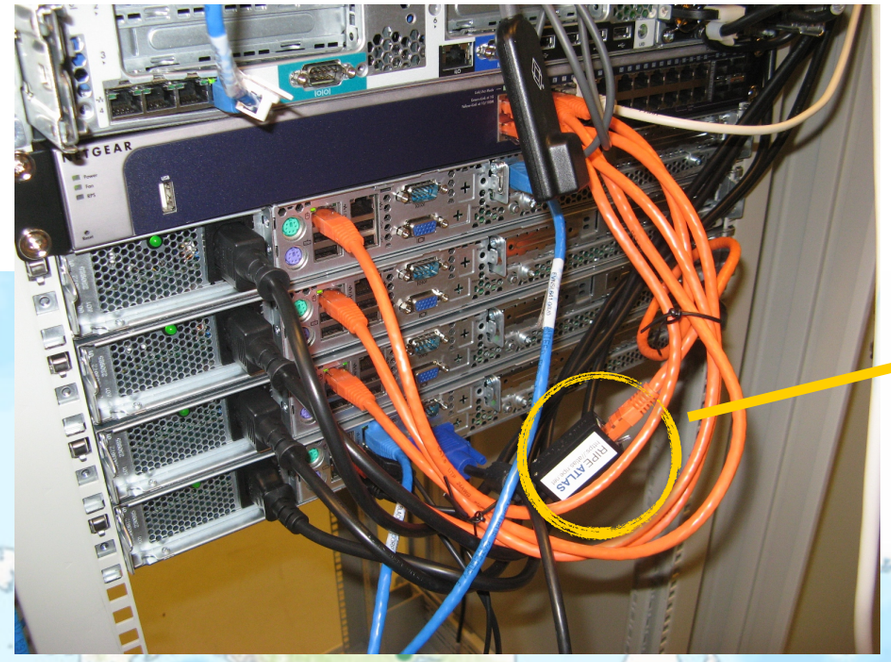
RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE Atlas Data

emile.aben@ripe.net | USJ | 2018-02

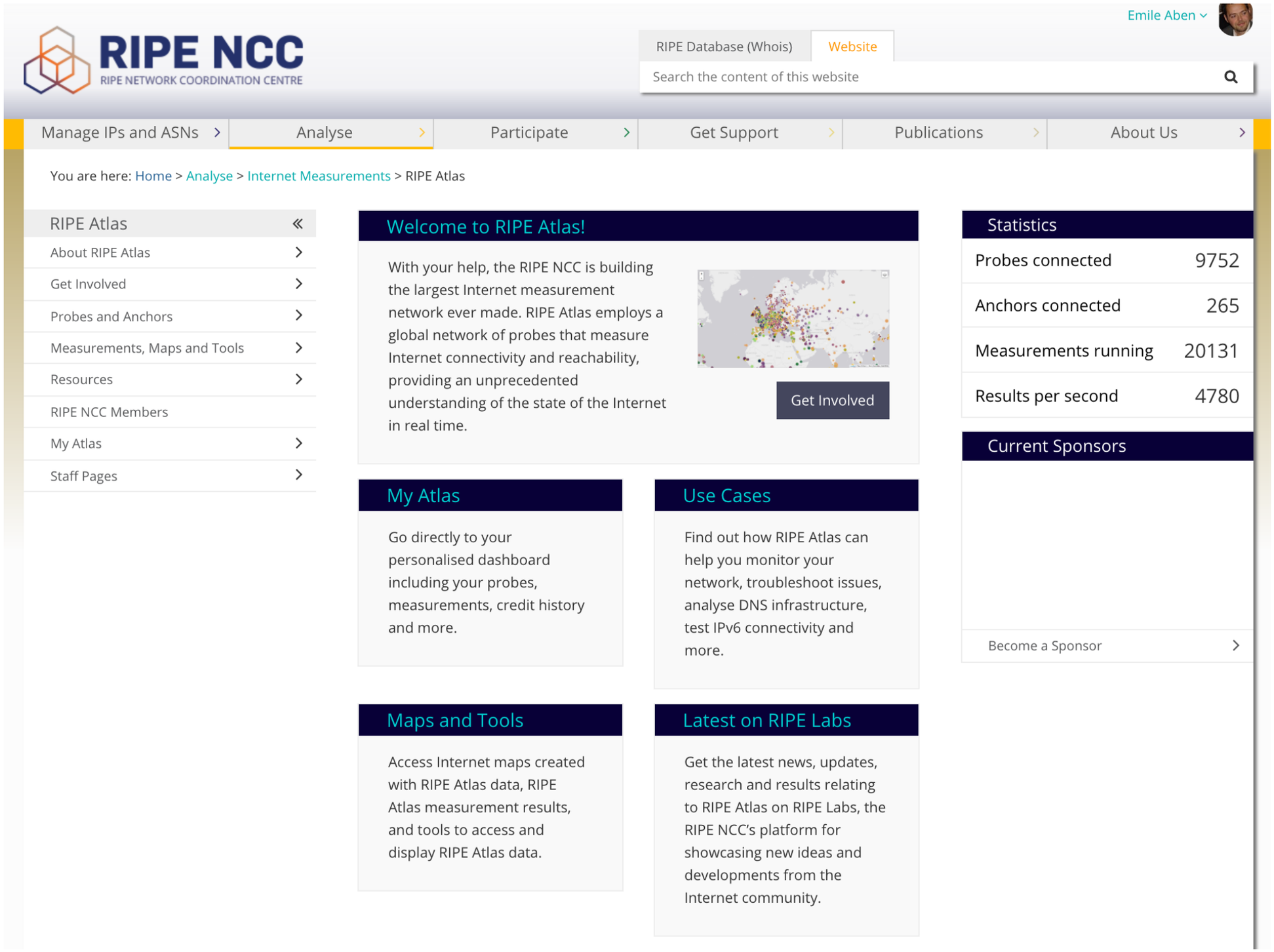

NETGEAR
RIPE ATLAS


NORTH AMERICA
SOUTH AMERICA
EUROPE
AFRICA
ASIA
AUSTRALIA
Atlantic Ocean
Pacific Ocean
Pacific Ocean
Indian Ocean
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

Interfaces

- Web UI
  - https://atlas.ripe.net/
  - https://atlas.ripe.net/docs/
- API
  - https://atlas.ripe.net/api/v2/root/
  - https://atlas.ripe.net/docs/api/v2/reference/
  - https://atlas.ripe.net/docs/api/v2/manual/
- Command Line Interface
  - https://github.com/RIPE-NCC/ripe-atlas-tools

Interface: https://atlas.ripe.net/



Programming Interfaces

- Python
  - ripe.atlas.cousteau : Interfacing with RIPE Atlas APIs
  - ripe.atlas.sagan : Interfacing with RIPE Atlas results
- Community contributions:
  - https://github.com/RIPE-Atlas-Community/

RIPE Atlas Probes

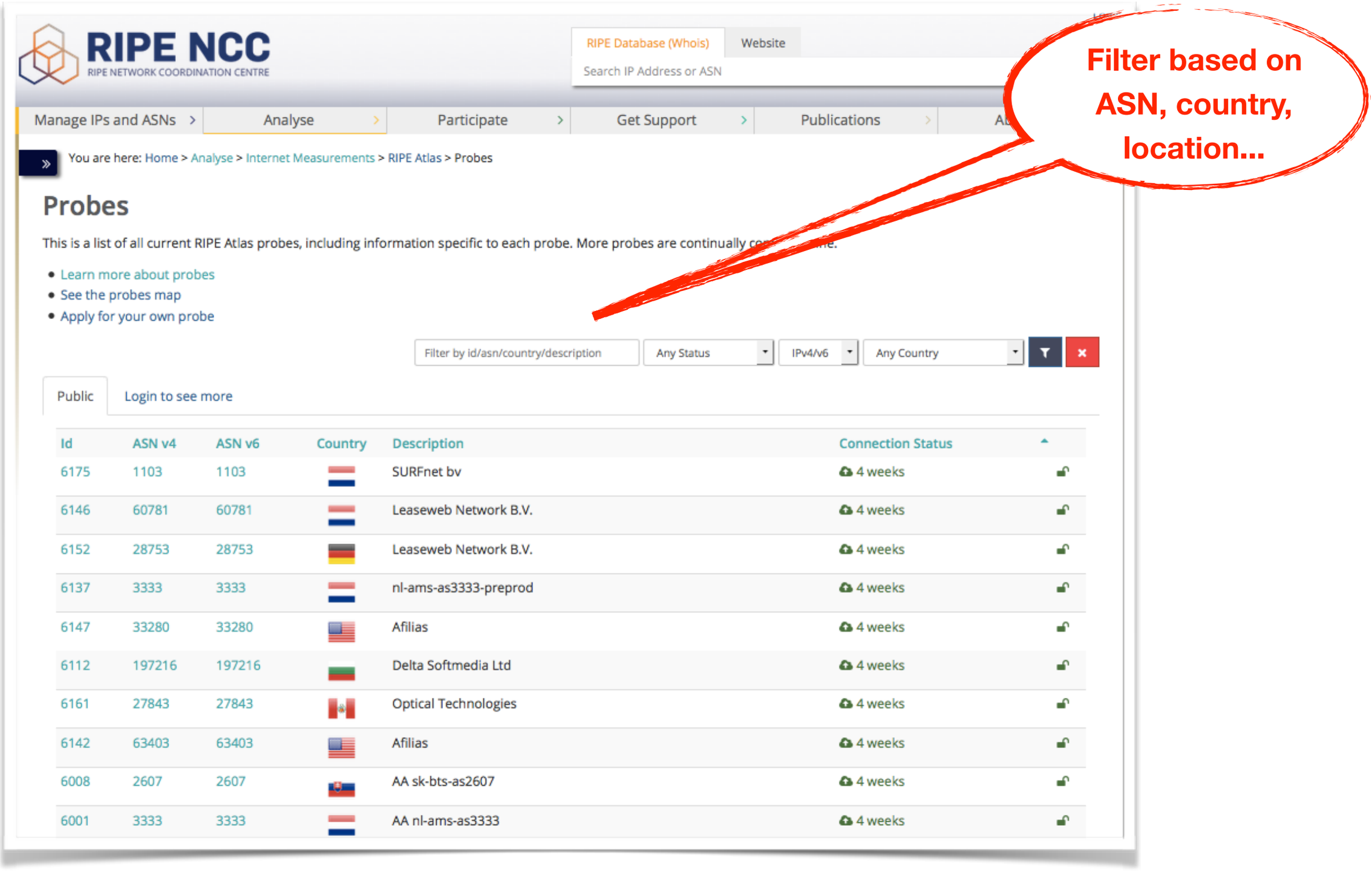
Technical Specifications

- v1 and v2: Lantronix XPort Pro
- v3: TP-Link TL-MR3020 powered from USB port

  - Does not work as a wireless router
  - Same functionality as the old probe

- RIPE Atlas anchor: Soekris net6501-70

Searching for Probes



Filter based on ASN, country, location...

Searching For Probes (API)

- https://atlas.ripe.net/docs/api/v2/reference/#!/probes

Parameters

Parameter	Value	Description	Parameter Type	Data Type
optional_fields		Include additional fields named in comma-separated values in response.	form	enum
country_code	IE		query	string
id__lt		filter on id being less than value.	query	integer
id__lte		filter on id being less than or equal to value.	query	integer
id__gte		filter on id being greater than or equal to value.	query	integer
id__gt		filter on id being greater than value.	query	integer
id__in		filter on id being one of comma-separated values.	query	string
latitude		filter on the latitude equaling the exact supplied float value.	query	string
latitude__lt		filter on the latitude being less than values (south to).	query	string
latitude__lte		filter on the latitude being less than or equal to value (south of).	query	string
latitude__gte		filter on the latitude being greater than or equal to value (north of).	query	string
latitude__gt		filter on the latitude being greater than value.	query	string
longitude		filter on the longitude equaling the exact supplied float value.	query	string
longitude__lt		filter on the longitude being less than the value.	query	string
longitude__lte		filter on the longitude being less than or equal to value (to the west of).	query	string
longitude__gte		filter on the longitude being greater than or equal to value (to the east of).	query	string
longitude__gt		filter on the longitude being greater than to value (to the east of).	query	string
asn		filter on probes announced by the autonomous system with the name of value. This field is useful for filtering when you don't care about IP version.	query	string
asn_v4		filter on probes with an IPv4 address announced by an autonomous system with a particular number.	query	string
asn_v4__in		filter on probes with an IPv4 address announced by one of the autonomous systems in a comma-separated list.	query	string

Exercise

- Look for all probes in Lebanon

- Anything interesting?

- Hackathon project: tagcloud for LB probes?
  - Different for other countries?

Probe Page

» You are here: Home > Analyse > Internet Measurements > RIPE Atlas > Probes > Probe #10010

Probe #10010 (Register)

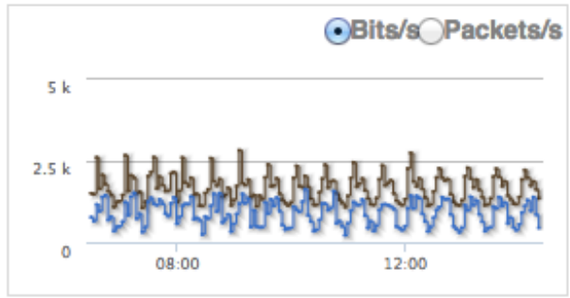
General | Network | Built-in Measurements | User-defined Measurements

General Information

Edit

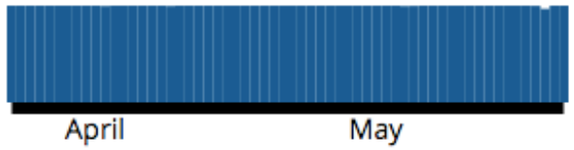
Id	10010
MAC Address	F8:D1:11:A9:F3:2C
Architecture	tl-mr3020
Firmware Version	4680 (1070)
Router Type	
Bandwidth Limit	Not set
DNS Entry	Off
Shared Publicly	Yes
User Tags	NAT, Chello 200MB
System Tags	V3, Resolves A Correctly, Resolves AAAA Correctly, IPv4 Works, Auto GEOIP city, IPv4 Capable, IPv4 RFC1918

Connection & Traffic



Connected Time

3 days, 9 hours



3 days, 9 hours

Firmware 4680

#10010

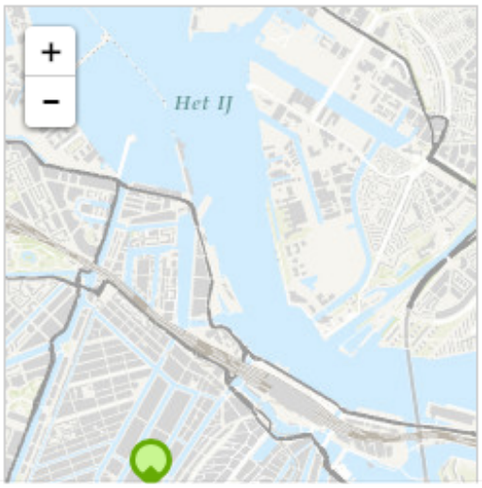
Architecture tl-mr3020

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



set by probe host

set by system

Management Sharing

Edit

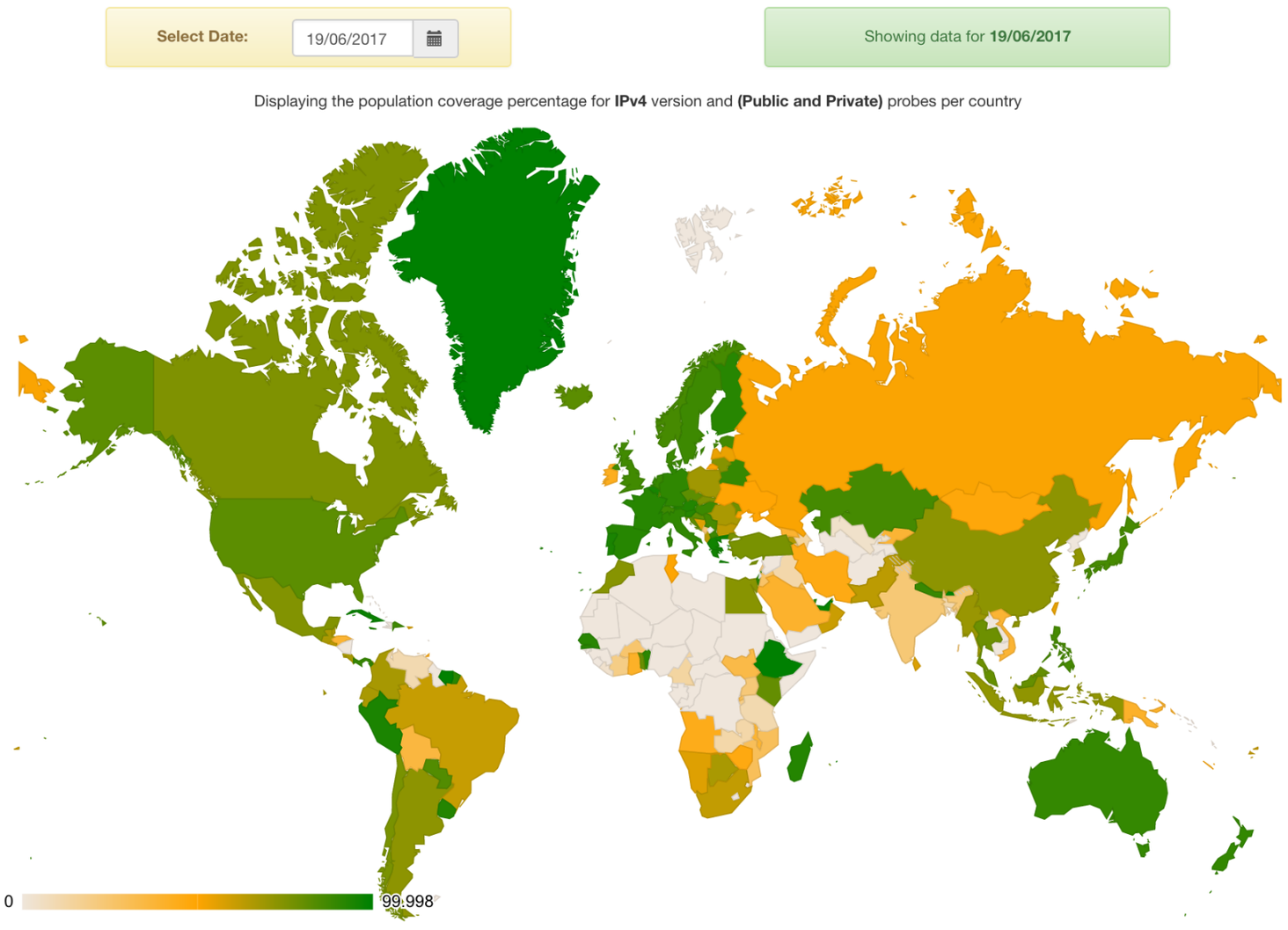
Only the probe host is permitted to administer this probe.

Probe IDs

- Example for probeID 4
  - UI: https://atlas.ripe.net/probes/4
  - API: https://atlas.ripe.net/api/v2/probes/4
  - CLI: ripe-atlas probe-info 4
- Probe type embedded in ID:
  - < 6000 : Probe v1,v2
  - 6000-10000 : Anchors
  - > 10000 : Probes v3

Probes - Where users are?

- http://sg-pub.ripe.net/petros/population_coverage/
- https://github.com/pgigis/ripe_atlas_eyeball_coverage



Where are your users?

- Do you have netflow/web or other access logs?
- Can you aggregate by:
  - routed prefix
  - routed ASN
  - Are there RIPE Atlas probes in these networks?
  - #hackathon project

RIPE Atlas Measurements

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

“Measurements”

- Beware: “measurement” is ambiguous!
- Could be a
  - Measurement specification
  - Measurement result

Measurement Specification

- A RIPE Atlas “measurement specification” is:
  - A number of sources (1-all probes)
  - A single destination (by hostname or IP)
  - For a given IP protocol (IPv4/IPv6)
  - For a given measurement type (ping, traceroute, DNS…)
  - At a given interval (or as a one-off)

RIPE Atlas Measurement IDs

- UI
  - https://atlas.ripe.net/measurements/
  - https://atlas.ripe.net/measurements/<msm_id>
- API
  - https://atlas.ripe.net/api/v2/measurements/<msm_id>/
  - https://atlas.ripe.net/api/v2/measurements/<msm_id/results
- CLI
  - ripe-atlas measurement-info <msm_id>
  - ripe-atlas report <msm_id>

UI

Traceroute measurement to hu-bud-as12303.anchors.atlas.ripe.net

General Information | Probes | Map | TraceMON (beta) | OpenIPMap Prototype | Results | Modification Log

General Information

ID	#8754060
Group ID	#8754060
Type	Traceroute
Owner	Emile Aben
Charge credits to	Emile Aben
Public measurement?	Yes
Target	hu-bud-as12303.anchors.atlas.ripe.net
Resolve on Probe	No
This is a one-off measurement	
Timing	2017-05-17 12:52 - 2017-05-17 13:00
Costs	60 per result, 60 per day
Response timeout	4000
Protocol	TCP
Paris	16
Packets	3
Firsthop	255
Maxhops	255
Port	80
Size	0
Probe Fulfilment	Responsive **Total responsive:** 1 **Total allocated:** 1 **Total requested:** 1
Costs	Others

Anchoring Measurements

- From-To:
  - 100s of probes towards each RIPE Atlas anchor
  - All anchors in a mesh
- Types: ping, traceroute, HTTP

Anchoring Measurements

- UI
  - https://atlas.ripe.net/anchors/list/
  - https://atlas.ripe.net/anchors/map/
- API
  - https://atlas.ripe.net/api/v2/anchor-measurements/
  - https://atlas.ripe.net/api/v2/anchors/

Use Existing Measurements

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

RIPE Atlas Measurement Creation

Measurements Cost Credits

- Running measurements costs credits
  - ping = 3 credits, traceroute = 30, etc.
  - Why? Fairness and to avoid overload
  - Daily spending limit & max measurements user can create
  - Hosting a RIPE Atlas probe earns credits
- Get extra credits by:
  - Being a RIPE NCC member
  - Hosting an anchor
  - Sponsoring probes

Exercise

- Make sure you have credits

  - A RIPE Access account: please create one here: https://access.ripe.net/registration
  - once you have such account, you can load it up with RIPE Atlas credits with this voucher code:
  IthnanWa-arba'un
  (instructions on how to redeem a voucher code are here: https://atlas.ripe.net/user/credits/#!redeem)

- Create a key for use in measurements

  - <TODO>

Create measurement to test reachability

- Use the traceroute command to test the reachability of:
  - wikipedia.org
  - on TCP port 443 <<rene article>>
  - from probes in Lebanon

How to Create a Measurement?

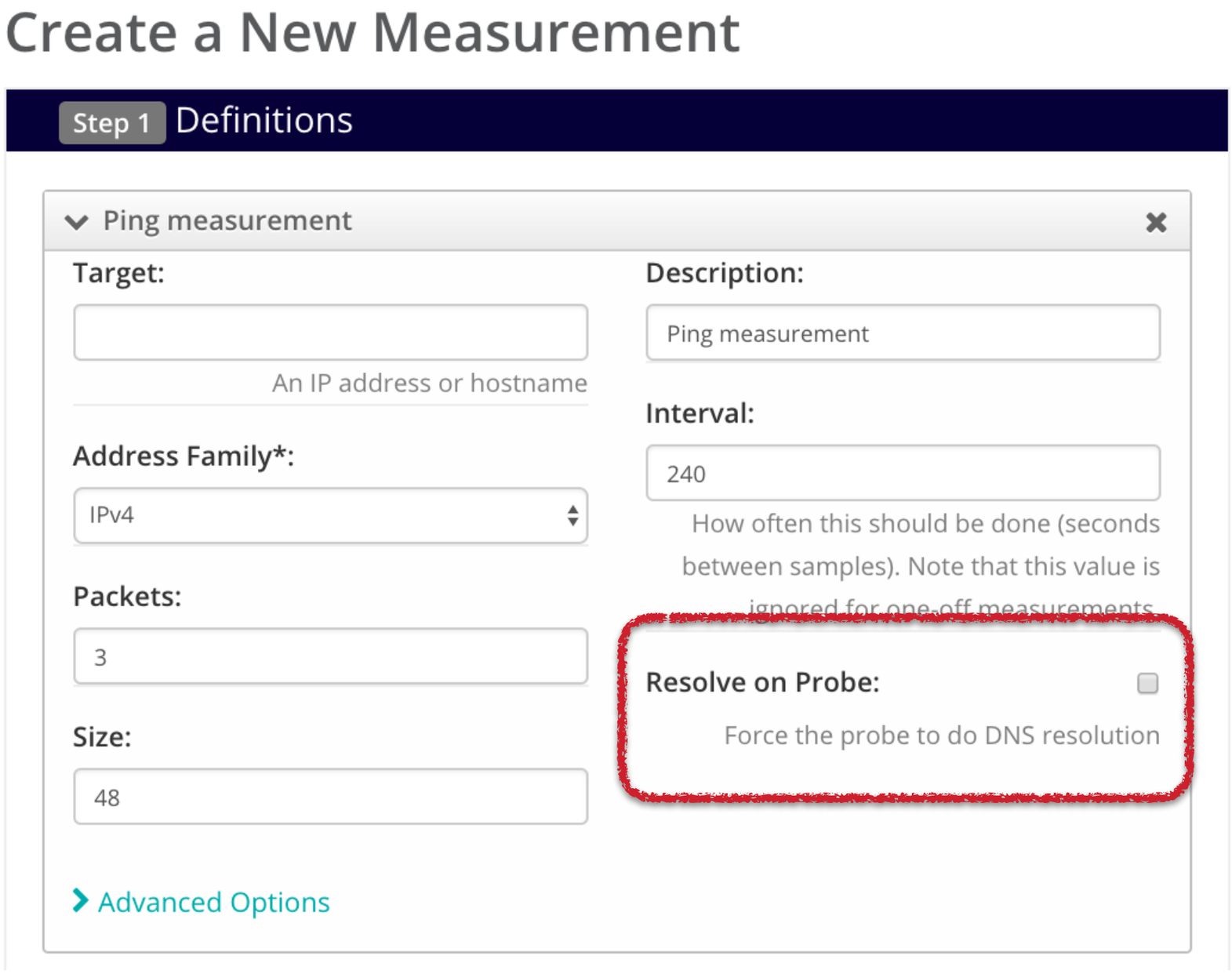
- UI or API

- Many options per measurement type!!

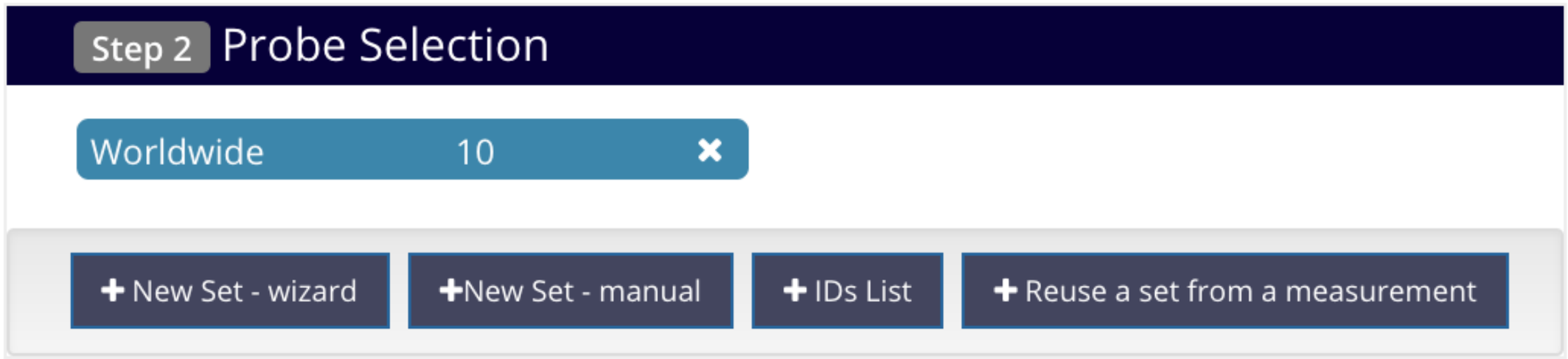
- Upon creation you'll get an ID back by which you can track the status and download the data

UI

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



UI (Probe Selection and Timing)



UI (Spec)

Measurement API Compatible Specification

```
curl --dump-header - -H "Content-Type: application/json" -H "Accept:
application/json" -X POST -d '{
 "definitions": [
  {
   "af": 4,
   "packets": 3,
   "size": 48,
   "description": "Ping measurement",
   "interval": 240,
   "resolve_on_probe": false,
   "skip_dns_check": false,
   "type": "ping"
```

Copy to clipboard

Create My Measurement(s)

API

- You'll need an API key
  - https://atlas.ripe.net/keys/
- POST a JSON measurement specification to
  - https://atlas.ripe.net/api/v2/measurements/?key=YOUR_KEY_HERE
- Probably easier: via Python library ripe.atlas.cousteau
  - https://ripe-atlas-cousteau.readthedocs.io/en/latest/use.html

API Example (with Cousteau)

```
from datetime import datetime
from ripe.atlas.cousteau import (
  Ping,
  Traceroute,
  AtlasSource,
  AtlasCreateRequest
)

ATLAS_API_KEY = ""

ping = Ping(af=4, target="www.google.gr", description="testing new wrapper")

traceroute = Traceroute(
    af=4,
    target="www.ripe.net",
    description="testing",
    protocol="ICMP",
)

source = AtlasSource(
    type="area",
    value="WW",
    requested=5,
    tags={"include":["system-ipv4-works"]}
)
source1 = AtlasSource(
    type="country",
    value="NL",
    requested=50,
    tags={"exclude": ["system-anchor"]}
)


atlas_request = AtlasCreateRequest(
    start_time=datetime.utcnow(),
    key=ATLAS_API_KEY,
    measurements=[ping, traceroute],
    sources=[source, source1],
    is_oneoff=True
)

(is_success, response) = atlas_request.create()
```

RIPE Atlas Measurement Results

Retrieving Measurement Results

- By Measurement ID

- Streaming

- Daily dumps (bulk downloads) ⟵ new!

By Measurement ID

- UI
  - https://atlas.ripe.net/measurements/<msm_id>/#!download
  - other tabs have visualisation of results
- API
  - https://atlas.ripe.net/api/v2/measurements/<msm_id>/results
- CLI
  - ripe-atlas report <msm_id>

RIPE Atlas Streaming

- RIPE Atlas streaming is an architecture that allows users to receive the measurement results as soon as they are sent by the probes - in real time
  - Publish/subscribe through web sockets (RFC 6455)

- There are two types of data:
  - Measurement results
  - Probe connection status events

Streaming Features

- Advanced filtering examples:
  - All data between 2017-01-01 and 2017-01-03
  - All measurements of a single type (“gimme all teh pings”)
  - All measurements towards an IP prefix

- Documented at:
  - https://atlas.ripe.net/docs/result-streaming/

Daily Dumps

- ftp://ftp.ripe.net/ripe/atlas/data
- https://labs.ripe.net/Members/petros_gigis/daily-atlas-results-dumps

Other Bulk Downloads

- Probe archive:
  - ftp://ftp.ripe.net/ripe/atlas/probes/archive/

- Measurement archive (specifications!):
  - ftp://ftp.ripe.net/ripe/atlas/measurements/

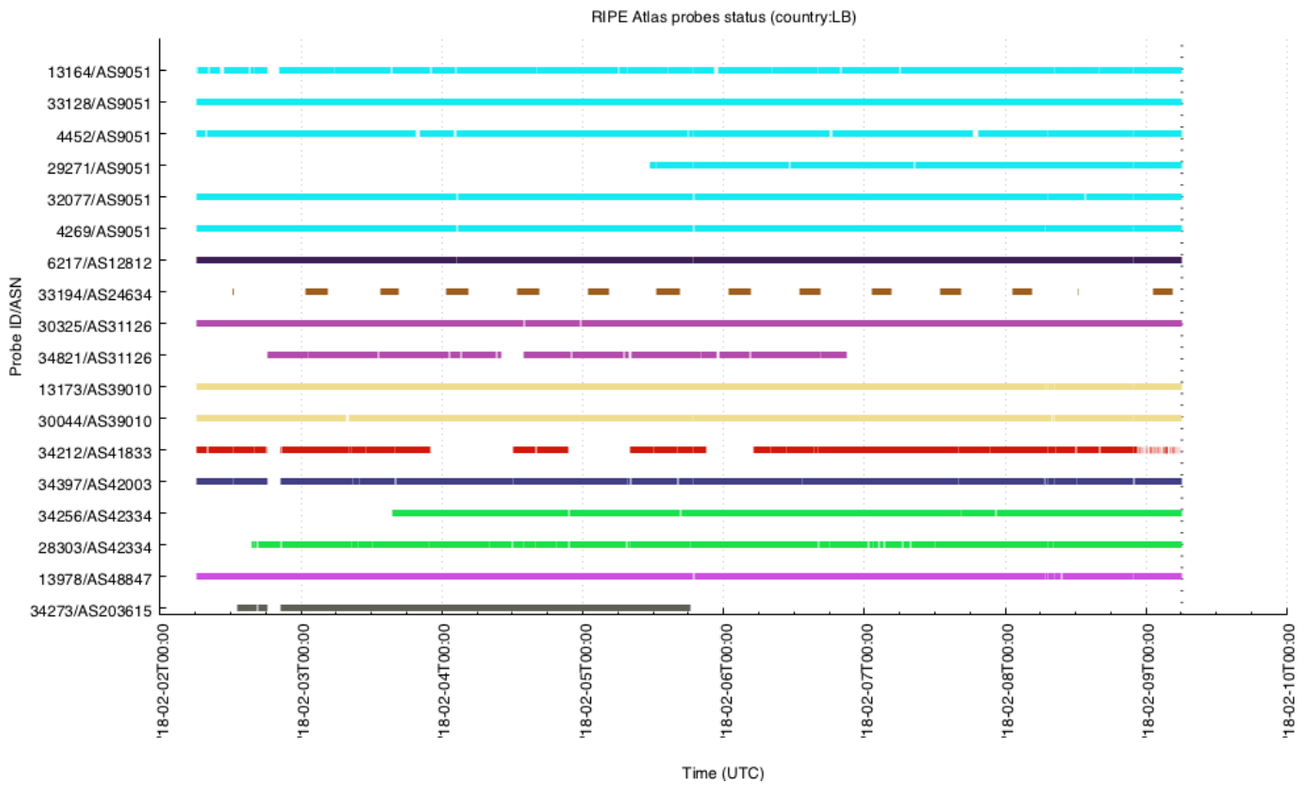
Data Challenges

RTTs are not normal!

- RTT distribution is not normal
  - Don’t take ‘averages’. it won’t work!
- Possible project: See if (Lebanese) RIPE Atlas RTTs fit Pareto distribution?

Probe disconnects

- Specific measurement ID: 7000 (also 7001)
  - probes going off/online
- Prototype-use: https://github.com/emileaben/resource-gnuplotter (doit-probe-connects.py)



Assymetric routing

- Forward path != reverse path
- Take RIPE Atlas traces (ixp-country-jedi?) and look at the asymmetry in Lebanon?
- Direct Interconnects and/or IXPs help
  - Can we show this?

Probe Similarity

- <do we have this dataset>
- img?
- what does this look like

Section Title

Section subtitle

Community

- Ambassadors help distribute probes at conferences, give presentations, etc.
- Developers contribute free and open software
- Network operators create measurements to monitor and troubleshoot
- Researchers/students use it to better understand the Internet

← You!

How to Participate

- Use RIPE Atlas (and give us feedback)
- Talk with us about your (crazy?) ideas
- Share your research on RIPE Labs:
  - https://labs.ripe.net/
- Come to our meetings (RACI):
  - https://www.ripe.net/participate/ripe/raci
- Participate in a hackathon
- Collaborations? Internships?

Questions

emile.aben@ripe.net

@meileaben

Not a typo!

For The Lab

- You need a RIPE NCC Access account:
  - access.ripe.net
- Measurement credits voucher: DATAHUNGRY
  - https://atlas.ripe.net/user/credits/#!redeem
  - https://atlas.ripe.net/user/credits/
- Think of a country!

Bonus Talking Points

- Demo!!
- OpenIPMap
- IXP-Country-Jedi