Product Brief

Emulex Virtual Fabric Adapter II Technology:

How IBM Enables Virtual Networking Environments

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Abstract: *Virtualized servers are becoming ubiquitous as they continue to expand into production environments. As organizations push for higher VM densities and mixed workloads, it will be imperative to ensure their underlying infrastructure is capable of supporting future requirements. In order to fulfill this need, IBM worked with Emulex to create the only virtual networking solution for IBM BladeCenter and System x servers that provides true QoS for IP, ISCSI, and FCoE on one wire.*

Overview

IT organizations are constantly searching for and deploying new technologies that will enable them to be more responsive to the needs of the businesses they support. One of the best examples of such a technology is server virtualization. ESG research[1] indicates that server virtualization technology is nearly ubiquitous (93% of respondents had deployed or were planning to deploy server virtualization) and that increasing the use of server virtualization has been the number one IT initiative for the last two years.

ESG research also indicates that as virtualized server environments mature, organizations are increasing virtual machine (VM) density, running more production applications on VMs, and running mixed workloads. All of this contributes to more stress on IO and the need for different levels of service for multiple VMs running on a single physical server. What's more, these environments are more dynamic, so a particular configuration today may look dramatically different tomorrow. It will be critical for organizations to be able to wire once and provide multiple services over any connection—they can't afford to constantly reconfigure cards and cabling. With that in mind, IBM and Emulex have worked together to provide future-proofed Virtual Fabric Adapter (VFA) technology for the IBM BladeCenter and System x.

IBM recently announced two new adapters based on Emulex's next-generation OneConnect technology, referred to as VFA II.

- **Virtual Fabric Adapter II.** Designed for the IBM BladeCenter and System x, it delivers 10 Gigabit Ethernet (10GbE) network interface card (NIC) connectivity with the option to add to iSCSI or Fibre Channel over Ethernet (FCoE) with full protocol offload.
- **Virtual Fabric Adapter Advanced II.** The advanced model offers all the benefits of the Virtual Fabric Adapter II and comes with iSCSI or FCoE support included.

Both cards have a number of *exclusive* features for IBM Virtual Fabric Solutions including:

- **Virtual NIC Leadership.** Emulex was the first vendor to ship VFA technology with IBM and set the standard for flexibility and cost savings. Emulex VFA solutions provide advanced features required to optimize virtual environments including unique bi-directional bandwidth management with the IBM BNT Virtual Fabric Switch module that can provide QoS and SLAs for individual VMs. Emulex VFA solutions are fully qualified with the VMware I/O Vendor Program (IOVP) and are included with the VMware HCL listings.
- **iSCSI Support for VFA**. Emulex VFA adapters are the only solution IBM sells with full protocol offload for the fast-growing iSCSI market. This is key for SME and departmental applications. The Emulex VFA solution for

[1] Source: ESG Research Report, *2011 IT Spending Intentions Survey*, January 2011.

IBM BladeCenter can support both 1Gb and 10Gb iSCSI solutions with investment protection for current infrastructure and future performance demands.

- **FCoE Support for VFA**. Emulex VFA solutions provide the only hardware offload option for FCoE on IBM Virtual Fabric connected systems. Emulex claims the hardware FCoE option uses less CPU resources than software initiators and thereby increases the number of VMs that can run on each server.
- **Bi-directional Bandwidth Management**. One of the unique features of Emulex VFAs is the ability to manage both input and output bandwidth for each virtual device. This feature, which works with the IBM BNT Virtual Fabric Switch module, helps optimize QoS and SLAs in flexible virtualization environments. Using this feature, IT managers can dynamically assign the right IO capabilities for individual VMs without rebooting the server.
- **Certified for VMware**. Emulex VFA adapters are the only combined virtual NIC, ISCSI, and FCoE solutions that are certified for VMware vSphere deployments and are listed on the VMware HCL.

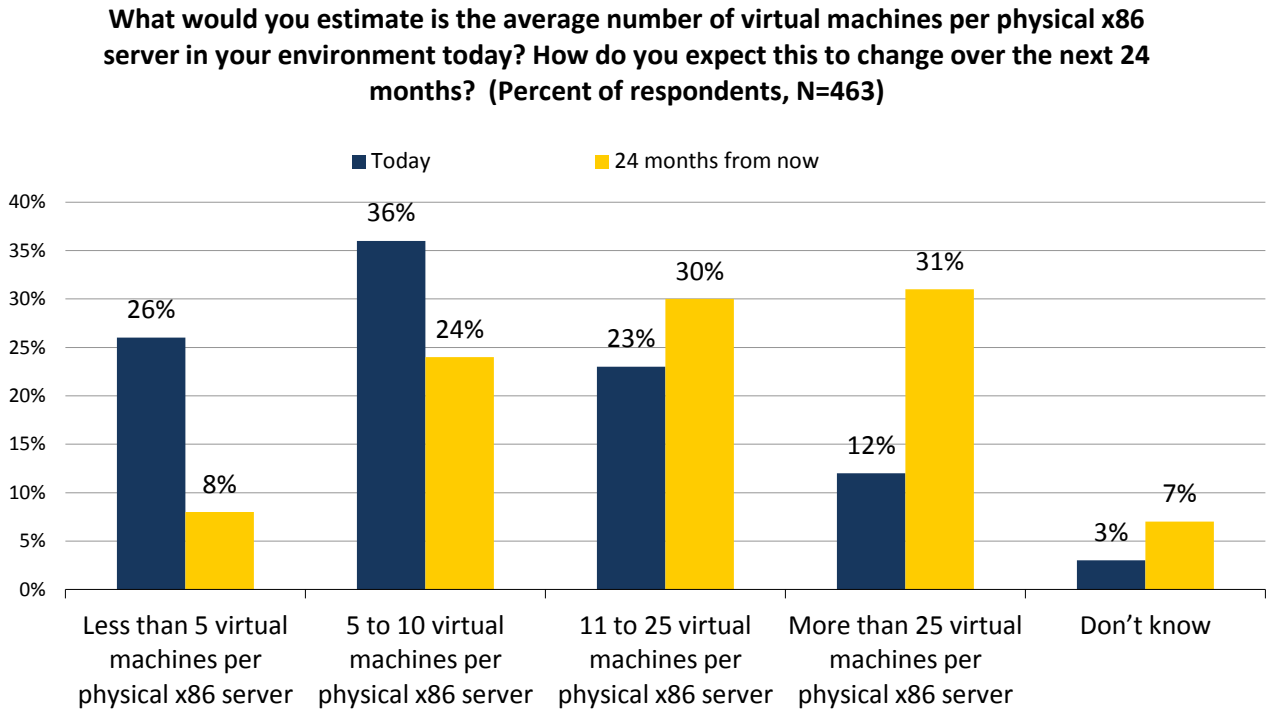
Emulex also claims a 20% power reduction with next-generation VFA II adapters. All Emulex adapter cards, regardless of protocol, can be used to manage IO leveraging Emulex OneCommand Manager and are fully integrated into IBM management solutions.

Analysis

Emulex and IBM worked closely to provide complete solutions. Integration extends beyond the adapters to the IBM switching modules as well. But why are these solutions important?

- **Virtual server IO requirements are rapidly expanding.** According to ESG research,[2] the number of VMs on each physical server will dramatically increase. Figure 1 illustrates the progression from today's average of about ten VMs per physical device to a future demand of 25 or greater.

Figure 1. VM Density Now and 24 Months from Now



Source: Enterprise Strategy Group, 2010.

[2] Source: ESG Research Report, *The Evolution of Server Virtualization*, November 2010.

As this occurs, it will have a significant impact on server IO. This wasn't a concern in legacy environments where a single application was hosted on a single server; however, as the number of VMs increases, so does the requirement for additional IO. While FC is still prevalent in many organizations and 16 Gb is on the way, the Ethernet roadmap of 10, 40, and 100 Gbps with FCoE and iSCSI support is attractive. To better support virtualized server environments as they scale, IBM and Emulex will also offer automatic virtual LAN (vLAN) configuration support.

- **More production applications and mixed workloads are running on VMs.** Not only will there be more VMs on each physical server, they will also be more critical to the business. The ability to provide sufficient throughput and quality of service will be required. This will be especially true for mixed workload environments that may require a combination of FCoE, iSCSI, and IP. In order to optimize performance, Emulex's vEngine technology delivers full protocol offload support, minimizing CPU overhead. Bi-directional bandwidth management allows data centers to align performance with application requirements and ensure SLAs are met.
- **Private cloud environments require flexibility.** Taking a page out of the service provider manual, enterprise IT organizations need highly agile and flexible infrastructures to deliver IT-as-a-Service. Response times in minutes and seconds do not allow for manual reconfiguration of assets. Working closely with Emulex, IBM is able to offer dynamic configuration of vNICs without system reboots. As organizations march down a path toward private cloud environments, it would be helpful to learn from those that have gone before them. ESG's server virtualization maturity model[3] breaks down users based on the progress and maturity of their environment—it indicated that the number one network impact reported by the most advanced users was the need for 10 Gb Ethernet technology.

The Bigger Truth

The server virtualization market is rapidly growing and continues to be a top IT priority. As a result, organizations are rapidly deploying new environments with different stages of maturity and different levels of success. Together, Emulex and IBM understand that to drive higher levels of consolidation, run mixed workloads, and deploy mission-critical production applications in virtualized environments, it is imperative to ensure proper connectivity and IO load. The virtualization-centric features of Emulex VFAs make them the best option for IBM shops to evaluate. They provide the performance to maximize virtualization ratios, ensure protection for current and future infrastructure (iSCSI and FCoE) investments, and provide the tools required to optimize QoS and SLA for individual VMs.

By bringing these new offerings to market, IBM and Emulex are enabling their customers to derive greater benefits from their virtualized server environments. When combined with IBM BladeCenter or System x technology, services and software, complete solutions can be deployed that enable IT-as-a-Service and deliver tangible business benefits.

[3] Source: ESG Research Report, *The Evolution of Server Virtualization*, November 2010.