



**RIPE NCC**  
RIPE NETWORK COORDINATION CENTRE

# RIPE NCC Operations and Analysis Tools

Emile Aben | 27 November 2017 | SIG-NOC

# My Goals

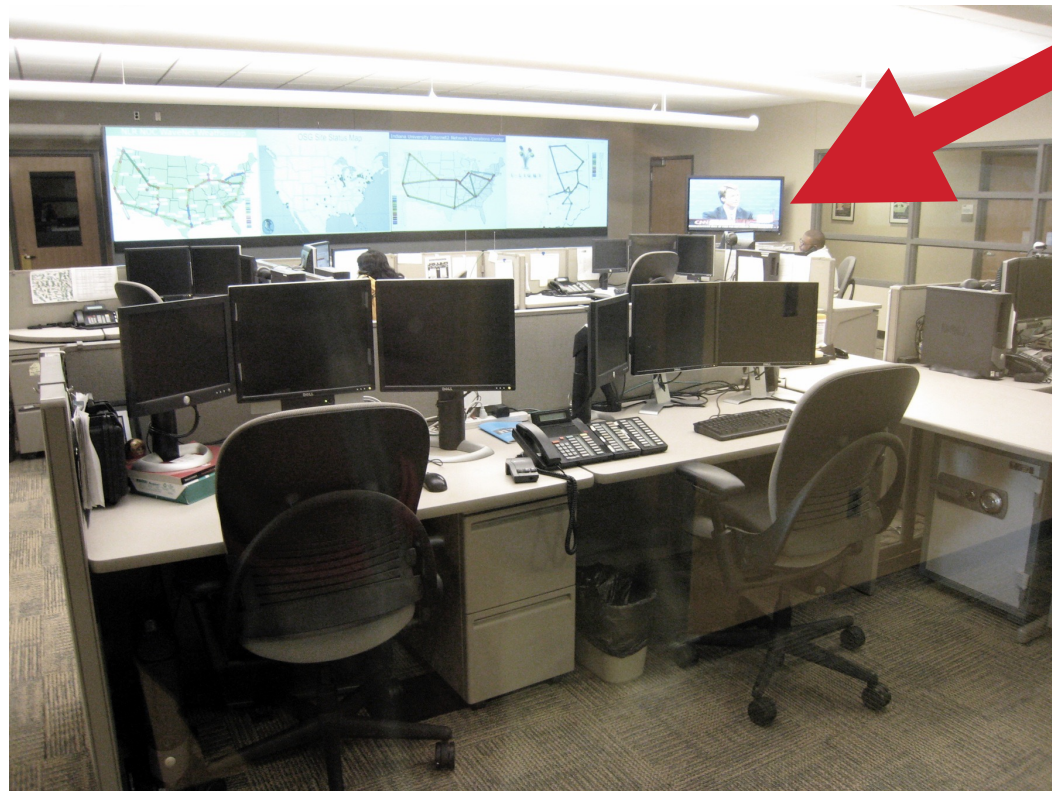


- Show you tools and data available from RIPE NCC
- Do these meet your NOC needs?
- How can we make things better?

# Confession



- I don't have a NOC background
- My assumptions about a NOC
  - Has a very good view of their own network
  - Affected by things happening outside of their own network



By Alan Levine from United States - Network Operations Center, CC BY 2.0, <https://commons.wikimedia.org/w/index.php?curid=2487597>



**RIPE Atlas**



# RIPE Atlas



From Wikipedia, the free encyclopedia

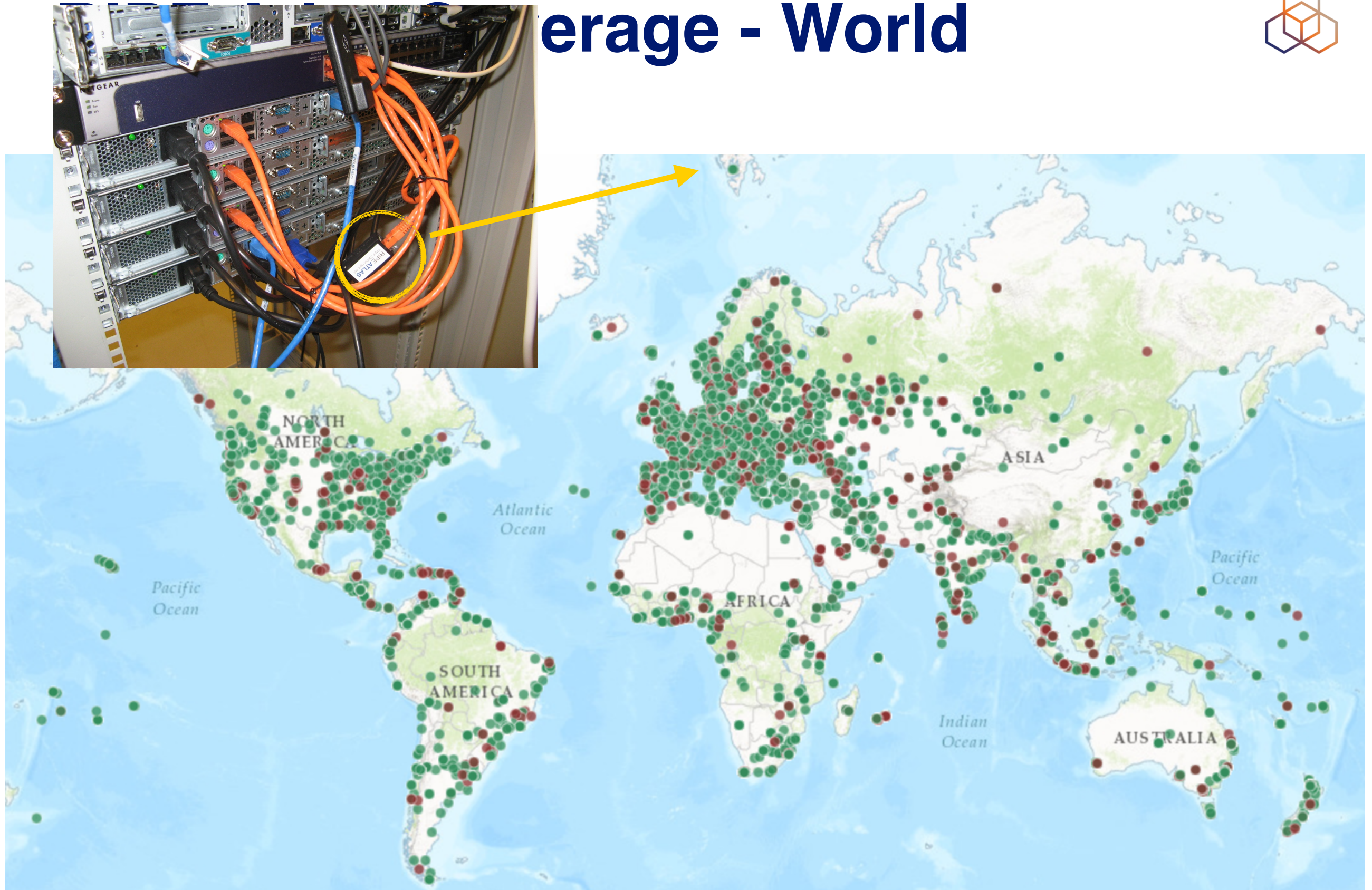
**RIPE Atlas** [↗](#) is a global, open, distributed Internet measurement platform, consisting of thousands of measurement devices that measure Internet connectivity in real time.







# erage - World



Leaflet | Tiles © Esri — Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

# RIPE Atlas Infrastructure



- Measurement points
  - Probes: 10.3k
  - RIPE Atlas Anchors: 293
- Coverage:
  - 183 countries (93%)
  - Networks (ASNs):
  - IPv4: 3,613 (6.1%)
  - IPv6: 1,369 (9.6%)





# Probe/Anchor view



[Manage IPs and ASNs](#) > [Analyse](#) > [Participate](#) > [Get Support](#) > [Publications](#) > [About Us](#) >

You are here: [Home](#) > [Analyse](#) > [Internet Measurements](#) > [RIPE Atlas](#) > [Probes](#) > Probe #6019

## ⚓ RIPE NCC Anchor v2

[General](#) [Network](#) [Built-ins](#) [UDMs](#)

### General Information

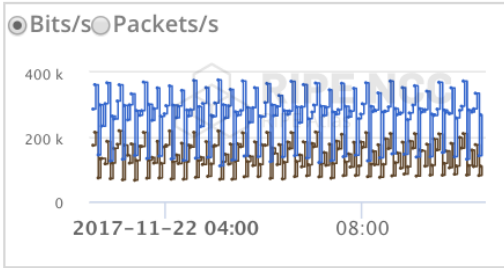
Id	6019
Architecture	centos
Firmware	4900
Version	
Router Type	None
Shared Publicly	Yes

User Tags: [No NAT](#)

System Tags: [Anchor](#) [Resolves A Correctly](#) [Resolves AAAA Correctly](#) [IPv4 Works](#) [IPv6 Works](#) [IPv4 Capable](#) [IPv6 Capable](#) [IPv6 Stable 30d](#) [IPv6 Stable 1d](#) [IPv4 Stable 30d](#) [IPv4 Stable 90d](#) [IPv6 Stable 90d](#) [IPv4 Stable 1d](#)

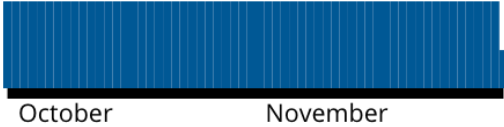
### Connection & Traffic

● Bits/s ● Packets/s



### Connected Time

1 month, 1 week



### Anchor Details

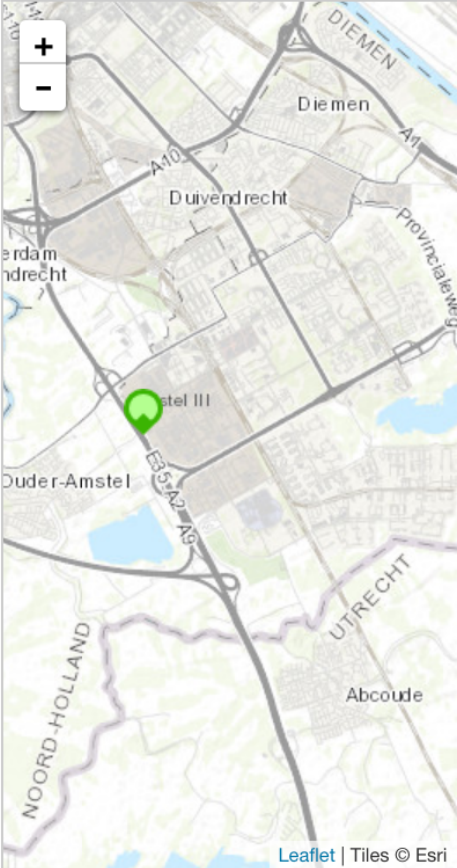
Hostname: nl-ams-as3333-2  
FQDN: nl-ams-as3333-2.anchors.atlas.ripe.net  
Contact details in RIPE Database: [GII-RIPE](#)  
This anchor also [participates in DNSMON](#) measurements.

1 month, 1 week

#6019

Firmware 4900

Architecture centos



# RIPE Atlas: Coverage by tag



10214	system-ipv4-capable
7738	system-ipv4-rfc1918
731	datacentre
213	academic
82	noc
1	datacenter

<https://gist.github.com/emileaben/cfa43dd68193407911ef6f7daa866bc1>

<https://sg-pub.ripe.net/emile/tmp/tags.2017-11-22.txt>

# RIPE Atlas near Internet users?



- [http://sg-pub.ripe.net/petros/population\\_coverage/table.html](http://sg-pub.ripe.net/petros/population_coverage/table.html)

Details for : **Armenia ( AM )** | [View Armenia on RIPEstat](#)



Internet Users covered : **1241884**

Total Internet Users: **1510906**

Internet users coverage is estimated using percentage of IPv4 Public probes.

  IPv4 Public Probes  $\geq 3$

   $3 >$  IPv4 Public Probes  $> 1$

Search:

ASN	Name	<u>Estimated Population</u> % ▼	IPv4 Public Probes	IPv4 Private Probes	IPv4 Total Probes	IPv6 Public Probes	IPv6 Private Probes	IPv6 Total Probes	More
44395	ORG-UL31-RIPE	39.99	7	0	7	2	0	2	<a href="#">View</a>
12297	ARMENTEL	26.5	1	0	1	0	0	0	<a href="#">View</a>
49800	GNC-ALFA	13.84	3	1	4	0	1	1	<a href="#">View</a>
43733	K-TELECOM	5.98	0	2	2	0	1	1	<a href="#">Apply for a probe</a>
47975	KT-AS-47975	2.88	0	0	0	0	0	0	<a href="#">Apply for a probe</a>
197834	INTERACTIVE	1.51	1	0	1	0	0	0	<a href="#">View</a>



# Most Popular Features



- Six types of measurements: ping, traceroute, DNS, SSL/TLS, NTP and HTTP (to anchors)
- APIs to start measurements and get results
- Powerful and informative visualisations
- CLI tools
- Streaming data for real-time results
- “Time Travel”, LatencyMON

# NOC perspective?



- 10k RIPE Atlas probes =
  - 10k remote Looking Glasses for some standard network debugging tools: ping, traceroute
  - Ability to look at your network outside-in
- Does this satisfy NOC needs?
- How can we make things better?

# Traceroute for Checking Reachability

- To start traceroute: GUI, API & CLI
- Results available as
  - visualised on the map, as a list of details, LatencyMon
  - download via API
  - Real-time data streaming
- Many visualisations available
  - List of probes: sortable by RTT
  - Map: colour-coded by RTT
  - LatencyMON: compare multiple latency trends

# RIPE Atlas CLI ToolSet



- Network troubleshooting from command line
- Familiar output (ping, dig, traceroute)
- Installation for Linux/OSX & Windows [experimental]
- Included in many BSD and Linux distros
- Documentation
- Source code available, contributions welcome!

# “Users from India have issues reaching us”!



```
le1000$ ripe-atlas measure traceroute --from-country IN --target surfnet.nl

Looking good! Your measurement was created and details about it can be found here:

  https://atlas.ripe.net/measurements/10276342/

Connecting to stream...

Probe #32886

  1 192.168.1.1          0.696 ms      0.423 ms      0.391 ms
  2 171.76.72.1         2.962 ms      2.965 ms      2.64 ms
  3 125.21.0.189        2.278 ms      2.826 ms      2.503 ms
  4 182.79.187.18       149.874 ms    149.552 ms    149.478 ms
  5 195.66.225.24       149.507 ms    149.388 ms    149.556 ms
  6 109.105.98.110      186.926 ms    155.355 ms    154.874 ms
  7 145.145.17.14       161.267 ms    157.917 ms    157.124 ms
  8 192.87.108.15       157.075 ms    156.767 ms    157.877 ms

Probe #32958

  1 192.168.0.1          1.617 ms      0.743 ms      0.718 ms
  2 202.83.20.205        2.334 ms      2.022 ms      3.129 ms
  3 202.83.26.1          2.369 ms      2.41 ms       2.269 ms
  4 14.141.145.197       3.483 ms      3.445 ms      3.308 ms
  5 172.31.47.5          23.575 ms     23.723 ms     23.403 ms
  6 180.87.39.25         23.491 ms     22.502 ms     22.554 ms
  7 180.87.38.1          128.36 ms     127.767 ms    127.58 ms
  8 180.87.38.126        126.672 ms    125.524 ms    126.017 ms
  9 80.231.217.6          127.204 ms    124.816 ms    125.074 ms
 10 80.231.153.49         126.176 ms    126.155 ms    126.064 ms
 11 80.231.153.202        128.463 ms    128.374 ms    128.215 ms
 12 141.136.105.89        135.736 ms    135.672 ms    136.018 ms
 13 77.67.72.110         137.012 ms    140.409 ms    136.684 ms
```

# Complex Example: “HTTP ping”



- HTTP fetch only possible towards Anchors
- “HTTP ping” to check reachability

## Create a New Measurement

Step 1 Definitions

Traceroute measurement to dk-blp-as39839.anchors.atlas.ripe.net

Target\*: dk-blp-as39839.anchors.atlas.ripe.net  
An IP address or hostname

Address Family\*: IPv4

Timeout (ms): 4000

Protocol\*: TCP

Description: Traceroute measurement to dk-blp-as39839.

Interval: 600  
How often this should be done (seconds between samples). Note that this value is ignored for one-off measurements.

Resolve on Probe: ☐  
Force the probe to do DNS resolution

Advanced Options

Packets: 3

Size: 0  
Size of the packet

First Hop: 64  
Start measuring the traceroute at this hop.

Maximum Hops: 64  
Stop measuring the traceroute at this hop.

Spread:   
Spread of uniformly distributed random probe start time phase

Port: 80

Paris: 16  
Number of different variations for paris traceroute. Set 0 for standard traceroute.

Destination Extension Header Size: 0  
The size of the destination extension header to include in the IPv6 packet.

Hop-by-Hop Extension Header Size: 0  
The size of the hop-by-hop extension header to include in the IPv6 packet.

Don't Fragment: ☐

Skip DNS check: ☐  
Disables target DNS check on measurement creation



























































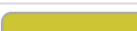















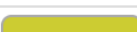

















```
# ripe-atlas measure
traceroute --target
82.94.235.165 --protocol
TCP --size 1 --first-hop
64 --max-hops 64 --port 80
```



# Measurement results



## ⚡ Traceroute measurement to surfnet.nl

General Information										
Probes										
Map										
TraceMON (beta)										
Openipmap (beta)										
Results										
Probe	ASN (IPv4)	ASN (IPv6)		Time (UTC)	RTT		Hops	Success		
25164	24560		 						No recent report available	
33546	24560		 						No recent report available	
25387	132933		 	2017-11-21 10:21	126.822		15	✓		
28878	17439		 	2017-11-21 10:21	127.944		15	✓		
24887	24309		 	2017-11-21 10:21	129.588		15	✓		
33575	24309		 	2017-11-21 10:21	131.924		15	✓		
32167	24309		 	2017-11-21 10:21	135.219		16	✓		
32958	24309		 	2017-11-21 10:21	136.520		15	✓		
25373	132933		 	2017-11-21 10:21	136.711		14	✓		
28502	18196		 	2017-11-21 10:21	138.149		8	✓		
32923	24309		 	2017-11-21 10:21	139.512		16	✓		
23697	17625		 	2017-11-21 10:21	141.129		15	✓		
32932	56209		 	2017-11-21 10:21	149.828		6	✓		
31242	134053	134053	 	2017-11-21 10:21	150.312		8	✓		
32954	17813		 	2017-11-21 10:21	153.087		10	✓		
29959	9430		 	2017-11-21 10:21	153.754		17	✓		
29939	135036		 	2017-11-21 10:21	154.320		11	✓		
25261	55862		 	2017-11-21 10:21	155.279		10	✓		
32886	24560		 	2017-11-21 10:21	157.075		8	✓		
32001	23860		 	2017-11-21 10:21	158.148		16	✓		
17011	132933	58901	 	2017-11-21 10:21	158.796		14	✓		
30669	55824		 	2017-11-21 10:21	159.807		12	✓		
29983	58405		 	2017-11-21 10:21	161.715		10	✓		
32903	18101		 	2017-11-21 10:21	162.541		7	✓		

# Measurement Results

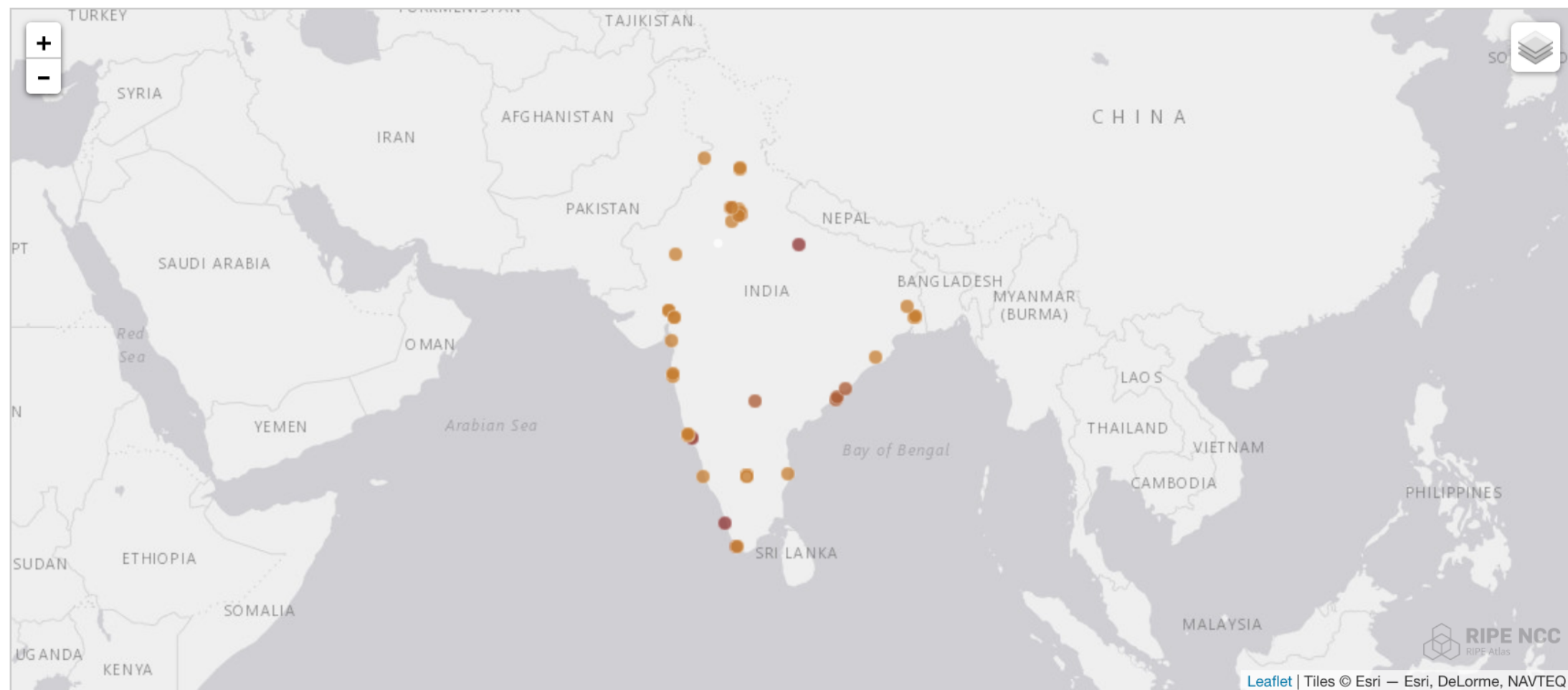


## ⚡ Traceroute measurement to surfnet.nl

General Information Probes **Map** TraceMON (beta) Openipmap (beta) Results

The probes involved in this measurement, plotted geographically.

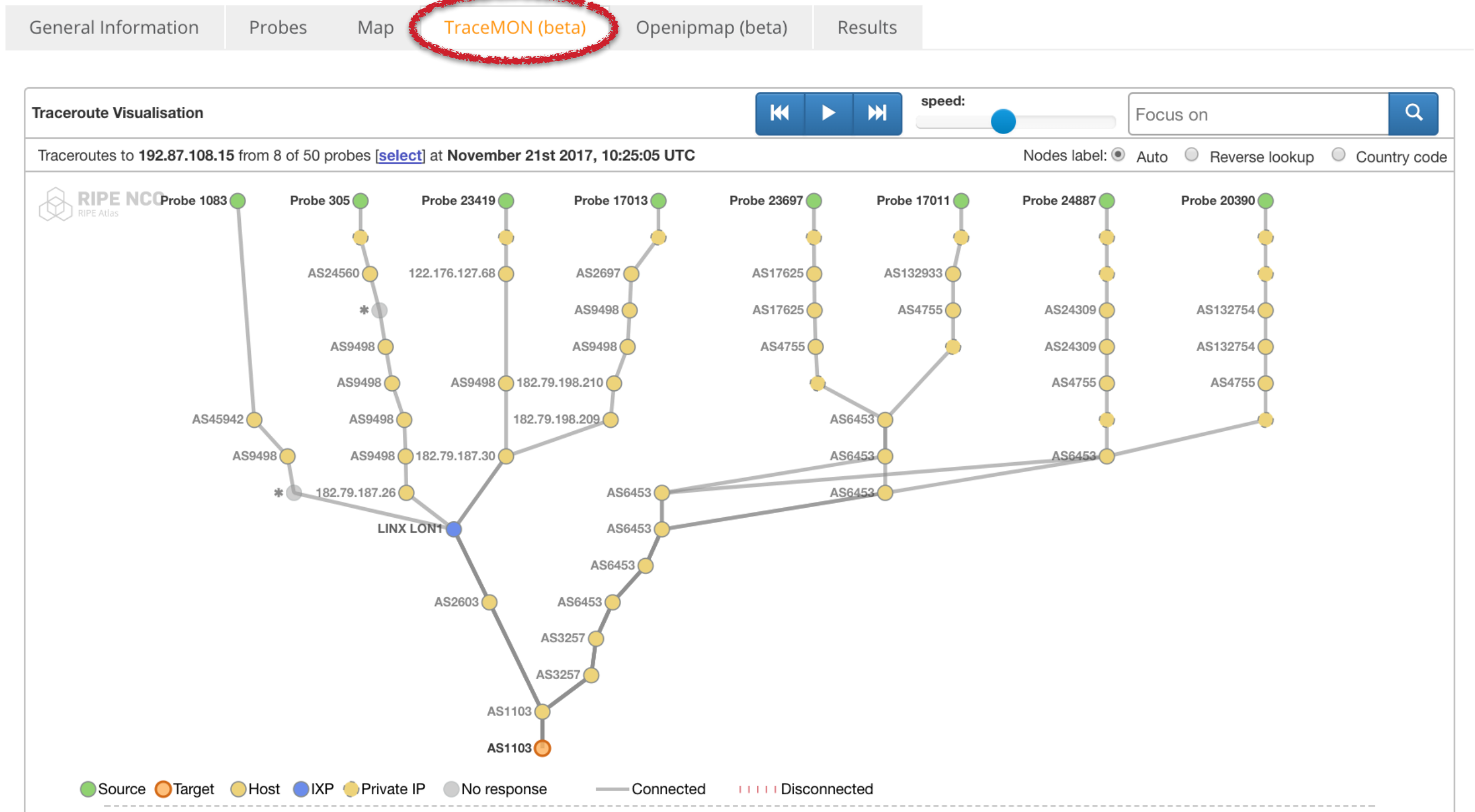
Filter by ASN, prefix, or country:



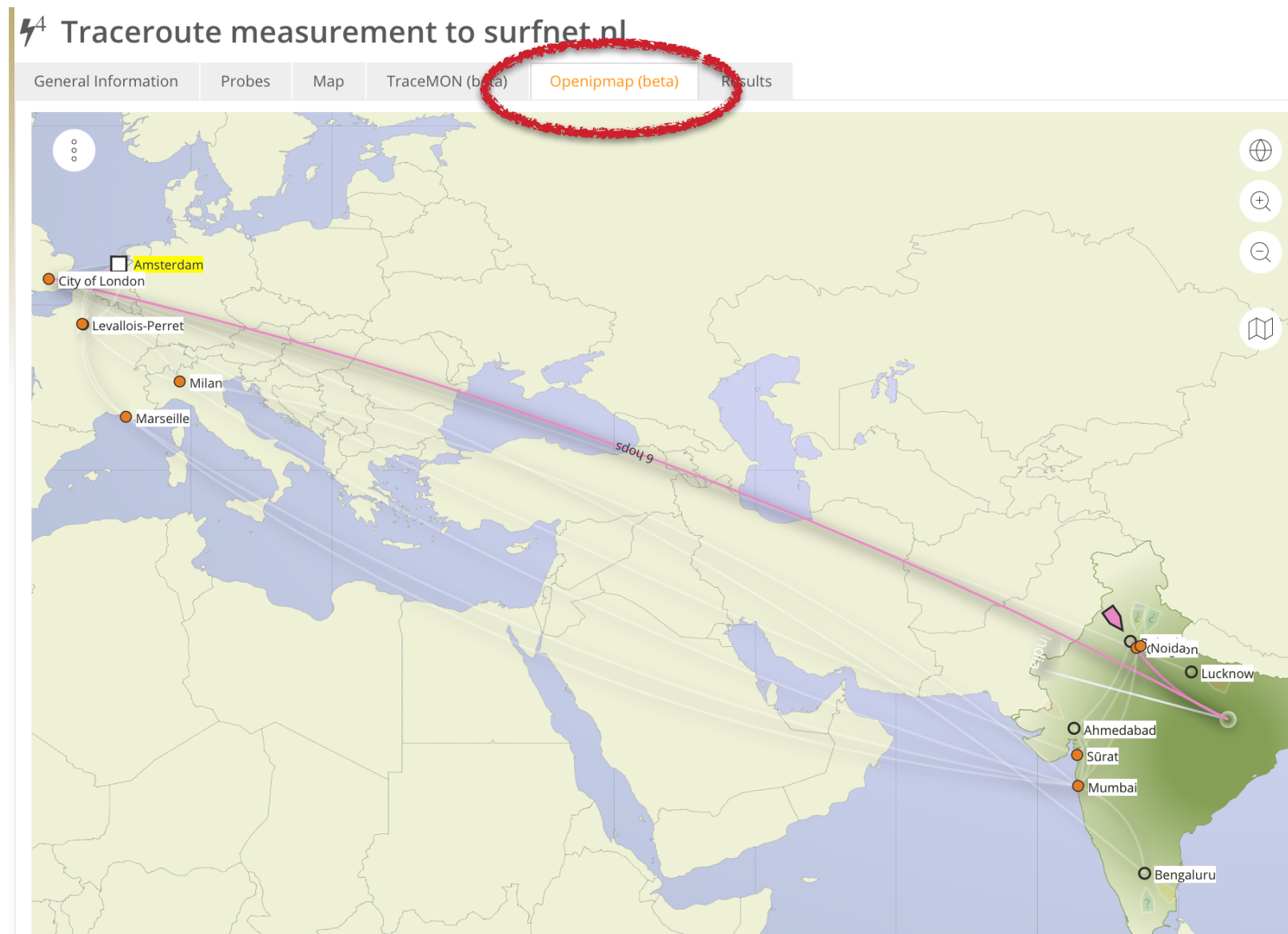
# Measurement Results



## ⚡ Traceroute measurement to surfnet.nl



# Measurement Results



<https://ripe75.ripe.net/archives/video/121/>

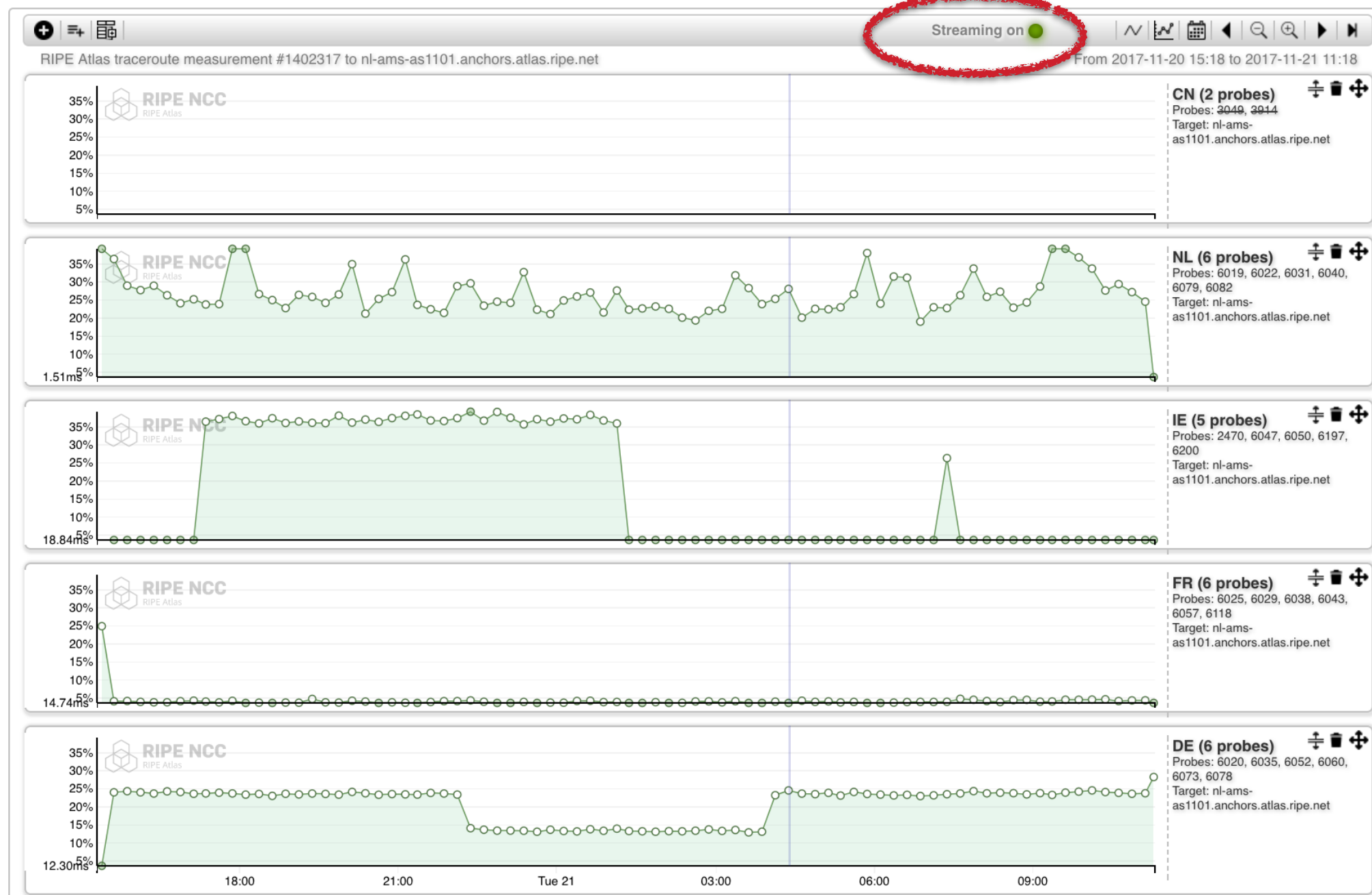
<https://ripe75.ripe.net/archives/video/203/>

# Traceroute View: LatencyMon



⚡<sup>4</sup> Anchoring Mesh Measurement: Traceroute IPv4 for anchor nl-ams-as1101.anchors.atlas.ripe.net

General Information Probes Map **LatencyMON** TraceMON (beta) Openipmap (beta) Results



# “Paying” for your measurements






- Running your own measurements cost credits
  - Ping = 10 credits, traceroute = 20, etc.
- Why? Fairness and to avoid overload
- Limited by daily spending limit and measurement results limits
- Hosting a RIPE Atlas probe earns credits
- Earn extra credits by being RIPE NCC members, hosting an anchor or sponsoring

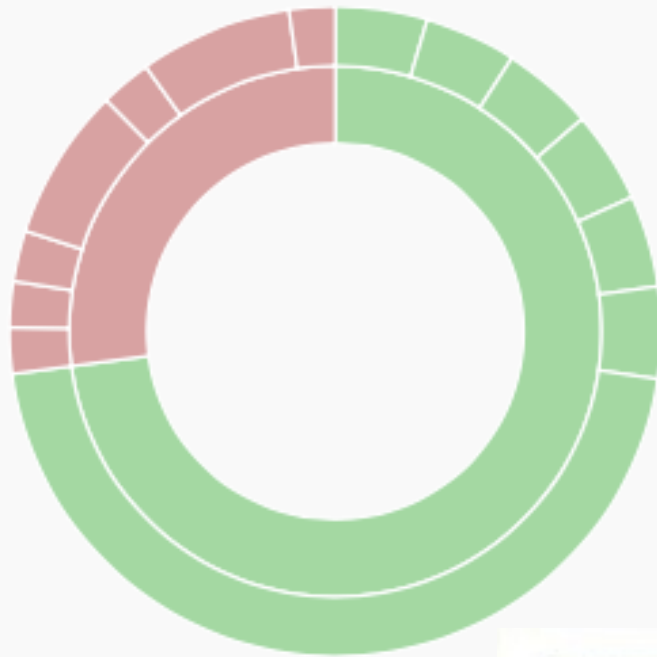


# Who Wants to be a Millionaire?



 Credits

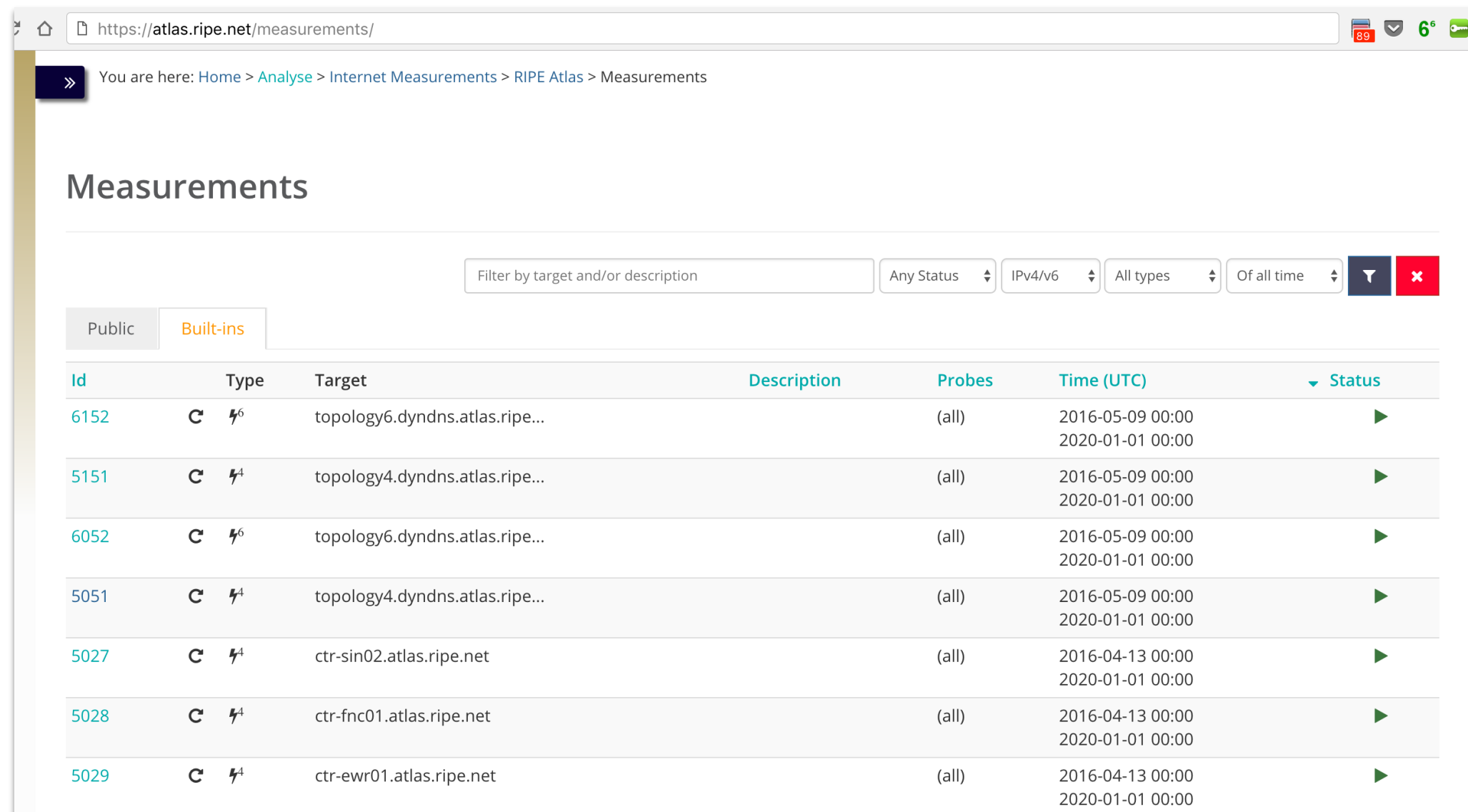
 76507  317.2 million



# Data, Data, Data



- Don't spend credits - Use Existing Data!
  - For instance: DNS, ping, traceroute to DNS root-servers



The screenshot shows the RIPE Atlas website's 'Measurements' page. At the top, there's a breadcrumb trail: 'You are here: Home > Analyse > Internet Measurements > RIPE Atlas > Measurements'. Below this is a search bar labeled 'Filter by target and/or description' and several dropdown filters: 'Any Status', 'IPv4/v6', 'All types', and 'Of all time'. There are also buttons for 'Public' and 'Built-ins'. The main content is a table with columns: 'Id', 'Type', 'Target', 'Description', 'Probes', 'Time (UTC)', and 'Status'. The table lists several measurements, including topology6.dyndns.atlas.ripe.net, topology4.dyndns.atlas.ripe.net, ctr-sin02.atlas.ripe.net, ctr-fnc01.atlas.ripe.net, and ctr-ewr01.atlas.ripe.net. Each row shows the measurement ID, type (C for ping, L for traceroute), target, description, number of probes, time range, and a status indicator (a green arrow).

Id	Type	Target	Description	Probes	Time (UTC)	Status
6152	C L <sup>6</sup>	topology6.dyndns.atlas.ripe...		(all)	2016-05-09 00:00 2020-01-01 00:00	▶
5151	C L <sup>4</sup>	topology4.dyndns.atlas.ripe...		(all)	2016-05-09 00:00 2020-01-01 00:00	▶
6052	C L <sup>6</sup>	topology6.dyndns.atlas.ripe...		(all)	2016-05-09 00:00 2020-01-01 00:00	▶
5051	C L <sup>4</sup>	topology4.dyndns.atlas.ripe...		(all)	2016-05-09 00:00 2020-01-01 00:00	▶
5027	C L <sup>4</sup>	ctr-sin02.atlas.ripe.net		(all)	2016-04-13 00:00 2020-01-01 00:00	▶
5028	C L <sup>4</sup>	ctr-fnc01.atlas.ripe.net		(all)	2016-04-13 00:00 2020-01-01 00:00	▶
5029	C L <sup>4</sup>	ctr-ewr01.atlas.ripe.net		(all)	2016-04-13 00:00 2020-01-01 00:00	▶

# Status Checks



- Status checks work on ping measurements
- You define alert parameters, for example:
  - Threshold for percentage of probes that successfully received a reply
  - How many of the most recent measurements to base it on
  - Maximum packet loss acceptable

[https://atlas.ripe.net/api/v2/measurements/10275975/status-check/?lookback=10&median\\_rtt\\_threshold=20&show\\_all=1&permitted\\_total\\_alerts=11&max\\_packet\\_loss=50](https://atlas.ripe.net/api/v2/measurements/10275975/status-check/?lookback=10&median_rtt_threshold=20&show_all=1&permitted_total_alerts=11&max_packet_loss=50)

- Documentation:
  - <https://atlas.ripe.net/docs/api/v2/manual/measurements/status-checks.html>

# Icinga Integration



- Community of operators contributed configuration code!
  - Making use of the built-in “check\_http” plugin
- GitHub examples:
  - [https://github.com/RIPE-Atlas-Community/ripe-atlas-community-contrib/blob/master/scripts\\_for\\_nagios\\_icinga\\_alerts](https://github.com/RIPE-Atlas-Community/ripe-atlas-community-contrib/blob/master/scripts_for_nagios_icinga_alerts)
- Post on Icinga blog:
  - <https://www.icinga.org/2014/03/05/monitoring-ripe-atlas-status-with-icinga-2/>

# Community



- Many community-contributed pieces of code
  - <https://github.com/RIPE-Atlas-Community/ripe-atlas-community-contrib>
  - Example: <https://github.com/pierky/ripe-atlas-monitor>
- RIPE Labs
  - <https://labs.ripe.net>
- Hackathons

**AUTOMATE ALL THE THINGS**



# Challenges In Using RIPE Atlas



- Select the right vantage points
  - Already possible: By ASN, country, tag, probe\_id, geoloc
  - As dissimilar as possible?
  - Where eyeballs are?
  - By AS-SET?
- Select the right destinations
- Timeliness of data

```
[e1000$ time ripe-atlas measure traceroute --from-probes 6042 --timeout 500 --packets 1 --target 8.8.8.8 --renderer raw  
real    0m4.651s  
user    0m0.245s  
sys     0m0.068s
```





# **Routing Information Service (RIS)**

# Routing Data (RIS)



- 18 BGP collectors and growing
- 600+ peers
- 150+ full-feed peers



# Raw BGP data!



- 15+ years of raw data (5.8 TB) available to download and analyse yourself :)
  - <https://www.ripe.net/analyse/internet-measurements/routing-information-service-ris/ris-raw-data>
- Readable using BGPdump utility
  - open source, maintained by RIPE NCC
  - <https://bitbucket.org/ripenncc/bgpdump>
- ...and by other tools
  - CAIDA BGPStream: <http://bgpstream.caida.org/>



# Live stream demo

- Prototype!!
- Let's see if it works
- <http://stream-dev.ris.ripe.net/demo>
- Live stream enables new applications
  - BGP hijack detection
  - Real time anomaly analysis
  - Live monitoring of your routes



# NOC perspective?

- Big Looking Glass
- Useful for post-mortems?
- Monitoring around changes?
- Event signaling?
  - THE INTERNET IS ON FIRE
  - Something is happening near you



**RIPEstat**

# RIPEstat



- Access to these datasets:
  - RIPE Database (INR, IRR) and other RIRs
  - BGP routing data (RIS)
  - RIPE Atlas, M-Lab, Speedchecker, etc.
  - Geolocation
  - Blacklist
- New datasets are constantly added!

The MLAB logo, featuring the text "MLAB" in a bold, sans-serif font, with the "M" underlined, all contained within a white rectangular box with a slight shadow.

**MLAB**

The Broadband Speedchecker logo, featuring the word "BROADBAND" in large, bold, black letters with a red and black circular graphic element, and "speedchecker" in smaller red letters below it, all within a white rectangular box with a shadow.

**BROADBAND**  
speedchecker

The MaxMind logo, featuring a network diagram with blue dots and lines above the text "MAXMIND" in blue, all within a white rectangular box with a shadow.

**MAXMIND**

The Spamhaus logo, featuring the word "SPAMHAUS" in bold, blue, sans-serif capital letters, all within a white rectangular box with a shadow.

**SPAMHAUS**

...



# Registry Data



- Registry of Internet number resources (INR)
- Five Regional Internet Registries



*5,655 members*

[https://www.arin.net/about\\_us/membership/index.html](https://www.arin.net/about_us/membership/index.html) - Nov 2017



*17,402 members*

<https://labs.ripe.net/statistics/number-of-lirs> - Nov 2017

*7,222 members*

<http://www.lacnic.net/1009/2/lacnic/members-list> - Nov 2017



*6,436 members*

<https://www.apnic.net/get-ip/apnic-membership/who-are-our-members> - Nov 2017



*1,540 members*

<http://www.afrinic.net/en/about/our-members> - Nov 2017



# Registry Data

- Internet Routing Registry (IRR)
- Purpose to facilitate routing (RPSL)

**IRR**  
Internet Routing Registry™

### List of Routing Registries

This list was designed for the Internet community. It enables users to coordinate their contact information.

- AFRINIC
- ALTDB
- AOLTW
- APNIC
- ARIN
- BELL
- BBOI
- CANARIE
- EASYNET
- EPOCH
- GT
- HOST
- JPIRR
- LEVEL3
- NESTEGG
- NTTCOM
- OPENFACE
- OTTIX
- PANIX
- RADB
- REACH
- RGNET
- RIPE
- RISQ
- ROGERS
- TC

**List of Routing Registries**

**Overview of the IRR**

**RPSL Reference Guide**

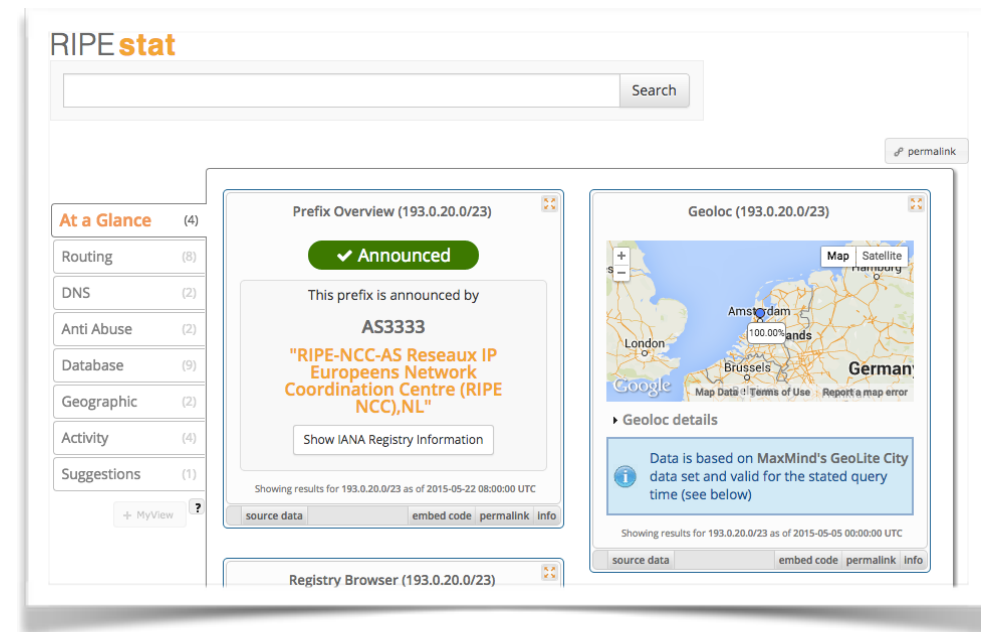
**FAQ: Why Use a Routing Registry?**

<http://www.irr.net/docs/list.html>

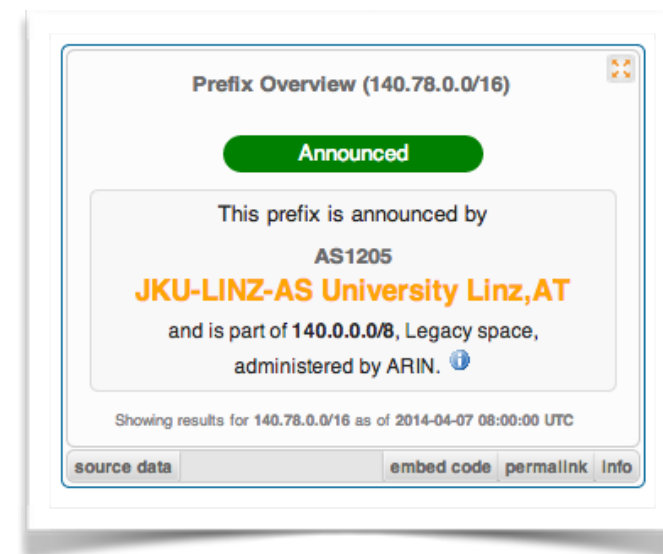
# RIPEstat



- <https://stat.ripe.net>



- RIPEstat widget API



- RIPEstat data API
  - <https://stat.ripe.net/data/routing-status/data.json?resource=...>

Your IP address is:

2001:67c:2e8:9::c100:14e6

## System Statistics

1,429,622

Requests seen in the last full hour on RIPEstat

## On RIPE Labs

New Feature: Easily Embed your  
RIPEstat Widgets in RIPE Labs  
Articles

Supported resources:

- \* IP address/prefix (v4/v6)
- \* ASN
- \* Domain names
- \* Country



Login



[About Us](#) >

Search

Your network: [AS3333](#), [2001:67c:2e8::/48](#)

e.g.: [IPv4 prefix/range](#), [IPv6](#), [ASN](#)

## RIPEstat Data API

RESTful. Versatile.  
And all about data.



# RIPEstat - Data API



- More than 50 data calls
- Documentation:  
[https://stat.ripe.net/docs/data\\_api](https://stat.ripe.net/docs/data_api)
- Building blocks
- Integration in open tools

Rosiak commented on 2 Oct 2015 Contributor

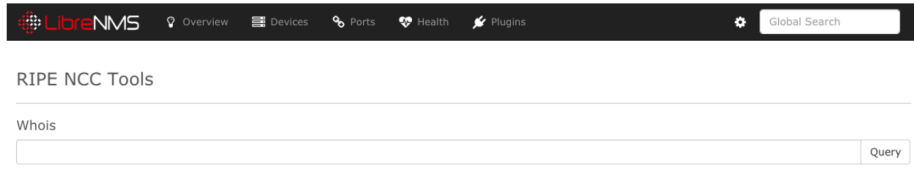
- Whois
- Abuse Finder
- Geolocate
- Looking Glass
- etc.

[https://stat.ripe.net/docs/data\\_api](https://stat.ripe.net/docs/data_api)

Rosiak added the **Feature-Request** label on 2 Oct 2015

Rosiak commented on 3 Oct 2015 Contributor

Quick example, thoughts?:



LibreNMS Overview Devices Ports Health Plugins Global Search

RIPE NCC Tools

Whois  Query

Overview  
Data Calls  
Abuse Contact Finder  
Address Space Hierarchy  
Address Space Usage  
Allocation History  
Announced Prefixes  
AS Overview  
AS Path Length  
AS Routing Consistency  
ASN Neighbours  
ASN Neighbours History  
Atlas Probe Deployment  
Atlas Probes  
Atlas Targets  
BGPlay  
BGP State  
BGP Updates  
BGP Update Activity  
Blacklist  
Country ASNs  
Country Resource Stats  
Country Resource List  
DNS Chain  
Example Resources  
Geolocation  
Geolocation History  
IANA Registry Info  
Looking Glass  
M-lab Activity Count  
M-lab Bandwidth  
M-lab Clients  
Network Info  
Prefix Count  
Prefix Overview  
Prefix Routing Consistenc...  
Prefix Size Distribution  
Registry Browser  
RIR  
RIR Prefix Size Distribut...  
RIS Asns  
RIS First-Last-Seen  
RIS Prefixes  
RIS Peerings  
RIS Peer Count  
Related Prefixes  
Reverse DNS  
Reverse DNS IP  
Reverse DNS Consistency  
Routing History  
Routing Status  
Searchcomplete  
Speedchecker Bandwidth Me...  
Visibility  
Whats My Ip  
Whois  
Whois Object Last Updated



# RIPEstat - Widget API

- HTML5/CSS/JS applications
- Standard Javascript
  - JQuery
  - Require.js
- More than 50 widgets
- Documentation
  - [https://stat.ripe.net/docs/widget\\_api](https://stat.ripe.net/docs/widget_api)
- Embed into NOC dashboards?



# RIPEstat Examples



BGP Looking Glass (195.137.160.0/24)

▼ 14 RRCs see 115 peers announcing 195.137.160.0/24 originated by AS6697. [EXPAND EVERYTHING]

- ▶ RRC11 in New York City, New York, US sees 1 ASN originating 195.137.160.0/24. (AS6697)
- ▶ RRC10 in Milan, Italy sees 1 ASN originating 195.137.160.0/24. (AS6697)
- ▶ RRC00 in Amsterdam, Netherlands sees 1 ASN originating 195.137.160.0/24. (AS6697)
- ▶ RRC01 in London, United Kingdom sees 1 ASN originating 195.137.160.0/24. (AS6697)

▼ RRC15 in Sao Paulo, Brazil sees 1 ASN originating 195.137.160.0/24. (AS6697)

▼ AS6697 is seen as the origin by 14 peers.

▼ 187.16.217.48 is announcing route AS16735 AS41095 AS6697.

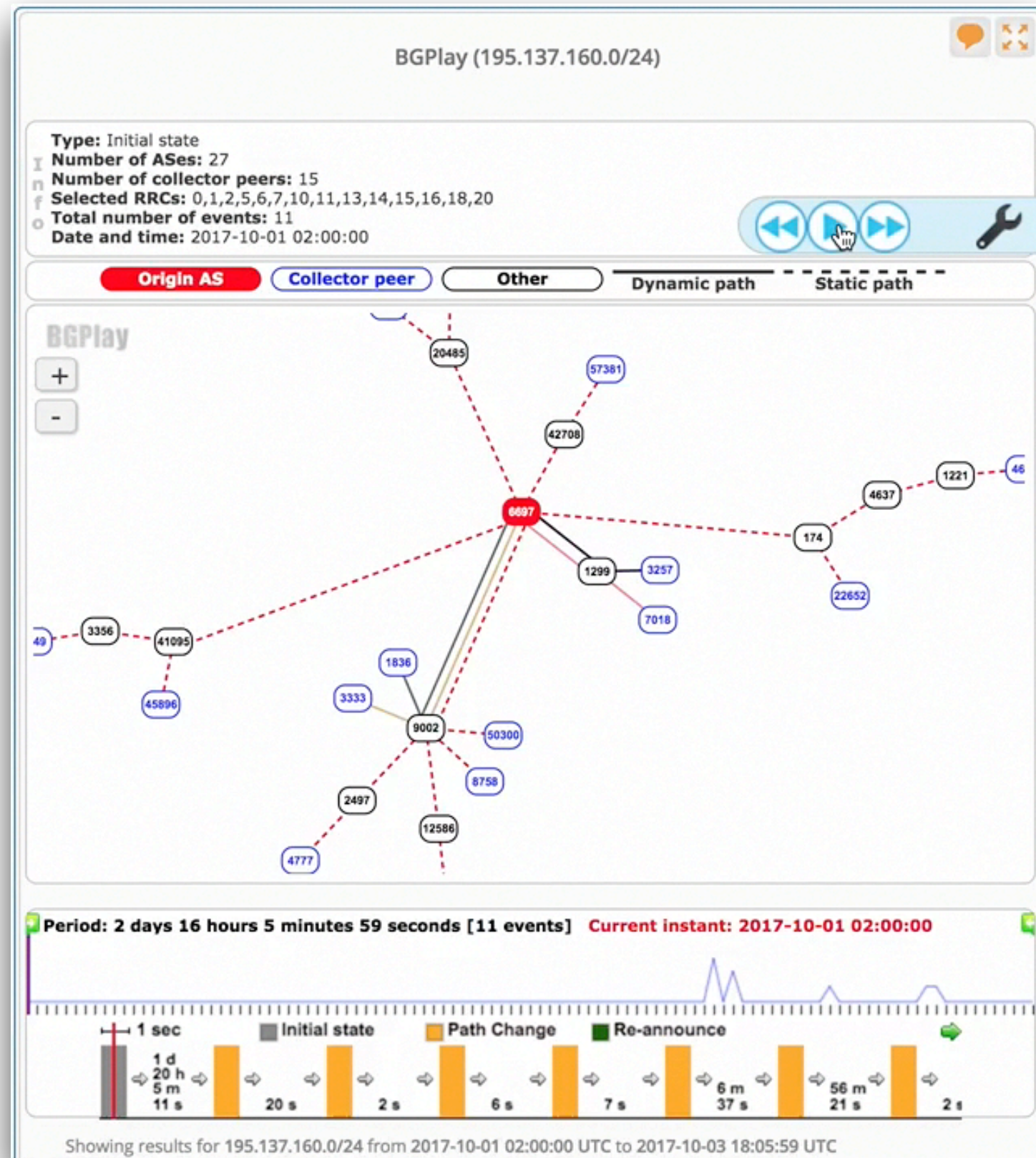
```
187.16.217.48 from 187.16.217.48 (200.225.196.252)
Origin IGP, localpref 100, valid, external, best
Community: 16735:5 16735:6101
Last update: Mon Sep 25 13:17:37 2017
```

▼ 187.16.220.193 is announcing route AS263584 AS263321 AS7738 AS41095 AS6697.

```
187.16.220.193 from 187.16.220.193 (177.129.136.254)
Origin IGP, localpref 100, valid, external
Last update: Tue Oct 3 04:19:37 2017
```



# RIPEstat Examples



# RIPEstat Examples



Visibility (195.137.160.0/24)

195.137.160.0/24 is visible by 100% of 158 IPv4 RIS full peers.

Visibility Location Details of 195.137.160.0/24

RRC	IXP Location	Location	IPv4 peers seeing	IPv4 Visibility
RRC00	RIPE-NCC Multihop	Amsterdam, Netherlands	15 of 15	100%
RRC01	LINX	London, United Kingdom	7 of 7	100%
RRC03	AMS-IX / NL-IX	Amsterdam, Netherlands	7 of 7	100%
RRC04	CIXP	Geneva, Switzerland	8 of 8	100%
RRC05	VIX	Vienna, Austria	3 of 3	100%
RRC06	DIX-IE	Tokyo, Japan	2 of 2	100%
RRC07	Netnod	Stockholm, Sweden	5 of 5	100%
RRC10	MIX	Milan, Italy	9 of 9	100%
RRC11	NYIIX	New York City, US	9 of 9	100%
RRC12	DE-CIX	Frankfurt, Germany	12 of 12	100%
RRC13	MSK-IX	Moscow, Russian Federation	11 of 11	100%
RRC14	PAIX	Palo Alto, US	7 of 7	100%
RRC15	PTTMetro	Sao Paulo, Brazil	14 of 14	100%



# **What Next?**

# Internet Events



- Something is happening on the Internet!
  - Global impact
  - Local impact
    - Your topological neighbors
    - Your geographical area
- What events do you want to be signalled on?
- How? Email, Social media (Twitter), App ...

# An Internal Alerting System



- We have internal alerts on BGP weirdness
  - A country drops >10% ASNs
  - An ASN adds 200+ prefixes
  - Total pfx count changes >500
- It's noisy and messy
- 5 minutes delay is a life-time when turds-hit-the-fan

at 17:54Z:

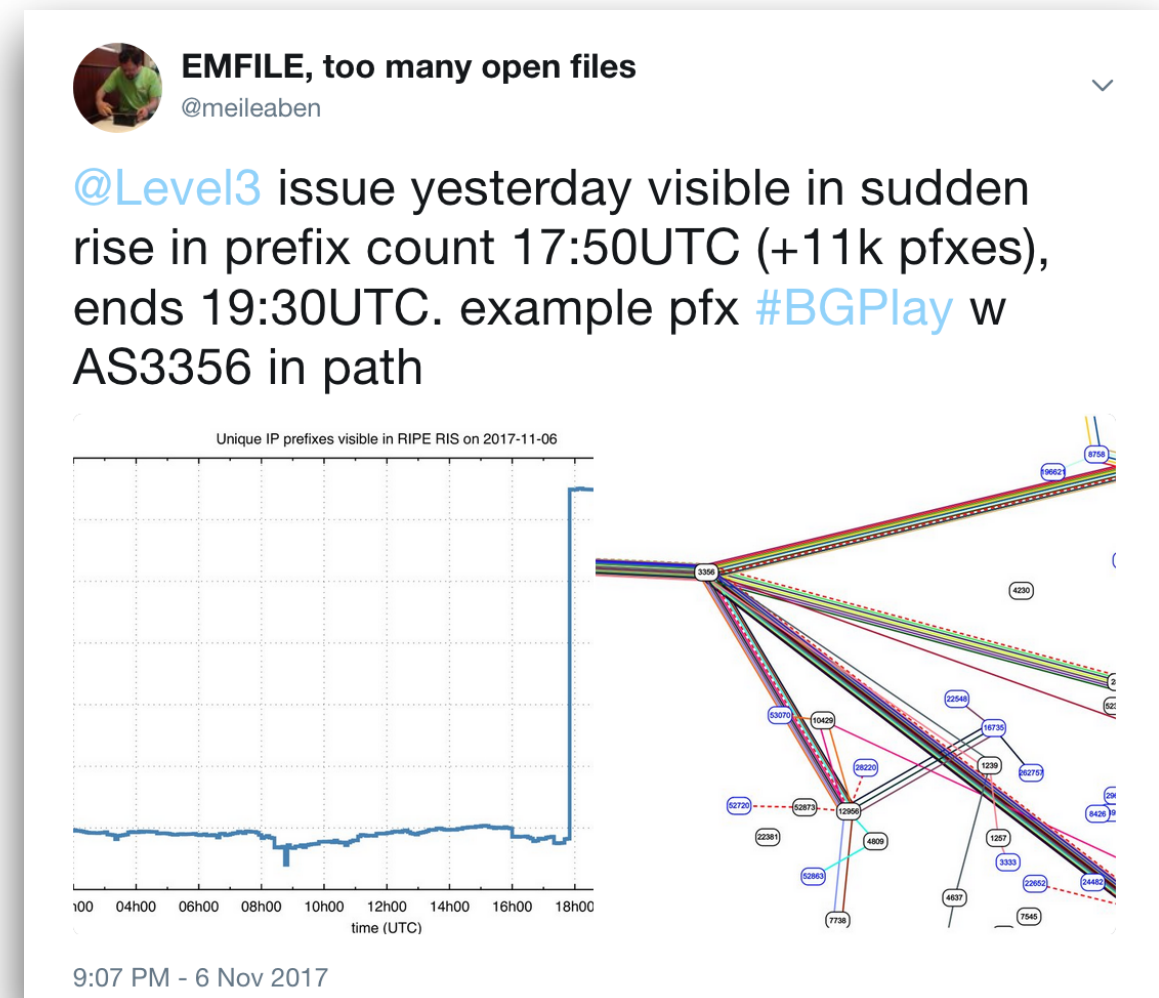
```
Time: 2017-11-06T17:50:00Z
mis-origination? AS10481 (pfxcount: 381->742)
mis-origination? AS13367 (pfxcount: 10->270)
mis-origination? AS20214 (pfxcount: 6->379)
mis-origination? AS22909 (pfxcount: 8->261)
mis-origination? AS33287 (pfxcount: 31->460)
mis-origination? AS33491 (pfxcount: 36->647)
mis-origination? AS33650 (pfxcount: 12->232)
mis-origination? AS33651 (pfxcount: 40->353)
mis-origination? AS33657 (pfxcount: 26->297)
mis-origination? AS33659 (pfxcount: 15->320)
mis-origination? AS33667 (pfxcount: 17->313)
mis-origination? AS33668 (pfxcount: 21->400)
mis-origination? AS39651 (pfxcount: 8->403)
mis-origination? AS5410 (pfxcount: 24->594)
mis-origination? AS577 (pfxcount: 385->4417)
mis-origination? AS7015 (pfxcount: 68->713)
mis-origination? AS7016 (pfxcount: 28->521)
mis-origination? AS7725 (pfxcount: 18->329)
```



# Example: Level3 - 2017-11-06



- Did it affect you?
- What actionable signals do you want?



By Alan Levine from United States - Network Operations Center, CC BY 2.0, <https://commons.wikimedia.org/w/index.php?curid=2487597>

# Research Collaborations



- Goal: Make research more useful to Internet operations
- How?
  - Actively collaborate with external researchers
  - Internships
  - Draw researchers attention to operational needs we hear from RIPE community
  - Make operations aware of useful research
  - Focus on code and tools
  - Your idea here!

# Interesting NOC Data for Research



- Correlate RIPE Atlas, RIS and other data to NOC data
  - “Did something happen near AS23456 5 mins ago?”
  - “Did something happen near Hamburg in the last hour?”
  - “We changed our network at 13:55, did something change near us?”
  - Receiving these questions from NOCs might be interesting data in itself!
- Structural data on events in your networks
  - Maintenance windows? DDoS events?



# Questions



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@meileaben



Not a typo!