An ISP perspective on IPv6 Deployment

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STRAIGHT FORWARD

My oldest ‘Thing to do’

- I have wanted to deploy IPv6 for a long time
- We’ll talk about the barriers to that, for an ISP
- But first…

Customer opinion

- What do our customers think about:
  - The need to transition to IPv6 to avoid IP address exhaustion?
  - The importance of the restoration of a true end to end IP Internet without NAT gateways?
  - The importance of IPv6 in their lives?


I have no idea what you're talking about...
...so here's a bunny with a pancake on its head.

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  - Simon Hackett
  - Australian Communications Mag
  - 1995

In the lab too long?

- “There is never time to do it right, but always time to do it over”
  - Critical items not resolved for many years have damaged the credibility of IPv6 deployment

Security

- "Security considerations are not discussed in this memo"
  - Lack of an end to end security architecture has further driven firewalls and NAT

Firewalls essential

- In the real world, the only thing stopping massive customer PC collapse is firewalls and NAT
- The costs of removing them would be massive
- Edge node security in the real world is really bad

The end to end mantra

- In 1995 we wanted to preserve end-to-end connectivity
- In 2006, the king is dead - long live the king
- In the real world:
  - Customers do not want end to end, they want to be firewalled
  - And ISPs agree with them

End-to-End examples:

- Soldiers with LANs in their backpacks within a battlefield IPv6 network
- Windscreen wipers on all the cabs in Tokyo
- Massive sensor networks
- Every single customer PC in Australia

None of them work

- None of them should be ‘public’ at all!
- All require security to firewall them, and are likely to use a server to securely/safely mediate access to summary data
- So what was that about end to end again?

Stopgaps still working

- CIDR worked
  - And IPv6 does not change this
- NAT staved off address starvation
  - *Remarkably* well

NAT: Not the anti-christ

- NAT and firewalls are the real world
  - Society employs them in many realms
  - They have naturally entered this one
  - IETF negativity toward NAT standardisation has raised to cost of NAT and increased interworking faults
  - But it works anyway

Lack of CPE router IPv6

- Almost zero consumer broadband CPE deployment of IPv6
  - Critical barrier in real world consumer networks
  - Blocks end-to-end even if desired
  - Difficult to see these devices ceasing to use NAT/Firewalls due to inherent benefits in doing so

Business Case?

- There is no compelling ISP business case
  - Commercial premium for IPv6 is zero
  - IPv6 not *essential* for *any* application
- There is no nett positive income to gain, its just infrastructure change after all
- True end to end distributes the security problem in a currently un-tenable manner
- No *current* crisis to force the issue

Other delay factors

- Provider Independent Multihoming broken
- Shims and other hacks
- Arguments over standardisation further delay deployments

Laundry list of other things

- Other challenges abound, to further obstruct progress to IPv6:
  - dual-stacking challenges; non-optimised router code; apathy; security challenges; customer support; DNS infrastructure challenges; ISP resource requirements (network operations, technical support)

So what now?

- Keep improving IPv4
  - This will keep happening anyway.
- *Do* keep advancing IPv6 ready for the crunch when it finally happens
- Secondary stopgap:
  - Two-stage NAT on customer dynamic IP populations would massively lower IPv4 demand
  - “I cant believe its not the Internet”
  - Static IP customers exempted but charged more for requiring end-to-end
  - No *current* premium on external static IPs

Tradeable IPv4 Addressing?

- Create an economy around IPv4 IP ranges to force the crunch earlier:
  - Sell new, and trade old, IPv4 address ranges
    - As for Carbon tax/Carbon Credit economy
  - Zero-rate IPv6 addresses for a ‘long’ time
  - Create economic drivers to achieve result needed
  - Donate new direct NIC income stream into Carbon Credits!

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Otherwise?

- Its still the best thing we have when IPv4 runs out
- (still!) a question of when
- Without economic drivers or customer demand…?
  - People are very bad at caring in the absence of crisis

So will we deploy?

- Yes, we will
- It remains, however, a difficult question of *when*
- I really, really want to do it
- It has, somehow, to get above the noise floor
- It has, somehow, *not* to represent a major technical cost to deploy, or:
- Tradeable IPv4 addresses may force the issue on an economic basis ‘underneath’ customers in a network transparent manner

Questions?

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