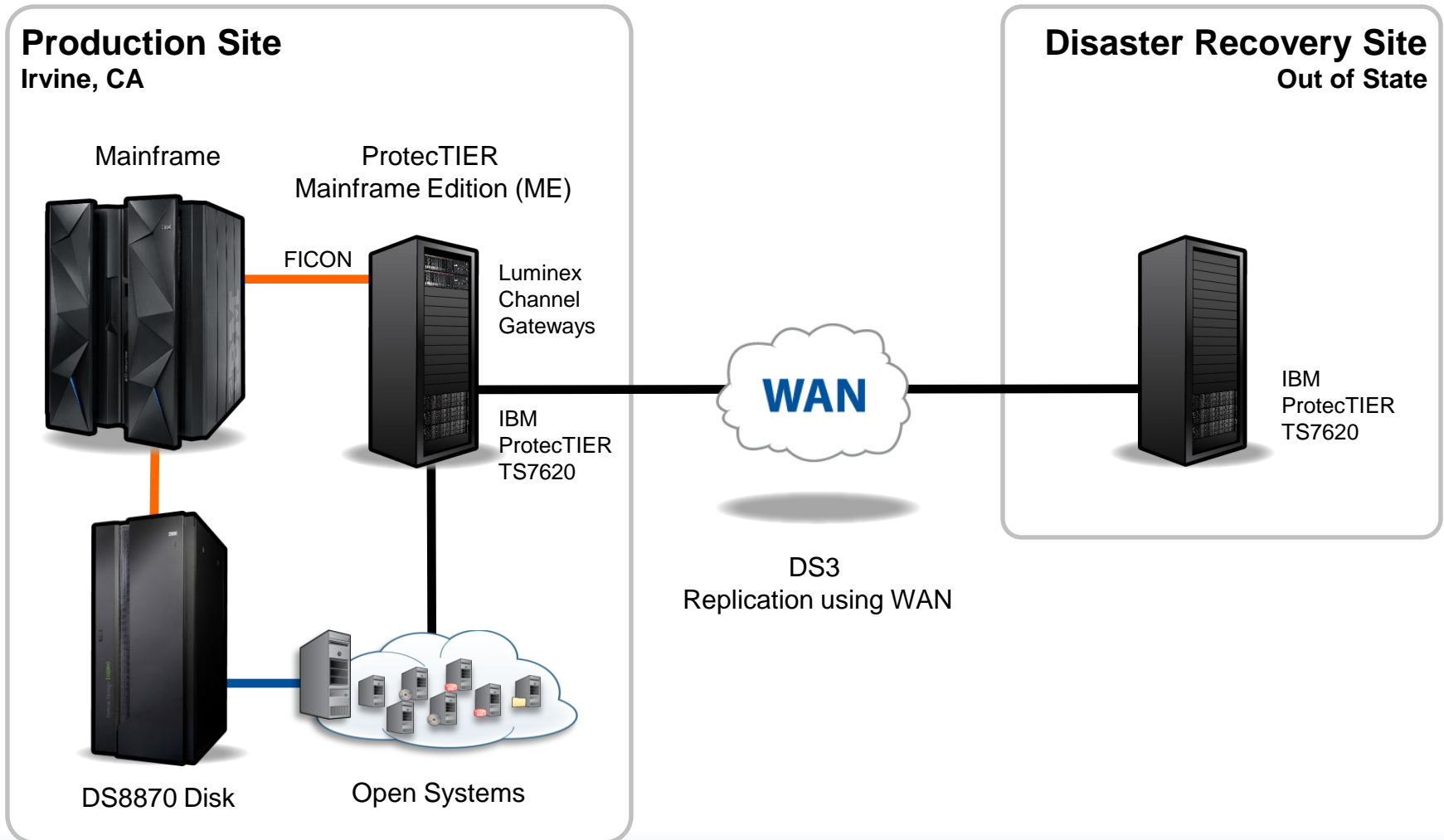
What Were Our Goals And Objectives?

- ❑ Approaching lease and maintenance renewal for all storage hardware

- ❑ More storage capacity needed

- ❑ Storage consolidation preferred

  - ❑ Improve purchase price

Production Site
Irvine, CA

Mainframe

Luminex Channel Gateways

FICON

Data Domain

IBM XIV

DS8100 Disk

Open Systems

WAN

DS3
Replication using WAN

Disaster Recovery Site
Arizona

Data Domain

Current Configuration

Production Site
Irvine, CA

Mainframe

ProtecTIER
Mainframe Edition (ME)

FICON

Luminex
Channel
Gateways

IBM
ProtecTIER
TS7620

DS8870 Disk

Open Systems

WAN

DS3
Replication using WAN

Disaster Recovery Site
Out of State

IBM
ProtecTIER
TS7620

How Did We Do?

Benefits/Achievements

- ☑ Mainframe media migration was accomplished by simply pointing backups to the new solution
- ☑ Storage consolidation
  - ☑ Single storage vendor – competitive pricing
  - ☑ Transition to DS8870 was smooth
- ☑ Approximately tripled storage capacity
- ☑ Deduplication rates
  - ☑ 14x for mainframe tape data
  - ☑ 8x for all data (open and mainframe)

What Can ProtecTIER ME Do For You?

1. Increase FICON throughput and reduce tape storage requirements
2. Offer better read performance for HSM, batch and other tape applications
3. Reduce data center floor space requirements
4. Further reduce or eliminate the cost of maintenance, media, shipping and off site storage for physical tape
5. Improve tape data security
6. Simplify Disaster Recovery via Push Button DR
7. Offer Replication Monitoring at the volser level
8. The solution can make it practical to replicate tape data over a WAN
9. Improve disaster recovery preparedness
   - Improve RPO and RTO
10. Improve all aspects of tape operations
    - Batch processing, HSM, Archiving, Backup & Recovery

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Other Channel Gateway Family Features & Options

OPTIONAL FEATURES

WAN, LAN or FC

Replication
at the control unit or storage level

Synchronous Tape Matrix
Continuous Availability

RepMon
Monitor replication at the VOLSER level

Push Button DR

Push Button DR
with non-disruptive DR testing

LTMon
Integrated, centralized management from the mainframe console

CGSafe
Encryption and key management

MDC

Multi-site Disposition Change
with reverse replication

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

Internal Storage

Compression
at the control unit level

TAPE MIGRATION SOFTWARE & SERVICES

Single source for Virtual Tape and Tape Migration

TMACS

Tape Monitoring (Device) and Allocation & Control System
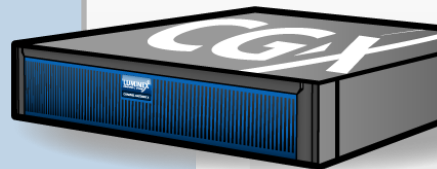
STORAGE OPTIONS

Enterprise
storage options

Modular
storage options

Deduplication
DataStream Intelligence further reduces bandwidth & storage requirements

DATASTREAM INTELLIGENCE

CloudTAPE
Cloud-based tape vaulting solution for mainframes

IBM | LUMINEX

Thank You

Scott James
VP Global Alliances
Luminex Software, Inc.

Randy Fleenor
Worldwide Data Protection Management
IBM Corporation

Mike Soursby
Systems Operations Supervisor
Kawasaki Motors Corp., U.S.A.