Introduction

ATA over Ethernet is a network protocol that provides simple access to block storage on the LAN.

> http://support.coraid.com/documents/AoEr11.txt

The EtherDrive (R) HOWTO for 2.6 and 3.x kernels is found at ...

> http://support.coraid.com/support/linux/EtherDrive-2.6-HOWTO.html

It has many tips and hints! Please see, especially, recommended tunings for virtual memory:

> http://support.coraid.com/support/linux/EtherDrive-2.6-HOWTO-5.html#ss5.19

The aoetools are userland programs that are designed to work with this driver. The aoetools are on sourceforge.

> http://aoetools.sourceforge.net/

The scripts in this Documentation/admin-guide/aoe directory are intended to document the use of the driver and are not necessary if you install the aoetools.

Creating Device Nodes

Users of udev should find the block device nodes created automatically, but to create all the necessary device nodes, use the udev configuration rules provided in udev.txt (in this directory).

There is a udev-install.sh script that shows how to install these rules on your system.

There is also an autoload script that shows how to edit /etc/modprobe.d/aoe.conf to ensure that the aoe module is loaded when necessary. Preloading the aoe module is preferable to autoloading, however, because AoE discovery takes a few seconds. It can be confusing when an AoE device is not present the first time the a command is run but appears a second later.

Using Device Nodes

"cat /dev/etherd/err" blocks, waiting for error diagnostic output, like any retransmitted packets.

"echo eth2 eth4 > /dev/etherd/interfaces" tells the aoe driver to limit ATA over Ethernet traffic to eth2 and eth4. AoE traffic from untrusted networks should be ignored as a matter of security. See also the aoe_iflist driver option described below.

"echo > /dev/etherd/discover" tells the driver to find out what AoE devices are available.

In the future these character devices may disappear and be replaced by sysfs counterparts. Using the commands in aoetools insulates users from these implementation details.

The block devices are named like this:

```
e{shelf}.{slot}
e{shelf}.{slot}p{part}
```

... so that "e0.2" is the third blade from the left (slot 2) in the first shelf (shelf address zero). That's the whole disk. The first partition on that disk would be "e0.2p1".

Using sysfs

Each aoe block device in /sys/block has the extra attributes of state, mac, and netif. The state attribute is "up" when the device is ready for I/O and "down" if detected but unusable. The "down,closewait" state shows that the device is still open and cannot come up again until it has been closed.

The mac attribute is the ethernet address of the remote AoE device. The netif attribute is the network interface on the localhost through which we are communicating with the remote AoE device.

There is a script in this directory that formats this information in a convenient way. Users with aoetools should use the aoe-stat command:

```
root@makki root# sh Documentation/admin-guide/aoe/status.sh
   e10.0            eth3              up
   e10.1            eth3              up
   e10.2            eth3              up
   e10.3            eth3              up
   e10.4            eth3              up
```

```
      e10.5            eth3             up
      e10.6            eth3             up
      e10.7            eth3             up
      e10.8            eth3             up
      e10.9            eth3             up
       e4.0            eth1             up
       e4.1            eth1             up
       e4.2            eth1             up
       e4.3            eth1             up
       e4.4            eth1             up
       e4.5            eth1             up
       e4.6            eth1             up
       e4.7            eth1             up
       e4.8            eth1             up
       e4.9            eth1             up
```

Use /sys/module/aoe/parameters/aoe_iflist (or better, the driver option discussed below) instead of /dev/etherd/interfaces to limit AoE traffic to the network interfaces in the given whitespace-separated list. Unlike the old character device, the sysfs entry can be read from as well as written to.

It's helpful to trigger discovery after setting the list of allowed interfaces. The aoetools package provides an aoe-discover script for this purpose. You can also directly use the /dev/etherd/discover special file described above.

Driver Options

There is a boot option for the built-in aoe driver and a corresponding module parameter, aoe_iflist. Without this option, all network interfaces may be used for ATA over Ethernet. Here is a usage example for the module parameter:

```
modprobe aoe_iflist="eth1 eth3"
```

The aoe_deadsecs module parameter determines the maximum number of seconds that the driver will wait for an AoE device to provide a response to an AoE command. After aoe_deadsecs seconds have elapsed, the AoE device will be marked as "down". A value of zero is supported for testing purposes and makes the aoe driver keep trying AoE commands forever.

The aoe_maxout module parameter has a default of 128. This is the maximum number of unresponded packets that will be sent to an AoE target at one time.

The aoe_dyndevs module parameter defaults to 1, meaning that the driver will assign a block device minor number to a discovered AoE target based on the order of its discovery. With dynamic minor device numbers in use, a greater range of AoE shelf and slot addresses can be supported. Users with udev will never have to think about minor numbers. Using aoe_dyndevs=0 allows device nodes to be pre-created using a static minor-number scheme with the aoe-mkshelf script in the aoetools.