RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE Atlas

Global Measurement Network

Christian Teuschel | October 2019 | ESNOG 24

RIPE Atlas

- ….is a global, open, distributed Internet measurement platform, consisting of thousands of measurement devices that measure Internet connectivity in real time

Global active measurements platform

- Goal: View Internet reachability
- Probes hosted by volunteers
- Measurements towards root name servers

  - Visualised as Internet traffic maps

- Users can also run customised measurements

  - ping, traceroute, DNS & SSL/TLS, NTP and HTTP*

- Data publicly available

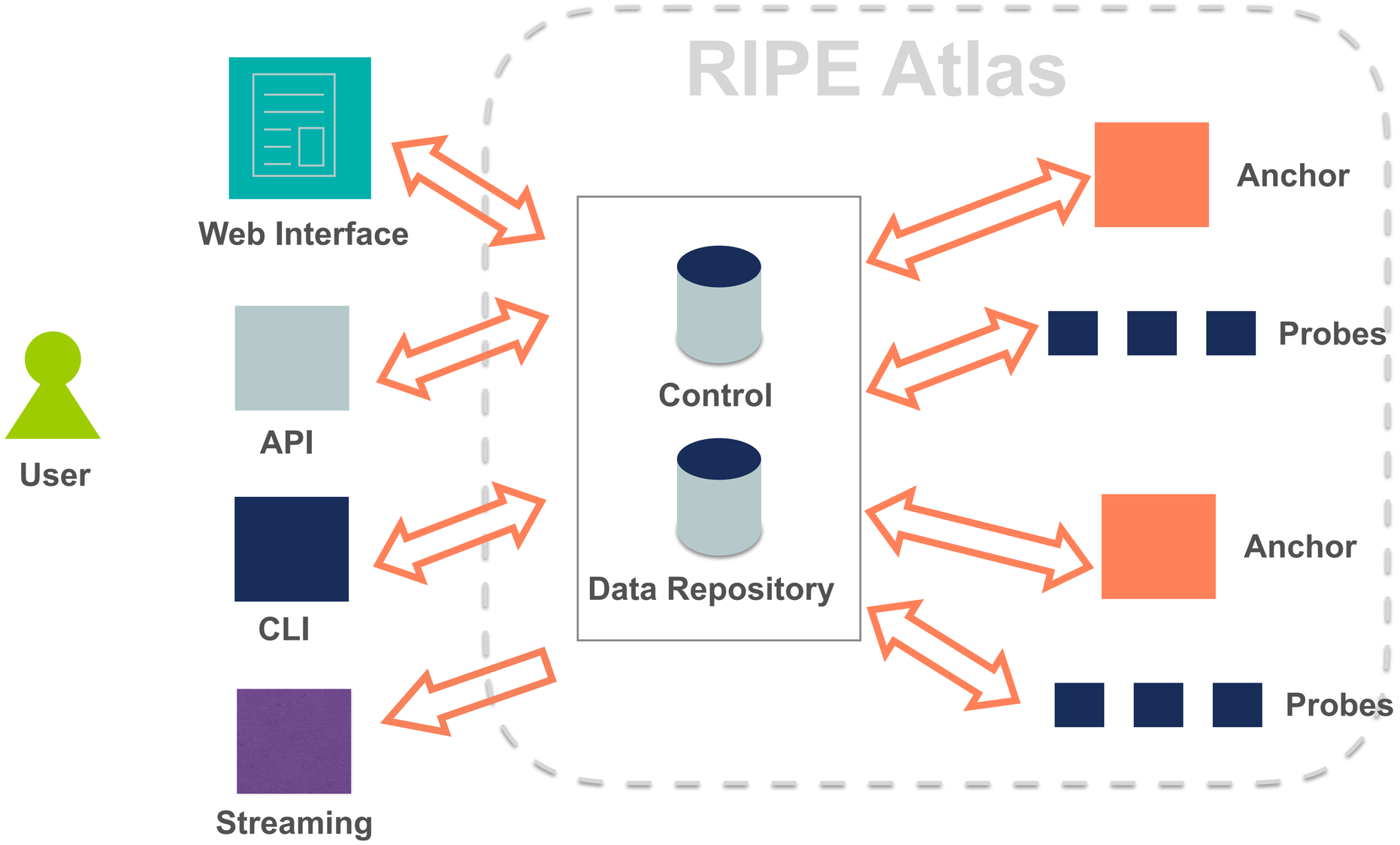
RIPE Atlas measurements

- **Built-in** global measurements towards root nameservers
  - Visualised as Internet traffic maps
- **Built-in** regional measurements towards “anchors”
- **Users** can run customised measurements
  - ping, traceroute, DNS, SSL/TLS, NTP and HTTP

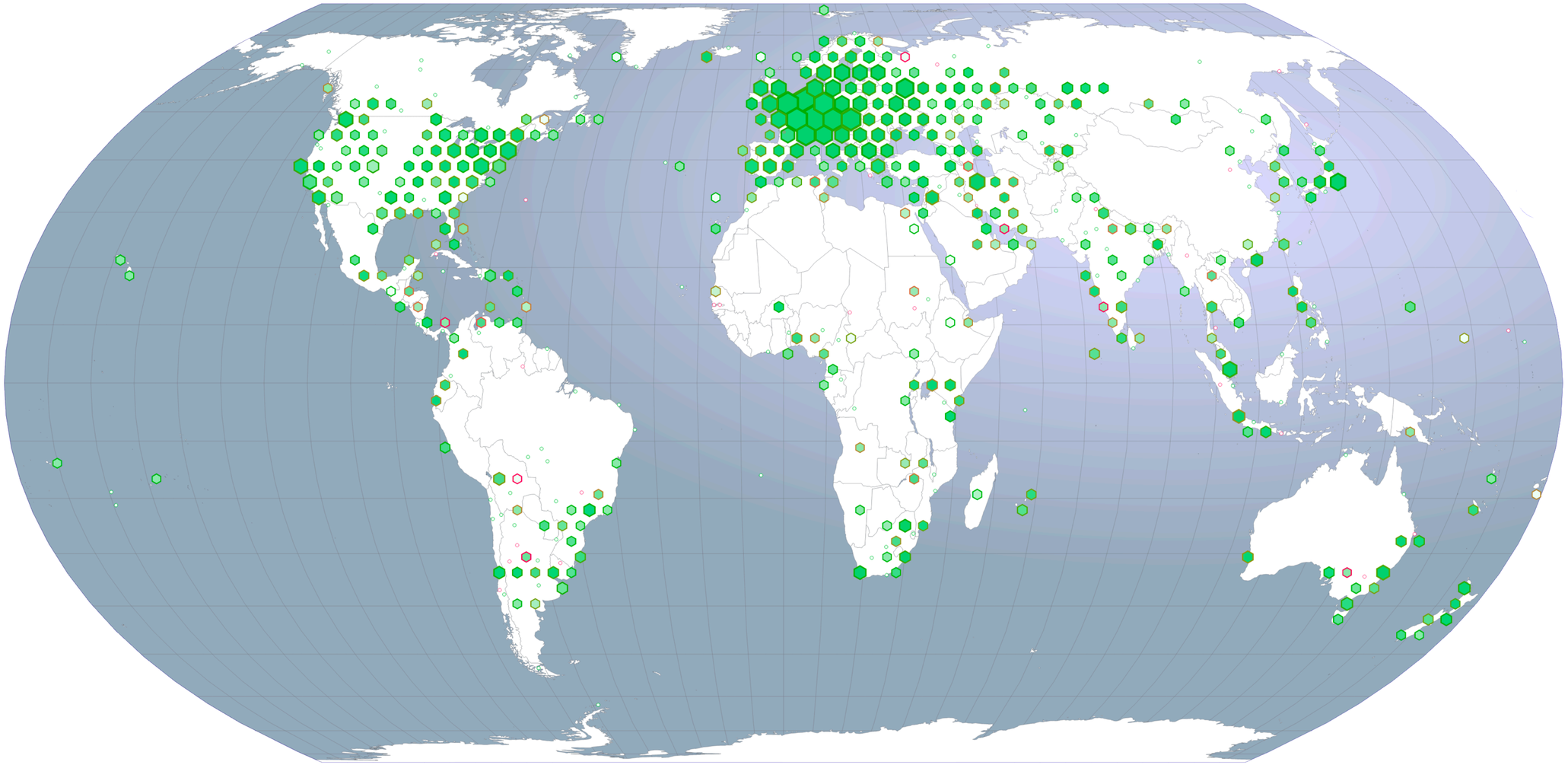
Probes and Anchors

- 10,000+ probes connected (almost 500 Anchors)
- 7,500+ results collected per second
- 21,000+ measurements currently running

RIPE Atlas Overview



RIPE Atlas Global Coverage

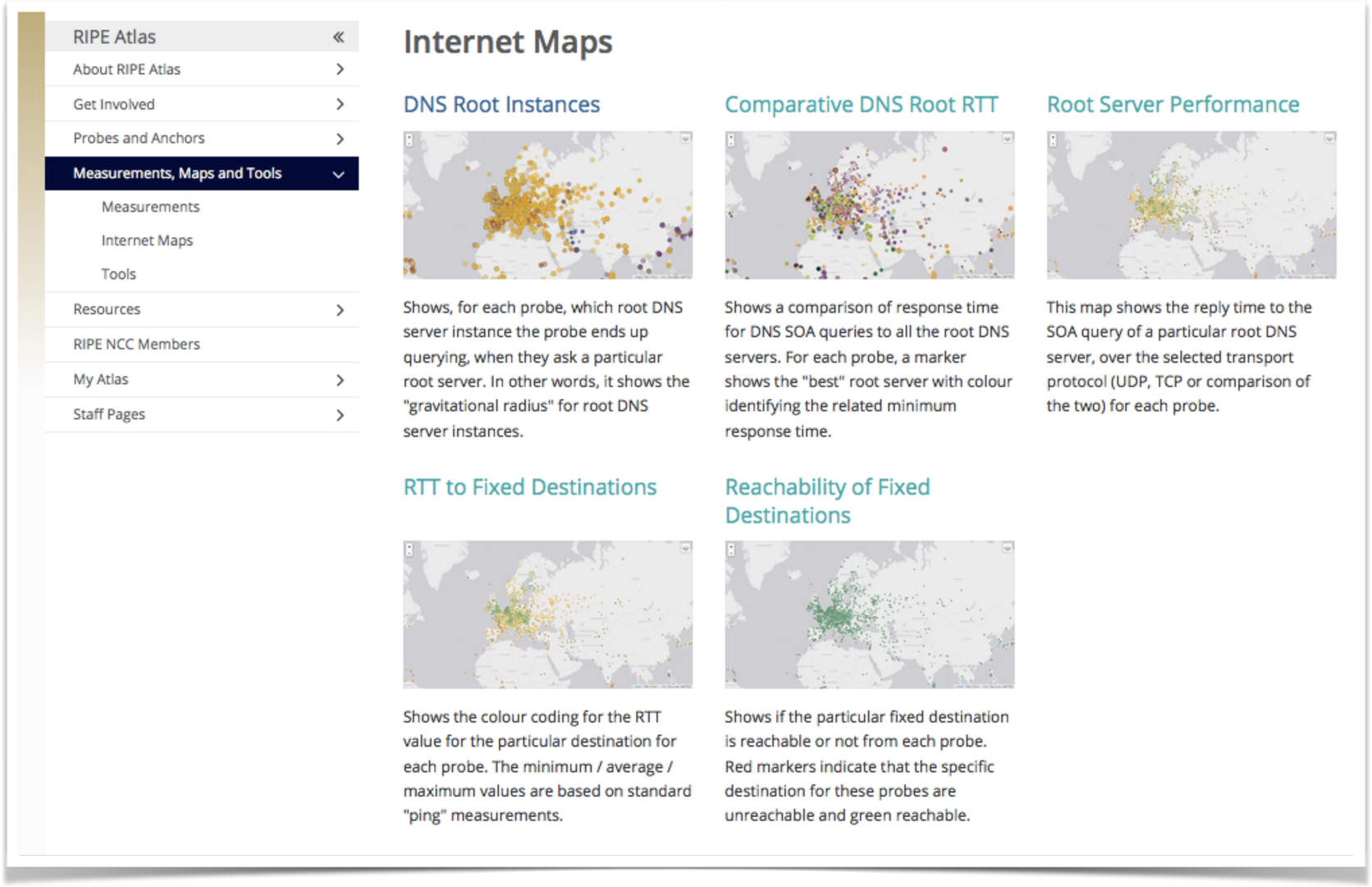


Most Popular Features

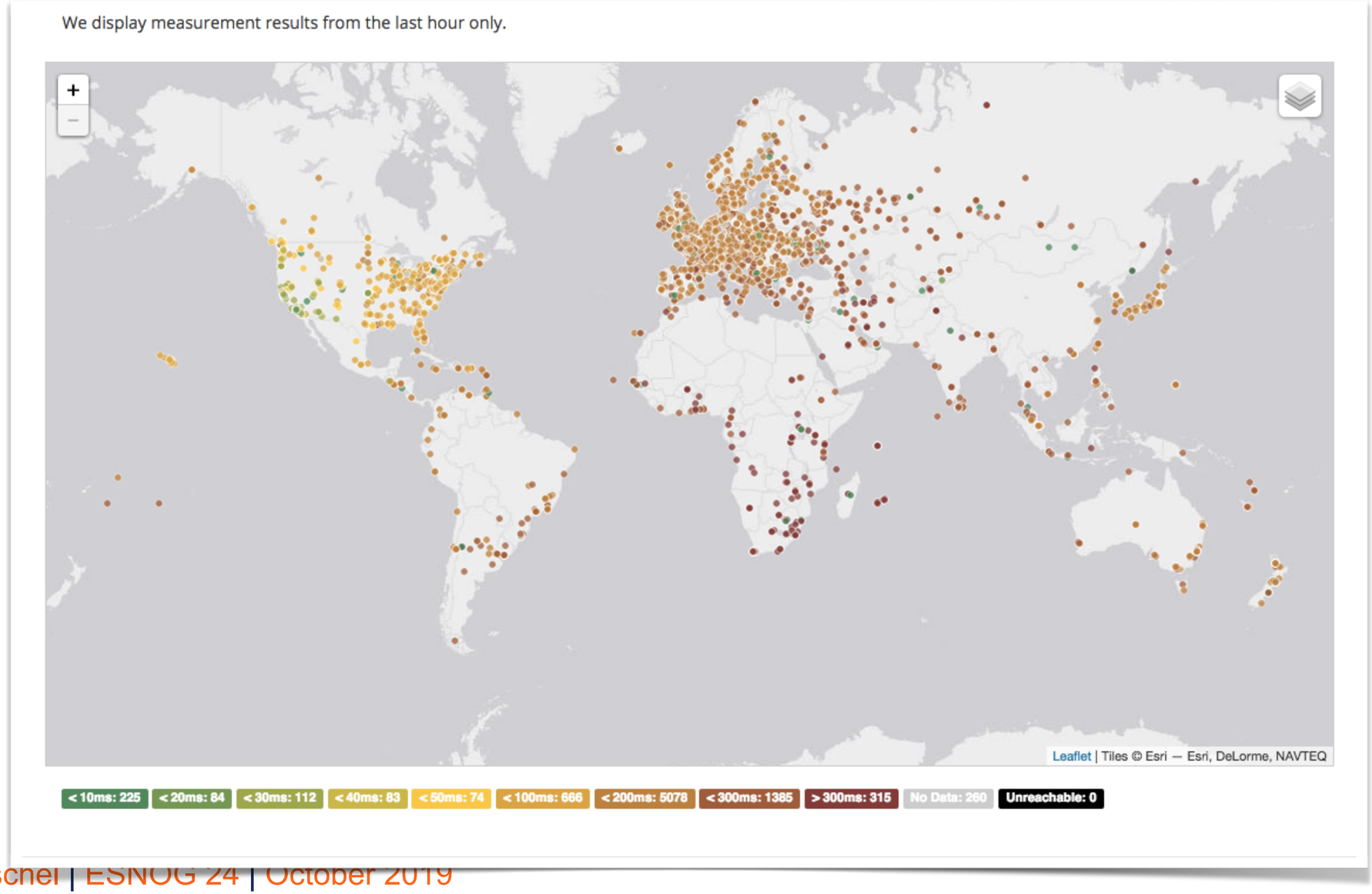
- Six types of measurements: ping, traceroute, DNS, SSL/TLS, NTP and HTTP (to anchors)
- APIs and CLI tools to start measurements and get results
- Streaming data for real-time results
- Status checks

Using
RIPE Atlas As a Visitor

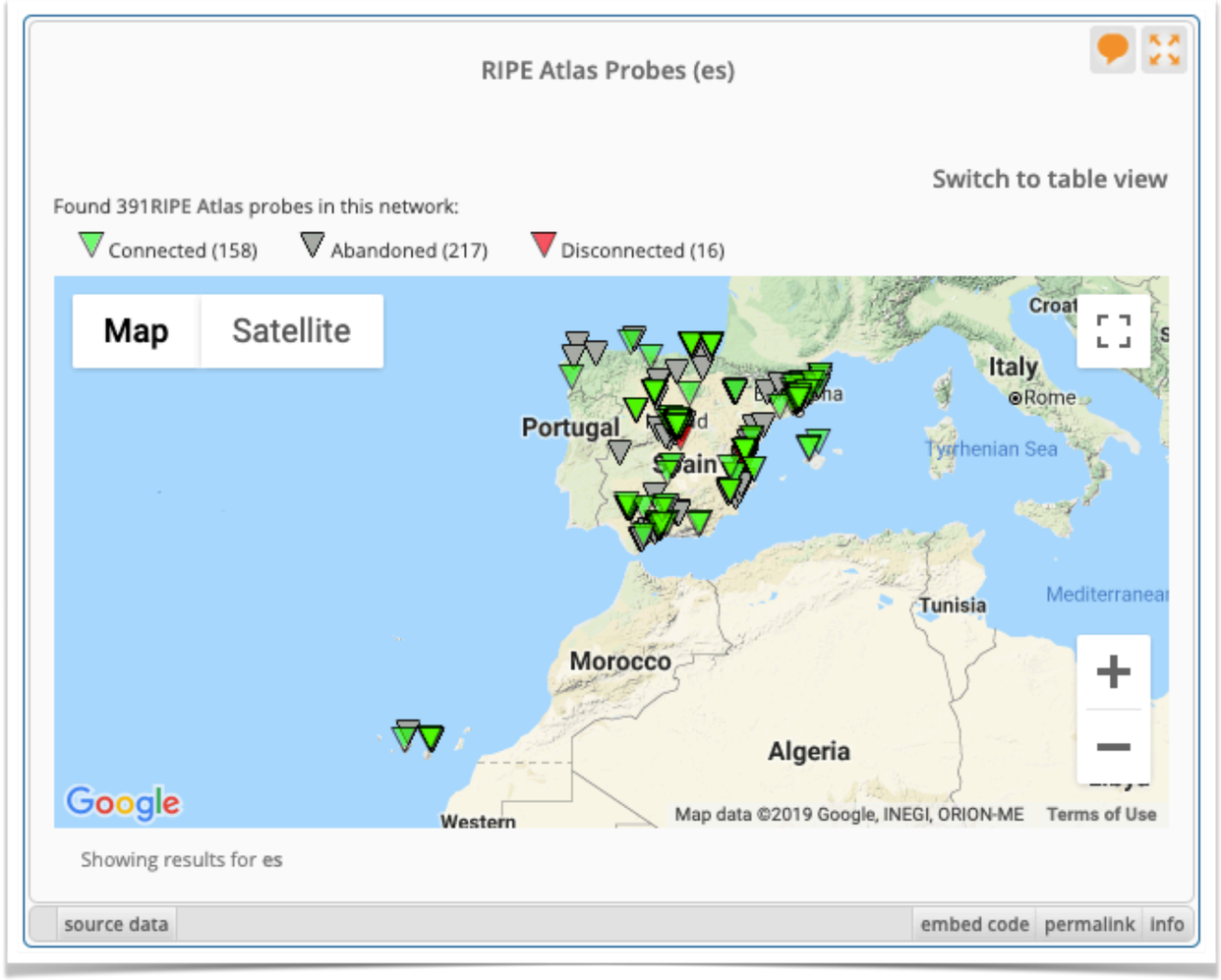
Internet Traffic Maps



Where is B-root?

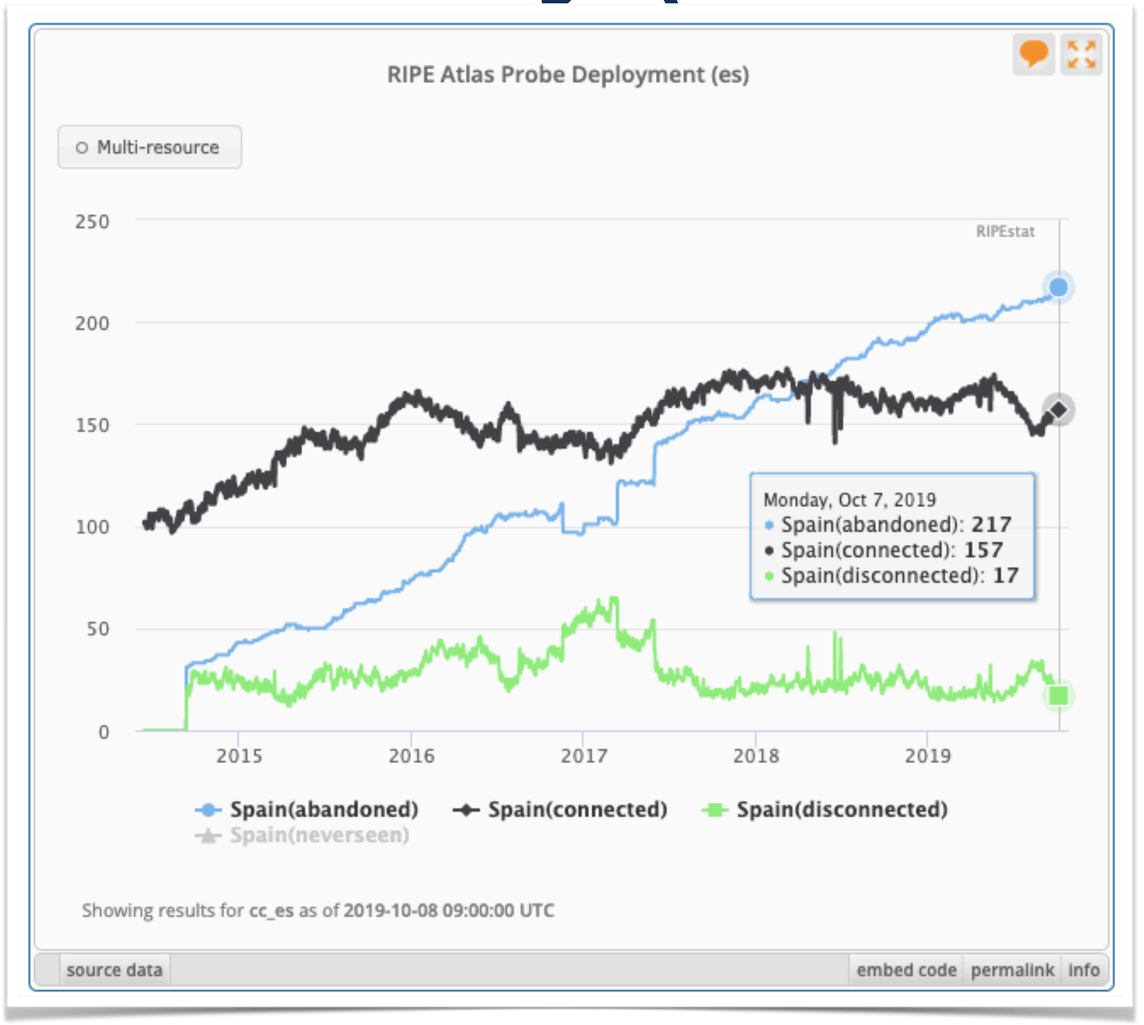


Probes per country (in RIPEstat)



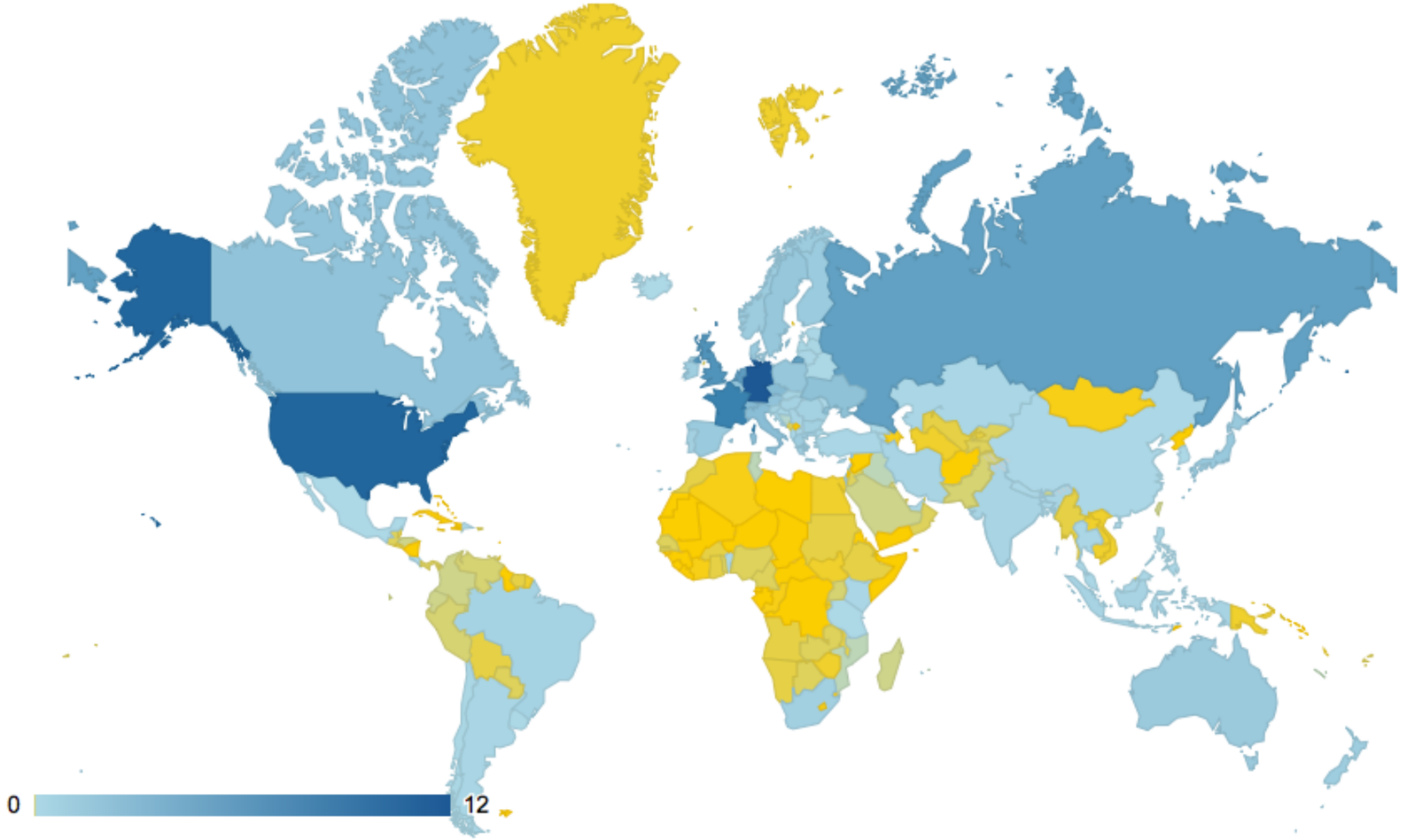
https://stat.ripe.net/es#tabId=activity

Probes per country (in RIPEstat)



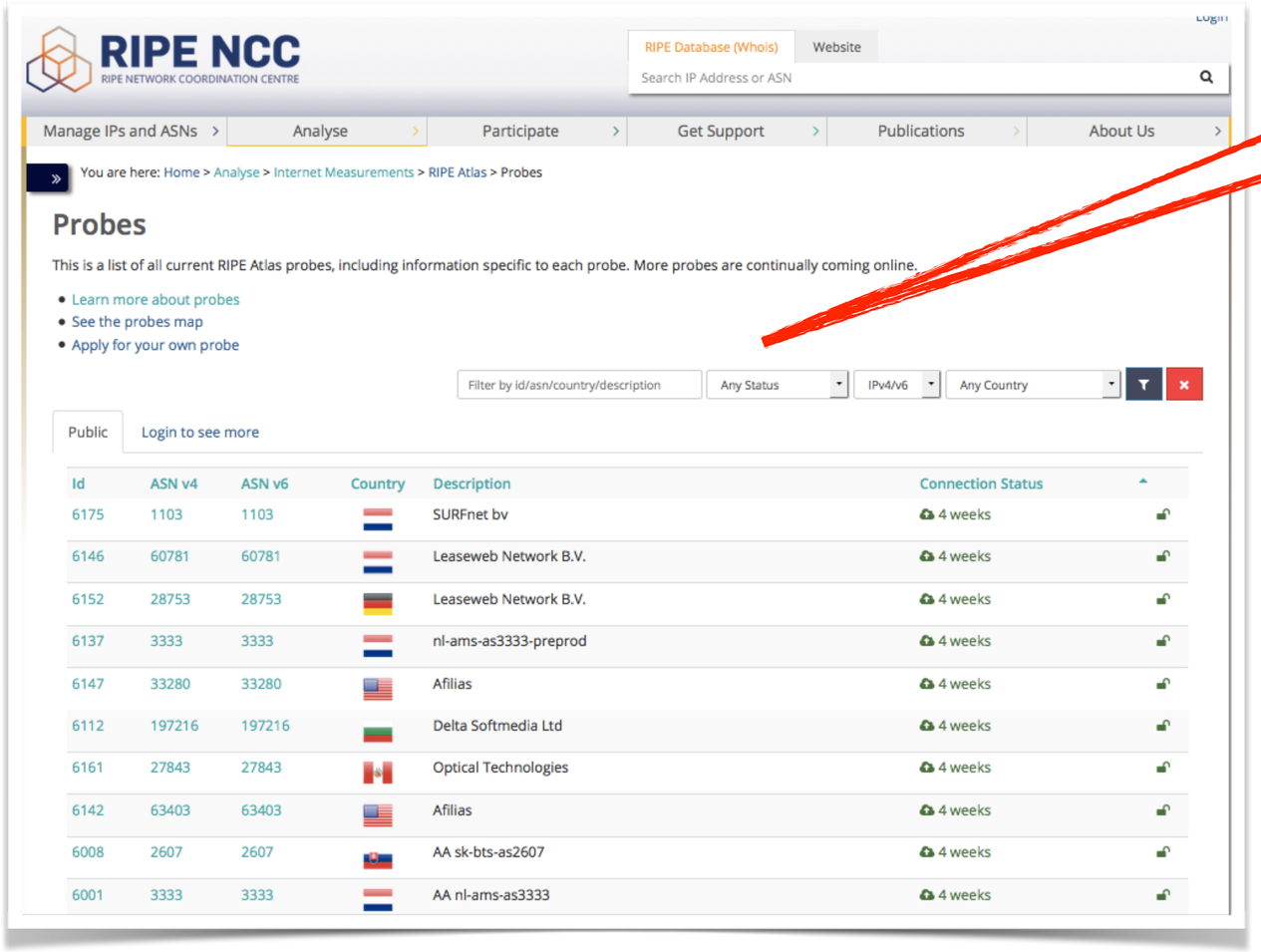
https://stat.ripe.net/es#tabId=activity

Where we want to place probes



Looking Up Public Probes

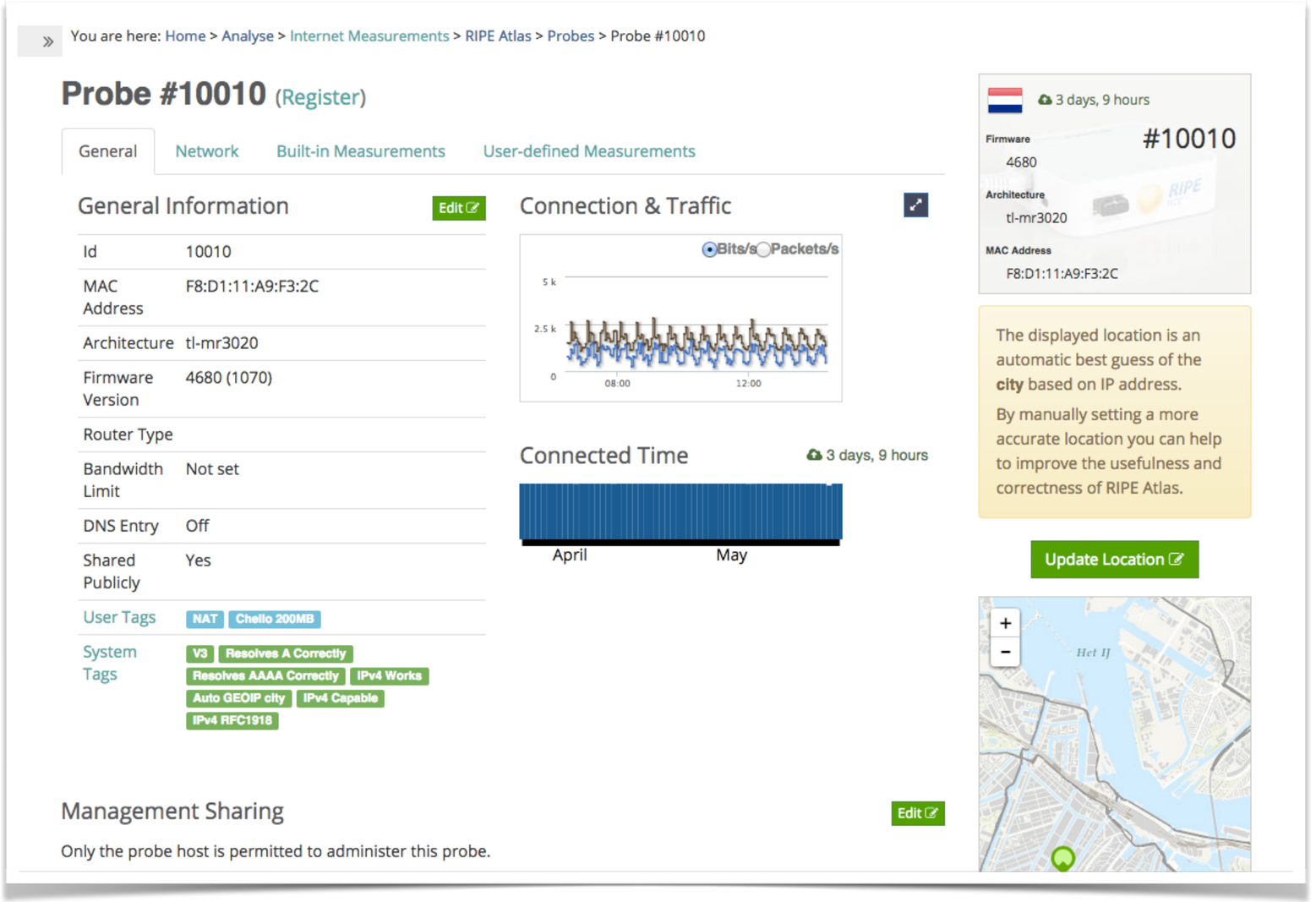
Searching for Probes



Filter based on ASN, country, location...

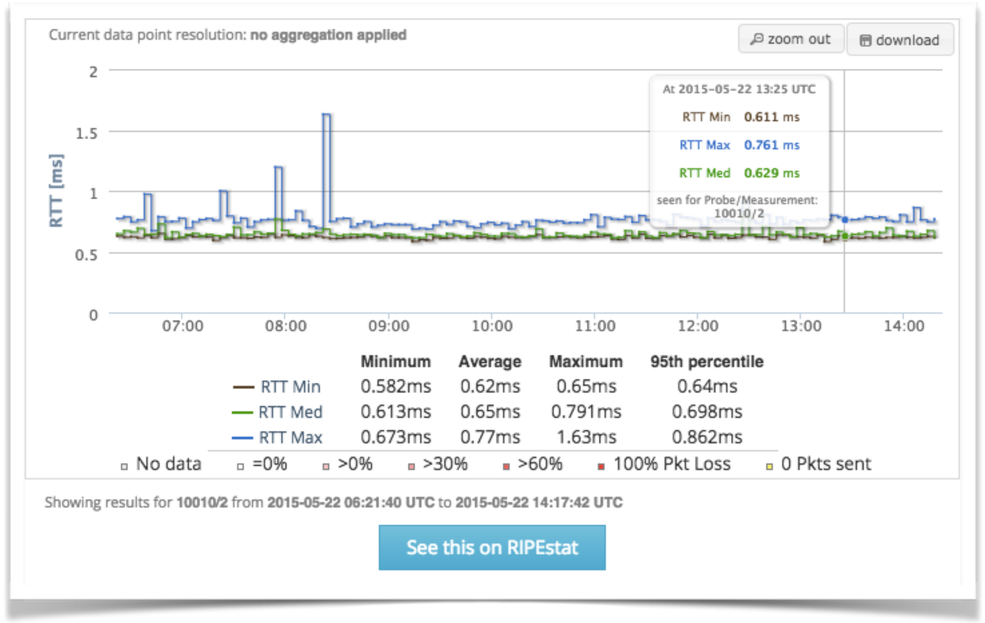
https://atlas.ripe.net/probes/

Probe Page


You are here: Home > Analyse > Internet Measurements > RIPE Atlas > Probes > Probe #10010
Probe #10010 (Register)
General
Network
Built-in Measurements
User-defined Measurements
General Information
Edit
Id 10010
MAC Address F8:D1:11:A9:F3:2C
Architecture tl-mr3020
Firmware Version 4680 (1070)
Router Type
Bandwidth Limit Not set
DNS Entry Off
Shared Publicly Yes
User Tags NAT Chello 200MB
System Tags V3 Resolves A Correctly Resolves AAAA Correctly IPv4 Works Auto GEOIP city IPv4 Capable IPv4 RFC1918
Connection & Traffic
Bits/s Packets/s
5 k
2.5 k
0
08:00
12:00
Connected Time
3 days, 9 hours
April
May
Management Sharing
Edit
Only the probe host is permitted to administer this probe.
3 days, 9 hours
#10010
Firmware
4680
Architecture
tl-mr3020
MAC Address
F8:D1:11:A9:F3:2C
The displayed location is an automatic best guess of the city based on IP address.
By manually setting a more accurate location you can help to improve the usefulness and correctness of RIPE Atlas.
Update Location
Het IJ

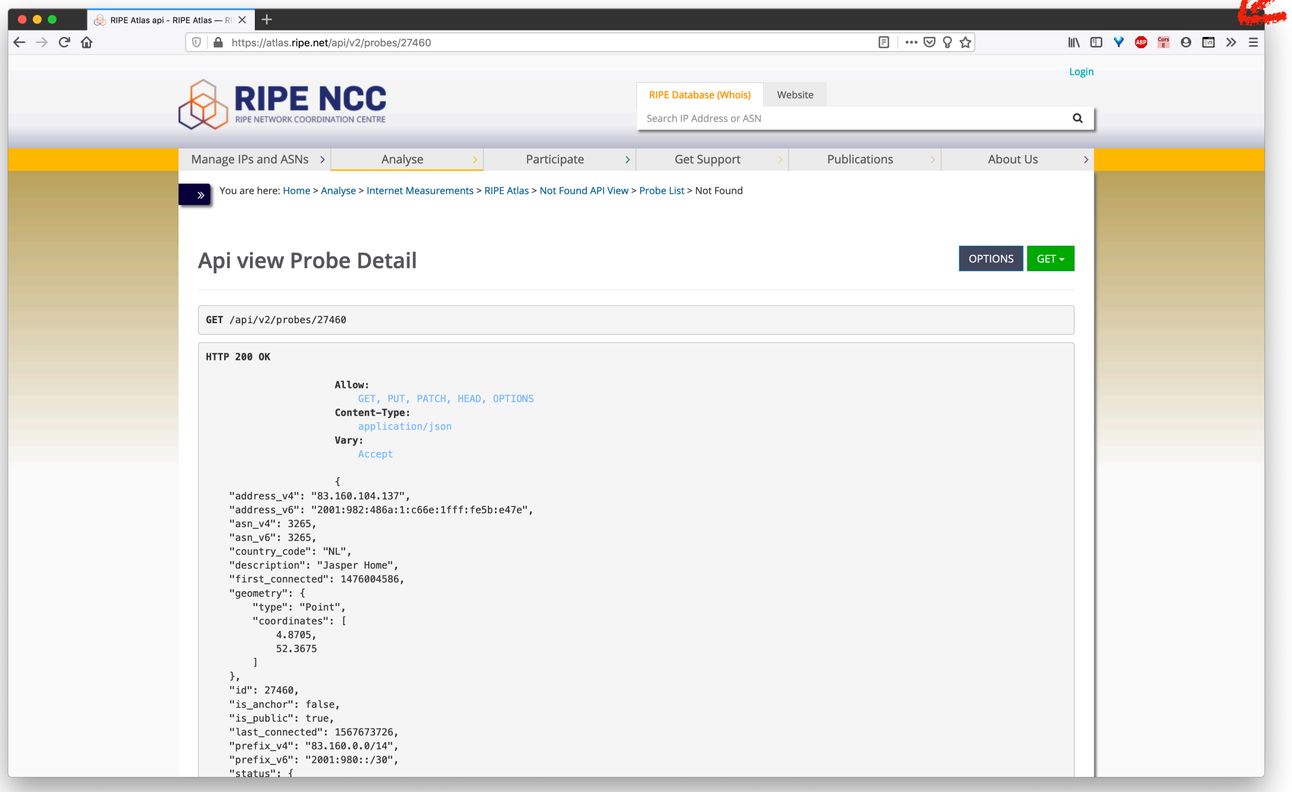
Zoomable Ping Graph

- Replace multiple RRD graphs: zoom in/out in time, in the same graph
- Easier visualisation of an event's details
- Selection of RTT class (max, min, average)



Searching probes with the API

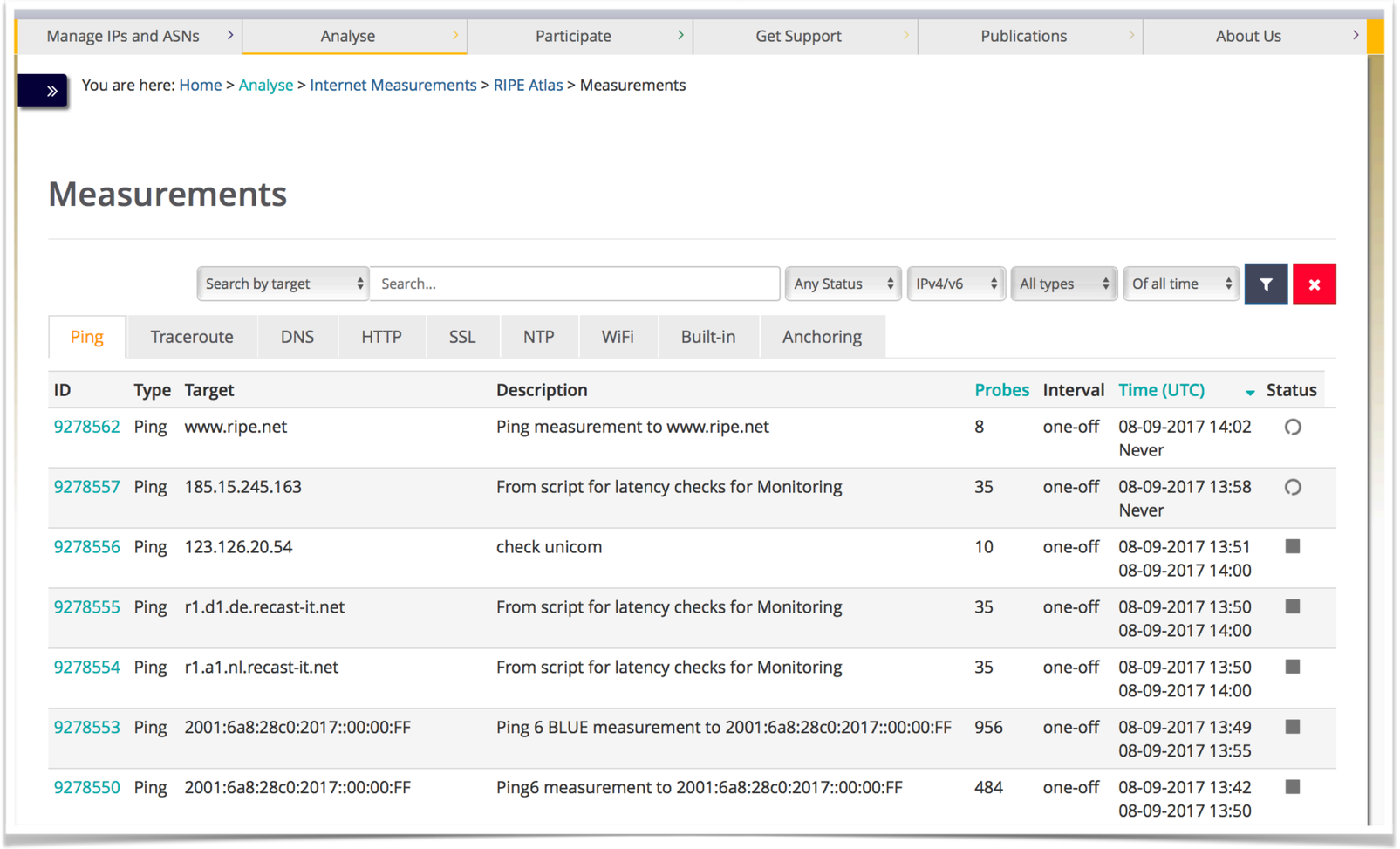
- endpoint **https://atlas.ripe.net/api/v2/probes/**
- different formats, e.g. geojson



also works in a browser!

Finding Results of Public Measurements

Looking up Measurements Results



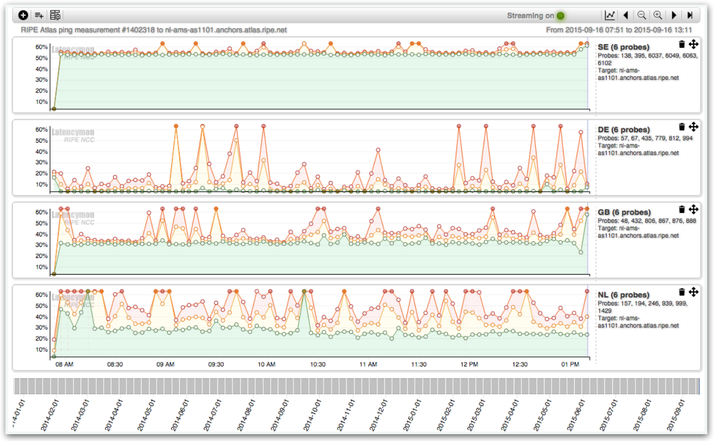
ID	Type	Target	Description	Probes	Interval	Time (UTC)	Status
9278562	Ping	www.ripe.net	Ping measurement to www.ripe.net	8	one-off	08-09-2017 14:02 Never	
9278557	Ping	185.15.245.163	From script for latency checks for Monitoring	35	one-off	08-09-2017 13:58 Never	
9278556	Ping	123.126.20.54	check unicom	10	one-off	08-09-2017 13:51 08-09-2017 14:00	
9278555	Ping	r1.d1.de.recast-it.net	From script for latency checks for Monitoring	35	one-off	08-09-2017 13:50 08-09-2017 14:00	
9278554	Ping	r1.a1.nl.recast-it.net	From script for latency checks for Monitoring	35	one-off	08-09-2017 13:50 08-09-2017 14:00	
9278553	Ping	2001:6a8:28c0:2017::00:00:FF	Ping 6 BLUE measurement to 2001:6a8:28c0:2017::00:00:FF	956	one-off	08-09-2017 13:49 08-09-2017 13:55	
9278550	Ping	2001:6a8:28c0:2017::00:00:FF	Ping6 measurement to 2001:6a8:28c0:2017::00:00:FF	484	one-off	08-09-2017 13:42 08-09-2017 13:50	

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

Available visualisations: ping

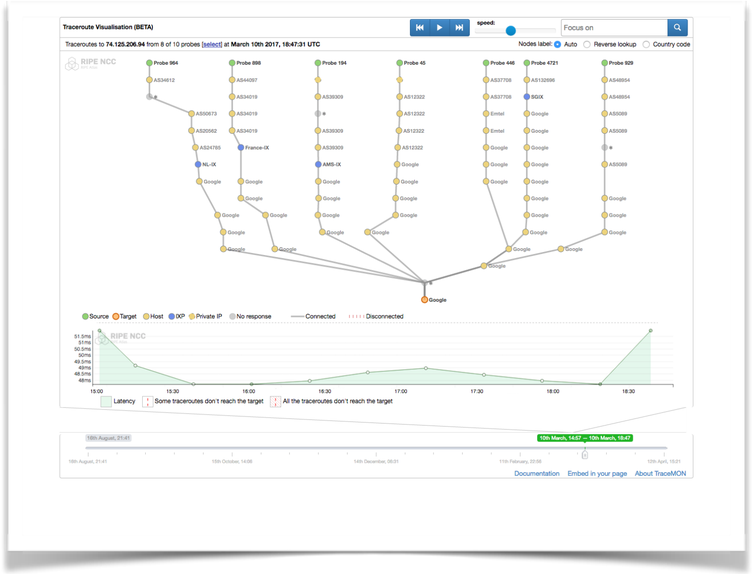
- List of probes: sortable by RTT
- Map: colour-coded by RTT
- LatencyMON: compare multiple latency trends

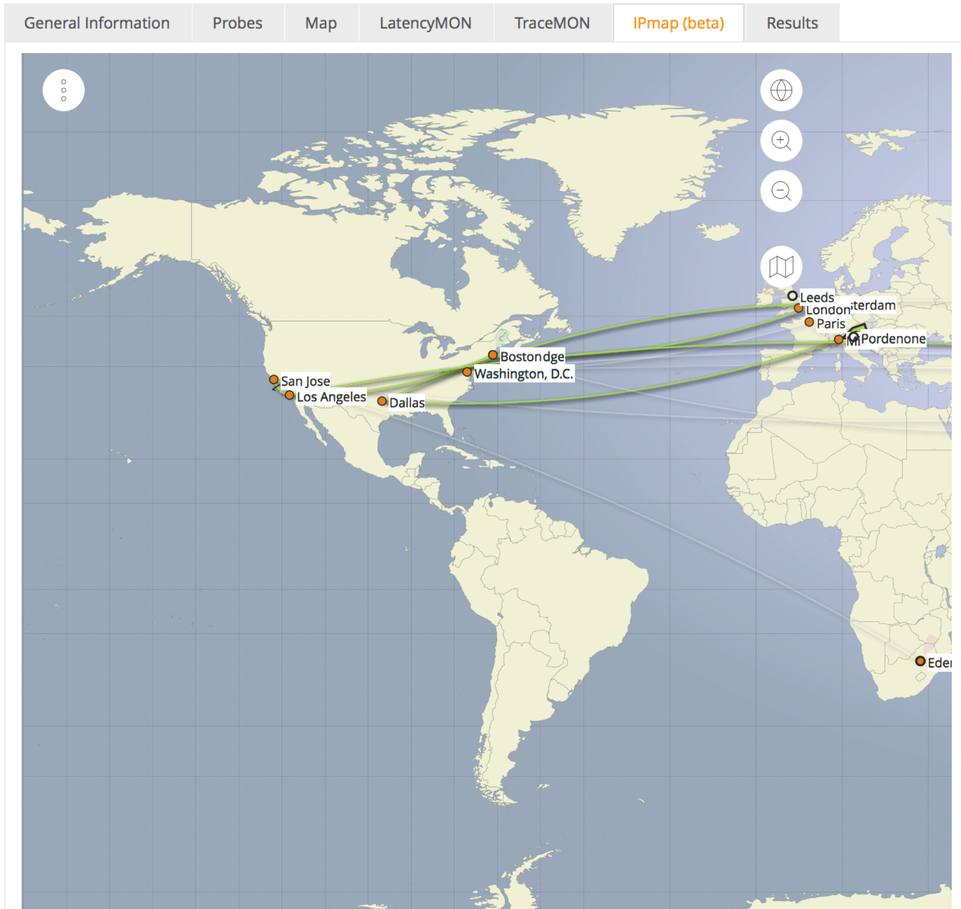
Probe	ASN (v4)	ASN (v6)	Time	RTT
6019	3333	3333	2015-05-19 09:23	1.157
6069	59469	59469	2015-05-19 09:23	15.253
6111	198068	198068	2015-05-19 09:23	37.760
6112	197216	197216	2015-05-19 09:23	35.494
10008	3851		2015-05-19 09:23	24.664
10218	6876		2015-05-19 09:23	37.952
10246	39608		2015-05-19 09:23	36.313
10252	50288		2015-05-19 09:23	62.441
10267	12322		2015-05-19 09:23	31.498
10296	51214		2015-05-19 09:23	Unreachable



Available visualisations: traceroute

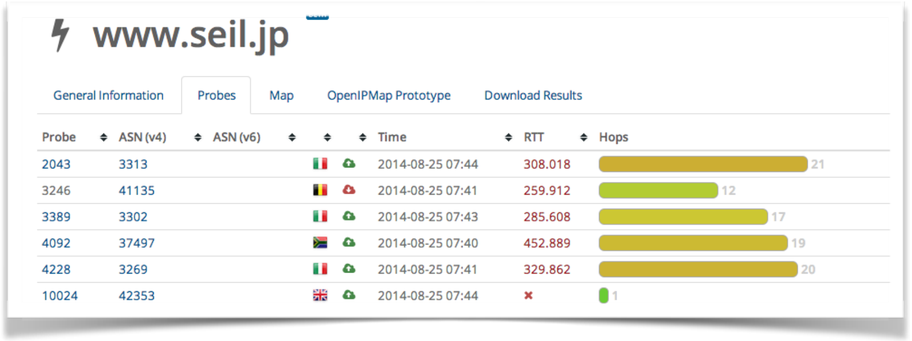
- TraceMON: network topology, latency and nodes information
- IPMap(beta): hops geolocation on map (prototype)





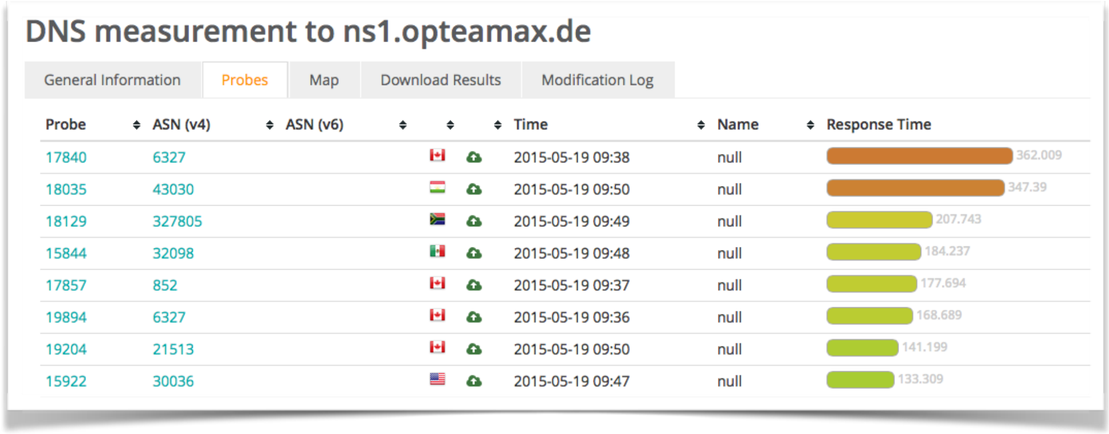
Available visualisations: traceroute

- List of probes, colour-coded number of hops



Available visualisations: DNS

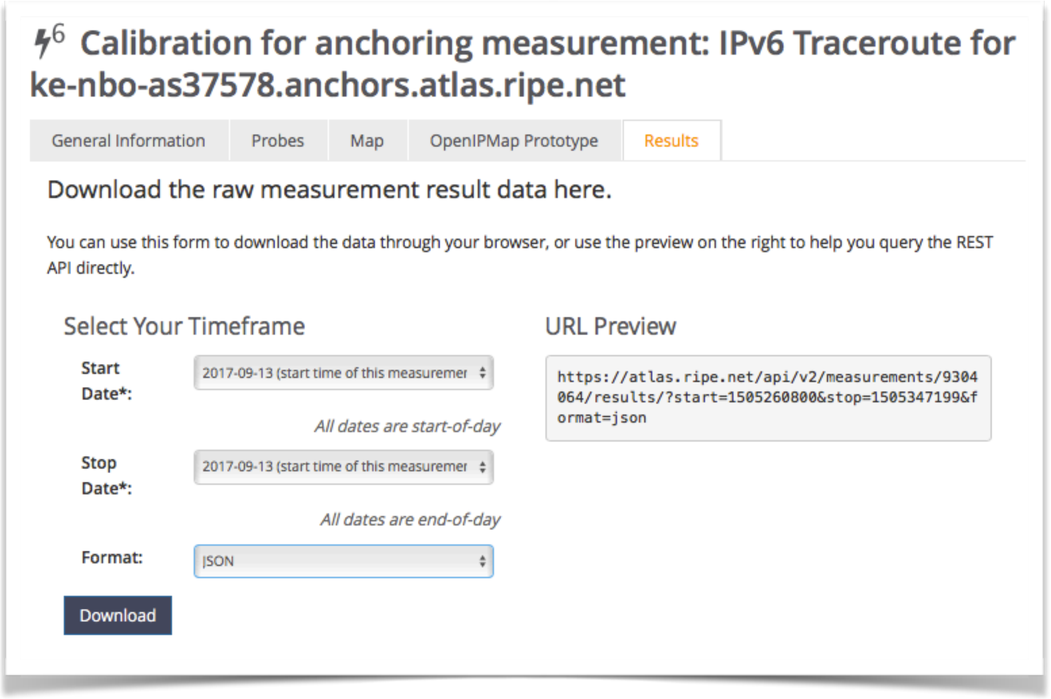
- Map, colour-coded response time or diversity
- List of probes, sortable by response time



Probe	ASN (v4)	ASN (v6)	Time	Name	Response Time
17840	6327		2015-05-19 09:38	null	362.009
18035	43030		2015-05-19 09:50	null	347.39
18129	327805		2015-05-19 09:49	null	207.743
15844	32098		2015-05-19 09:48	null	184.237
17857	852		2015-05-19 09:37	null	177.694
19894	6327		2015-05-19 09:36	null	168.689
19204	21513		2015-05-19 09:50	null	141.199
15922	30036		2015-05-19 09:47	null	133.309

Downloading Measurements Results

- Click on “Results”, then “Download”
- Or URL
- Or API
- Results in JSON
- Libraries for parsing



Looking at the Result

```
[{“af":6,"avg" 61.32,
”dst_addr":"2a00:1450:4004:802::1014",“dst_name":"www.google.com",
“dup":0,
“from":"2001:8a0:7f00:b201:220:4aff:fec5:5b5b",
“fw":4660,“lts":411,
“max”:62.148,"min":60.372,
“msm_id":1004005,"msm_name":"Ping",
"prb_id":722,"proto":"ICMP","rcvd":10,
“result":[{"rtt":62.148},{"rtt":61.437},{"rtt":61.444},{"rtt":61.448},{"rtt":6[illegible]},{[illegible]rtt":
60.372},{"rtt":60.373},{"rtt":61.384},{"rtt":61.267}],
“sent":10,"size"64,
“src_addr":"2001:8a0:7f00:b201:220:4aff:fec5:5b5b",
"step":240,"timestamp":1410220847,"ttl":54,"type":"ping"},
```

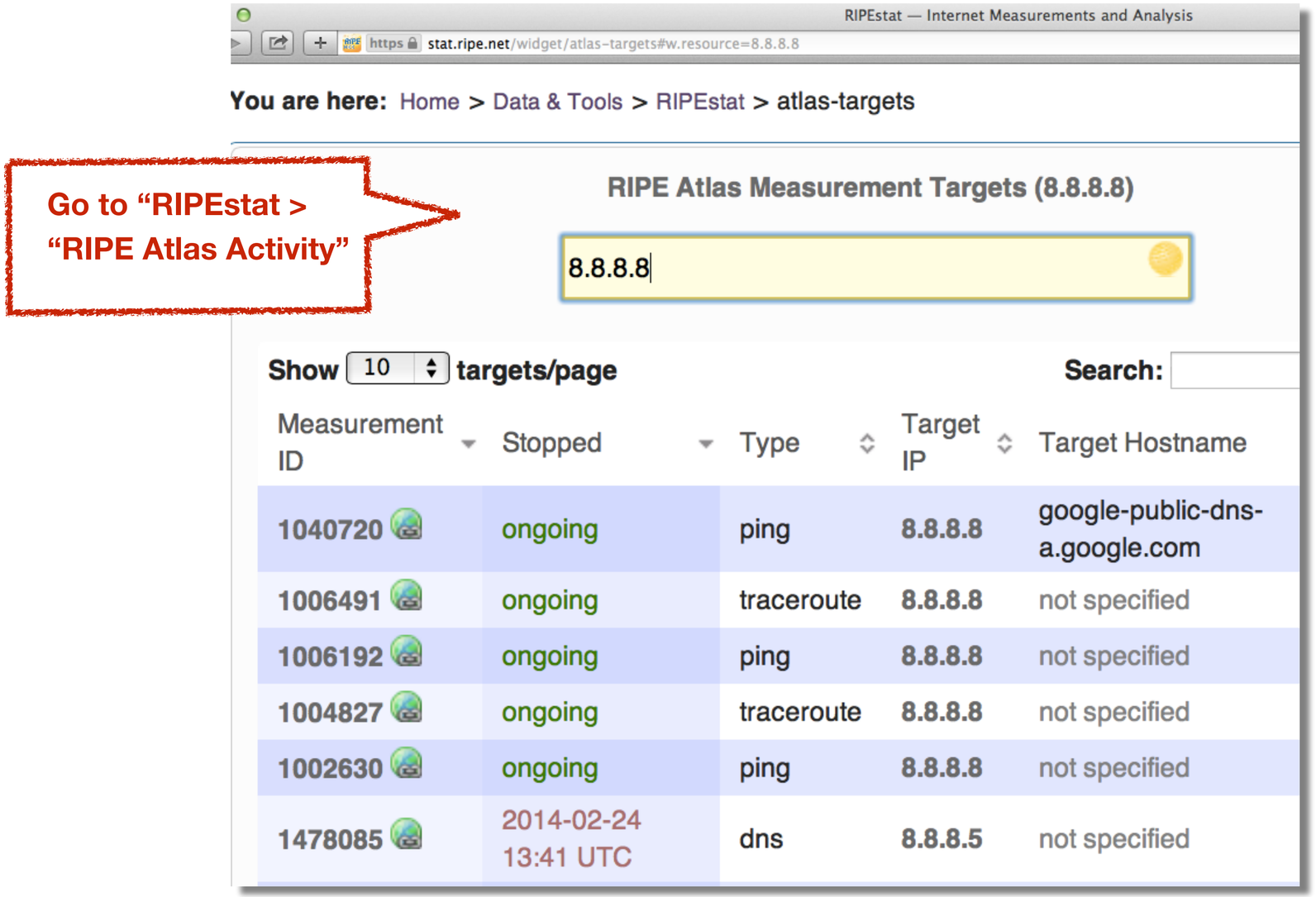

Destination (IP & name)

Source (probe public IP address)

Reference (msm ID)

Packet loss: difference between sent & received!

Search for Measurements by Target in RIPEstat



Finding one specific measurement

- If you know the measurement ID:
  - https://atlas.ripe.net/measurements/ID
  - https://atlas.ripe.net/measurements/2340408/

Use Existing Measurements

- Many measurements already running!
- Search for existing public measurements first…
- Only then schedule your own measurement

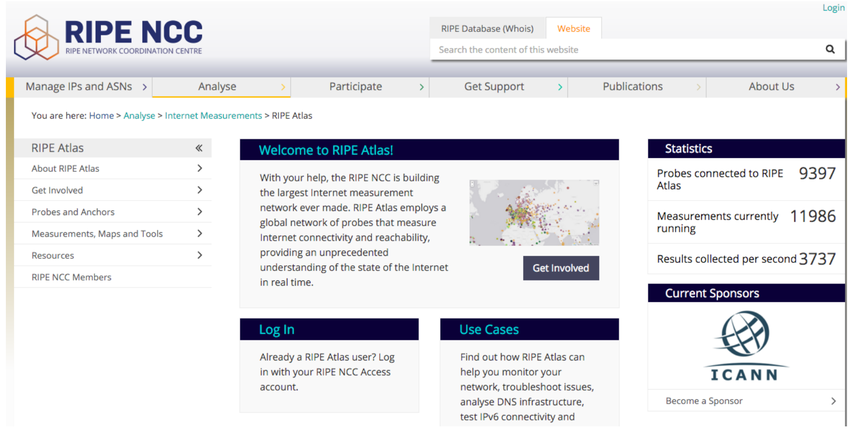
Creating a Measurement

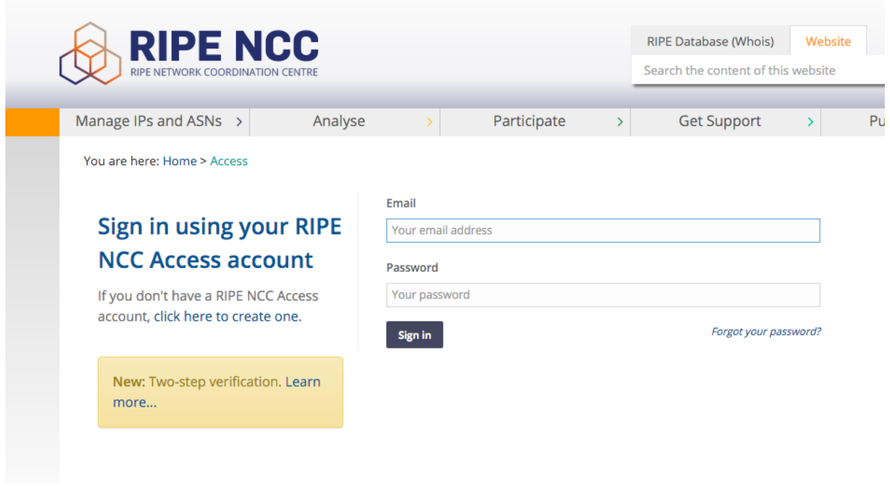
Benefits of your own measurements

- Customer problem: cannot reach your server
  - Schedule measurements (pings or traceroutes) from up to 1,000 RIPE Atlas probes worldwide to check where the problem is
- Measuring packet loss on suspected “bad” link
- Testing anycast deployment

Logging In

- Log in to atlas.ripe.net
  - Use your RIPE NCC Access account
  - Same account for LIR Portal, RIPE Atlas, RIPEstat, RIPE Labs...
  - Create an account if you don't already have one

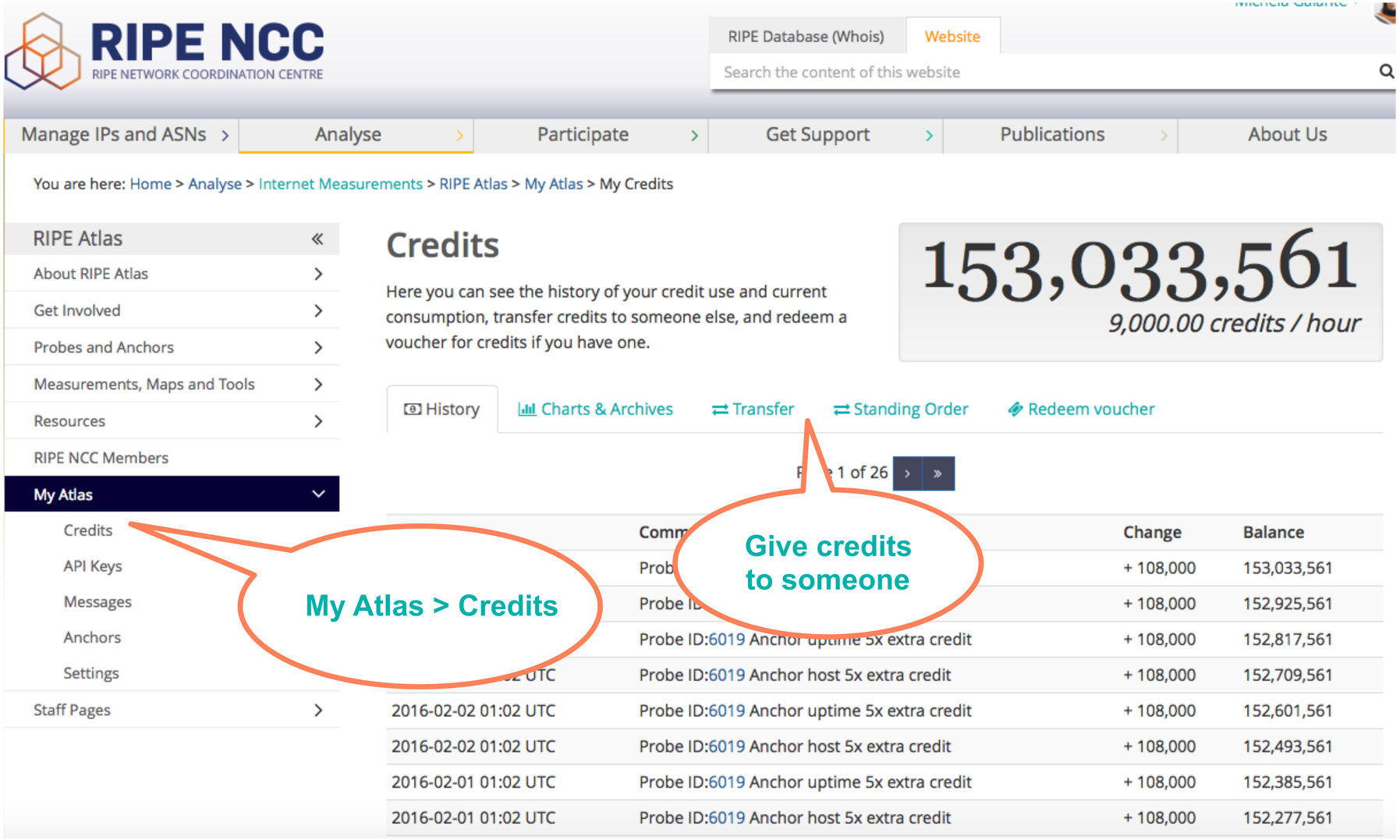




Credits system

- Measurements cost credits
  - ping = 10 credits, traceroute = 20, etc.
- Why? Fairness and to avoid overload
- Spending limit and max number of measurements

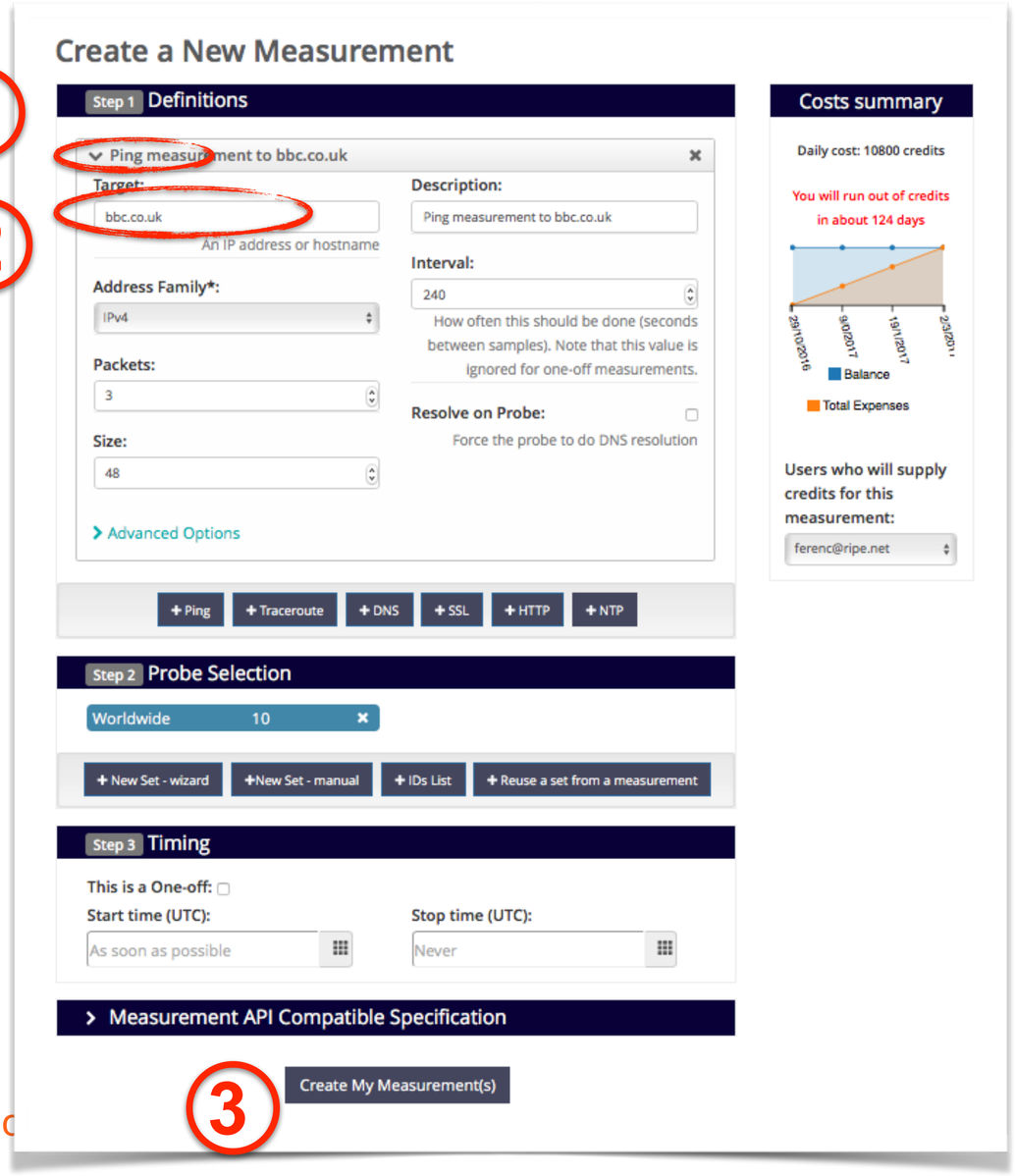
Credits overview



Scheduling a measurement with the web interface

- Log in to atlas.ripe.net
- Navigate to Measurements, Maps and Tools -> Measurements in the left hand sidebar
- Click the green ‘Create a Measurement on the right side of the page

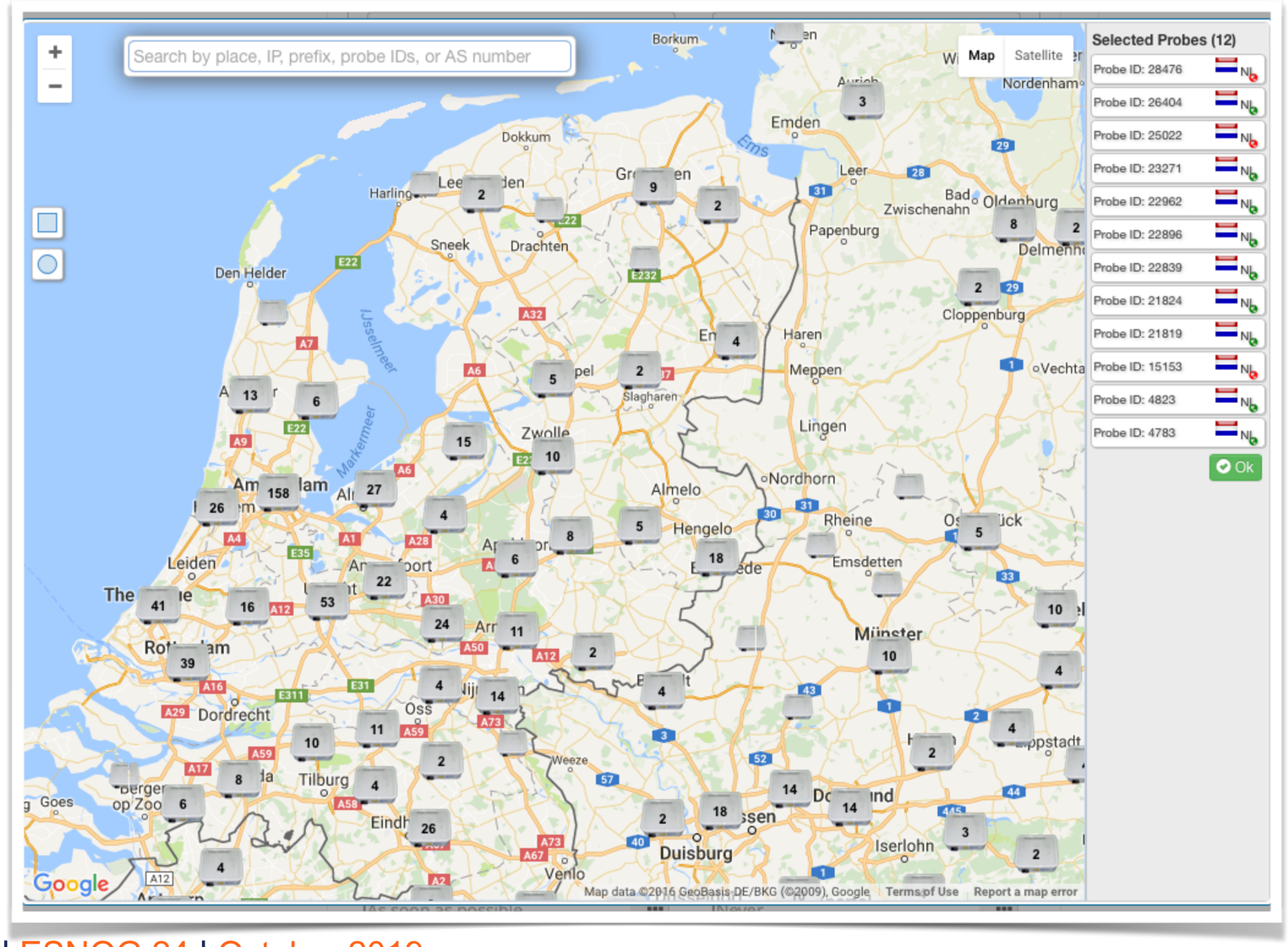
Scheduling a measurement (2)



Scheduling a measurement (3)

- Recurring measurement: mostly used for a periodic, long-term measurement, or..
- One-off measurement: one run on all selected probes.
- Choose type, target, frequency, start/end time, # of probes, region…
- Each measurement will have **unique ID**
- “**API Compatible Specification**” is generated too

Selecting probes with new-set-wizard



Use Cases

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

RIPE Atlas IXP Country Jedi (1)

- Do paths between ASes stay in country?
- Any difference between IPv4 and IPv6?
- How many paths go via local IXP?
- Could adding peers improve reachability?

https://www.ripe.net/ixp-country-jedi

- Experimental tool
  - Feature requests welcome!
  - Depends on probe distribution in country

RIPE Atlas IXP Country Jedi (2)

- Methodology
  - **Trace route mesh** between RIPE Atlas probes
  - Identifying ASNs in country using RIPEstat
  - Identifying IXP and IXP LANs in PeeringDB

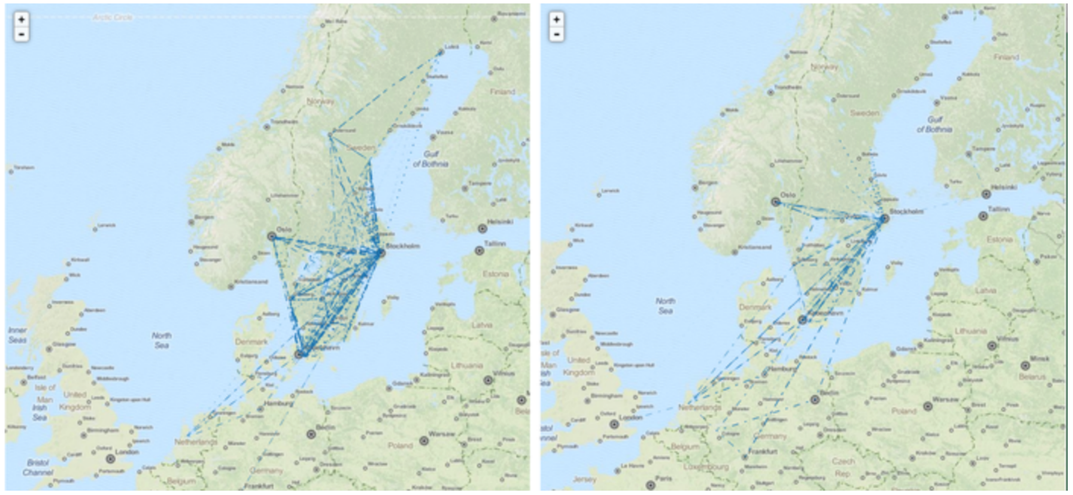
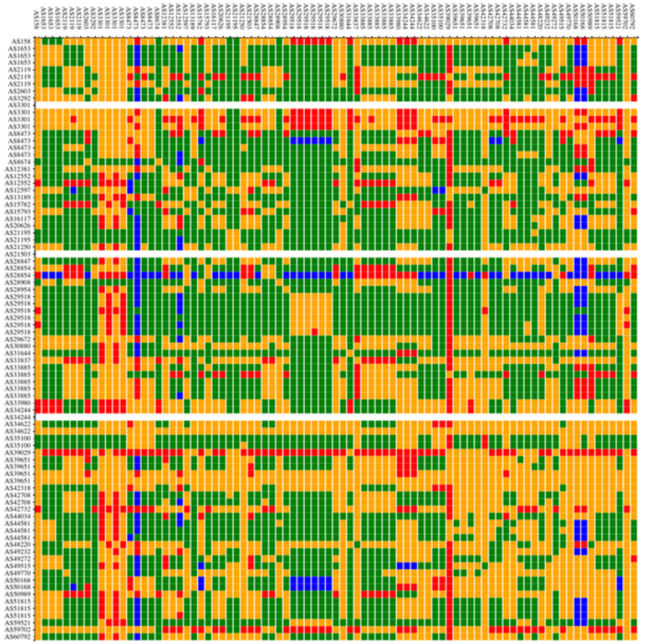


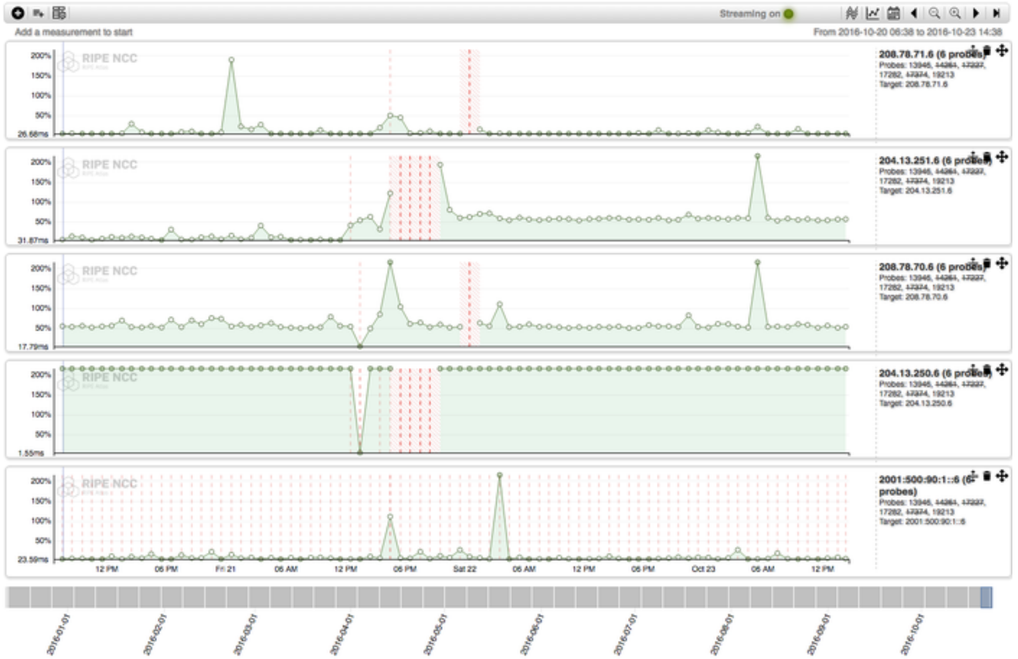
Figure 1: Visual representation of IPv4 paths (left) and IPv6 paths (right) between selected RIPE Atlas probes in Sweden



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

Use Cases (2)

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

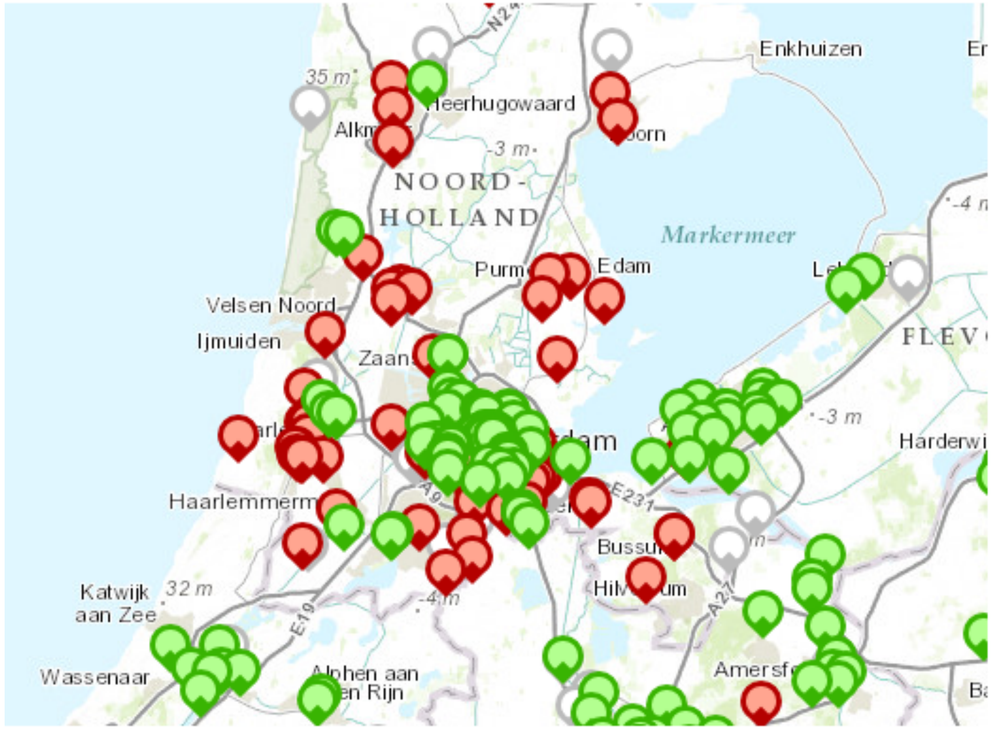


Use Cases (3)

- 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



Take Part in the RIPE Atlas Community

RIPE Atlas community (part 1)

- Volunteers host probes in homes or offices
- Organisations host RIPE Atlas anchors
- Sponsor organisations give financial support or host multiple probes in their own networks

RIPE Atlas community (part 2)

- Ambassadors help distribute probes at conferences, give presentations, etc.
- Developers contribute free and open software
- Network operators create measurements to monitor and troubleshoot
- Researchers and students write papers

Hosting a probe

- Create a RIPE NCC Access account
- Go to https://atlas.ripe.net/apply
- You will receive a probe by post
- Register your probe
- Plug in your probe
- If you receive a probe from an ambassador (trainer, sponsor, someone at a conference), just register it and plug it in!

Questions

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