Enabling IPv6

Remember IPv6 is 128 bits:

340.282.366.920.938.463.463.374.607.431.768.211.456 unique values

For this workshop, we use a Unique Local Address (fc00::/7) (RFC4193)

We have registered: the prefix fdba:dc55:48c7::/48

In full notation: fdba:dc55:48c7:0000:0000:0000:0000:0000 prefixlen 48

/48 is what is given to each customer in an ISP environment.
Normally, LANs are 64 bits in size (18446744073709551616 IPs), so
this leaves 16 bits - in total, 65536 LANs!

Note: We may also have a "real" routable prefix, which will be given in
class.

I. Manual configuration

Manually, we will use the following addressing scheme:

```
fdba:dc55:48c7:0000:0000:0000:00xx:000y/64  (LANs are 64 bit in IPv6)
|<- prefix ->||site||<----- LAN ------>|
```

... where xx = your group number, and y is your host IP (i.e.: 1)

For example, for Group 25, this will be:

```
                               group IP
                                vv   vv
fdba:dc55:48c7:0000:0000:0000:0025:0001/64  (LANs are 64 bit in IPv6)
|<- prefix ->||site||<----- LAN ------>|
```

Or, in short notation (consecutive 0's can be expressed as ::)

fdba:dc55:48c7::25:1 prefixlen 64 (LAN

1. On AUTH1, edit /etc/rc.conf, and add

    ipv6_ifconfig_eth0="fdba:dc55:48c7::XX:YY/64"

    Save the file & exit, and run the ip6addrctl script, which
    sets a source address selection policy:

    # service ip6addrctl start

    Run ip6addrctl and look at the output.

    # ip6addrctl

2. Start IPv6:

    Normally, to configure IPv6, we would need to restart the
    networking configuration, like this - BUT DON'T DO IT!

```
    # service netif start
    # service routing start

    ... if you do this now, you will lose connection to your machine!

    So instead, let's do it manually:

    # ifconfig eth0 inet6 fdba:dc55:48c7::XX:YY/64

3. Check your interface:

    # ifconfig eth0 inet6

    -> do you see an IPv6 address starting with fdba:... ?

4. Repeat steps 1 - 3 above for:

    - auth2.grpX
    - resolv.grpX

5. Check that the 3 hosts can ping each other:

    # ping6 fdba:dc55:48c7::XX:YY     (where XX = group number, YY = IP of host)

6. Can you ping the gateway ?

    # ping6 fdba:dc55:48c7::0000:254

7. What is another way to express:

    fdba:dc55:48c7::0000:254 ?

II. Auto configuration with RA/RS
---------------------------------

1. On AUTH1, edit /etc/rc.conf, and add

    ipv6_activate_all_interfaces="YES"

    Save and exit, and re-run the ipv6addrctl configuration:

    # service ip6addrctl start

2. Force an IPv6 sollicitaion

    # rtsol -F eth0

3. Check your IP configuration

    # ifconfig eth0 inet6

    -> You should now see an additional IPv6 address starting with fdba:...

    Try and ask other participants in the class to ping your
    autoconfigured IPv6 address.

4. If you see another prefix than fdba:dc55:...
```

When you run "ifconfig eth0 inet", do you see another prefix
than fdba:dc55:, then it is probable that you have a routable
IPv6 prefix configured as well!

Test ipv6 connectivity to the Internet like this:

dig +short @10.20.0.254 ipv6.google.com AAAA

Try and ping the IPv6 address returned by dig:

pin6 2404:6800:8005::67

Try and use the "mtr" command to see the path:

mtr -6 2404:6800:8005::67

...

BE AWARE that your machine is now connected, without filtering, to the
IPv6 Internet!