Cisco UCS VIC 1240 Performance with Red Hat Enterprise Linux Version 6.2

Performance Brief
February 2013

Highlights

38.7 Gbps of TCP Throughput

- The Cisco UCS® Virtual Interface Card (VIC) 1240 with the I/O port expander card delivers 38.7 Gbps of TCP data traffic across the network at 60 percent of line-rate speed.

Increased IP Performance with I/O Port Expander Card

- With multiple traffic flows, the Cisco UCS VIC 1240 with the I/O port expander card provides up to 94 percent better performance than the Cisco UCS VIC 1240 alone.

7.5 GBps SAN Read/Write Performance

- The Cisco UCS VIC 1240 delivers more than 4 GBps peak read-only SAN performance, nearly 4 GBps peak write-only performance, and 7.5 GBps peak read/write performance.

Increased SAN Performance with I/O Port Expander Card

- The Cisco UCS VIC 1240 with the I/O port expander card provides up to 71 percent better peak read-only SAN performance, up to 69 percent better peak write-only performance, and up to 74 percent peak read/write performance than the Cisco UCS VIC 1240 alone.

The Cisco UCS® Virtual Interface Card (VIC) 1240 provides excellent IP and Fibre Channel over Ethernet (FCoE) performance using Red Hat Enterprise Linux (RHEL) Version 6.2.

A system's peak performance is essentially limited by its slowest component. Intel® Xeon® processor performance is becoming ever faster, and the capacity and performance of the rest of the system must keep pace to avoid memory and I/O bottlenecks that limit performance. The Cisco UCS VIC 1240 is the exception, delivering excellent performance for both IP networking and storage traffic. The results demonstrate how Cisco supports a better balance of resources today and has the capacity to provide even greater bandwidth as bus speeds increase.

Cisco UCS VIC 1240

The Cisco UCS VIC 1240 is a virtualization-optimized converged network adapter (CNA) modular LAN-on-motherboard (mLOM) card designed specifically for the M3 generation of Cisco UCS B-Series Blade Servers. It is available preinstalled, allowing blade servers to move from the loading dock into production more quickly than ever before.

The Cisco UCS VIC 1240 supports up to 256 peripheral component interconnect express (PCIe) standards-compliant virtual interfaces that can operate in parallel to increase performance. These PCIe interfaces can be dynamically configured so that both their interface types (whether a network interface card [NIC] or host bus adapter [HBA]) and identity (MAC address and worldwide name [WWN]) are established using just-in-time provisioning. Complete device and network isolation between the PCIe devices is essentially guaranteed using network interface virtualization (NIV) technology.

The Cisco UCS VIC 1240 can provide 40 Gbps of midplane connectivity (using only the mLOM slot) and 80 Gbps of connectivity when using the I/O port expander card in the server's mezzanine card slot (Figure 1). The card's hardware PortChannels automatically and efficiently load-balance traffic across all connected fabric ports to increase traffic flow. Fabric failover helps ensure uninterrupted connectivity in the event that one of the system's two fabrics fails. Cisco tested the Cisco UCS VIC 1240 both alone and with the I/O port expander card to demonstrate the degree to

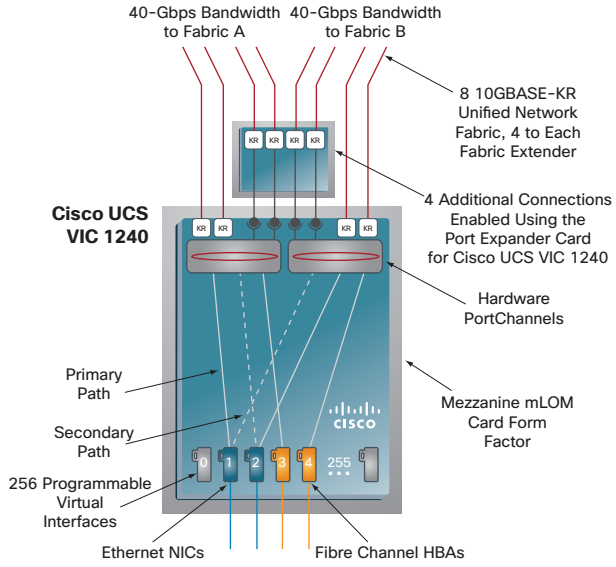

Figure 1. Cisco UCS VIC 1240 and I/O Port Expander Card

which the adapters deliver outstanding IP and FCoE performance.

Test Configuration

Two Cisco Unified Computing System™ (Cisco UCS) B200 M3 Blade Servers were used for this performance evaluation. The same blade servers were used for testing IP and FCoE performance using the Cisco UCS VIC 1240 alone and using the Cisco UCS VIC 1240 with an I/O port expander card. Two of the VIC's 10-Gbps ports connect to Fabric A, and the other two connect to Fabric B (Figure 2). When an I/O port expander card is added to the server, four 10-Gbps ports connect to Fabric A, and the other four connect to Fabric B.

Given the configuration (see Figure 1), the theoretical maximum bandwidth for the Cisco UCS VIC 1240 alone is 40 Gbps (20 Gbps per fabric) per half-width blade server. However, with the addition of the I/O port expander card, the theoretical maximum bandwidth is 64 Gbps rather than 80 Gbps because of the bandwidth limitations of the PCIe 2.0 bus on which the VIC is installed. The Cisco UCS VIC technology exceeds the PCIe 2.0 bus capabilities, which enables Cisco to quickly increase capacity using the same technology when performance enhancements are added to the PCIe bus specification. This capability helps ensure continuously high I/O performance as other technologies evolve.

The test configuration was designed to increase CPU utilization during I/O request processing and push the networking hardware to its fullest capacity. Cisco configured testing software, including netperf, PKTGEN, and vwrio, to determine the throughput

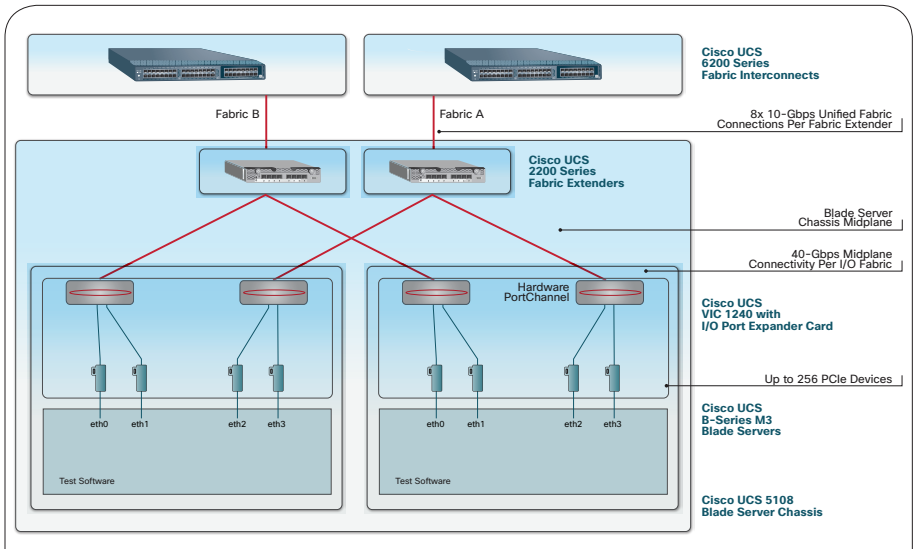

Figure 2. Configuration for IP Networking Tests

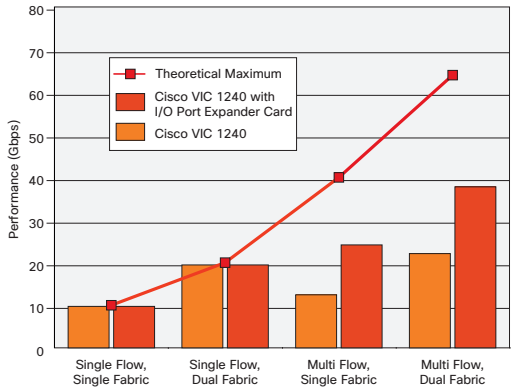

Figure 3. Comparison of Single and Multiflow IP Performance Between Cisco UCS VIC 1240 and Cisco UCS VIC 1240 with I/O Port Expander Card

using a single IP flow, and also to probe the maximum throughput when multiple flows use the PortChannel capabilities of the Cisco UCS VIC and Cisco UCS fabric interconnects.

IP Performance Results

A single IP flow for both the Cisco UCS VIC 1240 and the Cisco UCS VIC 1240 with the the I/O port expander card delivers throughput almost reaching the theoretical maximum of 10 and 20 Gbps. The results are identical (as they should be) on both single-fabric and dual-fabric configurations (Figure 3). However, with multiple IP flows, the Cisco UCS VIC 1240 with the the I/O port expander card performs 70 percent better in comparison to the Cisco UCS VIC 1240 by itself. At 60 percent line-rate efficiency, the Cisco VIC 1240 delivers 38.7 Gbps with multiple TCP flows, which is an industry-leading result from a single host.

FCoE Performance Results

When FCoE performance is tested, the Cisco UCS VIC 1240 delivers more than 4 GBps peak read-only performance (Figure 4). With the addition of the I/O port expander card, the configuration provides a 71 percent performance improvement, to 5.85 GBps. The peak write-only performance is nearly as good with the Cisco UCS VIC 1240 alone, providing 3.77 GBps, and with the I/O port expander card delivering an additional 69 percent write performance improvement, to 5.5 GBps. However, when the workload mixed the peak read and write requests, the Cisco UCS VIC 1240 delivered 7.5 GBps, and the I/O port expansion card improved on that by 74 percent, to 10.2 GBps.

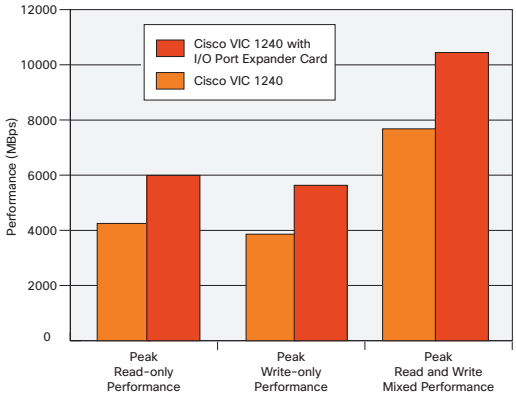

Figure 4. Comparison of FCoE Peak Read-Only, Peak Write-Only, and Peak Read and Write Mixed Between Cisco UCS VIC 1240 and Cisco UCS VIC 1240 with I/O Port Expander Card

Conclusion

The industry expects nothing but the best from Cisco, and Cisco delivers. The standards-based Cisco UCS VIC 1240 is matching I/O performance with performance enhancements made to the Intel Xeon processors. The Cisco UCS VIC 1240 with RHEL Version 6.2 running bare metal provides excellent IP and FCoE performance. The Cisco UCS VIC 1240 in combination with the I/O port expander card delivers exceptional performance on all I/O-intensive server workloads.

For More Information

- For more information about the Cisco UCS VIC 1240 and I/O port expander card, please visit http://www.cisco.com/en/US/products/ps12377/index.html.
- For more information about the IP-based performance tests, please see http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns944/whitepaper_C11-720526.pdf.
- For more information about the FCoE-based performance tests, please see http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns944/whitepaper_C11-721280.pdf.

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