

IPv6 Intro

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SkullSpace Hackathon

Online HTML5 Slides

Presentation source/download available at
github.com/tbaschak/ipv6-intro-presentation

Who I Am

- ▶ Primary Network Administrator of VOI Network Solutions – Winnipeg-based commercial Internet Service Provider and carrier.
- ▶ Involved with both Internet Exchanges in Winnipeg.
 - ▶ Elected member on the Board of Directors for MBIX.
 - ▶ Also involved with the creation and technical operations of WpgIX.
- ▶ Avid opensource software user/fanatic, and recently, contributor.

My Own IPv6 Experience

- ▶ Running IPv6 since ~2004.
 - ▶ Over tunnels for many, many years.
 - ▶ Native IPv6 since December 2012, via Voi Networks BGP address space.
- ▶ My internal network currently runs OSPFv3 (IPv6 OSPF).
 - ▶ 2604:4280:d00d::/48

IPv6 Address Basics

- ▶ The IPv6 address space is 128-bits (2^{128}) in size, containing 340,282,366,920,938,463,463,374,607,431,768,211,456 IPv6 addresses.
- ▶ Like IPv4, Network and Host bits.
- ▶ Unlike IPv4, Network and Host bits are usually equal (at least on a /64 network).

IPv6 Address Sample

- ▶ My IPv6 privacy address at the time of writing:
2604:4280:d00d:202:1986:feb8:ccb0:78e1
 - ▶ Prefix: 2604:4280:d00d
 - ▶ Network: \$Prefix:202
 - ▶ Host: 1986:feb8:ccb0:78e1

rfc4291: IPv6 Addressing

▶ Valid Host Addresses

- ▶ 2001:DB8:0:0:8:800:200C:417A
- ▶ 2001:DB8::8:800:200C:417A
- ▶ 2604:4280:d00d::80
- ▶ 2604:4280:d00d:200::1
- ▶ ::1 (loopback)
- ▶ :: (0:0:0:0:0:0:0:0)

rfc4291 (cont)

- ▶ Valid Network Addresses

- ▶ 2001:0DB8:0000:CD30:0000:0000:0000/60
- ▶ 2001:0DB8::CD30:0:0:0:0/60
- ▶ 2001:0DB8:0:CD30::/60
- ▶ ::/0

ARP -> ND (rfc4861)

- ▶ Uses link-layer multicast instead of broadcast.
- ▶ Subcomponents include
 - ▶ Address Resolution
 - ▶ Duplicated Address Detection
 - ▶ Neighbor Unreachability Detection
- ▶ Makes use of a number of predefined multicast addresses (much like routing protocols)
 - ▶ all-nodes (FF02::1)
 - ▶ all-routers (FF02::2)
- ▶

DHCP -> RA / DHCPv6

- ▶ DHCP for autoconfiguration has been replaced with SLAAC, and/or DHCPv6.
- ▶ IPv4 untrusted layer 2 issues have followed to IPv6.
 - ▶ Rogue DHCP -> Rogue RA & Rogue DHCPv6

IPv6 Subnetting vs IPv4

- ▶ Where a /24 is often used with IPv4, /64's are encouraged with IPv6.
 - ▶ This allows various autoconfiguration mechanisms to function.
 - ▶ a /48 (Recommended network size for one site) allows 64k /64's
 - ▶

Resources

- ▶ ipv6.he.net/certification/
- ▶ www.sixxs.net/tools/grh/ula/
- ▶ ipvfoo chrome extension
- ▶ ipvfox firefox extension

Useful IPv6 RFCs

- ▶ RFC2460: IPv6 Specification
- ▶ RFC6434: IPv6 Node Requirements
- ▶ RFC4291: IPv6 Addressing Architecture
- ▶ RFC3484: Default Address Selection
- ▶ RFC4193: Unique Local IPv6 Unicast Addresses (ULA)
- ▶ RFC4443: ICMPv6
- ▶ RFC3315: DHCPv6 client
- ▶ RFC4862: SLAAC
- ▶ RFC4861: Neighbor Discovery
- ▶ RFC6177: IPv6 Address Assignment to End Sites

Even More IPv6 RFCs

- ▶ RFC1981: Path MTU Discovery
- ▶ RFC4213: Basic Transition Mechanisms for IPv6 Hosts and Routers
- ▶ RFC3596: DNS protocol extensions for incorporating IPv6 DNS resource records
- ▶ RFC2671: DNS message extension mechanism
- ▶ RFC3226: DNS message size requirements
- ▶ RFC5095: Deprecation of Type 0 Routing Headers in IPv6
- ▶ More info at: <http://www.ripe.net/ripe/docs/ripe-554>
- ▶ BIG GIANT list at: <http://ipv6now.com.au/RFC.php>

The End

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