
FreeBSD on Telstra's Bigpond ADSL Network

Paul Hoadley, Logic Squad

Copyright © 2000, 2001, 2002, 2003 Paul Hoadley

\$Date: 2003/03/31 12:57:49 \$

This document describes how to set up a **FreeBSD** system for connection to **Telstra's Bigpond ADSL Network**. The information is claimed only to be sufficient—there are bound to be other ways to do it. The information may not be applicable to ISPs other than Telstra (Australia).

1. Pre-Connection

1.1. Preliminary Issues

Parts of this document assume that the reader is able to recompile a kernel. In particular, if any of the following are true, recompilation of the kernel will be required:

- Support for the `rl` Ethernet device driver has not previously been compiled into the kernel. (The `GENERIC` kernel *does* have support for this driver.)
- The system runs a version of **FreeBSD** prior to 4.2-RELEASE, in which case the modifications to the kernel source described below must be made.

Recompiling a kernel is relatively straightforward, and is well described by the **FreeBSD Handbook**. All of the changes to configuration files described throughout should obviously be made as the `root` user.

1.2. Arranging Connection with Telstra

Telstra does not support the connection of machines running **FreeBSD** to the Bigpond ADSL network. In practice, this means only two things:

- You will need a machine that runs one of the supported **Windows** or **Macintosh** operating systems present when the installer arrives to make the connection.
- You will be unable to obtain help from the Bigpond telephone Helpdesk if a problem arises with your **FreeBSD** system. If a problem occurs and you believe it to be distal to your ADSL modem, it is often useful to have the original **Windows** or **Macintosh** system available on which you can test the connection while conversing with the Helpdesk staff.

2. Connection

2.1. Hardware Issues

The hardware used was that supplied by Telstra: an **SMC EZ Card 10/100** NIC, and an **Alcatel SpeedTouch Home** ADSL modem. Telstra has begun to push the use of USB-Ethernet adapters between the machine and the modem. Due to lack of such an adapter to test on, this document does not apply to that hardware.

2.1.1. SMC EZ Card 10/100 NIC

The appropriate device driver for this NIC is `r1`. If it is not present, adding the line

```
device      r10
```

to your kernel configuration file will be sufficient for this PCI card to be found at startup.



Important

Don't recompile the kernel yet—more changes may be made below.

Add `r10` to the list of network interfaces in `/etc/rc.conf`:

```
# You may have more than two interfaces
network_interfaces="r10 lo0"
# There is no need to supply r10 with an IP address
ifconfig_r10="media 10baseT/UTP up"
```

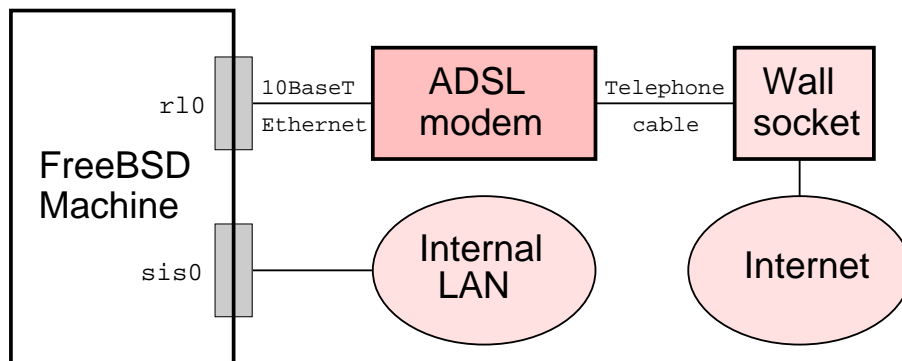
For comparison, this is the output of `ifconfig r10` on my machine:

```
# ifconfig r10
r10: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
```

```
inet6 fe80::2e0:29ff:fe66:305f%r10 prefixlen 64 scopeid 0x1
ether 00:e0:29:66:30:5f
media: Ethernet 10baseT/UTP
status: active
```

2.1.2. Alcatel Speedtouch Home ADSL Modem

Connecting the ADSL modem is simple, but differs from connecting a standard serial modem:



This diagram shows how you would set up a **FreeBSD** machine to be the gateway for your own LAN. `sis0` is shown as the internal interface as a demonstration only. You may have a different NIC requiring a different device driver. If you don't have a local network, only the connection to `r10` is relevant.

2.2. Software Issues

2.2.1. Kernel Configuration

According to the [FreeBSD Handbook](#), netgraph support no longer needs to be compiled into the kernel. If netgraph support is not found, **ppp** can load it into the kernel at runtime.

2.2.2. Modification of `ng_pppoe.c`



Important

This modification needs to be made only for systems prior to **FreeBSD 4.2-RELEASE**. The changes described were incorporated into the kernel source at **FreeBSD 4.2-RELEASE**.

2.2.2.1. Background

This section can be safely skipped if you are not interested to know why the source needs to be modified.

A description of the PPP over Ethernet Protocol can be found in [RFC 2516](#). For some reason, Telstra's Access Concentrators are sensitive to the order in which the tags are placed in the initial PADI packet. A simple modification to the source to swap the order of the [Service-Name] and [Host-Uniq] tags is all that is required. If you're interested in watching the discovery process fail, and you haven't done this already, run **tcpdump** in another window or on another console. If you're running **X Windows**, fire up a spare **xterm** with **xterm &**. If you're at the console, switch between virtual terminals using **Alt+F1**, **Alt+F2** and so on. As **root**, run:

```
# tcpdump -e -i rl0 -s 1500 not ip
```

Depending on which version of **FreeBSD** you are running, and which city you live in, the process will die at some point before a session is set up.

2.2.2.2. Modification of `ng_pppoe.c`

1. Save the appropriate diff from one of the three links below into the file `/tmp/ng_pppoe.diff`. Diffs from the original 3.4-R, 4.0-R and 4.1.1-R source are linked here, but Aaron Hill is willing to create diffs for any other versions that people may require. See the section on [Contacting the Author](#) below.

- [Diff for 3.4-RELEASE](#)
- [Diff for 4.0-RELEASE](#)
- [Diff for 4.1.1-RELEASE](#)

2. Go to the required directory:

```
# cd /usr/src/sys/netgraph
```

3. Make a backup of the original source:

```
# cp ng_pppoe.c ng_pppoe.c.bak
```

4. Apply the diff:

```
# patch < /tmp/ng_pppoe.diff
```

2.2.3. Recompile the kernel

If any modifications to the kernel configuration file, or to the kernel source itself, have been made as described above, the kernel should now be recompiled as described in the [FreeBSD Handbook](#). The machine should then be rebooted.

2.2.4. Modify `/etc/ppp/ppp.conf`

The following `ppp.conf` is sufficient to connect to the Telstra Bigpond ADSL Network:

```
default:
set device PPPoE:rl0:bigpond
set speed sync
set mru 1492
set mtu 1492
set ctsrts off
enable lqr
add default HISADDR
set timeout 0
set redial 0 0

# Network Address Translation (NAT)
nat enable yes
nat log yes
nat same_ports yes
nat unregistered_only yes
enable dns

bigpond:
set authname yourname@bigpond
set authkey yourpassword
```

2.2.5. Modify `/etc/rc.conf`

`/etc/rc.conf` can be modified to enable automatic connection at boot-time:

```
ppp_enable="YES"
ppp_profile="bigpond"
ppp_mode="ddial"
```

2.2.6. Modify `/etc/resolv.conf`

Add the IP addresses of the nameservers that were entered into your Windows or Mac configuration by the installation technician. For example, in Adelaide the numbers entered by my installer were:

```
nameserver 61.9.128.13
nameserver 61.9.128.16
```

The numbers for your location may be different.

3. Post-Connection

3.1. Testing the connection

For testing, use **ppp**'s interactive mode:

```
# ppp
```

This should bring up the familiar interactive prompt:

```
ppp ON yourhost>
```

At the prompt, type **dial bigpond**, and **ppp** should connect in the standard way:

```
ppp ON yourhost> dial bigpond
Ppp ON yourhost>
PPp ON yourhost>
PPP ON yourhost>
```

As each successive p in ppp changes to a P, it indicates that the negotiation is progressing. Specifically, the first P indicates that LCP is complete, the second that authentication is complete, and the third that an IP number has been assigned. More information can be found in **man ppp**.

I found initially that it may take one or two attempts to make a connection. Since modifying `rc.conf`, and getting **ppp** to run quietly at boot time, though, I haven't had this problem.

Finally, try to contact a host on Telstra's network, first by number:

```
# ping 139.134.2.129
PING 139.134.2.129 (139.134.2.129): 56 data bytes
64 bytes from 139.134.2.129: icmp_seq=0 ttl=229 time=49.518 ms
64 bytes from 139.134.2.129: icmp_seq=1 ttl=229 time=49.758 ms
64 bytes from 139.134.2.129: icmp_seq=2 ttl=229 time=50.274 ms
^C
--- 139.134.2.129 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 49.518/49.850/50.274/0.315 ms
```

And then by name:

```
# ping telstra.com
PING telstra.com (139.134.2.129): 56 data bytes
64 bytes from 139.134.2.129: icmp_seq=0 ttl=229 time=48.037 ms
64 bytes from 139.134.2.129: icmp_seq=1 ttl=229 time=49.454 ms
64 bytes from 139.134.2.129: icmp_seq=2 ttl=229 time=49.913 ms
^C
--- telstra.com ping statistics ---
```

```
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 48.037/49.135/49.913/0.798 ms
```

Note that some FAQs suggest pinging your nearest neighbour, but Telstra configures some of its hosts not to respond to ICMP requests. Pinging my nearest neighbour makes it look like there is a problem when there's not:

```
# ifconfig tun0
tun0: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1454
inet 61.9.135.135 --> 172.31.28.3 netmask 0xff000000

# ping 172.31.28.3
PING 172.31.28.3 (172.31.28.3): 56 data bytes
36 bytes from GigabitEthernet4-0.wel-gw1.Perth.telstra.net
(203.50.113.18): Destination Host Unreachable
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
4 5 00 5400 075d 0 0000 f5 01 3199 61.9.135.135 172.31.28.3

^C
--- 172.31.28.3 ping statistics ---
1 packets transmitted, 0 packets received, 100% packet loss
```

This does not indicate a problem.

Contacting the Author

The author of this document is [Paul Hoadley](#). This document only describes what I did to get PPPoE functioning on my **FreeBSD** machine. Your mileage may vary. If you notice any errors in this document, or your experience with Telstra's ADSL network was vastly different, please [let me know](#).

I'm willing to help troubleshoot problems related to the setup described in this document. You will need, however, to send me *actual verbatim copies of error messages*, as well as *actual copies of the files involved* (with username and password information deleted). Email claiming that “My rc.conf is just like the one on your page, and it doesn't work” will *no longer receive any reply*.

Credits

Many thanks to [Aaron Hill](#) for comments, and for the original modifications to the kernel source that were required prior to **FreeBSD** 4.2-RELEASE. If you *need* to run an older version of **FreeBSD** Aaron is willing to make diffs for any other versions of `ng_pppoe.c` that people have floating around. [Email](#) a copy of your `ng_pppoe.c`, and Aaron will send back the diff.

Thanks to Ryan Trainor for information regarding the USB-Ethernet adapters supplied by Telstra.