

## Ethernet SAN or iSCSI SAN

Companies of all sizes have turned to shared block-level storage to help manage data growth and complexity, especially in server virtualization environments. iSCSI storage area networks (SANs) are popular with many companies because it is less expensive than Fibre Channel and because it runs on the same IP network the IT department is familiar with. This technology brief compares iSCSI SAN infrastructure to another Ethernet based storage technology that runs on Layer 2 Ethernet called - Ethernet SAN.

### Networking

iSCSI SAN and Ethernet SAN both run on Ethernet, but here is where the similarities end. iSCSI essentially encapsulates SCSI storage commands in a TCP/IP wrapper and sends those commands from a server to the storage across Ethernet as shown in figure 1. Because TCP/IP was designed to route Internet traffic across multiple router hops, it adds extra overhead not necessary for transporting data from servers to storage.

iSCSI is not a network, but a group of managed point-to-point connections. iSCSI does not support multi-path natively, but requires third party multi-path drivers (MPIO driver). These special drivers increase the complexity of installing and managing iSCSI SANs. Because most multi-path drivers are active-passive, when using multi-path over iSCSI it is normally used for redundancy and does not automatically load balance for performance.

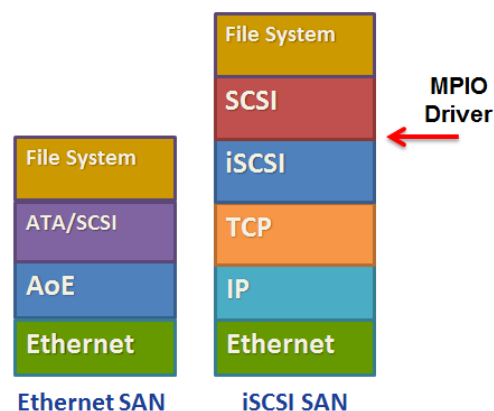
Ethernet SAN is a connectionless protocol that connects servers and storage directly across layer 2 Ethernet. It does not require TCP/IP or user configured multi-path IO (MPIO) software. The use of layer 2 Ethernet represents a simpler approach for SAN. With Ethernet SAN packets are automatically sent over every available network path between the server and storage (without MPIO configuration). Ethernet SAN is robust, every packet is checked for bit errors and all packets are acknowledged. Ethernet SANs low latency allows dropped packets to be retransmitted immediately insuring high throughput and reliability.

This is an extremely fast and simple method for sharing disk drives through a low latency network. Since Ethernet SAN doesn't need TCP/IP, it has less overhead, lower latency and automatically utilizes all network paths. Coraid's EtherDrive storage products take full advantage of Ethernet SANs simplicity to deliver storage that will outperform iSCSI.

### Management

Because of the added complexity of TCP/IP installation and configuration of iSCSI storage arrays is a time consuming process that is also difficult to trouble shoot. Based on the number of steps in Table 1, iSCSI can take hours to set up, compared to the five steps and few minutes for an Ethernet SAN.

Ethernet SAN storage integrates with a server's operating system (OS) using a simple driver that enables the OS to mount Ethernet SAN storage arrays as if they were direct-attached disk. Ethernet SANs can even be managed from within the hypervisor layer, providing simple control for the application manager. Ethernet SANs are so easy to configure, provision, and start using, that an array can be ready to use in less than two minutes from power on. Customers find the ease of implementation and management of Ethernet SAN storage "shockingly simple compared to iSCSI".



Storage Protocol Stacks

Figure 1

Table 1:

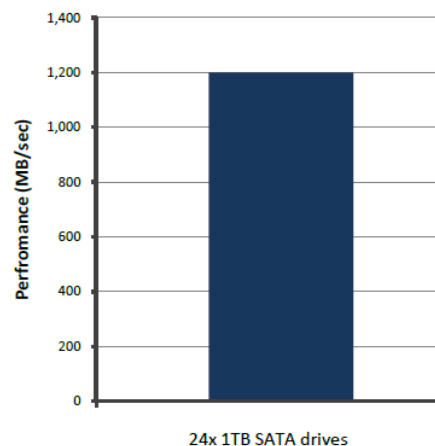
Steps	iSCSI SAN	Ethernet SAN
1	Plug in Physical HBA.	Plug in Physical HBA
2	Load HBA specific firmware.	Load HBA specific firmware
3	Place IP address, Gateway address, and subnet mask address on HBA.	Create LUN on storage array (one command)
4	Configure TCP offload if this HBA has ToE hardware.	On-line LUNs are automatically discovered
5	If Multi-path is required install and configure vendor specific multi path software for each operating system.	Not required
6	Create LUN on storage array	Completed in step 3 above
7	Mask initiator at the storage array	Optional
8	Perform an iSCSI login	Not required
9	If CHAP is enabled, authenticate.	Not required
10	If mutual CHAB is required, go back to the storage array, turn this feature on and retry. login.	Not required
11	Go to the HBA and perform a LUN discovery.	Completed in step 4 above
12	Mount disk	Mount disk
	12 steps = Hours	5 steps = Minutes

## Performance

Ethernet SAN technology was designed to leverage Layer 2 Ethernet without the need for TCP/IP, making it possible to achieve near line rate performance, using commodity 1Gb and 10Gb Ethernet, delivering throughput that is up to 200% faster than iSCSI.

ESG Labs tested the Coraid SRX3200 Ethernet SAN storage array with 24 drives and showed it can deliver up to 1200 Megabytes/sec throughput per shelf (figure 3). Put into perspective, a single shelf was able to drive enough bandwidth to saturate a 10Gbps interface.

Ethernet SAN can achieve near-line rate performance, 2x that of iSCSI, it is a better fit for applications that demand high performance. Ethernet SAN can achieve significantly higher performance by eliminating layers of overhead associated with TCP/IP making it ideal for the most demanding High Performance Computing and Server Virtualization environments.



As Figure 3 shows, streaming media performance was excellent, delivering more than 1,200 MB/sec from 24 SATA drives.

## Cost

In an August 2010 report: Coraid EtherDrive SAN, ESG Lab examined cost of acquisition for a petabyte of storage and network connectivity for both iSCSI and Ethernet SAN. Each storage technology was configured to support the same class and quantities of storage, and SAN connectivity was calculated to support 200 physical servers with redundant connections. Since iSCSI storage and Ethernet SAN storage both leverage commodity Ethernet, the cost for the network connectivity is the same. Table 2 below summarizes the configuration built for iSCSI and Ethernet SAN. The cost of storage and SAN connectivity hardware was obtained from a combination of publically available sources, including reseller websites, GSA pricing schedules, and online pricing available directly from vendors.

Table 2: CAPEX cost details based on 1 PB of Networked Storage

	Ethernet SAN	iSCSI SAN
Hardware	\$1,272,177	\$3,549,000
Connectivity	\$77,320	\$77,320
Total	\$1,349,437	\$3,536,320

According to the report, Ethernet SAN solutions where less than half of iSCSI. But even at price parity, Ethernet SAN makes a better option for companies looking to purchase shared storage because of its reduced storage management complexity and higher performance compared to iSCSI.

## Conclusion

Analyst firms report that storage costs consume 25% to 40% or more of IT budgets. Companies are under constant pressure to find ways to reduce storage costs. Investing in new technology that helps reduce capital and operational costs in the storage environment makes sense.

While the performance of Ethernet SAN is impressive, what is most impressive is the simplicity and lower cost of Ethernet SAN, making management of petabytes a reasonable task. If your organization is struggling to keep up with exponential data growth while at the same time controlling cost and providing ever higher levels of performance and availability, consider Ethernet SAN as the infrastructure for your next shared storage SAN deployment.