# Implementing a unified networking fabric in virtualized data centers

By Sunil Ahluwalia and Pankaj Gupta

IT organizations can now simplify data center connectivity and reduce costs by consolidating LAN, NAS, iSCSI SAN, and Fibre Channel SAN traffic onto a single 10 Gigabit Ethernet wire.

## Efficient IT

This Webcast series explores specific steps organizations can take to maximize server and storage efficiency in the data center.

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For many organizations, the benefits of virtualization have been limited by the complexities of networking virtualized servers. I/O demands increase as virtual machines are added to each physical server, which requires adding more ports than were necessary for traditional networking connectivity. A typical virtualized server may use 8–10 Gigabit Ethernet (GbE) LAN ports and two dedicated storage area network (SAN) ports.

As server virtualization continues to take root, 10 Gigabit Ethernet (10GbE) and unified networking are helping organizations overcome connectivity challenges and simplify the data center infrastructure. Unified networking enables consolidation of multiple GbE connections onto a single 10GbE adapter to help reduce cable and infrastructure complexity and overall total cost of ownership. Enhancements to the Ethernet standard and ratification of the Fibre Channel over Ethernet (FCoE) specification enable IT departments to realize increased benefits by cost-effectively converging data and storage infrastructures.

### Accelerating the transition to unified networking

Ethernet has served as a familiar, cost-effective data center fabric for years, supporting LAN, network attached storage (NAS), and Internet SCSI (iSCSI) SAN traffic. Now, with Open-FCoE, a standard 10GbE server adapter can also connect servers to Fibre Channel SANs. Open-FCoE uses the Fibre Channel network, service, and protocol layers and carries data packets over the Ethernet physical and data link layers. The Data Center Bridging (DCB) standard enhances 10GbE connectivity by providing quality-of-service features needed to create a lossless, unified Ethernet fabric for storage.

These technologies, together with Intel® Ethernet X520 server adapters on Dell™ PowerEdge™ servers, now enable LAN, NAS, iSCSI SAN, and Fibre Channel SAN traffic over one 10GbE wire. Combined, Dell servers and Intel Ethernet server adapters can deliver a cost-effective and high-performing connection to the storage network and help accelerate the move to 10GbE-based I/O consolidation.

### Extending consolidation with Open-FCoE

The Open-FCoE architecture uses a combination of FCoE initiators in Microsoft® Windows® and Linux® operating systems and in the VMware® ESX hypervisor to deliver high-performance FCoE solutions over standard 10GbE Ethernet adapters (see Figure 1). This approach allows IT managers to simplify the data center and standardize on a single adapter for LAN and SAN connectivity.

Intel 10GbE server adapters are designed to fully offload the FCoE data path to deliver full-featured converged network adapter (CNA) functionality without compromising on power efficiency and interoperability. Key advantages of the Intel Open-FCoE solution include the following:

- **Scalable performance:** Because there are no proprietary hardware offloads, Intel Open-FCoE performance scales naturally with the server processor. For real-life applications, Open-FCoE can deliver the performance that IT managers expect.[1]
- **Ease of use:** The Open-FCoE approach uses standard 10GbE adapters so that IT staff can leverage existing knowledge to configure and manage adapters for FCoE deployments, and standardize on Intel 10GbE server adapters for LAN, NAS, iSCSI, and FCoE traffic.
- **Cost-effectiveness:** The intelligent combination of hardware data plane offloads and software initiators enables comprehensive CNA functionality in a cost-effective way.
- **Reliability:** Intel's extensive Ethernet experience combined with certified FCoE initiators enable a reliable Open-FCoE solution.

## Announcing Dell/EMC certification of Dell servers and Intel adapters

Dell PowerEdge servers and Intel Ethernet X520 server adapters with 10GbE technology are designed to provide the processing and I/O performance required for unified data centers. PowerEdge servers are built with multi-core processors and memory controllers to power multiple virtual machines and demanding applications. Intel Ethernet X520 server adapters use hardware-based offloads to enhance FCoE throughput and help ensure processor cycles are available for application processing. PowerEdge server models 1950, 2900, 2950, 2970, R410, R510, R610, R710, R715, R805, R810, R815, R900, R905, R910, T610, and T710 with Intel Ethernet X520 server adapters are now certified for use with Dell/EMC storage.

I/O unification requires storage that supports both application-level file protocols and disk-level block protocols while leveraging storage virtualization. Dell/EMC storage works as an enabler of unification, supporting NAS, iSCSI, and FCoE in the same storage system plus existing Fibre Channel deployments.
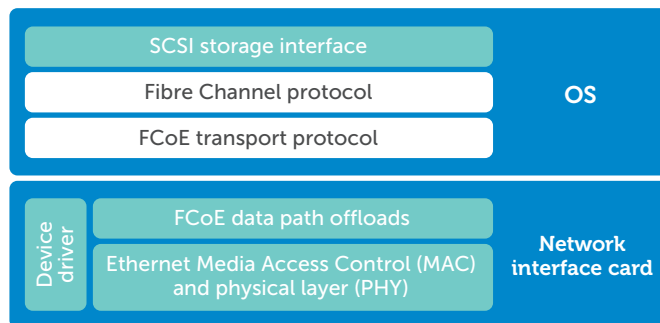


**Figure 1.** Open-FCoE architecture

## Reducing the cost and complexity of networking

Server virtualization in data centers continues to grow, creating connectivity and networking challenges. The combination of 10GbE and unified networking helps organizations overcome connectivity challenges and simplify the data center infrastructure. 10GbE provides a simple, well-understood fabric for virtualized data centers, one that helps reduce cost and complexity as the number of virtual machines continues to grow. 10GbE unified networking can also lay the groundwork for new computing models, such as cloud computing, designed to deliver enhanced business agility and data center efficiency.

FCoE helps extend and simplify infrastructure consolidation. Open-FCoE, the architecture available in Intel Ethernet server adapters with 10GbE technology, also helps ease the transition to a unified data center. And the certification of Dell PowerEdge servers with Intel Ethernet X520 server adapters offering 10GbE technology for Dell/EMC storage provides an optimized, end-to-end unified data center solution that is available to IT organizations today. PS

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[1] For more information, see "Intel 10GbE adapter performance evaluation for FCoE and iSCSI," by Demartek, September 2010, demartek.com/reports_free/demartek_intel_10gbe_fcoe_iscsi_adapter_performance_evaluation_2010-09.pdf.