

# IPv6 Deployment Experiences

– or what’s it really like hearing “IPv6 IPv6 IPv6” every day

Hurricane Electric

*IPv6 Native Backbone – Massive Peering!*

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# Agenda

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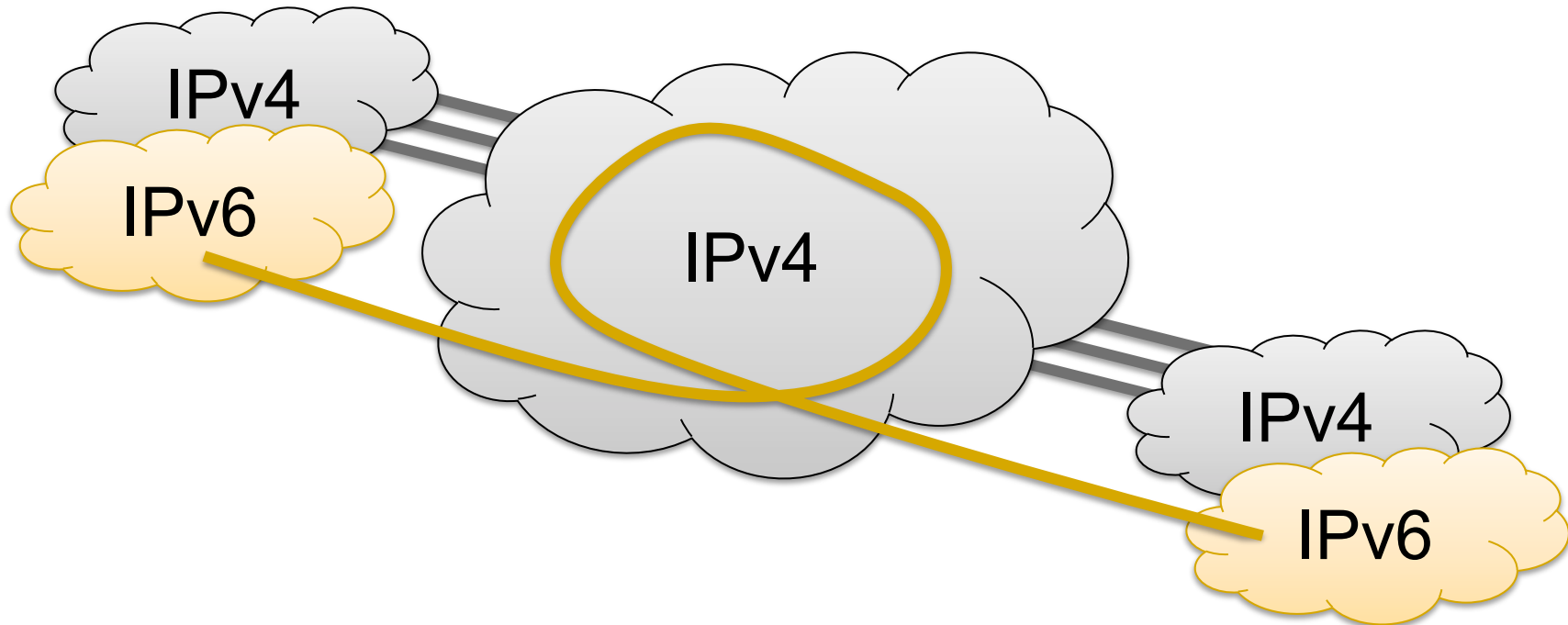
- Historic issues unrelated to today
  - Yes; we once ran two networks (seems quaint now)
- Picking a new vendor
  - If only it was easy (so many to choose from; so few choices)
- Running with the bulls
  - What part of “*this is important*” didn’t you understand?
- Hearing “IPv6 IPv6 IPv6” said every day!
  - Never take yourself too seriously
- Summary ...





## 2001 – Yes, we once ran two networks

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- Non commercial, non critical, none too special
- Highly motivating – “This IPv6 thing is going to be big”
- Enough experience to realize this was worth the focus!



# 2006 – Picking a new vendor

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- Parameters vital to the choice of vendor
  - We needed v4/v6 equality in ASIC-based solution
  - We needed v4/v6 equality in all firmware functions
  - We needed v4/v6 roadmap with absolute commitment
- We relaxed some requirements
  - Decided that network management could be just v4 to start
  - Decided that not all v6 bells-and-whistles were needed
  - Decided that (independent of v6) we needed big TCAMs
- We chose what we knew
  - OSPFv3 because we understood OSPF and felt comfortable
  - Two sessions for iBGP (v4 & v6) even if the spec allowed for both
- Deployed everywhere
  - Build for each-and-every connection to be v4/v6 dual-stack and don't skimp
  - Allowed for delivering v6 connection, even when the customer didn't need it





# 2006-2010 – Running with the bulls

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- 2007 – IPv6 was not going to be an afterthought
  - We realized: run-out wasn't being taken seriously; time to become an evangelist
  - We realized: IPv6 needed a kick-start
- 2008 – We expanded tunnelbroker.net offerings globally
  - Get-over thinking that tunnels are bad; they exist
  - The core didn't need them; but the edge did
  - Somewhere out there (anywhere), many-many people showed an interest in v6
- 2009 – 6to4 and Teredo become the center of attention
  - Derided by many; loved by few!
  - The best way to remove those protocols on your LAN is to enable native v6
- 2010 – Massive uptick in v6 allocations and enabled networks
  - The numbers are good; but do the end-users notice? (Hint: Only some do)
  - Last major (US Based) backbone enables v6 in it's core and edge!
- 2011 – No ability to relax now; plenty more work to do!





# Experiences along the way ...

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- Any amount of hands-on experience is worthwhile
  - Convincing anyone to “just try IPv6” is a win
  - Convincing anyone to take one step at a time is a win
- Remove misconceptions
  - The fact is: v6 is easier than people expect
  - The fact is: v6 actually works
  - The fact is: arguing over v4 depletion is a waste of time
- Doing something makes you wiser
  - Sitting on the fence does not provide an education to anyone
- Keep saying “v6” to vendors; maybe they will listen
  - Load Balancer vendors now understand this
  - Firewall vendors nearly understand this (less so the VPN side of the equation)
- One you have been doing v6 a long time ...
  - ... you're immune to these misconceptions

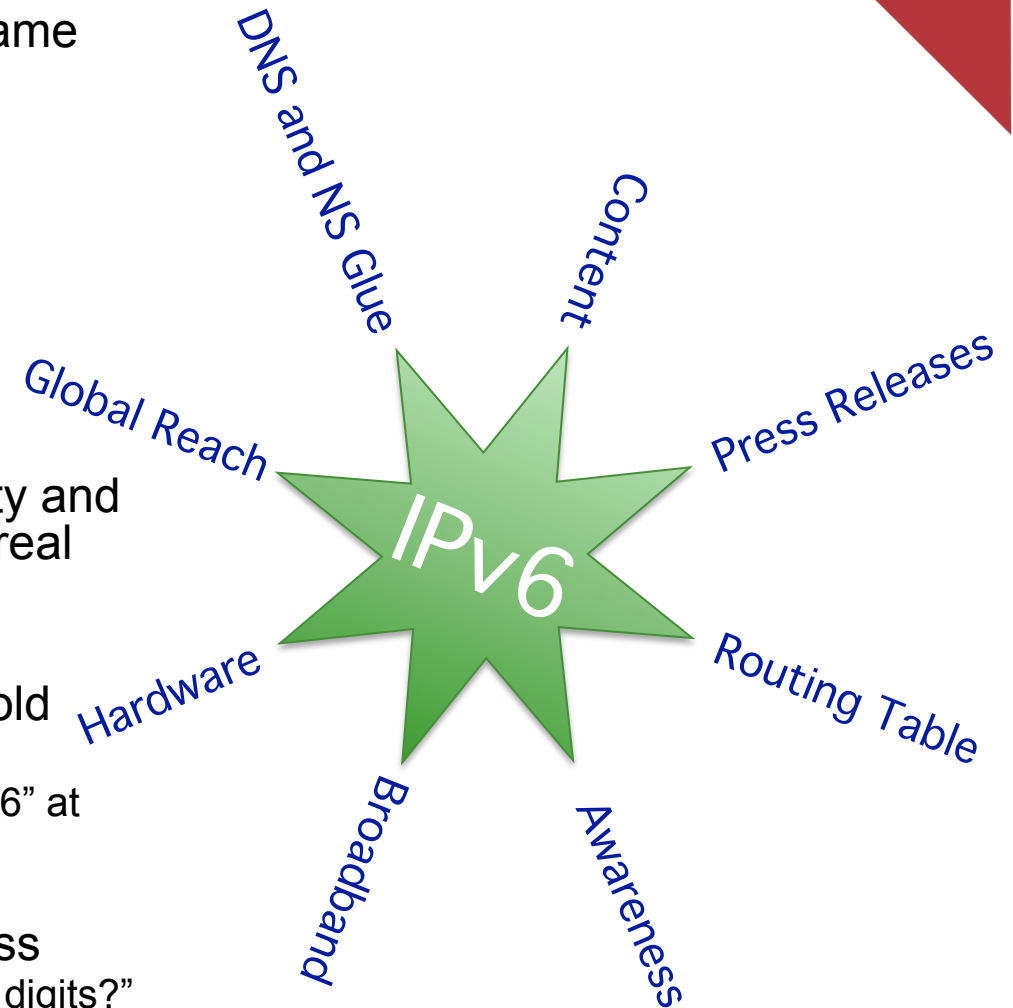




# 2011 – IPv6 readiness – Not just technology

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- 2010-2011 – the global Internet became more IPv6 centric.
  - Every “large network enabled v6”
- Every metric points to more IPv6 readiness; while the IPv4 availability declines
  - Increase uptake in practical v6 usage
- The global reach for IPv6 connectivity and IPv6 awareness has finally become real
  - Numerous countries enable v6
- Talking about IPv6 is now officially “old hat”
  - Let’s assume there’s no more “what is v6” at conferences
- Don’t underestimate the popular press
  - Do try to correct them when they say “6 digits?”





# 2011 – With three days to go ...

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Freshly posted today by an open-source/java programmer in Holland ...



<http://gnu.wildebeest.org/blog/mjw/2011/01/31/who-knew-ipv6-would-be-this-easy/>

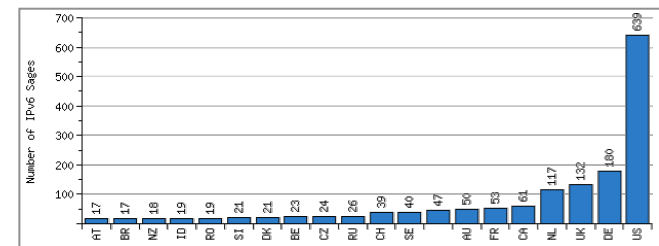
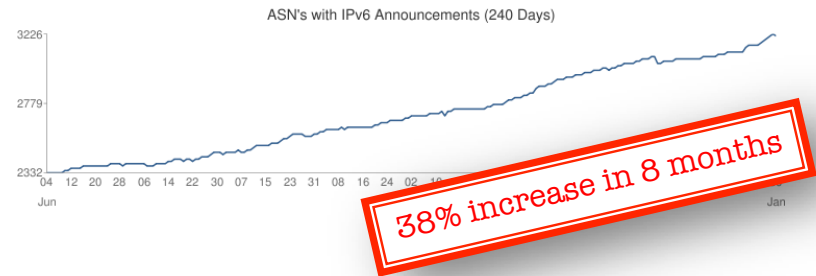




# Some of the key IPv6 metrics

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- IPv6 global routing table
  - 2010-2011 has seen solid growth
  - Increase to 8.4% of all ASNs
- DNS glue records
  - Roots and cctld's doing well (245 out of 295)
  - Operators improving v6 performance
- Country code count
  - 123 countries and counting!
  - (Up from 91 in Jan 2010)
- Awareness and Training
  - Hurricane Electric IPv6 Certification up!





# “IPv6 IPv6 IPv6”

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- Rule #1 ... Always enjoy your work!
  - I thank each and every one of you for putting up with me going on-and-on-and-on about IPv6 ...



IPv6 IPv6 IPv6



IPv6 IPv6 IPv6



# Summary

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- You have two choices ...



... but actually you only have one!







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