IPv6 deployment

ggm@apnic.net

gih@apnic.net

IPv6 deployment
the beauty pageant

gih@apnic.net

ggm@apnic.net

What do I want to know?

What do I want to know?

- Is it too late for IPv6?

What do I want to know?

- Is it too late?
- Could IPv6 work?

What do I want to know?

- Is it too late?

- Could it work?

- Do I have to go on being 'negative' about IPv6 just to get folk to listen?

What do I want to know?

- Is it too late?
- Could it work?
- Do I have to go on being 'negative' about IPv6?

…. Or are there any signs which might justify some optimism that it will all work out?

What do I want?

What do I want?

I'd like to be in 'my happy place'! ☺

What do I want?

I'd like to be in 'my happy place'

I really want to be pro IPv6

What do I want?

I'd like to be in 'my happy place'

I really want to be pro IPv6

Really.

What do I want?

I'd like to be in 'my happy place'

I really want to be pro IPv6

Really.

Because the alternatives are now looking REALLY ugly…

But its not just about me

But its not just about me

Really.

What do ISPs want to know?

What do ISPs want to know?

- If I invest in IPv6, will anyone be able to use it?

What do ISPs want to know?

- If I invest in IPv6, will anyone be able to use it?
- How quickly do I get an ROI compared to other spend?

What do ISPs want to know?

- If I invest in IPv6, will anyone be able to use it?

- How quickly do I get an ROI compared to other spend?

- What are my competitors doing?

What do ISPs want to know?

- If I invest in IPv6, will anyone be able to use it?

- How quickly do I get an ROI compared to other spend?

- What are my competitors doing?

ARE MY CUSTOMERS READY?

What do Content Providers want to know?

What do Content Providers want to know?

- If I Dual Stack will I strand existing clients?

What do Content Providers want to know?

- If I Dual Stack will I strand existing clients?
- Will performance suck?

What do Content Providers want to know?

- If I Dual Stack will I strand existing clients?
- Will performance suck?
- How many clients will switch to IPv6?

What do Content Providers want to know?

- If I Dual Stack will I strand existing clients?

- Will performance suck?

- How many clients will switch to IPv6?

ARE MY CLIENTS READY?

What do public policy wonks want to know?

What do public policy wonks want to know?

- Do we have to go and beat up industry players with a Big Stick?

What do public policy wonks want to know?

- Do we have to go and beat up industry players with a Big Stick?

- Do we have to bribe them with incentives and sugar treats?

What do public policy wonks want to know?

- Do we have to go and beat up industry players with a Big Stick?

- Do we have to bribe them with incentives and sugar treats?

- Are we doing at least as well/badly as everyone else?

What do public policy wonks want to know?

- Do we have to go and beat up industry players with a Big Stick?

- Do we have to bribe them with incentives and sugar treats?

- Are we doing at least as well/badly as everyone else?

- If we are doing relatively well/poorly can we make something of it?

What do we know?

IPv6 Client Genotypes

Clients come in two types:

IPv6 Client Genotypes

Clients come in two types:

1. Loud and Proud IPv6

    "I have IPv6 and I'm willing to use it whenever I can!"

    i.e. clients who prefer to use IPv6 in dual stack scenarios

    Typically, these clients use a "native-mode" IPv6 ISP

IPv6 Client Genotypes

Clients come in two types:

1. **Loud and Proud IPv6**
   "I have IPv6 and I'm willing to use it whenever I can!"
   i.e. clients who prefer to use IPv6 in dual stack scenarios
   Typically, these clients use a "native-mode" IPv6 ISP

2. **Hiding in the Closet IPv6**
   "I have an active IPv6 stack, but I'll try to hide it because I know that auto-tunneling sucks!"
   i.e. clients who will not use IPv6 except when presented with an IPv6-only or even not until they see an IPv6-literal URL, in which case they will be persuaded to come out of the closet and expose their IPv6 capability!
   Typically, these clients use a IPv4 ISP and IPv6 is accessed by auto-tunnels

Data

- 50+ weeks of collated measurements via javascript & flash using 1x1 image fetches
- Includes client tests to check Dual Stack Preference, IPv6 only capability, auto-tunnel access, V6 Literal

What do we know?

- We have a simple, scaleable, effective method to test IPv6 capability

- We know the source IPs of tested clients, and how they map to provider and economy

- We have a long-baseline of activity
  - Enough to now make some observations on trends

- We think we may have some useful data

What's today's question?

- Is IPv6 capability across the Internet uniform or lumpy?

  - Is IPv6 capability much the same across the entire Internet?

  - Or can we see differences in IPv6 client capability metrics across different economies?

What's today's question?

Or, to put it more crudely, are various national IPv6 promotion campaigns and public procurement programs working, or are they just more hot air?

Data Set

- Between 150,000 and 3,000,000 tests/week
- 29 week sample series for 2011, consistent test methodology
- Exclude economies with less than 100 datapoints per week
- Some 150 economies can be analysed for IPv6 capability with some confidence

So.. What did we find?

IPv6 Capability Data

- Relative IPv6 capability, per economy

IPv6 Capability Data

- Relative IPv6 capability, per economy
- As seen from client-side

IPv6 Capability Data

- Relative IPv6 capability, per economy

- As seen from client-side

- Including both measures of clients with an active IPv6 stack but no local IPv6 service as well as clients with a native IPv6 service

IPv6 Capability

- So, what proportion of clients have an active functioning IPv6 stack, by economy?

Good eh?
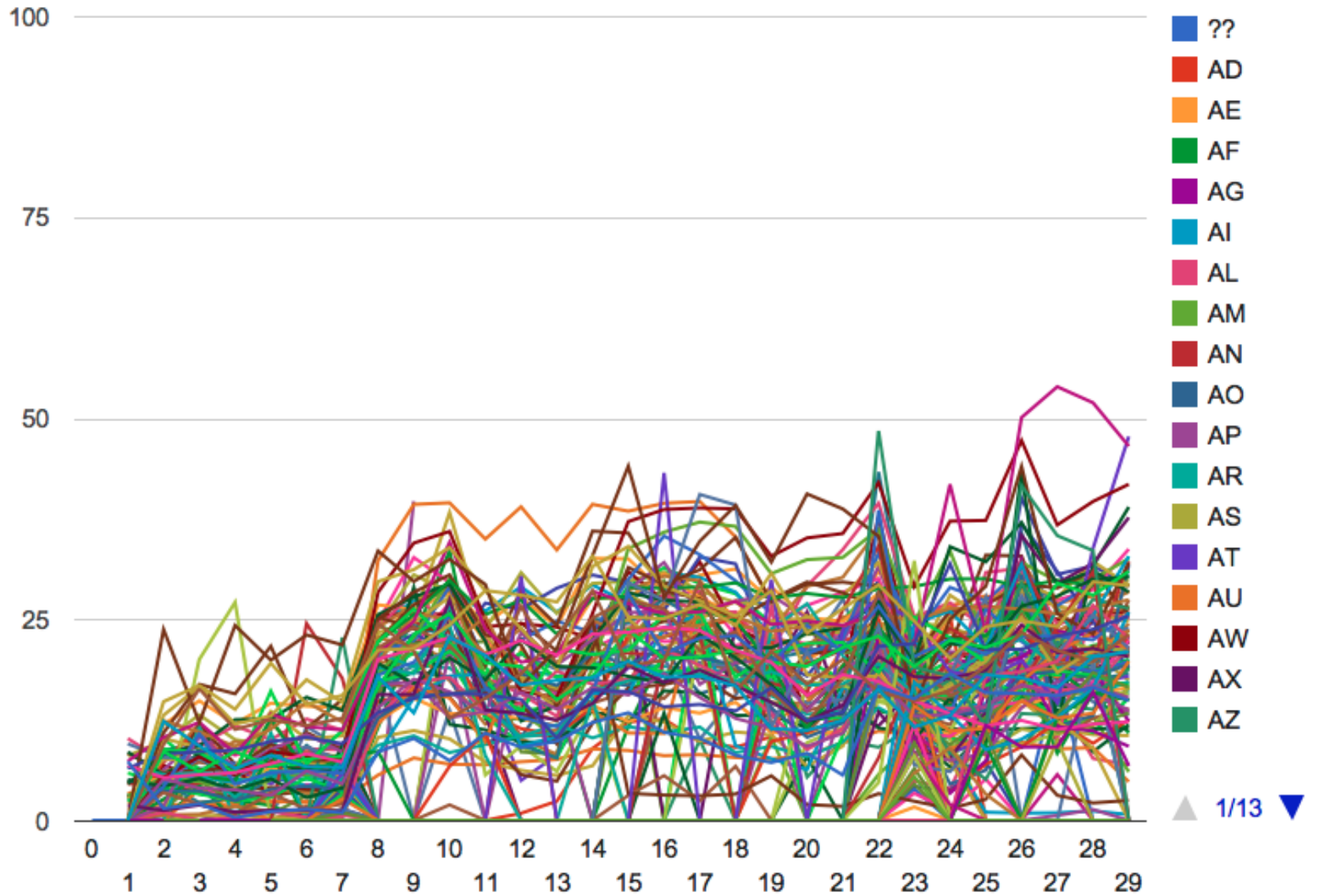
Er.. What was that spaghetti?

Latent IPv6 capability per economy
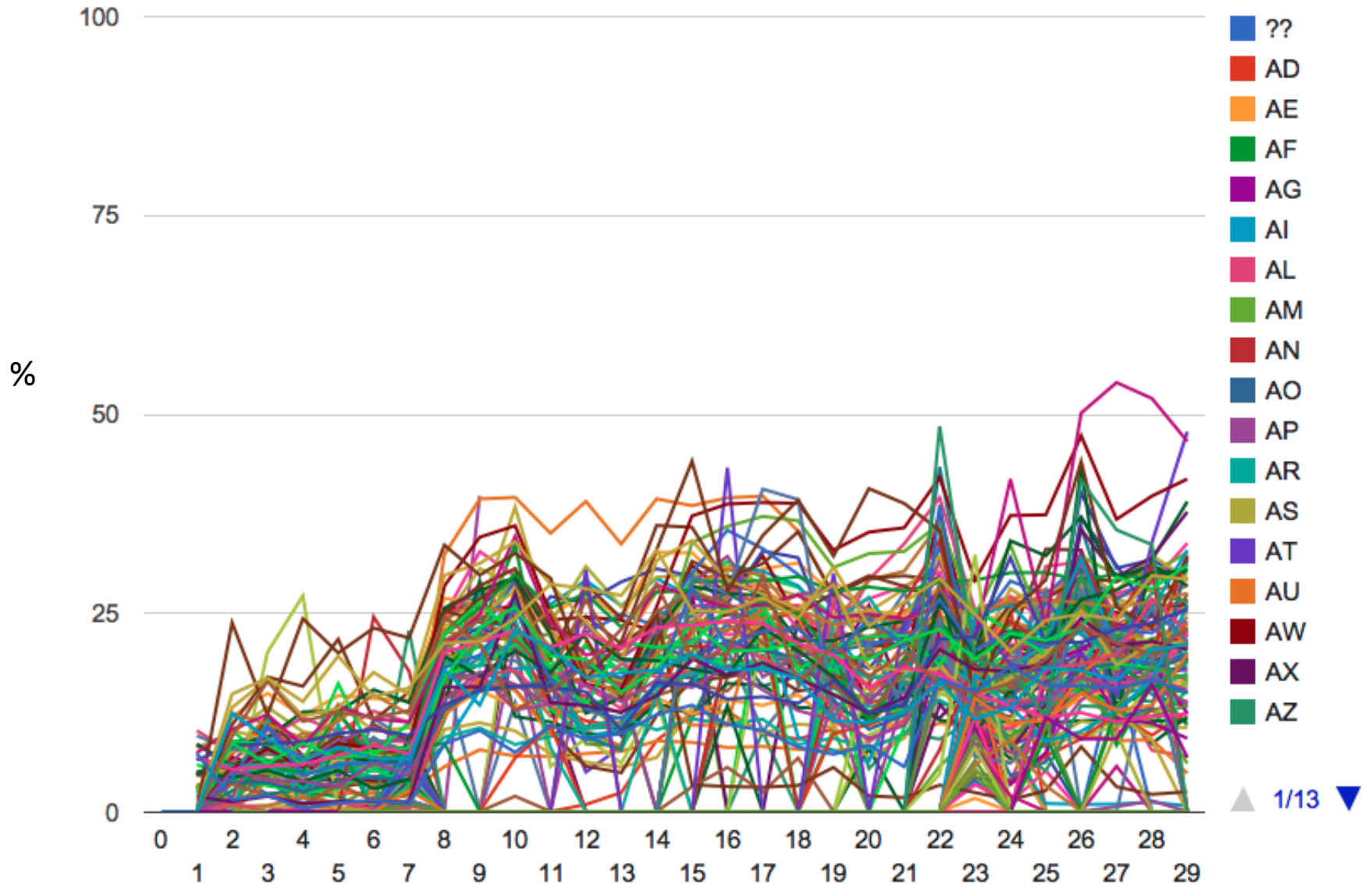
Holy Cow! 25%

- Varying per economy, but around 20-25% of the internet we see appears able to do IPv6 RIGHT NOW

Holy Cow! 25%

- Varying per economy, but around 20-25% of the internet we see appears able to do IPv6 RIGHT NOW

- 25% of your customers are ready to run IPv6. They have an active IPv6 protocol stack on their system. And it works! So its likely that IPv6 is just going to work, if you are prepared to bring it to their door

25%?
But you told me it was 0.4%!

25%?
But you told me it was 0.4%!

I did, and that number was is also "right"!

25%?
But you told me it was 0.4%!

- 0.4% of clients will prefer to use IPv6 in a Dual Stack Scenario.

  These clients typically have an IPv6 service delivered by their ISP, and use conventional IPv6 unicast addresses

- Some 4 – 6% of clients have an active IPv6 Stack and Public IPv4, and their host system uses 6to4 auto-tunneling.

  Most host systems will de-pref 6to4 below IPv4 access. Considering the performance and reliability costs of 6to4, this is a prudent move!

25%?
But you told me it was 0.4%!

- Some 20% of clients have an active IPv6 Stack and Private IPv4, and their host system uses Teredo auto-tunnelling

  Most host systems will try to avoid using IPv6 with Teredo. Considering the awesomely bad performance and reliability penalty of Teredo, this is a prudent move!

Time for a beauty pageant…

Time for a beauty pageant…

- Comparisons are ugly, but maybe its time for some baseline observations about the kind(s) of capital investment challenges different economies are facing with IPv6…
- Some very obvious winners and losers in the national IPv6 capability rankings.
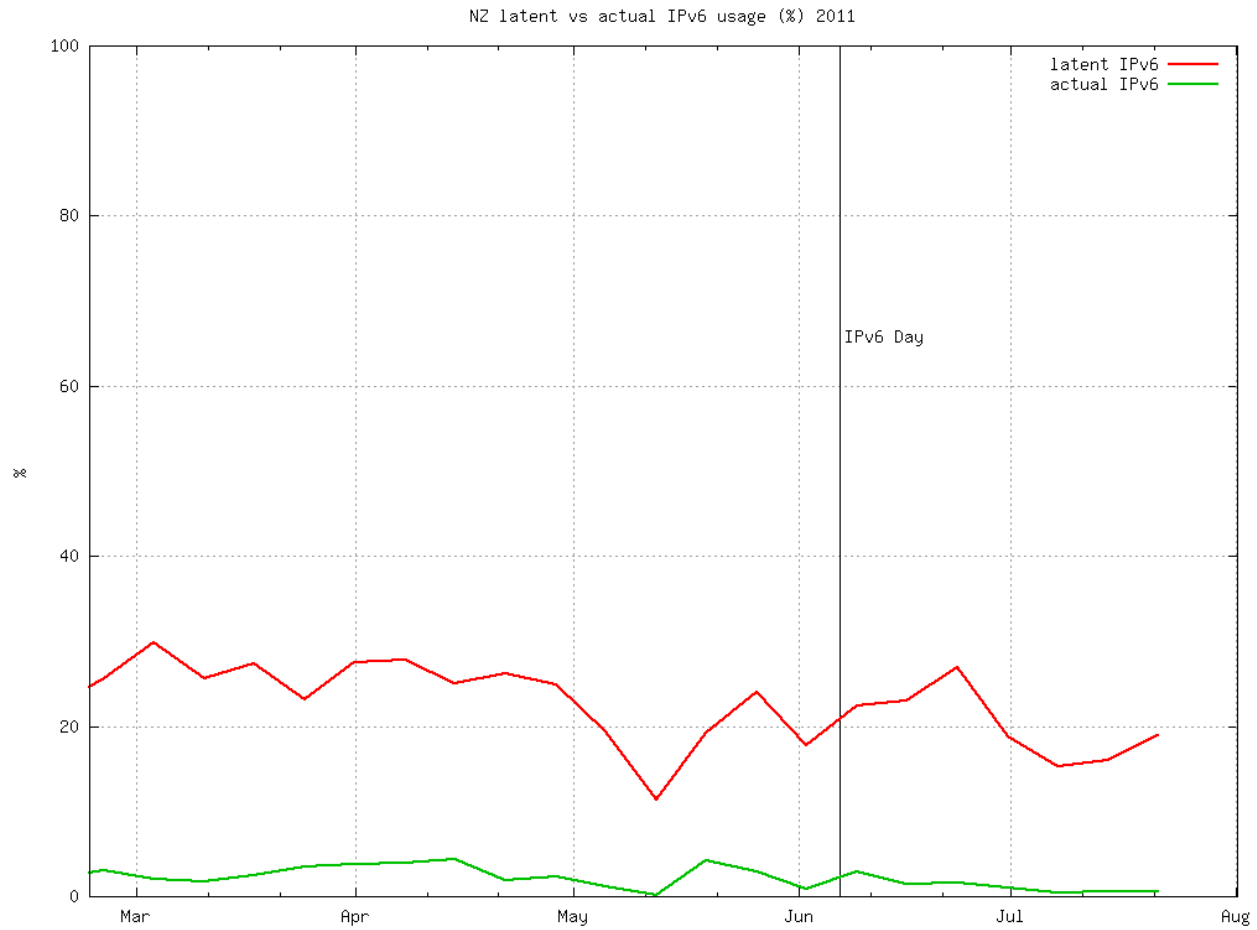- Some BIG economies down below 10% latent IPv6

Way to go Russia!
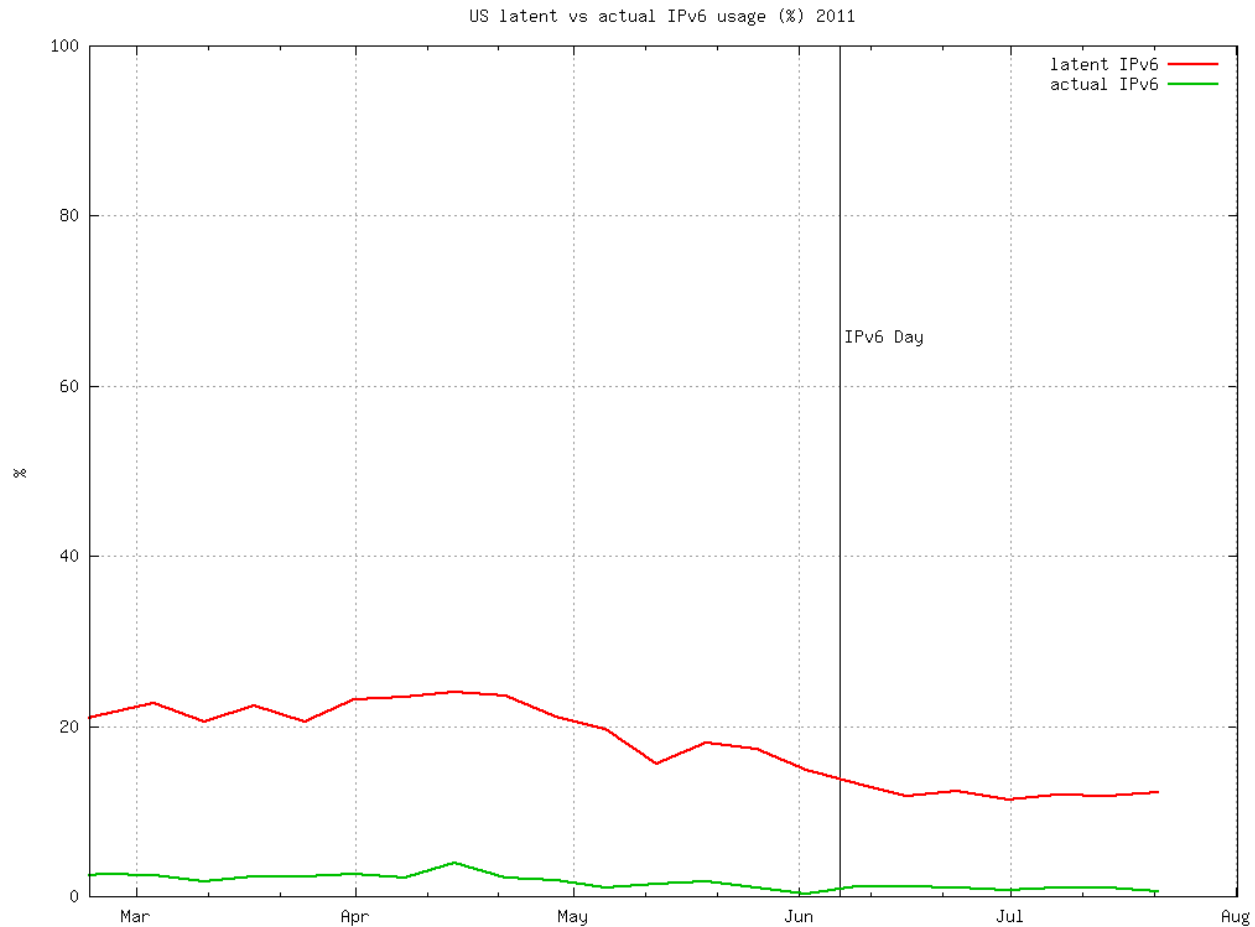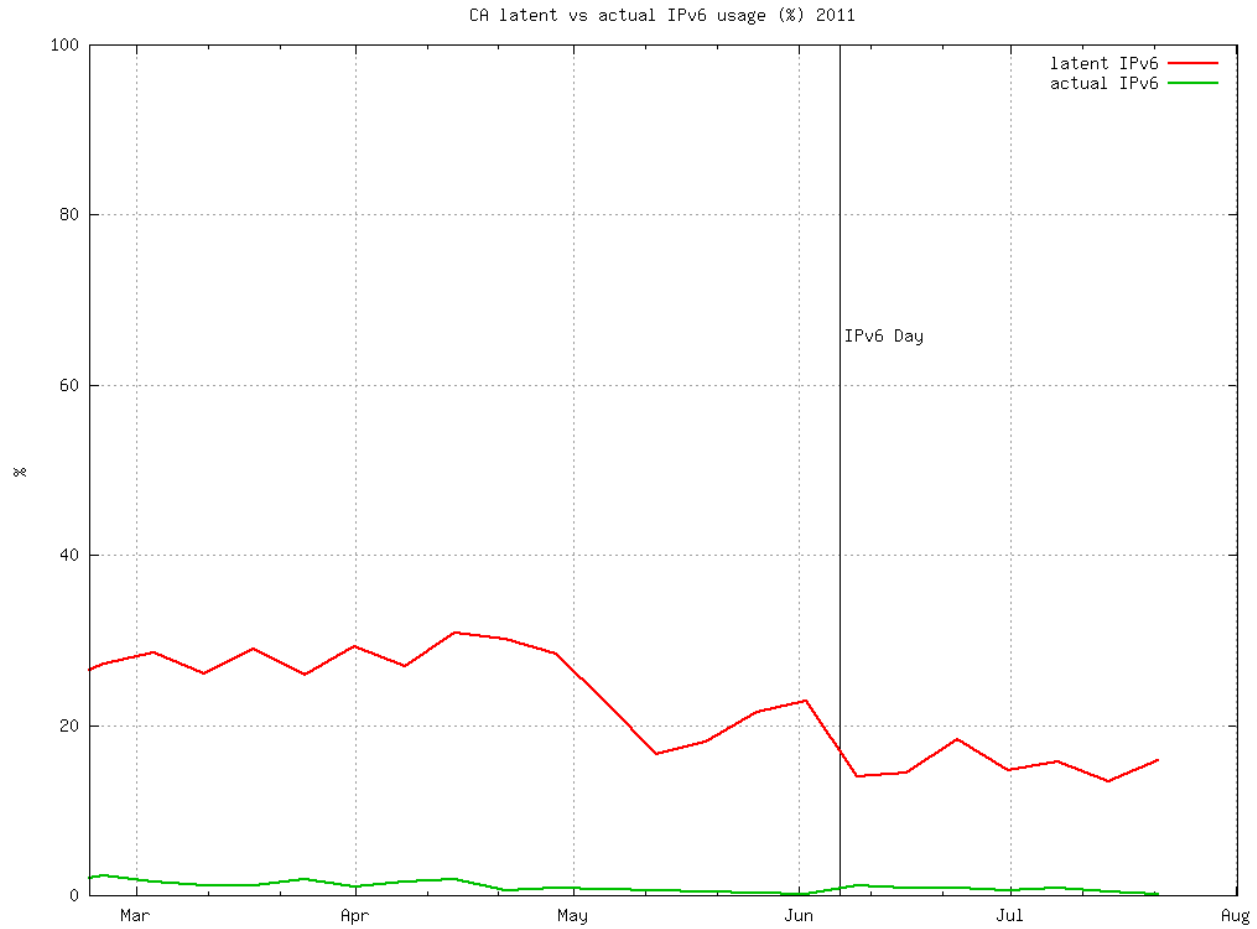
RU latent vs actual IPv6 usage (%) 2011

…a long way to go, America!

US latent vs actual IPv6 usage (%) 2011

Oh Canada!

CA latent vs actual IPv6 usage (%) 2011

Australia…

AU latent vs actual IPv6 usage (%) 2011

New Zealand...

NZ latent vs actual IPv6 usage (%) 2011

Sweden…

SE latent vs actual IPv6 usage (%) 2011

Japan…

JP latent vs actual IPv6 usage (%) 2011

China…

CN latent vs actual IPv6 usage (%) 2011

India…

IN latent vs actual IPv6 usage (%) 2011

Portugal…

PT latent vs actual IPv6 usage (%) 2011

Netherlands…

NL latent vs actual IPv6 usage (%) 2011

Germany!

DE latent vs actual IPv6 usage (%) 2011
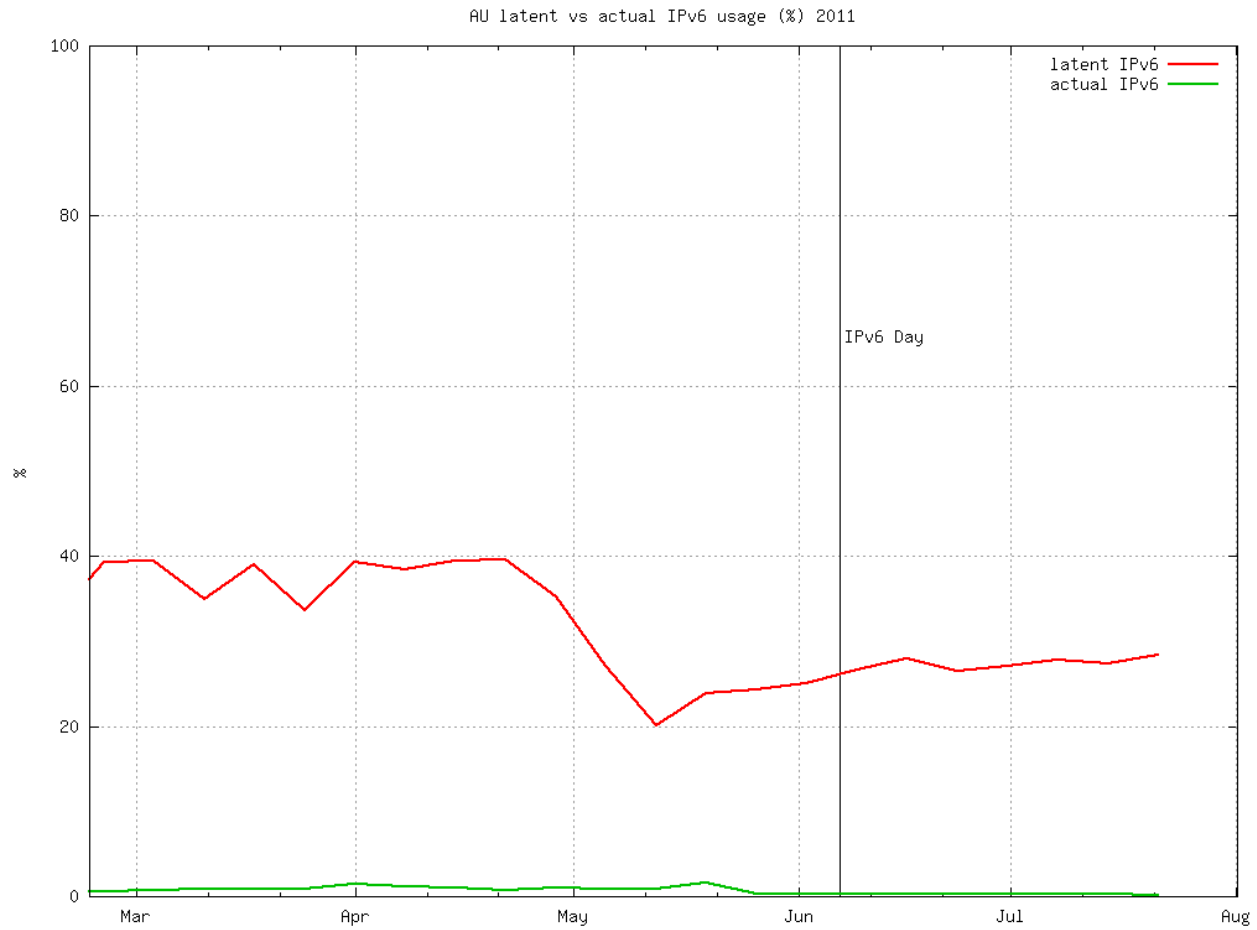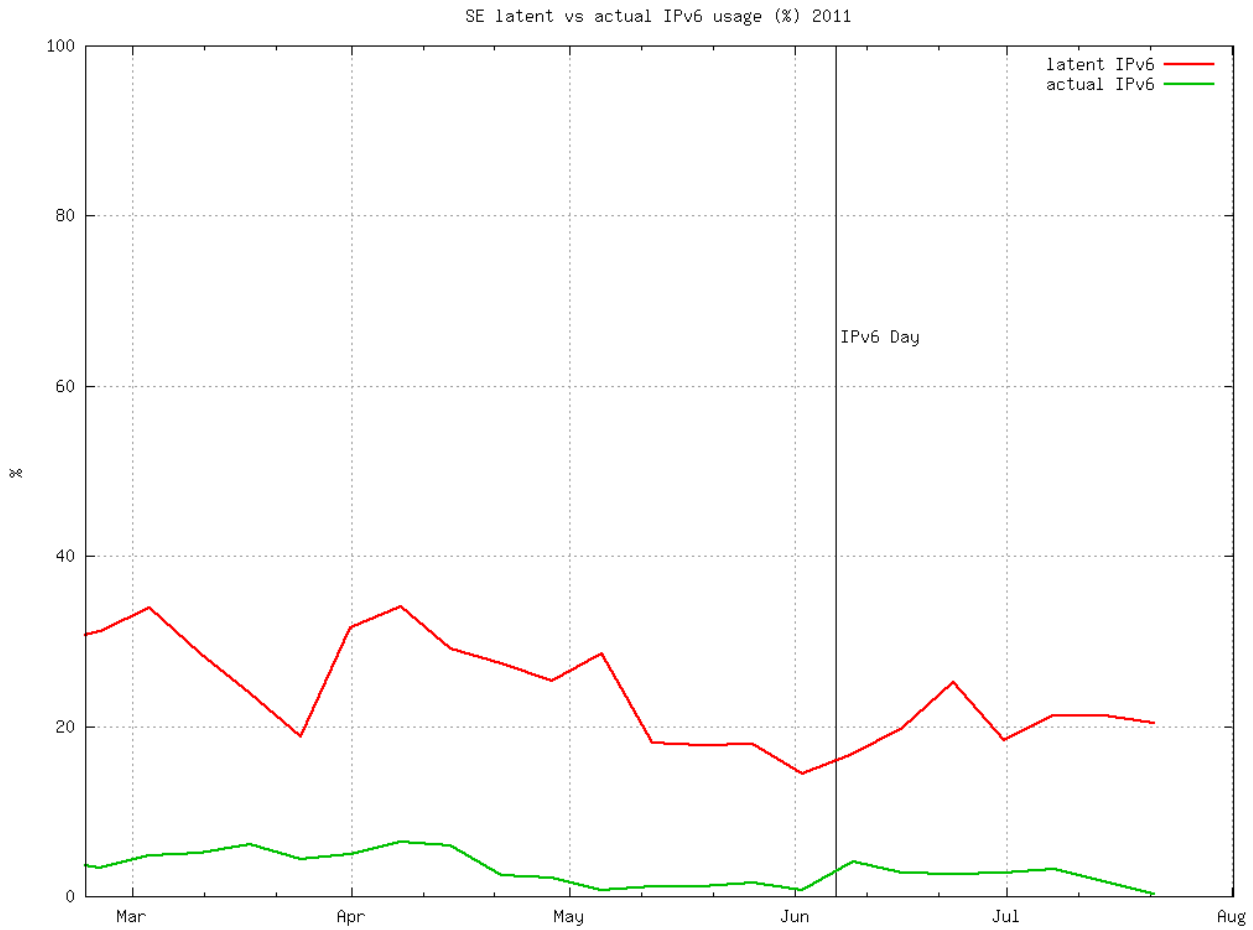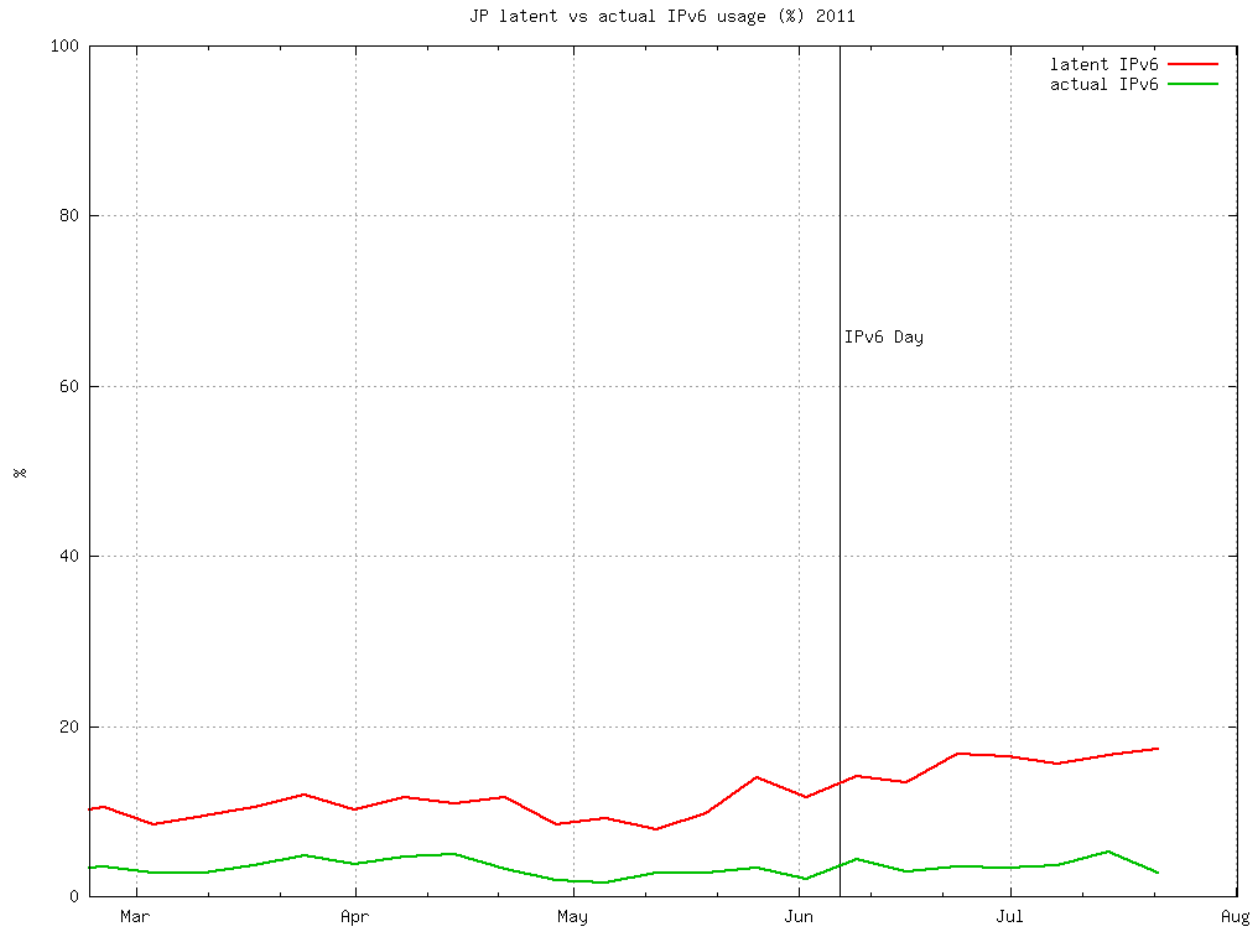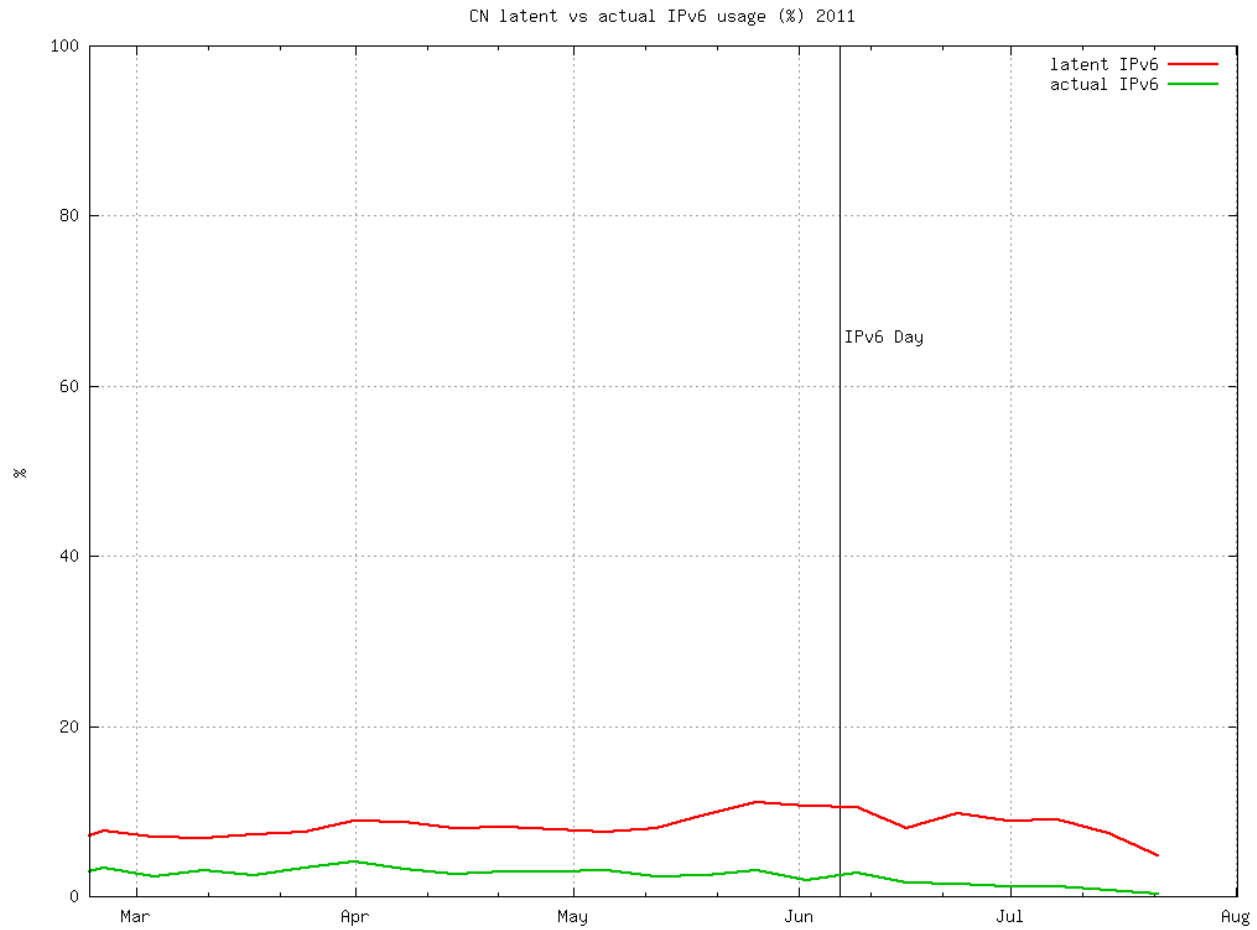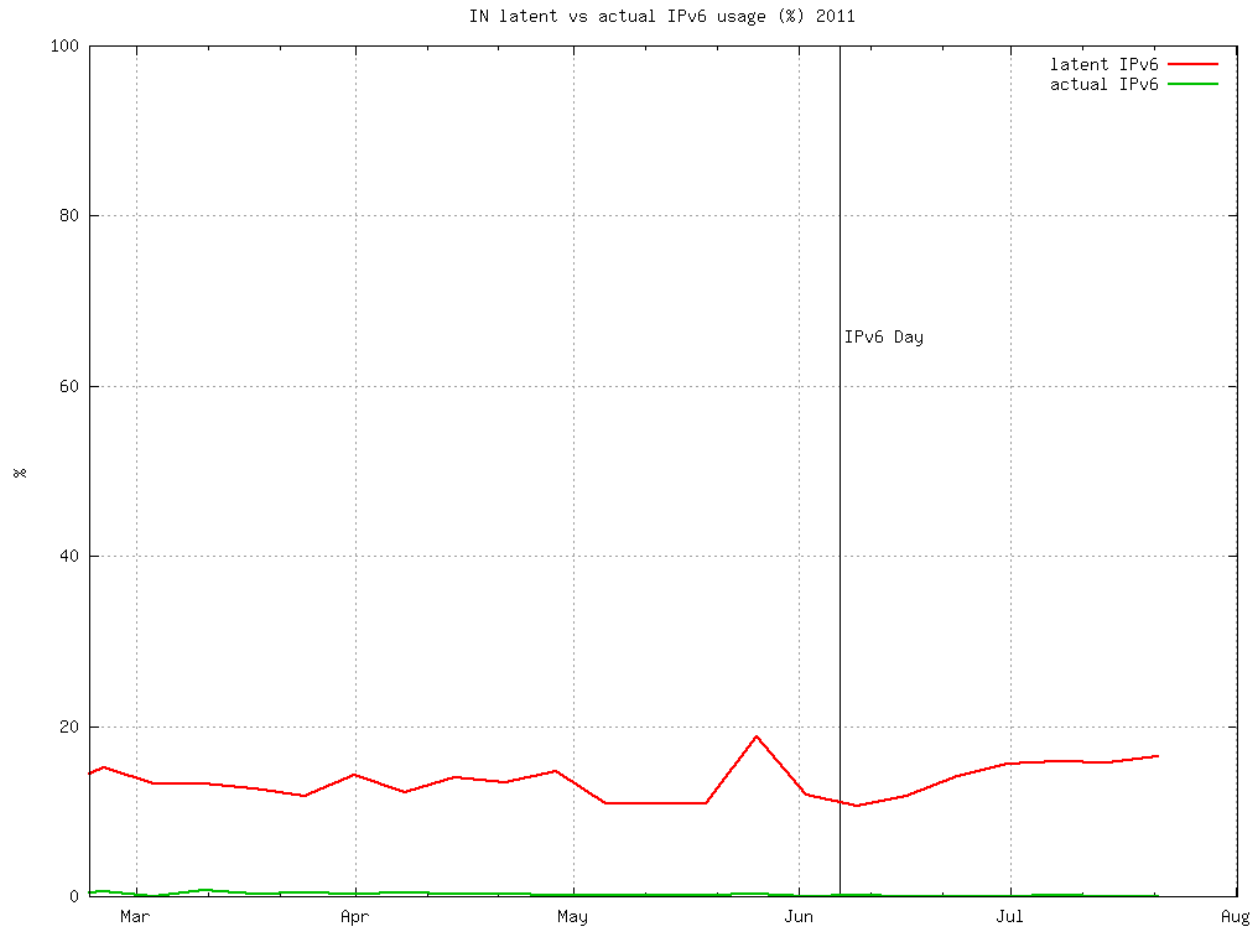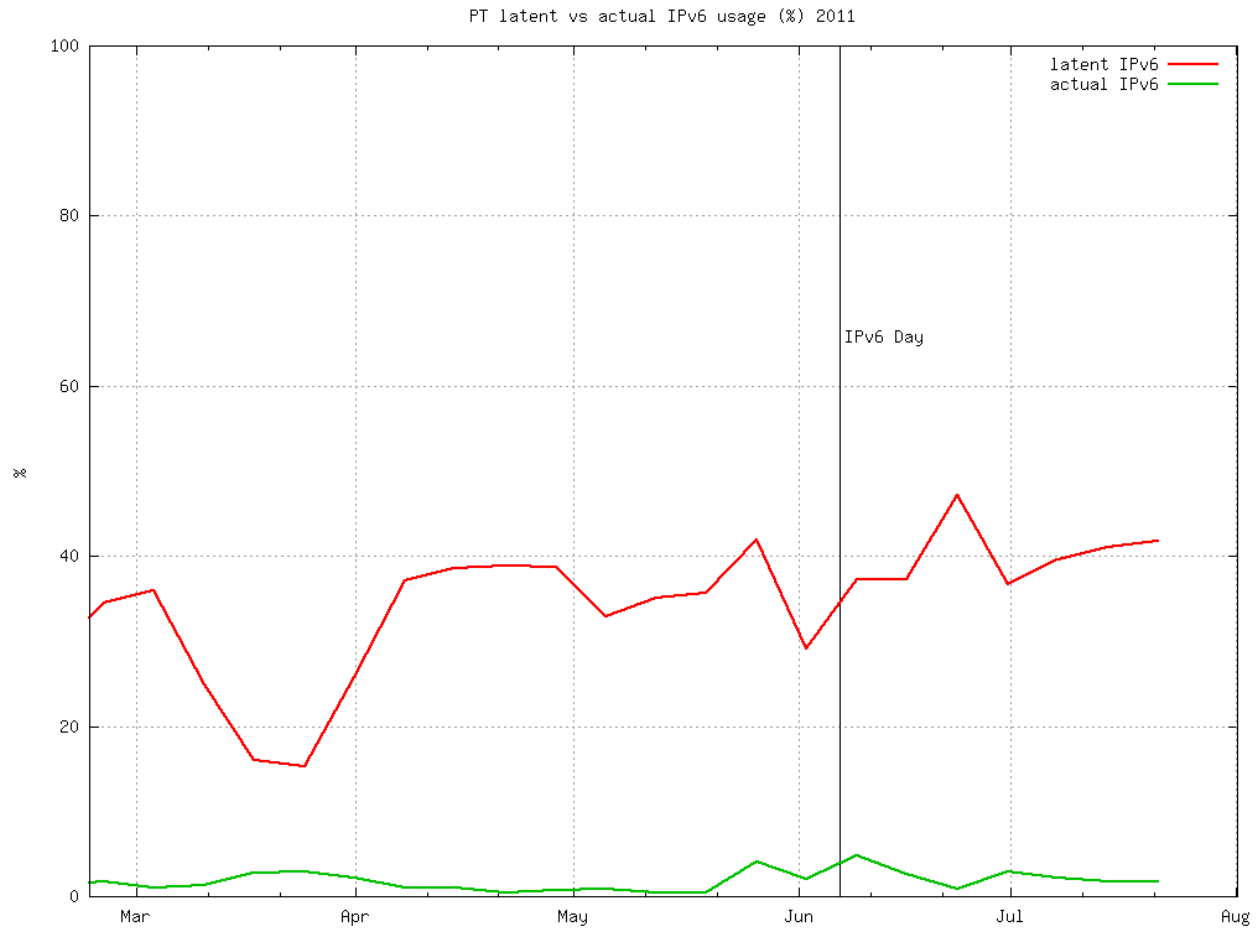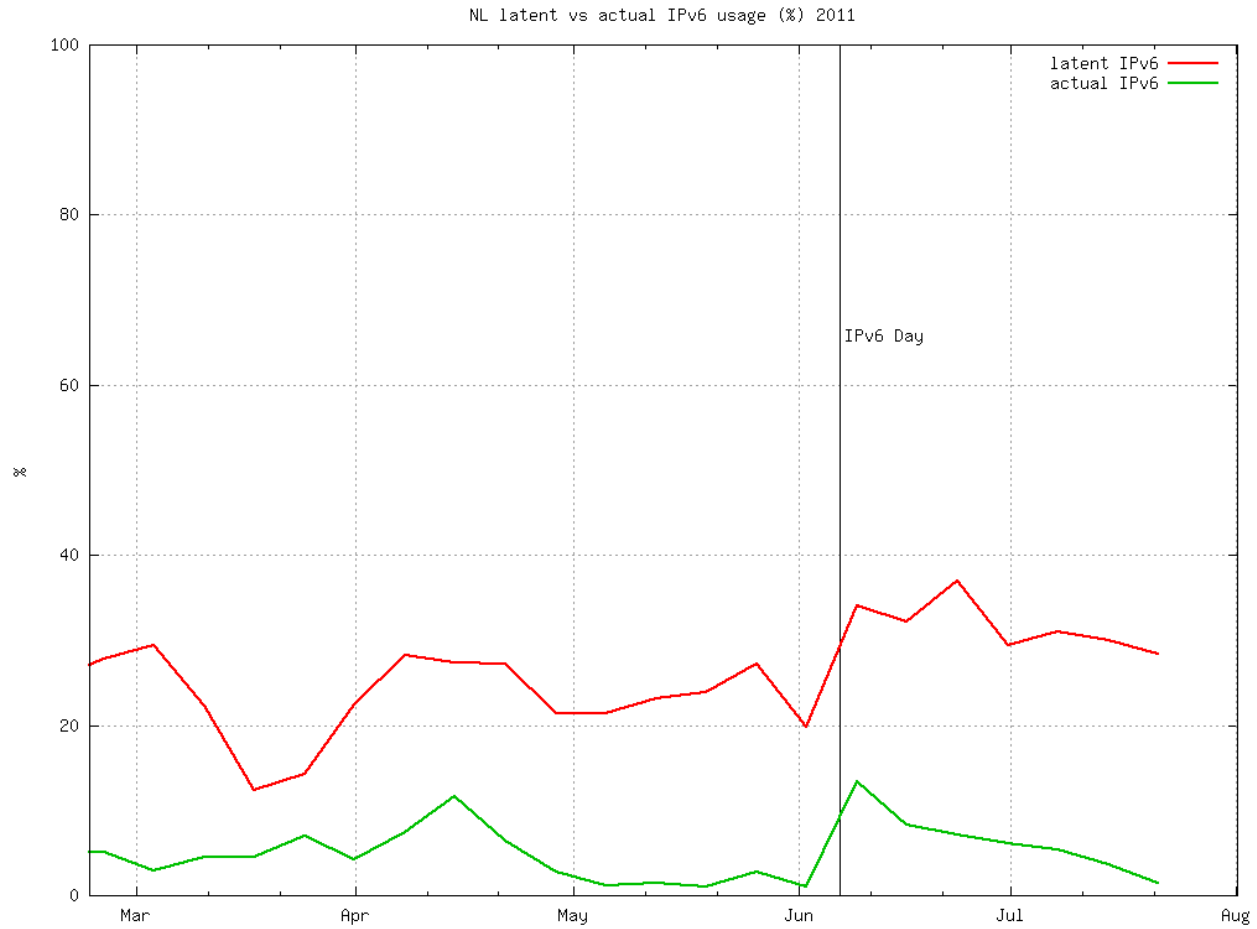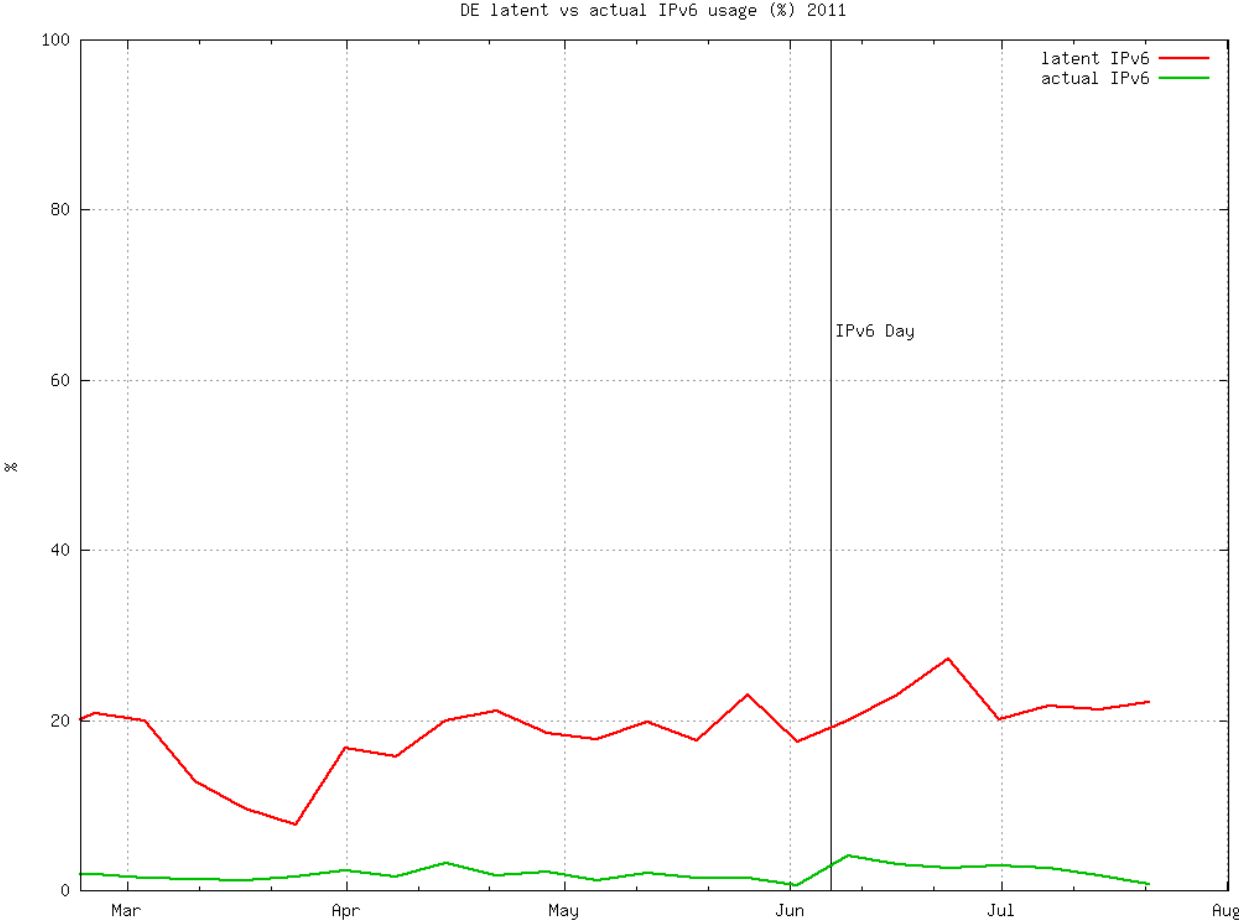
Where are we going with this?

Option A

Option B

- Maintain long baseline IPv6 capability measurements
- Look at originating AS (ISP) as well as economy
- Monitor performance and loss rates
- Publish data, graphs useful to planners, ISPs, regulators, standards bodies..
- Increase the size of the dataset to get more economies included, better numbers