Most Efficient SDN based Data Center Solutions

Increased Performance, Higher Scalability and Extreme Resiliency

June, 2016
Leading Supplier of End-to-End Interconnect Solutions

Analyse

Enabling the Use of Data

Store

ICs

Adapter Cards

Switches/Gateways

Software and Services

Metro / WAN

Cables/Modules
Entering The Era of 25GbE, 50GbE And 100GbE

- **Software**
  - NEO
  - MLNX-OS
  - SW Management Kit

- **Switch**
  - 32 100GbE Ports, 64 25/50GbE Ports
  - (10 / 25 / 40 / 50 / 56 / 100GbE)
  - Throughput of 6.4Tb/s

- **Adapter**
  - 100GbE Adapter
  - (10 / 25 / 40 / 50 / 56 / 100GbE)
  - Multi Host Solution

- **Interconnect**
  - Copper (Passive, Active)
  - Optical Cables (VCSEL)
  - Silicon Photonics
The Market Is in Transition to Open Fabrics

Closed

L2 Core Switch

Open

L3 Fabric

2012
Mellanox Software Defined Networking and Solutions

- OpenFlow Controller
  - OVS/Virtual Switch Acceleration
  - Mellanox Ethernet switch
  - OpenFlow support

- Overlay SDN Controller
  - VXLAN/NVGRE/Geneve Offload
  - OVS/Virtual Switch Acceleration
  - Mellanox Ethernet switch VTEP
  - Gateway support

- Cisco Application Policy Infrastructure Controller
  - VMware
  - Microsoft
  - Red Hat

- Hypervisor

Most consider Cisco ACI as a closed hardware defined networking solution.
Spectrum: The Ultimate 25/100GbE Switch

- Highest Packet Forwarding Rate
- Better buffers: 10-15X better microburst performance
- Predictable behaviour
- Better latency: 50% lower
- Lower power consumption
Spectrum: The Ultimate 25/100GbE Switch

- The only predictable 25/50/100Gb/s Ethernet switch
- Full wire speed, non-blocking switch
  - Doesn’t drop packets per RFC2544
- ZPL: ZeroPacketLoss for all packets sizes

zeropacketloss.com
Packet loss creates huge problems at 25, 50, & 100 Gb/s

32 Ports @ 100Gb/s requires 4.76 BPPS packet rate
  - Anything less will lose data when small packet microbursts occur
Poor Buffer Management Also Causes Packet Loss

- Inefficient buffer allocation
- Only 25% of buffers available for microbursts
- Packet Loss!
  - Microbursts result in buffer overruns

- Efficient buffer allocation
- 100% of buffer available for microbursts
- No Packet Loss
  - Sufficient buffers to accommodate microbursts
Efficient Buffers Makes Microburst Packet Loss a Thing of the Past!

Spectrum provides 9X to 15X better effective microburst capacity.
## Spectrum 25/50/100GbE Switch Portfolio

### SN2700 - Aggregation or TOR Switch
- 32 * 40G/56/100G (QSFP28)
- 64 * 10/25/50G (thru breakout cables)
- 300nsec latency
- x86 CPU
- Low power consumption

### SN2410 – 25GbE Leaf or TOR Switch
- 48 * 10/25G (SFP28) + 8 * 40G/56/100G (QSFP28)
- Variety of blocking ratios
- 300nsec latency
- x86 CPU
- Low power consumption

### SN2100 – Side by Side Small Scale TOR
- 16 * 40G/56/100G (QSFP28)
- Up to 64 * 25 or 32 * 50G (thru breakout cables)
- 300nsec latency
- x86 CPU
- Low power consumption

### Software Flexibility
- ONIE, OCP
- White box
- SDK, SAI
- MLNX-OS®
Mellanox Adapters Roadmap

- **ConnectX-3**
  - 56Gb/s VPI (IB/Eth)
  - PCIe Gen3 x8

- **ConnectX-3Pro**
  - 56Gb/s VPI (IB/Eth)
  - PCIe Gen3 x8

- **Connect-IB**
  - 56Gb/s InfiniBand
  - PCIe Gen3 x16

- **ConnectX-4**
  - 100Gb/s VPI (IB/Eth)
  - PCIe Gen3 x16

- **ConnectX-4 Lx**
  - 25/50 Gb/s VPI (IB/Eth)
  - PCIe Gen3 x8

**Timeline:**
- 2011
- 2012
- 2013
- 2014
- 2015
Overlay tunnels add network processing
- Limits bandwidth
- Consumes CPU

System efficiency drops 10s of percents

For penalty free overlays, at bare-metal speed use NIC with overlay Network HW offloads
- ConnectX-3 Pro
- ConnectX-4 family

Mellanox adapters also support HW VXLAN/NVGRE encap/decap

Turbocharge Overlay Networks

Mellanox/Plumgrid VXLAN white paper

© 2016 Mellanox Technologies
Higher Performance enables higher Efficiency

Source: Cloud Performance Systems (CPS) demo at Ignite’15
CloudX Enterprise
Hyper Converged Platform
VMware® vCloud suite 6.0
with NSX and VSAN All-Flash

7% CPU with offload vs. 12% CPU without offload

21 Gb/s with offload vs. 12 Gb/s without offload

Proven Higher Efficiency EVO SDDC based System
Accelerated Switching And Packet Processing (ASAP²)

- Virtual switches are used as the forwarding plane in the hypervisor
- Virtual switches implement extensive support for SDN (e.g. enforce policies) and are widely used by the industry
- SR-IOV technology allows direct connectivity to the NIC, as such, it bypasses the virtual switch and the policies it can enforce

**Goal**

- Enable SR-IOV data plane with OVS control plane
  - In other words, enable support for most SDN controllers with SR-IOV data plane
- Offload OVS flow handling (classification, forwarding etc.) to Mellanox eSwitch