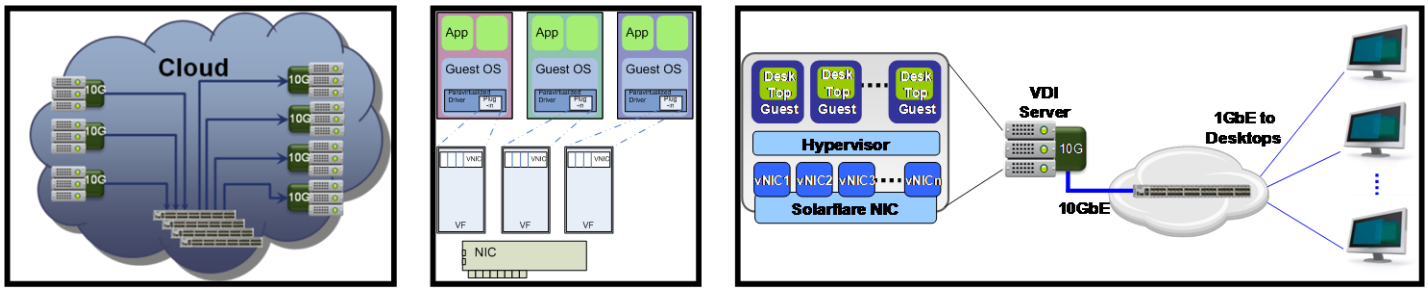
Solutions Brief

Solarflare Virtualization Solutions

Solarflare 10 Gigabit Ethernet Optimizes Virtual Infrastructures

Solarflare 10 Gigabit Ethernet Server Adapters enable IT managers to consolidate more virtualized applications over fewer physical servers by scaling network I/O bandwidth, removing I/O bottlenecks in virtual environments, and delivering near-native performance.



Server virtualization enables IT managers to consolidate workloads on fewer physical servers, thereby increasing the utilization of physical servers and creating a more flexible, efficient, and dynamic data center environment. As a result, server virtualization can lead to lower capital costs and lower ongoing operating costs. For these reasons, server virtualization is moving beyond traditional data center applications and is finding use in cloud computing, virtual desktop infrastructure (VDI), and other environments.

The virtual OS providers such as VMware are now specifying multiple ports of 10GbE per server in their reference architectures. Also, recognizing this trend, market analysts, such as IDC and IT Brand Pulse, point to server virtualization as a key driver for 10GbE adoption. However, 10Gbps speeds are not enough to insure the best possible network I/O solution for server virtualization. When designing a virtualized server environment, a number of factors affecting network I/O should be considered.

HIGH "REAL" NETWORK BANDWIDTH

Loading virtual machines, virtual machine migration, backup, fault tolerant clusters, and application network traffic between virtual machines (VMs) on different physical servers place high demands on network bandwidth. To keep up, the network server adapter must be capable of sustaining line rate on multiple ports with bidirectional traffic – a challenge that requires 40Gbps of aggregate throughput for a dual-port server adapter.

ABILITY OF NETWORK PERFORMANCE TO SCALE WITH THE NUMBER OF VIRTUAL MACHINES

It is critical that all the VMs have access to network bandwidth when needed. As the number of VMs increases, this challenge becomes increasingly difficult to meet. Today's virtualized servers routinely support dozens of workloads, and soon hundreds of VMs on a single server will be common. The network adapter must have the ability to deliver performance that scales as the number of VMs increases.

ABILITY OF NETWORK PERFORMANCE TO SCALE WITH THE NUMBER OF CPU CORES

As users add more CPU cores, they rightfully expect to get more performance from the server. Today's servers support from 16 up to 40 CPU cores, and next-generation processors will continue to increase this number. Network I/O performance must keep up. In order to do this, the network I/O must be able to deliver performance that scales as the number of CPU cores increases.

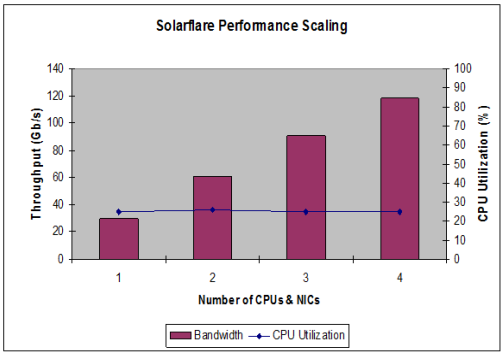
EXCELLENT ISCSI AND NFS PERFORMANCE

Virtualized servers are now taking advantage of the cost-effectiveness and flexibility of Ethernet-based storage. The emergence of 10GbE has made iSCSI and NFS practical and effective for storage access. The network server adapter must be capable of delivering full 10Gbps of bandwidth in order to provide excellent performance for iSCSI and NFS storage access.

Solarflare 10G Ethernet Server Adapters—Perfect Match for Server Virtualization Delivers on the key needs of virtualized server network I/O

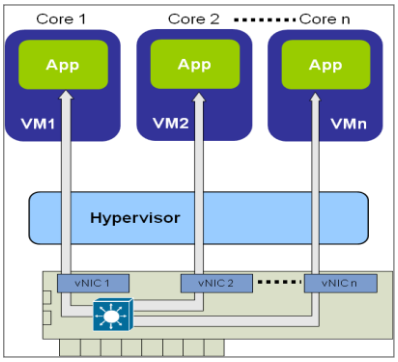
HIGHLY SCALABLE BANDWIDTH

Solarflare 10GbE server adapters deliver outstanding bandwidth performance, easily sustaining line rate on two ports with bidirectional traffic, for an aggregate bandwidth of nearly 40Gbps. This total throughput is unsurpassed in the industry and assures users that Solarflare can meet the needs of the most demanding situations. Further, Solarflare server adapters are highly efficient, using a minimum amount of the CPU.



PERFORMANCE SCALING WITH INCREASES IN NUMBER OF VIRTUAL MACHINES

Solarflare server adapters have a unique hardware accelerated virtualized architecture that provides up to 2048 virtual NIC (vNIC) instances to support NetQueue network acceleration. A virtual NIC can be thought of as a slice of the 10GbE adapter that is dedicated to an I/O process, or in this case, a virtual machine (VM). The vNIC insures that network resources are available to a VM. Most network adapters today support some form of NIC virtualization, but in a very limited way – typically very few vNIC instances (32 or fewer) and no hardware acceleration. Solarflare 10GbE server adapters provide unmatched scalability, supporting hundreds or even thousands of VMs, each with a dedicated vNIC to insure access to network I/O. Solarflare hardware acceleration insures the vNICs sustain high-performance and low CPU utilization. VM scaling is important today, but will become increasingly portant as VM density extends beyond dozens to hundreds per server.

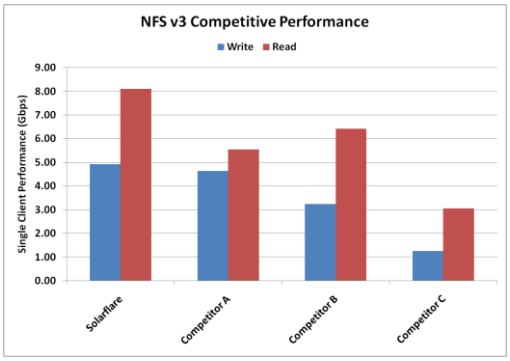


PERFORMANCE SCALING WITH INCREASES IN THE NUMBER OF CPU CORES

Solarflare's unique hardware-accelerated, virtualized NIC architecture provides important benefits to CPU core scaling as well. Solarflare server adapters use vNICs to implement Receive Side Scaling (RSS) to distribute the network traffic across the CPU cores. This technology allows the network I/O processing to be spread across the available CPU cores, eliminating potential processing bottlenecks and dramatically improving performance on a busy network. Solarflare's server adapters also can use vNICs for both NetQueue VM scaling and RSS, providing additional performance benefits competitors can't match.

EXCELLENT ISCSI AND NFS PERFORMANCE

Solarflare 10GbE server adapters provide exceptional performance for iSCSI and NFS, two popular forms of Ethernet-based storage that are increasingly used today with virtualized servers. As the chart shows, Solarflare server adapters outperform other 10GbE adapters, including popular market leaders.



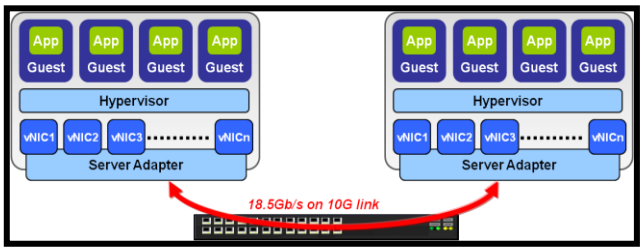
Solarflare 10G Ethernet Server Adapters—Accelerating Server Virtualization Supports emerging virtualized server network I/O technologies

SOLARFLARE'S UNIQUE DIRECT GUEST ACCESS TECHNOLOGY

Solarflare server adapters have a unique capability to connect virtual machine network traffic directly to the adapter hardware, bypassing the overheads of the hypervisor. This capability has been demonstrated and tested using Citrix XenServer 5.x hypervisor. Incorporating a network plug-in module to the guest operating system's virtualized driver enables direct communication between the virtual machine and the adapter's vNIC hardware. As a result, Solarflare adapters are capable of achieving unmatched performance in virtualized servers.

One Solarflare benchmark demonstrates 18.5Gbps bidirectional line rate performance, with individual guest to guest links resulting in 4.6Gbps each. (http://www.solarflare.com/news/news_press_show.php?release=20091207a)

Another Solarflare benchmark reveals near-native latency performance of 26 microseconds between VMs communicating on different hosts – VM to VM communication. (http://www.solarflare.com/technology/documents/monterey-performance-infrastructure-west-letter.pdf



SR-IOV is an emerging industry standard used to enable direct guest access. Solarflare's hardware architecture supports this technology and will roll out production support as this becomes available and supported by the leading hypervisors.

SOLARFLARE SUPPORTS KEY VIRTUALIZATION REQUIREMENTS

Important functions for robust and reliable virtual infrastructure operations include data protection, service continuity, network partitioning, performance scaling, transparent migration of VMs and data stores, and flexible boot scenarios. The server adapter is key to unifying services across virtual machines through the virtual network and to / from virtual storage.

Virtualization Feature	Customer Benefit
Fault Tolerance	Continuation protection
HA/DRS/DRM/VM cluster	Scalable workload protection & performance
VLAN tagging policy	Server isolation
Load-based NIC Teaming Load balancing, Failover	Performance & redundancy over dyamnic workloads
Traffic shaping	Finer granularity with high performance
Live VM migration	Application performance unaffected
Storage I/O – NFS, iSCSII	High storage performance
Remote Boot (ESX or VM)	Easy scalable system management

SOLARFLARE 10G ETHERNET SERVER ADAPTERS – PERFECT MATCH FOR ESX, HYPER-V, AND XENSERVER

Solarflare server adapters enable higher levels of workload consolidation by supporting more virtual applications per physical server. These highly scalable 10GbE server adapters optimize network I/O bandwidth to accommodate any number of NICs, VMs, and CPU cores in the system. Solarflare features the lowest virtualized Ethernet latency in the industry which accelerates VM to VM networking. Solarflare's scalable hardware-accelerated virtualization technology enables greater VM density supporting orders of magnitude more vNICs than competitors.

SOLARFLARE'S FAMILY OF VIRTUALIZATION SOLUTIONS

Solarflare offers single- and dual-port 10 GbE server adapters that deliver high bandwidth, industry leading latency and power, with hardware acceleration that minimizes CPU utilization. The Solarflare family supports both SFP+ and 10GBASE-T media. The SFP+ adapter supports optical modules or direct attach copper twin-ax cables, while the 10GBASE-T supports Category 6A, 6, 5E cables which are compatible with existing data center infrastructures for distances up to 100 meters.

Solarflare's two families of server adapters meet a broad range of virtualization networking needs. Enterprise server adapters are targeted at applications demanding the lowest latency, and most scalable virtualization. Midrange server adapters offer an exceptional 10GbE value.