



## Supercharge Your Server Virtualization with Network Convergence

### At a Glance

Server virtualization offers several key benefits to enterprise data centers which include simplified infrastructure, easier provisioning and high availability. Network convergence fully complements server virtualization deployments and provides the foundation for an end-to-end virtualized infrastructure where applications and network services are provisioned on the fly. This white paper provides an overview on how network convergence can drive virtualization initiatives to support higher levels of business agility.

Data center managers are clearly in need of networking solutions that contain the sprawl of network infrastructure and enable an adaptive next-generation network. Organizations are increasingly embracing virtualization technology to enable businesses to respond faster to these changing market demands and growth opportunities. From the cost perspective, virtualization technology helps reduce the total cost of ownership of IT infrastructure both in terms of capital expenses and operating expenses by making the most of available physical resources.

A virtualized environment increases flexibility and enables resources to be added, changed or moved as required. Virtualization technology also improves business agility, business continuity and disaster recovery capabilities.

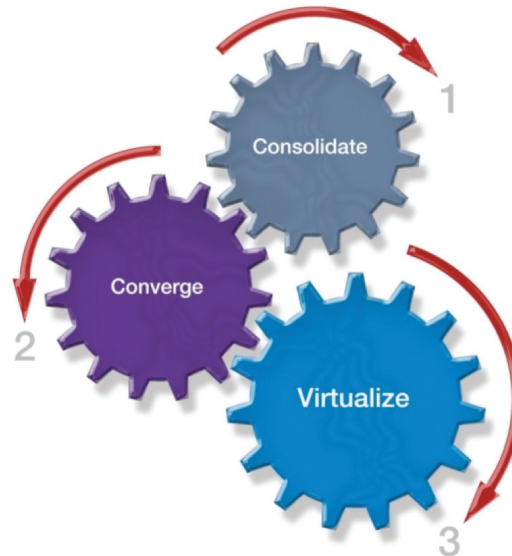


Figure 1 Network convergence lays the foundation for a virtualized data center.



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The solution for optimizing the data center network must be capable of addressing the following high-level requirements:

**Consolidate**—The network solution must be capable of consolidating multiple low-bandwidth links into a faster high-bandwidth infrastructure and significantly reduce the number of switch and adapter ports and cables.

**Converge**—The network solution must be capable of converging or unifying networking and storage traffic to a single network, eliminating the need for dedicated networks for each traffic type. This functionality will further contribute to the reduction in network ports and cables, and simplify deployment and management.

**Virtualize**—The network solution must be capable of virtualizing the underlying physical network infrastructure and providing service level guarantees for each type of traffic. In addition, the solution must be capable of responding to dynamic changes in network services based on the business demands of data center applications.

	Server Virtualization	Network Convergence
Simplify infrastructure	✓	✓
Flexible architecture	✓	✓
Easier provisioning	✓	✓
Better SLAs	✓	✓

Figure 2 Network convergence complements server virtualization.

A converged network fully complements server virtualization, enables network simplification and facilitates the roll-out of on-demand services where applications and network services are provisioned dynamically.

### Simplified Networking and Management

A Converged Network Adapter (CNA) works in tandem with an FCoE-enabled 10GbE switch to provide a converged network—significantly reducing the number of cables, switch ports and adapters as shown in Figure 3.

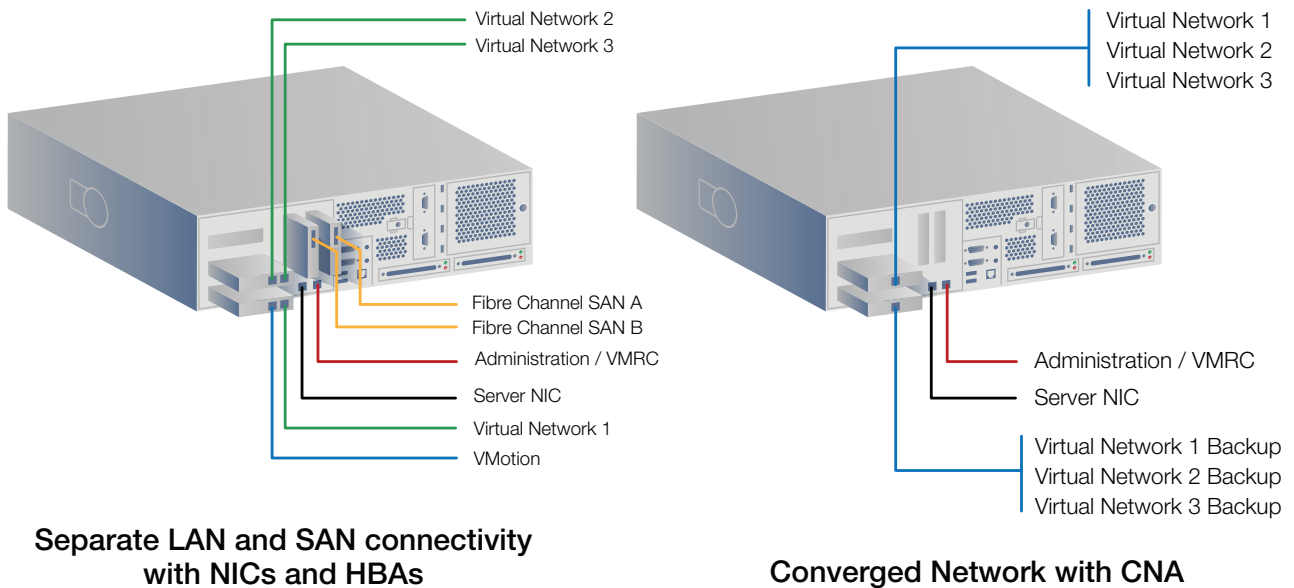


Figure 3 Significant cable reduction with CNA deployment in a rack-mount server running VMware ESX.

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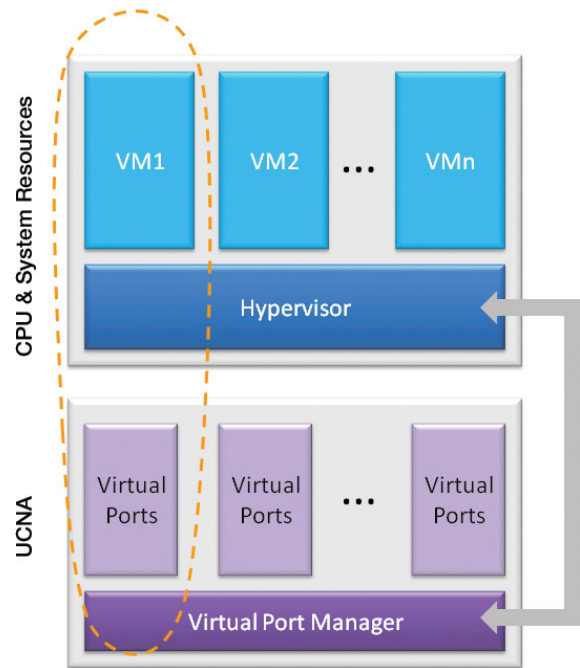
In addition to simplifying the network infrastructure of adapters, switches and cables, CNAs also ensure that the transition from traditional networking to converged networking remains transparent to the hypervisor or the operating system. Although a CNA is a single physical entity, the adapter is represented to an operating system as a Host Bus Adapter (HBA) and a Network Interface Card (NIC). This level of transparency to the operating system ensures that CNA configuration and management practices are performed in the same manner as for current standalone NIC and HBA devices.

Deploying FCoE-enabled network convergence also simplifies network management by using a common framework across Fibre Channel and FCoE-connected servers. This approach protects existing investments in management tools and processes and lowers the long-term operating cost of the data center.

## Improved Business Agility

Network convergence simplifies network connectivity to fully optimize virtual machine (VM) provisioning on-demand. This enables IT organizations to dynamically respond to changing business demands through rapid deployment of application and infrastructure services from shared pools of consolidated compute, storage and network resources.

N\_Port ID Virtualization (NPIV) is another key technology that allows each VM to be managed with a virtual identity on a Storage Area Network (SAN). With NPIV, a physical adapter port can be logged in to a fabric switch as multiple virtual ports with each virtual port having a unique virtual worldwide port name (WWPN) that can be used for zoning, LUN masking and other SAN management best practices.



**Figure 4** The UCNA enables creation of virtual ports in sync with hypervisor requirements.

The ability to dynamically create and delete virtual ports and partition bandwidth across multiple traffic types enables applications and VMs to move between physical servers, while maintaining consistent levels of security, Quality of Service (QoS) and performance. This collection of virtual machine-optimized networking and storage services enables IT managers to tie VM mobility to policy- and event-based triggers, such as CPU utilization, networking requirements and energy savings initiatives.

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## Network Convergence Improves Performance, Lowers Costs

With its second generation of network convergence products, Emulex has introduced the first family of Universal Converged Network Adapters (UCNAs) that support multiple options to combine network and storage traffic over a 10GbE infrastructure. Emulex OneConnect™ UCNAs provide high-performance server offloads for FCoE or iSCSI connectivity based on the personality that is loaded to the adapter. Network convergence, combined with server virtualization, leads to substantial improvements in power consumption, cooling efficiency and floor space optimizations—all of which helps to achieve a green data center.

- The Emulex OneConnect UCNA technology provides optimized performance for TCP/IP, FCoE and iSCSI protocols. Accelerators/offload engines for all supported protocols allow Emulex OneConnect UCNAs to deliver maximum performance, regardless of the mix of network traffic. This directly translates into more VMs per physical server and improved data center energy efficiency.
- Emulex UCNAs leverage ten generations of field-proven Fibre Channel software stacks. The common driver model for FCoE UCNAs and Fibre Channel HBAs also enables simplified driver management and better scalability.
- Emulex UCNAs utilize industry-proven Fibre Channel functionality that provides extensive interoperability with existing Fibre Channel investments in switches, directors and storage systems.
- The drivers used for Emulex UCNAs are qualified and supported by major operating system such as Windows, Linux, VMware and Solaris.
- The OneCommand™ Manager application enables management of Emulex OneConnect UCNAs and LightPulse® HBAs throughout the data center from a centralized console. Using the OneCommand Manager application, administrators can manage high-performance connections for networking and storage (Fibre Channel, FCoE and iSCSI) with a single view of the entire network.
- Emulex UCNAs and HBAs are certified to work with all the major multipathing solutions in the market today from server, storage and operating system vendors.

## Conclusion

Data center challenges are growing by the day. Businesses are required to maintain an IT infrastructure that is flexible and adaptive enough to meet changing customer demands and opportunities. Server consolidation initiatives such as blade servers and server virtualization have increased the demand for high bandwidth networks that can be provisioned dynamically. Pooling of multiple networks into a common infrastructure that supports multiple traffic types can help achieve these objectives. Network convergence powers these initiatives while achieving significant reductions in capital equipment and operating expenses.



[www.emulex.com](http://www.emulex.com)

**World Headquarters** 3333 Susan Street, Costa Mesa, CA 92626 +1 714 662 5600  
**Wokingham, UK** +44 (0) 118 977 2929 | **Munich, Germany** +49 (0) 89 97007 177  
**Paris, France** +33 (0) 158 580 022 | **Beijing, China** +86 10 68499547  
**Tokyo, Japan** +81 3 5322 1348 | **Bangalore, India** +91 80 40156789

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