IPv4 and IPv6 disparities

Goals & Metrics

- Comparing IPv4 and IPv6 paths (control plane, data plane)
- BGP disparities
  - Different adjacencies
  - Difference in AS Paths
- Traceroute disparities
  - Visualize traceroute paths
  - Compare traceroute paths
- Data: Routing data, Atlas Probes, Looking Glass

Control Plane

https://vgiotsas.github.io/ipv6-route-optimization/as_paths/

AS statistics

This web application computes and displays statistics about an AS, using BGP data from RIS.
The goal is to compare the IPv4 and IPv6 connectivity of an AS.

It was created during the RIPE IPv6 hackathon in Copenhagen, 4-5 November 2017.

Simple query

AS Number

e.g. 3333

This tool will look for Atlas probes in the given AS, and use them to compute colocated IPv4 and IPv6 prefixes. It then computes statistics on the BGP reachability of these prefixes.

Compute statistics

Advanced query

IPv4 Prefix

192.0.2.0/24

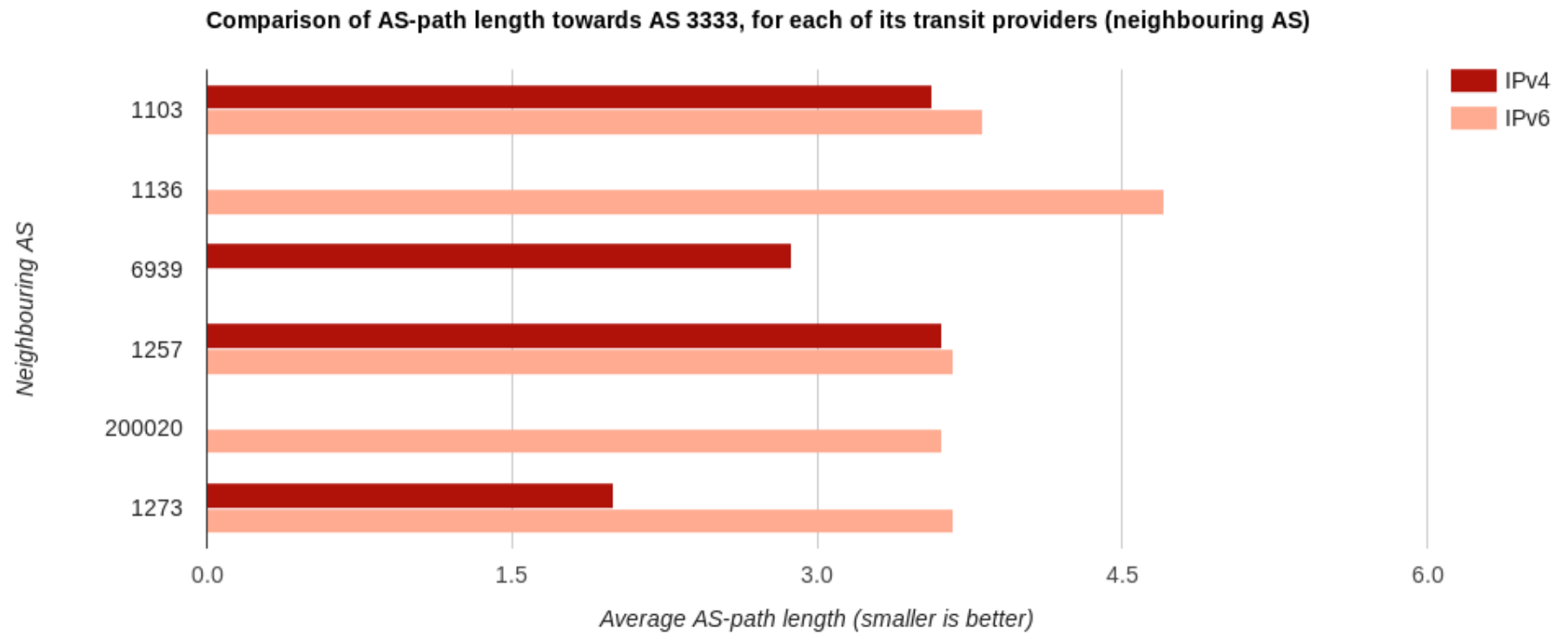
IPv6 Prefix

2001:db8::/32

This tool will directly compare BGP reachability of the two prefixes. For a meaningful comparison, they should be "colocated" prefixes, i.e. be announced by the same BGP router

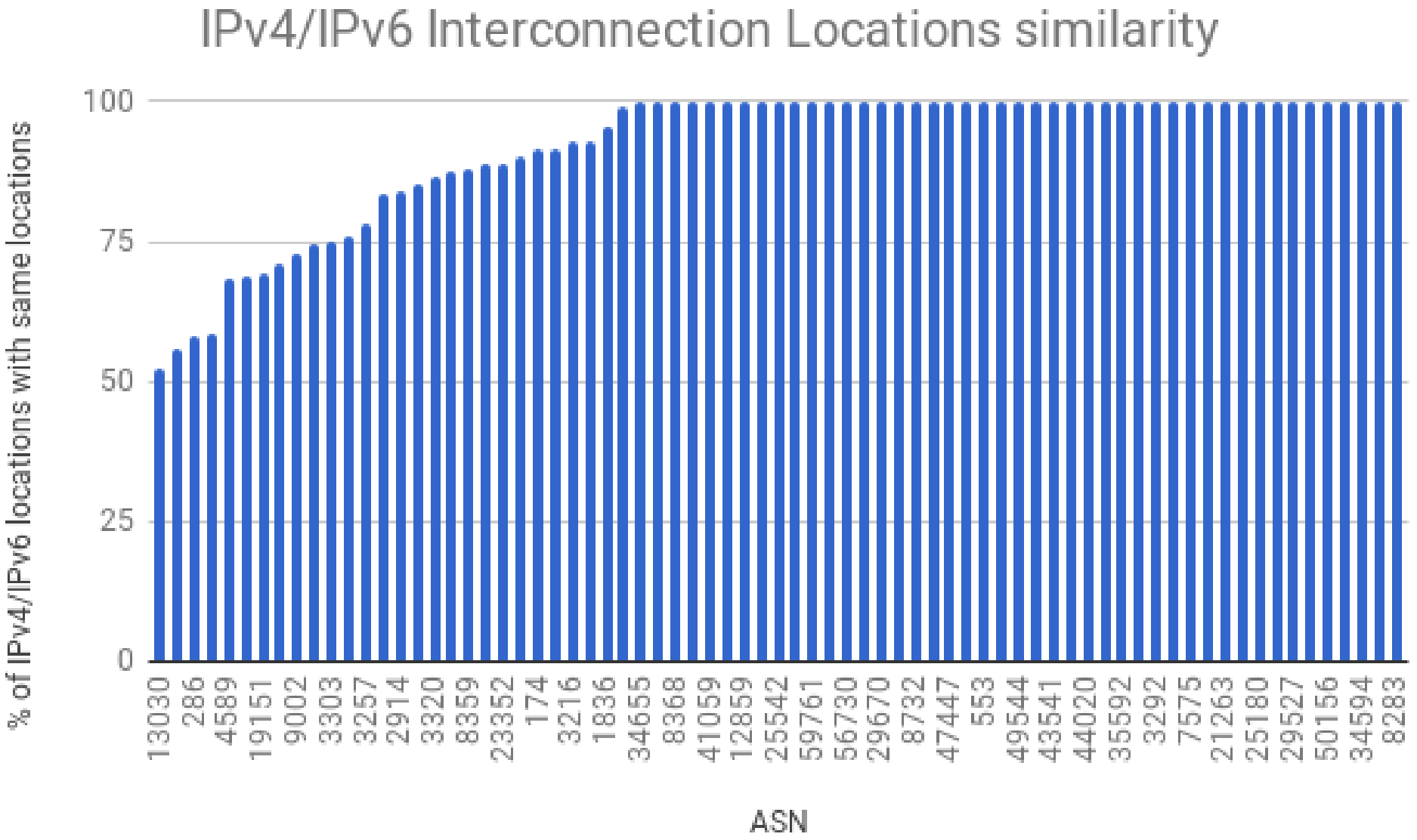
Compute statistics

BGP AS-path length



BGP interconnection score for AS 3333

234 IPv4 peers
154 IPv6 peers
146 simultaneous IPv4 + IPv6 peers
Adjacency score: **0.60**


IPv4/IPv6 Interconnection Locations similarity
% of IPv4/IPv6 locations with same locations
100
75
50
25
0
13030
286
4589
19151
9002
3303
3257
2914
3320
8359
23352
174
3216
1836
34655
8368
41059
12859
25542
59761
56730
29670
8732
47447
553
49544
43541
44020
35592
3292
7575
21263
25180
29527
50156
34594
8283
ASN

Data Plane

Getting the Data

Where did the data come from?

- BGP Looking Glasses
- Find out top 110 AS Numbers that have different path in v4 and v6 traceroute
- RIPE Atlas Probes
  - Identified probes with working dual stack where asn_v4 == asn_v6
  - Created fully meshed probe-to-probe v4 and v6 traceroutes

Fun facts

RIPE Atlas Probes

(False, {'error': {'detail': 'There was a problem with your request', 'status': 400, 'errors': [{'detail': 'You are not permitted to run more than 250 concurrent measurements.', 'source': {'pointer': '/definitions'}}], 'title': 'Bad Request', 'code': 102}})

(False, {'error': {'status': 400, 'code': 102, 'title': 'Bad Request', 'errors': [{'source': {'pointer': ''}, 'detail': 'Executing this measurement request would violate your maximum daily spending limit of 5000000.0 credits. Please stop some of your currently running measurements and try again.'}], 'detail': 'There was a problem with your request'}})

RIPE Atlas Probes

My RIPE Atlas

Quotas and System Settings

Daily credit spending currently (approximately) / your limit:	23,870,173 / 10,000,000
Parallel running measurements currently (approximately) / your limit:	250 / 250
Daily measurement result flow (approximately) / your limit:	397,836 / 500,000
Maximum number of probes per measurement:	2,500
Maximum number of measurements towards the same target:	250
Negative credit balance allowed?	No
Your roles:	User


Traceroute Visualisation
speed:
Focus on
Traceroutes to 186.226.68.106 from 1 of 10 probes [select] at November 5th 2017, 16:05:00 UTC
Nodes label: Auto Reverse lookup Country code
RIPE NCC
RIPE Atlas
Probe 45
*
AS21502
AS6461
Telecom Italia
Telecom Italia
Telecom Italia
*
AS28329
Source Target Host IXP Private IP No response Connected Disconnected
25th July, 09:00
5th November, 13:40 — 5th November, 16:10
25th July, 09:00
19th November, 10:49
16th March, 12:37
11th July, 14:26
5th November, 16:14
Documentation
Embed in your page
About TraceMON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About TraceMON

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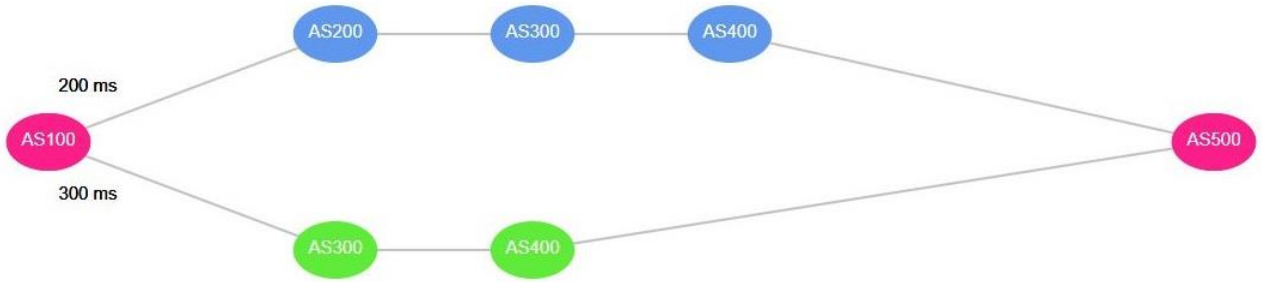
(feature request for TraceMon?)

Visualizations

- We have created three kind of maps using these tools

1. D3
2. VIS JS
3. RIPE NCC tracemon

Visualizations



TraceMonks

- Publicly available API
- Dataset at this moment includes:
  - Full mesh (100x100) ASNs
    - One dual stack probe per AS
    - Selection based on BGP Disparities data

Thanks

Petros Gigis
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Nikos Roussos
Andrea Barberio
Vasileios Giotsas

https://github.com/vgiotsas/ipv6-route-optimization