Vantage Point Selection for IPv6 Measurements

Benefits and Limitations of RIPE Atlas Tags

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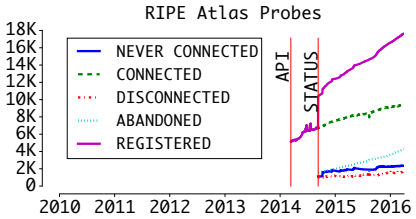
Supported by:
Flamingo Project: flamingo-project.eu

Introduction

- 9.3K probes connected around the globe (May 2016).



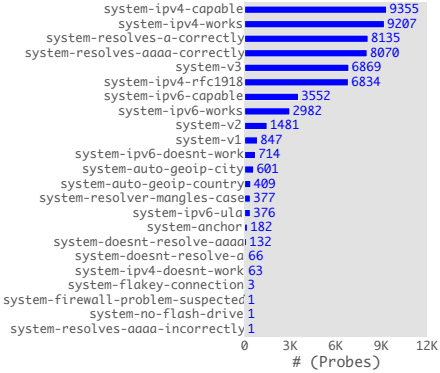
NEVER CONNECTED	2342	13.28%
CONNECTED	9381	53.20%
DISCONNECTED	1639	9.29%
ABANDONED	4272	24.23%
REGISTERED	17634	100.0%

- Recent Events:

Feb '13 Public APIs [1, 2, 3] to provision measurements on probes.
Jul '14 Feature to add tags to probes [4].
Oct '14 Vantage point selection using tags.

System Tags

- Tags applied by RIPE Atlas based on results from built-in measurements.

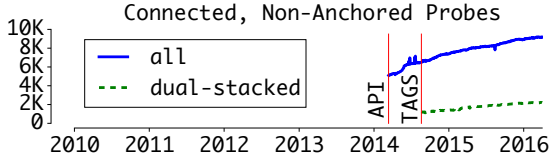


- Frequently updated (every 4 hours)
- Fairly stable and accurate.

- Highlights state of DNS and IP connectivity.
- Helps identify hardware version of the probe.

Dual-Stacked Probes | Evolution

- 2.2K probes are dual-stacked (May 2016).
- Richest source of vantage points for IPv6 measurement studies.



- Criteria:
  1. Probes with same IPv4 and IPv6 ASN.
  2. Probes with `system-ipv4-works` and `system-ipv6-works` tags.

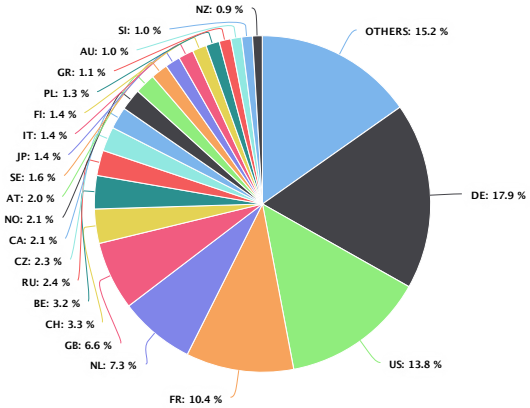
Dual-Stacked Probes | Country-based Distribution

- 91 countries / 813 ASNs covered.

DE	398
US	307
FR	230
NL	161
GB	146

COMCAST	180
DTAG	116
PROXAD	108
XS4ALL	75
ORANGE	45

- Belgium[1] missing in the top 5 list!
- Probes likely do not reflect IPv6 user population across the globe.

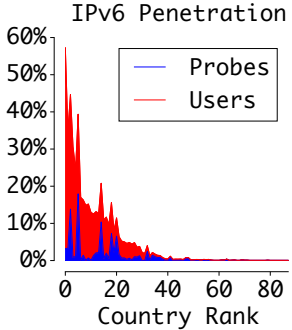


Entire list at: http://goo.gl/UdEe1Q

[1] Belgium with 42% penetration leads (as of May 2016) Google IPv6 adoption statistics [5]

Dual-Stacked Probes | APNIC Correlation

- Correlation of IPv6 users against dual-stacked probes using APNIC dataset [6]

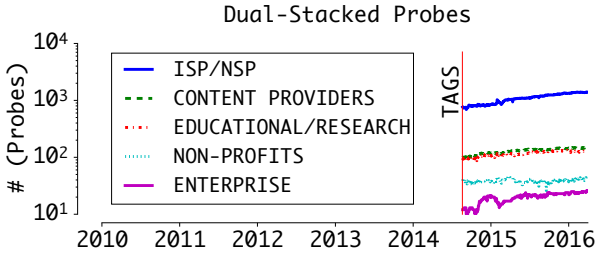


	USERS	PROBES
BE	54.0%	3.2%
PT	29.8%	0.9%
CH	31.6%	3.3%
GR	23.3%	1.1%
US	30.8%	13.8%
EE	16.8%	0.2%
EC	14.8%	0.1%
LU	14.5%	0.7%
JP	14.9%	1.4%
MY	12.9%	0.1%

- JP with 17M IPv6 users (around 15% IPv6 usage ratio) hosts only 32 probes.
- These countries with large IPv6 userbase can benefit from more probes.

Dual-Stacked Probes | Network Type Distribution

- We further used PeeringDB [7] to map ASNs by network type.



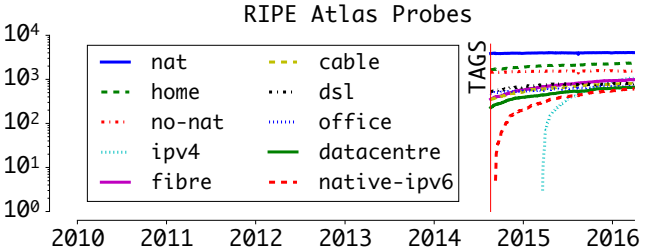
NSP	1390	80.0%
CP	147	8.5%
EDU	130	7.5%
NP	43	2.5%
EP	26	1.5%

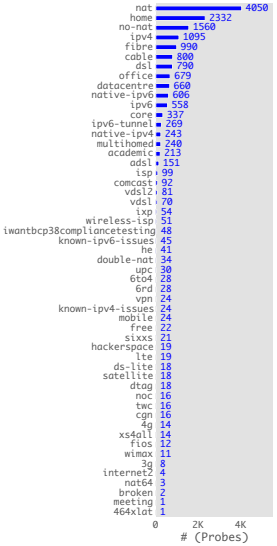
- 80% of dual-stacked probes are hosted by ISPs.
- 60% (681 probes) of which are deployed at home.

RESIDENTIAL	DSL	203
	CABLE	139
	FIBRE	144
	TOTAL	486

User Tags

- Tags manually applied by probe hosts.

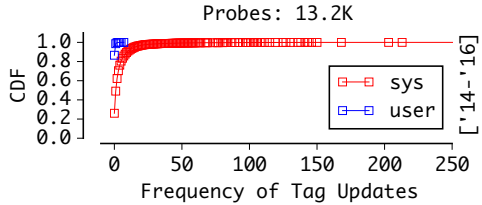




- Popular user tags are centered around home probes.

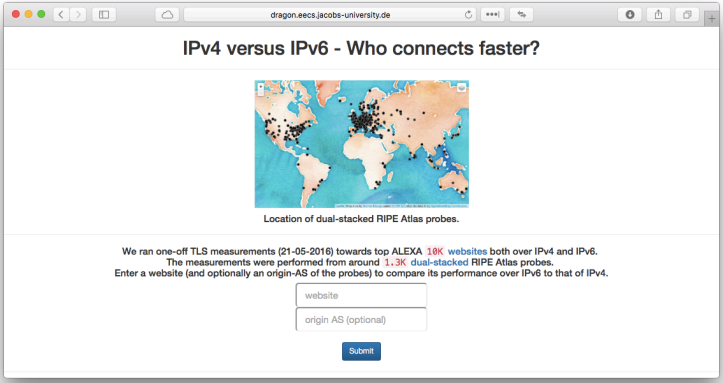
User Tags | Tag Updates

User tags tend to become stale over time!



- 1.6% of probe hosts ever update their user tags.
- 59.1% of probes received at least 1 update on system tags.
- 13.3% of probes received atleast 10 updates on system tags.

Playground



Try it now!

http://goo.gl/hbzbwD

Takeway

- User tags tend to become stale over time.
- System tags (refresh every 4 hours) are stable and accurate.
- We used system tags to identify dual-stacked probes:
  - 2.2K probes covering 91 countries and 813 ASNs.
  - 80% deployed by ISPs with 681 connected at homes.
  - Evenly split across DSL, cable and fibre deployments.
  - Some countries (such as BE and JP) are underrepresented in this sample.

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Appendix

Appendix | References I

[1] "RIPE Atlas - Probe API: v1," https://atlas.ripe.net/api/v1/probe, [Online; accessed 06-November-2015].

[2] "RIPE Atlas - Probe Archive API: v1," https://atlas.ripe.net/api/v1/probe-archive, [Online; accessed 06-November-2015].

[3] "RIPE Atlas - Measurement Creation API," https://atlas.ripe.net/docs/measurement-creation-api, [Online; accessed 06-November-2015].

[4] "RIPE Atlas - Midsummer Update 2014," https://labs.ripe.net/Members/fatemah_mafi/ripe-atlas-midsummer-update-2014, [Accessed: 04-Apr-2016].

[5] "Google - IPv6 Adoption Statistics," http://goo.gl/kKYXqS, [Online; accessed 22-Jan-2016].

[6] "APNIC - IPv6 users by country," http://labs.apnic.net/dists/v6dcc.html, [Online; accessed 22-Jan-2016].

[7] A. Lodhi, N. Larson, A. Dhamdhere, C. Dovrolis, and kc claffy, "Using peeringDB to understand the peering ecosystem," ser. Computer Communication Review (CCR) '14, 2014, pp. 20–27, http://doi.acm.org/10.1145/2602204.2602208. [Online]. Available: http://doi.acm.org/10.1145/2602204.2602208