Introducing 200G HDR InfiniBand Solutions

INTRODUCTION

In a world characterized by ever-increasing generation and consumption of digital information, the ability to analyze data to find insights in real time has become a competitive advantage. An advanced network must address how best to transfer growing amounts of data quickly and efficiently, and how to perform analysis on that data on-the-fly.

The Co-Design technology transition has revolutionized the industry, clearly illustrating that the traditional CPU-centric data center architecture, wherein as many functions as possible are onloaded onto the CPU, is outdated. The transition to the new data-centric architecture requires that today's networks must be fast and they must be efficient, which means they must offload as many functions as possible from the CPU to other places in the network, enabling the CPU to focus on its primary role of handling the compute.

THE DEMAND FOR MORE THROUGHPUT

As the demand for data analysis grows, so too does the demand for higher data throughput to enable such detailed analysis. Whereas state-of-the-art applications to analyze automotive construction or weather simulations required 100Gb/s as recently as a few years ago, today's high-performance, machine leaning, storage and hyperscale technologies demand even faster networks. 100Gb/s bandwidth is not enough for many of today's more advanced data centers. Whether for brain mapping or for homeland security, the most demanding supercomputers and data center applications need to produce astounding achievements in remarkable turnaround times.

Thus the race is on to develop 200Gb/s technologies that can support the requirements of today's most advanced networks.
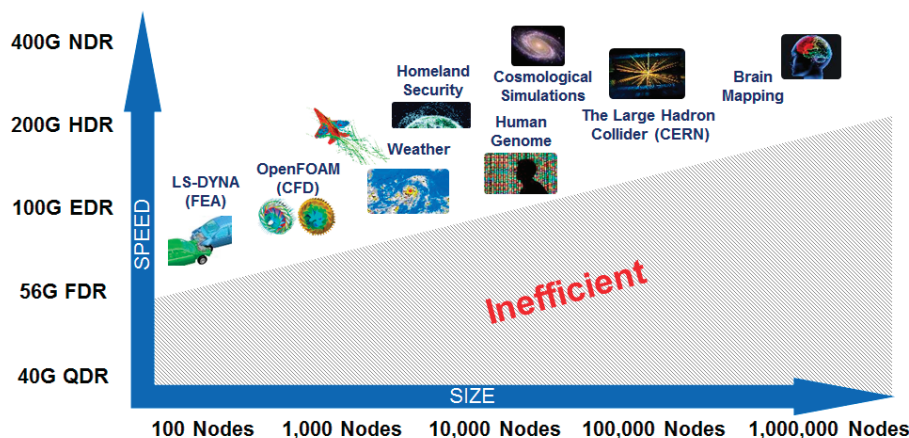

Figure 1: The Demand for HDR

MELLANOX INTRODUCES 200G HDR INFINIBAND SOLUTIONS

Over the past decade, no one has pushed the industry forward more than Mellanox. As the first to 40Gb/s, 56Gb/s and 100Gb/s bandwidth, Mellanox has both boosted data center and cloud performance and improved return on investment at a pace that far exceeds Moore's Law and even exceeds its own roadmap.

To that end, Mellanox has now announced that it is the first company to enable 200Gb/s data speeds with Mellanox Quantum™ switches, ConnectX®-6 adapters, and LinkX® cables combining for an end-to end 200G HDR InfiniBand solution in 2018.

By doubling the previous data rate, only Mellanox can provide the necessary speed to meet the demands of the world's most data-intensive applications.

Mellanox Quantum 200G HDR InfiniBand Switch

With 40 ports of 200Gb/s HDR InfiniBand, Mellanox Quantum offers an amazing 16Tb/s of bidirectional throughput and 15.6 billion messages per second in only 130ns of port-to-port switch latency. Mellanox Quantum provides industry-leading integration of 160 SerDes, which can operate at a flexible 2.5Gb/s to 50Gb/s per lane, making Mellanox Quantum the world's most scalable switch.

Furthermore, Mellanox Quantum is also the world's smartest switch, improving performance by processing data as it traverses the network and eliminating the need to send data multiple times between endpoints. By including collective communication accelerators and Scalable Hierarchical Aggregation and Reduction Protocol (SHARP)™ 2.0 MPI aggregation and reduction technology, Mellanox Quantum is able to meet the needs of even the most demanding applications, from high performance computing to machine learning.

Introducing HDR100 for Ultimate Scalability

Mellanox Quantum also offers the HDR100 option, which enables ultimate scalability for data centers. By utilizing two pairs of two lanes per port, Mellanox Quantum can support up to 80 ports of 100Gb/s to create the densest and most efficient top-of-rack switch available in the market. HDR100 allows data centers to utilize 1.6X fewer switches and 2X fewer cables than the competition to connect a 400-node system. Mellanox Quantum can also connect 128,000 nodes in a 3-level Fat Tree topology, which is 4.6X better than competitive proprietary products.

The ultimate effect is that whether using 40 ports of 200G HDR to achieve twice the throughput of the competition or 80 ports of 100G HDR100 to require half as many switches and cables as the competition for the same throughput, Mellanox Quantum produces the lowest total cost of ownership for today's data centers and HPC clusters.
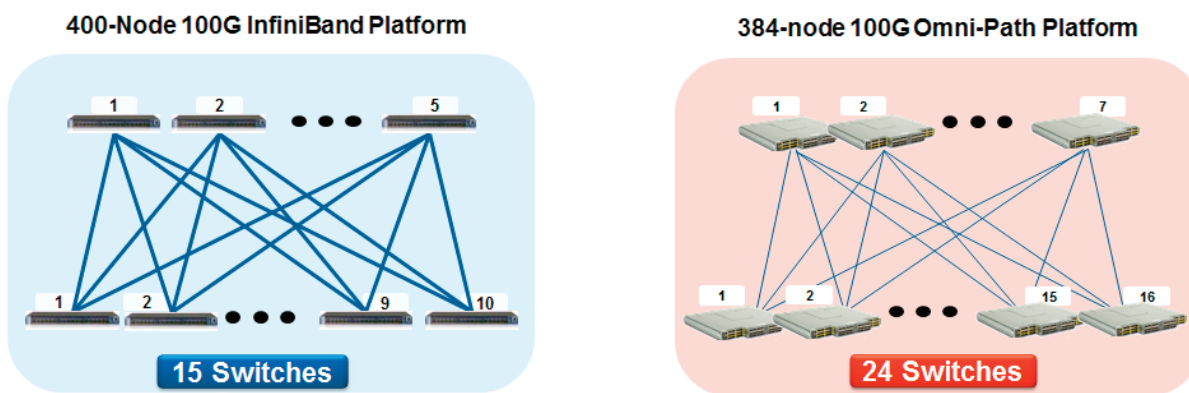

Figure 2. HDR100 Requires 1.6X Fewer Switches for 400 Nodes

ConnectX-6 200Gb/s InfiniBand and Ethernet (VPI) Network Adapter

Offering world-class performance for both InfiniBand and Ethernet, ConnectX-6 delivers 200Gb/s throughput with 200 million messages per second at under 600 nanoseconds of latency end-to-end. Plus, as with all Mellanox standard-based products, ConnectX-6 is backward compatible, supporting HDR, HDR100, EDR, FDR, QDR, DDR and SDR InfiniBand and 200, 100, 50, 40, 25, and 10 GbE.

ConnectX-6 offers improvements in Mellanox's Multi-Host® technology, allowing for up to eight hosts to be connected to a single adapter by segmenting the PCIe interface into multiple and independent interfaces. This leads to a variety of new rack design alternatives, lowering the total cost of ownership in the data center by reducing CAPEX (cables, NICs, and switch port expenses), and OPEX (cutting down on switch port management and overall power usage.
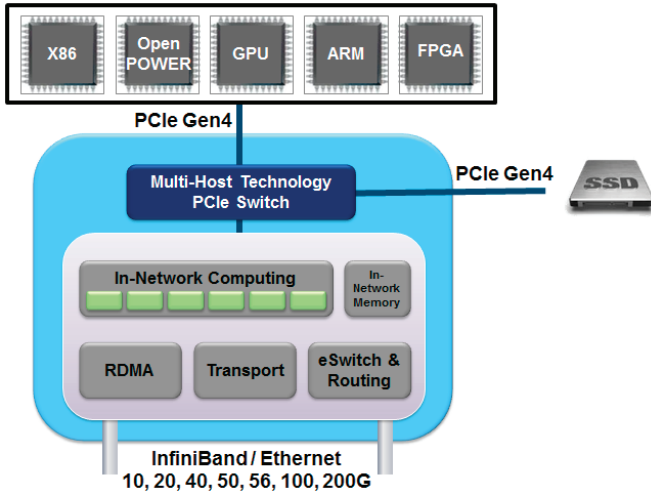

Figure 3. ConnectX-6 Architecture

Storage customers will benefit from ConnectX-6's embedded 16-lane PCIe switch, which allows them to create standalone appliances in which the adapter is directly connected to the SSDs. By leveraging ConnectX-6 PCIe Gen3/Gen4 capability, customers can build large, efficient high speed storage appliances with NVMe devices.

In-Network Computing and Security Offloads

ConnectX-6 and Mellanox Quantum support the new generation of the data center architecture – the data-centric architecture, in which the network becomes a distributed processor. By adding additional accelerators, ConnectX-6 and Mellanox Quantum enable In-Network Computing and In-Network Memory capabilities, offloading even further computation to the network, which saves CPU cycles and increases the efficiency of the network.
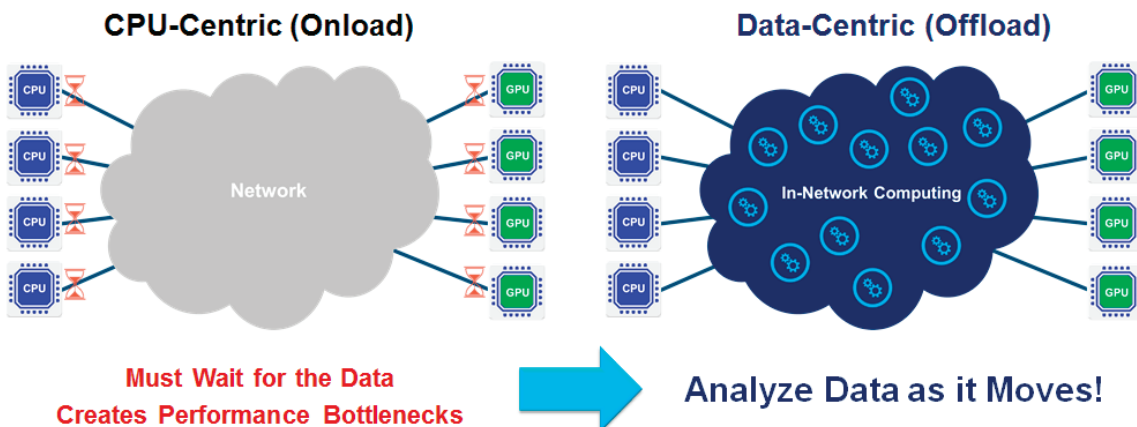

Figure 4. The New Data-Centric Paradigm Enables In-Network Computing

ConnectX-6 also offers a crucial innovation to data center security by providing block-level encryption. Data in transit undergoes encryption and decryption by the ConnectX-6 hardware as it is stored or retrieved, saving latency and offloading CPU. Moreover, ConnectX-6 block-level encryption offload enables protection between users sharing the same resources, as different encryption keys can be used. ConnectX-6 supports compliance with the Federal Information Processing Standards (FIPS), alleviating the systemic need for self-encrypted disks, which enables the flexibility to use byte-addressable and NVDIMMs that otherwise would be used without encryption.

LinkX 200Gb/s InfiniBand and Ethernet Copper and Active Optical Cables

The final piece of the Mellanox 200Gbs solution is its line of LinkX cables. Mellanox offers direct-attach 200G copper cables reaching up to 3 meters and 2 x 100G splitter breakout cables to enable HDR100 links, as well as 200G active optical cables that reach up to 100 meters. All LinkX cables in the 200Gb/s line come in standard QSFP56 packages.

ENABLING THE NEXT GENERATION OF DATA CENTERS

As the requirement for intensive data analytics increases, there is a corresponding demand for higher bandwidth. Even 100Gb/s is insufficient for some of today's most demanding data centers and clusters. Moreover, the traditional CPU-centric approach to networking has proven to be too inefficient for such complex applications.

The Mellanox 200Gb/s solutions address these issues by providing the world's first 200Gb switches, adapters, and cables, and by enabling In-Network Computing to handle data throughout the network instead of exclusively in the CPU.

With its 200Gb/s solution, Mellanox continues to push the industry toward Exascale computing and remains a generation ahead of the competition.

About Mellanox

Mellanox Technologies (NASDAQ: MLNX) is a leading supplier of end-to-end Ethernet and InfiniBand intelligent interconnect solutions and services for servers, storage, and hyper-converged infrastructure. Mellanox intelligent interconnect solutions increase data center efficiency by providing the highest throughput and lowest latency, delivering data faster to applications and unlocking system performance. Mellanox offers a choice of high performance solutions: network and multi-core processors, network adapters, switches, cables, software and silicon, that accelerate application runtime and maximize business results for a wide range of markets including high performance computing, enterprise data centers, Web 2.0, cloud, storage, network security, telecom and financial services. More information is available at www.mellanox.com.

350 Oakmead Parkway, Suite 100, Sunnyvale, CA 94085
Tel: 408-970-3400 • Fax: 408-970-3403
www.mellanox.com