

HEAnet IPv6 Tutorial

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Tutorial Outline

- Turn on IPv6 on Windows XP
- Use link-local addresses and multicast addresses to find the router
- Log into the router and configure it
- Check that router advertisements work
- Do some IPv6 web browsing

Tutorial: Enabling

- Enabling IPv6 on XP

The easiest way to do this is to use the command:

```
ipv6 install
```

from a cmd prompt.

Alternatively, this can be done from the control panel:

"Settings -> Control Panel -> Network -> Local Area Connection -> Properties -> Add protocol->..."

Tutorial: Examining

- We should see IPv6 addresses

Let's use our old friend here:

```
ipconfig /all
```

Note that there are only link-local addresses right now.

See also that link local addresses are followed by "%N", where N is the "scope ID" of the interface.

Find the scope ID for the LAN adapter and remember it. It's probably an integer!

Tutorial: Neighbours

- Examining neighbour cache on XP

Use the versatile `ipv6 nc` command:

```
ipv6 nc
```

Note that this is very similar to the `arp` cache.

The "permanent" entries are related to the local machine. (Our own addresses are the only things we can be sure are permanent!)

The scope ID is on the left.

Tutorial: Neighbours

- Knocking for neighbours

Now we want to get the router's address into the neighbour cache, so we can find out what it is. To do this we ping the *all-nodes multicast* address on the correct interface, which will bring the addresses of all nodes into the cache. We do this with:

```
ping6 ff02::1%N
```

where N was the integer to remember.

Sadly Windows does not display hosts other than the first to reply.

Tutorial: Neighbours

- Examining neighbour cache on XP

Going back to the neighbour cache:

```
ipv6 nc
```

There's a new address - the link-local address of the router.

It will probably be listed as "stale".

Let's assume this address is

```
fe80:a9b8::dead:c0de%N
```

(Don't forget scope ID!)

Tutorial: Router

- Configuring the router

Remembering that address, try to telnet to it:

```
telnet fe80:a9b8::dead:c0de%N
```

You should get the usual Cisco password prompt, where you can log in with the supplied username/password combo.

Tutorial: Router

- Configuring the router

Let's see what it says about its interfaces:

```
show ip int
(davew will tell us some commands)
show ipv6 interface <INT>
```

We see that we got the correct link-local address.
Note that there is no global address on this interface;
we're going to add one.

Tutorial: Router

- Configuring the router

We now need a global address on the interface facing us.

```
conf term
interface <INT>
    ipv6 address 2001:770:d3::1234/64
    ipv6 mtu 1280
exit
```

The MTU is a hack because of our MPLS setup.

Tutorial: Router

- Configuring the router

The remaining infrastructure:

```
conf t
  ipv6 route 2000::/3 2001:770:af:1::1
  ip name-server 2001:770:18:2::90
end
```

This establishes a route to HEAnet (and the rest of the world) and name service.

Tutorial: Router

- Configuring the router

Note the router has upstream connectivity:

```
ping ipv6 lanczos.maths.tcd.ie
```

Success?

Tutorial: Router

- Configuring the router

Turning on router advertisements and doing routing is the same thing:

```
conf t
    ipv6 unicast-routing
end
```

If we wanted to prevent router advertisements from being sent, we could say "ipv6 nd suppress-ra" for the interface in question. Useful for exchange points.

Tutorial: Examining

- Examining addresses

Go back to ipconfig:

```
ipconfig /all
```

You should have 2001: addresses learned via RAs.

If they doesn't show up immediately, you can wait for a periodic announcement, or unplug and replug your ethernet to make Windows solicit a router advertisement.

Tutorial: Applications

- Real applications!

Again from cmd:

```
ping6 ftp.heanet.ie  
tracert6 ftp.heanet.ie
```

Open Internet Exploder (sorry, Explorer) and go to <http://www.kame.net/> and <http://www.heanet.ie/>.

Try browsing to <http://www.google.ie/> - also try <http://www.google.ie.sixxs.org/>

Tutorial: Other things

- Other things to try

Useful Windows command for manipulating IP things:

```
netsh
```

```
netsh interface ipv6 set interface  
"Local Area Connection" mtu=1280
```

That sets MTU on the local ethernet to 1280.