Managed Infrastructure Evolution for System z

The centralized new enterprise data center
of the twenty-first century

The IBM System z10 is an evolutionary machine in the history of enterprise computing. To realize the full value of an investment in the System z10 requires a transformation in the infrastructure supporting your new mainframe. A high-performance sports car requires high performance tires to unleash its full potential; in the same way, the System z10 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 done.

INTRODUCTION

The February 2008 announcement of the IBM System z10 outlined the significant scalability and flexibility that the new platform offers for your mainframe environment. The improvements in 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 The term "mainframe," which has been considered out-of-date for a decade, is now back in style. In fact, IBM is using it once again in a positive light to describe the System z10.

The improved System z10 is the foundation for what IBM is calling the "New Enterprise Data Center." The New Enterprise Data Center is 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—information, applications, infrastructure, people, and processes—that will help your business achieve rapid deployment of business services accessible from anywhere in the world. To realize the full value of your investment in the System z10 and the New Enterprise Data Center, you need to implement the services-oriented infrastructure to support it.

IBM announced the end of marketing of the 9032-5 ESCON director oat the end of 2004, with End of Life/End of Support projected for the end of 2009. 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 System z10 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 you thoughtfully manage the transition from ESCON to FICON in your 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?

MAINFRAME EVOLUTION SURVEY

zJournal, a leading mainframe industry publication, conducted a survey in May 2008. 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 in the mainframe arena with storage, networking, Disaster Recovery (DR), capacity planning, and/or performance management.

The survey identified that fewer than 20 percent of Fortune 1000 enterprises have fully converted their System z infrastructures to FICON. In fact, more than 80 percent of the enterprises surveyed have a significant mix of FICON, ESCON, and Bus & Tag devices and channel types, as shown in Figure 1. Comments made by respondents indicated that these decisions were based on solid business reasons.

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 is inefficient and costly.
3. The benefits of an "all FICON" infrastructure can be significant, but are not being fully exploited.
4. There is an opportunity for IBM System z clients to approach mainframe infrastructure planning differently, which would allow them to maximize efficiency and lower operational costs.

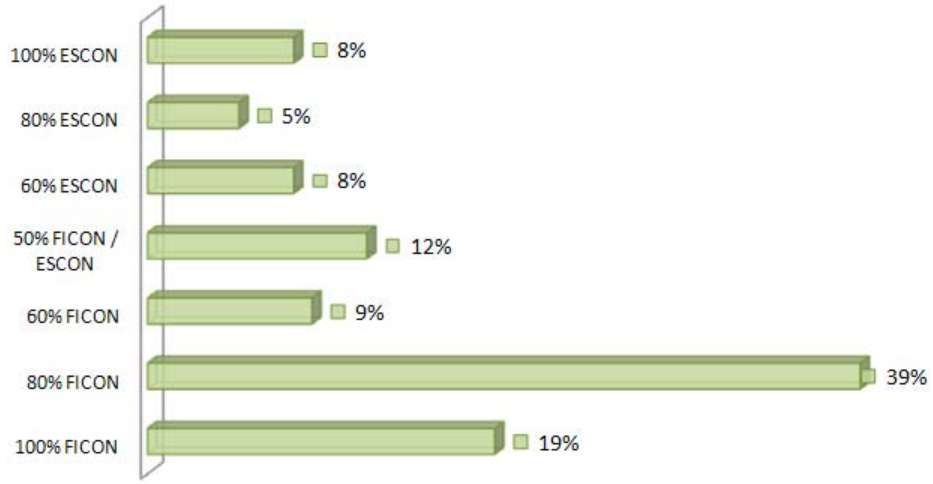

Figure 1.
Customers have a mix of ESCON and FICON (Source: zJournal, May 2008).

THE NEW ENTERPRISE DATA CENTER

The era of highly distributed, non-centralized computing officially came to an end when the System z10 was announced. Server sprawl, difficult-to-manage Storage Area Network (SAN) islands, and inefficient, fragmented architectures are no longer acceptable. The System z10 and the consolidation potential, energy efficiency, and architectural simplification it enables point the way toward a new IT model: the New Enterprise Data Center.

IBM describes the New Enterprise Data Center (NEDC) as an evolutionary model that helps reset the economics of IT and dramatically improves operational efficiency. The NEDC can help control and reduce rising costs and improve provisioning speed, data center security, and resiliency—at any scale. NEDC aligns technology and business and therefore gives customers the flexibility to innovate and stay ahead of their competition. This last point is very important and deserves further analysis.

In the NEDC, Information Technology (IT) should not be considered merely a cost of doing business. IT should align with and compliment the business strategy. To achieve this, organizations must architect a flexible and resilient infrastructure designed to anticipate and respond to shifting business requirements. The NEDC, with the System z10 at its heart, allows for massive scalability and dynamic responsiveness while simultaneously providing an energy-efficient, resilient infrastructure.

There are three stages of adoption in moving to the NEDC: 1) simplified, 2) shared, and 3) dynamic. This paper focuses on the first stage.

The first stage of adoption addresses complexity: server sprawl, storage sprawl, inefficient resource usage, disparate management tools, and inconsistent processes. It focuses on consolidation, virtualization, and standardization. Infrastructures should be consolidated and simplified, and the System z10 was designed to meet these needs. Server footprints and disparate architectures can be reduced, as can network and storage footprints. This 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 System z10 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 and the consolidation of Direct-Attached Storage Devices (DASD) and tape (virtual and real) onto smaller footprints. The key to this is to thoughtfully manage the migration of your infrastructure from ESCON to FICON. Then, you are well on your way to the shared and dynamic stages of the NEDC.

SERVICE-ORIENTED ARCHITECTURE AND SERVICE-ORIENTED INFRASTRUCTURE

System z data centers have been evolving for decades and have re-established themselves as core processing facilities that contain much more than just legacy business applications. For many years the mainframe has epitomized reliability, availability, security, and scalability. These strengths of the mainframe computing platform are the reasons why enterprises around the world have chosen the mainframe as the deployment platform for mission-critical applications. The banking industry has had a strong affinity for the mainframe. However, the capabilities offered by the mainframe are growing in importance for all industries. The mainframe is increasingly seen in data centers across all industries.

The concept of a Service-Oriented Architecture (SOA) is based on applying the appropriate services to applications, processors, and storage to maximize efficiency and flexibility in an IT environment. The strengths of the System z platform, combined with SOA, represents a powerful solution for any business This solution provides internal architectural flexibility while retaining all of the mission-critical attributes that characterize the System z platform. In addition to intelligent processing, operating systems, and storage, the SOA concept requires an infrastructure that supports its objectives, hence the term “Data Center Fabric.” The Data Center Fabric (DCF) should support and provide the services to both the host and storage that allow data flows to be managed as requirements change. A Service-Oriented Infrastructure (SOI) provides administrators the flexibility to use Adaptive Networking services, which include Quality of Service (QoS), data mobility, encryption, and virtual connectivity for fast and reliable deployments independent of the network protocol.

A more flexible and cost-effective approach to delivering IT value is being developed through the SOA model. A Data Center Fabric is a strategic architecture that complements the IBM vision of a Service-Oriented Data Center, for which enterprise business needs define the requirements for infrastructure services. To fulfill this strategy, it is imperative that the infrastructure be both flexible and capable of providing the necessary services when required. The storage technology advancements in performance, data protection, data mobility, and raw scalability can be complex but are strategic to the overall success of the business. The Data Center Fabric that deploys an SOI provides an intelligent, policy-based architecture designed to provide these advanced fabric-based services in an efficient, cost-effective, and highly scalable manner.

THE MANAGED INFRASTRUCTURE EVOLUTION

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 System z10 presents the new enterprise data center with immense scalability and flexibility. The significant benefits associated with the NEDC Initiative and the IBM System z10 include:

- **Business resiliency and security.** Manages enterprise risk and protects the enterprise's most valuable data assets
- **Cost and service delivery.** Consolidation increases 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 System z10, new mainframe planning realities have emerged, including:

- System z host upgrades
- Growth in z/OS- and Linux- based workload
- Advanced storage architectures that include virtual tape and data replication
- 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. Managed Infrastructure Evolution (MIE) is a planned approach to modernizing System z infrastructure by attaching ESCON and Bus & Tag devices to the same homogeneous FICON infrastructure as the native FICON devices. Managed Infrastructure Evolution unleashes the full power of the System z 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 System z10 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. MIE 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. MIE is an infrastructure-based simplification initiative that drives the following business benefits:

- **Accelerates z10 readiness and acceptance.** Conditioning a host I/O environment to pure FICON in advance of migrating to z10 simplifies the migration process and reduces planned downtime.
- **Maximizes the value of z10.** Populating a new z10 with FICON channel cards vs. 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 MIE, the value proposition for leveraging FICON channels in the host system is enhanced with the ability to leverage the advantages across your entire device portfolio.
- **Simplifies the cable plant and the 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 EOL/EOS issues.** CMIE 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 their power and cooling costs by up to 80 percent
- Reduce the amount of floor space
- Leverage the advantages of migrating to FICON on the mainframe

The customer was looking 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 some high-value assets that still required ESCON attachment. The Prizm FICON converter from Optica Technologies 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 bank 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 8 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.

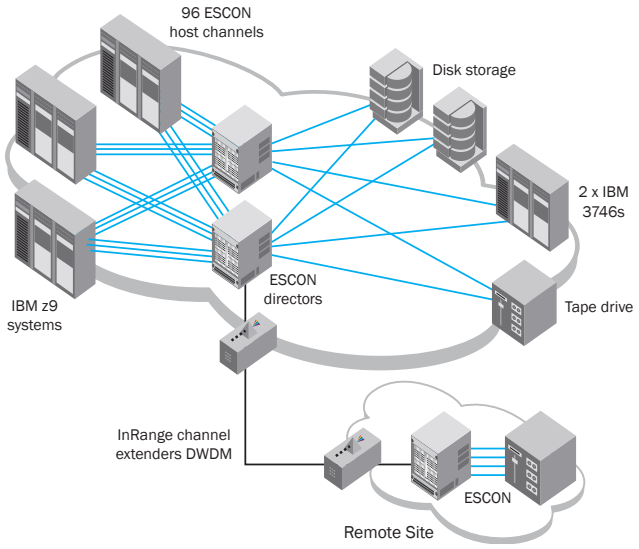

Figure 2.
Bank data center infrastructure before the FICON installation.

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 8 FICON channels)
2. **Phase 2, z10 deployment.** Install the z10 host at the new data center and decommission 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.** Extend FICON and remove ESCON director and channel extenders for remote tape support (reduces maintenance costs and capitalizes on inherent distance capabilities of FICON)

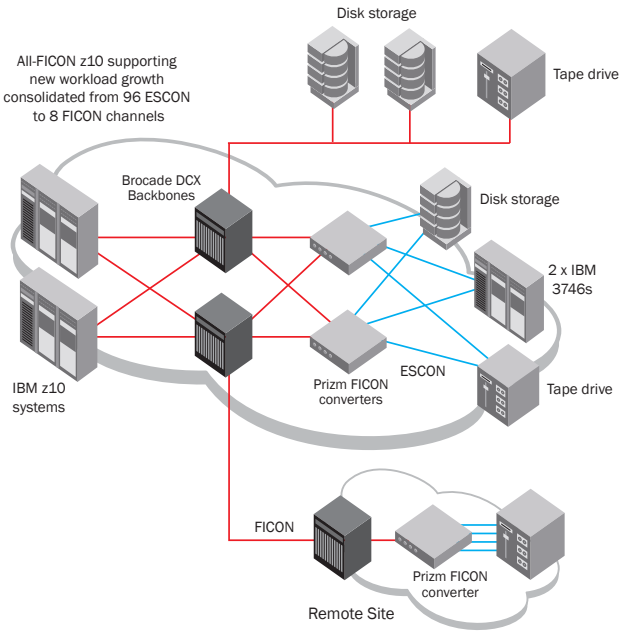

Figure 3.
New Data Center IBM z10 and Prizm FICON converter (no ESCON DASD was involved).

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 Prizm FICON converter and managed evolution include:

- 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

SUMMARY

A Managed Infrastructure Evolution enables significant simplification of the New Enterprise Data Center, aligns with the IBM System z10 benefits, and eases z10 readiness and acceptance. MIE allows customers:

- To plan their move from ESCON to FICON in a thoughtful manner
- To migrate to an all-FICON z10, while protecting the investment in legacy ESCON devices
- To simplify their mainframe infrastructure via consolidation

At the same time, they can expect better performance and higher energy efficiency.

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