



NxtGen improves efficiency on multitenant environments

Innovative cloud service provider NxtGen drives cost efficiencies with higher network bandwidth using Intel® technology

At a Glance:

- NxtGen was experiencing I/O bottlenecks on its multitenant servers
- It replaced 10GbE NICs across its data centers with 25GbE Intel® Ethernet Network Adapters XXV710
- Alleviating the bottlenecks enabled the company to cut its costs and improve its service to clients

In the competitive cloud services market, continuous innovation is critical for success – a fact recognized by one of the leading Indian cloud service providers (CSP) NxtGen. As part of its ongoing mission to improve service levels for its customers at the lowest possible cost, NxtGen upgraded its Network Interface Cards (NICs) in order to optimize price-performance ratio.

Challenge

- Deliver high service levels to customers at the lowest possible price point
- Meet accelerating demand for more bandwidth in the data centers
- Eliminate hypervisor I/O bottlenecks in the multitenant environment to improve performance of customers' virtual machines (VMs)

Solution

- NxtGen replaced 10GbE NICs across its data centers with 25GbE Intel® Ethernet Network Adapters XXV710
- Intel and NxtGen are working together to improve performance further by automatically reprovisioning bandwidth from idle VMs

Results

- Upgrading the NICs allowed NxtGen to build upon its previous investments in Intel® Xeon® Scalable processors and Intel® Solid State Drives (Intel® SSDs) to deliver higher efficiency and performance when services are being offered in a multitenant cloud environment
- For large application buffers, NxtGen could deliver line-rate performance with low CPU usage while being able to allocate CPU resources to multiple tenants
- Intel's support for 25GbE enables NxtGen to support a wide range of different applications by harnessing advanced virtualization technologies such as Intel® Data Direct I/O Technology (Intel® DDIO) and intelligent offloads

Ensuring performance in a multitenant environment

Cloud Service Providers (CSPs) are faced with a number of challenges in ensuring a quality experience for their customers. Customers' needs are often evolving as their applications grow in demand for more bandwidth and data. More and more data is being collected and flowing into data centers, as more devices are being connected to the Internet of Things, and new methods for analyzing these huge data sets are becoming more widely used, such as big data, machine learning, and artificial intelligence applications. Application users want to benefit from their fast web connections at home and at work, and use them for both entertainment and business applications. As a result, public clouds are increasingly being used to host data-intensive applications that process video, audio, and other high bandwidth data types.

NxtGen is one company that has noticed this trend. It caters for the data center and cloud services marketplace, with a broad portfolio of infrastructure and value-added services. Based in India, the company focuses on harnessing emerging cloud technologies to help deliver services that allow their customers' businesses to grow while reducing the cost and complexity of clients' cloud infrastructures.

NxtGen regularly invests in optimizing its data centers to help increase efficiency, lower its total cost of ownership, and optimize the performance its customers experience. The company recently introduced Intel Xeon Scalable processors across its data centers because they represent the ideal foundation for the cloud. With the new Intel® Mesh Architecture, increased core count, and other newly integrated technologies, the Intel Xeon Scalable processor platform enables new levels of consistent and pervasive performance. Additionally, the Intel Xeon processor Scalable family delivers strong performance in virtualization capabilities—also critical for cloud agility and efficiency. Servers based on Intel's latest processor allow enterprises to run more VMs per server than ever before.

The next step for the company in delivering high performance and cost efficiency for its customers was to improve network bandwidth.

NxtGen's existing infrastructure was based on servers featuring industry-standard 10Gb/s NICs but the company wanted to add greater bandwidth in order to avoid networking bottlenecks when running customers' cloud services workloads. In multitenant environments such as a typical server within a CSP's cloud infrastructure, multiple inputs may be traveling through a single NIC located at the server edge. This creates a pinch point for traffic into and out of the server, particularly when multiple VMs within the environment are running several different applications at a given time. To alleviate this bottleneck and improve the performance of VMs across its data center, NxtGen investigated upgrading its NICs to the next generation 25Gb/s bandwidth.

Better performance, lower latency

NxtGen ran a proof of concept using real workloads to compare the 25GbE Intel Ethernet Network Adapter XXV710 with another 25Gb/s NIC product. The goal was to establish which would meet the company's demands for scalable bandwidth, performance and low total cost of ownership (TCO). The CSP selected the Intel Ethernet Network Adapter XXV710 based on the product's ability to meet server virtualization needs. That includes reducing I/O bottlenecks by providing intelligent offloads for networking traffic per VM, which enables fast performance and VM scalability over previous generation NICs.

The Intel Ethernet Network Adapter XXV710 enhances interoperability, with backwards compatibility to 1/10GbE and support for multiple media types, backed by extensive testing and validation. Used together with the Intel® Xeon® processor-based servers in NxtGen's data center, the Intel Ethernet Network Adapter XXV710 enables intelligent offloads and supports accelerators to enhance network performance. Kernel and Data Plane Development Kit (DPDK) drivers can be used to enable scalable packet processing.

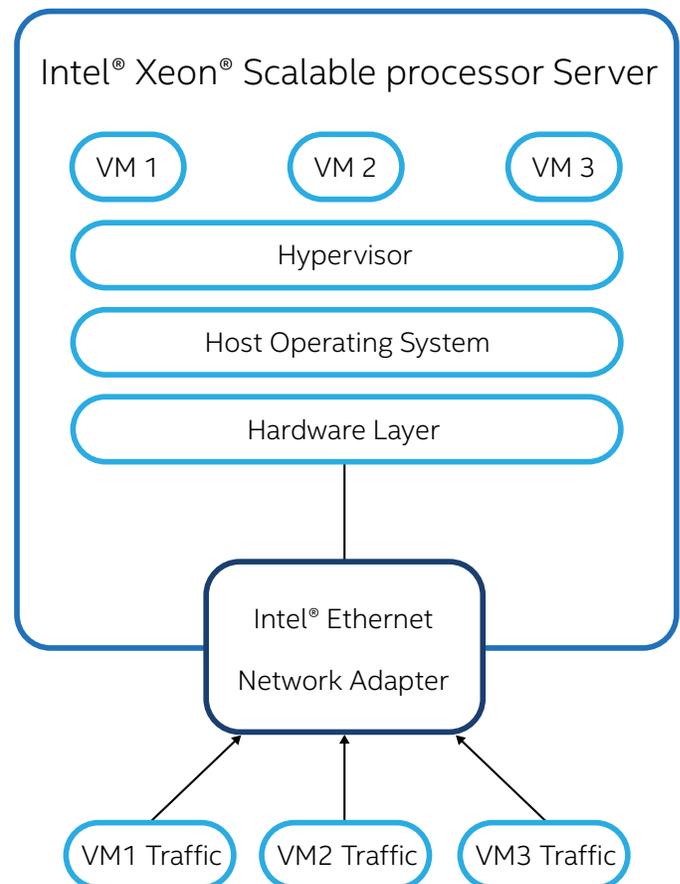


Figure 1: The Intel® Ethernet Network Adapter enabled NxtGen to alleviate a bottleneck in its multitenant hosting environment, by providing more capacity to handle traffic for multiple virtual machines (VMs)

Another key feature of the Intel® technology for NxtGen's cloud infrastructure is the in-built Intel® Ethernet Flow Director (Intel® Ethernet FD), an advanced traffic steering capability. It consists of a large number of flow affinity filters that direct received packets by their flows to queues for classification, load balancing, and matching between flows and CPU cores. It eliminates context switching required within the CPU. As a result, Intel Ethernet FD can significantly increase the number of transactions per second and reduce latency for cloud applications like memcached.

Finally, the Intel Ethernet Network Adapter is able to work closely with NxtGen's existing Intel Xeon Scalable processor-based servers to intelligently offload some functions, further optimizing performance and efficiency. Intelligent offloading harnesses the computing power of the Intel Xeon processor where appropriate and implements complementary accelerations in the network controller. By employing a balanced hybrid of compute and offload, intelligent offloads are able to achieve an optimized point of performance and efficiency. NxtGen is using VXLAN offloading, enabled with the Linux* utility ethtool.

As part of the long-standing relationship between the two companies, Intel worked closely with NxtGen to test and implement the NICs. Intel assisted with the in-house proof of concept, and demonstrated the new features of the adapter. Engineers from Intel worked with NxtGen on benchmarking and optimization of the solution.

Optimizing to reduce network congestion

NxtGen has been able to achieve greater efficiency in its data center and can now provide a better level of service to its customers. With the 25GbE Intel Ethernet Network Adapters XXV710 replacing 10GbE NICs in its data centers, NxtGen is able to meet the increasing demand for higher available bandwidth. The additional bandwidth allows the CSP to improve service levels for its customers while keeping the cost of its services as low as possible.

NxtGen is working with Intel to enable separation of the traffic flow at the hardware level to facilitate more effective data transfer and communication. This will allow the bandwidth allocated to idle VMs to be redistributed to those that are active, reducing congestion and improving the performance of virtualized applications that require higher bandwidth.

Business Results

By working with Intel, NxtGen has built a high-performing data center based on Intel Xeon Scalable processors, with Intel Ethernet Network Adapters that provide the performance and bandwidth to offer more services out of a single host. By supporting more customer workloads in the data centers - without impacting on the performance of customer applications - NxtGen is able to improve the cost efficiency for its customers and can continue to offer infrastructure and value-added cloud services at competitive prices.

Technical Component of Solution

The Intel® Ethernet Adapter XXV710 delivers excellent performance for 25GbE connectivity and is backwards compatible to 1/10GbE, making migration to higher speeds easier. It is part of the Intel Ethernet 700 Series Network Adapters. These adapters are the foundation for server connectivity, providing broad interoperability, critical performance optimizations, and increased agility for Telecommunications, Cloud, and Enterprise IT network solutions.

Spotlight on NxtGen

NxtGen's vision is to enable its customers with an Infinite Datacenter*, taking out the complexity of running mission-critical infrastructure and letting its customers focus on applications. Infinite Datacenter is the enterprise technology infrastructure platform that federates clouds and on-premises infrastructure, supports a single design environment for multiple use cases and consolidates operations management - performance, security, resilience and services. NxtGen's Infinite Datacenter helps drive business growth for its customers by transforming their technology infrastructure and helping them rethink their go-to-market strategies. It delivers the fundamental capabilities needed for long-term success, including digitization, analytics, and agile development. NxtGen pioneered Hybrid Cloud and hyper-convergence in India.

Lessons Learned

The key lessons that CSPs can learn from NxtGen's experience are:

- To deliver exceptional performance for customers in multitenant environments, CSPs can upgrade NICs to provide additional bandwidth
- Upgrading to Intel® Ethernet Network Adapters XXV710 allows CSPs to take advantage of traffic flow features such as steering traffic into specific queues to increase transactions per second and reduce latency
- Intel Ethernet Network Adapters alongside Intel® Xeon® Scalable processors allow CSPs to take advantage of features such as intelligent offloads, which help to achieve an optimized point of performance and efficiency

Learn More

- Intel® Ethernet Network Adapter XXV710
- Intel® Xeon® Scalable processor

Find the solution that is right for your organization.
Contact your Intel representative or visit [intel.com/CSP](https://www.intel.com/CSP).



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