

IPv6 deployment experiences

Marco Hogewoning

marco@xs4all.net

IEPG - Maastricht (NL) - 25 July 2010

Agenda

XS4ALL

- Who we are
- Where we are coming from
- Why we are doing it
- What the heck are we doing
- Solving the puzzle
- Issues encountered
- Things that still need fixing
- ...open end

Who are we ?

- One of the oldest Dutch ISPs
- Established May 1st, 1993
- Originated from 'Hacktic' as a not-for-profit
- Co-founder Amsterdam Internet Exchange
- Since December 1998 part of KPN NV
- Which happened to be the Dutch incumbent
- Operate an independent network (AS3265)
- Roughly 300k customers
- DSL access and hosting



We come from way back when...

XS4ALL

6bone pTLA 3FFE:8280::/28 allocated to XS4ALL-NL

Bob Fink fink@es.net

Tue, 02 Oct 2001 12:30:03 -0700

XS4ALL-NL in The Netherlands has been allocated pTLA 3FFE:8280::/28 having finished its 2-week review period.

<<http://whois.6bone.net/cgi-bin/whois?XS4ALL-NL>>

Note that it will take a short while for their pTLA inet6num entry to appear in the 6bone registry as they have to create it themselves. However, their registration is listed on:

<http://www.6bone.net/6bone_pTLA_list.html>

To create a reverse DNS registration for pTLAs, please send the prefix allocated above, and a list of at least two authoritative nameservers, to either bmanning@isi.edu or hostmaster@ep.net.

Thanks,

Bob

We come from way back when...

XS4ALL



(the IPv6 landscape back in the days)

Why we do it ?

XS4ALL



What the heck are we doing ?

XS4ALL



Solving the puzzle...

XS4ALL



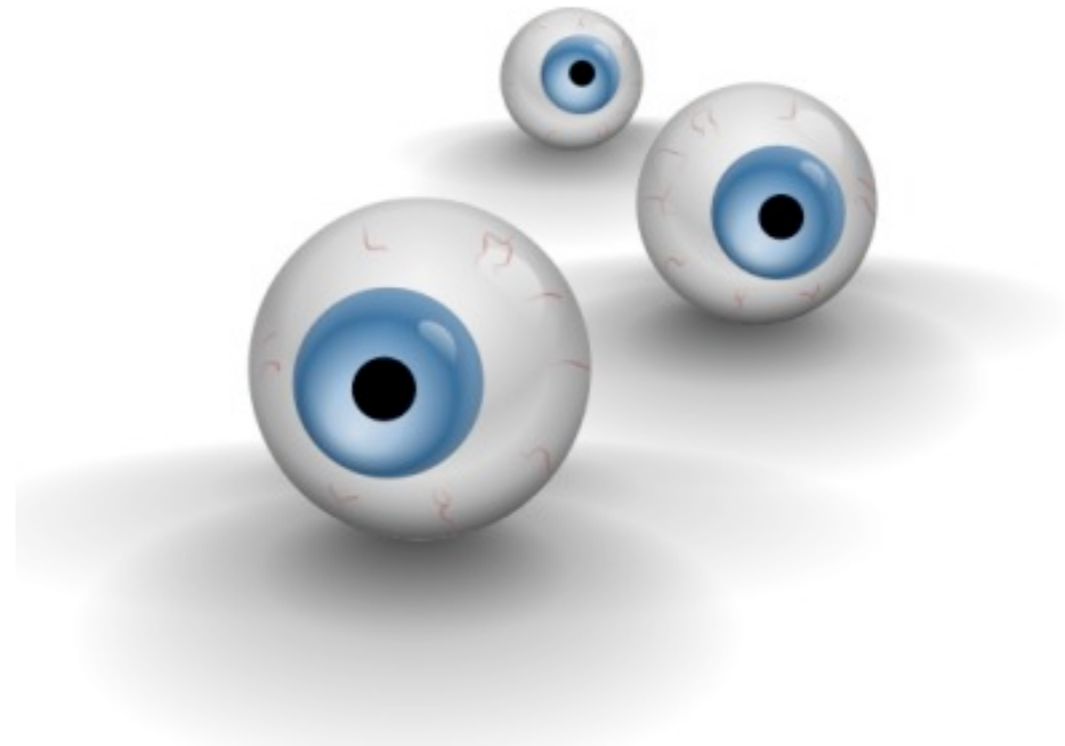
How to eat an elephant ?

(credits to Brian Carpenter)

Chicken or egg ?

- eyeballs want content
- content wants eyeballs

XS4ALL



Free usenet (2002)

XS4ALL

- newszilla6.xs4all.nl
- read-only open for the world
- as long as you use IPv6 as transport



Peeping through the keyhole

XS4ALL

- Access via 6in4 tunnels (since 2001)
- Limited bandwidth
- MTU issues
- Requires knowledge



IPv6 in the last decade

XS4ALL



Building the access layer

XS4ALL

- CPE support was fairly basic
- It could be done, but manually (2003)
- Still a pretty bumpy road
- Hacking it (PPtP -> linux)
- Vendors: “tell us what to build”



The breakthrough

XS4ALL

- AVM one of the first to introduce consumergrade CPE (May 2009)
- FRITZ!Box 7270 beta firmware
- Relatively cheap and easy to manage
- Standards ?????



Monkey see...

XS4ALL

- Markets start to emerge (Google, Comcast)
- More vendors started releasing
- Draytek, D-link, ZyXEL (?), Technicolor
- Guided by draft-ietf-v6ops-ipv6-cpe-router



The road is there

XS4ALL



Test driving

XS4ALL

- Bugs are a part of life
- So you need to test
- Start slow...
- ...and speed up as you go
- XS4ALL runs a pilot since May 2009...
- ...so is Comcast (and various others)
- To be prepared !!!!!



Back to reality

XS4ALL



We are running out of time...

XS4ALL





Status update



XS4ALL

(sorry for the long introduction)

Results of the pilot so far

XS4ALL

- Mostly happy customers (~300)
- Especially the less technical users are ok
- The techies will always find something
- Is perfect the enemy of good enough ?
- CPE bugs are still present but decreasing
- The real delay is in the OSS/BSS



So what are the issues



XS4ALL

We need real life experience

XS4ALL

- Find all the bugs
- Make sure the drafts actually work
- CPE overview on <http://labs.ripe.net>
- ARIN wiki also contains useful info
- Please test and give feedback
- We all benefit of this

Status of various documents

XS4ALL

- CPE requirements are still drafts
- Vendors don't like drafts as they change
- Not all vendors monitor the IETF closely
- Can lead to discussions
- This really needs to speed up...

A race condition by design ?

XS4ALL

- Normally when running IPv4 single-stack
 - Not being able to open IPCP is a failure
 - CPE backs off (close LCP) and try again
- When in dual-stack
 - IPv6CP opens but IPCP fails
 - This is not considered a fault
(after all single stack might be by design)
 - Customer ends up with 'IPv6 only'
 - And considers the internet broken

A race condition by design ? (2)

XS4ALL

- IPv4 pool full ?
- Dual session - single stack ?
- Difference in behavior
 - IPv4 address (one) is tied to PPP session
 - IPv6 prefix (IA_PD) is tied to DUID
 - Session hangs and claims IPv4
 - Address not available
 - But the IPv6 prefix is (DUID unchanged)
- Everybody implements the standard
- But the customer has a bad experience
- At the moment this is our primary risk !

Reverse DNS

XS4ALL

- draft-howard-isp-ip6rdns
- Provides an overview
- But what to ask for ?
- And whom to ask ?
- Main issues:
 - Trust
 - Security
 - Scalability
- Most likely we will build a webportal
- Not in unlimited numbers, should we wildcard ?

Handing out DNS resolvers

XS4ALL

- To many standards
- Mismatch can happen (DHCP vs RA)
- Some implement none
- Advertising a built-in vs ISP provided ?

Preference in built-in resolvers

XS4ALL

- Lots of consumer CPE have a resolver/proxy
- IPv6 support varies
- When supporting IPv6 you want predictable behavior as answers may vary based on transport (whitelisting etc)
- This is not always a clear case
 - Some will forward on v4 only
 - Or just pick the first one they got
 - Advertise themselves on v4 and advertise ISP supplied for IPv6

Blacklists and aggregation

XS4ALL

- When filling a blacklist...
- When do you aggregate ?
- And to what level ?
- Also can apply to other systems (Geo IP ?)
- Do not consider /48 to be default !!
- Is /64 a safe level ?



More ?

- The floor is yours



XS4ALL



XS6ALL

meer adressen.