Mellanox Increases Efficiency on vSAN Ready Nodes Running on Dell PowerEdge Servers

VMware's Virtual SAN (vSAN) brings performance, low cost and scalability to virtual cloud deployments running on Dell hardware. An issue the cloud deployment model raises is the problem of adequate storage performance to virtual instances. Spinning disks and limited bandwidth networks lower IO rates over local drives. VMware's solution to this is vSAN, which adds a temporary local storage "instance" in the form of a solid-state drive to each server. vSAN extends the concept of local instance storage to a shareable storage unit in each Dell server, where additionally, the data can be accessed by other servers over a LAN. The benefits of vSAN include:

Increased Performance
Due to local server access to flash

Lower Infrastructure Cost
By removing networked storage appliances

Unified Management
No server/storage silo separation

VSAN

Eliminate Boot Storms
Since data is stored locally

Highly Scalable
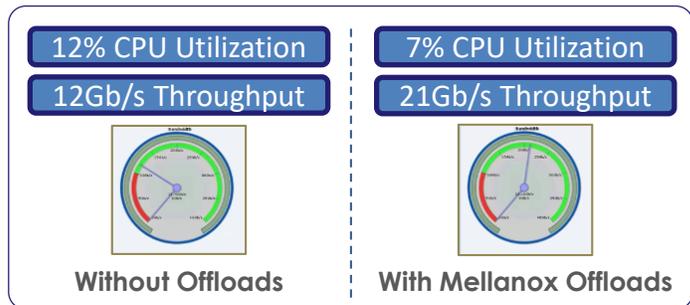Simply add more servers/storage

25GbE Advantage

Mellanox 10/25G Ethernet adapters enable unmatched competitive advantages in VMware environments by increasing efficiency of overall server utilization and eliminating I/O bottlenecks to enable more virtual machines per server, faster migrations and speed access to storage. Explore this solution brief to learn more about how Mellanox key technologies can help improve efficiencies in vSAN environment.

vSAN Systems CapEx Analysis:	10GbE	25GbE
# Port for Applications @ ASP ($)	2 @ $400	1 @ $500
# Ports for Storage @ ASP ($)	2 @ $400	1 @ $500
16 Nodes Cluster Price ($)	$25,600	$16,000
32 Nodes Cluster Price ($)	$51,200	$32,000
64 Nodes Cluster Price ($)	$102,400	$64,000

✓ **Fewer networking components reduces cost of ownership**

✓ **Increase bandwidth for better scalability and faster storage access**

Higher Efficiency

New workloads and technologies are increasing the load on CPU utilization. Overlay protocols, OVS processing, and faster storage are all placing a strain on VMware environments. These workloads require intensive processing which can waste CPU cycles, and choke applications. Mellanox adapters can alleviate CPU loads by implementing intelligent networking that can ease CPU strain, increase network bandwidth and enable scale and efficiency in virtual environments.

12% CPU Utilization	7% CPU Utilization
12Gb/s Throughput	21Gb/s Throughput

Without Offloads | **With Mellanox Offloads**

✓ **40% reduction in CPU resources**

✓ **75% improvement in bandwidth**

Accelerate your vSAN Infrastructure to the Fast Lane!

RoCE Certified

vSphere 6.5 introduced Remote Direct Memory Access over Converged Ethernet (RoCE), which offloads the transfer of data to a Mellanox adapters, freeing the CPU from the data transfer process and reducing latencies. For virtual machines, the same Mellanox adapter can be used for PVRDMA (para-virtualized RDMA) to communicate with other virtual machines. Mellanox adapters are certified in vSphere where inbox drivers are available to dramatically accelerates communication. Once RoCE is setup on vSphere close-to-local, predictable latency can be gained from networked storage along with line-rate throughput and linear scalability to accommodate dynamic and agile data movement between nodes.

Throughput Numbers for RDMA & TCP/IP
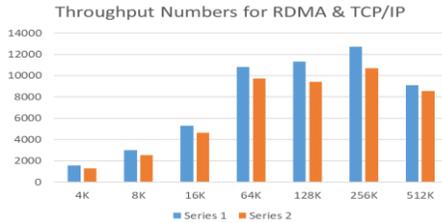
70% Read and 30% Write Throughput		
# of Threads	RDMA	TCP/IP
6	1545.42	1278.19
6	2995.17	2533.35
6	5287.53	4614.59
6	11331.56	9706.61
6	12716.34	10715.93
1	9099.93	8558.96

iSER Efficiency

Storage virtualization requires an agile and responsive network. iSER accelerates workloads by using iSCSI extensions for RDMA. Using Mellanox iSER extension lowers latencies and CPU utilization to help keep pace with I/O requirements and provides:

✓ 70% improvement in throughput

✓ 70% reduction in latencies
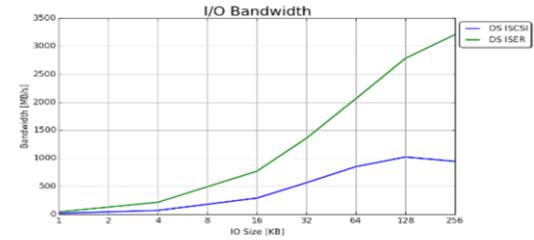
Deployment Configuration

Sample vSAN Configuration

Dell EMC vSAN Ready Nodes are pre-configured and validated building blocks that reduce deployment risks, improve storage efficiency, and let you quickly and easily scale storage as needed. Mellanox ConnectX adapters are certified to run over vSphere and in Dell PowerEdge nodes. In the configuration to the left, two Dell S-series switches provide redundant paths to the three Dell PowerEdge R740 servers and to the storage controllers. Two Mellanox ConnectX-4 Lx 10/25G Ethernet adapters in each of the servers provide connectivity and redundancy along with RoCE and iSER to improve efficiency.

Since not all workloads have the same requirements, Dell provides a variety of server and storage options for different workload necessities based on performance and capacity requirements. Speak to your Dell representative to learn more about which configuration is best for your environment.

Mellanox Adapters

Mellanox Connect-X Adapters:

Mellanox provides a variety of adapter formfactors and speeds:

Description	Speed	Mellanox PN	Dell PN
ConnectX-4 Lx rNDC	10/25G	MCX4121A-ACAT	406-BBLH
ConnectX-4 Lx dual port (FH)	10/25G	MCX4121A-ACAT	406-BBLF
ConnectX-4 Lx dual port (LP)	10/25G	MCX4121A-ACAT	406-BBLC
ConnectX-4 dual port (FH)	100G	MCX416A-CCAT	540-BBUU
ConnectX-4 dual port (LP)	100G	MCX416A-CCAT	540-BBVR
ConnectX-5 EX dual port (FH)	100G	MCX516A-CDAT	540-BCIV
ConnectX-5 EX dual port (LP)	100G	MCX516A-CDAT	540-BCIW

Dell OpenManage

Dell OpenManage

Dell OpenManage integrates with VMware vCenter and is designed to streamline the management processes in your data center environment by allowing you to use VMware vCenter to manage your entire server infrastructure - both physical and virtual.

- Discovery,, deployment, configuration and monitoring

- Enriched health monitoring of Dell EMC servers and storage

Accelerate vSAN Performance and Lower Costs with 25GbE Network Adapters from Mellanox