Demartek Evaluation of Multi-protocol Storage Latency in a Multi-Switch Environment

Webinar

August 9, 2012

Storage Protocols

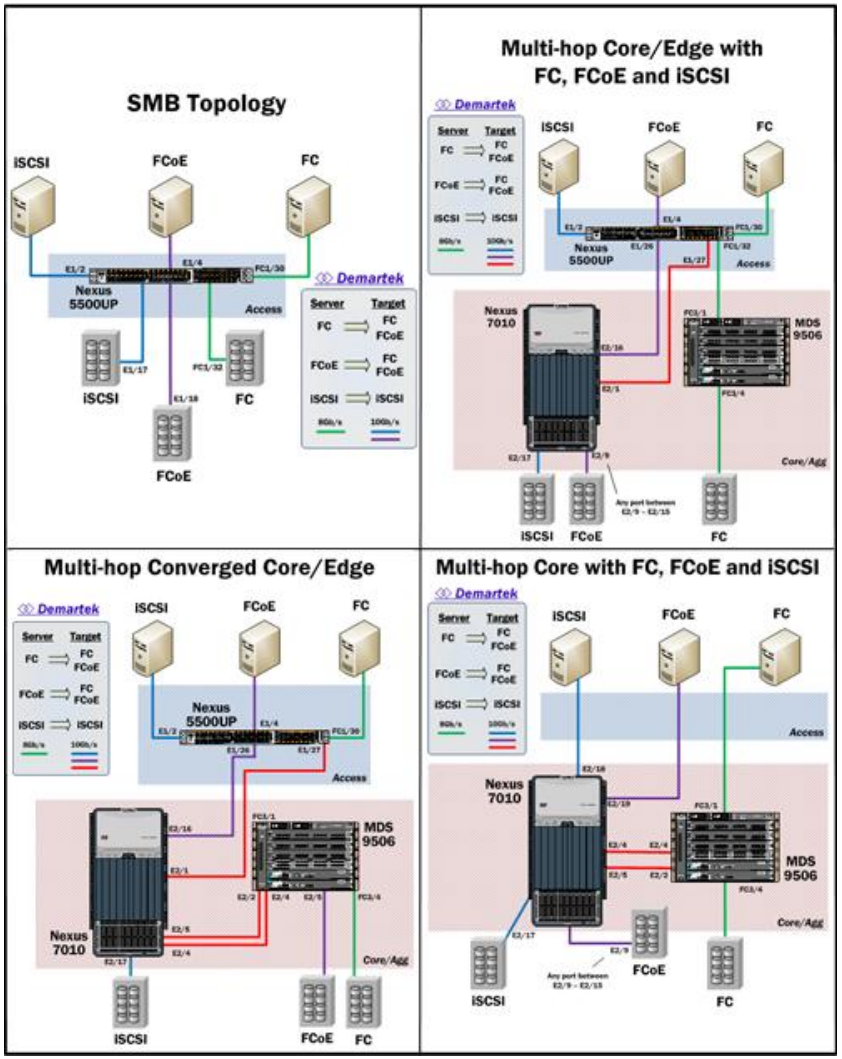
- Storage Area Network (SAN) carries SCSI "block" protocol over a network
  - Fibre Channel
  - iSCSI (Ethernet)
  - FCoE (Fibre Channel over Ethernet with DCB)
- Server applications generally can't tell the difference between the type of "plumbing" used for a SAN
  - Application performance can be affected by latency, line rate and protocol overhead

Switches and Protocols

- Traditional Ethernet
  - iSCSI
- Ethernet with Data Center Bridging (DCB)
  - Fibre Channel
  - FCoE
  - iSCSI
- Native Fibre Channel
  - Fibre Channel

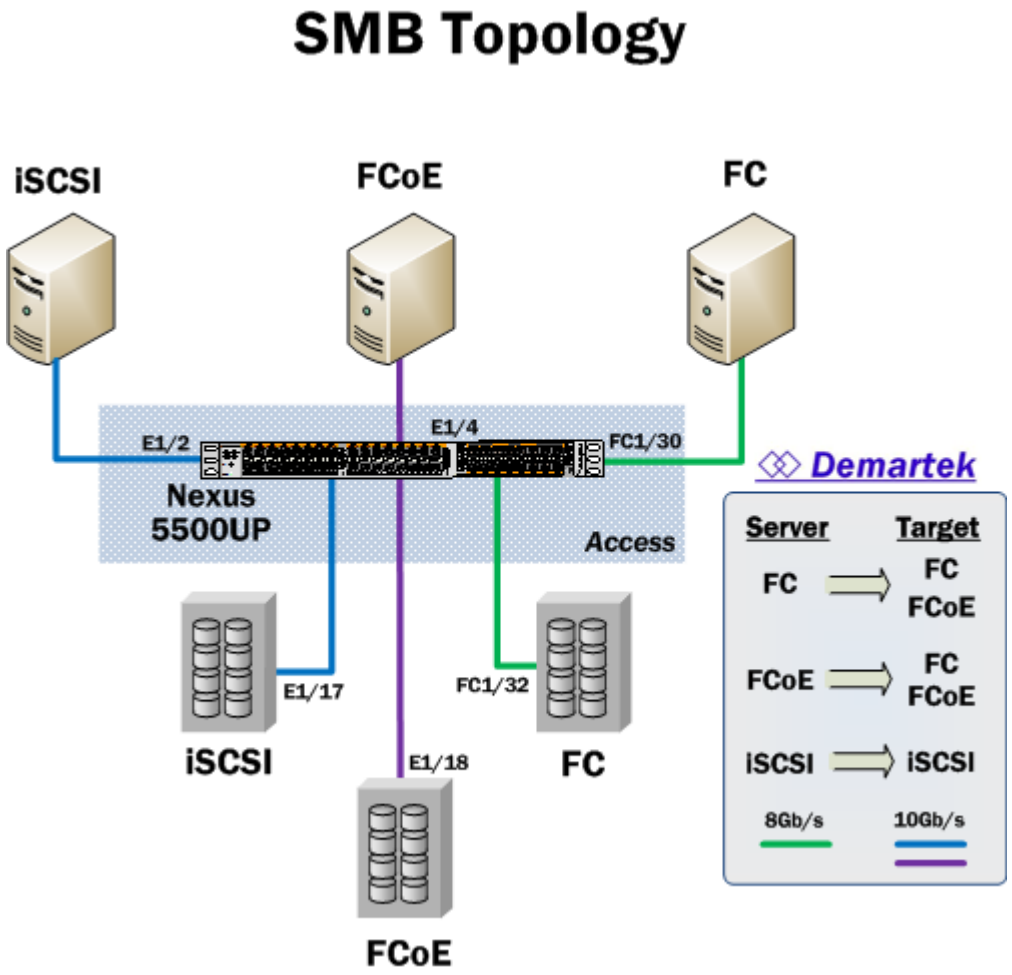
Topologies

1. SMB
2. Multi-hop Core/Edge with FC, FCoE & iSCSI
3. Multi-hop Converged Core/Edge
4. Multi-hop Core with FC, FCoE & iSCSI



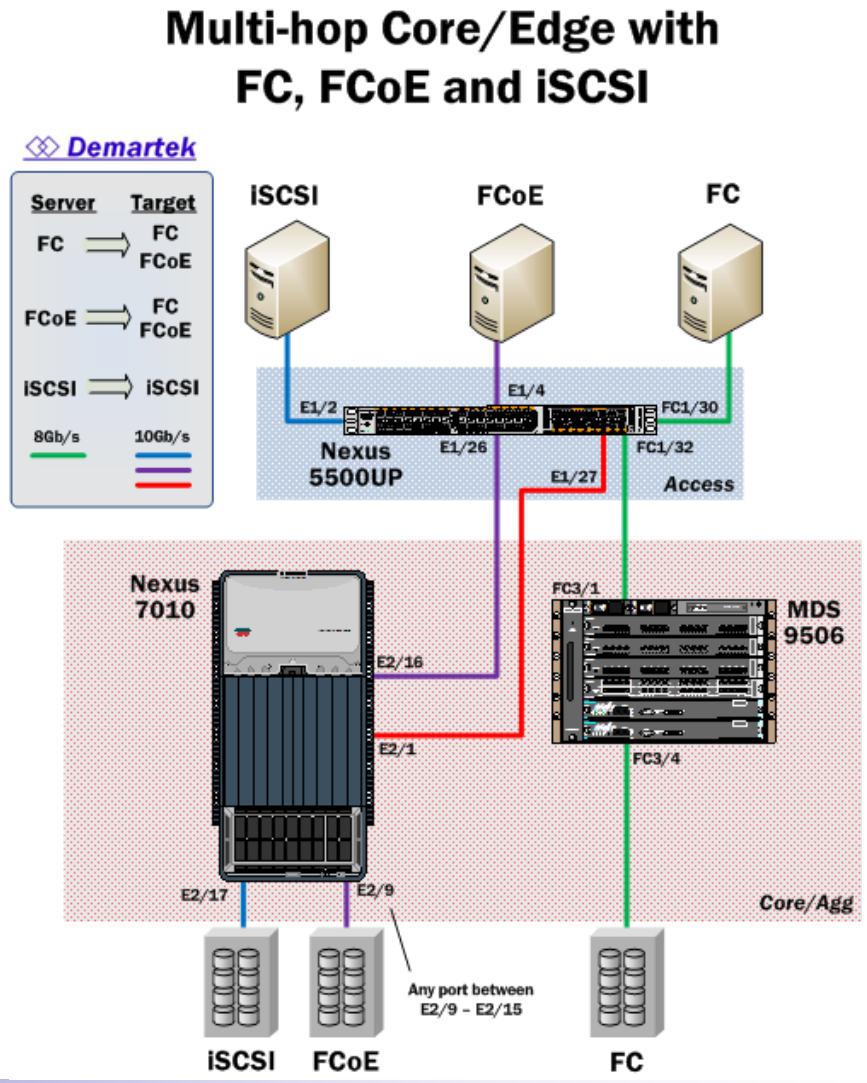
SMB Topology

- Single switch
- FC, FCoE & iSCSI



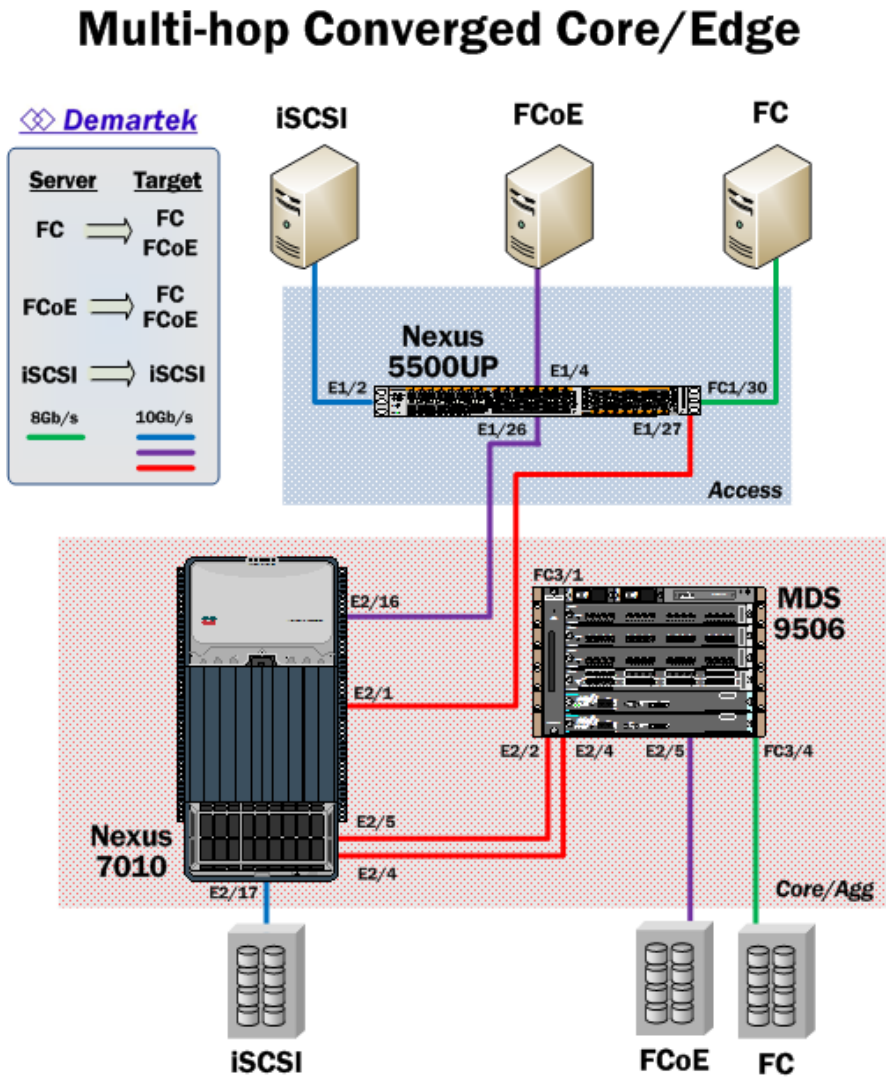
Multi-hop Core/Edge

- Multiple switches
- Servers connected at the edge
- Storage connected in the core
- FC, FCoE & iSCSI



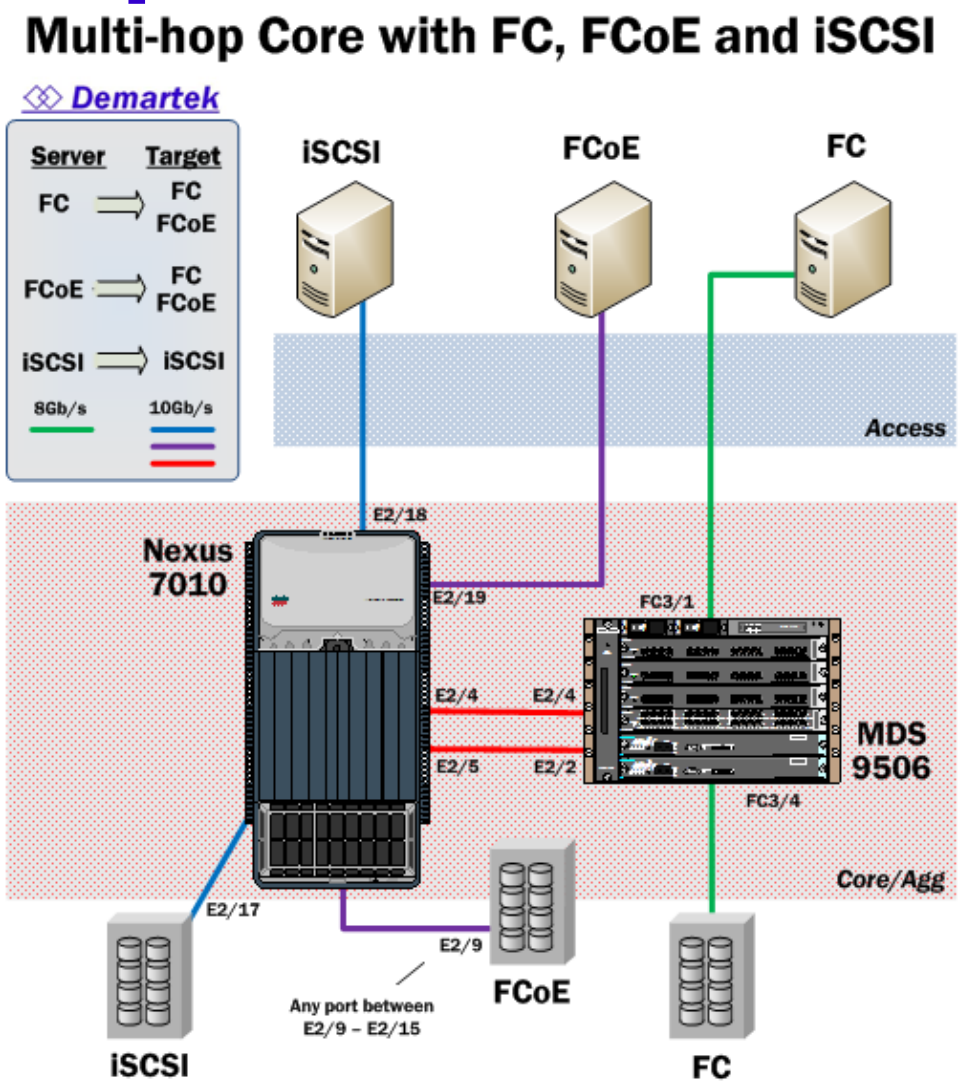
Multi-hop Converged

- Multiple switches
- Servers connected at the edge
- Storage connected in the core
- Converged traffic between servers and core
- FC, FCoE & iSCSI



Multi-hop Core

- Multiple switches
- Servers and storage connected in the core
- FC, FCoE & iSCSI



Performance Tests

- SQLIO workloads

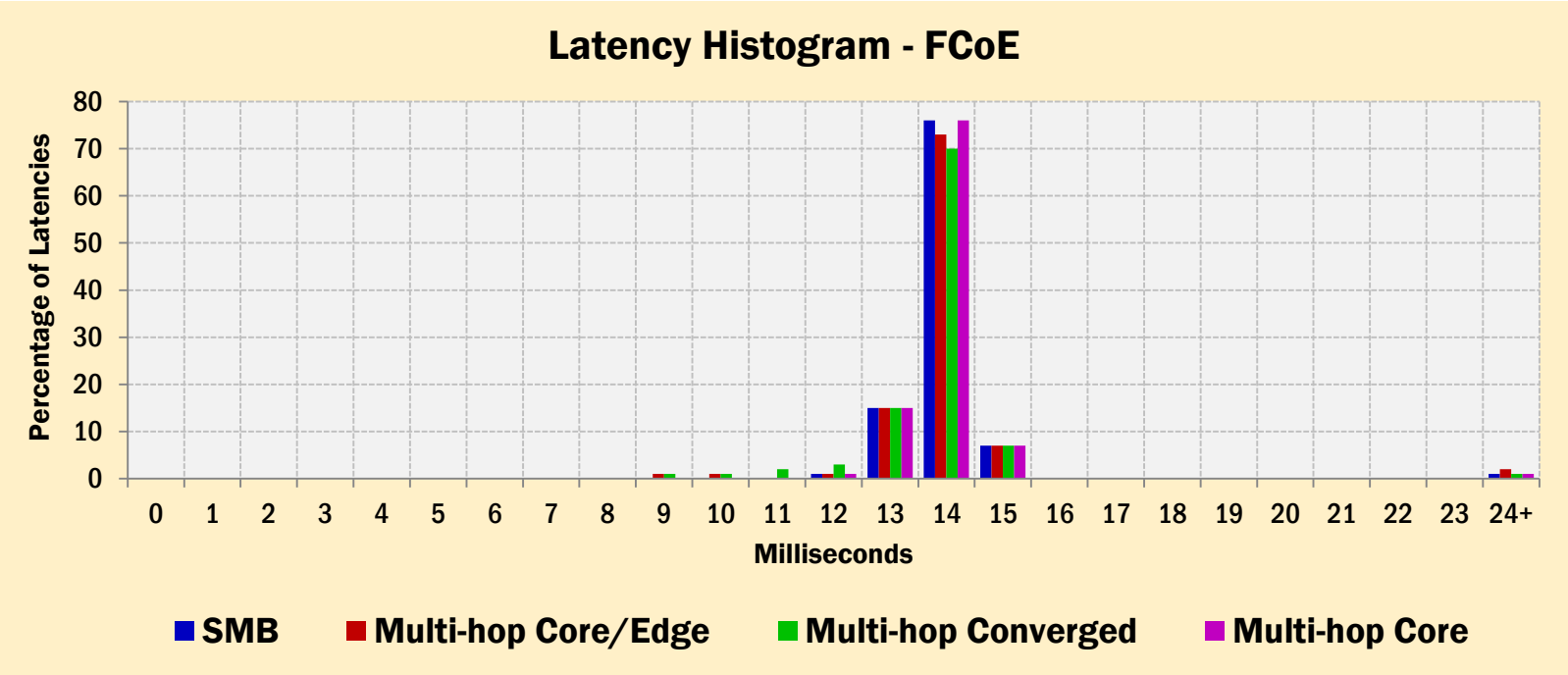
```
sqlio.exe -kR -s3600 -fsequential -o1 -b1024 -LS -Fparam.txt
sqlio v1.5.SG
using system counter for latency timings, 1562587 counts per second
parameter file used: param.txt
        file M:\sqlio_test_001.dat with 16 threads (0-15) using mask 0x0 (0)
16 threads reading for 3600 secs from file M:\sqlio_test_001.dat
        using 1024KB sequential IOs
        enabling multiple I/Os per thread with 1 outstanding
using specified size: 2048 MB for file: M:\sqlio_test_001.dat
```

Results - FCoE

- 10 Gbps FCoE had the lowest average latency of all of the topologies

Topology	IOPS	MBPS	Minimum Latency (ms)	Average Latency (ms)	Maximum Latency (ms)
SMB	1108.75	1108.75	4	13	45
Multi-hop Core/Edge	1104.72	1104.72	4	13	9952
Multi-hop Converged	1105.50	1105.50	4	13	59990
Multi-hop Core	1108.81	1108.81	4	13	45

Results - FCoE



- 95% of latencies within a 3 ms range for FCoE

Results – Fibre Channel

- 8 Gbps Fibre Channel had the lowest minimum latency in all the topologies

Topology	IOPS	MBPS	Minimum Latency (ms)	Average Latency (ms)	Maximum Latency (ms)
SMB	689.82	689.82	1	22	85
Multi-hop Core/Edge	689.02	689.02	1	22	78
Multi-hop Converged	702.91	702.91	1	22	205
Multi-hop Core	689.02	689.02	1	22	78

Results - iSCSI

- 10 Gbps iSCSI had the highest minimum and average latencies in all the topologies

Topology	IOPS	MBPS	Minimum Latency (ms)	Average Latency (ms)	Maximum Latency (ms)
SMB	593.69	593.69	6	26	47
Multi-hop Core/Edge	592.94	592.94	6	26	41
Multi-hop Converged	592.62	592.62	6	26	82
Multi-hop Core	592.99	592.99	6	26	39

Conclusions

- The four network topologies had little effect on overall latencies between the servers and storage systems
- The four network topologies were consistent in their latency for each traffic type
- We demonstrated flexibility for multi-protocol storage traffic
  - Using native protocol gear
  - Using converged gear

References

- The full report is available on the Demartek website
  - Search for “Demartek Cisco Topology Evaluation”
  - www.demartek.com/Demartek_Cisco_Multi-protocol_Multi-topology_Latency_Evaluation_2011-07.html
- Free monthly newsletter ***Demartek Lab Notes***
  - www.demartek.com/Newsletter/Newsletter_main.html
- Cisco Blogs
  - http://blogs.cisco.com/datacenter/fcoe-versus-iscsi-the-mystery-is-solved/

Demartek Interface Comparison

- Free reference page on demartek.com
  - http://www.demartek.com/Demartek_Interface_Comparison.html
  - www.demartek.com/SNIC
  - Search for "storage interface comparison" in your favorite search engine
- Popular page
- Provides comparison of storage interfaces
  - FC, FCoE, IB, iSCSI, PCIe, SAS, SATA, USB
  - Transfer rates, encoding schemes, history, roadmaps, cabling, connectors
- Links to Deployment Guides

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