



RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE Atlas Tools for Operators and IXPs

Phillip Smith
on behalf of RIPE NCC

10 July 2017 | SANOG 30 | Gurugram



Overview

- Introduction to RIPE Atlas
- Use Cases
- IXP Country Jedi
- New: TraceMON
- How to Take Part in RIPE Atlas
- RIPE Atlas in LAC



Introduction



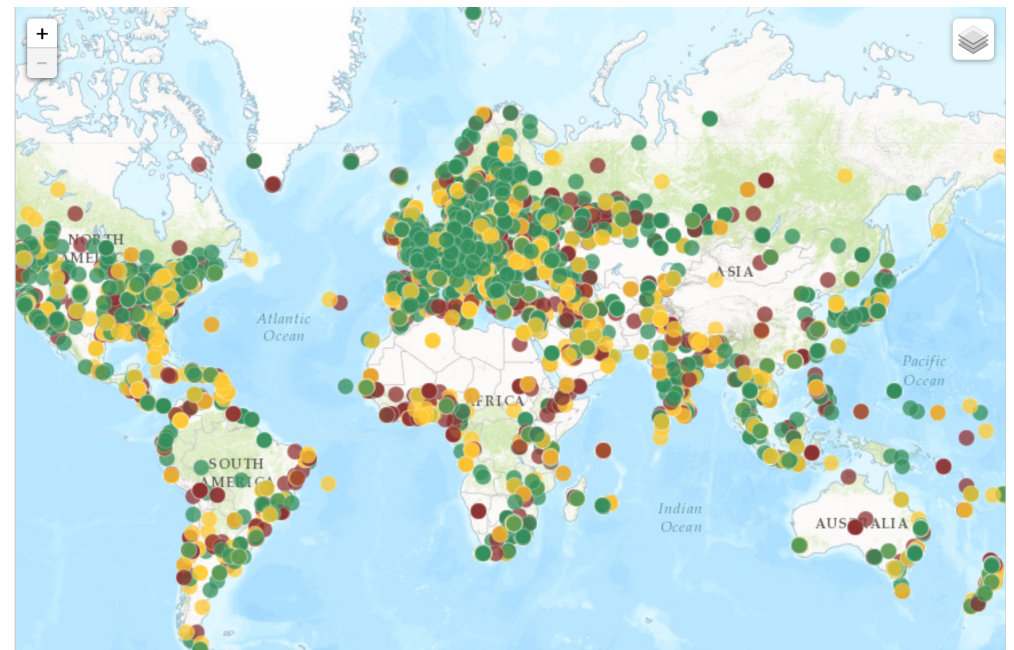
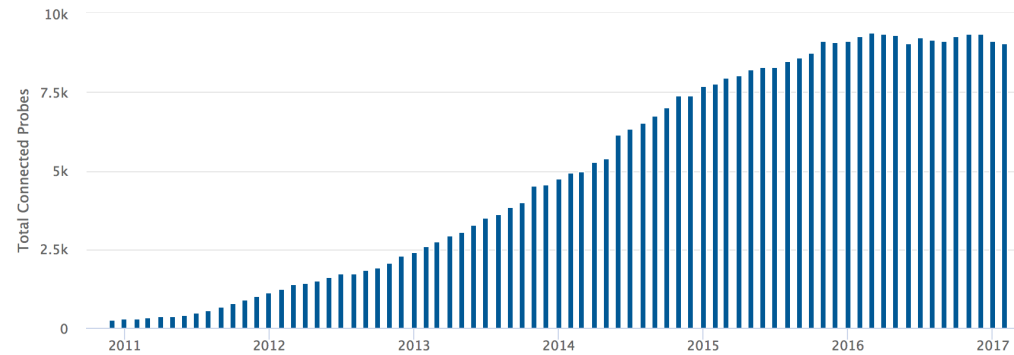
What is RIPE Atlas? (1)

- RIPE Atlas video
- 9700+ active probes
 - 2,606 disconnected
 - 6,692 abandoned
- Countries: 177
- Originating ASNs:
 - 3,394 (IPv4) = 5.9%
 - 1,241 (IPv6) = 9.2%



Probes

The number of connected probes





What is RIPE Atlas? (2)

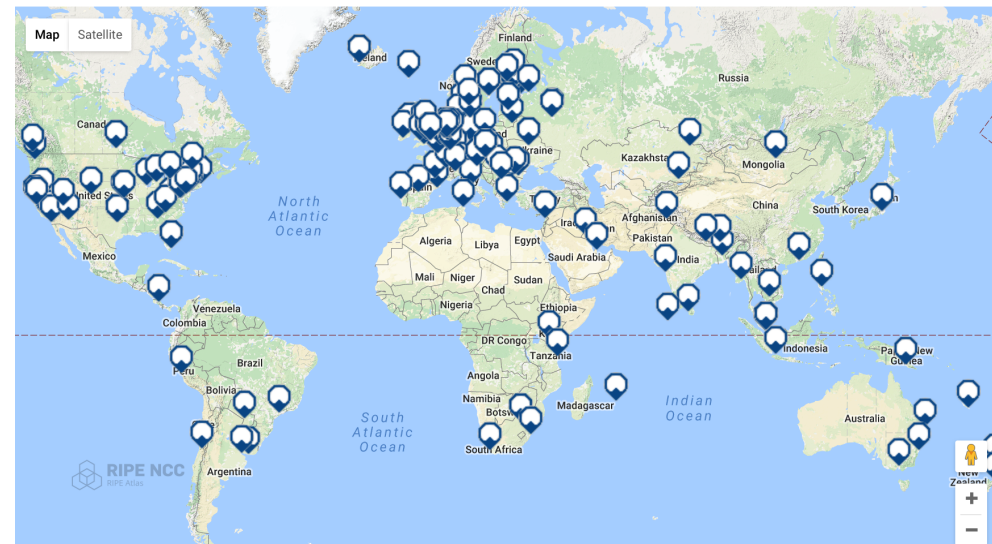
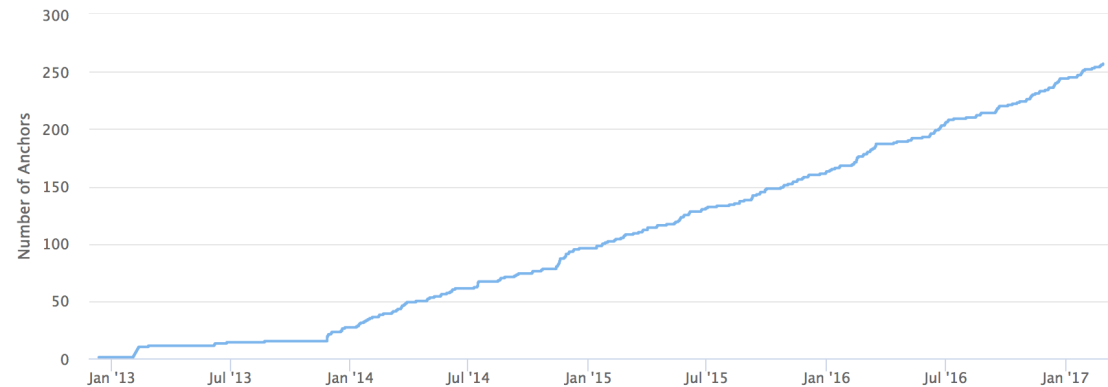
Composed by: **Anchors**

- 268 in total
 - 31 in APNIC region
- Worldwide coverage improving, also thanks to cooperation with other RIRs and ISOC



RIPE Atlas Anchors

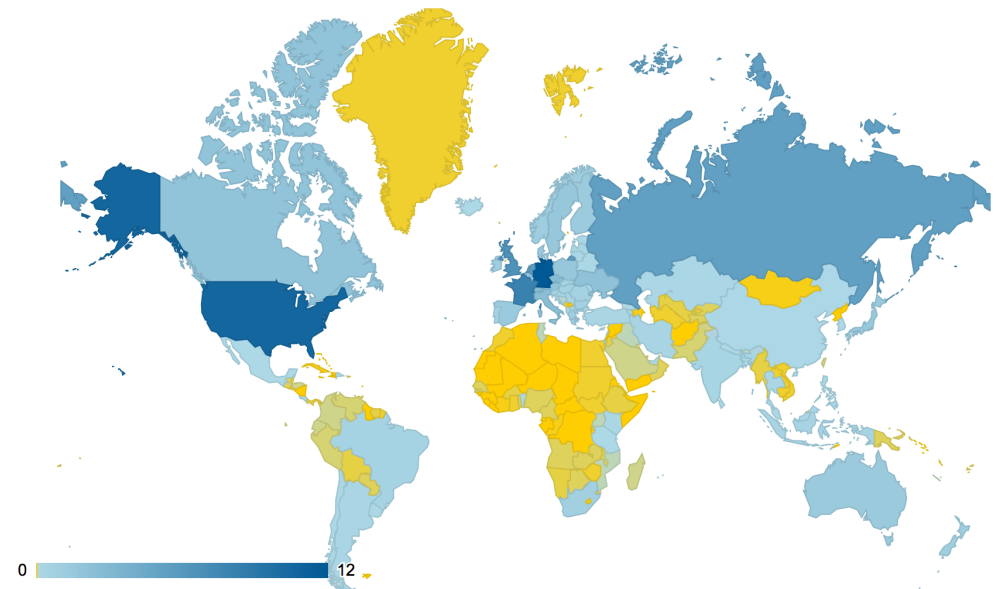
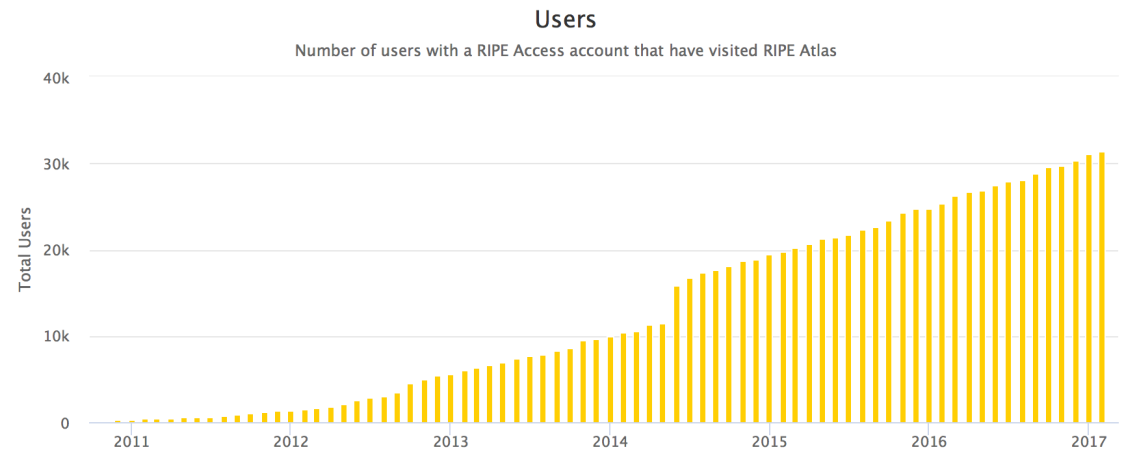
Growth in the number of RIPE Atlas anchors over time



RIPE Atlas Community



- Users
- Hosts
 - Probes
 - Anchors
- Sponsors
 - Two in 2017
- 300+ Ambassadors at many conferences





Highlights

- Six types of measurements: ping, traceroute, DNS, SSL/TLS, NTP and HTTP (to anchors)
- New: TraceMON
- APIs and CLI tools to start measurements and get results
- Streaming data for real-time results
- Status checks (Icinga & Nagios)
- “Time Travel”, LatencyMON, DomainMON



Use Cases

Examples of RIPE Atlas use



Use Cases (1)

Using RIPE Atlas to Validate International Routing Detours

[Anant Shah](#) — 30 Jan 2017

A Quick Look at the Attack on Dyn

[Massimo Candela](#)  — 24 Oct 2016

Contributors: [Emile Aben](#)

Using RIPE Atlas to Monitor Game Service Connectivity

[Annika Wickert](#) — 14 Sep 2016

Using RIPE Atlas to Measure Cloud Connectivity

[Jason Read](#) — 06 Sep 2016

Using RIPE Atlas to Debug Network Connectivity Problems

[Stéphane Bortzmeyer](#) — 10 May 2016



Use Cases (2)

- DDoS Attack on Dyn DNS Servers (Oct. 2016)
 - 10s millions devices - Mirai botnet
 - Legitimate requests





Use Cases (3)

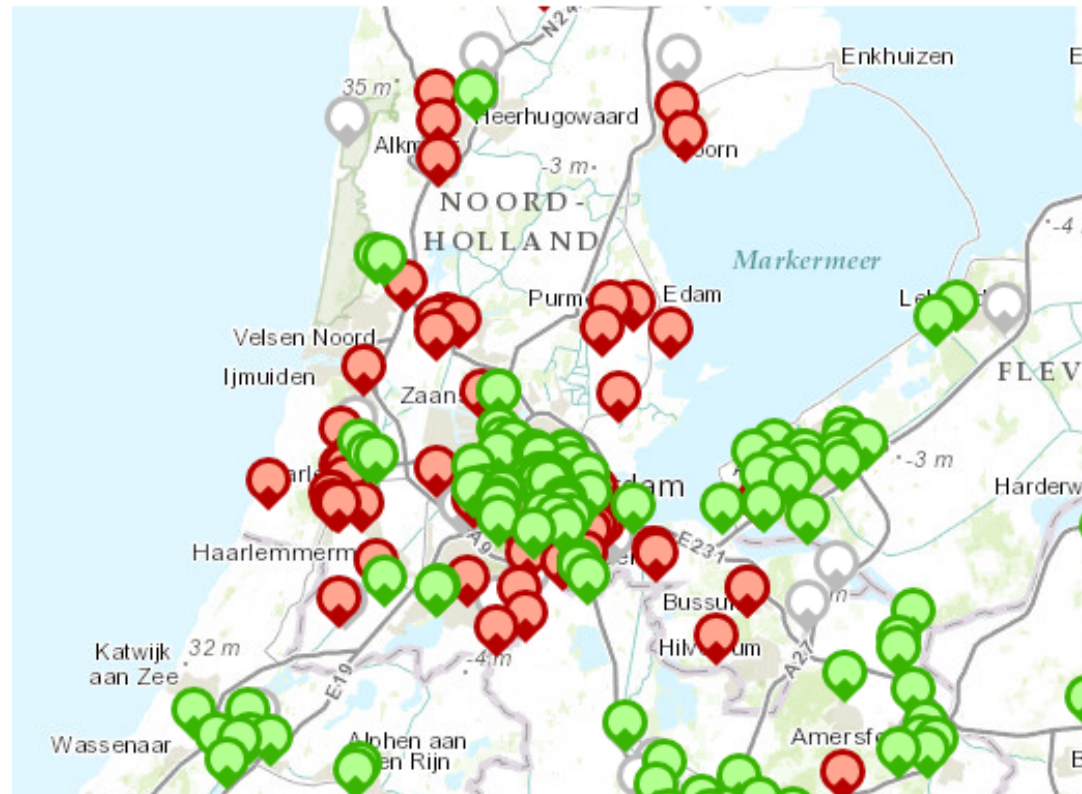
- Monitor Game Service Connectivity (Sept. 2016)
- Requirements:
 - Check General Reachability, Latency, Historical data
 - Supported by an active and helpful community
 - Integrate with their existing logging system
- Track down an outage in one upstream
- Became sponsors





Use Cases (4)

- Amsterdam Power Outage (March 2015)
- When and where the outage was happening





IXP Country Jedi



IXP Country Jedi

- Tool and concept by Emile Aben
 - <https://github.com/emileaben/ixp-country-jedi>
 - <https://labs.ripe.net/Members/emileaben/measuring-ixps-with-ripe-atlas>
- Method:
 - Traceroute mesh between RIPE Atlas probes
 - Detect whether they go via local IXPs' LAN IP
 - Hops geolocated using OpenIPMap database
- Data:
 - <http://sg-pub.ripe.net/emile/ixp-country-jedi/>

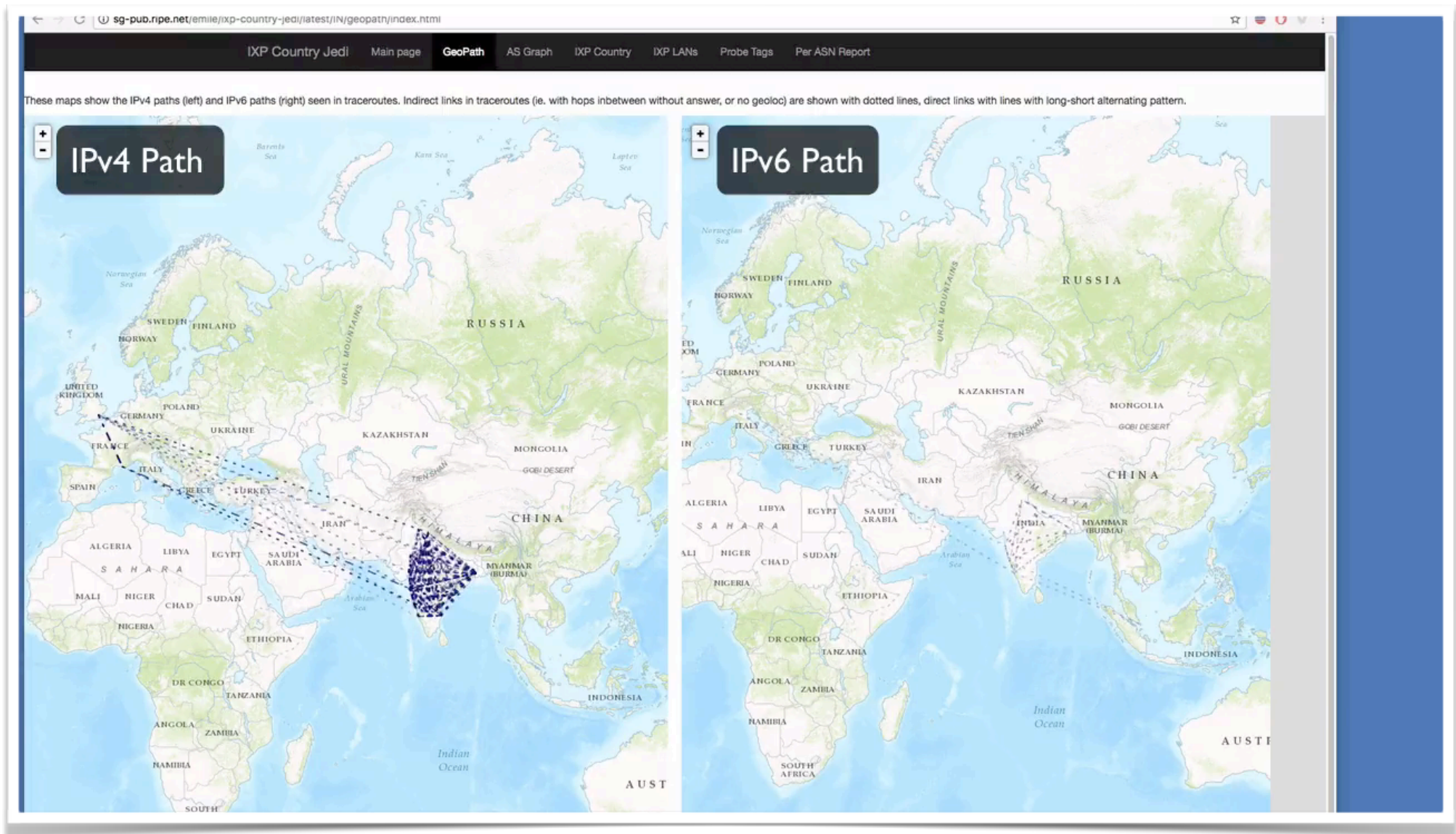


IXP Country Jedi

- Benefits:
 - Shows how IXPs help keep traffic local
 - Comparing countries' performances with each other
 - Routing and traffic optimisation
 - Comparing IPv6 and IPv4
- India:
 - <http://sg-pub.ripe.net/emile/ixp-country-jedi/latest/IN/>



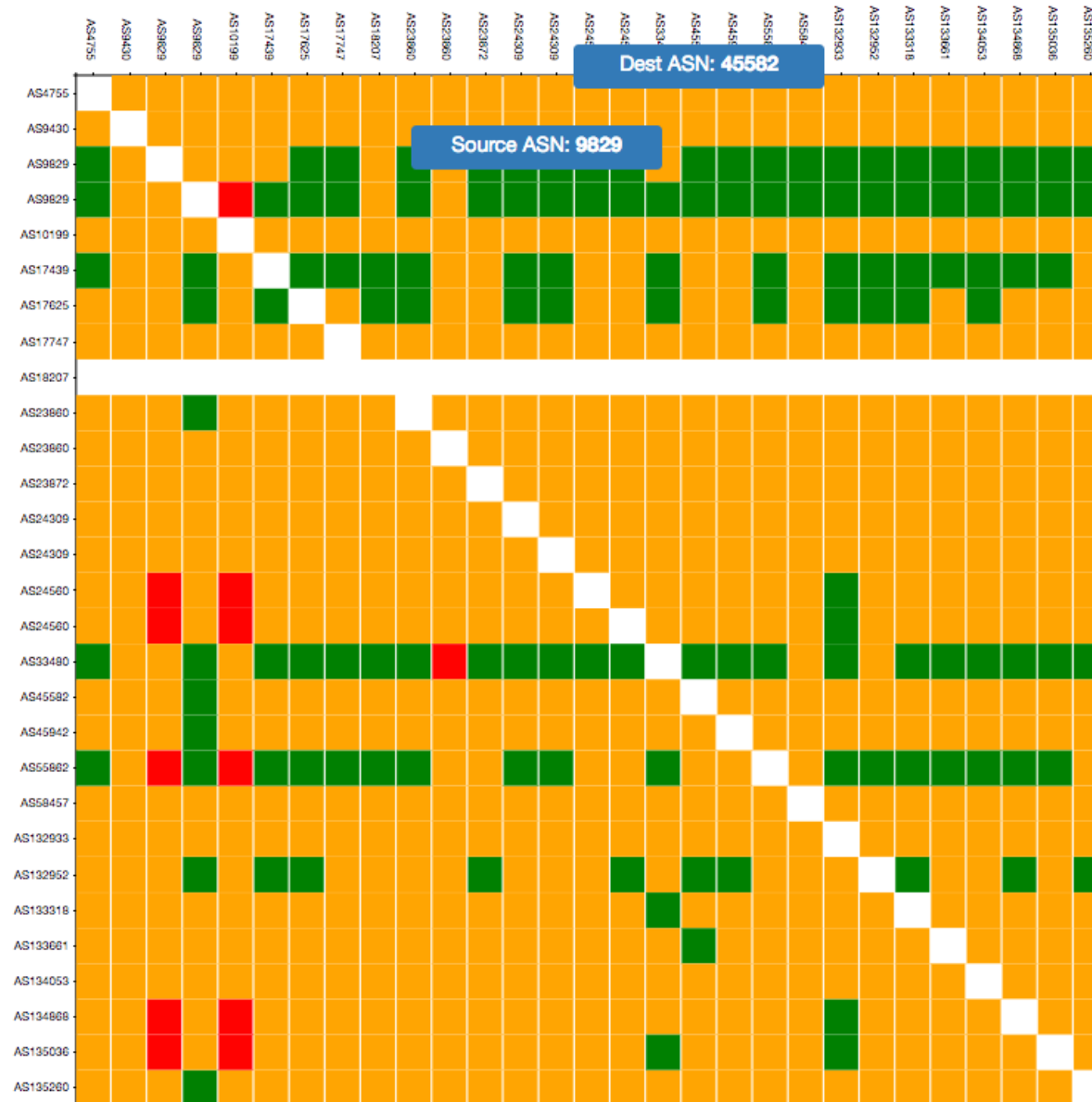
Paths for India



How Many Paths Go Via Local IXP?



- IXP IPs: NO, out-of-country IPs: NO
- IXP IPs: YES, out-of-country IPs: NO
- IXP IPs: YES, out-of-country IPs: YES
- IXP IPs: NO, out-of-country IPs: YES





Optimise Routing

- Interactive tool! (hover over the cell...)
 - <http://sg-pub.ripe.net/emile/ixp-country-jedi/latest/IE/>

```
## msm_id:9144260 prb_id:29959 dst:103.10.134.76 ts:2017-07-02 22:13:06 -00:00
1 () 192.168.5.1 [1.507, 1.647, 4.225] ||
2 (AS9829) 103.69.92.1 [3.011, 3.277, 3.552] ||
3 (AS9829) 218.248.173.65 [2.872, 2.993, 3.825] ||
4 (AS9829) 218.248.165.154 [2.856, 2.942, 3.328] ||
5 (AS9829) 218.248.235.129 [13.442, 13.522, 16.091] ||
6 err:{u'x': u'*'}
7 err:{u'x': u'*'}
7 (AS9829) 218.248.178.42 [66.934] ||
8 () 218.100.48.152 [55.093, 57.231, 58.432] |Chennai,Tamil Nadu,IN|
9 () 182.19.107.57 [61.217, 61.307, 61.626] ||
10 (AS38266) 42.104.115.145 [61.179, 62.476, 66.099] ||
11 err:{u'x': u'*'}
12 (AS45582) 119.235.54.238 [89.72, 89.945, 90.437] ||
13 (AS45582) 119.235.55.237 [90.204, 90.792, 93.929] ||
14 err:{u'x': u'*'}
15 err:{u'x': u'*'}
16 err:{u'x': u'*'}
17 err:{u'x': u'*'}
18 err:{u'x': u'*'}
255 err:{u'x': u'*'}
```

- Red or blue: the path is going out of country
 - If this is a surprise, talk to your upstream(s)
- Yellow: the path that is not going via local IXP
 - If this is undesired, make a new peering agreement



New in IXP Country Jedi

- “Hackerspaces-Jedi”
 - <https://labs.ripe.net/Members/becha/the-next-42-ripe-atlas-probes-at-hackerspaces>
- It uses tags instead of countries for probe selection
- An easy way to build community around probes and to be able to run your own customised measurements



TraceMON

Network debugging made easy



Daily Struggles: A Reaches B

- How?
 - Optimised?
 - IXP?
 - Which Autonomous Systems?
 - Latency?
- Where?
 - Which local entity/node of the CDN?
 - From which source?
 - Is it going in another country?

Daily Struggles: A Doesn't Reach B

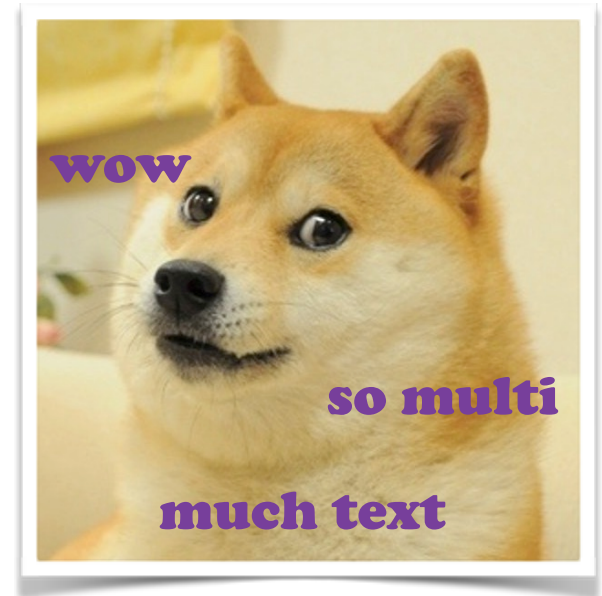


- Where does it stop?
 - Which AS?
 - Which geographical location?
- Who is involved?
 - Which portion of the network?
 - Who is behind a private address or a * in my traceroute?
 - Who can I contact?
- What happens at the BGP level?



Let's Use Traceroutes

- RIPE Atlas **multi**-source traceroutes
- What about a visualisation?
 - Complex model
 - *What is a node? (a single one!)*
 - *Filtering/simplification needed (difficult!)*
 - Complex view
 - *Precomputing from Traceroute to Graph (no operators are willing to do it...daily)*
 - *Static snapshot...still a lot of work and not so useful*



TraceMON



Traceroute Visualisation (BETA)

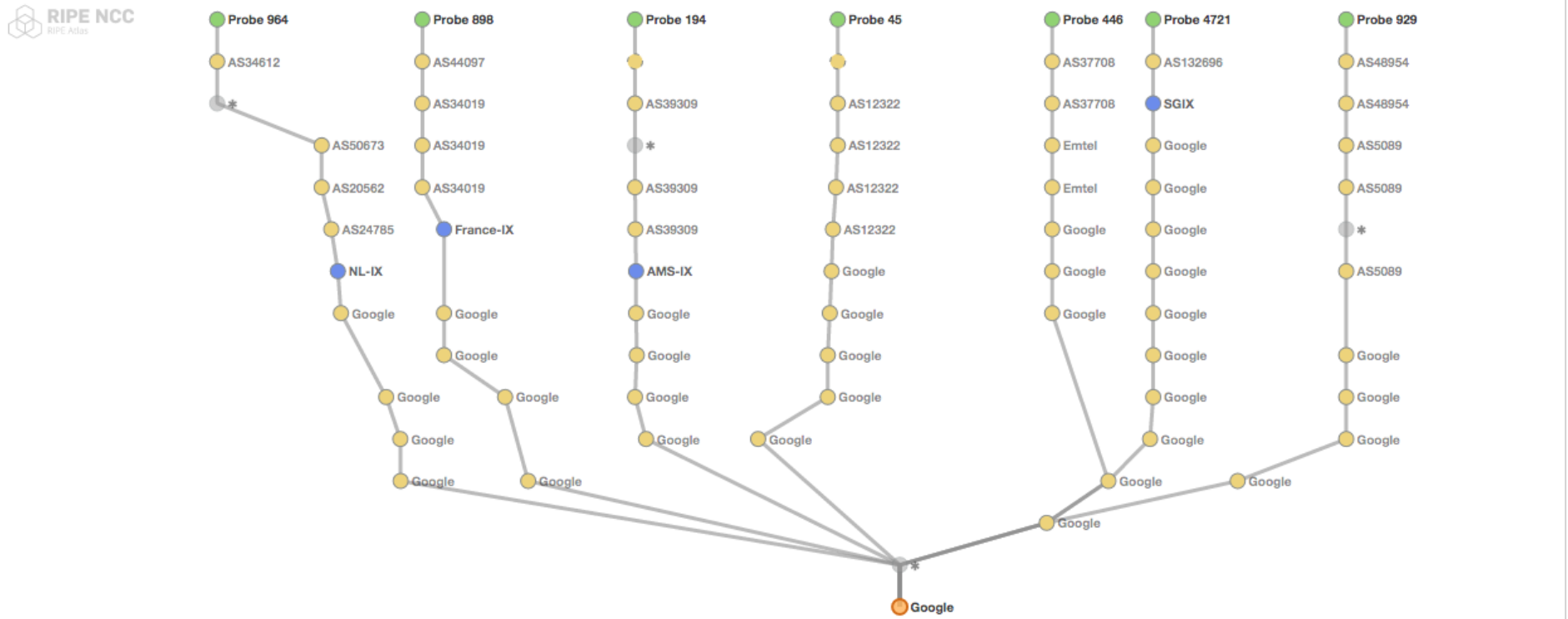


speed:

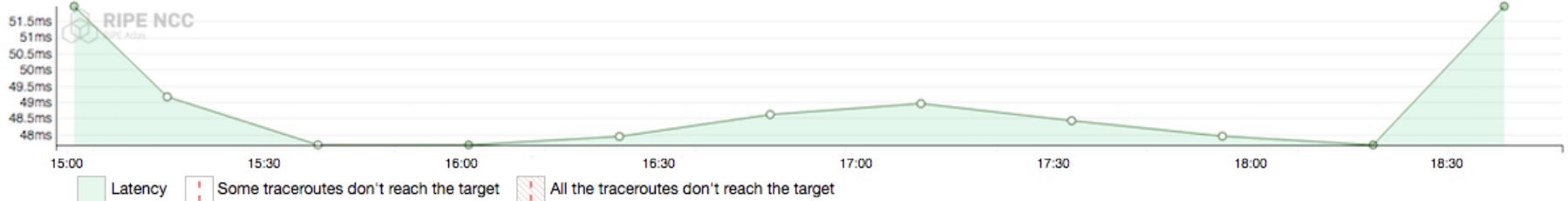
Focus on

Traceroutes to 74.125.206.94 from 8 of 10 probes [\[select\]](#) at March 10th 2017, 18:47:31 UTC

Nodes label: Auto Reverse lookup Country code



● Source ● Target ● Host ● IXP ● Private IP ● No response — Connected - - - - Disconnected



16th August, 21:41

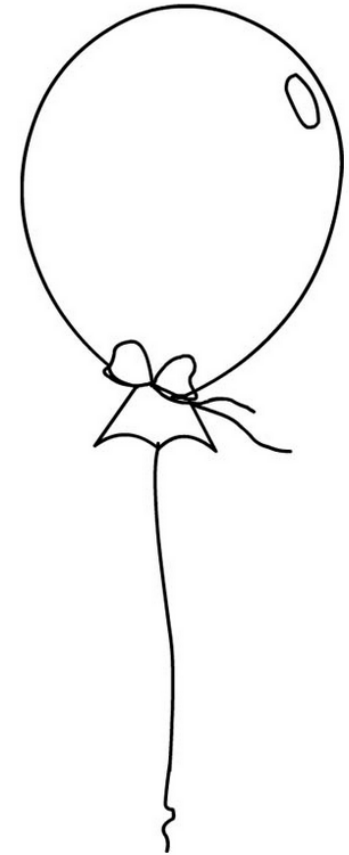
10th March, 14:57 — 10th March, 18:47

16th August, 21:41 15th October, 14:06 14th December, 06:31 11th February, 22:56 12th April, 15:21



What's New: TraceMON

- **TraceMON** is a web application for visualising (multi-source) traceroutes
- Infers network topology and characteristics of the various network components involved
- Aggregates data from many data sources, providing one-click access to:
 - Resource holder contacts, latency, whois, BGP visibility, IP geolocation, IXP detection, reverse DNS lookup ...



Latency Chart and Time Navigation



Traceroute Output



Traceroute Visualisation (BETA)

Traceroutes to 186.226.68.106 from

RIPE NCC
RIPE Atlas

Probe 964

- AS34612
- AS50673
- AS50673
- AS201011
- AS201011
- AS3320
- AS3320

● Source ● Target ● H

Traceroute output

Traceroute to 106.bgp.ipm.g8.net.br (186.226.68.106), 32 hops max, 48 byte packets

```
1 192.168.0.1 (192.168.0.1) 1.776 ms 2.246 ms 2.423 ms|
2 ***
3 84.116.228.173 (84.116.228.173) 108.442 ms 109.906 ms 109.942 ms
4 ***
5 84.116.140.170 (84.116.140.170) 108.682 ms 108.728 ms 118.707 ms
6 84.116.137.194 (84.116.137.194) 107.026 ms 108.121 ms 108.654 ms
7 4.68.72.9 (4.68.72.9) 108.244 ms 108.631 ms 108.692 ms
8 4.68.72.141 (4.68.72.141) 106.114 ms 108.992 ms 123.627 ms
9 67.16.156.78 (67.16.156.78) 231.704 ms 233.539 ms 233.575 ms
10 154.13.125.189.static.impsat.net.br (189.125.13.154) 233.67 ms 236.175 ms 238.559 ms
11 g8.po1.spo-flo-rcre02.g8.net.br (186.226.80.18) 258.666 ms 258.707 ms 258.752 ms
12 g8.te4-1.gna-t63-rcre01.g8.net.br (186.226.80.6) 277.511 ms 278.333 ms 280.468 ms
13 ***
14 ***
15 ***
16 ***
17 ***
18 ***
```

Close

Reverse lookup Country code

15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30

■ Latency ■ Some traceroutes don't reach the target ■ All the traceroutes don't reach the target

Resource Info



AS34019 — France-IX — AS7477
IX Australia NSW

France-IX (AS57734)

IP: 37.49.236.2
Located in: Paris, FR [Update](#)

PeeringDB:
IXP: France-IX, Paris, FR
Lan: 37.49.236.0/23
[Update PeeringDB](#)

Routing Info:
57734 - FRANCEIX , FR
Announced: Yes

Registry info:
Resource: 57344-58367
Name: IANA 16-bit Autonomous System (AS)
Numbers Registry
Desc: Assigned by RIPE NCC

[Contact holder](#) [Whois](#) [See BGP events](#)

Probe 281
10.7.4.1 (AS7922)
*

*** (Guess AS7922)**

Located in: Not available

Best Guess :
7922 - COMCAST-7922 - Comcast Cable
Communications, Inc., US
Announced: Yes

Registry info:
Resource: 7911-7926
Name: IANA 16-bit Autonomous System (AS)
Numbers Registry
Desc: Assigned by ARIN

[Contact holder](#) [Whois](#)

RIPE NCC

TraceMON tries to guess private addresses and wildcards



Resource Info

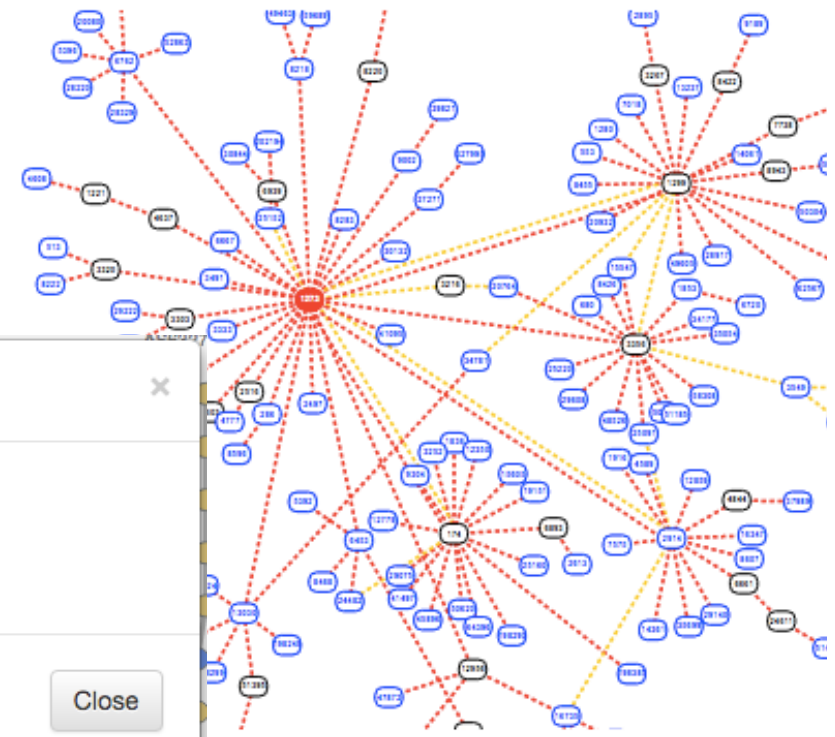
- IXP details (PeeringDB)
- Get/Update Location (OpenIPmap)
- Routing Information and BGPlay
- Whois/RIPE Database
- Technical contact emails

Update location

Resource: 80.249.208.71
Reverse DNS: gw.amsix.teltr.ripe.net

Select location:

The changes cannot per persisted yet. This feature will be enabled soon.



Highlight RIPE NCC managed values

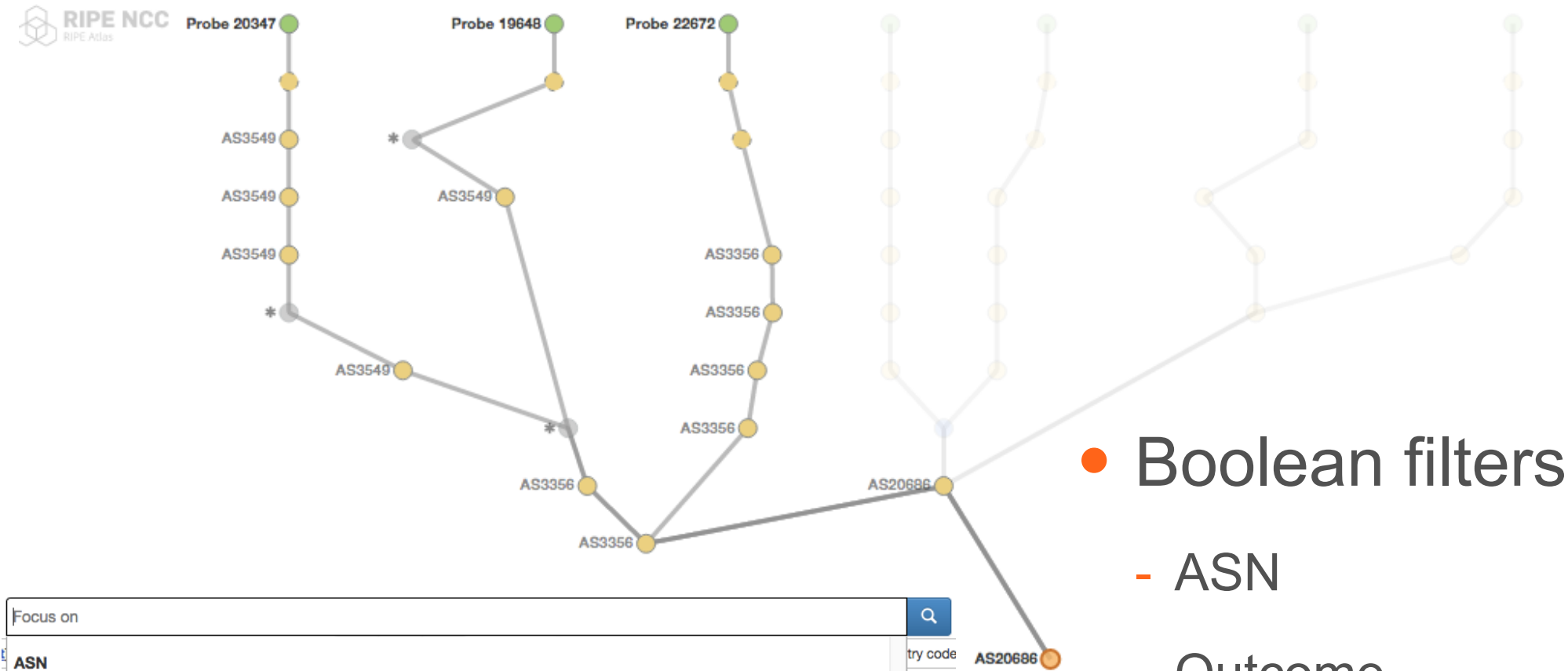
organisation: ORG-NCC1-RIPE
org-name: RIPE Network Coordination Center
org-type: LIR
address: Singel 258
address: 1016 AB
address: Amsterdam
address: NETHERLANDS
phone: +31 20 535 4444
fax-no: +31 20 535 4445
admin-c: CREW-RIPE
admin-c: AP110-RIPE
tech-c: CREW-RIPE
mnt-ref: RIPE-NCC-RIS-MNT
mnt-ref: RIPE-NCC-HM-MNT
mnt-by: RIPE-NCC-HM-MNT
created: 2004-04-17T09:55
last-modified: 2017-04-03T15:08
source: RIPE # Filtered

person: Andrea Cima
address: RIPE NCC
address: Singel 258
address: 1016 AB Amsterda
address: The Netherlanda
phone: +31 20 5354444
fax-no: +31 20 5354445
nic-hdl: ACM2-RIPE
mnt-by: RIPE-NCC-HM-MNT
org: ORG-PAGE1-RIPE

Contacts for: AS3333

tech-c: ops@ripe.net
abuse_c: abuse@ripe.net

Filter and Search



- Boolean filters
 - ASN
 - Outcome
 - Probe
 - ...

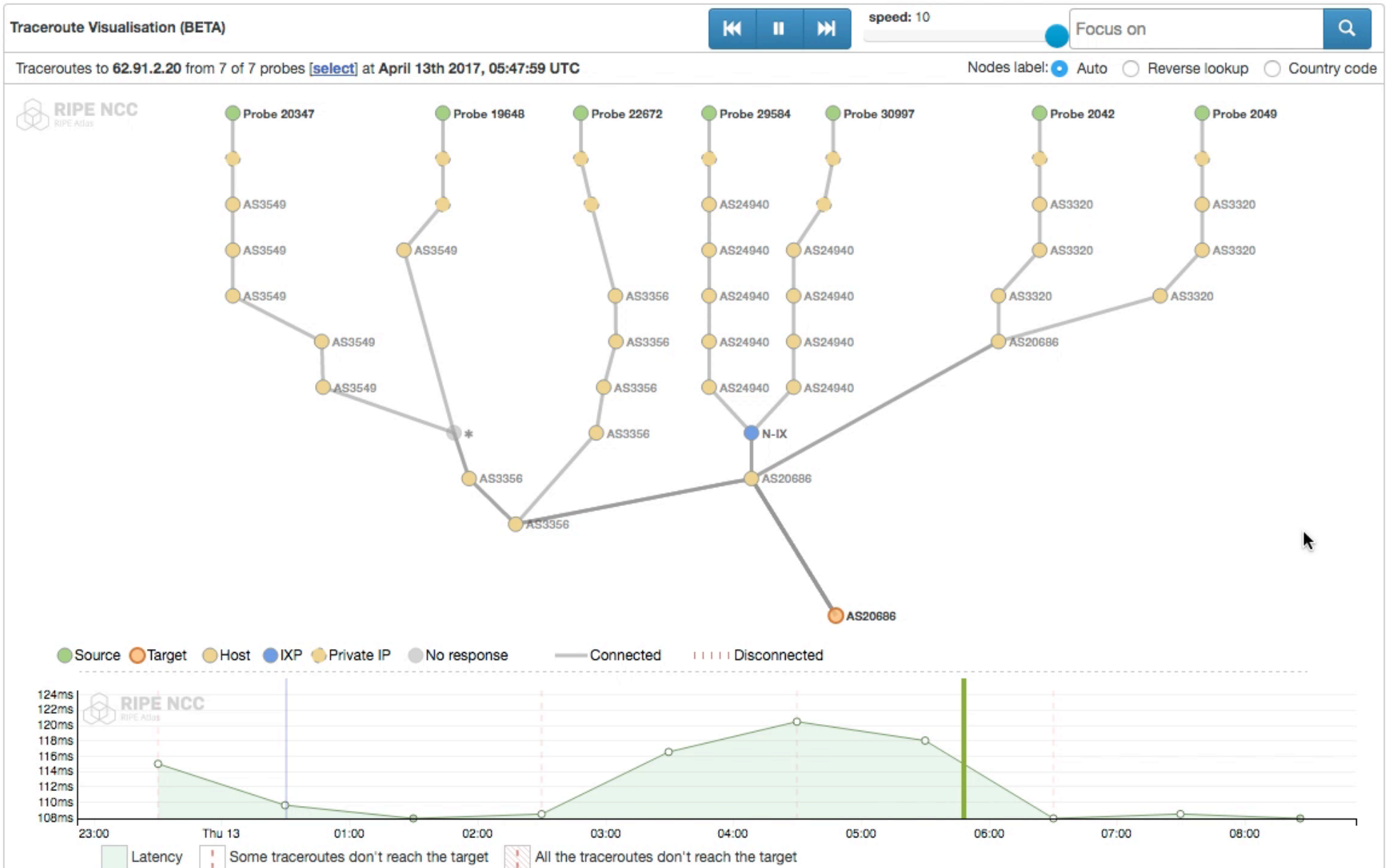
Focus on

ASN

- AS3320 - DTAG Internet service provider operations, DE
- AS3356 - LEVEL3 - Level 3 Communications, Inc., US**
- AS3549 - LVL3-3549 - Level 3 Communications, Inc., US
- AS20686 - BISPING ISP & Citycarrier, Germany, DE
- AS24940 - HETZNER-AS, DE

try code AS20686

And Of Course....Replay History





TraceMON is Open

- Open Source
 - <https://github.com/RIPE-NCC/tracemon>
- Open research topics
 - Network simplification
 - Network characterisation
 - Visualisation
- Open to other datasets
 - Traceroute datasets (including private ones)
 - Enrichment datasets (also experimental)



Upcoming Features

- Autonomous System grouping
 - And a more flexible grouping in general
- Real-time monitoring
- Alias resolution
 - To detect multiple interfaces of the same node
- Path colouring
 - More flexible path colouring e.g. which part of the graph is local network and which is the network of the target? User-defined colouring?
- Anomalies detection
- Auto filtering
 - To automatically highlight the traceroute variations that are considered "interesting" based on historic behaviours

Questions



Massimo Candela
@webrobotics



How to Take Part



Get Involved!

- Use RIPE Atlas for your operations: monitoring, troubleshooting, measuring
 - Get 1 Million credits by entering this voucher: SANOG30
 - <https://atlas.ripe.net/user/credits/#!/redeem>
- Do scientific research
- Add multilingual content.
- Become an ambassador or a sponsor
- Host a RIPE Atlas probe or an Anchor

Contribute to Tools and Code



- CLI tools
 - Write a patch: <https://github.com/RIPE-NCC/ripe-atlas-tools/blob/master/CONTRIBUTING.rst>
 - Use in your syllabus
- OpenIPMap
 - Add more data: <https://marmot.ripe.net/openipmap/>
 - Modify, reuse and improve the code:
<https://github.com/RIPE-Atlas-Community/openipmap>
- Add a link to your software on GitHub:
 - <https://github.com/RIPE-Atlas-Community/ripe-atlas-community-contrib/blob/master/README.md>



Hackathons

- Results of IXP Tools Hackathon in Madrid
- RIPE NCC DNS Measurements Hackathon
- Next Hackathon in October/November:
Stay tuned!





Questions



<https://atlas.ripe.net>



<https://labs.ripe.net/atlas>



ripe-atlas@ripe.net



atlas@ripe.net



[@RIPE_Atlas](#) and [#RIPEAtlas](#)