



## The Converged Network of the Future

### HIGHLIGHTS

- Converged fabrics can provide greater simplicity and cost savings
- Converging data and storage networks requires a more robust form of Ethernet
- Many organizations are starting to implement convergence at the edge of the data center
- Brocade® provides the industry's only complete family of FCoE-based converged networking solutions

**Converged fabrics provide an innovative way to meet tomorrow's connectivity challenges—a strategy that many CIOs are already exploring today.**

What do most CIOs and their teams want from the corporate networking technologies of the future? Lower latency, enhanced reliability, and higher throughput are all high on the wish list, but—above all—many are looking for a single network infrastructure capable of handling all types of data, clustering, and storage traffic.<sup>1</sup>

The request for a single network sounds like a tall order, but it's hardly surprising since many CIOs find their current network infrastructures lacking in many ways. Today, their teams are typically managing two or three parallel networks: one for data, one for storage, and often one for server clustering. Each type of network requires separate switches, Host Bus Adapters (HBAs), Network Interface Cards (NICs), and cables.

This clutter and complexity poses a significant burden to IT resources and budgets—and has environmental consequences as administrators struggle to manage the power and cooling that each component requires.

<sup>1</sup> Two recent industry reports indicate strong interest among respondents in LAN/SAN convergence: *Benefits Of SAN/LAN Convergence*, Forrester Consulting, December 2009; *Future Datacenter Management Strength—Network Convergence*, IDC, October 2009

## **THE NEED FOR GREATER PERFORMANCE AND SCALABILITY**

The race to consolidate servers and storage resources to better support virtualization, while delivering considerable efficiency, has only added to the demands on the network infrastructure. By allowing multiple applications to run on a single virtualized server, organizations have been able to reduce the number of physical servers required, slash the energy consumed, and vastly increase operational efficiency.

However, a single server hosting perhaps 20 Virtual Machines (VMs) requires significant bandwidth to keep all these services up and running. The dynamic movement of VMs between different physical machines, according to their processing requirements and users' needs, poses further network management challenges. If network connections don't migrate smoothly with their associated VMs, or create unpredicted demands on physical servers during times of peak processing, network performance—and the end-user experience—quickly go downhill.

The next steps along this journey will present further challenges. Increasingly, many organizations are capitalizing on their early success with virtualization to create internal (or private) clouds, where all IT assets interact seamlessly to provide a single pool of computing resources. But they must have the right management tools to do so in an efficient manner.

Beyond that, they plan to work towards a hybrid cloud model, where applications and services are provided by a mix of internal and third-party resources. Either way, cloud computing—where distributed applications residing on different machines all contribute to vital business processes—clearly means more traffic travelling across corporate networks and beyond the firewall.

As a result, CIOs expect tomorrow's corporate networks to address a wide range of sometimes-conflicting demands. They want unprecedented scalability but reduced management complexity. They want seamless mobility but tight orchestration. They also want emerging networking technologies to complement the investments they are making today, instead of forcing them to change the entire environment in a wholesale "rip-and-replace" exercise. For these reasons, converged fabrics are quickly emerging as a viable strategy for network evolution.

## **THE PROMISE OF THE CONVERGED FABRIC**

Tomorrow's converged fabric environments will consolidate data traffic and storage traffic onto a single, high-performance, highly available network that has the built-in intelligence to identify different traffic types and handle them appropriately, according to predefined rules.

The benefits of this approach are clear in terms of time savings, cost savings, skills overlap, and procurement—not to mention reduced complexity. Although the path to getting there might seem steep at first, an incremental approach can help ensure that the journey doesn't cause unnecessary upheaval for the IT team and the end users they serve.

That's because a very established and well-understood technology lies at the heart of the converged fabric—Ethernet. It is already the predominant network choice for connecting servers to each other on the corporate Local Area Network (LAN) for the purpose of transporting user application traffic. The converged fabric approach proposes that the separate Fibre Channel Storage Area Network (SAN) network, the one that typically transports storage traffic, utilize the Ethernet network as well.

## TECHNOLOGY TREND

SAN/LAN convergence requires a more robust form of Ethernet.

In order for this kind of SAN/LAN convergence to work, however, it requires a more robust form of Ethernet designed to provide the same level of reliability and latency characteristics associated with Fibre Channel networks. This new Ethernet transport is referred to as Data Center Bridging (DCB).

DCB must offer these advanced capabilities because storage networks require data to be delivered in sequence and intact—in industry parlance, a “lossless” infrastructure is required. Traditional Ethernet, by contrast, falls short in this respect, instead taking a “best effort” approach where data is not necessarily delivered in the right order and where some packets might be dropped altogether due to network congestion.

In response to these challenges, the essence of DCB lies in higher transmission speeds based on 10 Gigabit Ethernet (GbE) technologies as well as in enhancements to the underlying Ethernet specifications. These enhancements mirror the reliability and class-of-service features seen in today’s SAN environments.

### OPEN INDUSTRY STANDARDS ARE KEY

Today, standards bodies representing some of the world’s foremost suppliers of storage and networking technologies are working on specifications to increase the performance of existing Ethernet networks and to transport Fibre Channel traffic securely and efficiently over more robust Ethernet infrastructures.

One of the most important of these is the Fibre Channel over Ethernet (FCoE) standard, an encapsulation protocol that wraps Fibre Channel storage data into Ethernet frames, enabling it to be transported over a lossless Ethernet medium. Developed by the T11 technical committee of the International Committee for Information Technology Standards (INCITS), it relies on flow control to recognize when a buffer is almost full and to request that the sender briefly stop transmission until the buffer is ready to receive new data.

One major advantage is that FCoE uses the same Fibre Channel management applications already in use today. That allows organizations to start introducing convergence within the first few meters of their data center networks today, using FCoE with DCB at 10 GbE speeds to send both data and storage traffic to the first access switch it encounters. That traffic can then be forwarded to the corporate LAN or SAN—immediately reducing the number of cables that need to be plugged into a server rack.

### THE ROAD AHEAD

In this way, a technology still in its infancy is already starting to permeate the network edge in the data centers of early adopters. However, others will likely follow their example soon. Richard Villars of analyst firm IDC has predicted that 2010 will continue to see an increase in converged networking pilot projects, with significant technology deployments expected in 2011.<sup>2</sup> In fact, according to figures from analyst firm Dell’Oro Group, approximately one million FCoE ports are expected to ship in 2011.<sup>3</sup>

In a recent poll conducted by analysts at Forrester Research, two-thirds of respondents (all storage professionals in the UK, US, China, and the Netherlands) said that they were “very interested” or “moderately interested” in implementing unified fabric at their organizations.

Of course, mainstream consolidation onto DCB is dependent on other factors, too. Storage device vendors must allow for FCoE adapters on their products. And NICs for 10 GbE must continue to drop in price and be incorporated into server motherboards before widespread deployment will likely occur.

<sup>2</sup> *Future Datacenter Management Strength—Network Convergence*, IDC, October 2009

<sup>3</sup> *SAN 5-Year Forecast Report*, Dell’Oro Group, August 2009

**TECHNOLOGY TREND**

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In addition, many organizations will need to undergo changes to ensure that storage, server, and network operations can be monitored by a single service desk, for example. Network and storage teams will need to work together far more closely than they do in today's silos. And when data center switches are ready for replacement, organizations will need to ensure that new solutions can support the move to more unified fabrics.

Reporting on their findings, Forrester analysts described the use of Ethernet for both LAN and SAN as a concept with "significant momentum," and one that is likely to provide considerable benefits for adopters. "While there remain some questions about what it will look like and when most firms will move towards adoption," Forrester added, "it makes good sense to gain further understanding of the concepts and supporting technologies, and to begin evaluating Ethernet storage offerings now as a precursor to eventual fabric unification."<sup>4</sup>

To learn more about converged network solutions, visit [www.brocade.com](http://www.brocade.com).

<sup>4</sup> *Benefits of SAN/LAN Convergence, Forrester Consulting, December 2009*

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