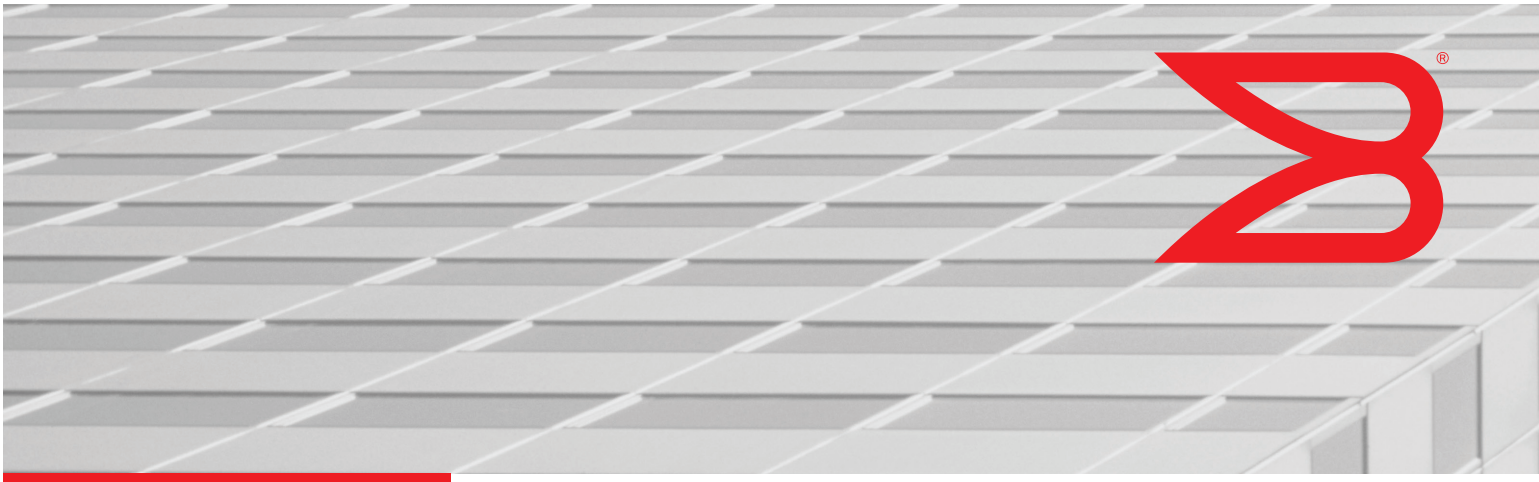

DATA CENTER

Deploying Strategic Data Center Solutions for IBM zEnterprise System z Environments

The Brocade DCX Backbone provides industry-leading performance, scalability, and investment protection, unleashing the full capabilities of IBM System z, especially IBM zEnterprise 196 (z196) solutions.

BROCADE

The z196 is the industry's fastest and most scalable enterprise system that leverages 8 Gbps FICON Express8 and z High Performance FICON (zHPF). Brocade® DCX® is the most flexible FICON director for designing, building, and transforming enterprise data centers into strategic business assets. Building the core FICON infrastructure with Brocade DCX enables IT organizations to address their most pressing business challenges while preparing for emerging and future technologies. Today, System z users can benefit from the unique advantages of this forward-thinking solution built on field-proven technologies.

NEW SOLUTIONS FOR EVOLVING DATA CENTERS

In today's ever-changing IT environment, organizations typically face more decisions than they would like to make. The most common challenges include finding the best ways to reduce costs, increase flexibility, deploy new applications, and protect data—without burdening overworked staff or disrupting business operations. All of these challenges revolve around the exponential growth in data processing requirements and storage capacity.

Emerging or future technologies can further complicate decision-making since new capabilities impact how IT organizations should invest today in order to grow their computing environments most efficiently. The new IBM System z196 improves performance for traditional and modern workloads, enabling unprecedented virtualization support for massive consolidation and infrastructure simplification. However, maximizing the value of the processing power and I/O capabilities requires a high performance, scalable, and reliable 8 Gbps FICON infrastructure.

The Brocade DCX is the core of next-generation FICON Express8 and beyond network infrastructure that unleashes the full potential of System z. It's a FICON director that meets the requirements of today's data centers while helping to ensure investment protection for tomorrow's virtualized and cloud-enabled data center. This paper describes how the Brocade DCX supports IBM zEnterprise environments in the most effective manner.

SYSTEM Z INFRASTRUCTURE AND VISION

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. Although many organizations have continued to isolate different operating systems and technologies, mainframe data center fabrics have steadily moved from a single switching function to a fully integrated infrastructure that provides a much broader solution for storage interconnectivity. As shown in Figure 1, the capabilities of the Brocade DCX fabric infrastructure give these organizations even greater options to deploy a multifunctional strategy for their System z environments.

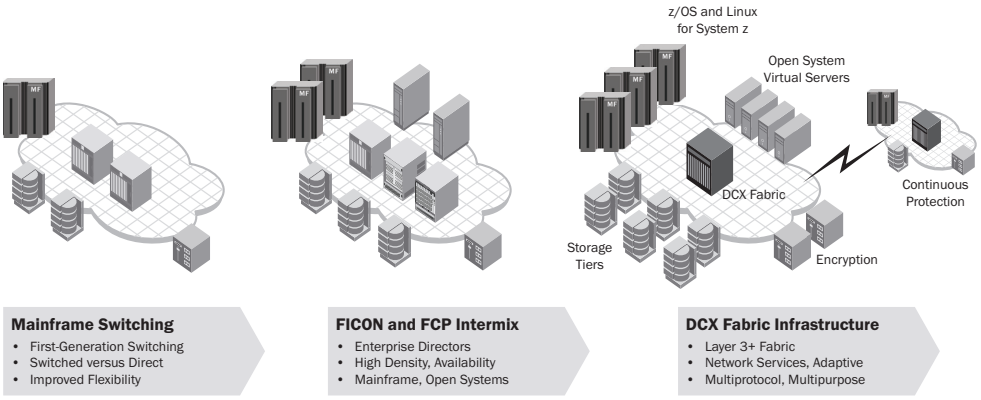

Figure 1.
The evolution of mainframe I/O infrastructures.

The System z operating system (z/OS) has been at the forefront of offering capabilities that have yet to be realized in open systems environments. For example, virtualized processing has been a cornerstone of z/OS for some time, enabling organizations to integrate and share processor, storage, and fabric resources in order to reduce cost and complexity.

Figure 2 provides a high-level view of current System z processor capabilities. The advanced level of sophistication provides the flexibility to consolidate many operating systems and applications into a virtual machine that uses well-established capabilities, such as the I/O supervisor and workload manager, to help distribute work from applications to I/O and avoid congestion throughout the entire system.

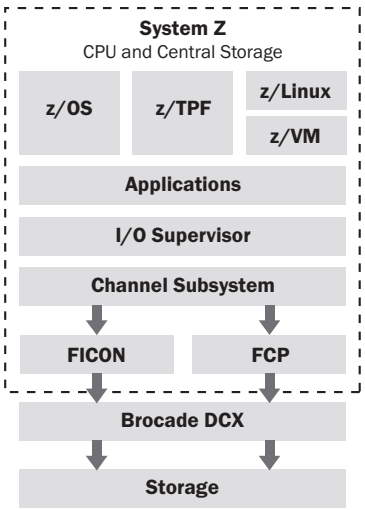

Figure 2.
System z processor model.

The System z processor has emerged as a multiprotocol device that supports mixed I/O and traffic types, and today it can support both FICON® and Fibre Channel protocols for simultaneous storage connectivity. As the System z processor and technologies move into the future, organizations will need a storage infrastructure that can support higher performance and new I/O capabilities while protecting existing investments.

Figure 3 shows how Brocade is addressing near-term needs while enabling the transformation of a single-purpose fabric into a common fabric designed to meet a wide range of future objectives.

The Brocade DCX enables the "plug-in" fabric-based services that applications can utilize today, as well as a scalable framework for protecting investments as new technologies emerge. This robust platform provides high performance, scalability, and flexible services. By leveraging this unique solution, organizations are better able to meet their current requirements while building a next-generation data center.

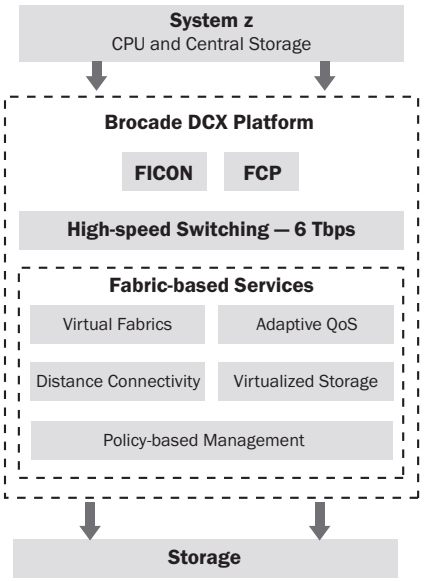

Figure 3.
A highly flexible data center infrastructure built on the Brocade DCX Platform.

THE BROCADE DCX PLATFORM

The Brocade DCX provides an intelligent, policy-based fabric infrastructure designed for efficiency, cost-effectiveness, and long-term scalability (see Figure 4). This unique approach incorporates a shared resource model that leverages a decade of Brocade experience in building low-latency, high-performance enterprise networks.

Brocade DCX fabrics encompass the connectivity of applications and their data, including:

- File and block data
- Virtualized server and storage islands
- Multiprotocol connectivity
- Unified connectivity and management (server-to-server, server-to-storage, and storage-to-storage)

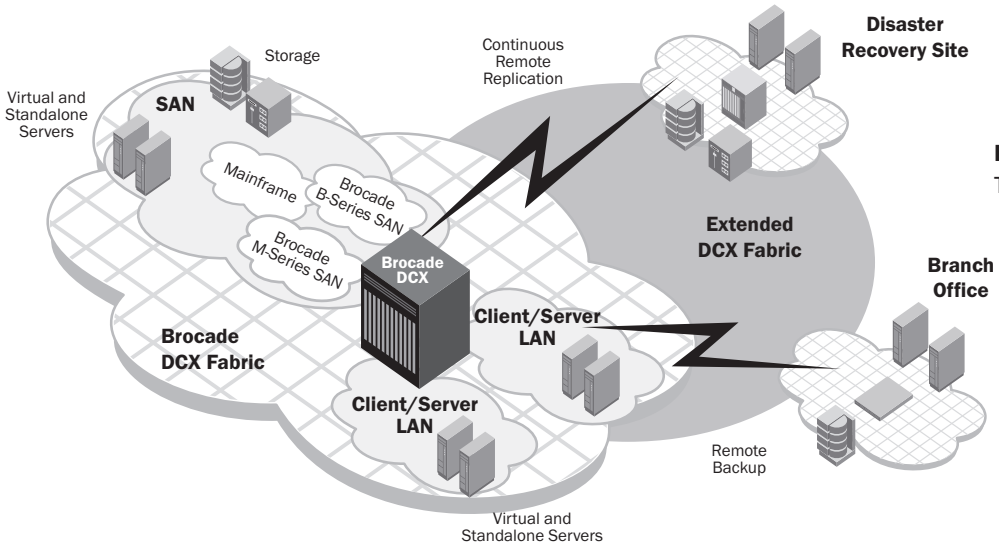

Figure 4.
The Brocade data center fabric and beyond.

System z users can utilize the Brocade DCX to solve key data management challenges, provide consistency across all types of applications, and reduce their overall operating costs for System z environments. Designed to meet the growing connectivity and cost-efficiency needs of enterprise data centers, the Brocade DCX is designed to:

- Complement existing Brocade FICON directors
- Provide breakthrough bandwidth performance
- Support multiple protocols and provide seamless interoperability across fabrics and networking protocols
- Utilize a wide range of Brocade Adaptive Networking services for maximum flexibility
- Deliver unmatched scalability for future requirements

REAL-WORLD BUSINESS APPLICATIONS

With its unprecedented functionality and performance, the Brocade DCX is ideal for use in a wide range of current and future enterprise-class solution areas, including:

- Resource optimization and consolidation
- Data protection for “always-on” operations
- Environments with System z and mixed operating systems

Resource Optimization and Consolidation

Optimization and consolidation paves the way for maximum efficiency and cost-effectiveness. With 8 Gbps FICON or Fibre Channel capabilities, the Brocade DCX can reduce the number of host and storage channel adapters to simplify management without sacrificing performance. Moreover, the ability to provide 8 Gbps performance without over-subscription and a simple upgrade path to 16 Gbps helps protect existing and future investments.

For instance, consider an existing infrastructure built on mature technology. Processor or storage upgrades are being considered because leases are expiring and higher performance is required. Organizations could review several elements to help optimize and consolidate their current resources. If there is under-utilized I/O, organizations could consolidate channels to reduce the overall connectivity requirements.

In addition, organizations could consolidate director or switch ports into a single platform that is easier to manage and is not over-subscribed. Through these types of optimization efforts, System z users can simplify deployment and management—resulting in lower administration and power costs, not to mention capital expenses.

The Brocade DCX provides a wide range of capabilities to help organizations save money through administration and power efficiency while protecting existing investments:

- The Brocade DCX can support 8 Gbps today and provide a seamless upgrade path to 16 Gbps, protecting investments and simplifying migration.
- The Brocade DCX with 384 FICON 8 Gbps line rate ports, non-blocking architecture, and local switching reduces the need for capacity planning due to over-subscription concerns.
- The Brocade DCX with a fully loaded chassis at full rated speeds will likely be able to consolidate four to six mature FICON directors with power consumption that is typically less than a smaller platform—saving three to five times the floor space and HVAC requirements.

Data Protection for "Always-On" Operations

Most organizations follow two types of data protection planning: Disaster recovery and business continuity. Disaster recovery is a way to bring operations back online within a reasonable amount of time after some element has failed. In contrast, business continuity is a way to ensure "always-on" operation (or near-immediate recovery from a lost element). These two types of operations are not mutually exclusive and are often used as part of a tiered recovery plan that meets enterprise-class recovery point objectives and recovery time objectives.

System z users typically have used physical tape, virtualized tape, and disk replication to protect their data in offsite facilities. Distance requirements vary, and can span anywhere from metropolitan to transcontinental distances. The length of the distance creates specific characteristics for performance and reliability. The Brocade DCX is uniquely designed to provide maximum performance over any distance, providing organizations with the most flexible platform to meet their particular requirements.

In metro-distance (100 kilometers or less) deployments, organizations can leverage the following functions:

- **8 Gbps Inter-Switch Link (ISL) Trunking:** Native E_Port connectivity for cascading between sites
- **Advanced ISL Trunking:** Up to eight ports trunked for scalability
- **Adaptive Networking Services:** Port isolation for failover management

For extended-distance solutions (beyond 100 kilometers), organizations can utilize the following advanced capabilities over FCIP links:

- **FICON Disk Emulation:** Performance enhancements for disk read operations
- **FICON Tape Pipelining:** Performance enhancements for tape write and read operations
- **FCIP Fast Write:** For maximum disk mirroring performance over distance
- **Advanced Quality of Service (QoS):** For traffic prioritization, network failover, and resiliency

With over 25 years of long-distance experience and expertise engineered into the Brocade DCX, organizations have a robust, stable platform to support a variety of disaster recovery and business continuance operations.

Environments with System z and Mixed Operating Systems

As described previously, System z can support multiple images (logical partitions) of operating systems such as z/OS and Linux for System z. Leveraging z/VM for virtualized processing and the I/O supervisor, organizations can share resources across processors and storage. For example, z/OS and its tool set can minimize the administration of how the fabric interacts in shared environments. However, having advanced capabilities within the fabric adds even more ways to maximize its effectiveness.

After several years of evaluating Linux for System z for the System z processor, many organizations are quickly moving forward with production applications. When considering moving standalone open system servers to Linux for System z partitions, organizations often find that the power efficiency and energy savings are well worth the effort. In addition to the energy cost savings, the resources available within System z processors provide a systematic way to manage storage access (ECKD- or FCP-based) and data backup.

The Brocade DCX is uniquely equipped to support mixed operating system environments, with the following functions providing high performance, scalability, and isolation of shared data center fabrics:

- **8 Gbps FICON or FCP connectivity:** Enables consolidation and investment protection
- **N_Port ID Virtualization (NPIV):** Reduces resource address administration
- **Adaptive Networking services:** Prioritizes application flows in the fabric
- **Logical partitioning:** Segments and isolates traffic flows

Organizations that are considering sharing System z and open systems servers in the same fabric without integrating them into the System z processor can take full advantage of these advanced functions as well.

SUMMARY

The Brocade DCX is designed for all types of computing environments, but they provide unique capabilities for today's System z environments. By working with the industry leaders in processors and storage, Brocade provides a strategic platform that can fulfill the requirements of today and tomorrow. As a result, enterprise organizations now have a strategic framework for building their next-generation data center fabrics in a highly flexible and cost-effective manner.

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