

## Mellanox Ethernet Overview

### WORLD-CLASS ETHERNET PERFORMANCE

- Maximize workloads with highest industry bandwidth
- I/O virtualization maximizes performance in VMs
- Address latency sensitivity with Intelligent offloads

### SUPERIOR PRODUCTIVITY

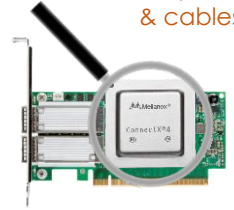
- Optimized for efficient packet processing
- RoCE offloads CPU with sub 1usec latencies
- Scale virtual and physical resources on demand for greater data center agility

## Advanced Ethernet Capabilities

### MELLANOX: OUR DIFFERENCE IS NETWORK ACCELERATION

- Founded as a state-of-the-art silicon chip (ASIC) manufacturer
- Intelligence hardware offloads to reduce CPU utilization;
  - RDMA, RoCE, iSER, NVMeoF, Erasure Coding, T10-DIF
- Scale & automate with stateless overlay networks;
  - VXLAN, NVGRE, GENEVE
- Hardware and packet processing accelerators;
  - LRO, LSO, SR-IOV, NetQueue, Virtual-IQ, DPK

Mellanox designs & builds intelligent ASICs that power switches, adapters, & cables



## Key Differentiators



### PERFORMANCE

- Direct data transfer to memory without CPU intervention
- Hardware-based offload and flow steering engines free CPU cycles (RoCE <1%)
- Proven to accelerate: Storage environments, Windows Storage Spaces, Red Hat Ceph and VMware VSAN



### VIRTUALIZATION

- Accelerate virtualized networks with VXLAN, GENEVE & NVGRE
- Extend hardware resources to 64 PF, 512 VF w/ SR-IOV & ROCE
- Stateless offloads enable near-native performance for VMs
- Align network services with compute services for multitenant network support



### STORAGE

- Achieve full potential of flash with 10/25/40/50 & 100G support
- Future-proof with 10/40 & easily upgrade to 25/50 & 100 G Ethernet
- Leverage within scale-out storage to simplify networking
- Alleviate storage network bottlenecks with RDMA, RoCE and NVMe over Fabric support



### VALUE & FUTURE PROOF

- Ethernet connectivity leader: 10/25/40/50 & 100Gb/s
- Optimized for NVMe storage systems
- Offload IPsec encryption
- Deliver 2.5X the performance of 10G
- Future Proof 10G w/ 25/40/50 and 100G capabilities

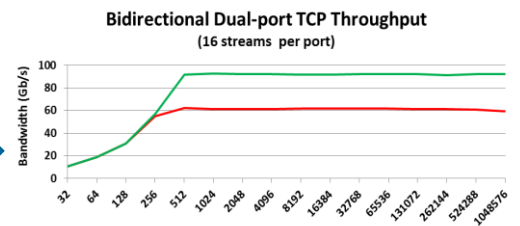
## Mellanox Advantages for Dell Solutions

- Mellanox offers multiple adapters format to meet each of Dell's server requirements: PCIe (full and half) and ML2 form-factor adapters
- Mellanox adapters are recommended for deployment in Windows 2016, VMware, SAP Hana, Cloud, OpenStack, Big Data and Hyperconvergence environments
- Mellanox has the most certifications across all Storage environments : Microsoft Storage Space, Ceph, GPFS, Scalify, RozoFS and many others
- Mellanox RDMA low-latency advantages over the competition help eliminate storage bottlenecks and increase efficiencies in Big Data, Hadoop, SMB Direct, VDI and other deployments
- Mellanox deploys full hardware offload to reduce CPU overhead and achieve maximum performance and efficiencies, unlike competitive offerings that utilize imbedded processors and only provide a small performance boost
- Support for advanced networking technologies to remove inefficiencies and increase performance including RDMA, stateless offloads, and tunneling protocol headers

## Dell 10/25G Adapter Performance Comparison: Mellanox vs QLogic

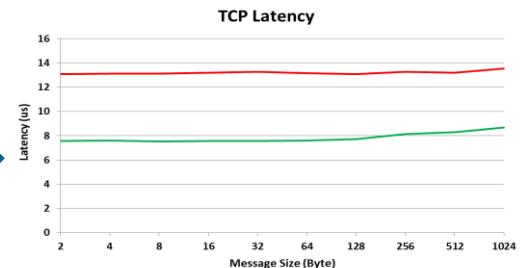
### Mellanox Advantage

50% Higher Throughput



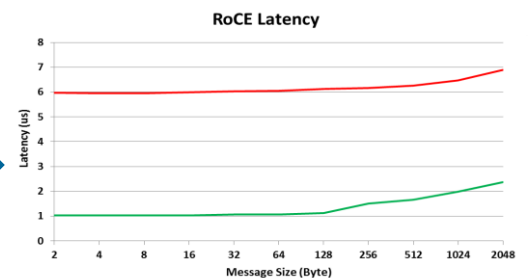
### Mellanox Advantage

42% Lower Latency



### Mellanox Advantage

83% Lower RoCE Latency



— ConnectX-4 Lx 25GbE — Qlogic 25GbE

## Portfolio Comparison

Adapter	Speeds	Ports	Connector	Bus	Features	Drivers
ConnectX-5	1/10/25/40/50/100 GbE	Single and dual	QSFP28	PCIe 4 x16 PCIe 3 x8	Out-of-order RDMA, RoCE over Overlay Networks, PeerDirect RDMA, SR-IOV, ASAP <sup>2</sup> , Overlay Networks, Stateless Offloads, NVMeof, MPI Tag Matching, Dynamically Connected Transport	Linux, Windows, VMWare, FreeBSD
ConnectX-4	1/10/25/40/50/100 GbE	Single and dual	QSFP28	PCIe 3.0 x8 or x16	RoCE(over layer2 and layer3), GPUDirect, SR-IOV, ASAP <sup>2</sup> , Overlay Networks, Stateless Offloads, Dynamically Connected Transport	
ConnectX-4LX	1/10 and 25GbE	Single and dual	SFP28 or QSFP28	PCIe 3.0 x8	RoCE(over layer2 and layer3), GPUDirect, SR-IOV, ASAP <sup>2</sup> , Overlay Networks, Stateless Offloads, Dynamically Connected Transport	

## Competitive Comparison

	Mellanox	Avago <sup>(Emulex)</sup>	Broadcom	Chelsio	Intel	SolarFlare	QLogic
Speeds	1/10/25/40/50/100 GbE	10/40 GE	10/25/40/50 GE	10/40 GE	10/40 GE	10/40 GE	25/100 GE
Latency	0.7µs (RoCE)	5µs (RoCE)	1.5µs (claim)	2.5µs (iWARP)	12µs (TCP)	sub-3 µs	13µs (TCP)
Message Rate	100 Mpps (DPDK) 42Mpps (RoCE)	Not available	(claim) 30Mpps	5Mpps (iWARP)	Not available	(claim) 3Mpps	Not available
Tunneling /Overlay Networks	MPLS, VXLAN, QinQ, IPinIP, NVGRE, GENEVE	VXLAN, NVGRE	VXLAN, NVGRE, GENEVE	VXLAN	VXLAN, NVGRE, GENEVE	✗	VXLAN, NVGRE
RDMA	RoCE	RoCE	✗	iWARP	✗	✗	RoCE and iWARP by CPU
iSER	✓	✗	✗	✗	✗	✗	✓
Stateless Offload	✓	✓	✓	(TOE) w/ Limitations ✓	✓	✓	✓

## Part #/Compatibility

Product	Description	Mellanox PN	Dell PN	Server Compatibility
ConnectX-4 LX	Dual Port 10/25GbE DA/SFP PCIe (LP)	MCX4121A-ACAT	406-BBLC	R440, R540, R640, R740, R740XD, R840, R940XA, R6415, R7415, R7425, C4140, C6420, FC640
	Dual Port 10/25GbE DA/SFP PCIe (FH)	MCX4121A-ACAT	406-BBLF	R440, R540, R640, R740, R740XD, R840, R940, R940XA, R7415, R7425, T640
	Dual Port 10/25GbE DA/SFP rNDC	MCX4121A-ACAT	406-BBLH	R640, R740, R740XD, R840, R940, R940XA, R7425
ConnectX-4	Dual Port 100 GbE QSFP PCIe (LP)	MCX416A-CCAT	540-BBVR	R440, R540, R640, R740, R740XD, R840, R940XA, R6415, R7415, R7425, C4140, C6420
	Dual Port 100 GbE QSFP PCIe (FH)	MCX416A-CCAT	540-BBUU	R440, R540, R640, R740, R740XD, R840, R940, R940XA, T640
ConnectX-5	Dual Port 100GbE QSFP28 PCIe (FH)	MCX516A-CDAT	540-BCIV	R440, R540, R640, R740, R740XD, R840, R940, R940XA, R7415, R7425 T640
	Dual Port 100GbE QSFP28 PCIe (LP)	MCX516A-CDAT	540-BCIW	R440, R540, R640, R740, R740XD, R840, R940, R940XA, R6415, R7415, R7425, R6415

(LP) = Low Profile; (FH) = Full Height

**Denise Cowart**  
Sr Sales Manager  
Email: [denisec@mellanox.com](mailto:denisec@mellanox.com)  
Tel: (512) 853-0937

**Chris Ruffing**  
Sr. Sales Manager  
Email: [chris@mellanox.com](mailto:chris@mellanox.com)  
Tel: (512) 649-6797

**Will Stepanov**  
Sr. Sales Manager  
Email: [wil@mellanox.com](mailto:wil@mellanox.com)  
Tel: (512) 966-4993

**Jeremy Willet**  
Dell Mellanox Consultant  
Email: [jeremy.willet@dell.com](mailto:jeremy.willet@dell.com)  
Tel : (512) 723-5294

General inquires visit: <http://www.mellanox.com/oem/dell/> or email: [dellsales@mellanox.com](mailto:dellsales@mellanox.com)