

IPv6 Overview

Mark Pulford <mark@kyne.com.au>

What's wrong with IPv4?

- Imminent address exhaustion
 - IANA expect to run out around Q3/Q4 2011
 - Increased cost / decreased reliability
 - End-to-end principle dies...again
- Routing table growth
 - Currently > 300000 prefixes
- Performance
 - Checksums, fragmentation

How is IPv6 different to IPv4?

- Larger addresses
 - 128 bits vs 32 bits
 - 2001:db8:1234:abcd::1 vs 192.0.2.1
- Larger allocations
 - Addresses will no longer be scarce
 - More real addresses for end users
 - Better aggregated by ISPs

How is IPv6 different to IPv4?

- Larger header
 - 40 bytes vs 20 bytes
- ..but simpler
 - Fixed size
 - Some fields removed (Eg, no checksum)
- Larger MTU
 - 1280 bytes vs 576 bytes
- No fragmentation

How is IPv6 different to IPv4?

- Link-local addresses
 - fe80::/10
- Unique local addresses
 - fc00::/7
- EUI-64
 - 2001:db8::224:d2ff:fef2:9301
- Only unicast/multicast
 - No broadcast

How is IPv6 different to IPv4?

- ICMP has a bigger role
- NDP replaces ARP
 - Neighbour Discovery Protocol
- Auto Configuration
 - Stateless Address Auto Configuration (SLAAC)
 - DHCPv6, Prefix Delegation
- DNS has a bigger role
 - AAAA records, ip6.arpa zone

How can we transition to IPv6?

- IPv6-only client networks
 - NAT-PT/NAPT-PT
 - Transport Relay Translation
 - ..generally ugly and impractical
- IPv4/IPv6 dual stack
 - IPv4 behind Carrier Grade NAT (CGNAT)
 - IPv6 will suck less

How can I use IPv6 at home?

- Tunnel brokers
 - Internode, Hurricane Electric,...
- 6to4
 - Reverse DNS, <http://www.nro.net/>
 - Public IPv4 required
- Toredo
 - Developed by Microsoft
 - Miredo, <http://www.remlab.net/miredo/>

How can I use IPv6 at home?

- IPv6 over PPP (native)
 - Internode IPv6 Broadband Trial
 - SLAAC, DHCPv6 Prefix Delegation
- ADSL CPEs
 - Linux desktop/router with PPPoE
 - WIDE DHCPv6 server
 - Open-WRT
 - <http://www.andy.id.au/Home/openwrt>

How can I use IPv6 at home?

- Linux router configuration
 - Enable IPv6 via PPP
 - Enable IPv6 forwarding
 - Configure WIDE DHCPv6 client
 - Configure radvd

How can I use IPv6 at home?

- Linux management tools
 - ip / ifconfig
 - ip -6 neigh show
 - route / netstat
 - ping6 / traceroute6
 - radvd

What can I do with IPv6?

- Many services and applications just work
- Firefox
 - “showip” extension
- ioQuake3
- P2P
- <http://www.sixxs.net/misc/coolstuff/>
- Administration

Resources

- Registries
 - <http://www.iana.org>, <http://www.apnic.org/>
- RFCs
 - 2460: IPv6 Specification
 - 4861: Neighbor Discovery Protocol
 - 4862: IPv6 Stateless Address Autoconfiguration
- Getting IPv6
 - <http://ipv6.internode.on.net/>