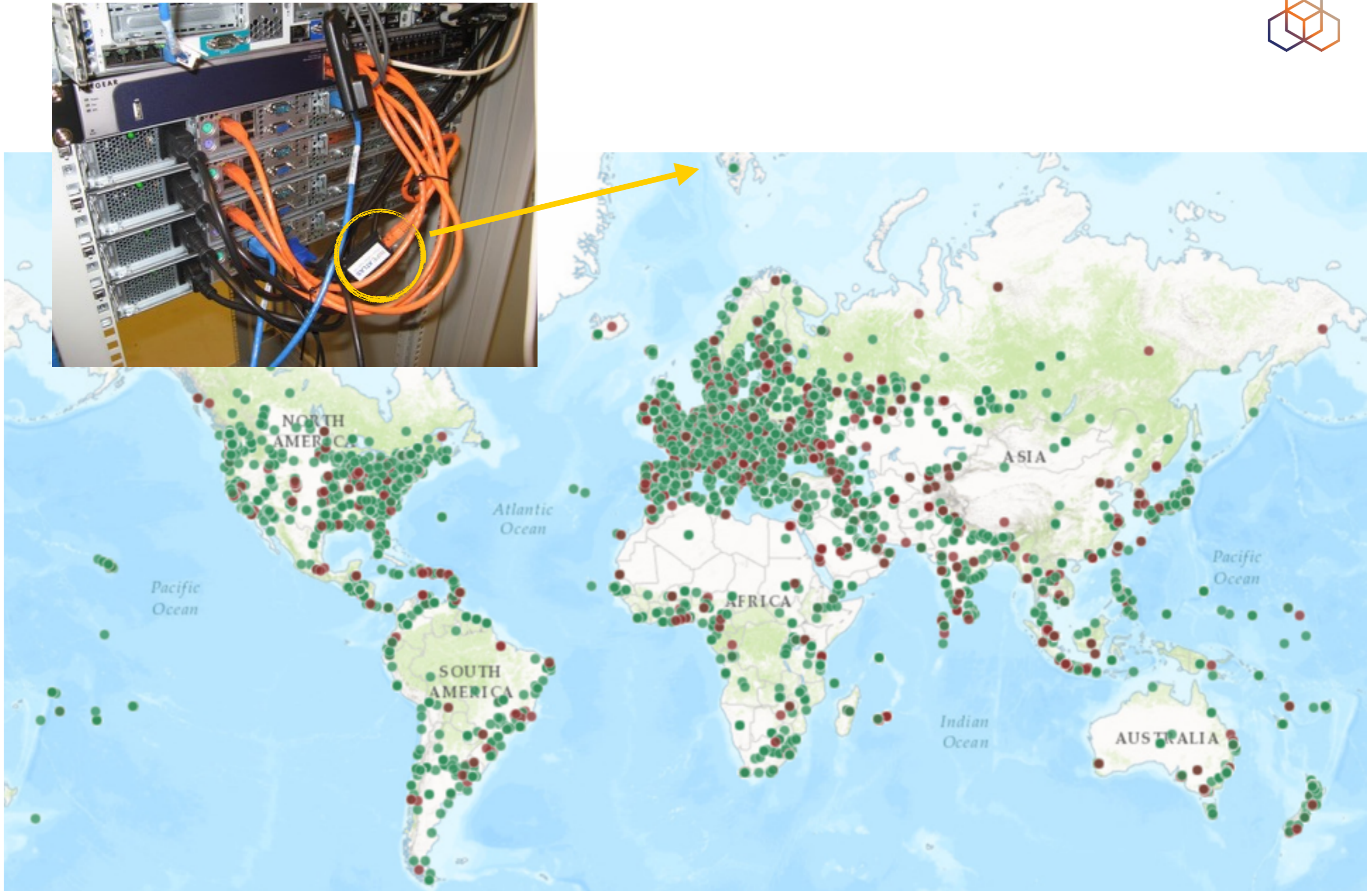




RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE Atlas for Network Researchers



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

Before We Start



- 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/>



... While You Create Your Account



- What is RIPE NCC?
- What does it have to do with research?





Introduction to RIPE Atlas

RIPE Atlas



RIPE Atlas - Wikipedia, the free encyclopedia

en.wikipedia.org/wiki/RIPE_Atlas

Becha 0 Talk Sandbox Preferences Beta Watchlist Contributions Log out

Article **Talk** Read Edit source Edit More Search


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.

Contents [hide]

- 1 History
- 2 Technical details
- 3 Community
- 4 Research papers
- 5 Similar projects
- 6 References
- 7 External links
- 8 Categories



The image shows a screenshot of a Wikipedia article for RIPE Atlas. The browser window title is 'RIPE Atlas - Wikipedia, the free encyclopedia' and the URL is 'https://en.wikipedia.org/wiki/RIPE_Atlas'. The user is logged in as 'Becha'. The article title is 'RIPE Atlas' and it is described as 'From Wikipedia, the free encyclopedia'. The main text states: 'RIPE Atlas is a global, open, distributed Internet measurement platform, consisting of thousands of measurement devices that measure Internet connectivity in real time.' Below the text is a world map with numerous red and green dots representing measurement devices. A 'Contents' table of contents is visible on the left side of the article, listing sections from History to Categories.

What is RIPE Atlas?



- Goal: Improve Internet through measurements
- Probes hosted by volunteers
 - “For the community, by the community”
- Data publicly available

What is RIPE Atlas?



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

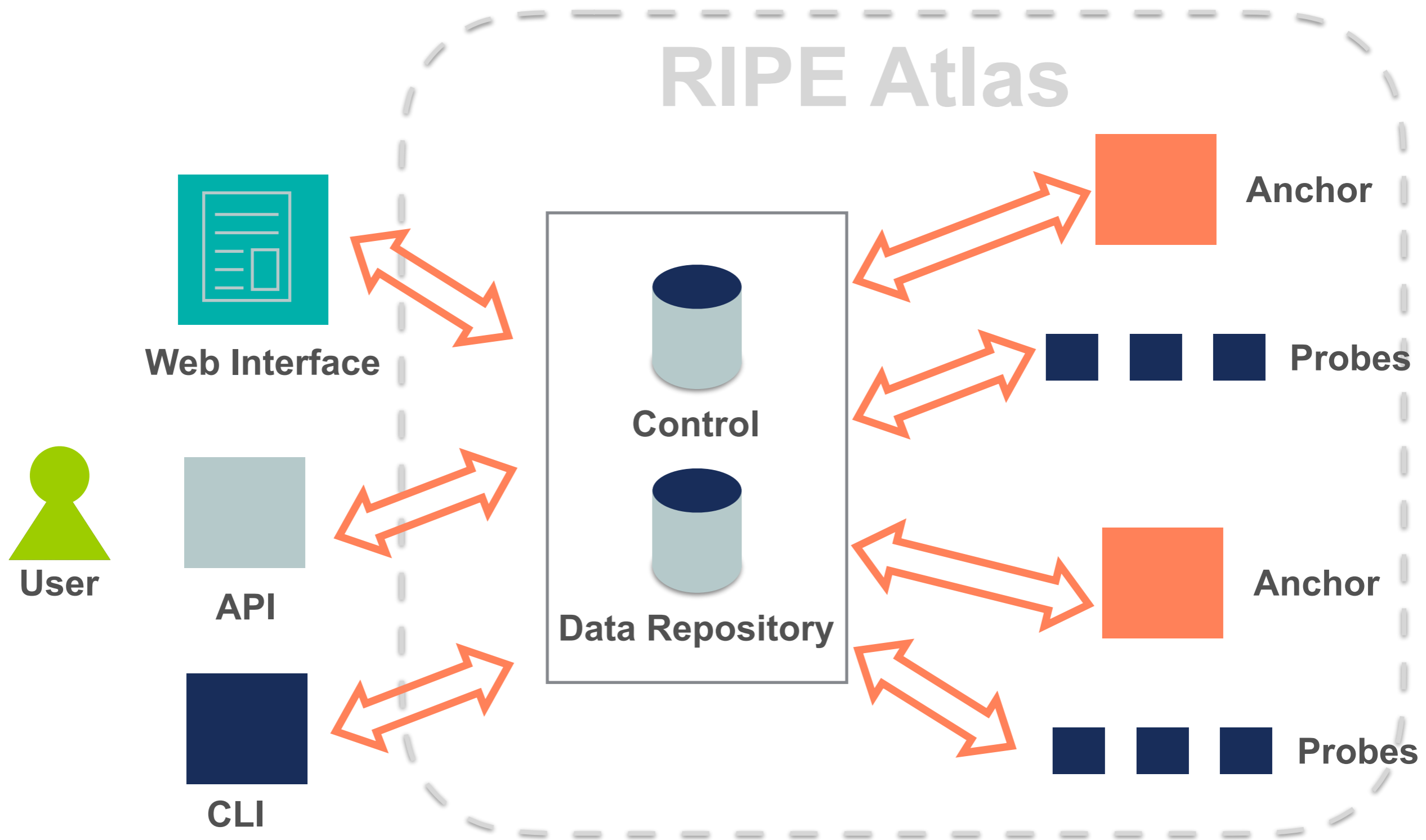
RIPE Atlas Probes



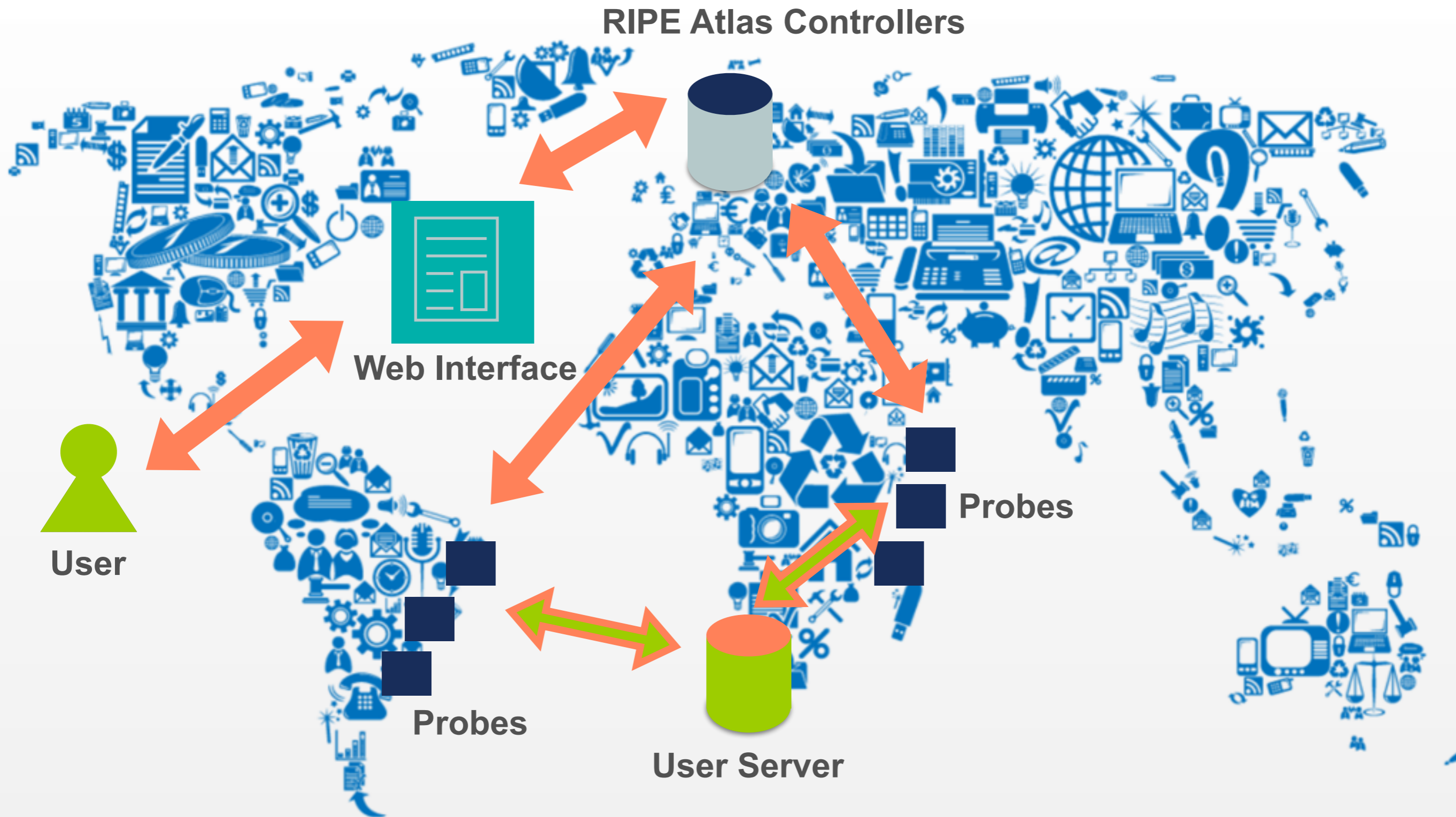
- Regular probes (version 1,2,3)
 - Small form factor boxes
- RIPE Atlas anchors
 - 1U servers (Soekris)
- Future: virtual machine probes?
 - Interested?



RIPE Atlas Overview (1)



RIPE Atlas Overview (2)

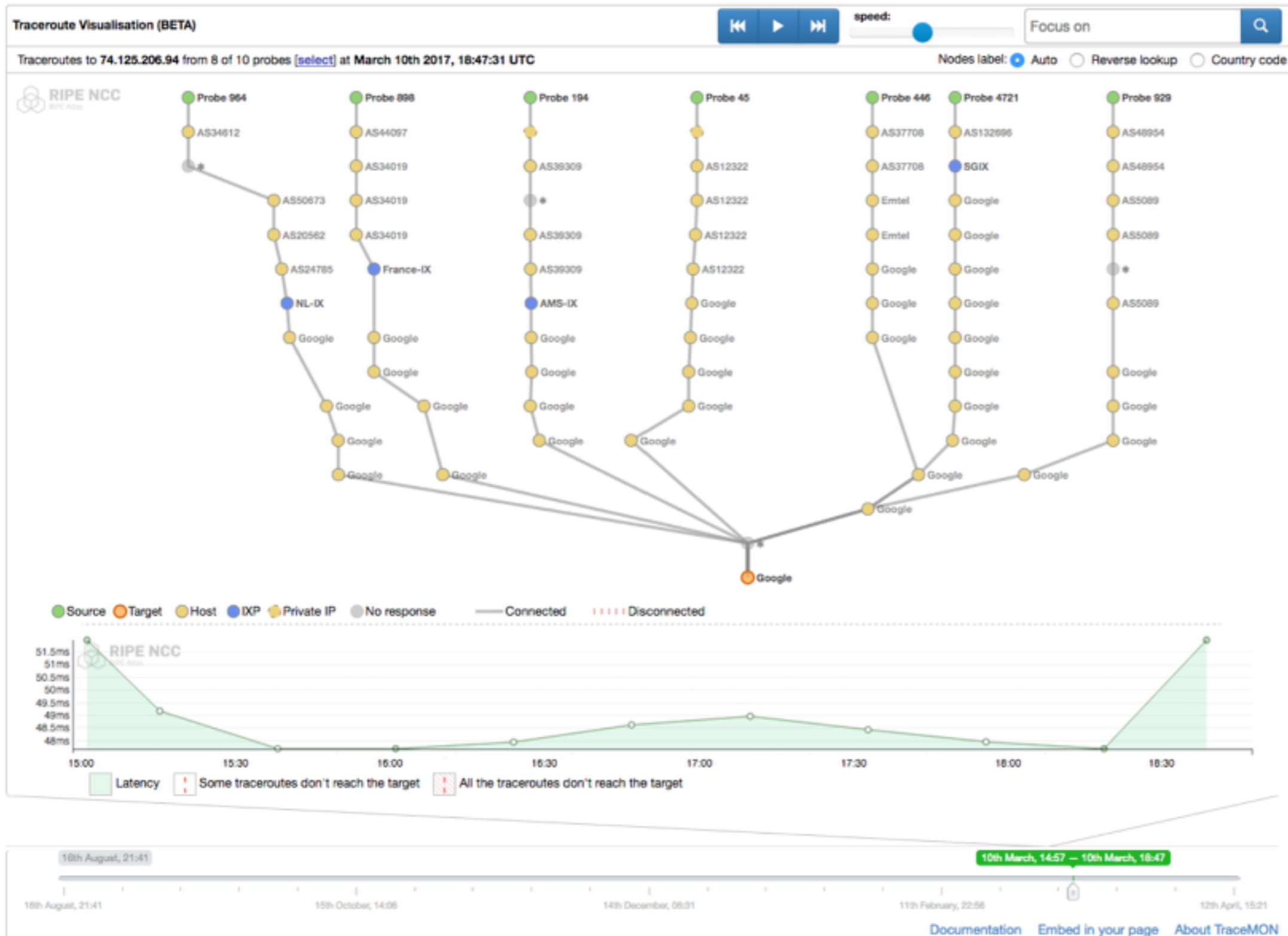


Most Popular Features



- 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
- “Time Travel”, LatencyMON, DomainMON
- Status checks (Icinga and Nagios)

Tracemon



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/>



The screenshot shows the RIPE Atlas website interface. At the top left is the RIPE NCC logo and name. To the right is a search bar and a user profile for Emile Aben. Below the header is a navigation menu with options: Manage IPs and ASNs, Analyse (highlighted), Participate, Get Support, Publications, and About Us. A breadcrumb trail reads: You are here: Home > Analyse > Internet Measurements > RIPE Atlas. On the left is a sidebar menu with links: RIPE Atlas, About RIPE Atlas, Get Involved, Probes and Anchors, Measurements, Maps and Tools, Resources, RIPE NCC Members, My Atlas, and Staff Pages. The main content area features a 'Welcome to RIPE Atlas!' section with a map and a 'Get Involved' button. Below this are four sections: 'My Atlas' (personalised dashboard), 'Use Cases' (network monitoring, DNS analysis, IPv6 connectivity), 'Maps and Tools' (Internet maps), and 'Latest on RIPE Labs' (news and updates). On the right is a 'Statistics' table and a 'Current Sponsors' section with a 'Become a Sponsor' link.

Statistics	
Probes connected	9752
Anchors connected	265
Measurements running	20131
Results per second	4780

Current Sponsors	
Become a Sponsor >	

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



RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE Database (Whois) Website
Search IP Address or ASN

Manage IPs and ASNs > Analyse > Participate > Get Support > Publications > Ad

You are here: Home > Analyse > Internet Measurements > RIPE Atlas > Probes

Probes

This is a list of all current RIPE Atlas probes, including information specific to each probe. More probes are continually coming online.

- Learn more about probes
- See the probes map
- Apply for your own probe

Filter by id/asn/country/description Any Status IPv4/v6 Any Country

Public Login to see more

Id	ASN v4	ASN v6	Country	Description	Connection Status
6175	1103	1103		SURFnet bv	4 weeks
6146	60781	60781		Leaseweb Network B.V.	4 weeks
6152	28753	28753		Leaseweb Network B.V.	4 weeks
6137	3333	3333		nl-ams-as3333-preprod	4 weeks
6147	33280	33280		Afilias	4 weeks
6112	197216	197216		Delta Softmedia Ltd	4 weeks
6161	27843	27843		Optical Technologies	4 weeks
6142	63403	63403		Afilias	4 weeks
6008	2607	2607		AA sk-bts-as2607	4 weeks
6001	3333	3333		AA nl-ams-as3333	4 weeks

Filter based on
ASN, country,
location...

Searching For Probes (API)



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

Parameter	Value	Description	Parameter Type	Data Type
optional_fields	<input type="text" value=";"/>	Include additional fields named in comma-separated values in response.	form	enum
country_code	<input type="text" value="IE"/>		query	string
id__lt	<input type="text"/>	filter on id being less than value.	query	integer
id__lte	<input type="text"/>	filter on id being less than or equal to value.	query	integer
id__gte	<input type="text"/>	filter on id being greater than or equal to value.	query	integer
id__gt	<input type="text"/>	filter on id being greater than value.	query	integer
id__in	<input type="text"/>	filter on id being one of comma-separated values.	query	string
latitude	<input type="text"/>	filter on the latitude equaling the exact supplied float value.	query	string
latitude__lt	<input type="text"/>	filter on the latitude being less than values (south to).	query	string
latitude__lte	<input type="text"/>	filter on the latitude being less than or equal to value (south of).	query	string
latitude__gte	<input type="text"/>	filter on the latitude being greater than or equal to value (north of).	query	string
latitude__gt	<input type="text"/>	filter on the latitude being greater than value.	query	string
longitude	<input type="text"/>	filter on the longitude equaling the exact supplied float value.	query	string
longitude__lt	<input type="text"/>	filter on the longitude being less than the value.	query	string
longitude__lte	<input type="text"/>	filter on the longitude being less than or equal to value (to the west of).	query	string
longitude__gte	<input type="text"/>	filter on the longitude being greater than or equal to value (to the east of).	query	string
longitude__gt	<input type="text"/>	filter on the longitude being greater than to value (to the east of).	query	string
asn	<input type="text"/>	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	<input type="text"/>	filter on probes with an IPv4 address announced by an autonomous system with a particular number.	query	string
asn_v4__in	<input type="text"/>	filter on probes with an IPv4 address announced by one of the autonomous systems in a comma-separated list.	query	string

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

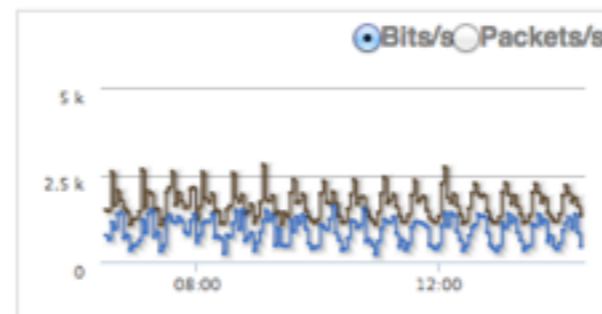
General Information [Edit](#)

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 [Edit](#)



Connected Time [3 days, 9 hours](#)



[3 days, 9 hours](#)

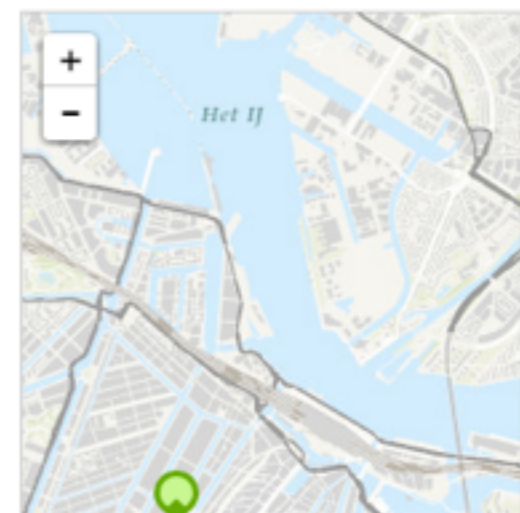
Firmware #10010
4680

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](#)



Management Sharing [Edit](#)

Only the probe host is permitted to administer this probe.

← set by probe host

← set by system



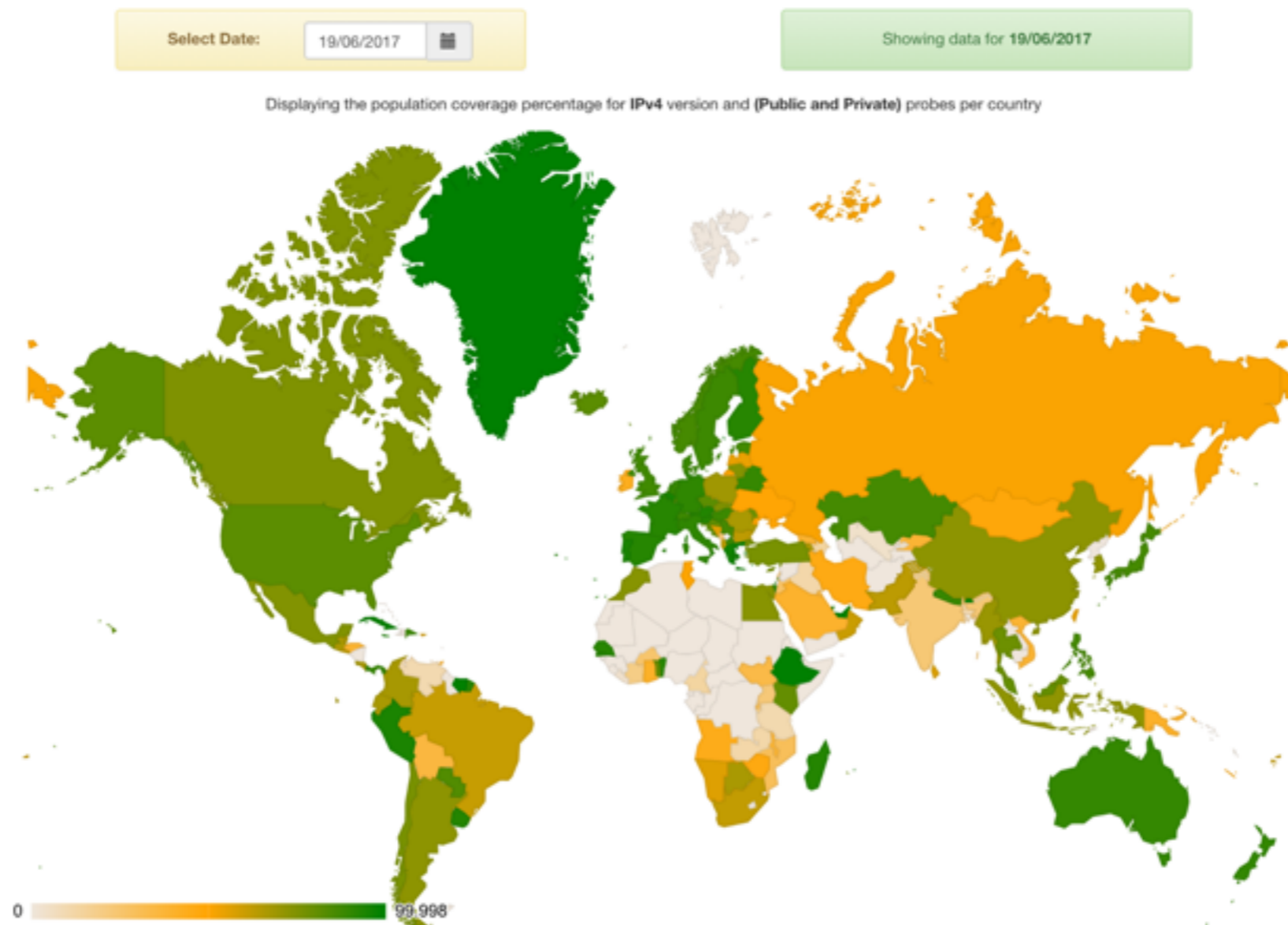
Probe IDs

- 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/





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>`



⚡ 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	<div style="background-color: #27ae60; width: 100%; height: 15px; margin-bottom: 5px;"></div> Responsive <p>Total responsive: 1 Total allocated: 1 Total requested: 1</p>
Costs	<div style="background-color: #c0392b; width: 100%; height: 15px; margin-bottom: 5px;"></div> 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

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



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

Create a New Measurement

Step 1 Definitions

▼ Ping measurement ×

Target:

An IP address or hostname

Address Family*:

Packets:

Size:

Description:

Interval:

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](#)

UI (Probe Selection and Timing)



Step 2 Probe Selection

Worldwide 10 ×

+ New Set - wizard

+ New Set - manual

+ IDs List

+ Reuse a set from a measurement

Step 3 Timing

This is a One-off:

Start time (UTC):

As soon as possible



Stop time (UTC):

Never



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/>



RIPE Atlas Community

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