AoE SAN Storage

SUMMARY

- 15 hot swap SATA disks, AoE accessed as RAID volumes
- Coraid RAID controller provides JBOD or RAID 0,1,5,10 with automatic global spares
- Continuous RAIDShield™ testing fixes SATA disk "soft failures"
- Access speed > 200 MB/sec sustained throughput
- Dual Gigabit Ethernet connections
- Simple command line interface

- Hot swap disks, fans and redundant power supplies
- Syslog status messages
- MAC filtering restricts volume access to authorized servers
- RAID configuration stored on each disk allowing disk portability
- AoE drivers are included in Linux 2.6.11+ kernels and available for other operating systems including

Windows®, Linux, Mac OS® X, FreeBSD, and Solaris™.

- Coraid open RAID algorithm, your data is not captive to a proprietary RAID controller

EtherDrive® Storage Area Networking (SAN)

CORAID's EtherDrive® SAN is affordable network storage that delivers Fibre Channel speeds at Ethernet prices. EtherDrive® storage uses the open ATA-over-Ethernet (AoE) light weight network storage protocol. AoE is a simple way to move storage out of your servers and onto an Ethernet storage network. With AoE, disk read/write requests are placed directly into Ethernet frames. The AoE protocol doesn't use TCP/IP so it's easy to process and doesn't require special network interface cards.

EtherDrive® SAN is accessible and shared by any server/host machine attached to the storage network. Disks inside the storage appliance are assembled into RAID volumes and presented as AoE block storage devices. Servers discover and mount AoE storage devices by using an AoE software driver. The AoE driver presents an AoE device to the host OS as a local disk drive. AoE storage is fast and can be used like any other disk drive.

Unlimited Storage

Users save money by installing their own disk drives. The SR1521 storage appliance accepts RAID class SATA or SATA2 disks. As disk capacity increases, higher density disks can be installed quickly and easily.

There are no limits to how many EtherDrive® storage appliance can be attached to a server. There are no constraints to how big an AoE storage network can be expanded. Each time a new EtherDrive® storage appliance is added to the storage network, more processing power is added and therefore aggregate throughput and IOPS performance of the storage system is also increased.

Rack Mounted 3U - 15 Slot Shelf

Everything is included. All you need to add are SATA disks. Each EtherDrive® SR1521 combines up to 15 SATA disks into RAID volumes and then connects them to the AoE storage network. AoE storage appears as a local disk drive to its host.

Simple to Understand, Simple to Manage

The simplicity of EtherDrive® SAN makes it easy to manage, because it's easy to understand. An EtherDrive® storage appliance is a disk connected to your server via Ethernet. That disk may actually be a RAID volume, but it just looks like a big disk to the server. No need to learn complicated Fibre Channel technology. Just add SATA disks to the EtherDrive® storage appliance, and you have all the space you want on any server attached to the AoE storage network. It's that simple.

Low Cost Networked Storage

EtherDrive® SAN is less expensive than any other networked storage. The storage costs for traditional Storage Area Networks (SANs) are very high. Fibre Channel switches and Host Bus Adapter (HBA) interfaces are expensive, take up a lot of space, and require costly system administration. EtherDrive® SAN technology eliminates all that by being very simple and affordable.

Easy to Install, Easy to Expand

A simple command line interface allows you to create disk RAID volumes. JBOD and RAID levels 0, 1, 5, 10 can be used. You can also expand a RAID set by concatenating RAID sets. You can assign hot spare disks that will automatically backup a failed disk. Alarm and status messages are used to update the host's syslog.

Performance and Reliability You Want

With the SR1521, sustained storage access speed of over 200 MBytes/sec can be achieved. And since the AoE protocol is simple, the host processing load is minimized. Multiple GigE interfaces also provide redundancy for the network connection.

Advanced RAID Controller

The SR1521 uses CORAID's RAIDShield™ algorithm to continuously test each disk in a RAID volume. RAIDShield™ is able to detect and repair disk "soft failures" before the user discovers them. Soft failures are bad blocks on the disk media that can be re-mapped by the disk itself to spare block locations. This means you won't be prematurely replacing perfectly good disks that were rejected by a typical RAID controller card when it tries to access one of these soft failed block locations.

CORAID's RAID controller marks each disk with its RAID configuration information. Disks in the chassis have no locational dependency and can be moved between slots or between chassis without losing the RAID configuration or the users data. This makes maintenance easy if you ever need to replace an entire SR1521 chassis.

CORAID's RAID algorithm is open and published as part of AoE tools on sourceforge.net. Your data is never captive to a proprietary RAID controller. In an emergency, RAID volumes can be unraveled and data recovered one disk at a time using any Linux host. Isn't that comforting to know?

EtherDrive® SAN Security

MAC address filtering allows the storage appliance to restrict access to volumes based upon host MAC addresses. With MAC address filtering, only hosts with allowed MAC addresses can access specified logical volumes within the SR1521.
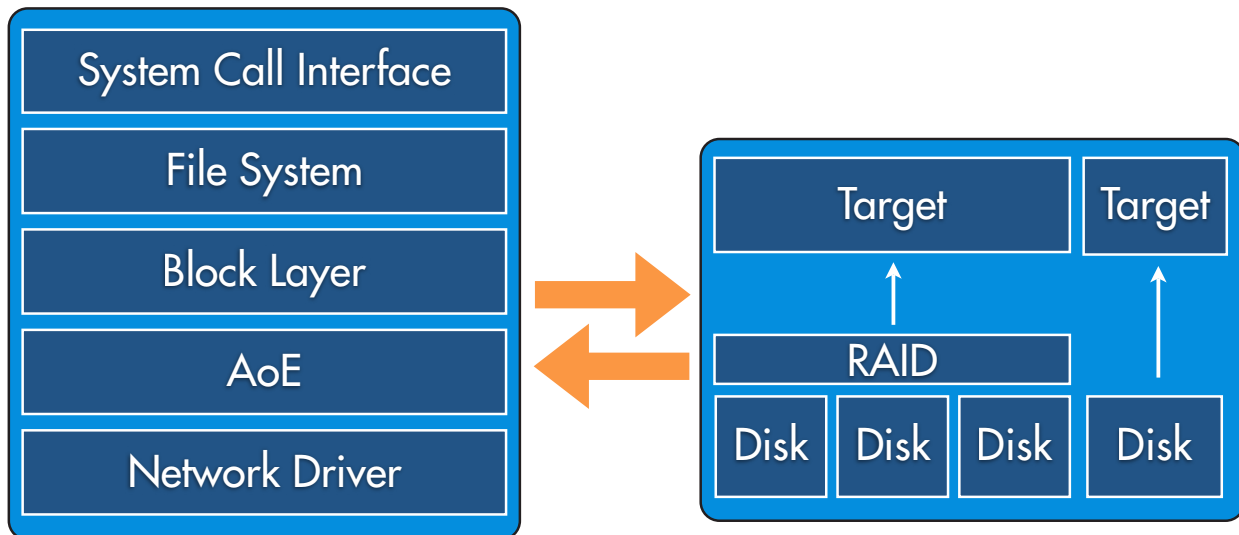
Simple Network Connection

EtherDrive® SAN is block storage just like a hard disk drive but located on the network. A software driver in the host discovers AoE storage on its network connections. Discovery is performed periodically by the software driver. AoE devices are presented as standard block devices to the host OS. On Linux hosts, AoE devices show up in the /dev directory as etherd/x.x. On Windows® hosts, the driver presents an AoE device as a hard disk in the Windows® device manager. Once formatted it becomes a "letter" drive.

AoE devices can be formatted (or partitioned and formatted) with any filesystem (i.e. EXT3, NTFS, FAT32, XFS, JFS, GFS, etc.). If the AoE volume is to be simultaneously shared by more than one host, a "cluster filesystem" like GFS must be used.

AoE devices are not natively Network Attached Storage (NAS) devices, but they can be used with a NAS Gateway server that provides NFS (or SMB/CIFS) "File" level sharing. CORAID's CLN21 NAS Gateway is an example of a Linux server providing file sharing services using an unlimited pool of AoE storage devices.

Servers can attach directly to EtherDrive storage using standard CAT6 GigE cables (auto-polarity sensing is provided by the SR1521) or by connection to a Gigabit Ethernet switch. A separate dedicated AoE SAN is highly recommended, and for best performance the network and host NICs should support jumbo Ethernet frames.

| System Call Interface |
| File System |
| Block Layer |
| AoE |
| Network Driver |

Target	Target
RAID	
Disk	Disk	Disk	Disk

SPECIFICATIONS

3.5" SATA Disk Capacity	RAID class SATA drives, up to 1 TB
Control Interface	RS-232, KVM or EtherConsole, command line interface
Network Interface	Dual 1 Gigabit Ethernet, RJ-45
Number of simultaneous hosts accessing storage	No limit
Sustained Storage Access Speed	> 90,000 IOPS, >200 MBytes/sec with 8K jumbo frames
RAID Types Supported	RAID 0 (striping) RAID 1 (mirroring) RAID 5 (striping with parity) RAID10 (striping over mirrors) JBOD (just a bunch of individual disks)
Storage Security (optional)	MAC address filtering, only allowed MAC addresses can access specified logical blades
Power Supply	100-240 VAC, 50/60Hz Redundant hot swap power modules
Cooling	6 hot swap fans
Power Consumption with disk drive	< 400 Watts, heat load < 1500 BTU
Shelf Dimensions	17.7 x 5.2 x 25.5 inches, 72 lbs w/o disks
SATA Disk Drives per Shelf	15
Expansion	up to 65,536 shelves per network (983,040 disks)
Operating Temp	50-95 degrees F (10-35 degrees C)
Relative Humidity	20%to 90%(non-condensing)
Warranty	36 Month
Operating System	AoE is in included the Linux 2.6.11+ kernel, drivers for earlier Linux kernels are available from CORAID, Drivers are also available for FreeBSD, Solaris™, Mac OS X® and Windows®