DATA CENTER

Brocade DCX Integration for Brocade 48000 Customers

Discusses the integration of the Brocade DCX Backbone into existing Brocade Fabric OS (FOS) Storage Area Network (SAN) infrastructures.

BROCADE

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INTRODUCTION

The Brocade® DCX® Backbone is the key building block for extending the reach of today's Storage Area Network (SAN) infrastructures. As IT departments move toward a goal of 100 percent SAN connectivity for server and storage components across the data center, the Brocade DCX empowers IT architects to build a foundation for reaching this goal.

Some SAN design elements of the Brocade DCX architecture include:

- Fibre Channel (FC) speed support at 1, 2, 4, 8, and 10 Gbps
- Option of 16-, 32-, and 48-port 8 Gbps blades, as well as a 6-port 10 Gbps blade
- Advanced blade options, such as Fibre Channel Routing (FCR)/Fibre Channel over Internet Protocol (FCIP), and fabric application blades
- Inter-Switch Link (ISL) trunking of 8 x 8 Gbps, for 64 Gbps trunking support
- Dynamic Path Selection (DPS) support
- Brocade DCX-to-DCX connectivity via Inter-Chassis Links (ICLs) at up to 512 Gbps full duplex
- Adaptive Networking services: Quality of Service (QOS) levels, Traffic Isolation, Ingress Rate Limiting, and "Top Talkers" (a flow-based performance tool)
- Seamless connectivity to existing Brocade Fabric OS® (FOS) SAN infrastructures
- Interoperability with existing Brocade M-Enterprise (M-EOS) SAN infrastructures

As the key building block for the next generation of SAN infrastructures, the Brocade DCX now supports new advanced technologies, including;

- SAN fabric encryption
- SAN protocols, for example, Fibre Channel over Ethernet (FCoE) and Converged Enhanced Ethernet (CEE)
- FC Routing and Virtual Fabrics partitioning on a per-port basis

NOTE: Throughout this document, the terms "Brocade DCX Backbone" or "Brocade DCX" refer to both the Brocade DCX and the Brocade DCX-4S Backbone unless otherwise noted. In illustrations, the Brocade DCX is shown to represent both backbone platforms.

INTRODUCING THE BROCADE DCX INTO A FOS SAN

Taking into consideration the architectural features of the Brocade DCX Backbone, this section examines the impact of introducing this next-generation platform into an existing FOS SAN infrastructure.

It is important to understand that the Brocade DCX represents a next step for the traditional Brocade FOS SAN architecture. It is powered by a next-generation ASIC family, which introduces new features and also extends current features found in Brocade 4 Gbps FOS SAN switching technology. It is blade compatible with the Brocade 48000 Director running FOS and allows current Brocade 48000 customers to take advantage of new 8 Gbps blades and new features of the next-generation ASIC. Finally, it is powered by Brocade Fabric OS, which is constantly introducing new and innovative features to support the evolution to a data center fabric. *The Brocade DCX represents a seamless transition to extend a FOS SAN infrastructure.*

As SAN designs have evolved from 1 Gbps through 4 Gbps and now 8 Gbps, introducing next-generation technology (such as the Brocade DCX) has followed a pattern. To understand this pattern, it is useful to review some of the common methodologies of current SAN design.

Most SAN designs use a variant of what is known as a "core-to-edge" network design. In this design the network elements, typically switches, are designated as either core or edge switches. The edge switches connect end node devices, and the core switches connect edge switches. For this reason, core switches are sometimes called "backbone" switches. The benefits of using this design become clear in situations in which there is rapid growth of the network infrastructure. The core-to-edge network presents a very powerful design to address scalability.

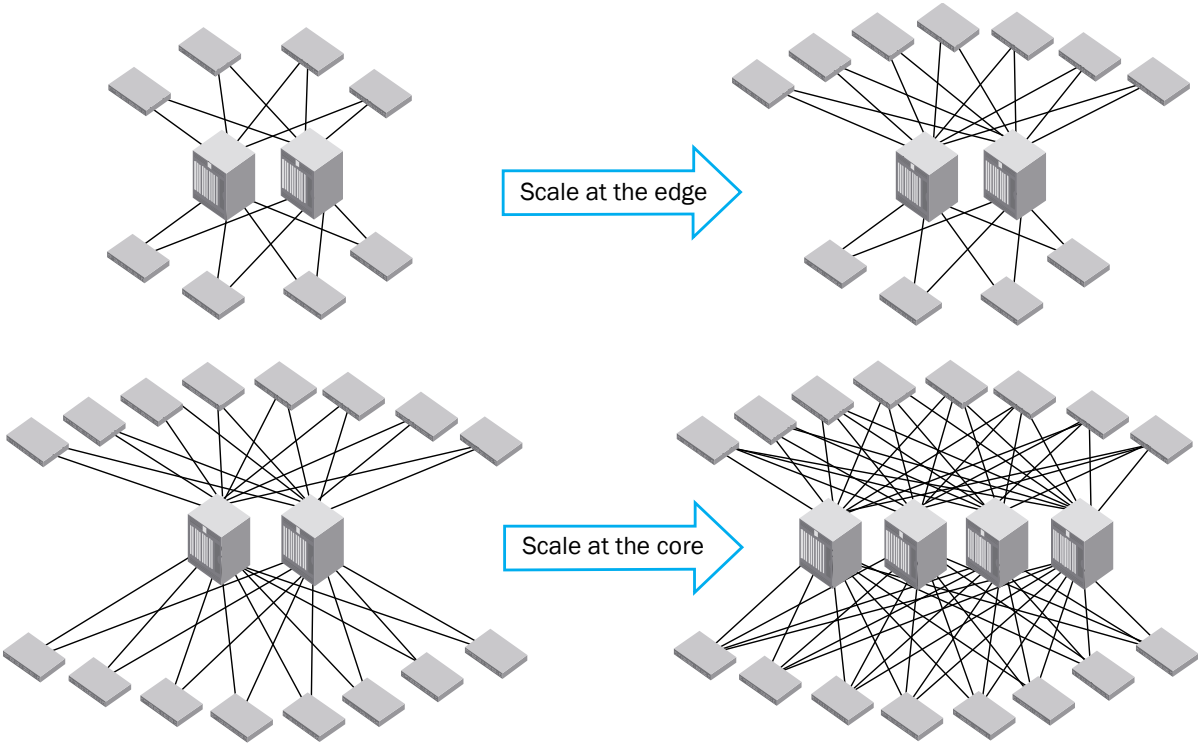

Figure 1. Comparison of scaling at the edge and at the core

As Figure 1 illustrates, scaling the core-to-edge network design can be done very flexibly. Most SAN designs incorporate aspects of core-to-edge network design, with one very common variant: they use the core switches in a hybrid core/edge mode. Specifically, they use edge switches for server connections, allowing many servers to be funneled into the core of the network, and the core switches to both connect the edge switches and to connect directly to storage devices. This use of a core switch for edge duty is appropriate for nodes that have a one-to-many relationship in the network, such as storage elements.

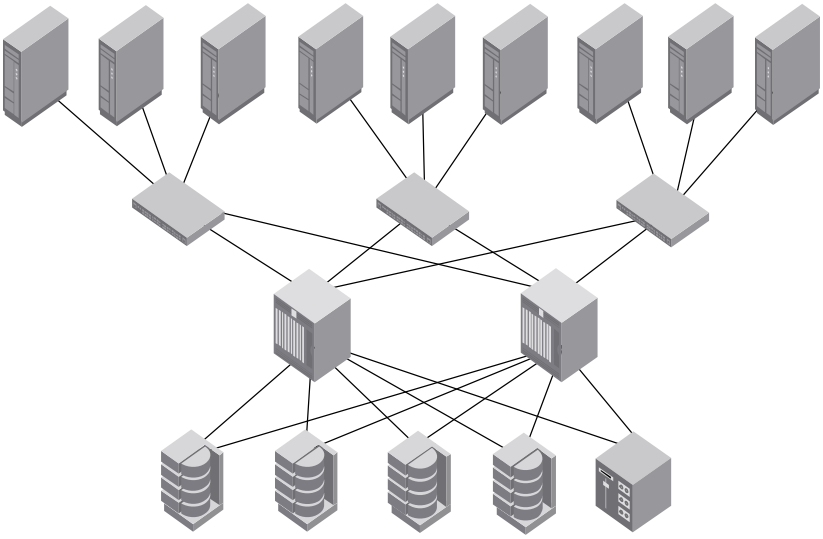

Figure 2. A common SAN core-edge design

Since most SAN communications occur between servers and storage elements, the SAN design must provide the proper bandwidth to funnel communications for all of the server connections through to the storage elements. As shown in Figure 2, edge switches typically connect many servers on the edge and then concentrate connections back to the core switches over fewer ISLs. Even though Brocade switches provide trunking and DPS technologies to make high-speed, switch-to-switch connections on the 4 Gbps switches and next-generation switches, most SAN designs purposely incorporate oversubscription for the edge–to-core switch ISLs, based on the load demand of the servers.

The Brocade DCX technology can enable the next enterprise-class SAN design by providing a higher speed and a denser fabric core, with a denser concentration of both server and storage, connections to the fabric. Similar to design decisions SAN architects made as Fibre Channel speeds moved from 2 Gbps to 4 Gbps, the transition from 4 Gbps to 8 Gbps allows a current FOS SAN infrastructure to use the Brocade DCX at the core of the fabric and propagate the Brocade 48000 toward the edge, as shown in Figure 3.

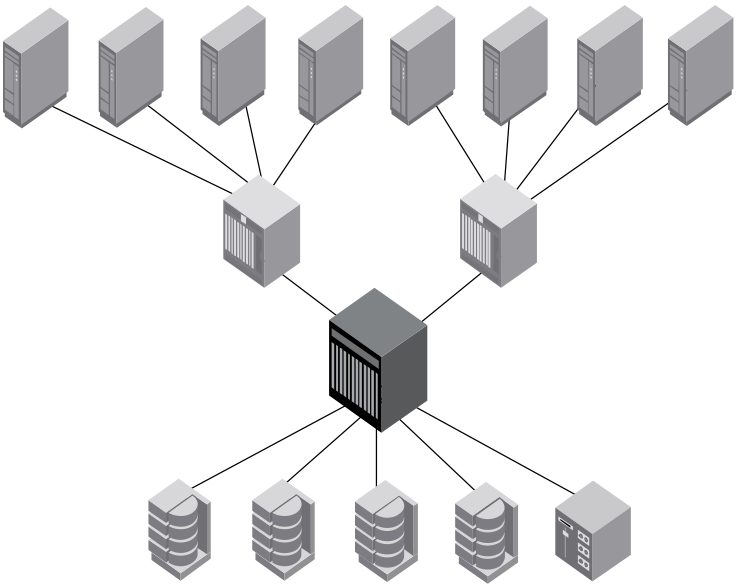

Figure 3. The Brocade DCX at the core and Brocade 48000s toward the edge

Benefits of a Consolidated SAN Design

The benefits of this consolidated SAN design include;

- Ease of management by reducing the number of SAN switch elements in the fabric
- Collapse of the SAN design requiring fewer ISLs, as well as fewer optics for ISLs
- Improved availability characteristics for the SAN, as all platforms maintain the highest availability levels
- Improved environmental efficiencies, as the edge Brocade 48000 provides more connectivity with lower power and cooling profiles than the equivalent number of edge switches
- Improved data center space efficiencies, as the edge Brocade 48000 provides more connectivity with decreased space requirements than the equivalent number of edge switches
- Brocade DCX technology enabled at the core/storage edge of the SAN design, where bandwidth demands are typically greater

With this architecture in place innovation, such as encryption, embedded fabric services, and next-generation protocols in the data center fabric, can be implemented without a fabric redesign, since the Brocade DCX performs core/storage edge duty. Additionally, Brocade DCX 8 Gbps FC blades are backward compatible with the Brocade 48000 Director. This allows ISLs between the Brocade 48000 and the Brocade DCX in this and other SAN designs to take advantage of 8 Gbps FC speeds.

As more of the server and storage infrastructure is incorporated into the enterprise SAN using enterprise-class SAN switch elements, the SAN design scales to enable 100 percent server and storage connectivity. Extending the SAN design to incorporate more enterprise-class switch elements at both core and edge can easily be achieved. As a result, the overall reach of the SAN infrastructure is extended, as shown in Figure 4.

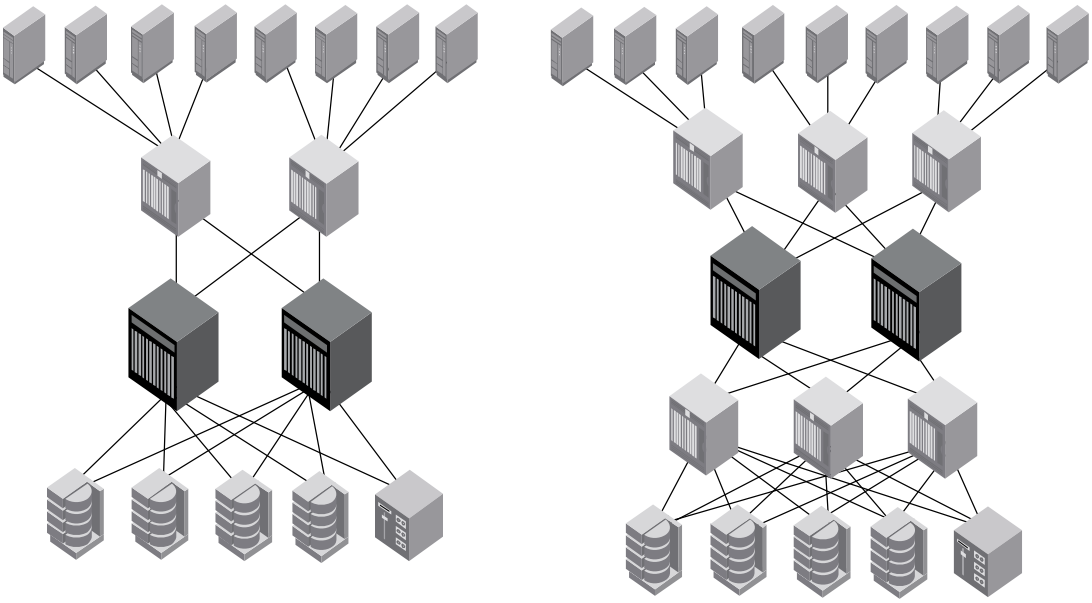

Figure 4. Examples of large-scale SAN designs using the Brocade DCX

This combination of the Brocade 48000 with the Brocade DCX in a SAN design, utilizing an advanced director blade technology, is very flexible. Both platforms can provide support for FCR/FCIP, FC FastWrite, or fabric application services—as long as there is an empty slot to accommodate the required blade.

As data center consolidation projects pick up speed, there may be situations in which a new SAN architecture is developed for the consolidated data center, and none of the existing Brocade 48000 Directors can be included in the design. If this is the case, replacing one or more Brocade 48000 Directors with the Brocade DCX Backbone may make sense. Or it may make sense until the previous Brocade 48000 SAN infrastructure can be taken offline and re-purposed in the new data center. Additionally, there may be other incentives for consolidating an existing FOS SAN infrastructure into a next-generation data center fabric architecture.

Brocade DCX Inter-Chassis Links

The Brocade DCX Backbone provides a new feature for linking two Brocade DCX and/or DCX-4S chassis together, which can be a benefit when a new SAN design or a consolidated SAN design is being considered. Inter-Chassis Links connect Brocade DCX and DCX-4S Backbones together with special ICL cables connected to dedicated ICL ports. This eliminates the need to link chassis via standard ISL cabling and the requisite SFPs, and you do not need to take up other FC ports to link the chasses. Two linked Brocade DCX Backbones, with 768 x 8 Gbps ports and 512 Gbps ICL links (one configuration option shown in Figure 5), can replace a significant amount of current infrastructure.

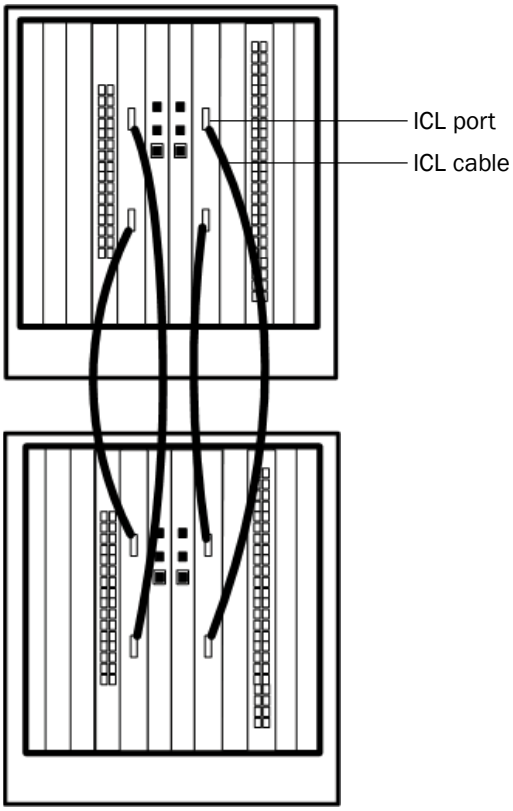

Figure 5. Brocade DCX Backbones linked using special ICL cables and ICL ports

For more about ICLs and currently supported configurations, see the *Brocade DCX Backbone Hardware Reference Manual* and the *Brocade DCX-4S Backbone Hardware Reference Manual*.

SUMMARY

The Brocade DCX Backbone enterprise-class platform is built to enable the next generation of enterprise SAN infrastructures. With its high-speed technology and high port density, it is the ideal building block for the enterprise SAN and will enable IT architects to design SAN infrastructures that achieve 100-percent connectivity of server and storage elements. Because of its technology, the Brocade DCX seamlessly extends existing Brocade FOS SAN infrastructures. It will provide existing Brocade 48000 SAN infrastructures with benefits in future proofing, scalability, availability, environmental efficiencies, as well as investment protection. It is the logical next step in designing the data center fabric of tomorrow.

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