

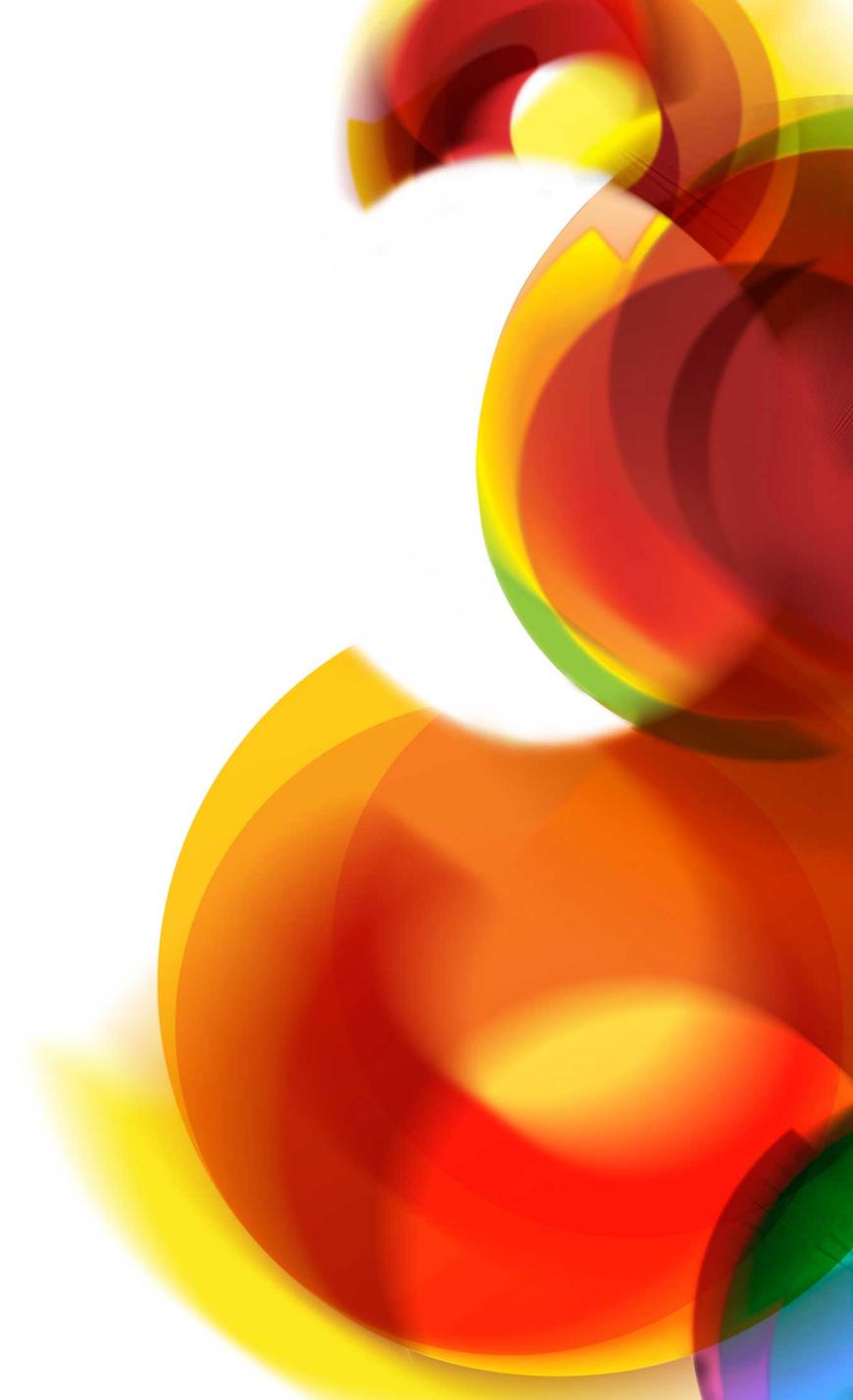
janet

IPv6

The Big Picture

Rob Evans, Janet

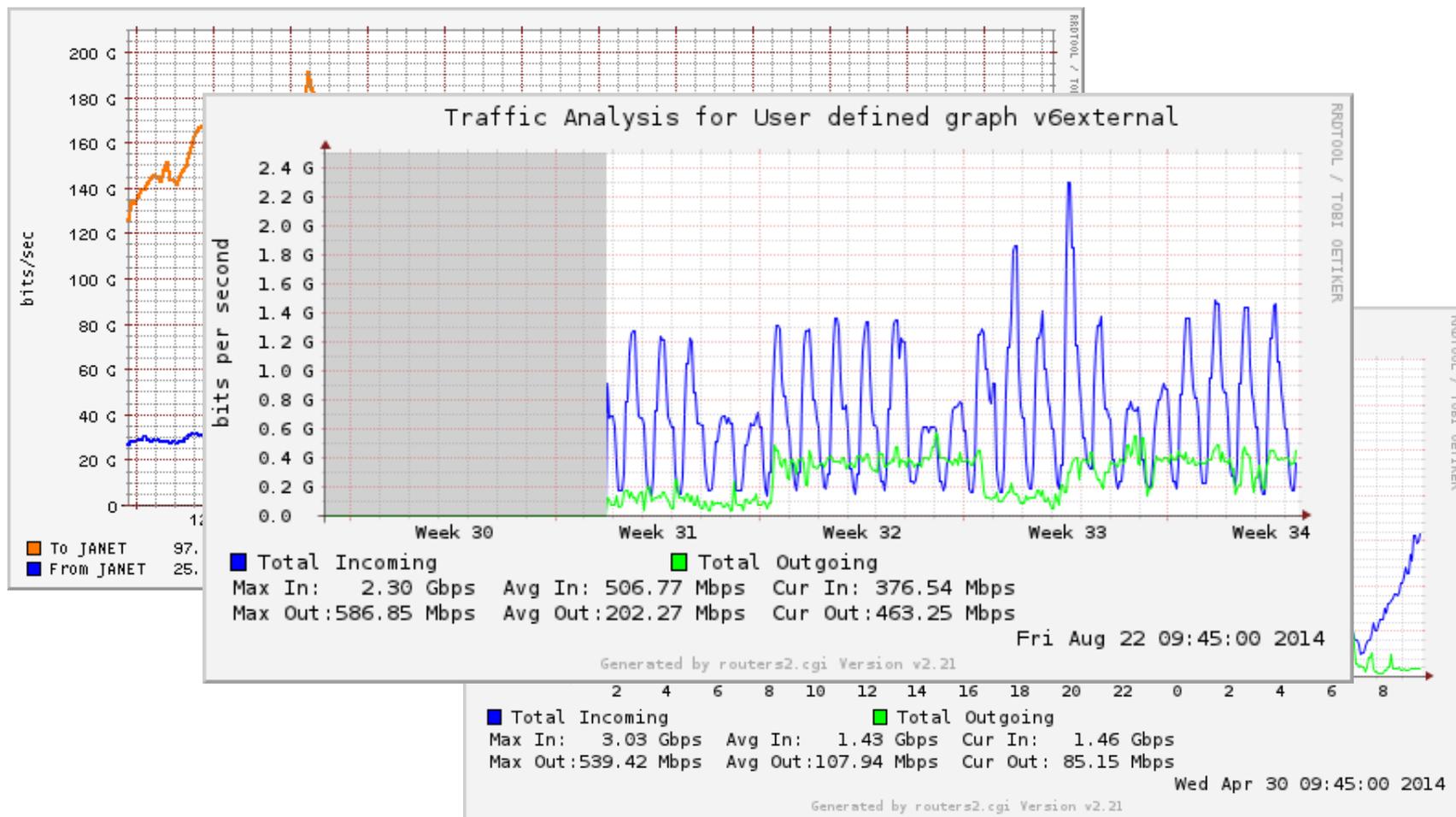
Rob.Evans@ja.net



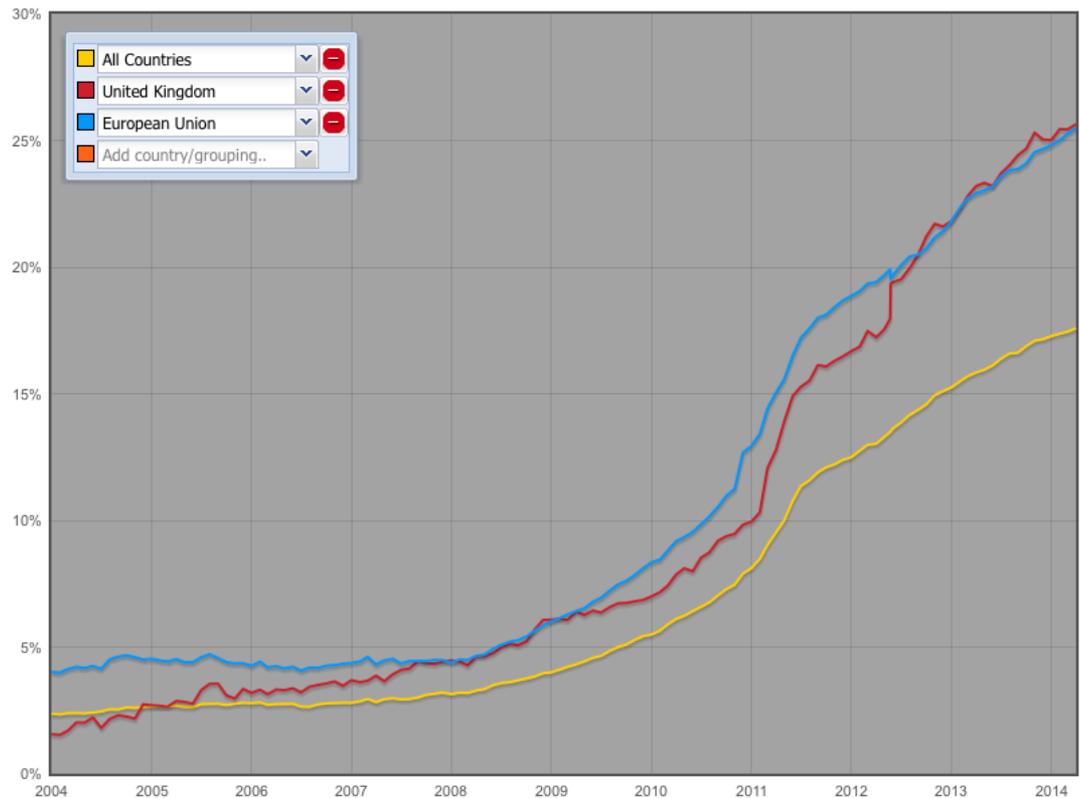
- Top level: IANA
 - Internet Assigned Numbers Authority
 - Number of IPv4 addresses left: 0
- Next level: Regional Internet Registries
 - AFRINIC (Africa)
 - Number of IPv4 addresses left: 3.06 /8s (Internet penetration: 15.6%)
 - APNIC (Asia-Pacific)
 - Number of IPv4 addresses left: 0.79 /8s (Internet penetration: 27.5%)
 - ARIN (North America)
 - Number of IPv4 addresses left: 0.72 /8s (Internet penetration: 78.6%)
 - LACNIC (Latin America)
 - Number of IPv4 addresses left: 0.23 /8s (Internet penetration: 42.9%)
 - RIPE NCC (Europe and the Middle-East)
 - Number of IPv4 addresses left: 0.92 /8s (Internet penetration: 63.2%)
 - Special policies start in an RIR when space is less than 1 /8

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- Backbone has been dual-stack since 2003
 - Regional networks must provide it on request
 - Native transit from global transit suppliers
 - Native IPv6 to GEANT for other R&E networks
 - Extensive IPv6 private and public peering to other ISPs
 - Services mostly available over IPv6
 - DNS (nsX.ja.net)
 - NTP (ntpX.ja.net)
 - Mail
 - Waiting for software support for videoconferencing

IPv6 deployment on Janet



- Some ISPs offering it
 - Andrews & Arnold, Bogons, Claranet, etc
- Still waiting for the larger providers
 - BT, Virgin Media

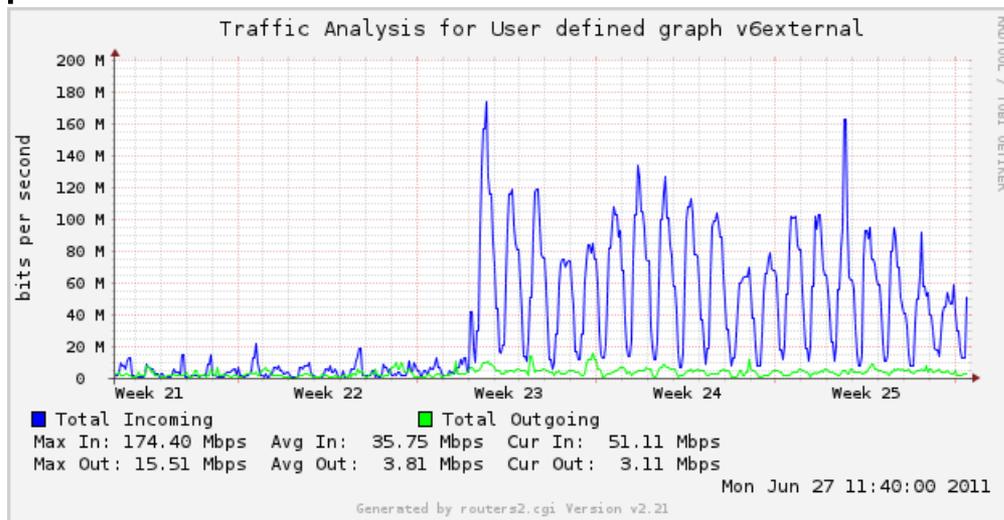


IPv6 Global Deployment

Rank	Country	Internet Users	v6 use ratio	v6 users	Population
1	Belgium	8,153,098	21.66%	1,766,148	10,452,690
2	Singapore	3,438,265	12.53%	430,790	4,842,627
3	Switzerland	6,545,201	12.24%	801,427	7,682,161
4	Romania	9,709,501	10.75%	1,043,295	22,057,023
5	Germany	68,151,404	10.02%	6,826,657	82,110,126
6	Luxembourg	470,579	9.89%	46,540	517,746
7	Peru	11,215,122	8.81%	987,806	31,153,117
8	United States of America	249,751,047	7.41%	18,498,885	320,769,391
9	France	51,923,187	5.42%	2,812,113	65,246,529
10	Japan	99,396,568	5.33%	5,296,047	125,738,859
11	Czech Republic	7,415,514	4.10%	304,027	10,162,415
12	Norway	4,445,097	3.22%	143,342	4,730,337
13	European Union	0	3.08%	0	0
14	Malaysia	16,907,614	2.08%	351,712	27,717,400
15	Bhutan	153,348	1.86%	2,850	730,232
16	Portugal	6,253,086	1.75%	109,466	10,825,981
17	China	518,184,502	1.27%	6,591,358	1,352,962,147
18	Greece	5,719,413	1.22%	69,616	10,791,346
19	Netherlands	15,702,326	1.21%	190,257	17,012,271
20	Australia	17,805,749	0.79%	140,979	22,397,169
...					
31	United Kingdom	53,741,482	0.32%	169,450	61,885,632

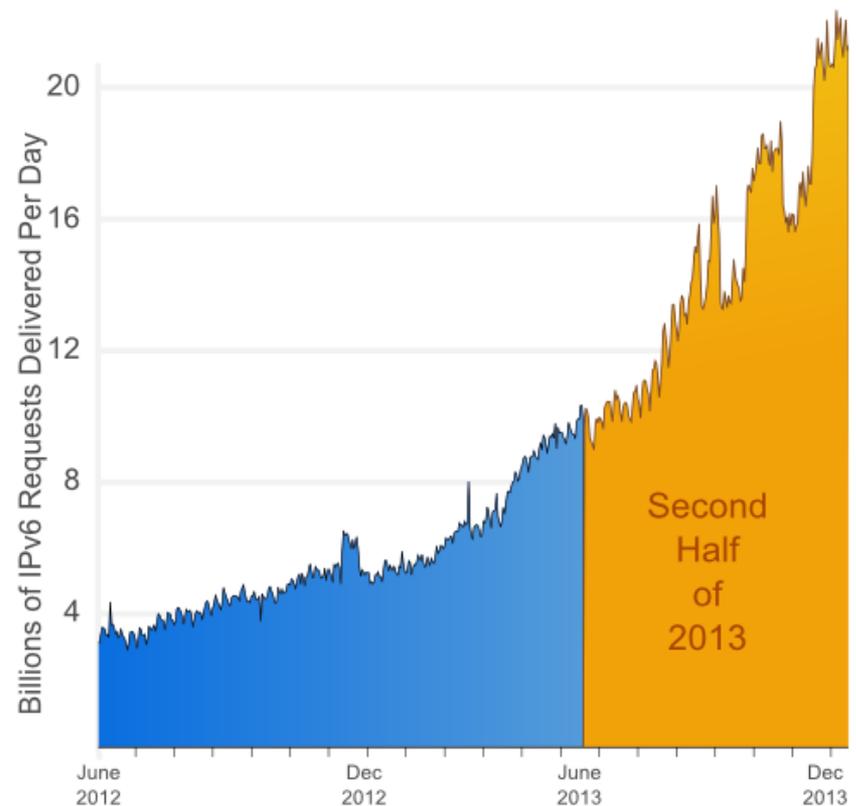
- World IPv6 Day

- 8th June, 2011
- Make content available for 24 hours, leave it switched on if it doesn't cause a problem
- Google, YouTube, Facebook, Akamai, Limelight
- Main concern was broken tunnels
 - Google warned Janet that 22,000 users might have broken connectivity
- Largely went off without problem



- Akamai

- <https://blogs.akamai.com/2013/06/world-ipv6-launch-anniversary-measuring-adoption-one-year-later.html>
- Increased 2.5x since last June
- 10 billion IPv6 requests per day



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- Comcast, Google Fiber [sic]
 - Native IPv6 on domestic broadband
 - Google, YouTube
 - IPv6 for content
 - “Happy eyeballs” in browsers and O/S IP stacks
 - Connect to a site over IPv4 and IPv6, give IPv6 a small head-start, continue using whichever one responds first
 - Safer to enable IPv6 on content

- Get some addresses
 - operations@ja.net
 - <https://www.ja.net/forms/obtaining-ip-addresses-application/>
- Ask for them to be routed
 - Can tunnel them as an interim measure
- Deploy on a test network
- Experiment with some firewalling
- Browse the web
 - Some websites will show the address you're connecting from
 - E.g. <http://www.ripe.net/>
- Whilst you're doing the above
 - Think of an addressing plan
 - May be based on IPv4 plan
 - May be different – site/building aggregation?



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- Configure some services
 - DNS
 - SMTP
 - HTTP
 - Before adding an IPv6 address record into the DNS, make sure all services on the box are IPv6-enabled
 - Mandate IPv6 in tender documents
 - Look at what others have done
 - Previous Networkshop presentations on EdLab
 - Be aware of some of the gotchas
 - E.g. Router Advertisement spoofing
 - Roll out to edge networks
 - More of this in the IPv6 technical guide
 - URL at the end of the presentation

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- Training
 - IPv6 Fundamentals: <https://www.ja.net/events/ipv6-fundamentals>
 - IPv6 Technical Guide
 - <https://community.ja.net/system/files/487/ipv6-tech-guide-for-web.pdf>
 - Community website
 - <https://community.ja.net/groups/ipv6>
 - JISCmail list
 - <https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=IPV6-USERS>
 - Your IPv6 prefix!
 - <https://www.ja.net/forms/obtaining-ip-addresses-application/>
 - Events like this...

- **World Population Clock**
 - <http://www.census.gov/popclock/?intcmp=sldr>
- **RIR address space remaining**
 - <http://www.potaroo.net/tools/ipv4/index.html>
- **Internet penetration statistics**
 - <http://www.internetworldstats.com>
- **IPv6-enabled ASNs**
 - http://v6asns.ripe.net/v/6?s=_ALL;s=GB;s=_EU
- **IPv6 deployment ranking**
 - <http://resources.potaroo.net/iso3166/v6dcc.html>
- **World IPv6 Launch measurements**
 - <http://www.worldipv6launch.org/measurements/>

Questions and discussion

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