

IPv6 theory

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What is IPv6?

1. Current version of IP is version 4.
2. IPv6 is an evolution of IPv4.
3. Not backwards or forwards compatible.

Major changes

- Bigger addresses.
- Better extensibility.
- Built in autoconfiguration.
- Mandatory IPsec.
- More integrated multicast.
- ARP replaced with Neighbour Discovery.

Addresses

IPv4 addresses: 32 bit 134.226.81.11 IPv6
addresses:

- 128 bit addresses: 340282366920938463463374607431768211456,
- Written in 8 hex quads,
- Several shortcuts allowed.

Examples

- 2001:0770:0010:0300:0000:0000:86e2:510b
- 2001:770:10:300:0:0:86e2:510b
- 2001:770:10:300::86e2:510b
- 2001:770:10:300::134.226.81.11

Structured Addresses

- $2001::/16$ = Production address space
- $2001:770::/32$ = HEAnet (ISP prefix)
- $2001:770:68::/48$ = DIT (organisation prefix)
- $2001:770:64:ff::/64$ = CNRI (subnet prefix)

Special Addresses

::	Unspec
::1	localhost
fe80::/10 block	link-local
fec0::/10 block	site-local
ff00::/8 block	multicast

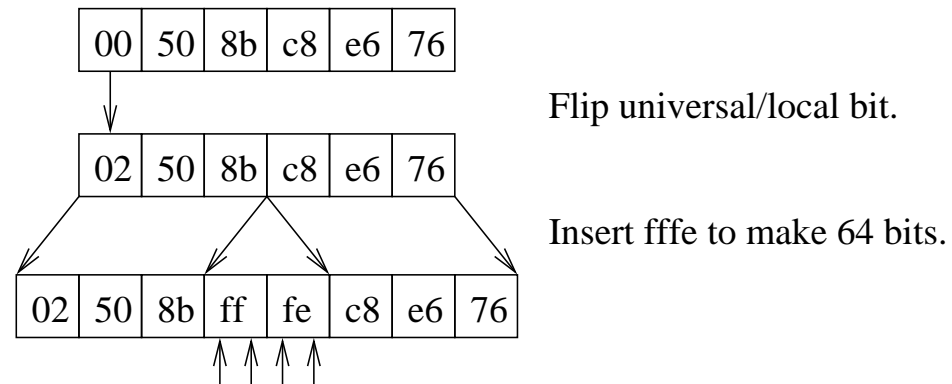
Autoconfiguration

Addresses formed from network prefix + host id.

1. Find host-id and form link-local.
2. Check unique.
3. Multicast to router to get prefix(es).
4. Form global address(es).
5. Check unique.

NB: manual or DHCPv6 assignment also possible.

Example



```
% ifconfig -a
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x3
    inet 127.0.0.1 netmask 0xff000000
xl0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    ether 00:b0:d0:f4:c6:c5
    inet6 fe80::2b0:d0ff:fef4:c6c5%xl0 prefixlen 64 scopeid 0x1
    inet 147.252.43.5 netmask 0xfffff00 broadcast 147.252.43.255
    inet6 2001:770:68:1ff:2b0:d0ff:fef4:c6c5 prefixlen 64 autoconf
```

Enabling

WinXP `ipv6 enable`

OS X Enabled in Jaguar/Panther.

Redhat Add `NETWORKING_IPV6="yes"` to
`/etc/sysconfig/network`

FreeBSD Add `ipv6_enable="YES"` to
`/etc/rc.conf`

Solaris Create `/etc/hostname6.ifname`.

Providing Routers

Can be same as IPv4 router, but doesn't need to be the same or use specialised hardware.

