Bridging mini–Howto

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Bridging mini−Howto

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This document describes how to setup an ethernet bridge. What is an ethernet bridge? An ethernet bridge is a device that controls data packets within a subnet in an attempt to cut down the amount of traffic. A bridge is usually placed between two separate groups of computers that talk within themselves, but not so much with the computers in the other group. A good example of this is to consider a cluster of Macintoshes and a cluster of unix machines. Both of these groups of machines tend to be quite chatty amongst themselves, and the traffic they produce on the network causes collisions for the other machines who are trying to speak to one another. A bridge would be placed between these groups of computers. The job of the bridge is then to examine the destination of the data packets one at a time and decide whether or not to pass the packets to the other side of the ethernet segment. The result is a faster, quieter network with less collisions.

1.Setup

2.Common problems

1.Setup

1. Get ``Bridge Config'':

   ```
   ftp://shadow.cabi.net/pub/Linux/BRCFG.tgz
   ```

2. Enable multiple ethernet devices on your machine by adding this to your `/etc/lilo.conf`, and re−run `lilo`:

   ```
   append = "ether=0,0,eth1"
   ```

   If you have three interfaces on your bridge, use this line instead:

   ```
   append = "ether=0,0,eth1 ether=0,0,eth2"
   ```

More interfaces can be found by adding more ether statements. By default a stock Linux kernel probes for a single ethercard, and once one is found the probe ceases. The above append statement tells the kernel to keep probing for more ethernet devices after the first one is found. Alternatively, the boot parameter can be used instead:

```
linux ether=0,0,eth1
```

Or, with 3 interfaces, use:

```
linux ether=0,0,eth1 ether=0,0,eth2
```

3. Recompile the kernel with `BRIDGING` enabled.
4. A bridge should not have an IP address. It CAN, but a plain bridge doesn't need one. To remove the IP address from your bridge, go to `/etc/sysconfig/network−scripts/` (for a RedHat system) and copy `ifcfg−lo0` to `ifcfg−eth0` & `ifcfg−eth1`. In these 2 eth files, change the line containing ``` ``DEVICE=lo'' ``` to ``` ``DEVICE=eth0'' ``` and ``` ``DEVICE=eth1'' ```. Other distributions may deviate from this, do what you need to do! If there are more than 2 interfaces to this bridge, be sure to make the corresponding configurations to those, as well.
5. Reboot, so you are running the new kernel with bridging in it, and also to make sure that an IP addresses are not bound to the network interfaces.
6. Once the system is back up, put the ethernet cards into promiscuous mode, so they will look at every packet that passes by its interface:

   ```
   ifconfig eth0 promisc ; ifconfig eth1 promisc
   ```

   All interfaces which are connected to network segments to be bridged are to be put into promiscuous mode.
7. Turn bridging ON using the `brcfg` program:

   ```
   brcfg −ena
   ```

8. Verify that there is different traffic on each interface:

   ```
   tcpdump −i eth0       (in one window)
   tcpdump −i eth1       (in another window)
   ```

9. Run a sniffer or `tcpdump` on another machine to verify the bridge is separating the segment correctly.

2.Common problems

1. ***Question***

   I get the message
   `ioctl(SIOCGIFBR) failed: Package not installed` What does this mean?

   Answer

   You don't have bridging capability in your kernel. Get a 2.0 or greater kernel, and recompile with the `BRIDGING` option enabled.
2. ***Question***

   Machines on one side cannot ping the other side!

   Answer

   Did you enable bridging using ``` ``brcfg −ena'' ```? (`brcfg` should say ``` ``bridging is ENABLED'' ```)
   Did you put the interfaces into promiscuous mode? (issue the ``` ``ifconfig'' ``` command. The ``` ``PROMISC'' ``` flag should be on for both interfaces.)
   If using multiple−media interface adapters, make sure that the correct one is enabled. You may need to use the config/setup program that came with the network interface card.
3. ***Question***

   I cannot `telnet/ftp` from the bridge! Why?

   Answer

   This is because there is no IP address bound to any of bridge interfaces. A bridge is to be a transparent part of a network.
4. ***Question***

   What do I need to set up in the way of routing?

   Answer

   Nothing! All routing intelligence is handled by the bridging code in the kernel. To see the ethernet addresses as they are learned by the bridge, use the `brcfg` program in debug mode:
   ```
   brcfg −deb
   ```
5. ***Question***

   The bridge appears to work, but why doesn't ``traceroute'' show the bridge as a part of the path?

   Answer

Due to the nature of a bridge, a ``traceroute'' should NOT show the bridge as a part of the path. A bridge is to be a transparent component of the network.

6. ***Question***

   Is it necessary to compile `IP_FORWARD` into the kernel?

   Answer

   No. The bridging code in the kernel takes care of the packet transport. `IP_FORWARD` is for a gateway which has IP addresses bound to its interfaces.
7. ***Question***

   Why are the physical ethernet addresses for port 1 and port 2 the same according to the ``brcfg'' program? Shouldn't they be different?

   Answer

   No. Every port on a bridge intentionally is assigned the same physical ethernet address by the bridging code.
8. ***Question***

   Bridging does not appear to be an option when performing a make config on the kernel. How does one enable it?

   Answer

   During the kernel config, answer 'Y' to the question, ``Prompt for development and/or incomplete code/drivers (CONFIG_EXPERIMENTAL) [Y/n/?]''.
9. ***Question***

   Too many hubs (4 or more) chained one after another (in series) cause timing problems on an ethernet. What effect does a bridge have in a subnet that is layered with hubs?

   Answer

   A bridge resets the 3/4/5 hubs rule. A bridge does not deal with packets the way a hub does, and is therefore not a contributor to timing problems on a network.
10. ***Question***

    Can a bridge interface to both 10Mb and 100Mb ethernet segments? Will such a configuration slow down the rest of the traffic on the high speed side?

    Answer

    Yes, a bridge can tie together a 10Mb segment with a 100Mb segment. As long as the network card on the fast network is 100Mb capable, TCP takes care of the rest. While it's true that the packets from a host in the 100Mb network communicating to a host in the 10Mb network are moving at only 10Mb/s, the rest of the traffic on the fast ethernet is not slowed down.