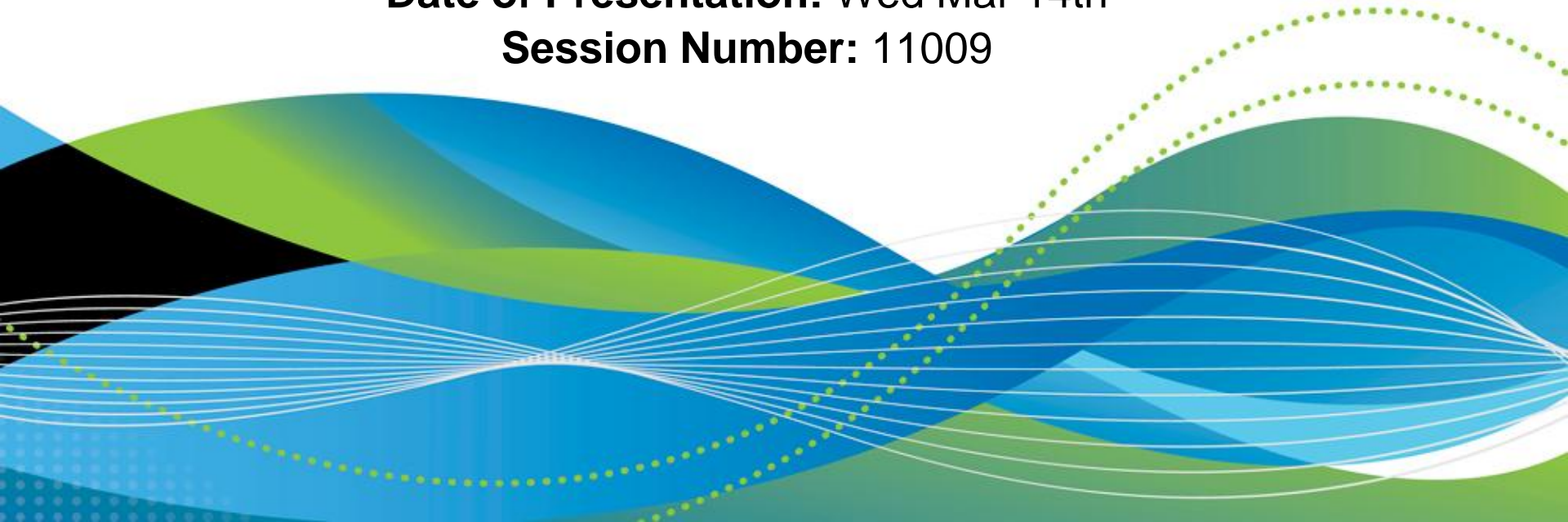# ESCON I/O Will not be supported on future System z Platforms…..
So what should I do now?

Speakers: Tom Hodson (Optica)
Bob Nusbaum (Cisco)

Date of Presentation: Wed Mar 14th
Session Number: 11009

Speakers

Bob Nusbaum

Product Line Manager
Software, DCSTG

Cisco

Tom Hodson

Sales Director
Enterprise Connectivity Solutions

Optica Technologies

Agenda

- IBM System z ESCON Roadmap

- Intro to Managed Evolution for System z
    - What is Managed Evolution?
    - Survey results

- The Managed Evolution solution
    - Managed Evolution architecture and topology
    - Managed Evolution applications
    - Customer examples
    - Managing your evolution with Optica's PRIZM FICON Converter
    - Managing your evolution with Cisco's MDS 9000 Directors

- Questions?
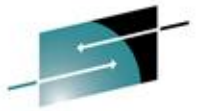
System z ESCON Roadmap

IBM's ESCON I/O Transition

Fact: ESCON I/O will no longer be supported beginning with the next System z platform

Requirement: Enable a seamless transition for customers who still have ESCON I/O while minimizing impact to I/O devices and applications

IBM ESCON Statement of Direction (announced July 12, 2011):

"The IBM zEnterprise 196 and IBM zEnterprise 114 are the last System z servers to support ESCON channels. IBM plans to not offer ESCON channels as an orderable feature on System z servers that follow the z196. In addition, ESCON channels cannot be carried forward on an upgrade to such follow-on servers".

NOTE: No RPQ's and no exceptions will be available.

❖ **Optica's Prizm is the "way forward" for customers with applications that require ESCON and Bus/Tag devices**

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2012

IBM System z Brand – ESCON Facts

- **Currently ESCON I/O cards support the following CHPID Types….**
  - CNC – Native ESCON
  - CVC – Converted Mode ESCON, *Block* Multiplexor
  - CBY – Converted Mode ESCON, *Byte* Multiplexor
  - CTC – Channel-to-Channel

- **The vast majority of current System z machines still utilize some amount of active ESCON channels**
  - 87% of all System z customers utilize ESCON channels configured as one of the above ESCON CHPID types
  - 33% of all customers still utilize CVC or CBY channels (i.e. bus/tag devices!)

Strategic Benefits of FICON

- Improved workload management
- Increased I/O bandwidth and performance
  - Reduction in interlocks between channel and control unit
    - Multiplexing of I/O operations (to multiple devices)
    - Pipelining of I/O operations (to a single device)
  - I/O prioritization
- Extended distance (ie: remote connectivity to devices)
  - ESCON supports maximum of 9km distances without data droop
  - FICON supports 100km
    - Enhancements for XRC acceleration
- Multiplexing of mixed workloads
  - ESCON (with Prizm), FICON or even Bus/Tag (with Prizm)

Customer Alternatives

How do I deal with my remaining ESCON (and B/T) devices?

A. Upgrade remaining devices to FICON **OK**

B. Use Prizm to support remaining ESCON and B/T devices **OK**

C. Do nothing (Stay on current platform) ❌ **NOT OK**

* Most customers will need to do a combination of A and B

Customer Considerations:

- Operational impact
- Compliance
- Complexity and time to implement
- Cost

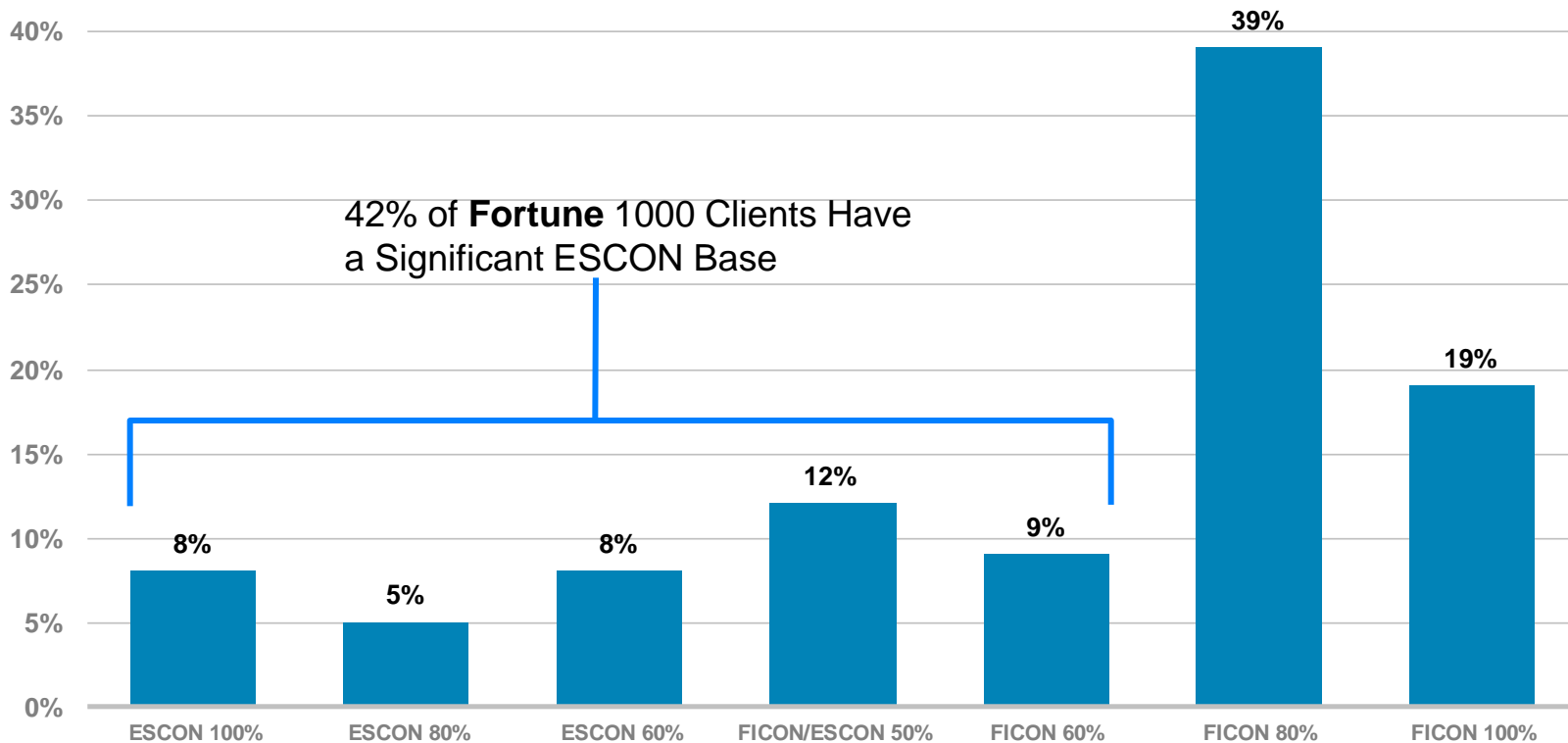# IBM Recommends: Managed Evolution for System z

- **What is Managed Evolution for System z?**
  - Managed Evolution for System z is a <u>strategic</u> infrastructure simplification solution that allows customers to optimize their System z I/O based on the latest technology, FICON, while preserving key applications that rely on ESCON and parallel device types
    - ❖ *System z Recommends that customers begin planning now*

- **"*System z conditioning*" enables customers to:**
  - Implement Prizm in advance of the System z upgrade in order to simplify the cutover to a new z platform
  - Consolidate ESCON infrastructure and operations
    - ❖ *System z Recommended Best Practice*

- **IBM System z and Optica Technologies have collaborated to deliver the exclusive technology (Prizm) required to support this strategy**

You Are Not Alone…

Results indicate customers are required to manage a blend of FICON and ESCON infrastructures and device types

42% of **Fortune** 1000 Clients Have a Significant ESCON Base

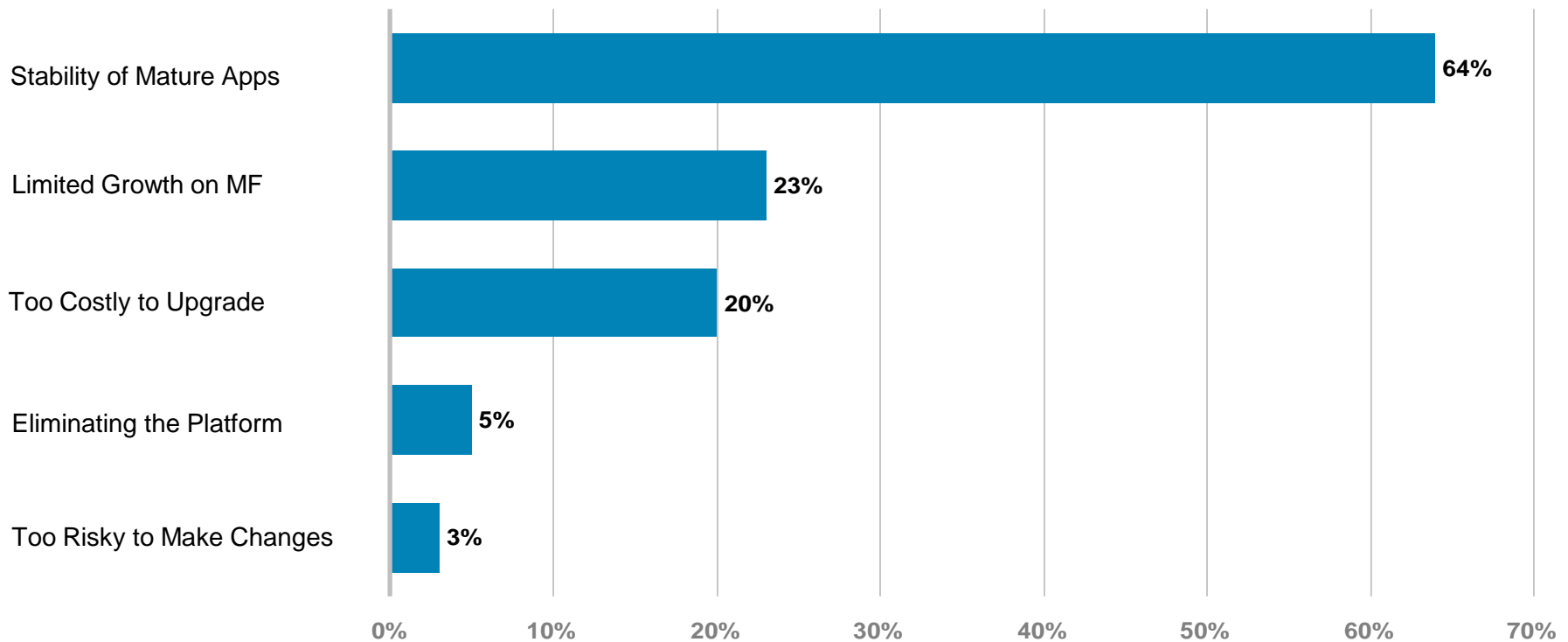| Category	Value
ESCON 100%	8%
ESCON 80%	5%
ESCON 60%	8%
FICON/ESCON 50%	12%
FICON 60%	9%
FICON 80%	39%
FICON 100%	19%

Source: zJournal "Mainframe Evolution Survey"

Stable, Mission Critical Applications Remain on ESCON

What factors compel you to preserve investments in ESCON applications and device types?

Factor	Percentage
Stability of Mature Apps	64%
Limited Growth on MF	23%
Too Costly to Upgrade	20%
Eliminating the Platform	5%
Too Risky to Make Changes	3%

Source: zJournal "Mainframe Evolution Survey"

# Survey Conclusions

- **Conclusions**
  - 8 out of 10 customers still have ESCON deployed

  - Managing dual FICON and ESCON infrastructures is costly and inefficient

  - The benefits of an "all FICON" channel infrastructure on System z are significant, but are not being fully exploited

- **Challenge**
  - Is there a way to modernize on System z today while retaining access to mature applications and devices (ESCON and B/T)?

Managed Evolution for System z

- Strategically invest in System z / FICON host infrastructure modernization

- Manage your storage and other device types based on application characteristics (FICON, ESCON, Parallel)

- Migrate to a simplified host-based FICON infrastructure supporting all applications and device types
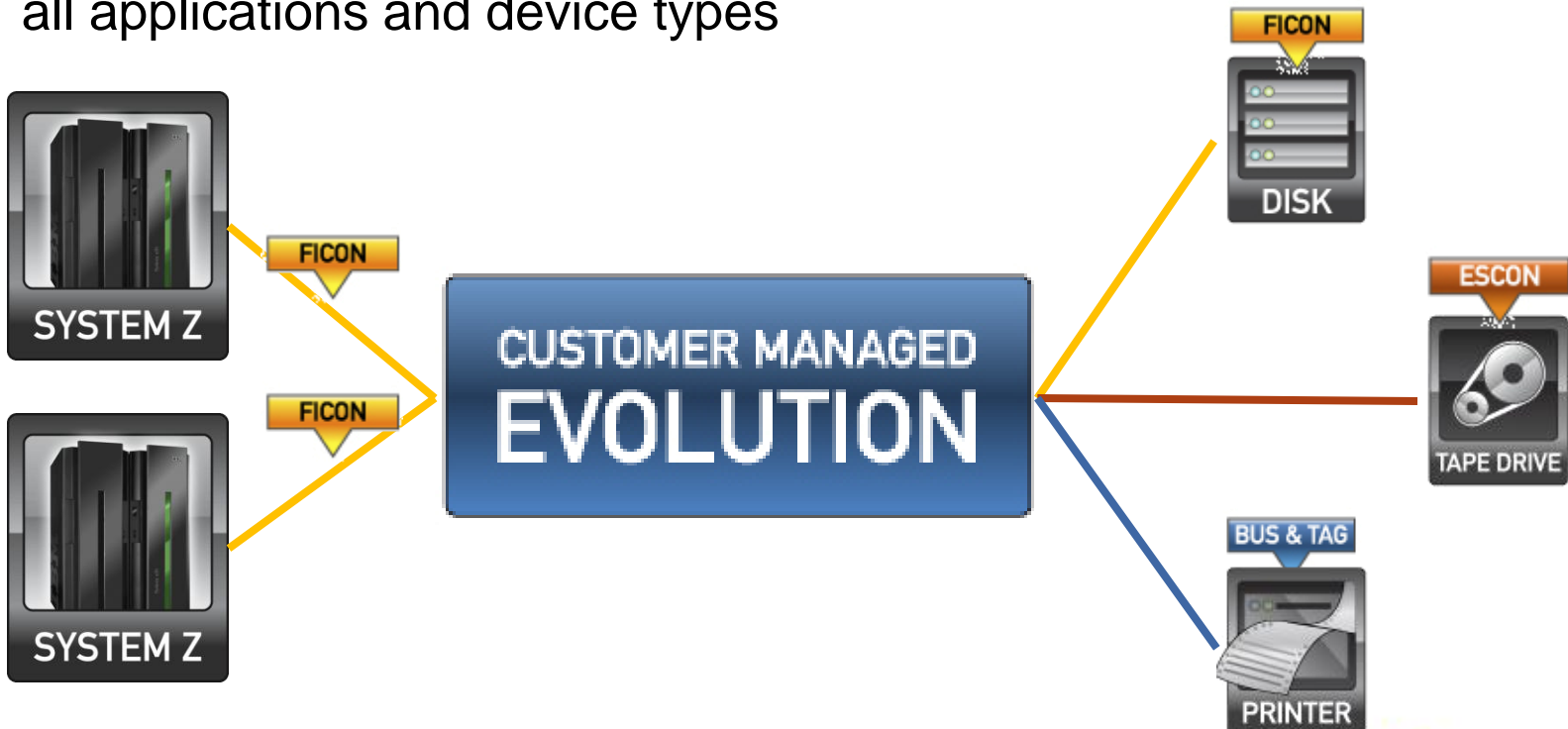
Prizm is the building block

- Prizm is a purpose built appliance designed **exclusively** for IBM System z

- Prizm converts native FICON (FC) protocol to native ESCON (CNC) protocol allowing ESCON and B/T devices to connect to FICON channels
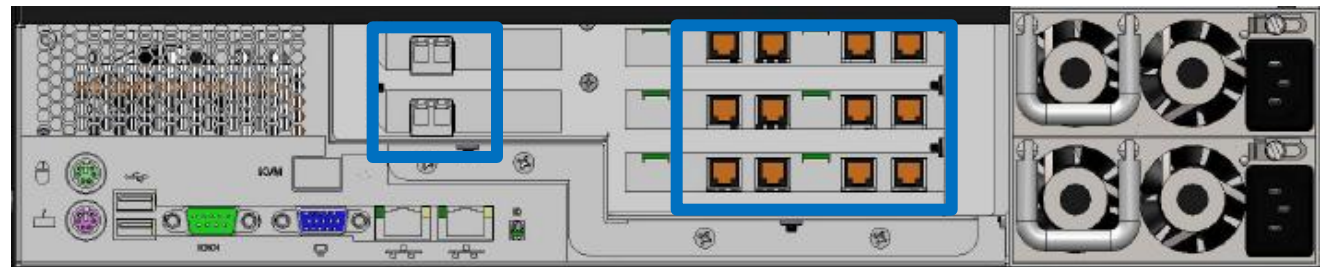
Front View

FICON Ports: LC Duplex

ESCON Ports: MT-RJ

2U

Rear View

Prizm Basics

- Prizm is a 2u rack mountable system which converts 1 or 2 FICON channels into 4, 8 or 12 ESCON channels.
  - Prizm also supports bus/tag device attachment via ESBT module

- Prizm is available in the following configurations:
  - 1 FICON (IN) to 4 ESCON (OUT) = 1:4
  - 2 FICON (IN) to 8 ESCON (OUT) = 2:8
  - 2 FICON (IN) to 12 ESCON (OUT) = 2:12
  - Available with long-wave (LX) or short-wave (SX) FICON optics

- Prizm is easy to configure and install and will attach to a broad array of ESCON (and Bus / Tag) devices.
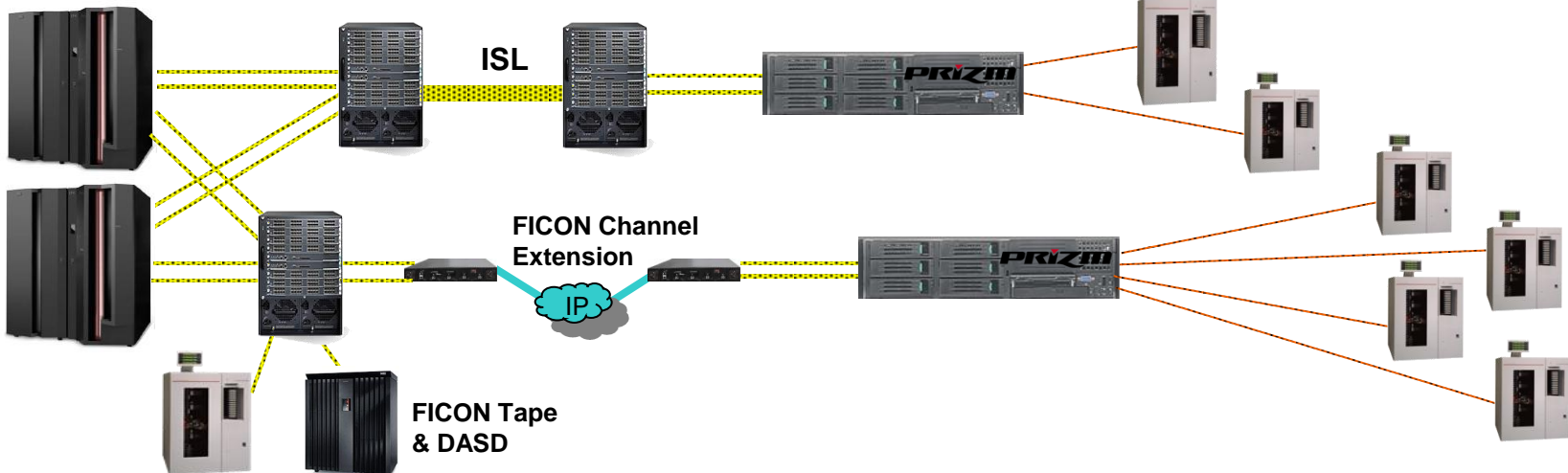 - Qualified in the IBM Vendor Solutions Lab in Poughkeepsie, NY

Where does Prizm fit in the data center?

1. Point to Point

2. Switched

3. Cascaded and Channel Extended

ISL

FICON Channel
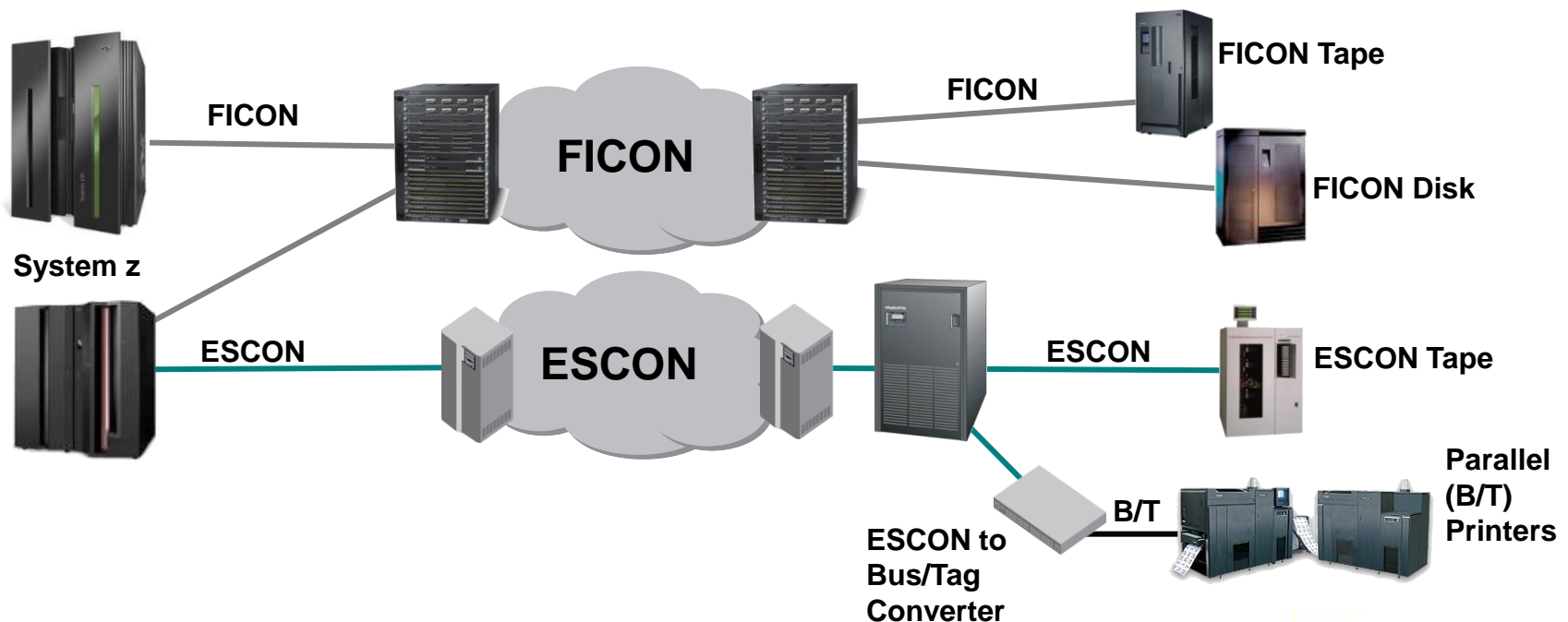Extension

FICON Tape
& DASD

4. Support for a broad set of ESCON and B/T devices: Tape, Printers, Com Devices, FEPs etc.

Today: Two Infrastructures

Current environment

- Dual infrastructures (FICON and ESCON)
- Local and extended distance (ESCON)

- FICON Disk and Tape
- ESCON Tape/Controllers
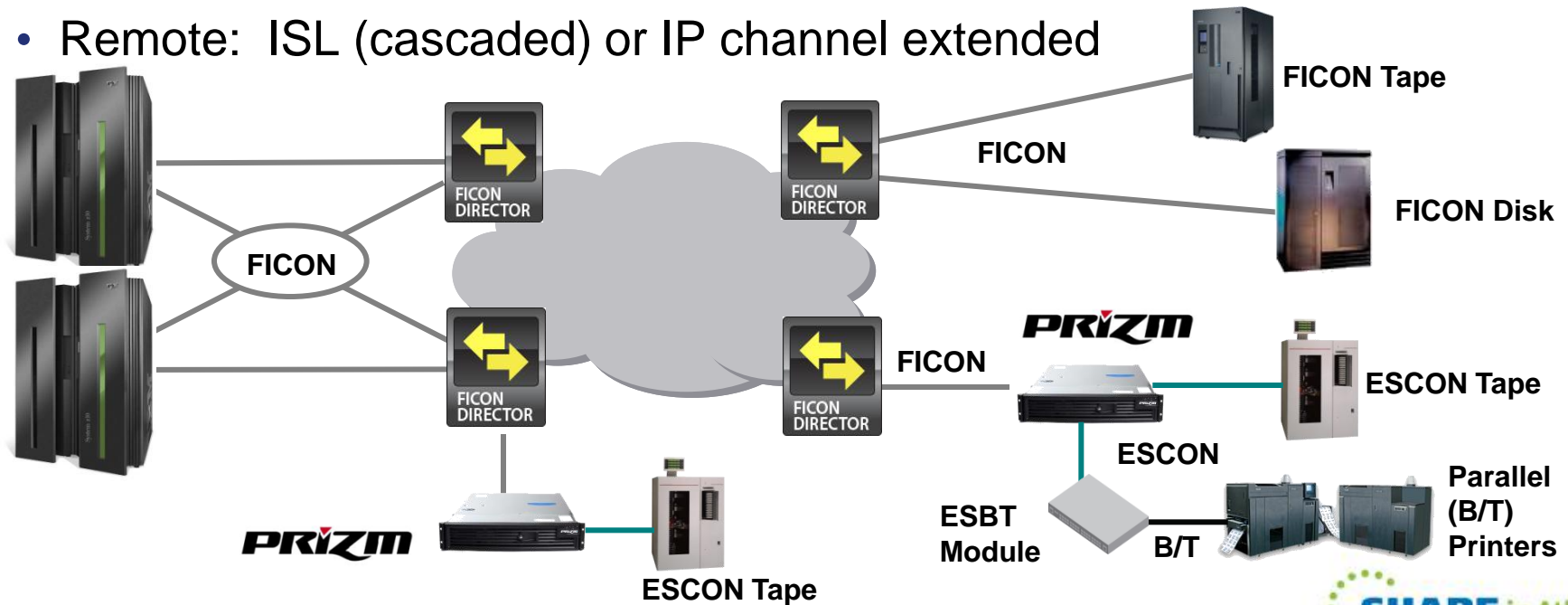- Parallel Printers/Controllers

Managed Evolution Applications

Where Does Prizm fit in the Data Center?
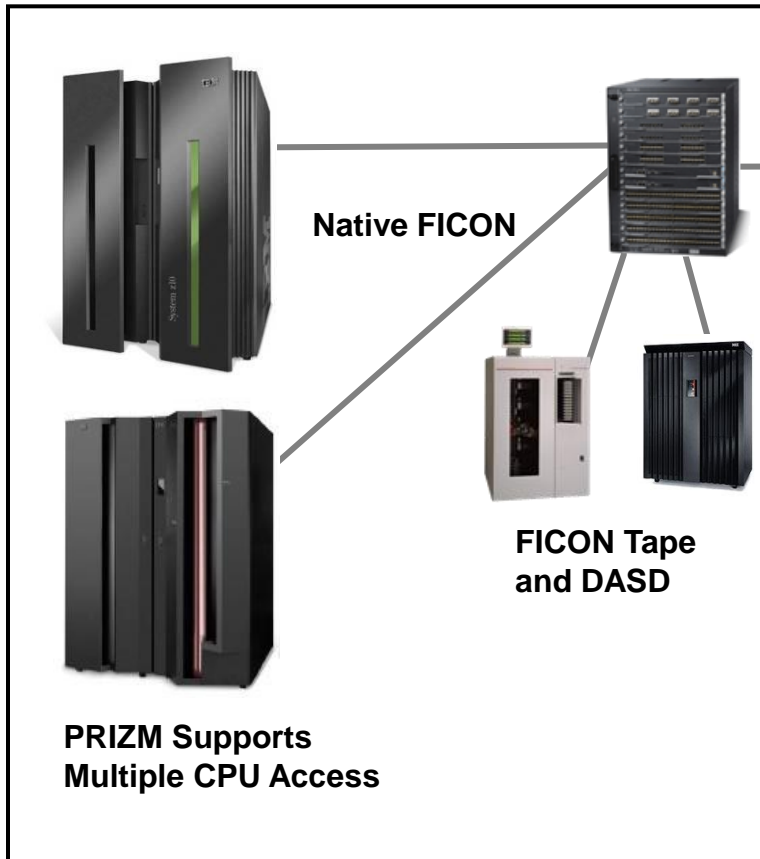
Topologies Supported by Prizm

- Local: direct attached or switched
- Remote: ISL (cascaded) or IP channel extended

Managed Evolution Applications

ESCON Device Extension via FICON Infrastructure

Local Site

Remote Site

FICON (ISL)

PRIZM 2:8

Native FICON

ESCON

FICON Tape and DASD

* **No channel extension gear required <150 km (vs. ~ 20 km for ESCON)**

* **Strong PRIZM ROI for remote ESCON (and parallel) device attachment**
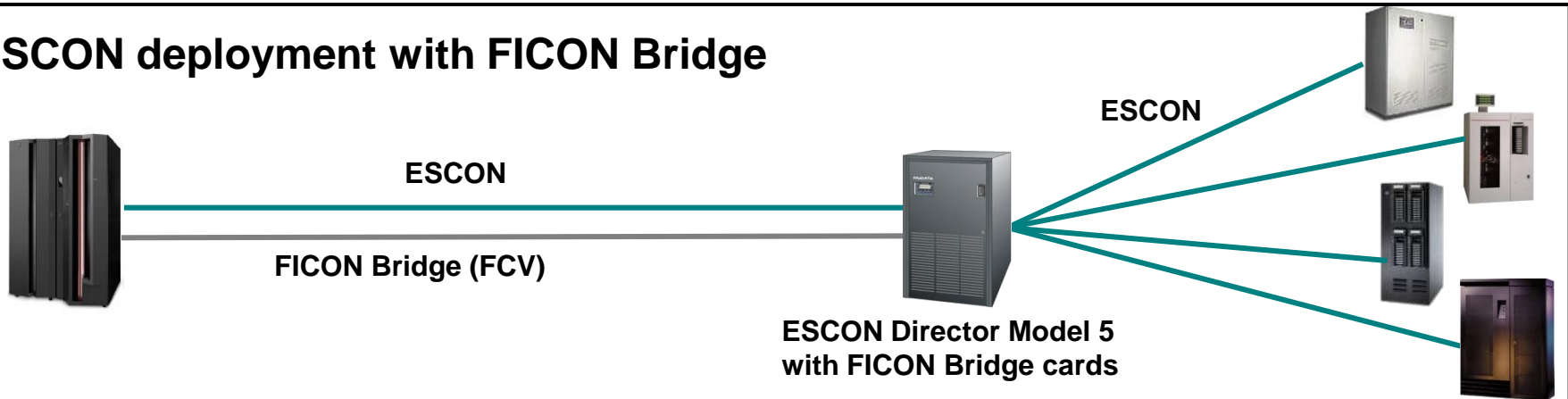
PRIZM Supports Multiple CPU Access
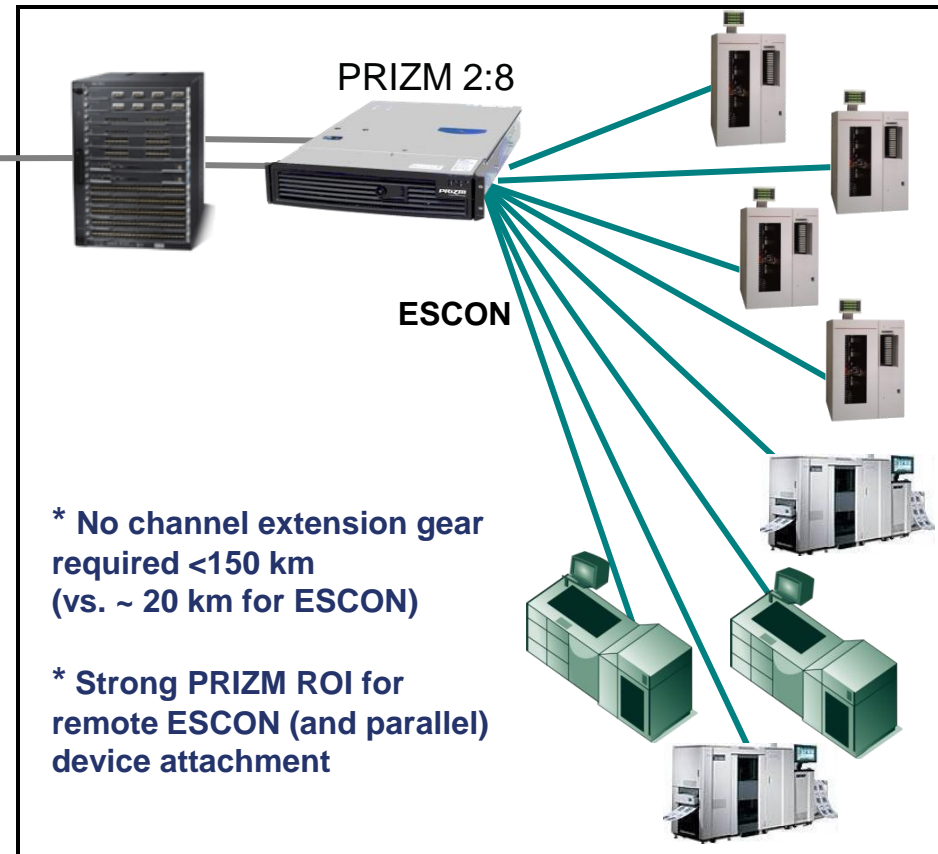
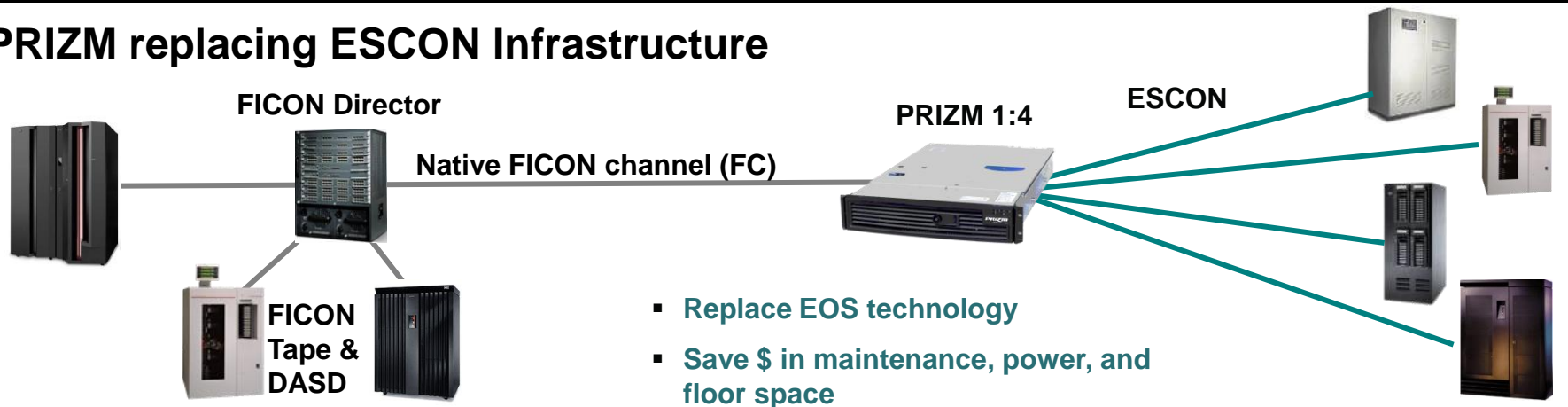# Managed Evolution Applications

ESCON Director and FICON Bridge Replacement

ESCON deployment with FICON Bridge

ESCON

ESCON

FICON Bridge (FCV)

ESCON Director Model 5
with FICON Bridge cards

PRIZM replacing ESCON Infrastructure

FICON Director

PRIZM 1:4

ESCON

Native FICON channel (FC)

FICON
Tape &
DASD

- Replace EOS technology
- Save $ in maintenance, power, and floor space
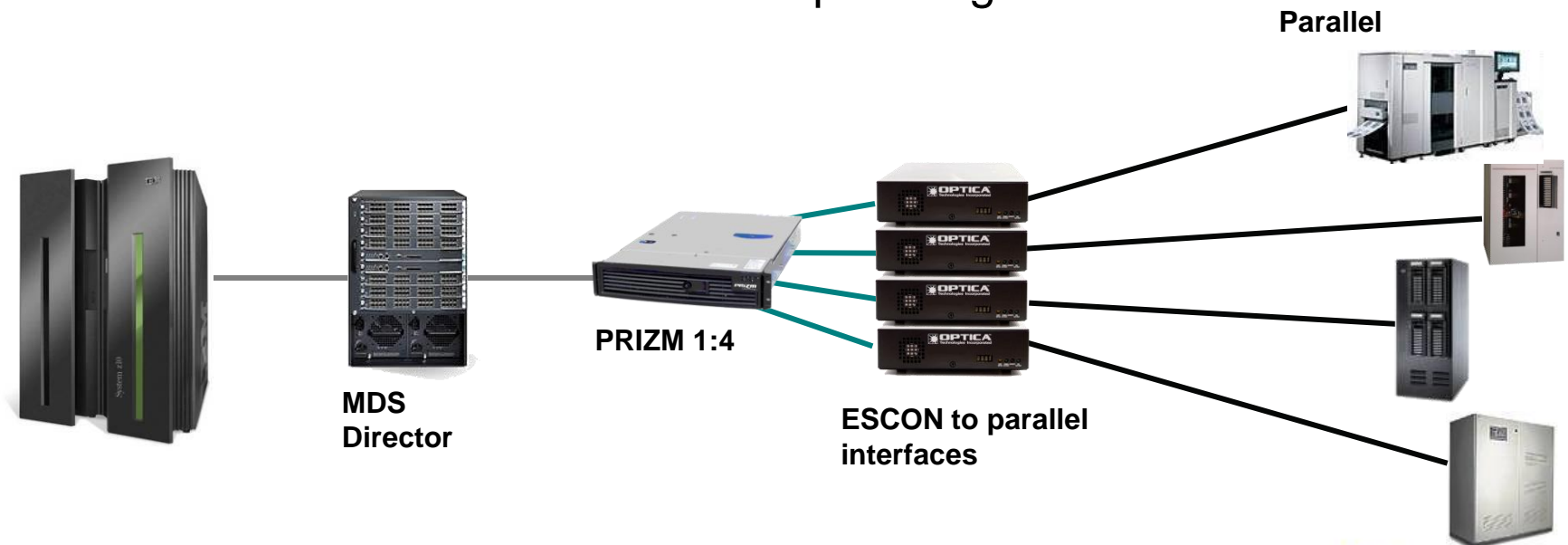
Managed Evolution Applications

Parallel device attachment to FICON channels

- Maintain installed parallel devices and applications while migrating to FICON on the host

- Parallel device channel extension via FICON
  - Attach parallel devices in remote data centers using FICON InterSwitch Links (ISLs)

- Provides infrastructure options and flexibility for mainframe refresh and new site planning

Parallel

PRIZM 1:4

MDS Director

ESCON to parallel interfaces

Customer Case Study #1 System z Consolidation

(16)

(16)

(16)

ESCON Directors
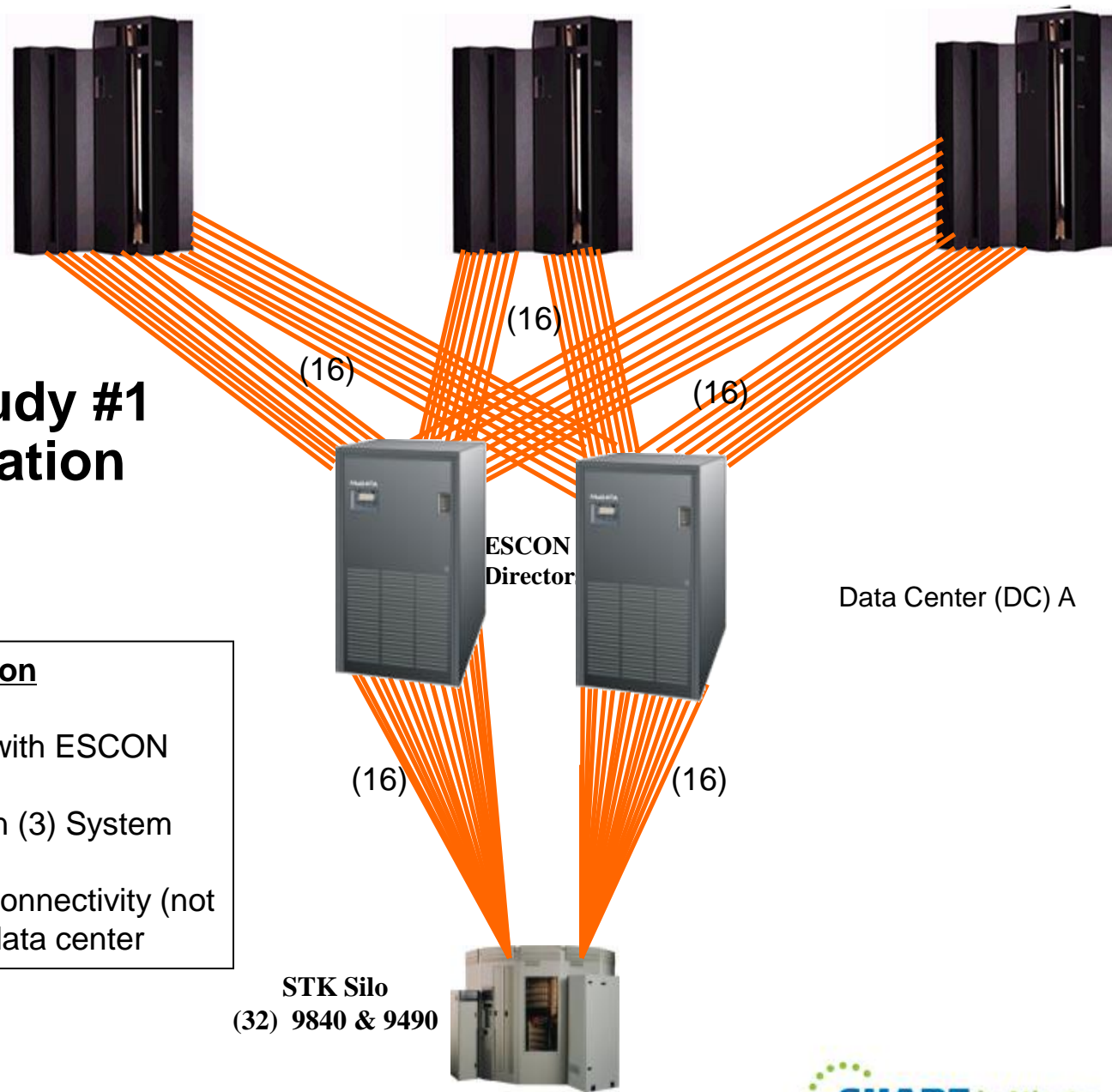
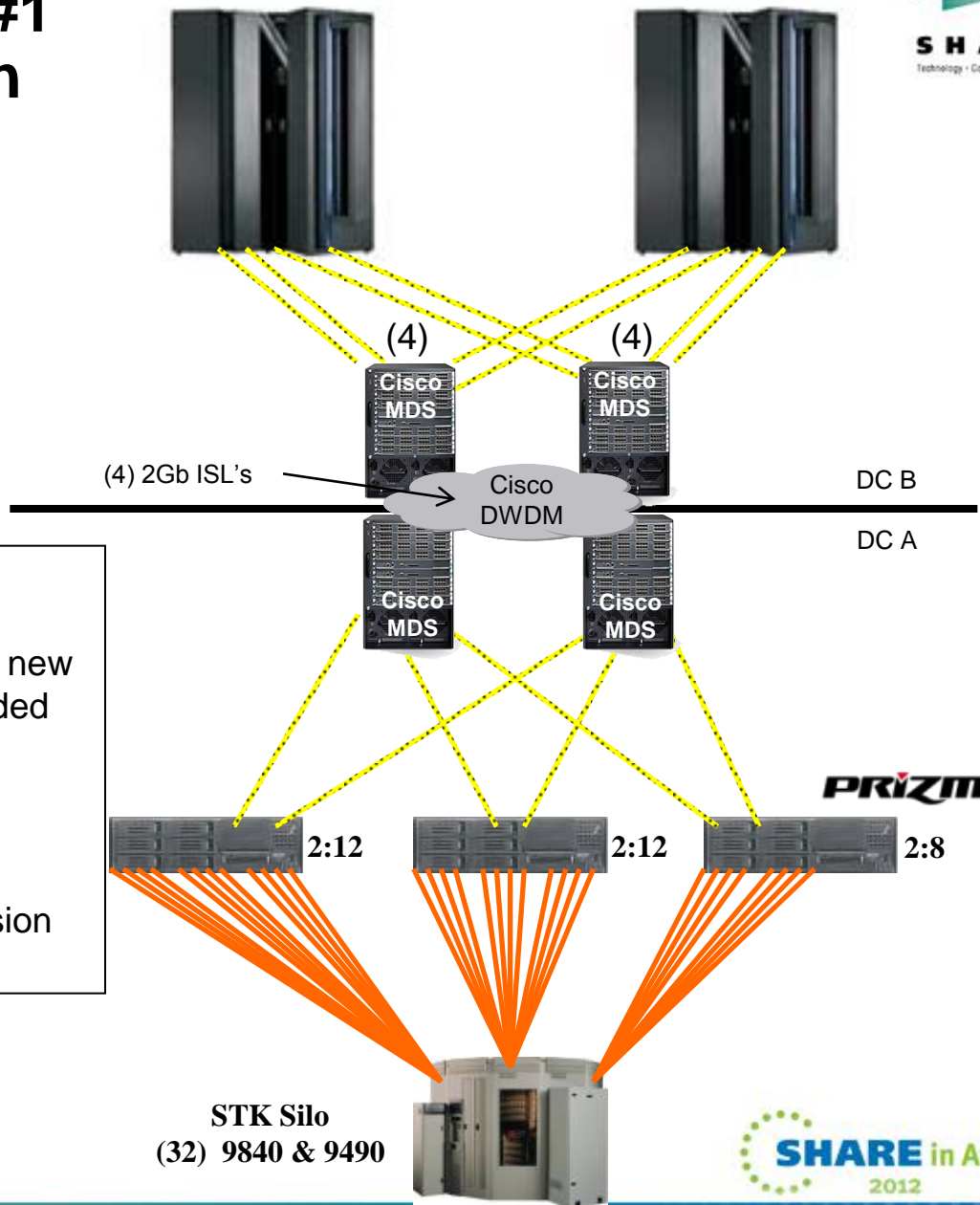Data Center (DC) A

Original ESCON Configuration

• Pure ESCON infrastructure with ESCON directors in data center A
• 48 local ESCON channels on (3) System z's
• ESCON channel extension connectivity (not shown) from existing remote data center

(16)

(16)

STK Silo
(32) 9840 & 9490

Customer Case Study #1
System z Consolidation

(4)   (4)

Cisco
MDS

Cisco
MDS

(4) 2Gb ISL's

Cisco
DWDM

DC B

DC A

Cisco
MDS

Cisco
MDS

Prizm Configuration

• Opened new data center (DC B), Installed new System z mainframes w/ FICON and extended FICON infrastructure to tape in DC A.

• Replaced ESCON directors

• Replaced existing ESCON channel extension to old data center

2:12   **2:12**   **2:8**

PRIZM

STK Silo
(32) 9840 & 9490

Customer Case Study #2
ESCON Channel Extension Replacement

NYS1 **NYS2** **NYS3** **NYS4**
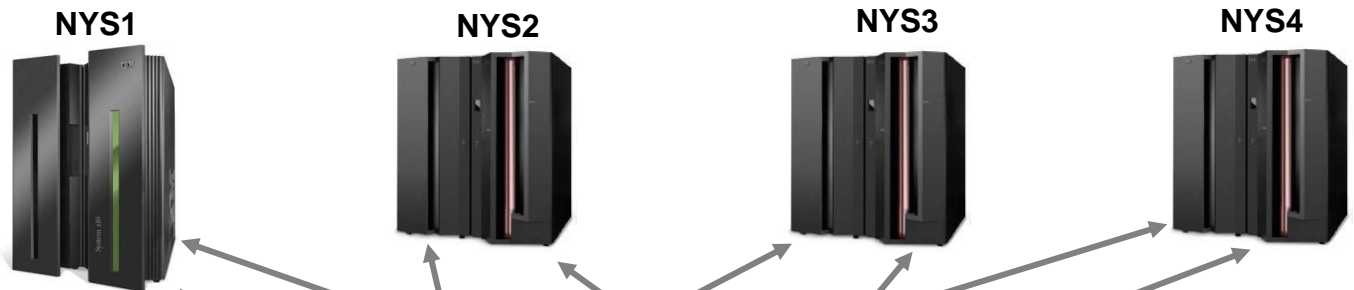
Prizm Configuration

- Opened new DR site
- Replaced existing ESCON channel extension to old data center in favor of cascaded FICON over 100km
- Replaced ESCON directors

Cisco MDS

Cisco MDS

100 km

Cisco MDS

Cisco MDS

NY

PA

Legend
= FICON
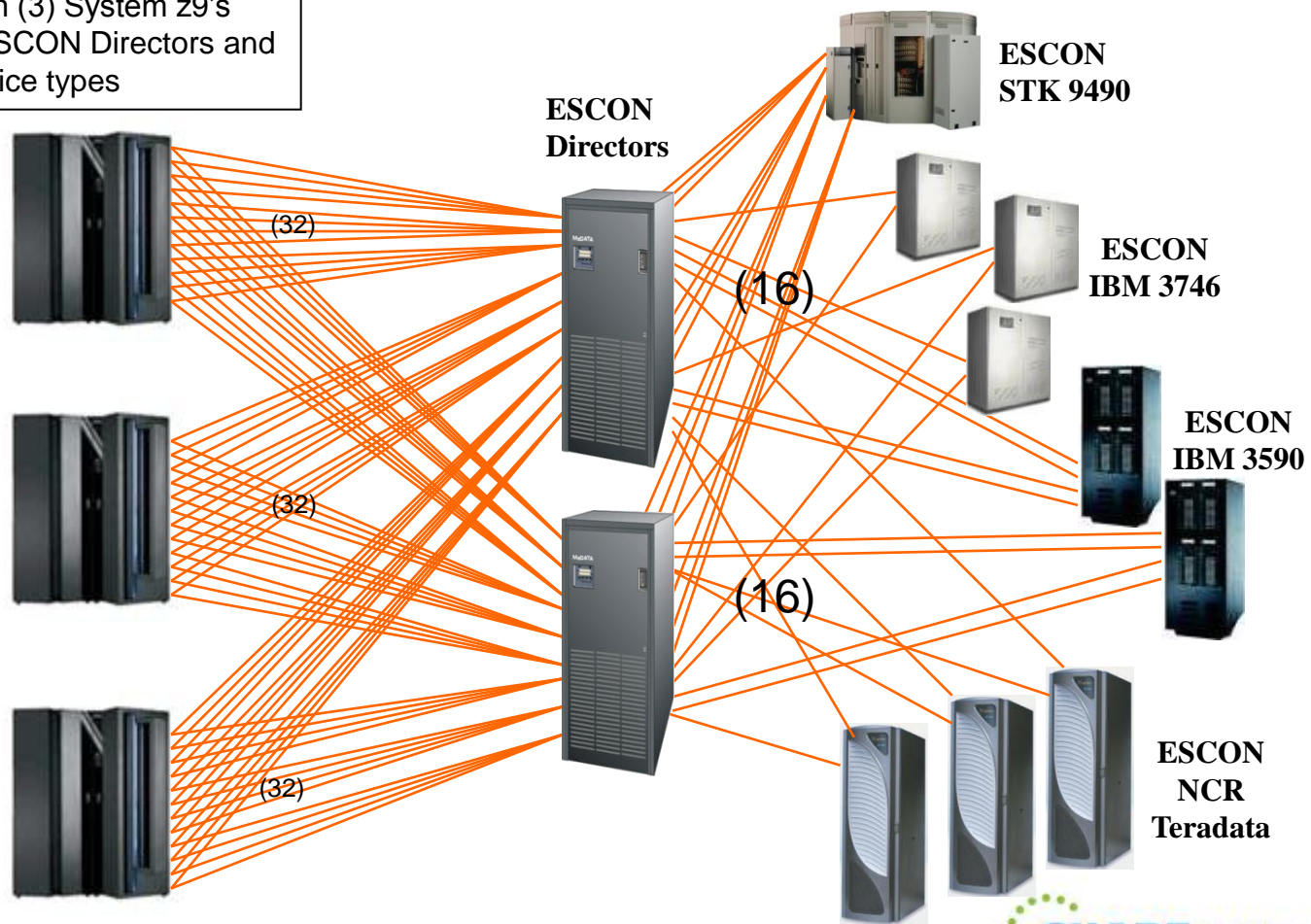
= ESCON

= Dark Fiber
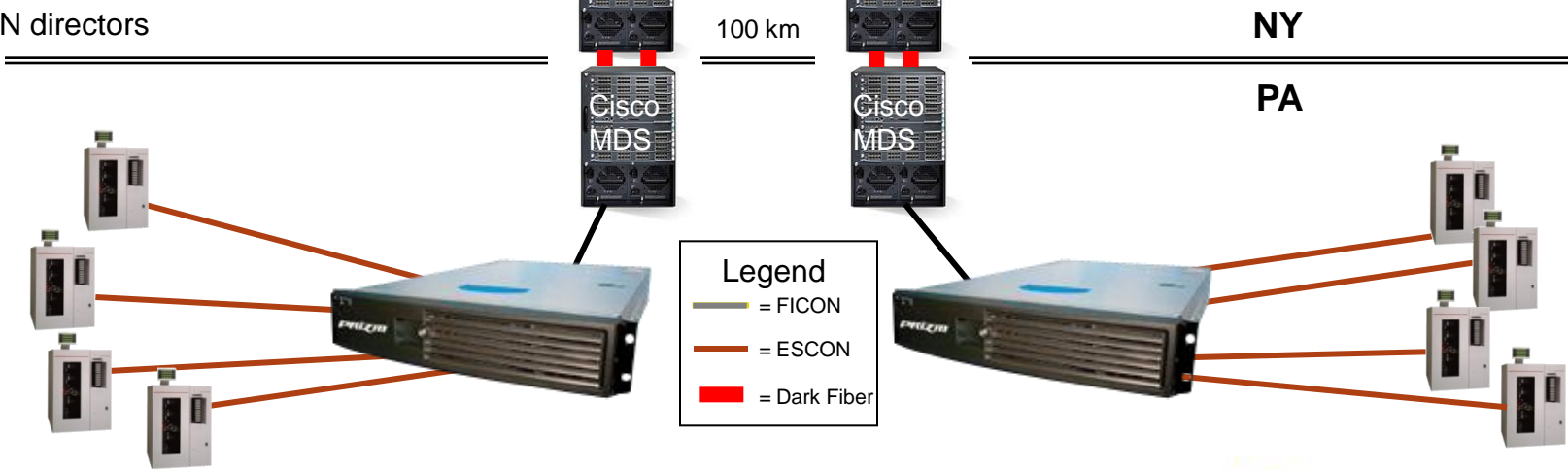
Customer Case Study #3
ESCON Infrastructure Replacement

Original ESCON Configuration

• Host: 96 ESCON channels on (3) System z9's
• ESCON infrastructure with ESCON Directors and
  a wide variety of ESCON device types

ESCON Directors

(32)

(16)

(32)

(16)

(32)

ESCON STK 9490
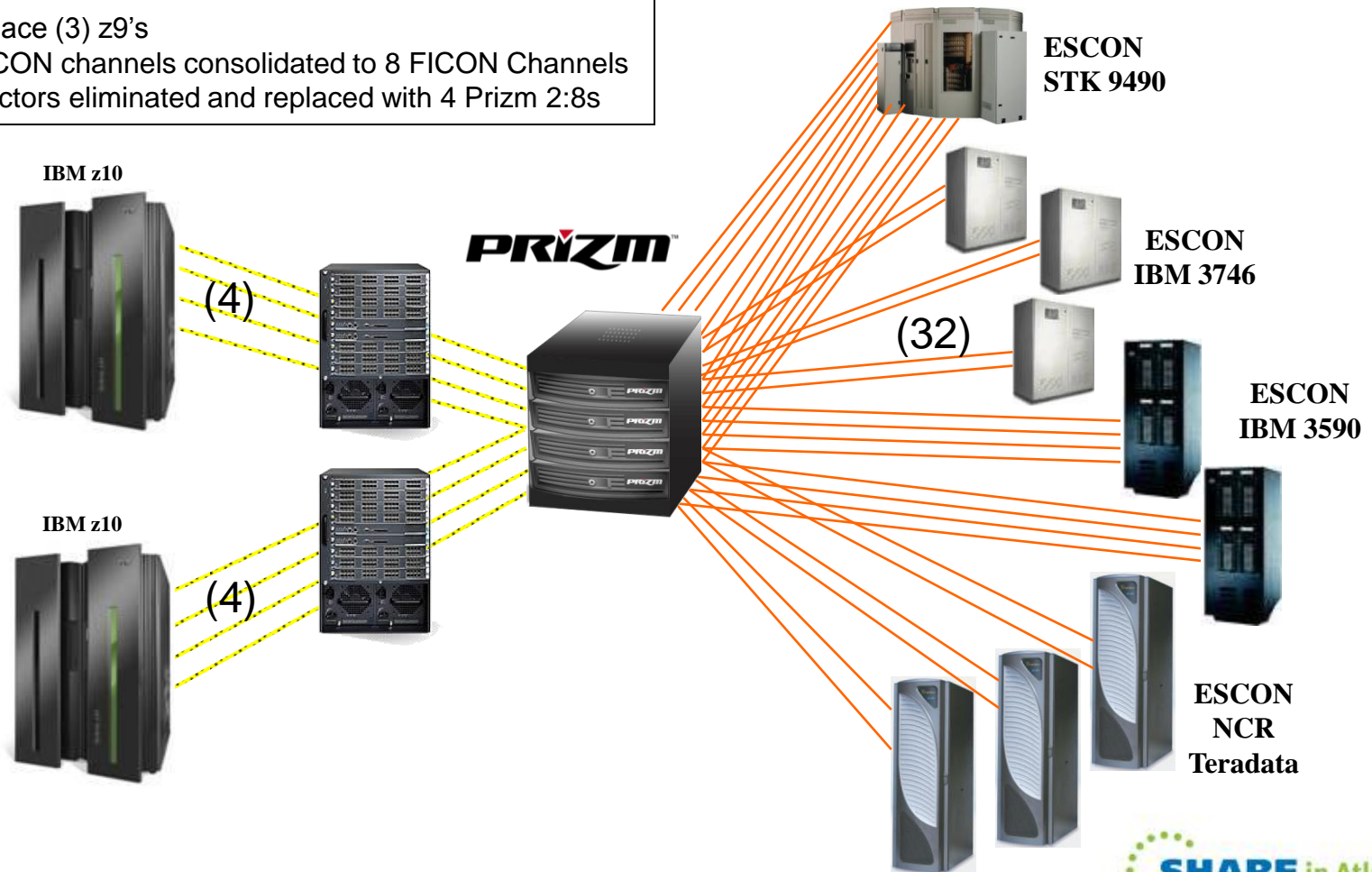
ESCON IBM 3746

ESCON IBM 3590

ESCON NCR Teradata

Customer Case Study #3
ESCON Infrastructure Replacement

Prizm Configuration

- (2) z10's replace (3) z9's
- Host: 96 ESCON channels consolidated to 8 FICON Channels
- ESCON Directors eliminated and replaced with 4 Prizm 2:8s

ESCON STK 9490

ESCON IBM 3746

ESCON IBM 3590

ESCON NCR Teradata

IBM z10

IBM z10

PRIZM

(4)

(4)

(32)

Customer Benefits

- Maximizes value of System z consolidation while reducing the "cutover" risk

- Leverages the value of FICON

- Simplifies I/O and Operations

- Eliminates ESCON as a planning consideration for System z

- Savings on ESCON director maintenance, power, cooling and floor space supports the case for transition

Predominant ESCON Applications for Prizm…

- **Tape Backup/Tape Exchange**
  - Tape has major operational infrastructure and change is expensive

- **SNA Networks/VTAM**
  - Either 37XX or CIP Networks with older ATM Technologies

- **Database Machines**
  - Teradata

- **Print**
  - Print can be ESCON or B/T – major infrastructure – collation, bursting, stacking

NONE of these applications require greater performance

What Events Drive the Change?

- **System z – zEnterprise 196/114 Planning and Upgrades**
  - 88% of Mainframe customers have ESCON or a mix of ESCON and FICON today*
  - System z recommends customers plan/move now

- **ESCON Director - Replacement**
  - 1000's of ESCON directors are still in production**
  - Plan for end of service

- **ESCON Channel Extension – Replacement**
  - Over 12,000 nodes deployed**
  - End of Life and Support is here
  - Prizm allows customer to leverage the value of FICON while reducing the cost and complexity of managing ESCON over long distances
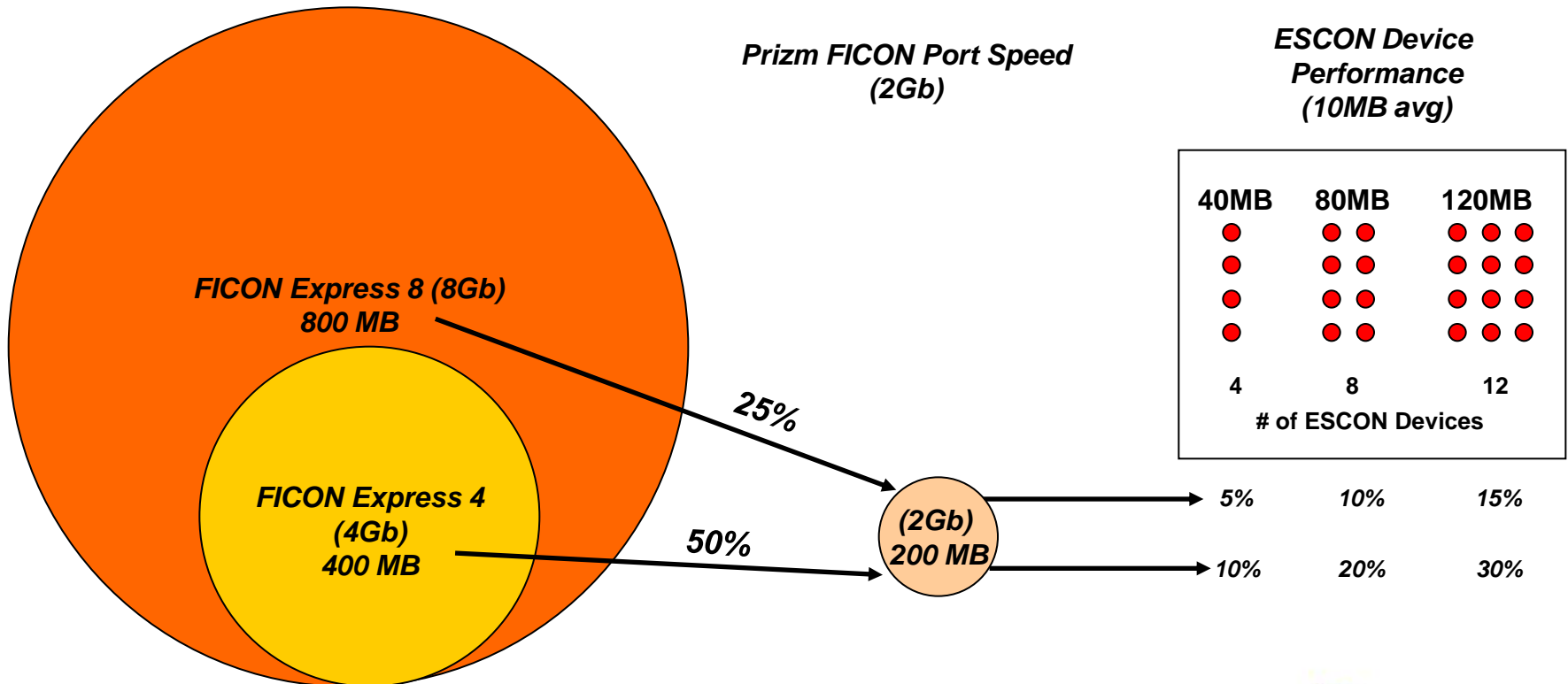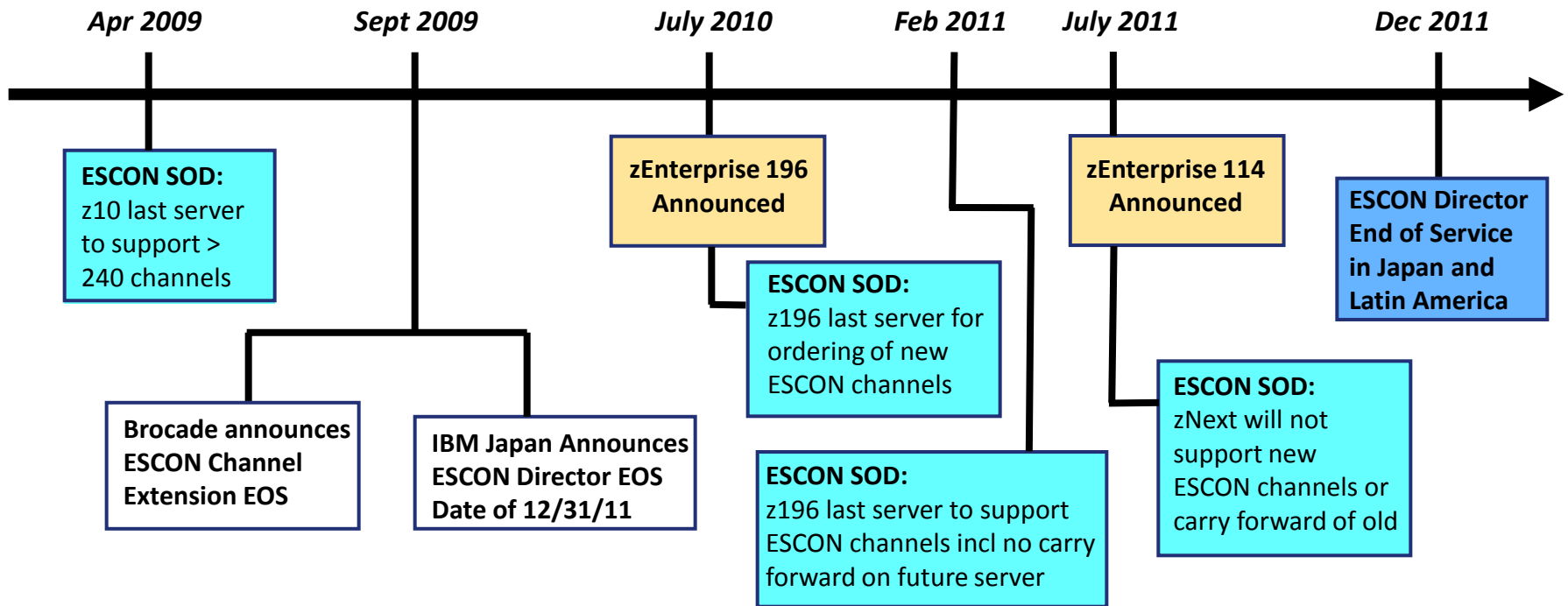
Planning for Prizm (ESCON) Bandwidth is easy!

- System z customers provision I/O with high levels of resiliency
  - 50% I/O headroom or more is the norm to deliver consistent application performance
- Prizm allows customers to share FICON CHIPIDs to service ESCON device requirements and uses a small percentage of available bandwidth
- FICON Express 8 enables customers to eliminate ESCON and consolidate FICON while increasing I/O headroom

Prizm FICON Port Speed (2Gb)

ESCON Device Performance (10MB avg)

FICON Express 8 (8Gb) 800 MB

FICON Express 4 (4Gb) 400 MB

25%

50%

(2Gb) 200 MB

40MB	80MB	120MB
4	8	12

# of ESCON Devices

| 5% | 10% | 15% |
| 10% | 20% | 30% |

The System z ESCON roadmap is clearly defined…
- now it's time to make sure you are prepared

Apr 2009 **Sept 2009** **July 2010** **Feb 2011** **July 2011** **Dec 2011**

ESCON SOD:
z10 last server to support > 240 channels

zEnterprise 196 Announced

zEnterprise 114 Announced

ESCON Director End of Service in Japan and Latin America

Brocade announces ESCON Channel Extension EOS

IBM Japan Announces ESCON Director EOS Date of 12/31/11

ESCON SOD:
z196 last server for ordering of new ESCON channels

ESCON SOD:
zNext will not support new ESCON channels or carry forward of old

ESCON SOD:
z196 last server to support ESCON channels incl no carry forward on future server

Planning for your future System z I/O connectivity….
- Assess current device/application portfolio and requirements
- Assess ESCON switching requirements in preparation for ESCD EOS
- Assess oppty for 8 Gb FICON consolidation
- Consider distance support requirements for ESCON/BT devices
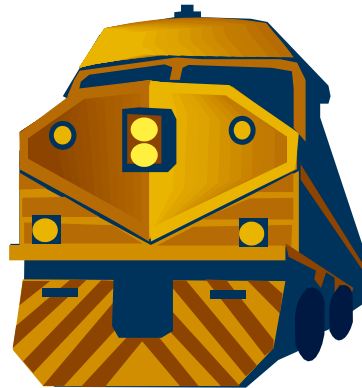
Managed Evolution for Your Directors

Bob Nusbaum, Product Line Manager

Data Center Group (DCG)

Current System z I/O Environment

- Mainframe market still growing
- 8G out for 3 years, but many channels & CUs = < 4G
- McData, Cisco Gen 1 End of Support in Sept. 2012
- BC / DR ever more important
- ESCON sees the light at the end of the tunnel
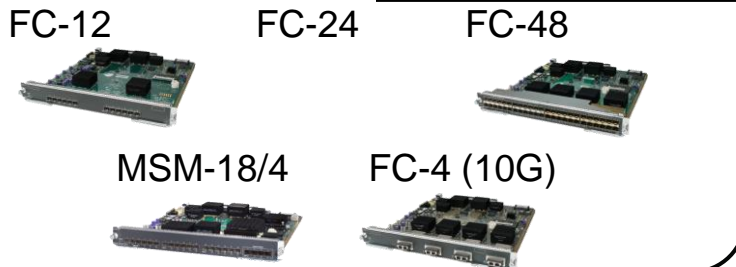
MDS 9500: Architected to Evolve

The Only Switches/Directors with Proven Investment Protection

Gen 1 2G Modules

FC-16   FC-32   MPS-14/2

SSM

Backward and forward compatible switching modules

Gen 2 4G Modules

FC-12   FC-24   FC-48

MSM-18/4   FC-4 (10G)

Non-disruptive upgrades

Gen 3 8G Modules

FC-24   FC-48   FC-4/44

Unified NX-OS with consistent features

Gen 4 Adv 8G Modules

FC-24   FC-48   SSN-16

MDS 9200 Fabric Switches

MDS 9222i
(66 ports)

MDS 9500 Directors

MDS 9506
(192 ports)

MDS 9509
(336 ports)

MDS 9513
(528 ports)

Customer Managed Director Evolution: Growing with Cisco

When you need more ports
- ➔ Add a line card
- ➔ License more ports (on fabric switches)

When you need faster ports
- ➔ Add a next generation line card

When you need more processing power
- ➔ Upgrade the supervisor cards

Customer Managed Director Evolution: Growing with Cisco

When You Need More Ports

- Add a line card
- License more ports (on fabric switches)

When You Need Faster Ports

- Add a next generation line card

When You Need More Processing Power

- Upgrade the supervisor cards

When You Need More Slot Bandwidth

- Upgrade the fabric cards

Cisco Innovations Driving TCO Reductions

Scalability and Performance	Up to 528 FC Ports/Chassis and 2.2 Tbps Switching Bandwidth
Investment Protection	Seamless Speed Transition from 2G to 4G, 8G, 10G in the Same Chassis
Virtual SAN (VSAN)	Consolidation, Reduced TCO, Fault and Management Isolation
Integrated C/DWDM Optics	Reduced Costs for MAN BC/DR Applications
Multi-Protocol Support	FC, iSCSI, FICON, FCIP, FCoE
Secure SAN Extension	Accelerate Tape, VT, z/OS Global Mirror (XRC) with Compression & Encryption
Unified Management	Fabric and Device Manager
Built-In Diagnostic Tools	Fabric Analyzer, FCPING, FC Trace Route, (R)SPAN
Integrated Security	ACLs, FC-SP, RBAC, RADIUS, TACACS+

SHARE in Atlanta
2012

Delivering Predictable Performance

Centralized Crossbar Switch Architecture
Evolved by McDATA, Cisco and others

Performance Features:

- Consistent deterministic latency—simplifies installation and change

- Gen 4 modules on MDS 9513 – 256 Gb / slot

- Centrally arbitrated local switching in Gen 4 line cards allows full bandwidth on MDS 9506 & 9509 chassis

- Virtual Output Queues prevent Head-of-Line blocking

- Precise Quality of Service (QoS) levels per VSAN

External Interfaces

External Interfaces

Crossbar Switch Fabric

Crossbar Switch Fabric
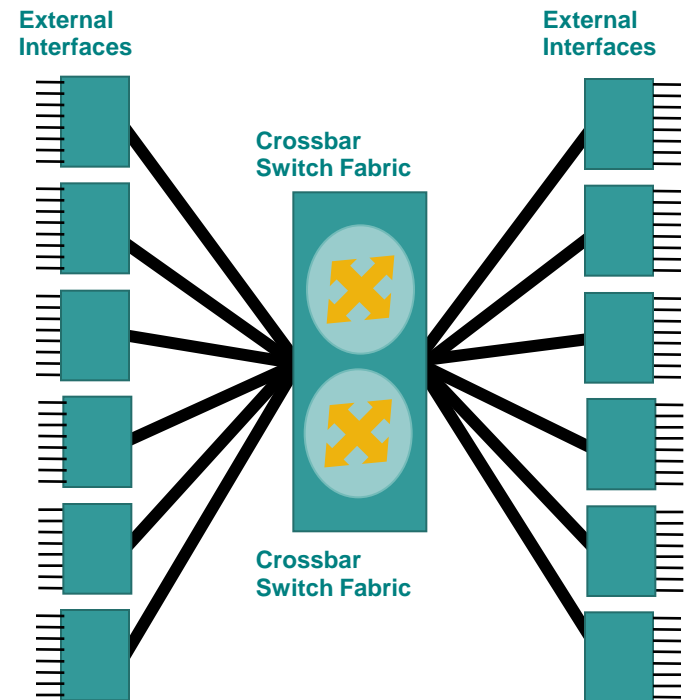
VSANs: End-to-End Isolation of Workloads
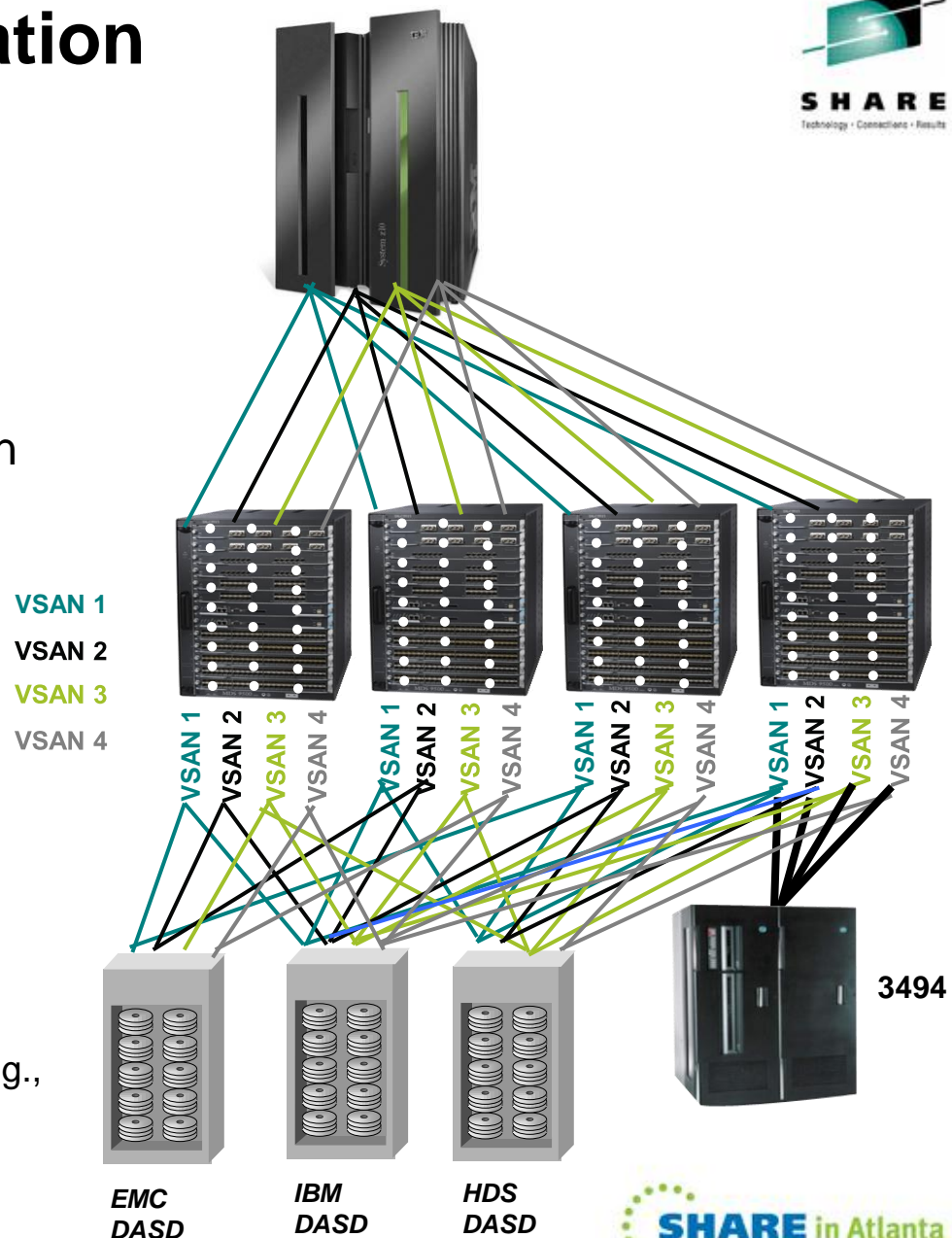
1. Scale hardware up to 528 ports (MDS 9513)
   - Even multiple ESCON CUs won't stress a FICON port

2. Create FICON VSANs (like LPARs on the switch)
   - Hardware-isolated partitions of ports from one or more switches
   - One to 250 ports per VSAN (FICON architectural limit)
   - Up to eight FICON VSANs per chassis
   - NO special hardware required

3. Virtualized resources in VSANs
   - Each VSAN has its own fabric services:
     - Domain ID, CUP, QoS, etc.
   - FICON port addresses assigned to each interface can be re-used across VSANs (e.g., port 0x1C in domains 0x19 and 0x12)

VSAN 1
VSAN 2
VSAN 3
VSAN 4

VSAN 1 VSAN 2 VSAN 3 VSAN 4
VSAN 1 VSAN 2 VSAN 3 VSAN 4
VSAN 1 VSAN 2 VSAN 3 VSAN 4
VSAN 1 VSAN 2 VSAN 3 VSAN 4

3494

EMC
DASD

IBM
DASD

HDS
DASD

Port Remapping

Port Remapping:

- Any FICON port address on any slot/port
    Since SAN-OS 3.0
- Reduce number of HCD / IOCDS changes needed for migration
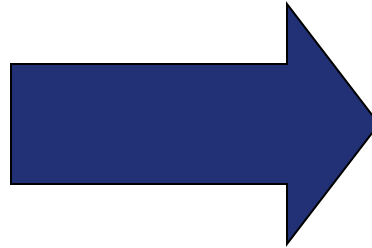- First port address does not have to be 0

04

08
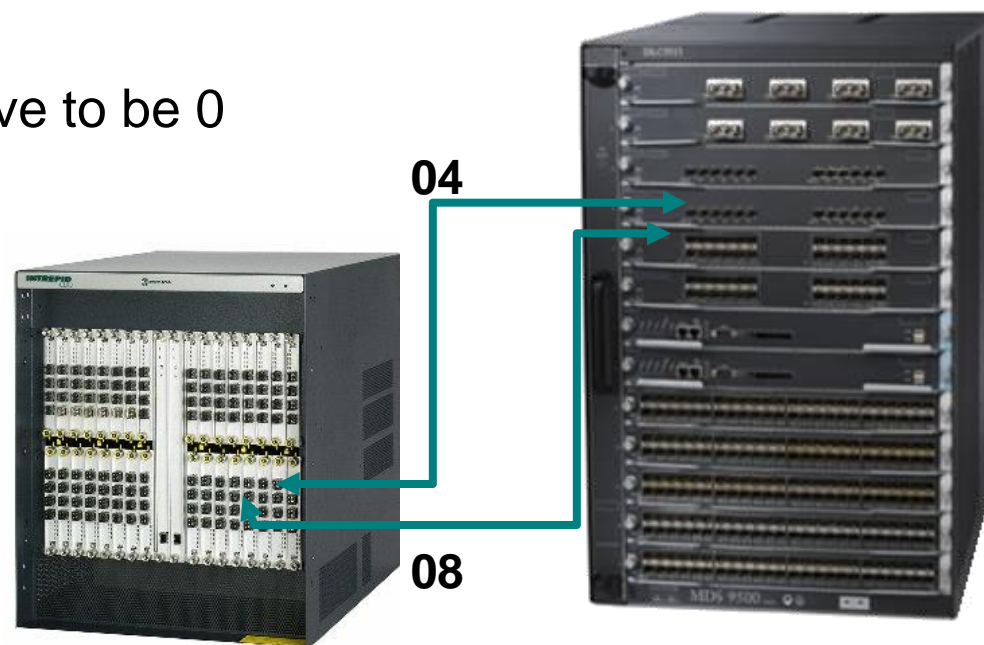
Evolution Made Simple: Old to New FICON
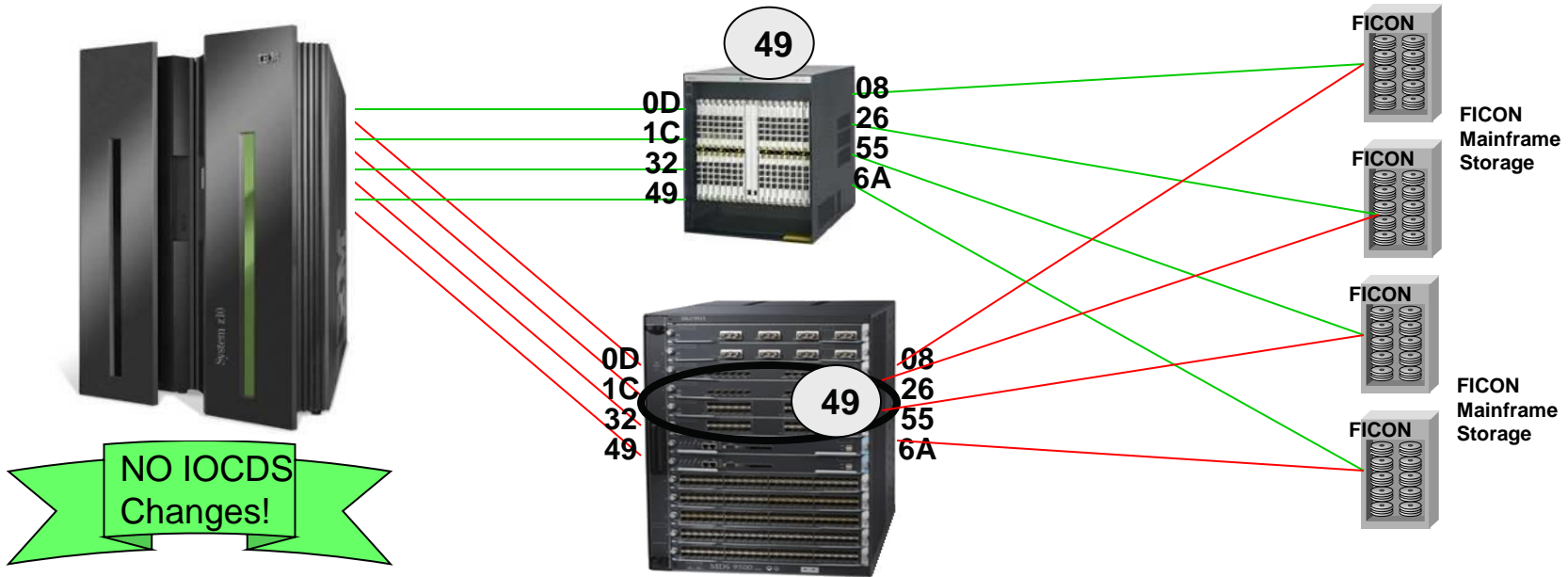
1. Install MDS 95xx in parallel to old director
2. Create VSAN w/ same switch # (domain ID) on MDS 95xx
3. Assign same FICON port numbers as director to be retired
4. Vary ALL devices offline
5. Move each cable to port with same FICON port #
6. Vary ALL devices online

Evolve Your Channel Extension

SSN-16* or
MSM 18/4 line card for
MDS 9500 directors

Integrated Channel Extension for XRC and tape based on director line card saves:

- Floor / rack space
- Power and cooling
- DWDM Transponder equipment (via integrated optics)
- Expensive service contracts
- Management complexity

* SSN-16 supported with FICON beginning with NX-OS 5.2(2)

Meet the New Box – Same as the Old Box!

MDS 9506   **MDS 9509**   **MDS 9513**

Cisco's 2G Platforms   **Cisco's 4G Platforms**   **Cisco's 8G Platforms**   **Faster 8G, FCoE**

Questions?

**ESCON I/O Will not be supported on future System z Platforms…..
So what should I do now?**

March 14, 2012
Session # 11009