



MAINFRAME

Managed Evolution for the IBM zEnterprise System

This document discusses the smart, centralized, cloud-optimized data center of the twenty-first century.

BROCADE

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EXECUTIVE SUMMARY

The IBM zEnterprise System is an evolutionary machine in the history of enterprise computing. To realize the full value of an investment in the zEnterprise requires a transformation in the infrastructure supporting your new mainframe. A high-performance sports car requires high-performance tires to utilize its full potential; in the same way, the IBM zEnterprise System requires an optimized infrastructure to maximize its capability and value. As part of a thoughtfully planned and managed process, the transition from a mixed ESCON and FICON infrastructure to a pure FICON infrastructure can and should be implemented.

INTRODUCTION

The July 2010 announcement of the IBM zEnterprise System outlined the significant scalability and flexibility that the new platform offers for mainframe environments. The zEnterprise System is truly a “system of systems” and a first-of-a-kind design that embraces multiple technology platforms—including mainframe, Unix, and x86—and that is integrated within a centrally managed, unified system. The improvements in virtualization, processing power, performance, and scalability are unprecedented in the evolution of the mainframe. And, perhaps most notable, all of these improvements can be realized while making significant improvements in energy efficiency. The term “mainframe,” which was considered out-of-date for a decade, is now back in style. In fact, IBM and the industry are using the term once again, in a positive light, to describe the zEnterprise System. The July 2011 announcement of the System z114 describes more fully how the system enables small- to midsize environments to make use of a new, centralized private or hybrid cloud computing infrastructure.

The IBM zEnterprise System is the foundation for a centralized, high-performance cloud computing environment and represents an evolutionary new model for efficient IT service delivery. The model is designed to address current operational challenges, while maintaining the flexibility to harness emerging technologies and the freedom to drive real business innovation. This is a transformation—of information, applications, infrastructure, people, and processes—that helps organizations achieve rapid deployment of business services that are accessible from anywhere in the world. To realize the full value of an investment in the IBM zEnterprise System and this new paradigm of cloud computing, implementation of a storage network with the performance to match is required.

Between April 2009 and July 2011, IBM released a series of four (4) ESCON statements of direction. The most recent of these, released July 12, 2011, was the most definitive: “The IBM zEnterprise 196 and the IBM zEnterprise 114 are the last System z servers to support ESCON channels: IBM plans not to offer ESCON channels as an orderable feature on System z servers that follow the z196 (machine type 2817) and z114 (machine type 2818). In addition, ESCON channels *cannot be carried forward* [emphasis added] on an upgrade to such follow-on servers. This plan applies to channel path identifier (CHPID) types CNC, CTC, CVC, and CBY and to feature code numbers 2323 and 2324. System z customers should continue to eliminate ESCON channels from the mainframe wherever possible. Alternate solutions are available for connectivity to ESCON devices.”

Based on this, data center managers with a significant installed base of ESCON equipment are faced with a very meaningful challenge. It does not make good sense to purchase a zEnterprise System and then run ESCON I/O. If you do so, you cannot take advantage of the significant performance potential and scalability that you have paid for. The question is this: how do organizations thoughtfully manage the transition from ESCON to FICON in the host infrastructure, while accommodating applications and device types that are not capable of FICON attachment? In other words, how can you migrate to a pure FICON channel configuration, but still support these legacy devices?

“The IBM zEnterprise 196 and the IBM zEnterprise 114 are the last System z servers to support ESCON channels... System z customers should continue to eliminate ESCON channels from the mainframe wherever possible.”

IBM

Mainframe Evolution Survey

zJournal, a leading mainframe industry publication, recently conducted a “Mainframe Evolution Survey.” The objective of the survey was to understand the FICON/ESCON usage characteristics of large enterprises deploying z Series and System z solutions. The survey was conducted with Fortune 1000 mainframe clients in North America in the finance, healthcare, government, and utility industries. Survey respondents were IT managers and IT staff, specifically from the mainframe arena working with storage, networking, Disaster Recovery (DR), capacity planning, and performance management.

Among other things, one of the key questions the survey asked participants was what factors compel them to preserve investments in ESCON applications and device types. In the process, the survey also identified three interesting facts:

1. 85% of all System z customers and 78% of all System z machines in use today have active CNC (native ESCON) channels defined.
2. 33% of all z9 and z10 systems have CVC and CBY (converted mode ESCON) channels defined to support Bus & Tag devices.
3. The vast majority of large mainframe customers still rely on ESCON-based and/or Bus & Tag-based applications.

Four important conclusions were drawn from the survey:

1. New workload growth relies on FICON storage, while stable, mission-critical applications are often dependent on mature ESCON and even Bus & Tag devices.
2. Managing dual ESCON and FICON infrastructures is very common, but it is inefficient and costly.
3. The benefits of an “all FICON” infrastructure can be significant but are not being fully exploited.
4. IBM System z clients have the opportunity to approach mainframe infrastructure planning differently, which would allow them to maximize efficiency and lower operational costs.

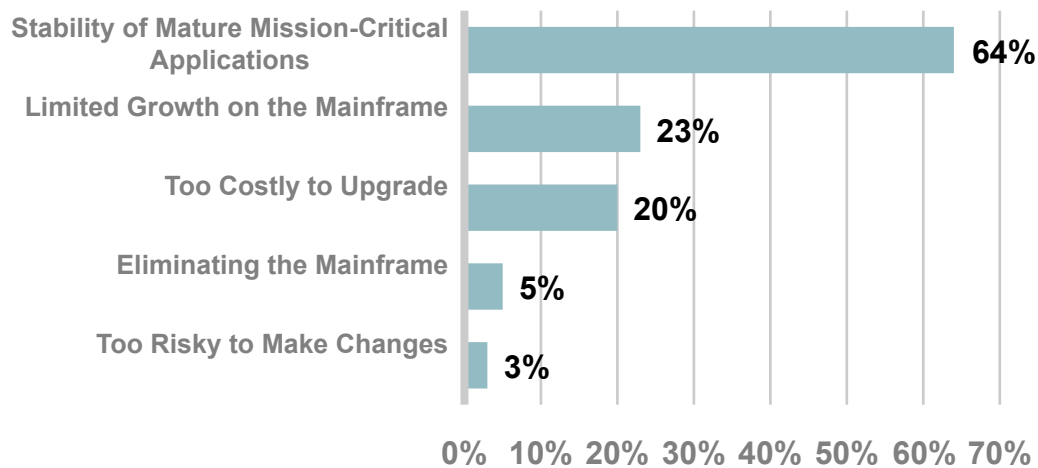


Figure 1. Factors compelling end users to preserve investments in ESCON

THE SMARTER, CENTRALIZED CLOUD-OPTIMIZED DATA CENTER

The era of highly distributed, multi-architecture, non-centralized computing officially ended when IBM announced the zEnterprise System. Server sprawl, difficult-to-manage Storage Area Network (SAN) islands, and inefficient, fragmented architectures are no longer acceptable. The IBM zEnterprise System and the consolidation potential, energy efficiency, and architectural simplification it enables point the way toward a new IT model: smart, centralized, cloud-optimized—the Smarter Enterprise Data Center (SEDC).

Smart, centralized, private or hybrid cloud computing is a revolutionary model that helps reset the economics of IT and addresses the complexity and inefficiencies in today's multi-architecture data centers, dramatically improving operational efficiency. The SEDC, centered on the zEnterprise and a Brocade® FICON/Fibre Channel DCX® Backbone-based storage network, helps control and reduce rising costs and improves provisioning speed, data center security, and resiliency—at any scale. A zEnterprise System-centered SEDC extends the strengths and capabilities of the mainframe, such as security, fault tolerance, efficiency, virtualization, and dynamic resource allocation to other systems and workloads running Unix, Windows, or Linux. SEDC fundamentally changes the way the 21st-century data center can be managed. It aligns technology and business, giving customers the flexibility to innovate and stay ahead of their competition. This last point is very important and deserves further analysis.

In the SEDC, Information Technology (IT) should not be considered merely a cost of doing business.

IT should align with and complement the business strategy. To achieve this, organizations must architect a flexible and resilient infrastructure designed to anticipate and respond to shifting business requirements. The SEDC, with the zEnterprise System and the Brocade DCX Backbone at its core, allows for massive scalability and dynamic responsiveness while simultaneously providing an energy-efficient, resilient infrastructure.

There are three stages of adoption when moving to the SEDC: 1) simplification, 2) sharing, and 3) dynamic. This paper focuses on the first stage. Subsequent papers will address the second two stages.

Simplification, the first stage in adopting the SEDC, addresses complexity issues: server sprawl, storage sprawl, inefficient resource usage, disparate management tools, and inconsistent processes. The focus in this stage is on consolidation, virtualization, and standardization. The zEnterprise System and the Brocade DCX Backbone were designed to meet the need for infrastructures to be consolidated and simplified. Server footprints and disparate architectures can be reduced, as can network and storage footprints. Such consolidation reduces unnecessary complexity and enhances energy efficiency, manageability, and resiliency—all for the goal of increasing business value.

A best practice for implementing a zEnterprise System is to implement a FICON channel architecture and a storage infrastructure that is predominantly FICON. It is well documented that moving from ESCON to FICON enables significant channel consolidation as well as the consolidation of Direct-Attached Storage Devices (DASDs) and tape (virtual and real) onto smaller footprints. The key is to thoughtfully manage the migration of your infrastructure from ESCON to FICON, which takes you well on your way to the shared and dynamic stages of the SEDC.

IBM introduced the new FICON Express8S channels in July 2011. The FICON Express8S channels are a significant improvement over the FICON Express8 channels, offering 108% more IOPS capability, and 77% more bandwidth throughput when running z High Performance FICON (zHPF). The FICON Express8S channels are the ideal mechanism for the SEDC, and for consolidation of existing ESCON channels onto a newer all-FICON channel host configuration.

MANAGED INFRASTRUCTURE EVOLUTION FOR THE IBM zENTERPRISE SYSTEM

Managed Infrastructure Evolution is the process of strategically transforming your mainframe infrastructure by investing in the newest feature-rich technology on the host, while maintaining a mixed portfolio of applications and device types based on a customer's specific business requirements.

The zEnterprise System presents the SEDC with immense scalability and flexibility. The significant benefits associated with the SEDC and the IBM zEnterprise System include:

- **Business resiliency and security:** Manages enterprise risk and protects the enterprise's most valuable data assets
- **Cost and service delivery:** Uses consolidation to increase control over rising administration costs and exponential data growth
- **Green IT:** Lowers energy consumption and balances energy demands to avoid high peak energy usage, while maintaining Service Level Agreements (SLAs)

With the resurgence of the mainframe under the IBM zEnterprise System, new mainframe planning realities have emerged, including:

- Private and hybrid cloud computing
- System z host upgrades
- Growth in z/OS- and Linux- based workload
- Advanced storage network architectures
- New economies associated with the green data center
- Awareness of and planning for ESCON end of life

Some of the benefits listed above can be undermined by the impact of a mixed FICON and ESCON environment. The managed infrastructure evolution for System z is a strategic infrastructure simplification solution that aligns with the SEDC and the IBM green data center initiatives. Managed evolution conditions the System z environment, enabling customers to:

- Simplify the cutover to a new zEnterprise platform while becoming "new workload ready"
- Maintain access to ESCON and Bus & Tag devices required to support key applications
- Consolidate ESCON infrastructure and operations
- Deploy 100% new FICON channels on the host, and exploit the full benefits of FICON

This managed infrastructure evolution unleashes the full power of the zEnterprise host I/O capacity, system performance, capacity management, and storage optimization. Consequently, IT planners are seeking solutions that enable them to fully embrace the new zEnterprise revolution, while ensuring the gradual evolution of mission-critical applications that rely on mature ESCON and Bus & Tag peripheral devices.

In order to introduce new applications and support business growth, it is preferable to direct investments towards System z host upgrades and FICON infrastructures. Managed evolution for System z is the ideal solution to complement this investment and modernize legacy devices. It delivers a flexible FICON infrastructure, which simplifies storage migration while preserving investments in mature ESCON and Bus & Tag devices.

The managed infrastructure evolution is an infrastructure-based simplification initiative that drives the following business benefits:

- **Accelerates zEnterprise System readiness and acceptance:** Conditioning a host I/O environment to pure FICON in advance of migrating to zEnterprise simplifies the migration process and reduces planned downtime.
- **Maximizes the value of zEnterprise:** Populating a new z196 or z114 with FICON Express8S channel cards versus ESCON cards provides maximum flexibility, performance, and investment protection for your new mainframe. The single infrastructure type can now support all existing devices, regardless of the interface style.
- **Leverages management, performance, and distance capabilities of FICON:** The technical advantages of FICON vs. ESCON protocol are well-documented. In the context of managed evolution, the value proposition for leveraging FICON channels in the host system is enhanced with the ability to leverage the advantages across the entire device portfolio.
- **Simplifies the cable plant, configuration planning, and operations of the mainframe:** Managing a single and consistent cable plant with a reduced number of physical cables (in light of the ESCON-to-FICON consolidation ratio) reduces complexity and streamlines connectivity planning. Mainframe configuration planning and operational aspects are greatly simplified with a single protocol.
- **Eliminates ESCON director End-of-Life/End-of-Support issues:** Managed evolution provides a means for replacing aging ESCON directors that are approaching End-of-Support status.
- **Provides green environmental benefits:** System z consolidation and the migration to a pure FICON host infrastructure provide significant environmental benefits, including substantially reduced maintenance, power, and cooling costs and floor space efficiencies.

The customer case study in the next section illustrates these points.

USE CASE SCENARIO

A large financial institution undertook a project to consolidate three z9 mainframes down to two z10 systems, primarily as a means to simplify their mainframe infrastructure. The IT department deployed the z10 mainframes at a new primary data center facility with the goal of realizing the following planned benefits:

- Lower software licensing fees by 10 percent
- Lower total maintenance costs by 10 percent
- Reduce power and cooling costs by up to 80 percent
- Reduce the amount of floor space used
- Leverage the advantages of migrating to FICON on the mainframe

The customer wanted to simplify their infrastructure with FICON by installing as much FICON and as little ESCON as possible into the new System z10 systems. However, they needed to be able to maintain service levels to certain high-value assets that still required ESCON attachment. The Prizm FICON converter from Optica Technologies (www.opticatech.com) was a key component of the newly architected infrastructure. (The FICON converter is a channel-based appliance that converts native FICON protocol to native ESCON protocol, allowing attachment of existing ESCON devices directly to FICON channels.)

Details of the Transformation

Following are some details of the original and planned data center configuration:

- The financial institution had been operating a large ESCON infrastructure with locally attached ESCON directors, as shown in Figure 2.
- The new plan expanded two data centers to three data centers.

- Three IBM System z9 systems were consolidated down to two System z10 systems.
- 96 ESCON host channels were consolidated to an all-FICON infrastructure (replacing eight FICON channels).
- The remaining ESCON tape and communications controllers would continue to be supported.
- ESCON channel extenders between sites were eliminated in favor of FICON extension.

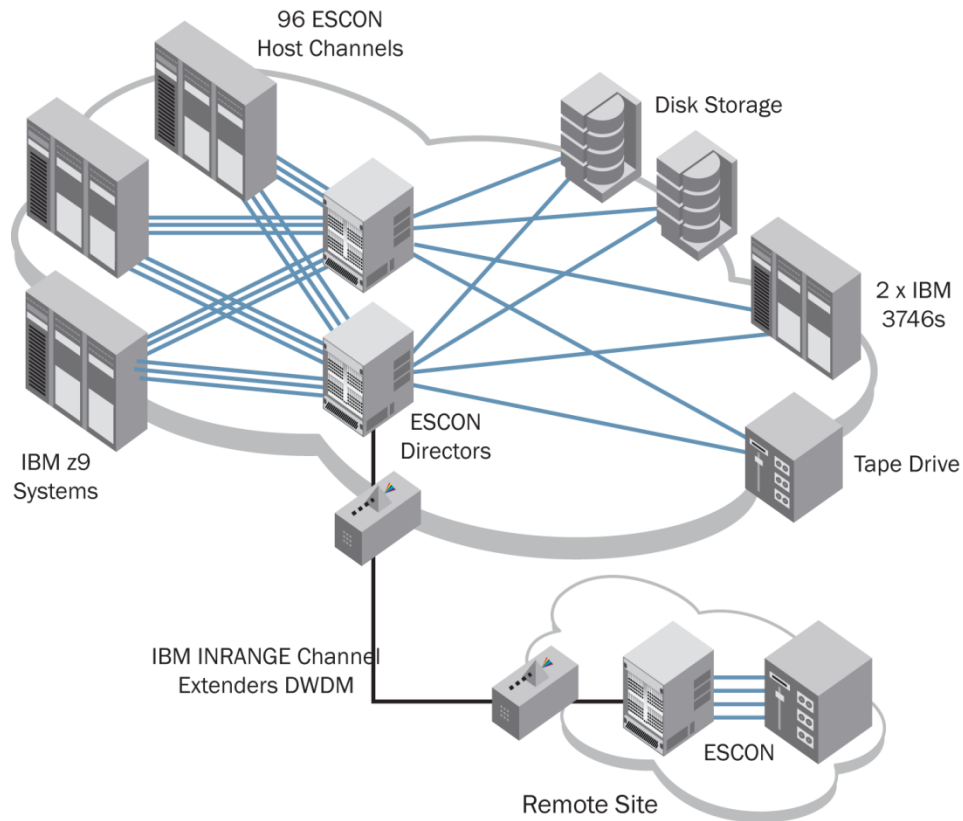


Figure 2. Financial institution data center infrastructure before the FICON installation

With thoughtful planning, this client had the opportunity to take advantage of an evolutionary three-phase program:

1. **Phase 1– z10 Readiness:** ESCON-to-FICON simplification and consolidation with the Prizm FICON converter (96 ESCON channels consolidated on eight FICON channels)
2. **Phase 2 – z10 Deployment:** Installing the z10 host at the new data center and decommissioning z9 processors at the original site (all FICON host channels on z10 allocated for workload consolidation and new workload growth)
3. **Phase 3 – Distance Solution:** Extending FICON and removing ESCON director and channel extenders for remote tape support (to reduce maintenance costs and capitalize on inherent distance capabilities of FICON)

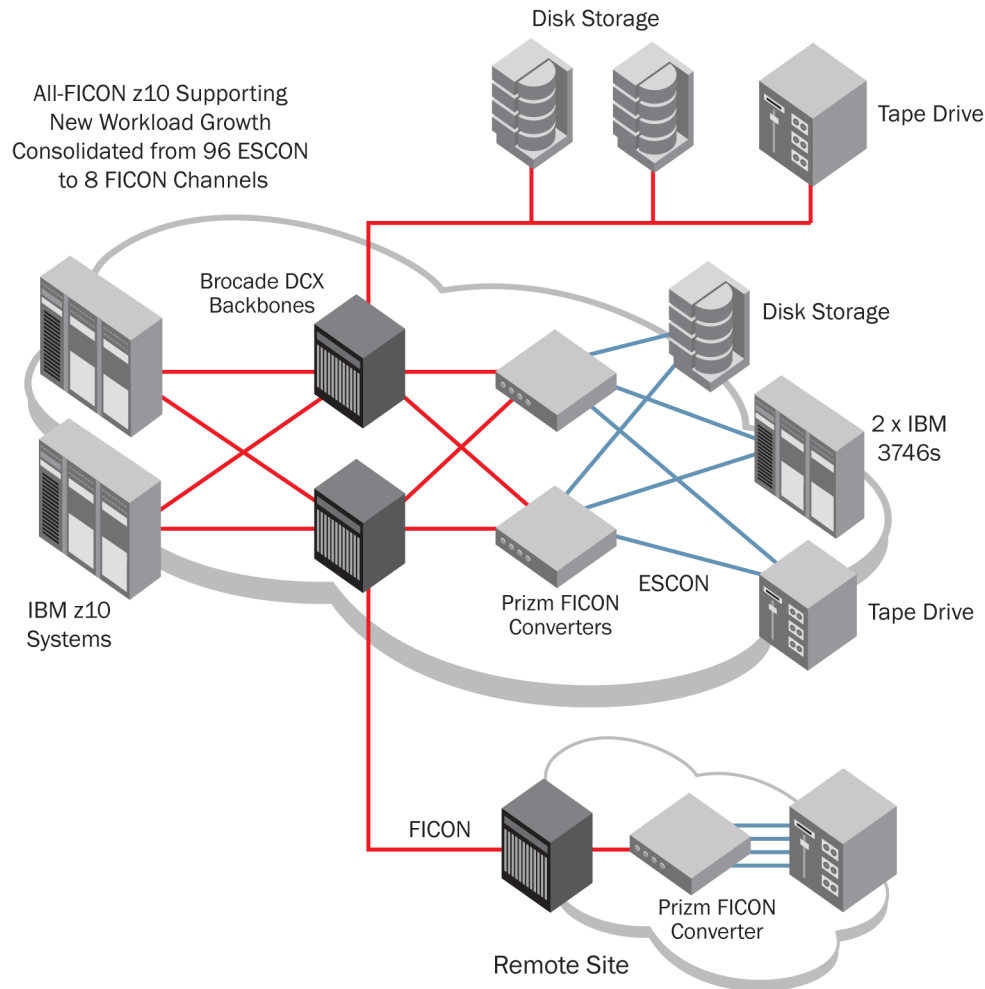


Figure 3. New data center, including IBM z10, Brocade DCX Backbone, and Prizm FICON converter (no ESCON DASD was involved)

Benefits of the Transformation

While the overall project Return on Investment (ROI) was justified by the benefits of the System z10 implementation, as shown in Figure 3, other benefits associated with managed evolution included:

- End-of-Service equipment eliminated and overall mean time between failures (MTBF) improved
- FICON addressing for ESCON assets
- Simplified change management process for mature applications
- CPU planning and downtime reduced (no ESCON)
- CPU support costs reduced (no ESCON)
- Increased start I/O capacity and management flexibility
- Dramatically higher performance and scalability

SUMMARY

In July 2011, IBM announced that the z196 and z114 would be the last IBM mainframes to support ESCON channels. The time has come for the many remaining ESCON channels on currently installed IBM mainframes to be replaced.

The IBM zEnterprise System offers end users a chance to develop a smarter enterprise data center—one that is centered on zEnterprise with a storage networking infrastructure built on the industry-leading Brocade DCX Backbone. SEDC enables end users to take optimal advantage of the zEnterprise's performance, cloud computing capabilities, and robust management tools, while running on a cloud-optimized high-performance storage network.

Managed evolution enables significant simplification of the Smarter Enterprise Data Center, aligns with the IBM zEnterprise System benefits, and eases zEnterprise readiness and acceptance. Managed evolution allows customers to:

- Plan their move from ESCON to FICON Express 8S in a thoughtful manner
- Migrate to an all-FICON zEnterprise, while protecting their investment in legacy ESCON devices
- Simplify their mainframe infrastructure via consolidation

At the same time, customers can expect better performance, increased scalability, improved reliability, and higher energy efficiency.

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