IPv6 Today

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DOCTOR FUN

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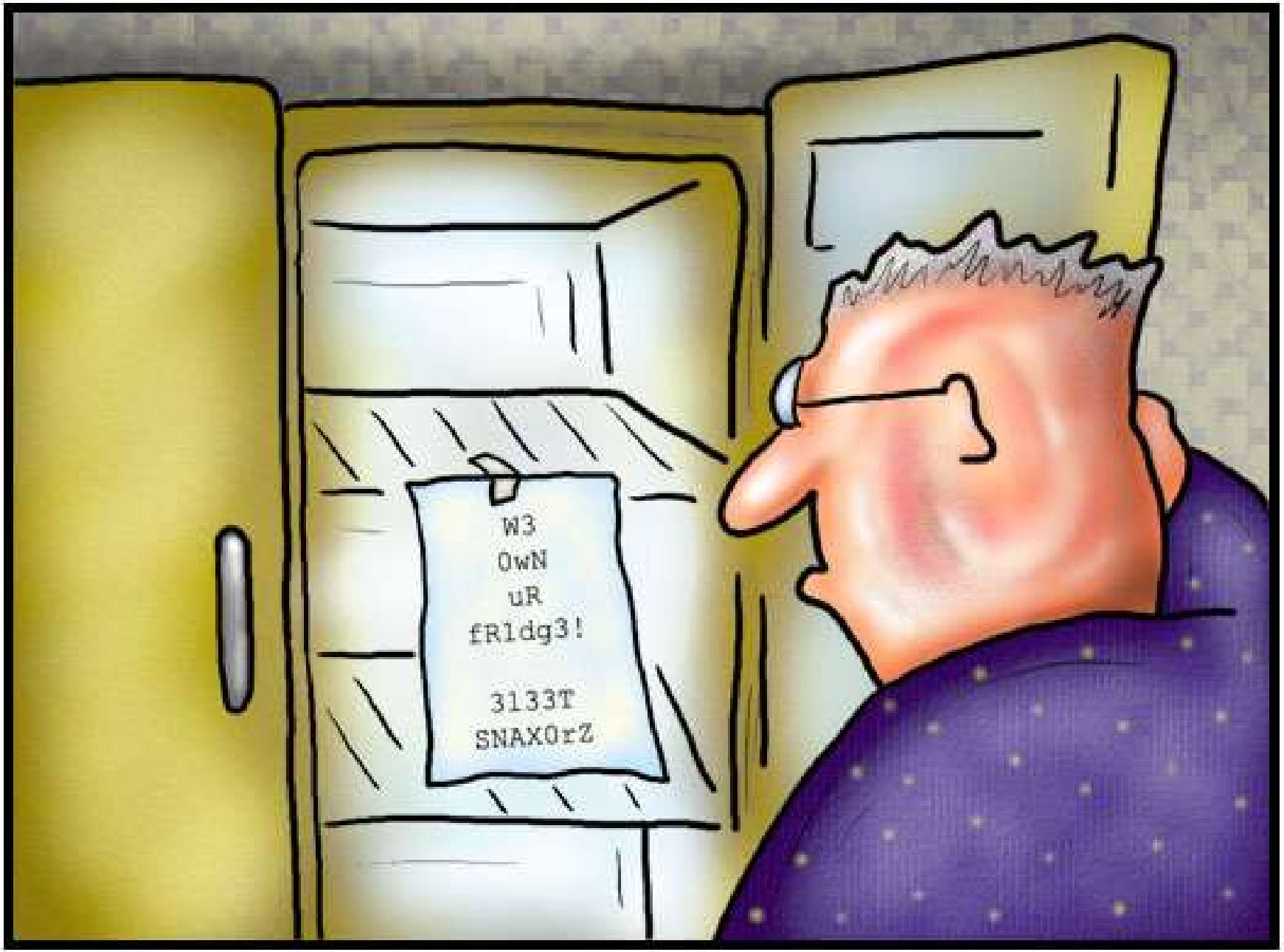

The brave new world of IPv6

Contents

- What is IPv6?
- Why was it developed
- IPv6 Addressing
- Stateless Autoconfiguration
- The 6bone
- What you can do with it
- What supports it
- Online Resources

What is IPv6?

- Next generation of IP Addressing
- Proivdes for
  - Larger address space
  - More features
  - Better security

History

- 1990: Researches saw a potential problem
  Predicted Class B exhaustion by March 2003
- 1992: Plan launch to find solutions
- IPv4 Address Assignment efficiency hideous
- Multiple Class Cs assigned
- Routing tables grew

How many addresses?

340,282,366,920,938,463,463,374,607,431,768,211,456

•Three hundred and forty undecillion, two hundred and eight-two decillion, tow hundred and sixty-six nonillion, nine hundred and twnty octillion, nine hundred and thirty-eight septillion, four hundred adn sixty-three sextillion, four hundred and sixty-three quintillion, three hundred and seventy-four quadrillion, six hundred and seven trillion, four hundred and thirty-oen billion, seven hundred and sixty-eight million, two hundred and eleven thousand, four hundred and fifty-six

IPv4 has

4,294,967,296

IPv6 Addressing

- Uses 8 16-bit hexadecimal sections
- FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF
- Any number of null sections (:0000:) can be replaced with ::
- Leading 0s can be removed
- 3ffe:0b80:11a5:0001:0000:0000:00ef
- 3ffe:0b80:11a5:0001::00ef
- 3ffe:b80:11a5:1::ef

IPv6 Addressing

- Three kinds of addresses
  - Unicast
  - Anycast
    - DNS
    - Time
    - 6to4
  - Multicast
    - Video Conference
    - Audio Conferencing

Allocated Ipv6 Ranges

- 2003::/3
  - 2001::/16 – Global Ipv6 Routed Network
  - 3ffe::/16 – Global Ipv6 Test Network (6bone)
- ff0X::/16 – Multicast
- fe80::/16 – Link-local
- fec0::/16 - Site-local

Stateless Autoconfiguration

- Address automatically configured
- Local router provides prefix
- Suffix calculaed from MAC address
- Router advertises 2001:388:7094:4080::/48
- MAC is 00:E0:29:07:3C:FF
- Combined address 2001:388:7094:4080:2e0:29ff:fe07:3cff

Getting connected

- Tunnel
  - AARNet Tunnel broker
  - http://tb.aarnet.edu.au/
- 6to4
  - Windows 2k/XP/2k3
- Native

Ipv6 Tunnels

- Allows IPv6 on networks only routed on Ipv4
- Requires no upstream provider support
- Require signup and routing via a tunnel broker
  - Try to find network close server
- Large latency
- Messy routing, cost affected etc

6to4

- Easy way to get windows online
  - ipv6 install
  - net start 6to4
- Uses Ipv4 address in Ipv6 subnet for gateway
- 2002:xxxx:xxxx::/48
- 130.95.13.9 -> 2002:825F:0D09::/48
- Relay-router translates to/form v4 encapsulated packets and routes onto the 6bone

What are its uses?

- Replaces the need for NAT
- Allows more IPs per perosn
- Better dynamic configuration
- Enhanced Mobilty
- Enhanced securiy

Native Link

- Direct Ethernet
- Router Advertising
- Automatic Configuration

NAT?

- Is NAT better?
- IPv6 provides for a unique address to each computer
- Need more than 1 IP for some services
  - SMTP, IRC, SSH
- Can still be firewalled at the border
- Incompatible with some applications (at all or some with hacks)

What hardware/OS supports it?

- Windows 95/98/ME (Trumpet Winsock)
- Windows 2000, NT (Microsoft Patch)
- Windows XP/2003 [SP1]
- Linux, FreeBSD, OpenBSD, NetBSD...
- Cisco IOS 12.xT
- Most commercial unix.. solaris, digital, hpux, aix, [open]darwin/macosx)
- Nokia

DNS Extensions

- “AAAA” record for Ipv6 Address
- Reverse dns (.int.arpa, .int.ip6) uses PTR
- bind9 supports

IPv6 Host File

```
seven    IN    A       130.95.13.25
seven    IN    AAAA    2001:388:7094:4080::7

mirrors  IN    AAAA    2001:388:7094:4080:3123
```

IPv6 Reverse DNS

; IPv6 reverse zone for 2001:618:4:12c1::/64

```
$ORIGIN 1.C.2.1.4.0.0.0.8.1.6.0.1.0.0.2.ip6.arpa.
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0    IN    PTR    balhalla.ipv6.irc-desk.net.
2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0    IN    PTR    irc-desk.net.
3.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0    IN    PTR    www.irc-desk.net.
4.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0    IN    PTR    balhalla.uk.irc-desk.net
```

What can you do with IPv6?

- Websites
  - Netbsd.org, mew.org, kame.org, many many others
- Mirrors
  - ftp.ipv6.espak.ee
  - ftp.heanet.ie
  - ftp.ipv6.digital.com

What can you do with IPv6?

- IRC
  - FreeNode.net: irc.ipv6.freenode.net
  - OFTC: irc6.oftc.net
  - IRCnet: irc6.datanet.ee
  - EFNet: irc6.qeast.net
  - FlexNet: irc6.nl.flexnet.org

Applications with IPv6 support

- Internet Explorer
- irssi
- Apache (½)
- PuTTY
- tin
- fetchmail
- squid
- pidentd
- mozilla (linux)
- Icecast/XMMS
- php4
- python2.3

... just to name a few ...

Web resources

- http://www.hs247.com/ - Online Ipv6 Resource
- http://www.freenet6.net/ - Tunnel broker (US)
- http://tb.aarnet.edu.au/ - Tunnel broker (AU)
- http://www.sixlabs.org/ - Coming soon
- http://www.linux-ipv6.org/ - USAGI (Linux)
- http://www.kame.net/ - KAME (FreeBSD)

Cheers :)

Any questions, please ask.

Slides: http://www.sixlabs.org/talks/

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And cheers to Ryan Verner for loaning me a laptop because mine suxbad and is dying :)