



Gain Exceptional Network Throughput with the Cisco UCS M81KR Virtual Interface Card

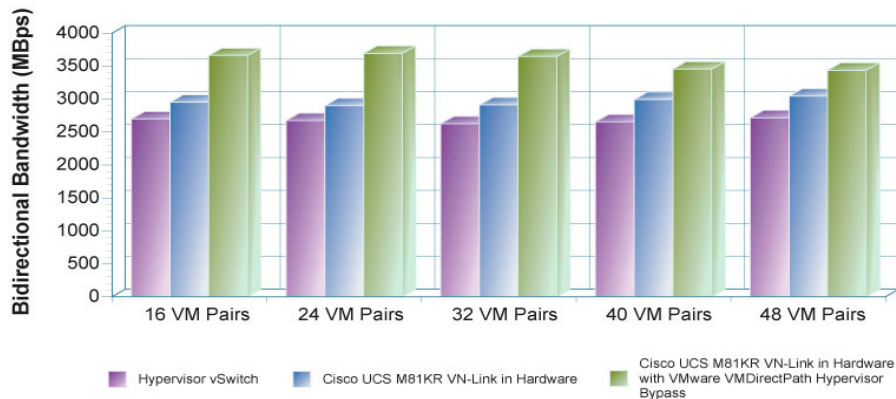
The groundbreaking Cisco® UCS M81KR Virtual Interface Card (VIC) increases application performance and consolidation ratios, with up to **30 percent greater network throughput**, complementing increases in Cisco Unified Computing System™ CPU and memory resources. The VIC and the Cisco Unified Computing System together set a new standard for balanced performance and efficiency.

Superior Network Performance for Virtualized Environments

Server virtualization is being widely deployed to increase utilization and reduce power, cooling, and floor space requirements. Implementing server virtualization makes good financial sense. However, each physical system now has multiple workloads sharing network resources, pushing current networking infrastructures and architectures well beyond their current capabilities. To accommodate this new, shared environment within a single system and assist with these new challenges, software switch solutions are available, but always at a performance price.

The Cisco UCS M81KR VIC is the first hardware-based solution that removes the need for a software virtual switch, freeing server CPU cycles for improved application network performance and support for higher virtual machine densities. The Cisco UCS M81KR VIC enables network management on a per-virtual machine basis, the same way network administrators manage physical network interfaces, increasing security and reducing complexity for lower total cost of ownership (TCO). Most important, the Cisco UCS M81KR VIC can saturate two 20-Gbps (bidirectional) unified fabric connections, for nearly 30 percent improvement in throughput performance over the VMware vSwitch solution (Figure 1).

Figure 1. Throughput Performance Comparison Between a Hypervisor Switch (Software), a Cisco UCS M81KR VIC Through the Hypervisor, and a Cisco UCS M81KR VIC Bypassing the Hypervisor



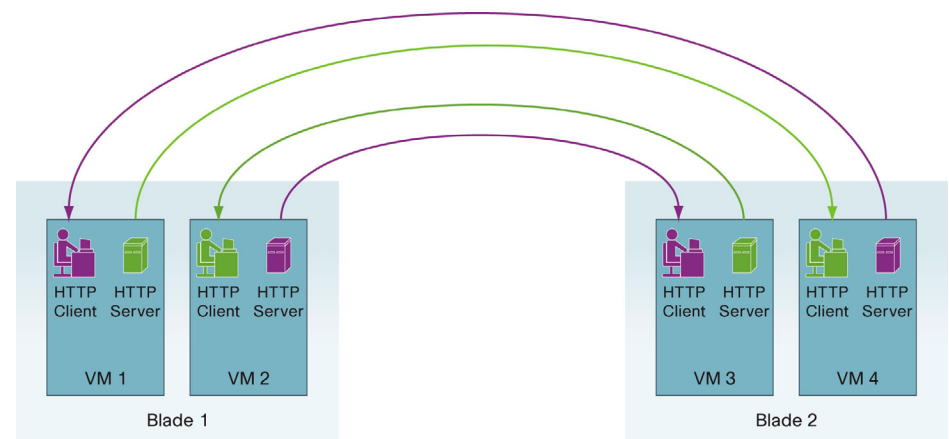
Benchmark Results

The results of preliminary testing by Cisco show that networking throughput performance for I/O-intensive tasks between two blades within the Cisco Unified Computing System platform is consistently better when using the Cisco UCS M81KR VIC than when using a software switch solution.

The Cisco UCS M81KR VIC is a mezzanine card for the Cisco UCS B-Series Blade Servers with connectivity to both 10-Gbps backplane networks for up to 40-Gbps bidirectional bandwidth. Each card can support up to 128 virtual interfaces configured as network interface cards (NICs) or Fibre Channel host bus adapters (HBAs), managed through Cisco UCS Manager. The virtual interfaces connect to virtual machines running within each blade. Cisco VN-Link technology, implemented in hardware within the card, enables connectivity from each virtual machine to physical switching interconnects, with the virtual links terminated at virtual interfaces within the parent fabric interconnects. This approach enables consistent management of attributes, such as quality of service (QoS), VLANs, and access control lists (ACLs) throughout the infrastructure from a single point. Additionally, when a virtual machine moves, these interface attributes move with the virtual machine.

The test environment used two blades, each with a single Cisco UCS M81KR VIC, within a single Cisco Unified Computing System platform. Each blade was configured with VMware vSphere 4.0, with all virtual machines running the Red Hat Enterprise Linux U4 64-bit operating system. Each virtual machine ran both an HTTP server and an HTTP client. Each HTTP server on one blade serves a 16-MB file (from a mounted RAM disk to reduce latency) to a client running on the other blade (Figure 2).

Figure 2. Traffic Flow Topology





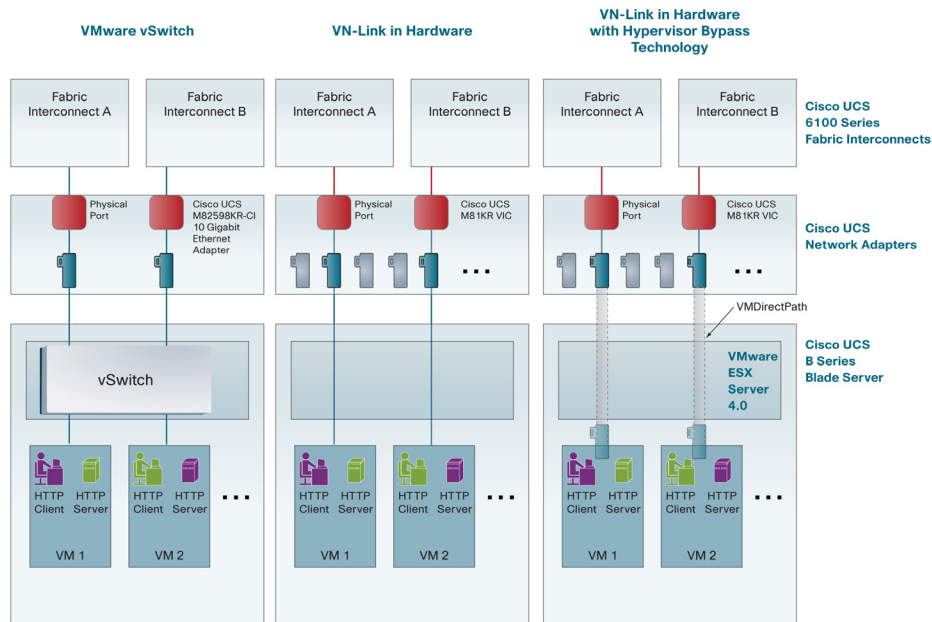
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This test configuration was then run with multiple pairs of virtual machines to test network throughput. The test examined throughput for 16 pairs of virtual machines (16 virtual machines on one blade connected to 16 virtual machines on the other blade), and then again for 24, 32, 40, and 48 pairs of virtual machines. Running 48 pairs of virtual machines, a total of 12 terabytes (TB) of bidirectional traffic was pushed through the VICs.

Test Scenarios

Three different scenarios were tested using this environment. The first scenario used the VMware vSwitch, a software switch that resides within each system's hypervisor, and the Cisco UCS 82598KR-CI 10 Gigabit Ethernet Adapter based on the Intel 82598EB 10 Gigabit Ethernet Controller. The second scenario used the Cisco UCS M81KR VIC with traffic passing through the hypervisor without any network processing at the hypervisor level. The third scenario used VMware VMDirectPath, which bypasses the hypervisor for direct access from the virtual machines to the virtual network interface cards (vNICs) within the Cisco UCS M81KR VIC (Figure 3).

Figure 3. Three Test Scenarios



What This Means for Your Environment

The results of these tests show that the Cisco UCS M81KR VIC provides exceptional performance for network-intensive application workloads. The Cisco VIC excels in performance with various virtual machine densities while maintaining evenly distributed bandwidth availability to all virtual machines under heavy network load.

Additionally, the absence of a software-based switch increases the CPU cycles available to the virtual machines and applications.

When configuring any virtualized system, one common best practice is to balance the CPU cycles across the workloads. This is also true for network I/O access. The best throughput will be obtained when bidirectional I/O access is balanced across the virtual machine workloads.

Conclusion

Consolidating servers using virtualization makes sound business sense. The Cisco Unified Computing System with the Cisco UCS M81KR VIC allows greater server consolidation densities and increases throughput performance by nearly 30 percent over software-based switch solutions. The hardware-based solution offloads performance-intensive I/O tasks from the CPU, enabling greater application performance and greater virtual machine densities while supporting throughput to handle increased densities.

A single Cisco UCS M81KR VIC performs the functions of both NICs and HBAs, lowering costs and simplifying the entire networking infrastructure. Integrated role- and policy-based management enables network and storage administrators to manage virtual interfaces the same way they manage physical interfaces, reducing the number of management systems and building on current skills for an overall lower TCO.

For More Information

For more information about the Cisco UCS M81KR Virtual Interface Card, visit http://www.cisco.com/en/US/prod/ps10265/ps10280/cna_models_comparison.html or contact your local account representative.