DATA CENTER FABRIC

Brocade DCX Integration for Brocade M6140 and Mi10K Customers

Presents ten use cases for technology refresh or consolidation of McDATA 6064 and the Brocade M6140and Mi10K Directors at end of lease or going into retirement; and describes how to integrate the Brocade DCX Backbone into these existing M-EOS SANs

BROCADE

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INTRODUCTION

Retiring older equipment or replacing units when their leases expire presents an opportunity to consolidate the Storage Area Network (SAN) infrastructure with state-of-the-art products that provide a smaller footprint, greater performance, and richer functionality. For the Brocade® M6140 Director and McDATA 6064 director customers, the Brocade DCX Backbone offers a substantial technology consolidation with a platform engineered to be the at the core of the next-generation data center fabric solution.

NOTE: The "Brocade M6140 Director" is the current product name for what was formerly the McDATA Intrepid 6140 Director. In this document, the McDATA Intrepid 6064 Director is called the "McDATA 6064."

While maintaining the robustness and reliability of traditional McDATA director technology, the Brocade DCX offers advanced data center fabric technology, including adaptive networking, SAN Routing (blade and per port), extension (FICON and open systems), and protocol integration. The Brocade DCX includes a data mobility platform, which delivers scalable support for replication, storage virtualization, data migration, data encryption, and other advanced data management applications. A technology refresh with the Brocade DCX will meet today's data center challenges and will seamlessly integrate tomorrow's emerging technologies.

Specific customer requirements may vary, but typically all customers have common immediate- and long-term requirements for their SAN infrastructure. Immediate requirements for a technology refresh may include:

- High-performance switch engine to handle server and storage consolidation workloads
- Accommodate current port count requirements and provide room to grow
- Higher port density to reduce footprint and simplify management
- Ability to integrate 1, 2, or 4 Gbit/sec with 8 Gbit/sec and higher speeds
- Higher performance Inter-Switch Links (ISLs)
- Maintain 99.999% availability
- Non-disruptive microcode upgrades
- Non-disruptive attachment to existing SAN directors and switches
- Interoperability with the existing infrastructure
- An opportunity to reduce data center footprint and power consumption

Longer-term requirements are often driven by new storage applications to help streamline storage operations, enhance security, and reduce costs:

- Ability to integrate advanced transport services (Quality of Service (QoS), routing, extension including FC-IP, partitioning)
- Ability to integrate a scalable platform for data mobility applications (storage virtualization, replication, encryption)
- Ability to integrate iSCSI initiators and future protocols, such as Fibre Channel over Ethernet (FCoE)

The Brocade DCX Backbone

The Brocade DCX Backbone delivers a new class of advanced data center connectivity required for evolving data center fabrics. The Brocade DCX is designed to deliver significant performance at excellent value on an expandable technology platform with non-disruptive scalability.

A data center fabric requires substantial performance at the core to deliver “no-compromise” connectivity. The Brocade DCX supports the convergence of workloads from server-to-storage, server-to-server and storage-to-storage extension on a common fabric. It integrates application-aware intelligence with adaptive networking services, while seamlessly scaling data mobility applications. Adaptive networking services provide QoS, traffic management, advanced performance reporting, and resource recovery. Adaptive networking ensures that the data center fabric will continue to meet service levels when application workloads dynamically shift across virtual servers and data is migrated between virtual storage tiers—cost effectively. Data mobility applications such as storage virtualization, replication, and the Brocade Data Migration Manager (DMM) use the very high performance of the Brocade DCX to keep up with the relentless growth of data management required.

The Brocade DCX Backbone non-disruptively connects to legacy SANs (including McDATA 6064 and Brocade M6140, Mi10K, and 48000 Directors and switches), reducing cooling, power, and space requirements. And, connecting the Brocade DCX Backbone to legacy M-Enterprise Operating System (M-EOS) SANs means that the performance and data mobility applications enabled by the Brocade DCX can be integrated non-disruptively.

The Brocade DCX is an expandable platform that integrates advanced data center fabric technology into legacy SANs. Customers can continue to use their SAN technology for the remainder of its useful economic life without the cost and risk of "rip and replace." Then, when they are ready they can seamlessly upgrade to the advanced data center fabric technology delivered by the Brocade DCX Backbone.

McDATA 6064 and Brocade M6140 Directors

The section describes and illustrates five common use cases for technology refresh or consolidation of M-EOS fabrics, replacing one or more McDATA 6064 or Brocade M6140 Directors with one or more Brocade DCX Backbone platforms.

Use Case #1: Technology Refresh for Brocade M6140 in a Small Fabric Environment

A small fabric composed of one Brocade M6140 Director and two McDATA 6064 directors is servicing approximately 264 devices, with approximately 126 device ports at 2 Gbit/sec on the McDATA 6064s and approximately 138 device ports at 4 Gbit/sec on the Brocade M6140. The number of ISLs used may vary from one customer configuration to another. The three directors occupy a total rack space of 30U, or one standard 42U 19" rack when the directors are co-located.

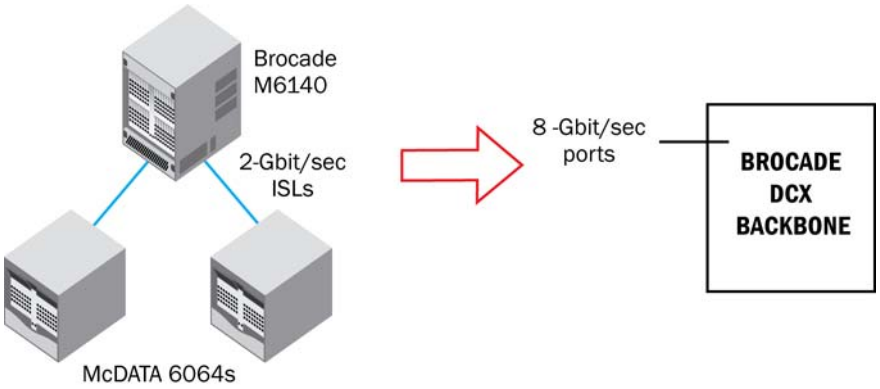

Figure 1. Small fabric with one Brocade M6140 and two McDATA 6064s replaced by one Brocade DCX

For a technology refresh, the three directors can be replaced by a single Brocade DCX Backbone. With much higher port density and optimized energy efficiency, the Brocade DCX can provide an equivalent port count (partially populated with port blades) and still allow room to grow.

In this example, the Brocade DCX is configured with 288 ports to satisfy current port requirements and is expandable to 384 ports in one chassis. The potential ISL bottlenecks are eliminated and management is reduced from three to a single device. In terms of performance, the Brocade DCX now offers up to 8 Gbit/sec on all ports with no over-subscription, enabling a much higher fan-in ratio between servers and storage ports. At 14U, the single Brocade DCX occupies less space than the previous configuration of 30U, and state-of-the-art components now provide greater power efficiency.

Use Case #2: Technology Refresh for McDATA 6064 and Brocade M6140 in a Medium Fabric Environment

A somewhat more complex fabric is composed of two Brocade M6140s and four McDATA 6064s. The fabric supports approximately 516 devices with other ports used as ISLs. (Even more ISLs would be used if the fabric were fully meshed.) Of the approximately 516 device ports, approximately 248 ports run at 2 Gbit/sec on the McDATA 6064s, and approximately 268 ports run at 4 Gbit/sec. The total configuration occupies 60U of rack space, or two standard 42U 19" racks when the directors are co-located. As in the small fabric configuration, the limited ISL speed of 2 Gbit/sec on the McDATA 6064s requires the storage administrator to monitor bandwidth use more closely to avoid ISL congestion, since more devices are attached to the McDATA 6064s at the edge.

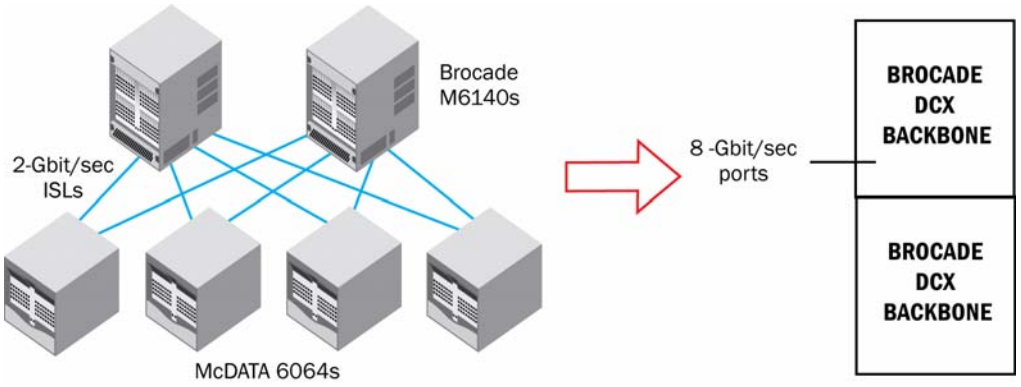

Figure 2. Medium fabric with McDATA 6064s and Brocade M6140s replaced by two Brocade DCXs

With a Brocade DCX technology refresh, the six directors can be replaced by two Brocade DCX platforms. One Brocade DCX is fully populated with port blades and the other is partially populated to provide the requisite 528 ports for current device attachment. This configuration is expandable to 768 total ports, allowing for incremental growth of approximately 200 devices over time. All ports are capable of 8 Gbit/sec performance and so allow for connectivity of 2 Gbit/sec and 4 Gbit/sec devices as well as new 8 Gbit/sec connections.

Because the Brocade DCX can use high-performance Inter-Chassis Links (ICLs) connected to dedicated ICL ports instead of ISLs between units, no device ports are sacrificed to provide chassis connectivity. The ICLs provide the equivalent of 64 ports of 8 Gbit/sec ISLs or 1 Tbit/sec of bidirectional bandwidth. Trunking and ISL management is therefore no longer required. This new configuration occupies only 28U of rack space, or a single standard 42U 19" rack for minimum footprint, power, and cooling requirements.

Use Case #3: Technology Refresh for Brocade M6140s in a Large Fabric Environment

A large fabric is composed of ten Brocade M6140 Directors in a core-edge or semi-meshed configuration. With a number of ports consumed for ISLs, there would be approximately 1,300 device ports available at 4 Gbit/sec. The entire configuration would occupy 120U of rack space, or four standard 19" racks when the equipment is co-located. Building larger fabrics introduces complexity into the SAN design in terms of management, ISL deployment, trunking, hop-count limitations, and configuring optimum paths between initiators and targets. Also, although not illustrated here, the fabric may include switches for server fan-in, auxiliary routers, or SAN extension devices for remote access or disaster recovery.

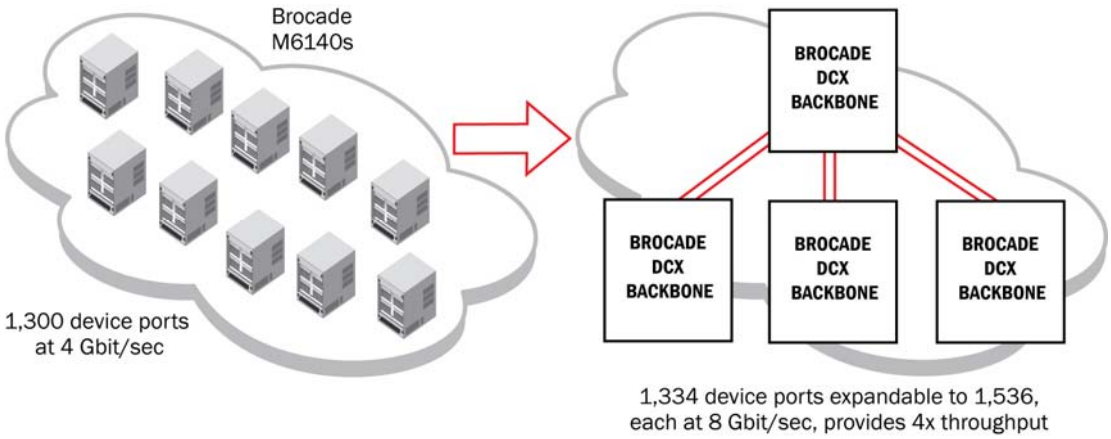

Figure 3. Large fabric consolidating ten Brocade M6140s down to four Brocade DCX platforms

To simplify and upgrade the entire infrastructure, a technology refresh with the Brocade DCX consolidates ten directors down to four Brocade DCX Backbones. To meet current device connectivity requirements, the new configuration provides 1,344 device ports and is expandable to 1,536 device ports over time. As in the previous examples, all ports support up to 8 Gbit/sec of bandwidth, quadrupling the throughput of the former Brocade M6140s.

Whereas the former configuration required at least four 19" racks of data center space, the new configuration occupies only 56U, or two standard 42U 19" racks. Power consumption is more than halved, because of fewer chassis and greater power efficiency. In addition, the Brocade DCX offers optional blades for SAN Routing and extension over FC-IP as well as multi-protocol support and advanced storage services. The SAN consolidation incorporates higher port densities in a smaller footprint and integration of services that otherwise would require separate pieces of equipment.

Use Case #4: Partial Technology Refresh for Brocade M6140s in a Large Fabric Environment

In this use case, only a portion of the existing fabric is available for a technology refresh. Five of the ten directors, for example, could be coming off lease with the other five at staggered lease ends or they could be purchased units. As in the previous example, ISLs consume a number of director ports and there are approximately 1,300 device ports at 4 Gbit/sec. The configuration occupies 120U of rack space, or about four standard 19" racks.

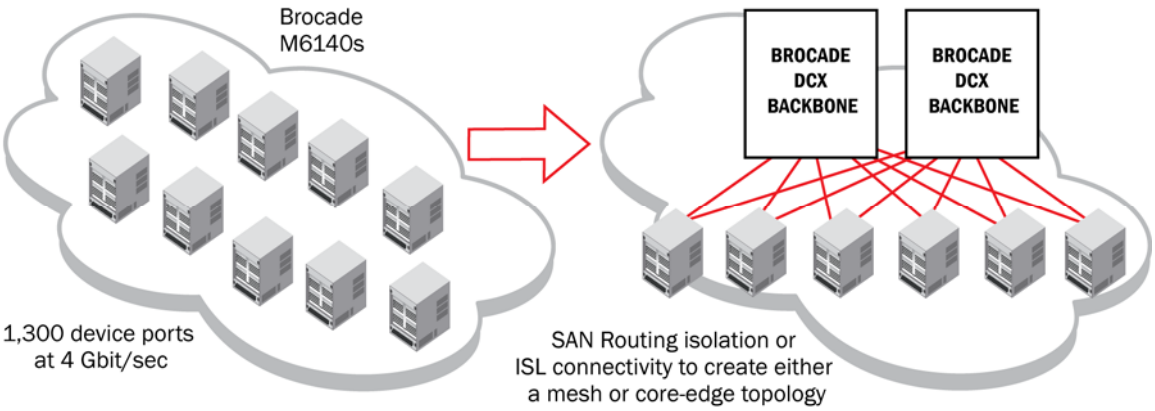

Figure 4. Five of ten Brocade M6140 Directors in a partial technology refresh

To refresh the equivalent of five Brocade M6140s, only two Brocade DCX Backbones are required. The new configuration is flexible, and the Brocade DCX platforms can provide SAN Routing isolation for departmental applications supported on the remaining Brocade M6140s or ISL connectivity to create a single fabric in either a mesh or core/edge topology.

Although not as compact as the configuration shown in Use Case #3, this technology refresh still consolidates ten down to seven units. The configuration provides approximately 1,300 ports expandable to approximately 1,400 ports. Of the 1,300 ports, 768 can run up to 8 Gbit/sec on the Brocade DCX while 700 support 4 Gbit/sec on the Brocade M6140. The total configuration occupies 88U of rack space, or approximately three standard 19" racks, replacing four racks in the original implementation. Power consumption of the fabric is also dramatically reduced. In addition to allowing port growth over time, this technology refresh positions the customer to take advantage of advanced storage services to streamline storage operations and simplify fabric management. As additional Brocade M6140s come off lease or are retired, the addition of new Brocade DCX platforms increases the capability of the SAN.

Use Case #5: Integrating Advanced Storage Services into Brocade M6140 Environments

Since the initial release of the Brocade M6140 Director, storage networking technology has continued to evolve. New productivity features and enhanced storage services to streamline storage operations are now available and Brocade continues to engineer intelligence in the fabric. These advanced services are now available to devices attached to Brocade M6140 Directors via connectivity to the Brocade DCX platform.

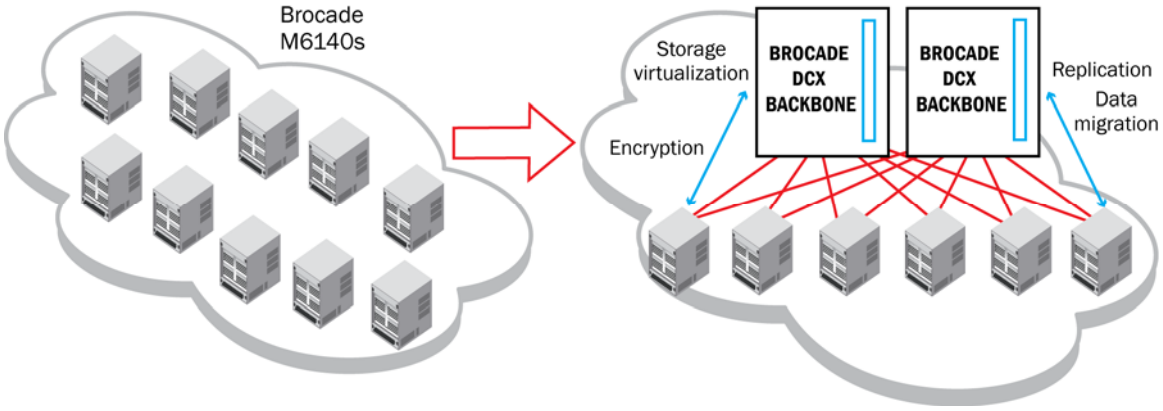

Figure 5. Leveraging the higher 8-Gbit/sec performance and higher port density of the Brocade DCX

As in the previous use cases, a technology upgrade with the Brocade DCX enables Brocade M6140 fabrics to leverage the higher 8 Gbit/sec performance of Brocade DCX ports and the higher port density of the Brocade DCX chassis. Unlike the Brocade M6140 Directors, however, the Brocade DCX can host a number of advanced services, which are now available to Brocade M6140-attached devices. This both protects the customer investment in M-Series directors and integrates new services to simplify storage administration and extract more value from the entire SAN infrastructure.

BROCADE MI10K DIRECTOR

The section describes and illustrates five common use cases for technology refresh or consolidation of M-EOS fabrics replacing one or more Brocade Mi10K Directors with one or more Brocade DCX Backbones.

Use Case #6: Fabric Expansion with Brocade DCX and Brocade Mi10K in a Medium Fabric Environment

In this example, two Brocade Mi10K Directors support a medium-sized fabric with a total of approximately 500 device ports for server and storage attachment. The customer might be experiencing significant growth in storage requirements and expects to bring additional business units and applications into the SAN.

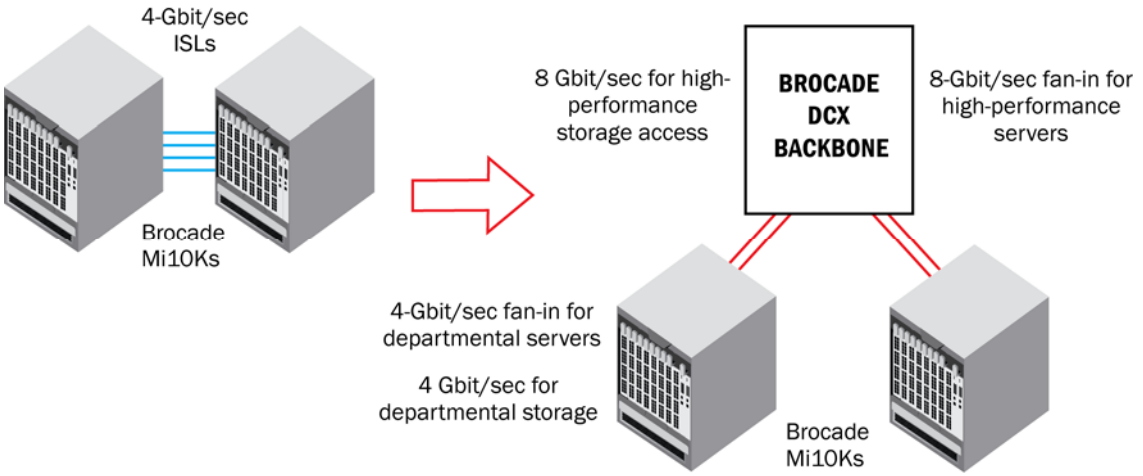

Figure 6. Expanding with the Brocade DCX for additional port count and higher productivity

This is a flat SAN architecture and could be expanded to accommodate more ports simply by adding another director to the configuration. That expansion, however, would not increase the productivity of the fabric, and the continued addition of directors over time would lead to hop-count issues and increased latency throughout the fabric.

Expanding this configuration with the Brocade DCX both accommodates port requirements over time to approximately 378 additional device ports and facilitates a core/edge architecture to optimize performance where it is most needed. The Brocade DCX's advanced transport services and storage services enable much higher productivity in the fabric and yield the greatest value in expanding the SAN.

By deploying the Brocade DCX as the fabric backbone at the core, it is now possible to prioritize applications and provide optimal performance for both core-attached and edge-attached devices. In this example, applications and storage that require the highest performance are connected to the Brocade DCX directly. This makes 8-Gbit/sec bandwidth available for server fan-in via switches or direct attachment. Likewise, storage resources accessed by those top-tier servers have full 8 Gbit/sec delivery. Advanced transport services such as adaptive networking for QoS, SAN Routing, and SAN extension are provided in the backbone layer. New enhanced storage services such as data migration, data encryption, and storage virtualization are also supported on the Brocade DCX Backbone.

Departmental or second-tier servers and storage are attached to the Brocade Mi10K Directors and route through the Brocade DCX only when storage sharing is required. The basic division between core applications/servers and edge applications/servers facilitates a data-centric approach to SAN design. Application data that has higher value and higher performance requirements is more efficiently serviced at the core, while applications with less rigorous requirements can be adequately serviced at the edge.

Use Case #7: Fabric Expansion with Brocade DCX and Brocade Mi10K in a Large Fabric Environment

In this example, four Brocade Mi10K Directors are configured on a mesh topology with ISLs connecting them and support for approximately 1,000 devices at 4 Gbit/sec. As in the previous use case, which illustrates a flat architecture, this configuration tends to treat all applications and data equally and provides a network-centric, any-to-any connectivity. In the real world, however, applications have an inherent hierarchy that reflects the business value of the data they generate, and a SAN architecture should be aligned with that hierarchy.

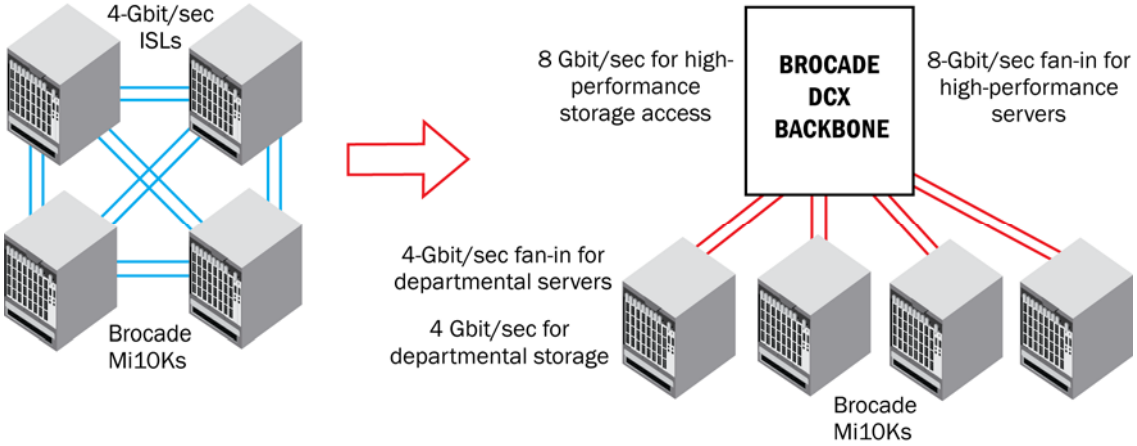

Figure 7. Providing investment protection while adding SAN productivity and streamlined management

This can be accomplished by integrating the Brocade DCX platform as the backbone core of the fabric, with the four Brocade Mi10ks providing edge services to departmental applications. This is accomplished with ISLs or SAN Routing services between the Brocade DCX Backbone and Brocade Mi10k Directors.

The new core/edge topology both aligns with actual application needs and provides a highly scalable configuration to accommodate growth. Advanced transport services such as adaptive networking for QoS, SAN Routing, and SAN extension are provided at the backbone layer. New enhanced storage services such as data migration, data encryption, and storage virtualization are also supported on the Brocade DCX.

This configuration provides investment protection for existing Brocade Mi10K customers, while adding significant SAN productivity and streamlined management value.

Use Case #8: Fabric Expansion with Brocade DCX and Brocade Mi10K in a Tiered Fabric Environment

This use case depicts a core/edge topology on Brocade Mi10K Directors at the core and Brocade M6140s at the edge. The core layer supports high-performance core servers and storage at 4 Gbit/sec, while the edge layer provides fan-out to departmental or business unit servers and storage. The core/edge design provides connectivity between both layers for resource sharing and common management.

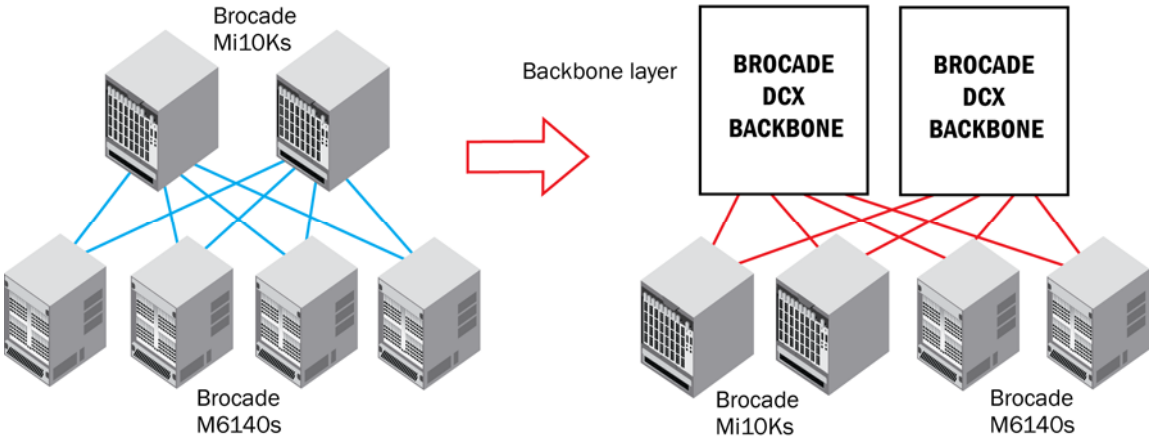

Figure 8. Two Brocade DCXs at the new core to add advanced storage services to the entire fabric

The configuration in this conventional core/edge design could be extended by adding directors for either core or edge functionality. Provisioning a Brocade DCX Backbone platform as the new core tier, however, extends the fabric and adds advanced storage services for the entire fabric.

In this topology, the Brocade DCX now provides the central backbone connectivity and services with 8 Gbit/sec, per-port bandwidth and adaptive networking, routing, extension, multi-protocol, encryption, and advanced storage services for data migration and storage virtualization. This configuration aligns the highest bandwidth and services to the most mission-critical data center applications, while providing tiers of connectivity that scale to the requirements of specific departmental applications.

Use Case #9: Fabric Expansion with Brocade DCX and Brocade Mi10K in a Mega-Fabrics Environment

Very large data center environments, often called "Mega-Fabrics," can support thousands of servers and storage devices in a single fabric infrastructure. Typically configured on a business-unit or application basis, portions of the mega- fabric are dedicated to specific application requirements, while common connectivity is provided for sharing centralized storage resources, such as large tape libraries. Beyond a certain point, however, these very large configurations become difficult to manage and unanticipated problems can arise because of fabric complexity. Simply adding more directors and ports is usually not the right option to choose.

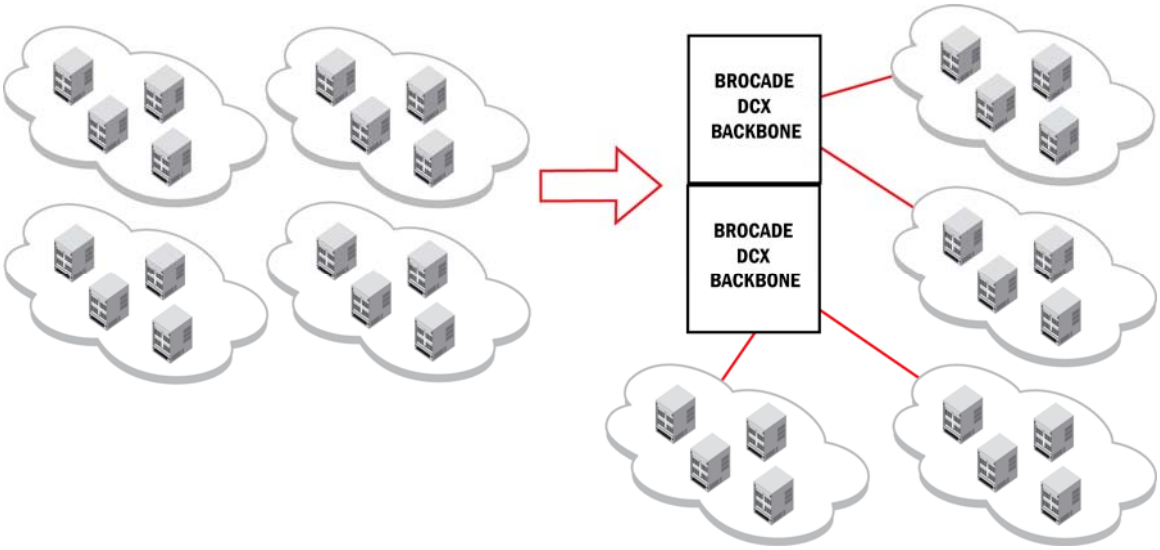

Figure 9. Adding two Brocade DCX Backbones into a mega-fabric environment

The Brocade DCX serves very large fabric configurations by providing integrated SAN Routing to divide the mega-fabric into managed SAN units. At the same time, connectivity between departmental applications is maintained for centralized storage applications.

As illustrated in Figure 9, the Brocade DCX platform satisfies a wide range of requirements for making very large fabrics manageable and accommodating growth. In this configuration, the Brocade DCX Backbones provide approximately 760 additional 8 Gbit/sec ports for device growth over time. Integrated SAN Routing enables each edge business unit to access centralized resources or selectively share storage assets. Core-attached servers and storage enjoy full 8 Gbit/sec performance and enhanced transport features such as adaptive networking and data encryption. Finally, the Brocade DCX provides richer functionality for the entire infrastructure, introducing advanced storage services for data migration, storage virtualization, and other features.

Use Case #10: Integrating Advanced Storage Services into Brocade Mi10K Environments

Since the initial release of the Brocade Mi10K Director, storage networking technology has continued to evolve. New productivity features and enhanced storage services to streamline storage operations are now available, and Brocade continues to engineer intelligence in the fabric. These advanced services are now available to devices attached to Brocade Mi10k and M6140 Directors via connectivity to the Brocade DCX Backbone.

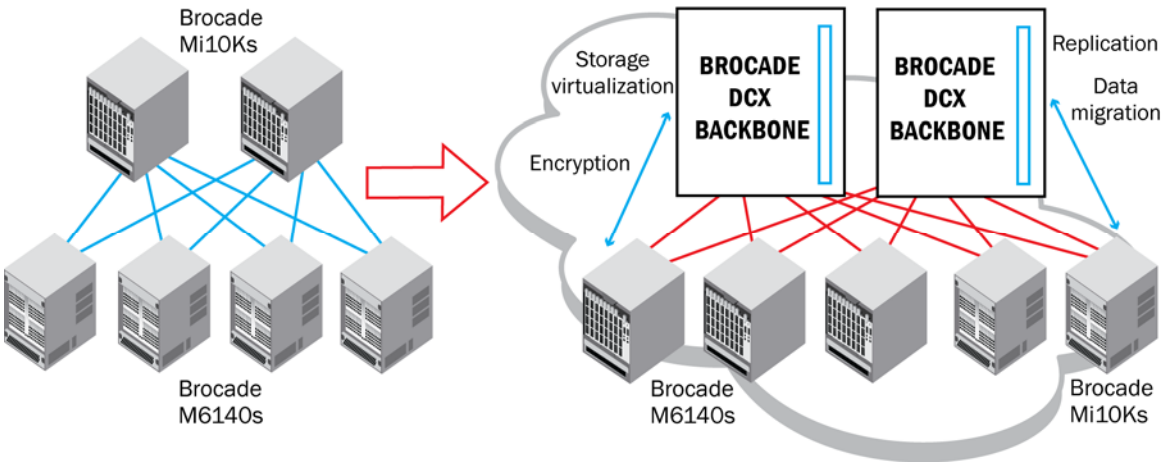

Figure 10. Using the Brocade DCX to host advanced services for investment protection and to add value to the entire SAN infrastructure

As in the previous use cases, a technology upgrade with the Brocade DCX enables Brocade Mi10K fabrics to leverage the higher 8-Gbit/sec performance of the Brocade DCX ports and higher port density of the Brocade DCX chassis. Unlike the Brocade Mi10K and M6140 Directors, however, the Brocade DCX can host a number of advanced services that are now available to M-Series-attached devices. This both protects the customer investment in Brocade Mi10K and M6140 Directors and integrates new services to simplify storage administration—all designed to extract more value from the entire SAN infrastructure.

SUMMARY

The Brocade DCX Backbone hosts replication, encryption, storage virtualization, and data migration applications on intelligent blades that slot into the Brocade DCX chassis. Because these services are integrated into the fabric and require no external storage appliances, performance and reliability are optimized. Data replication between heterogeneous storage systems can now be executed at the nexus of the fabric. Storage virtualization for storage pooling and optimum capacity utilization likewise takes place at the point of least latency switching. In addition, Brocade DCX-based data migration management and data encryption can be implemented non-disruptively into the fabric itself without the additional overhead of external appliances. Because the Brocade DCX Backbone is interoperable with Brocade M6140 and Mi10K Directors, these new fabric-based services extend the life of M-Series directors and enhance their productivity.