

When and How to Autoconfigure

- ◊ Not all sites want any random node to be able to acquire an address and use it without authorisation
 - Auto-config does not enable that
 - it does make it easy
- ◊ DHCP used to assign addresses in IPv4, can implement policy
 - Auto-config has no policy
- ◊ Some users concerned about privacy
 - Every IPv6 address they use contains their MAC address
- ◊ Hence need alternative methods

DHCPv6 & others

- ◊ DHCPv6 - very similar to DHCP
 - Managed or arbitrary address assignment
 - Can allocate addresses that contain EUI-64 or addresses 1 2 3 4 5 6 7 ...
- ◊ Manual Configuration
 - Always possible
 - 128 bits is a lot to configure correctly.
- ◊ RFC3041 Random Addresses
 - Avoids privacy concerns
 - Creates other problems

Information for Nodes

- ◊ How does a node decide
 - what kind of address to use?
- ◊ From where does it discover
 - the network prefix (or prefixes)?
- ◊ If not using DHCP
 - how does it find a router to use?
- ◊ Router Advertisements
 - Router periodically sends
 - all this information
 - and more
 - to all nodes

IPv6 Address Types

- ◊ Local Loopback
- ◊ Link Local Address
- ◊ Site Local Address
- ◊ Global Address
- ◊ IPv4 compatible Address
- ◊ Multicast Address

Loopback Address

- ◊ ::1
 - :: (0::0) is the "unspecified address"
- ◊ IPv6 Address Notation
 - nnnn:nnnn::nnnn
 - The :: indicates as many 0's as are needed
 - Only one :: in any address
 - 16 bits in each other numeric block (between ::s)
- ◊ Loopback address means "this node"
 - 127.0.0.1 in IPv4

Link Local Addresses

- ◊ Defined Prefix
 - FE80::/10
- ◊ Low 64 bits contain host identifier
 - fe80::210:a4ff:fe0f:41cf
 - fe80::1

Link Local Addresses

- ◊ These addresses can be used to communicate with other nodes on the same link
 - Routers do not route packets containing link local addresses
 - Useful for all on-link communications
 - eg: router advertisement
 - Used where off link addressing is incorrect
 - eg: redirect
 - eg: Neighbour Discovery

Site Local Addresses

- ◊ Defined Prefix
 - FEC0::/10
- ◊ Used for communications with a site
 - "site" can mean whatever is appropriate
 - Often a company/university/...
- ◊ Packets using these addresses are not forwarded beyond the boundaries of the site
 - FECr:rrrr:rrrr:SSSS:EUI-64
- ◊ Being deprecated

Local Addresses

- ◊ Defined Prefix
 - FC00::/7
- ◊ Unroutable address
 - Not useful to reach random destination
- ◊ Possibly unique
 - some would say probably
 - some would hope certainly
 - nothing enforces uniqueness
 - no way to test either
- ◊ FCaa : aaaa : aaaa : SSSS : EUI-64
 - Assigned by number authority
- ◊ FDrR : rrrr : rrrr : SSSS : EUI-64
 - Generated by random number generator

Global Addresses

- ◊ 48 bit site prefix
- ◊ 16 bit subnet number
- ◊ 64 bit EUI-64

| | | | |
|--------|-------------|--------|----------------------|
| F P | Site Prefix | Subnet | Interface Identifier |
|--------|-------------|--------|----------------------|

- ◊ FP: Format Prefix (3 bits: 001)
 - 001 010 011 100 101 110
 - All except 000 and 111
- ◊ Prefix: Site Identification (45 bits)
 - Internal aggregation boundaries exist
- ◊ Subnet: Network within site (16 bits)