

# IPv6 update

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# Are you the Elders of the Internet?



Asking for a friend...

# What's to update?

- A&A have been doing IPv6 since 2002!
  - Yes, that is only 15 years - we were a bit behind the times as IPv6 has been around nearly 20 years, sorry
- Some stuff has changed over time
  - Back then it was over IPv4 tunnels to users and transit, now all native!
- But for many many years IPv6 has been completely standard and default for all customers of A&A
  - We supply an IPv6 capable router - it just works!

IPv6 is not the new kid any more



# CPE is still the issue

- We have some new ZyXEL routers
  - VMG1312-B10D
- They seem to be way better than the previous ones
- They do seem to be “just working” using IPv6
  - Even for things like TR-069!
- Previously they mostly worked but some people had issues

# IPv6 all the services

- Most of our internal systems were obviously able to do IPv6 anyway, being Linux based, so IPv6 from the start
- Our FireBrick routers (for BGP, L2TP, etc., and as business CPE) were designed from the start with IPv6
- We did work with the first ADSL/VDSL router manufacturers handling IPv6 to ensure our LNSs worked well with them - some visiting our offices and testing
  - DHCPv6 and PD is, IMHO, a very messy way to do this, but stuck with it now
- The last service to be fully IPv6 was our VoIP platform (run on FireBrick), in part as we had a lot of problems finding anything to do compatibility testing!

# End user acceptance

- Not an issue - browsers, operating systems, everything - just works!
- As we all know, IPv6, done right, is behind the scenes
  - Nobody knows they are using IPv6, and nobody should care
- “When you do things right, people won’t be sure you’ve done anything at all”





# Blocks for customers

- There is now more consistent guidance from RIPE on this
- We continue with our system of a /48 for a “customer”, and they can route parts (or all) of that as they wish to each “site”, with a /64 being the default
- Yes, for home customers that means a /48 for them, with minimum default of /64 routed
- Obviously that means one or more blocks via DHCPv6/PD

# Some IPv6 only customers

- Yes, we have a few sites with IPv6 only
  - Hackspaces, mostly
- They may have IPv4 via someone else, and IPv6 via us, but they are experimenting
- We have tools to allow IPv4 access via IPv6 only addresses (FireBrick)

# Source address filtering

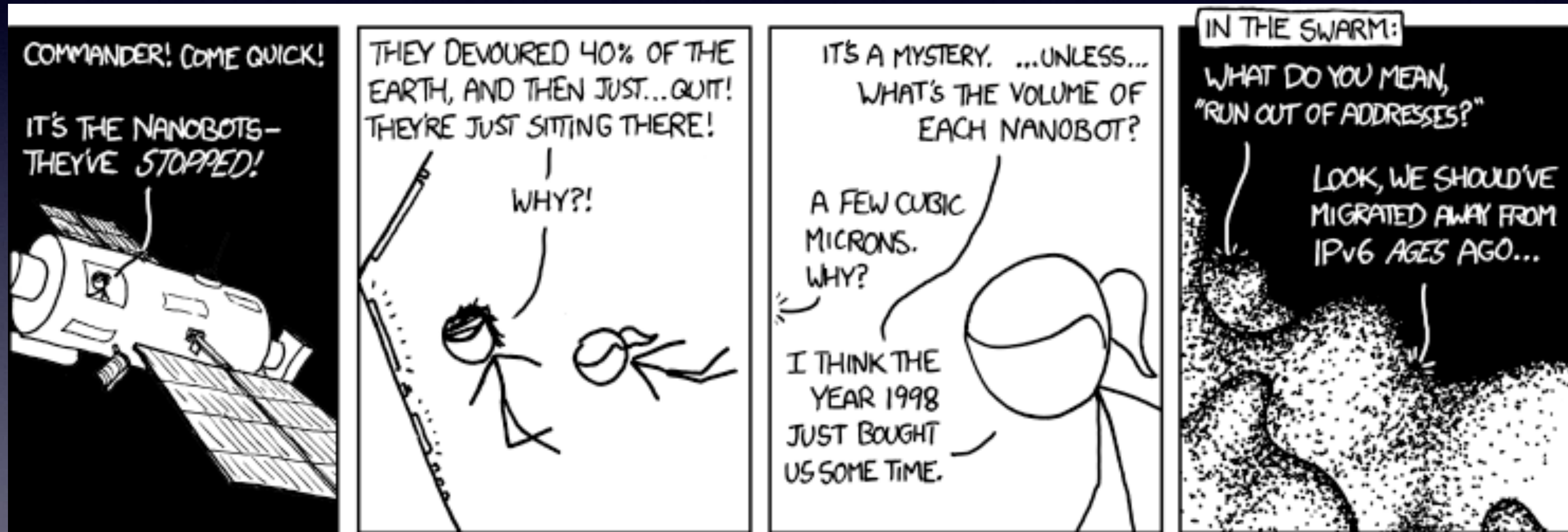
- Our source address filtering of customer traffic obviously has to handle both their IPv4 source address and IPv6 source address
- We also handle 2002::/16 prefix IPv6 with any of their IPv4 addresses embedded in the address!
- Yes, this did happen, where people were using 2002::/16 without realising it!

# Some unis dropping IPv6?

- I was shocked to be at Southampton uni last week to find they have some networks where they are deliberately disabling IPv6?
- What is going on here? Surely that is crazy!
- Some parts of the internet not available only on IPv4
  - [www.loopsofzen.uk](http://www.loopsofzen.uk)
- And it will only get worse. Why would any network do this?



# We know IPv6 is the future?!



# Should IPv6 be mandatory?

- EU law requires "*Providers of internet access services shall treat all traffic equally, when providing internet access services, without discrimination, restriction or interference, and irrespective of the sender and receiver, the content accessed or distributed, the applications or services used or provided, or the terminal equipment used.*"
- Surely that means you cannot discriminate and not handle IPv6?

# Should IPv6 be mandatory?

- BEREC (who provide guidance on the EU net neutrality law) mention IPv6 in only one place in their 43 page document. They consider “IPv4 only service” does not stop you being a “provider of an Internet Access Service”
  - That comment only relates to the definition of IAS
  - They do not comment on the obligations of an IAS provider not to discriminate, just that IPv4 only providers are in fact still “providers of Internet Access Service” so subject to those non discrimination obligations...

# Should IPv6 be mandatory?

- Nobody knows
- There has been no EU enforcement action on any aspect of the net neutrality laws as yet
- One day it may be decided - will be interesting



# NAT is evil



- Yes, so use IPv6
  - But I have implicit firewall with IPv4 NAT
- IPv6 routers have firewalls by default
  - But then how do I host a game, I need uPnP?
- Oh crap, we need a way to do that... PCP? (RFC6887) maybe?
  - FireBricks now support PCP to allow IPv6 firewall holes (with controls)

# Thank you for your time

- A&A web site [www.aa.net.uk](http://www.aa.net.uk)
- FireBrick web site [www.FireBrick.uk](http://www.FireBrick.uk)
- My blog [www.me.uk](http://www.me.uk)
- A fun IPv6 only website [www.loopsofzen.uk](http://www.loopsofzen.uk)