Converged Networking Solution for Dell M-Series Blades

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Overview

As the infrastructural requirements of networks evolve, system and network planners today have to ensure that the chosen solution provides the right mix of functionality, high performance, and integration, while minimizing the total cost of ownership (TCO). In addition, a solid network design requires future-proofing to cope with the rapid pace of technology change.

Dell's M-Series blade solution has proven itself in data center environments requiring extreme efficiencies in the areas of power/cooling, flexibility, performance, density and management. By integrating up to sixteen servers with Network Interface Cards (NICs) or Host Bus Adapters (HBAs) and their associated network and storage switches in a single chassis, M-Series offers improved Return in Investment (ROI) and lower Total Cost of Ownership (TCO). M-Series provides connectivity to both Storage Area Networks (SANs, via Fibre Channel or iSCSI) and Local Area Networks (LANs, via Ethernet). With the advent of converged networking technology comes the opportunity to consolidate SAN and LAN traffic onto a single set of hardware within the M1000e blade chassis.

Why Convergence?

Traditionally, IT managers have maintained multiple networks to meet different connectivity requirements. Typically, this included separate networks for low-latency server clustering, a network for client-server connectivity and management and finally, a network for storage connectivity. The clustering network typically was based on InfiniBand in high-performance environments. The management and client-server connectivity made use of IP networks over Ethernet and the storage network was based on Fibre Channel or more recently iSCSI. This model requires increased investment in data center infrastructure including the number of switch ports, cables and mezzanine cards required to connect every blade server with its corresponding networks. The resulting network lacks the level of flexibility that may be needed in today's dynamic data centers

Dell's converged networking solution (see figure 1), incorporating advanced levels of Ethernet and Fibre Channel functionality, delivers network consolidation solution that complements the server consolidation driven by blade server technology and includes the following components:

- Dell M1000e Blade Chassis and M-Series Blade Servers
- Dell M8428-k Converged Network Switches

- Brocade BR1741M-k Converged Network Adapters (CNAs)
- Brocade Network Advisor for end-to-end manageability

Some of the key benefits of this converged networking solution compared to a native networking solution, as it is shown in Figure 1, are include:

- Up to 50% reduction in infrastructure including adapters, switches, cables, and management ports.
- Seamless integration with existing Fibre Channel storage, switches, and existing management utilities
- Consolidation of server access network elements, reducing potential points of failure and overall capital and operational costs for data centers

The total M-Series converged networking solution offers enterprise-class server I/O consolidation with unified management, end-to-end visibility from VM to Logical Unit Number (LUN), and integration with the industry's most popular management applications to truly meet the needs of next generation data centers.

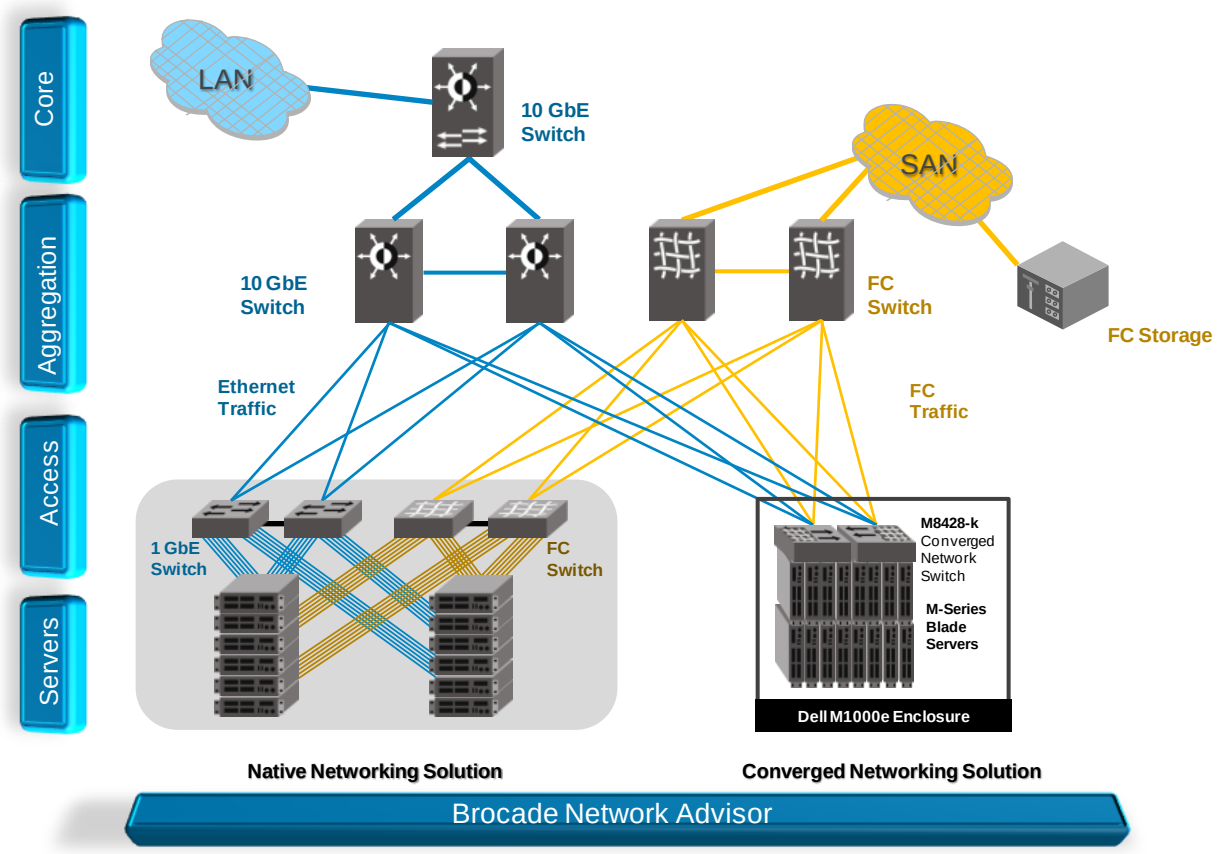

Figure 1: Dell Converged Networking Solution vs. a Native Networking Solution

Dell M8428-k Converged Network Switch

The Dell M8428-k switch module for the PowerEdge M1000e blade chassis is a true converged network switch, with twelve external ports (to connect to existing LAN and SAN) and sixteen internal ports (to connect to blade servers via M1000e midplane connections), supporting the following types of traffic:

- 10 Gb Enhanced Ethernet
    - supports Data Center Bridging (DCB), iSCSI TLV-ready
    - supports Fibre Channel over Ethernet (FCoE)
- 8 Gbps Fibre Channel (FC)

Designed to enable reliable converged networking for server I/O consolidation and to support mission-critical applications, the Dell M8428-k Converged Network Switch connects to each of the sixteen blade servers internally via 10Gb CNAs (one or more per blade) and connects to eight external 10 Gb Ethernet (DCB) ports and four external 8/4/2 Gbps Fibre Channel ports, providing a total of 28 ports (16 + 8 + 4) (see Figure 2).

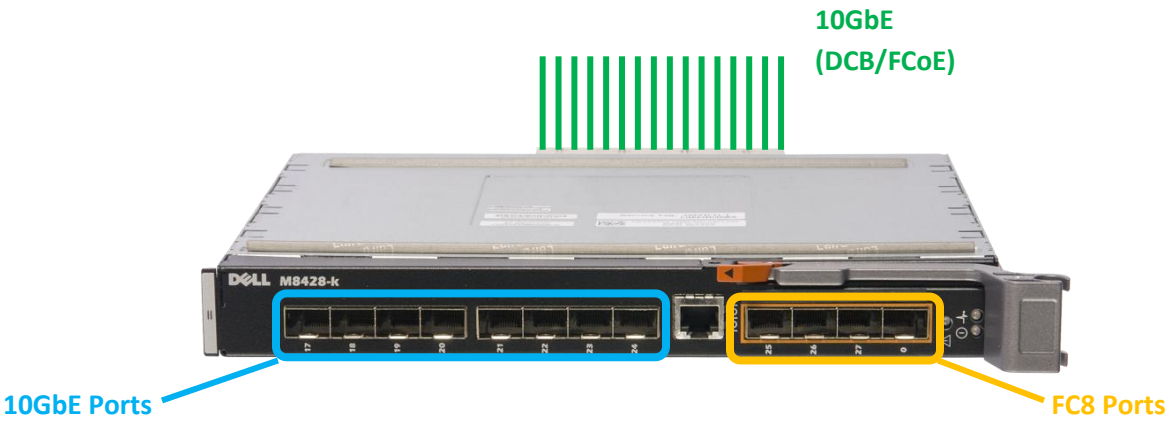

Figure 2: Dell M8428-k Converged Network Switch Front View

The Dell M8428-k Converged Network Switch offers full DCB support, including Enhanced Transmission Selection (ETS), Priority Flow Control (PFC), DCBx, Congestion Notification, and iSCSI TLV-ready. Based on the converged networking technologies, the Dell M8428-k Converged Network Switch provides a rich set of advanced features, including IPv6, native Fibre

Channel , NPIV (for connectivity to any NPIV-enabled SAN)[1], 10Gigabit Ethernet, Fibre Channel over Ethernet (FCoE), as well as advanced Layer 2 switching capabilities. With these as well as other enterprise class features, the Dell M8428-k addresses the diverse needs of data centers across the globe.

Brocade BR1741M-k Converged Network Adapter

The Brocade BR1741M-k dual-port (see Figure 3) Converged Networked Adapter for Dell M-Series blade servers is a powerful 10 Gigabit Ethernet NIC that supports the latest DCB and FCoE standards to deliver enterprise-class LAN and SAN connectivity and I/O consolidation for blade servers, thereby reducing cost and complexity in the data center.

The Brocade BR1741M-k transports both TCP/IP and iSCSI/FC storage traffic over a single 10 Gigabit Ethernet link, bringing not only reductions in blade deployment costs due to reduced infrastructure to install and maintain, but also operational savings in the form of diminished power and cooling requirements. These benefits combined with best-in-class I/O performance help ensure a reduced Total Cost of Ownership (TCO).

Figure 3: Brocade BR1741M-k Dual-Port Converged Networking Adaptor

[1]With N-Port ID Virtualization (NPIV), a physical adapter port is presented to a fabric switch as multiple virtual ports with each virtual port having a unique virtual worldwide name (WWN) that can be used for zoning, LUN masking and other SAN management best practices. NPIV mode provides the means to integrate M8428-k and the entire converged networking solution into any NPIV-enabled FC SAN, including Cisco, Brocade, McDATA, and others. In addition to the benefit of providing connectivity to any vendor's FC SAN, NPIV eliminates traditional FC SAN switch constraints, such as interoperability, domain counts, and incremental SAN management. For more info, please visit http://www.dell.com/simpleconnect.

Delivering full 10 Gbps line rate performance on both ports, industry standard stateless networking offloads, and hardware-based FCoE protocol offload, the Brocade BR1741M-k CNA delivers the performance necessary for highly virtualized environments, where multiple high-demand applications share the link to the network. Consolidation of traffic with BR1741M-k allows IT administrators to more confidently scale their virtualization environments.

In addition, BR1741M-k supports Virtual Machine Optimized Ports (VMOP), a technology that offloads important virtual switching functions from the hypervisor onto the adapter to help achieve line rate performance and alleviate CPU utilization that can be used towards further scaling the virtualization environment.

Brocade Network Advisor

Brocade Network Advisor[2] provides the industry's first unified network management solution for data, storage, and converged networks. It supports Fibre Channel SANs, FCoE, layer 2/3 IP switching and routing, wireless, application delivery and MPLS networks. As a result, it provides end-to-end visibility across different network types within a single application. With a fine-grain Role Based Access Control (RBAC) mechanism, it gives different network administrators complete control over their environments (see Figure 4).

The virtualized data center presents a number of manageability challenges. Virtualization creates an abstraction layer that results in multiple applications sharing the same physical adapter and network switch ports. From the network point of view, there is no way to differentiate each of the applications that access the network through the same adapter and port, so application visibility is essentially lost. Monitoring application performance or troubleshooting and diagnosing problems such as congestion in these conditions is nearly impossible.

In addition, server I/O consolidation through the use of DCB and FCoE entails that administrators need to look at both the Ethernet and storage networking aspects of their server deployments. Providing a single "pane of glass" to manage both environments becomes critical to achieve the management efficiencies required in dynamic virtualized IT environments.

[2] To download Brocade Network Advisor, please visit http://www.brocade.com/management

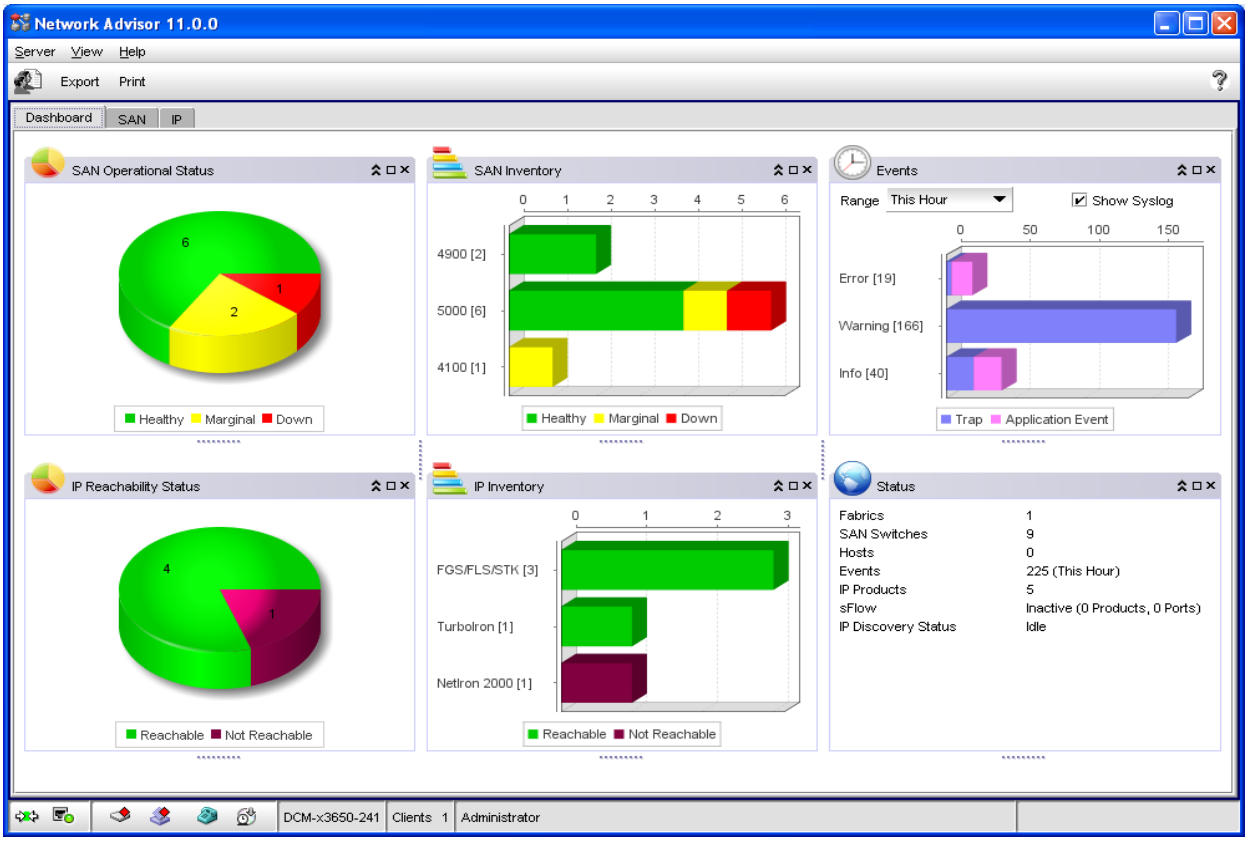

Figure 4: Brocade Network Advisor

Brocade Network Advisor helps network administrators regain application level visibility by integrating with industry leading third party management tools such as VMware vCenter and Microsoft System Center Operations Manager (SCOM), while providing the application administrators with visibility into the network. Such integration is achieved through the use of management packs or plug-ins that integrate with Network Advisor.

The Brocade Management Plug-in for VMware vCenter provides VMware administrators critical insight into network connectivity of their VMs and VM health to enable proactive response via policy-based actions for network issues. It populates vCenter with connectivity information as it pertains to the VMs—fabric details, switch details, performance statistics, event messages, and intelligent recommendations that IT administrators can then implement. This provides VM administrators with a holistic view across VMs, their connections through the network, and their connectivity to storage LUNs.

The Brocade Management Pack for Microsoft SCOM uses open, standards-based interfaces to seamlessly integrate with Microsoft SCOM and to help bridge operational gaps across server,

network, and storage administrators. Available directly within SCOM, it provides switch and fabric details, Call Home events, and end-to-end traffic statistics. With this level of information, Microsoft server administrators can quickly identify network bottlenecks in the environment, including the ability to view performance statistics or CRC errors that could be causing poor application performance.

End-to-End Converged Networking Solution

By design the Dell M8428-k Converged Network Switch and the Brocade BR1741M-k CNA address the server IO requirements by allowing multiple traffic types and classes to share the connection between the blade servers and the network while adhering to the strict service level agreements mandated by the application. By doing so, they significantly reduce the number of adapters and switches required to connect blade servers to both LAN and SAN networks.

Brocade Network Advisor provides the mechanism to configure, provision and manage the Dell M8428-k Converged Network Switch and the Brocade BR1741M-k CNA—and ultimately the network within which these elements reside—centrally and from a single application (see Figure 5).

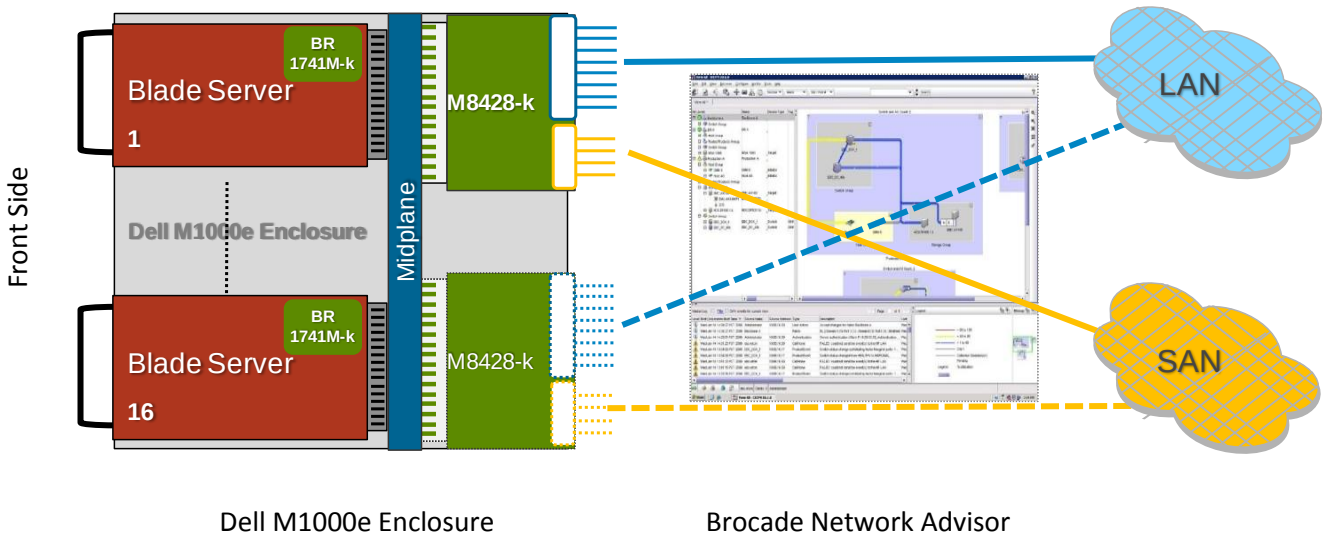

Figure 5: Converged Networking Solution with Dell M-Series Blades

The end-to-end converged networking solution reduces CapEx and simplifies operations (reduced OpEx) by consolidating hardware to fewer components and providing a single management console for end-to-end management, all while maintaining connectivity to existing LAN and SAN infrastructural investments outside the blade chassis.

About Dell

Dell (NASDAQ: DELL) is a leading technology provider to commercial and public enterprises around the world.