

A Quick Overview of IPv6

Networks Administration

Otago Polytechnic
Dunedin, New Zealand

OSI MODEL

- ▶ Application
- ▶ Presentaion
- ▶ Session
- ▶ Transport
- ▶ **Network**
- ▶ Data Link
- ▶ Physical

IPv4

- ▶ IPv4 was released in 1980¹ - 1981².
- ▶ It has been tremendously successful and will continue to be used for some time.
- ▶ It has some problems:
 - ▶ address exhaustion
 - ▶ complicated routing
 - ▶ poor support for security, QoS

¹RFC 760

²RFC 791

A NEW PROTOCOL WAS NEEDED

- ▶ By the early 1990s it was clear that we needed a new protocol
- ▶ In 1992-1993, the IETF began looking into a version of IP.
- ▶ Relevant RFCs began to come out in 1996.

SOME FEATURES OF IPv6

- ▶ Larger address space
- ▶ Simplified headers
- ▶ Hierarchical addressing and routing
- ▶ Improved device autoconfiguration
- ▶ IPSec

IPv6 ADDRESSES

- ▶ IPv6 addresses are 128 bits long.
- ▶ The first 64 bits are typically used to identify the network.
- ▶ The second 64 bits are used for the host.
- ▶ Example: 2001:0DB8:AC10:FE01:0000:0000:0000:01A6
2001:DB8:AC10:FE01::1A6

ADDRESS TYPES

- ▶ Unicast
 - ▶ Global
 - ▶ Link-Local
- ▶ Multicast
- ▶ Anycast
- ▶ N.B.: No broadcast

ADDRESS AUTOCONFIGURATION

- ▶ Manual configuration and DHCP are still available for IPv6
- ▶ Very briefly, autoconfiguration works like this:
 1. a device determines its link-local address
 2. it sends *router solicitation* messages
 3. it receives *router advertisements* in response
 4. from these the device determines its *network prefix*
 5. it appends its 64 bit interface id to produce its address

EUI-64

- ▶ An IPv6 interface typically uses EUI-64 to obtain its interface ID.
- ▶ Basically, we take the 48 bit MAC address and stretch it out to 64 bits.
- ▶ Example:
 1. Start with a MAC address: 39:A7:97:07:CB:D0
 2. Insert FFFE into the middle: 39:A7:97:FF:FE:07:CB:D0
 3. Set the seventh³ to 1: 3B:A7:97:FF:FE:07:CB:D0

³The universal-local bit

SIMPLIFIED ROUTING

The larger address space provided by IPv6 allows ISPs to aggregate their customers' networks with common prefixes and advertise one route.