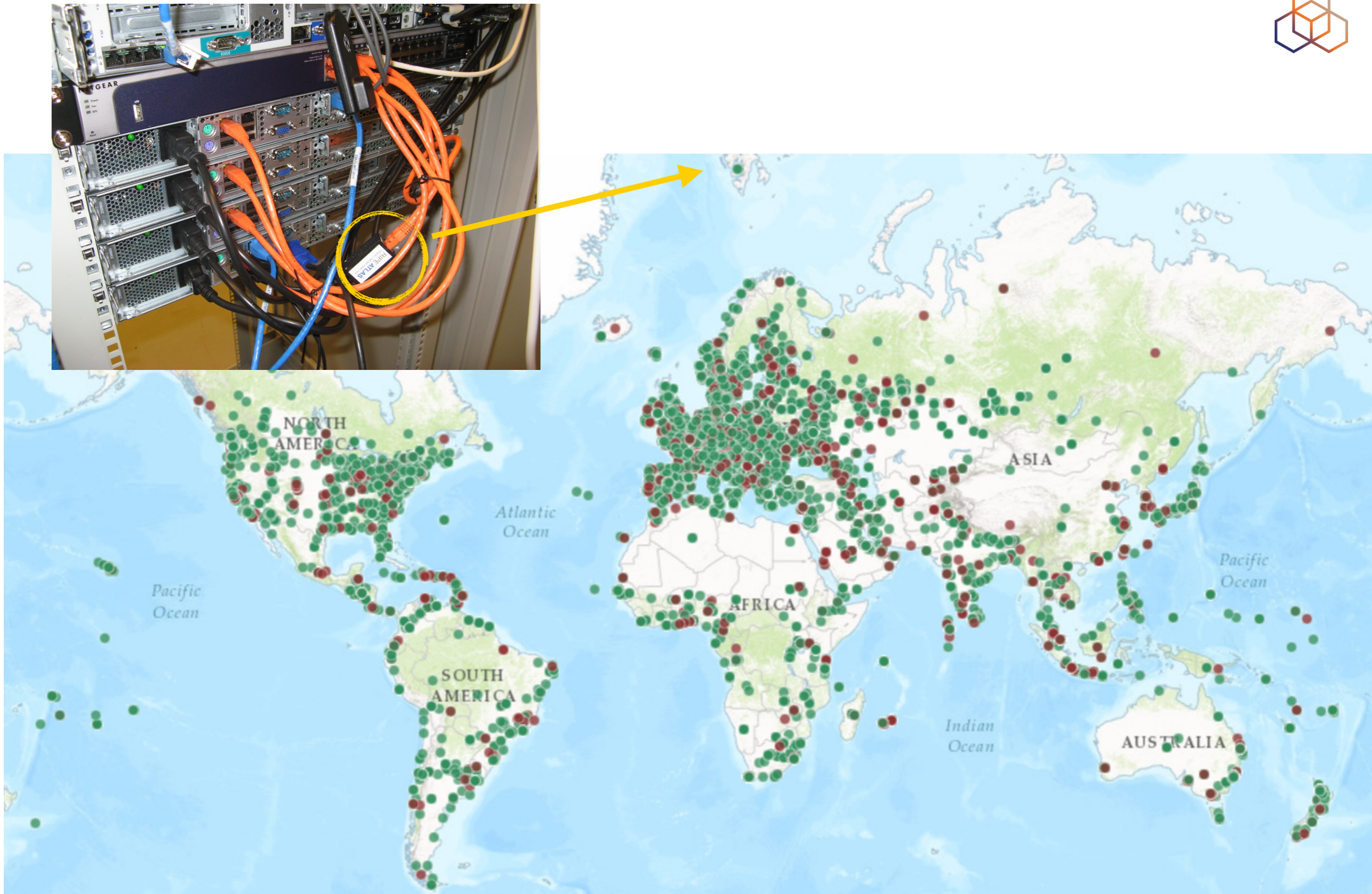




**RIPE NCC**  
RIPE NETWORK COORDINATION CENTRE

# 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](https://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 map displays a global distribution of measurement devices, represented by red and green dots, across all major continents: North America, South America, Europe, Africa, Asia, and Australia. The dots are most densely clustered in Europe and North America, with significant presence in Asia and South America as well.

# 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



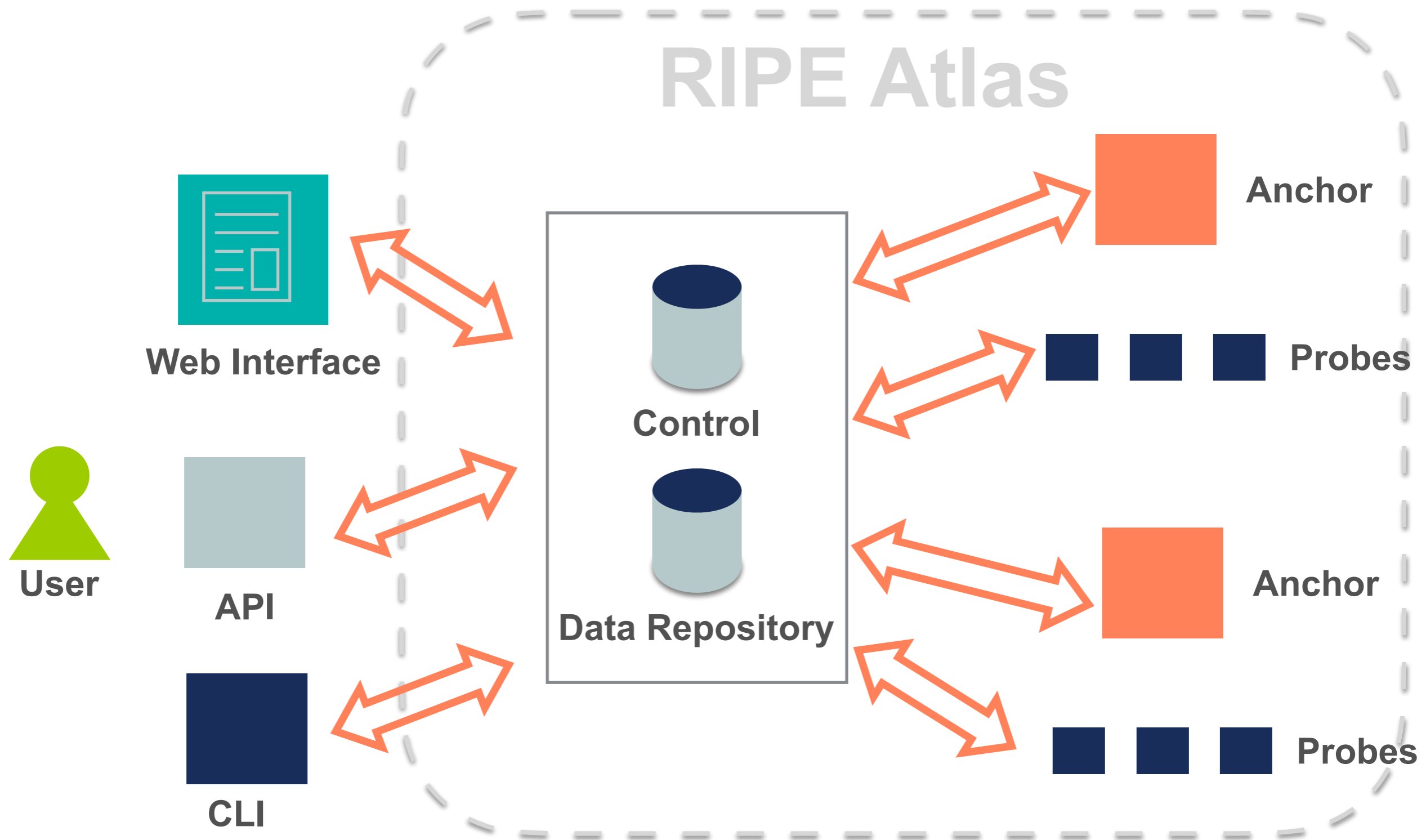
# RIPE Atlas Probes



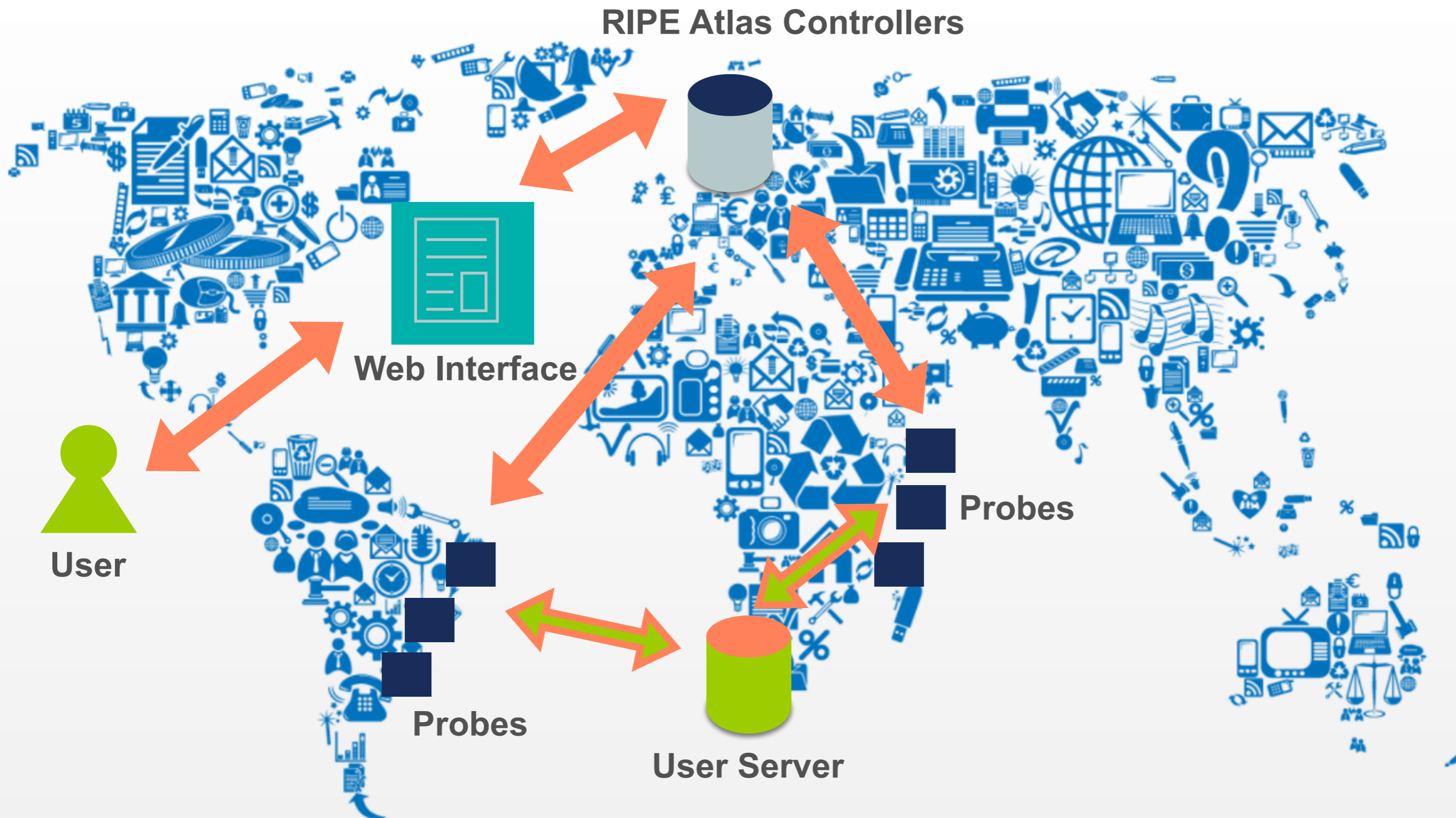
- Regular probes (version 1,2,3)
  - Small form factor boxes
- RIPE Atlas anchors
  - 1U servers (Soekris)
- Future: virtual machine probes?
  - Interested?



# RIPE Atlas Overview (1)



# RIPE Atlas Overview (2)

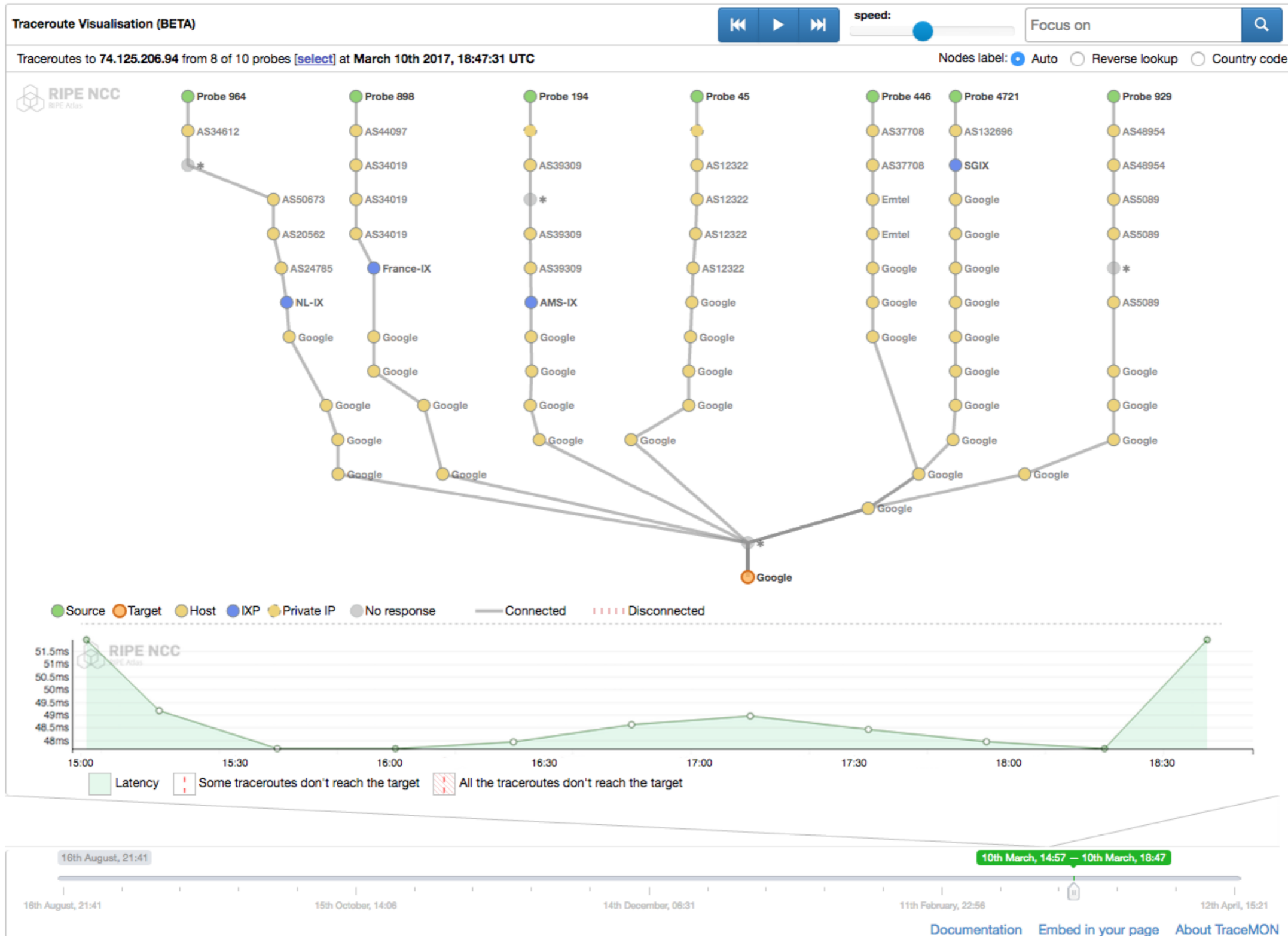


# Most Popular Features



- 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/>



RIPE NCC  
RIPE NETWORK COORDINATION CENTRE

RIPE Database (Whois) Website

Search the content of this website

Emile Aben


Manage IPs and ASNs > **Analyse** > Participate > Get Support > Publications > About Us >

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

- RIPE Atlas <<
- About RIPE Atlas >
- Get Involved >
- Probes and Anchors >
- Measurements, Maps and Tools >
- Resources >
- RIPE NCC Members
- My Atlas >
- Staff Pages >

### Welcome to RIPE Atlas!

With your help, the RIPE NCC is building the largest Internet measurement network ever made. RIPE Atlas employs a global network of probes that measure Internet connectivity and reachability, providing an unprecedented understanding of the state of the Internet in real time.



Get Involved

### My Atlas

Go directly to your personalised dashboard including your probes, measurements, credit history and more.

### Use Cases

Find out how RIPE Atlas can help you monitor your network, troubleshoot issues, analyse DNS infrastructure, test IPv6 connectivity and more.

### Maps and Tools

Access Internet maps created with RIPE Atlas data, RIPE Atlas measurement results, and tools to access and display RIPE Atlas data.

### Latest on RIPE Labs

Get the latest news, updates, research and results relating to RIPE Atlas on RIPE Labs, the RIPE NCC's platform for showcasing new ideas and developments from the Internet community.

### 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" value=""/>	filter on id being less than value.	query	integer
id__lte	<input type="text" value=""/>	filter on id being less than or equal to value.	query	integer
id__gte	<input type="text" value=""/>	filter on id being greater than or equal to value.	query	integer
id__gt	<input type="text" value=""/>	filter on id being greater than value.	query	integer
id__in	<input type="text" value=""/>	filter on id being one of comma-separated values.	query	string
latitude	<input type="text" value=""/>	filter on the latitude equaling the exact supplied float value.	query	string
latitude__lt	<input type="text" value=""/>	filter on the latitude being less than values (south to).	query	string
latitude__lte	<input type="text" value=""/>	filter on the latitude being less than or equal to value (south of).	query	string
latitude__gte	<input type="text" value=""/>	filter on the latitude being greater than or equal to value (north of).	query	string
latitude__gt	<input type="text" value=""/>	filter on the latitude being greater than value.	query	string
longitude	<input type="text" value=""/>	filter on the longitude equaling the exact supplied float value.	query	string
longitude__lt	<input type="text" value=""/>	filter on the longitude being less than the value.	query	string
longitude__lte	<input type="text" value=""/>	filter on the longitude being less than or equal to value (to the west of).	query	string
longitude__gte	<input type="text" value=""/>	filter on the longitude being greater than or equal to value (to the east of).	query	string
longitude__gt	<input type="text" value=""/>	filter on the longitude being greater than to value (to the east of).	query	string
asn	<input type="text" value=""/>	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" value=""/>	filter on probes with an IPv4 address announced by an autonomous system with a particular number.	query	string
asn_v4__in	<input type="text" value=""/>	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

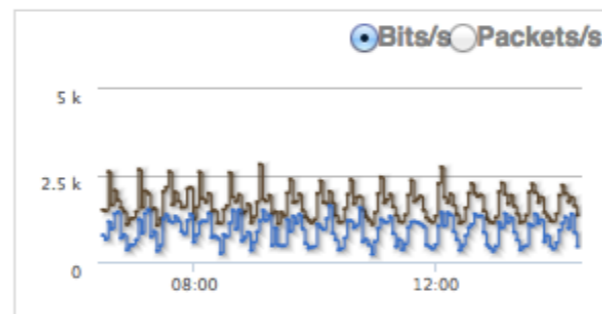
### General Information [Edit](#)

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

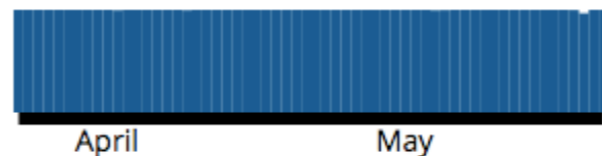
User Tags: NAT Chello 200MB

System Tags: V3 Resolves A Correctly Resolves AAAA Correctly IPv4 Works Auto GEOIP city IPv4 Capable IPv4 RFC1918

### Connection & Traffic [↗](#)



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



[↗](#) 3 days, 9 hours

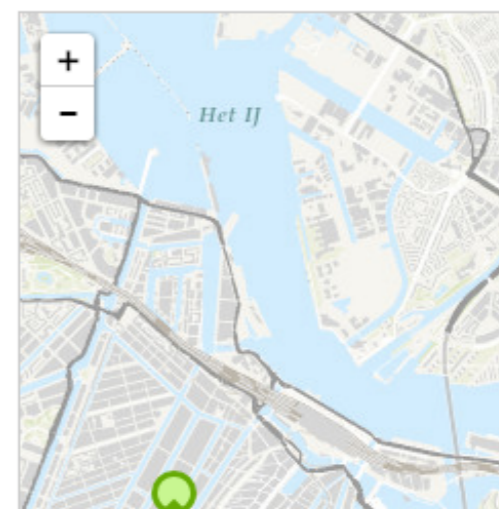
Firmware #10010  
4680

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](#) [↗](#)



← set by probe host

← set by system

### Management Sharing [Edit](#)

Only the probe host is permitted to administer this probe.



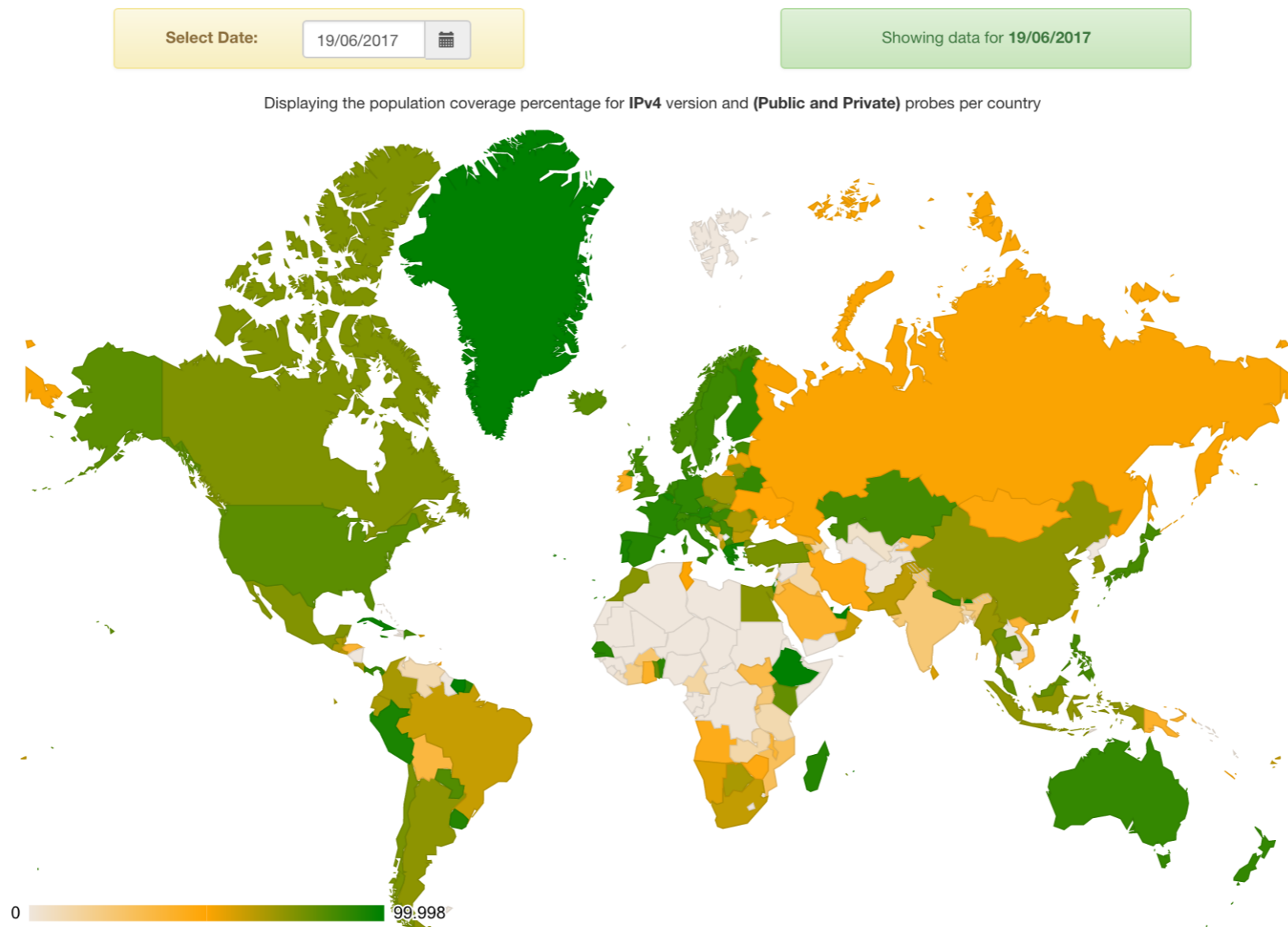
# Probe IDs

- 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/](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>](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>/)
- [https://atlas.ripe.net/api/v2/measurements/<msm\\_id>/results](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: #4CAF50; width: 100%; height: 15px; display: flex; justify-content: space-between; align-items: center;"> <span>Responsive</span> </div> <p>Total responsive: 1 Total allocated: 1 Total requested: 1</p>
Costs	<div style="background-color: #F44336; width: 100%; height: 15px; display: flex; justify-content: space-between; align-items: center;"> <span>Others</span> </div>

# 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:**

[▶ Advanced Options](#)

**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

# 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](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](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](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](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](mailto:emile.aben@ripe.net)

@meileaben



Not a typo!

# For The Lab



- You need a RIPE NCC Access account:
  - [access.ripe.net](https://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