



RIPE NCC

RIPE NETWORK COORDINATION CENTRE

Using RIPE Atlas

HOW-TO GUIDE

Webinar

February 2025

RIPE NCC Learning & Development



**This session is
being recorded**

Take the poll!

How do you use **RIPE Atlas**?



1 min.





Agenda

RIPE Atlas: A measurement tool

Getting started

Viewing measurements in RIPE Atlas

Demo: View a measurement

Creating measurements in RIPE Atlas

Demo: Create a measurement

The REST API

Using the CLI tool

Advanced data access and analysis

RIPE Atlas use cases



RIPE Atlas

An Internet Measurement Tool

An Introduction

- RIPE Atlas is a **global active measurements platform**
- **Goal:** Measure the performance, connectivity, and stability of the Internet
- Probes (our vantage points) are hosted by **volunteers**
- Data **publicly available**
- **Users:** Network operators, researchers, etc.
- **Applications:** Route monitoring, DNS performance analysis, Latency mapping, Outage detection, Peering analysis, IPv6 deployment monitoring, DDoS attack analysis and more!



Probes and Anchors

- **Hardware probes:** Small, USB-powered devices connected to routers
- **Software probes:** Can be installed on VMs, containers, or routers
- **Probe functionality:** Conduct measurements, relay data to the RIPE NCC
- **Security:** Probes don't access local network traffic and can't measure local network devices (e.g. RFC1918)



RIPE Atlas probe V5

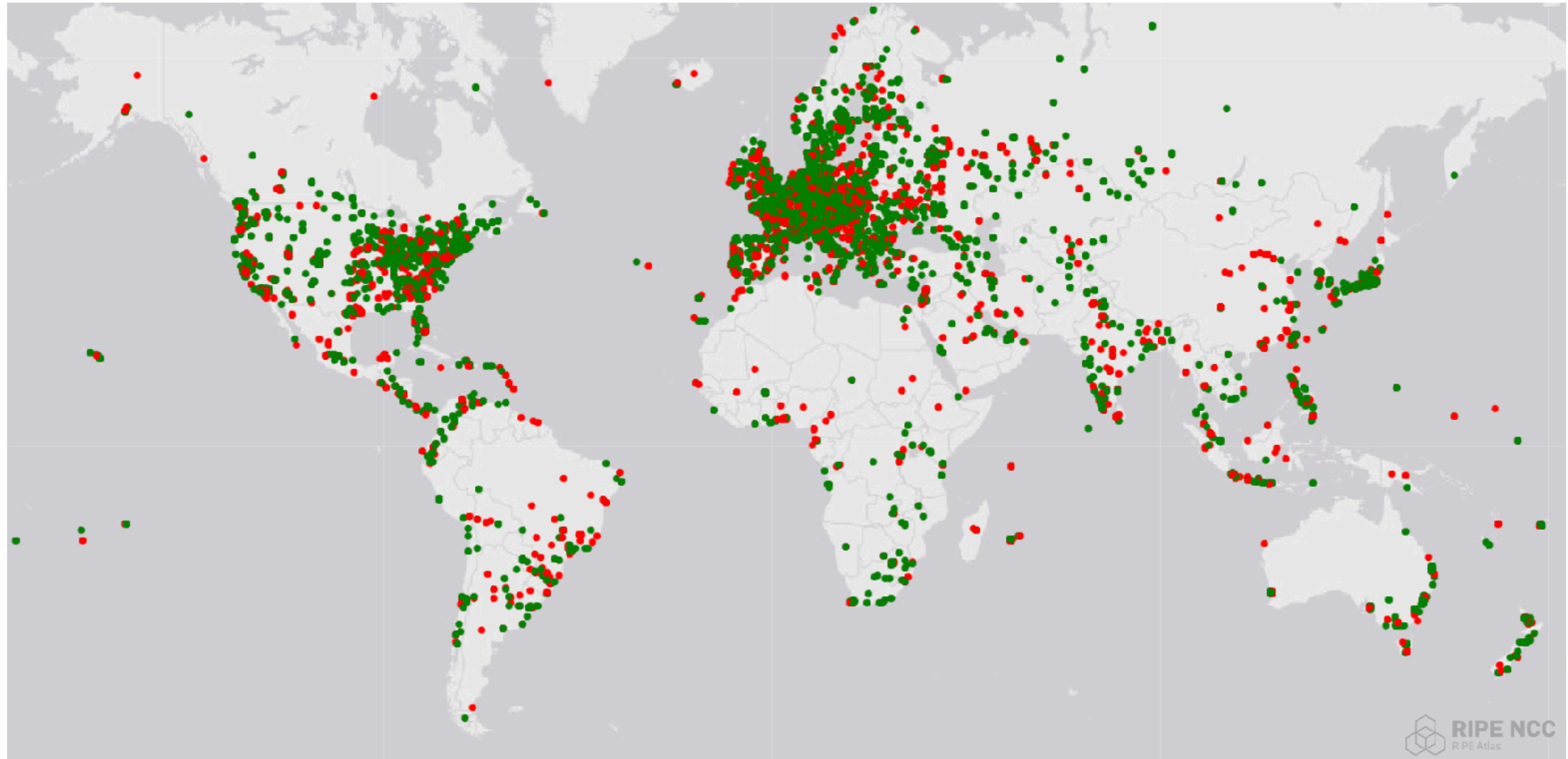


RIPE Atlas anchor V3

RIPE Atlas Concept



RIPE Atlas Coverage

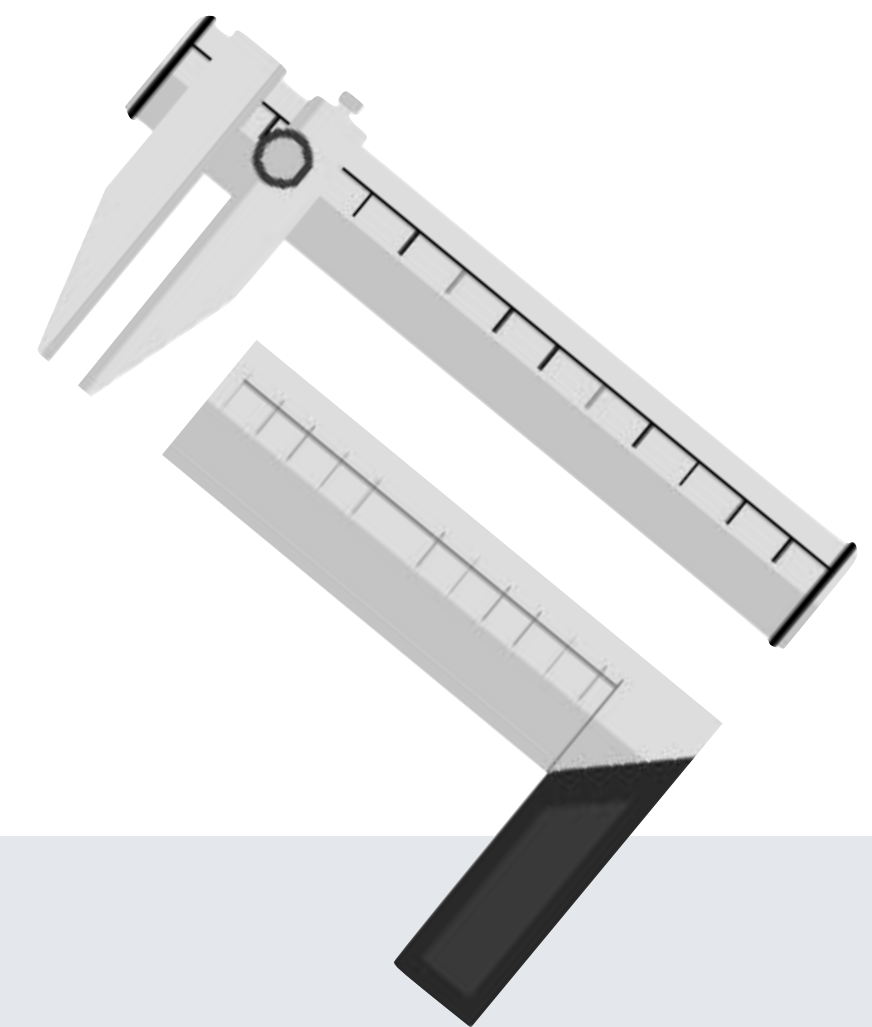


<https://atlas.ripe.net/coverage/>



Measurements

- **RIPE Atlas** performs **built-in** and **user-defined** measurements
- **Built-in measurements:** ping, traceroute, DNS, SSL/TLS, HTTP
- **User-defined measurements:** Six types available (ping, traceroute, DNS, SSL/TLS, NTP, HTTP*)
- **Targets:** Root DNS servers, RIPE Atlas anchors, user-defined targets



<https://atlas.ripe.net/docs/built-in-measurements/>

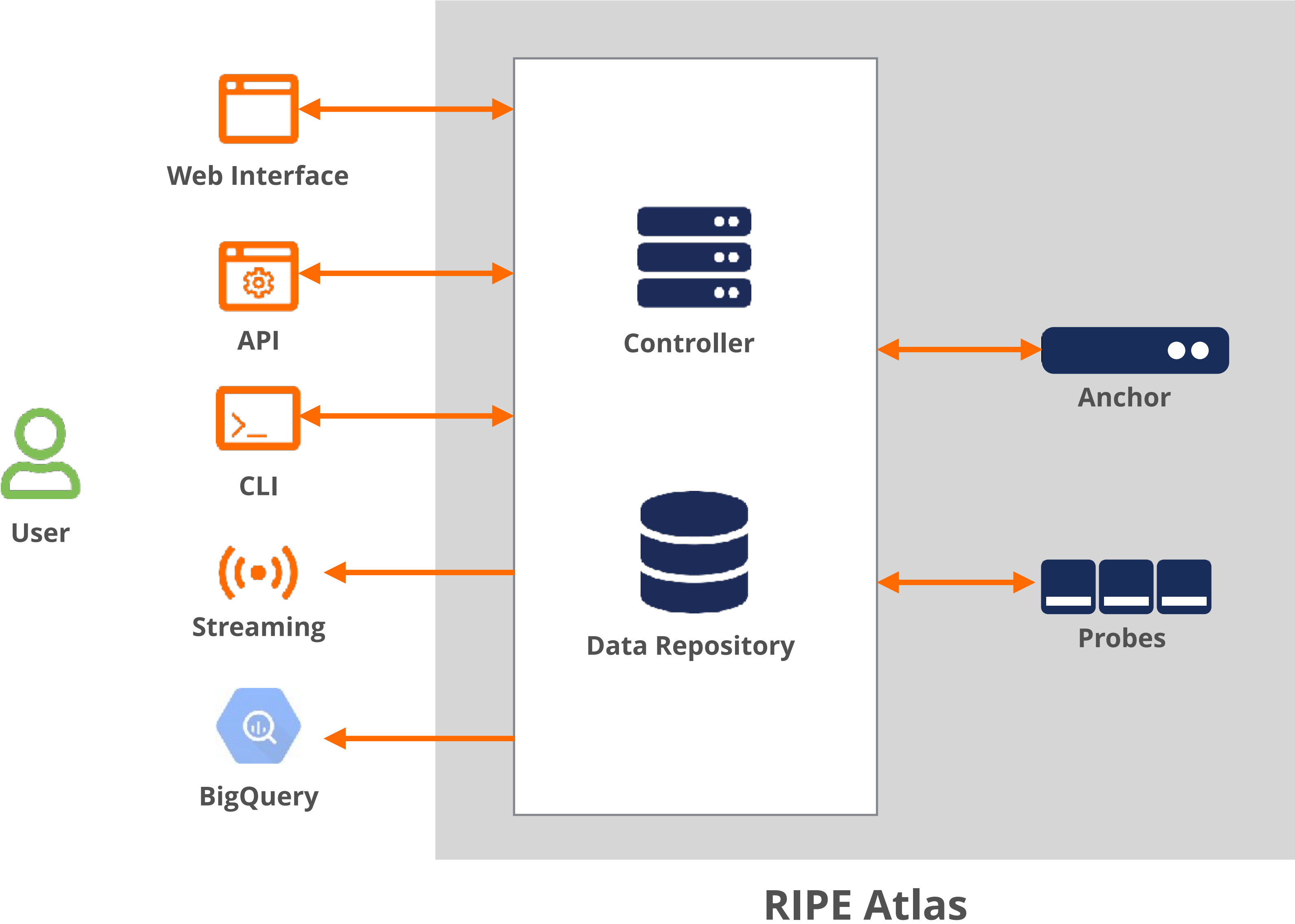


Credits System

- **Purpose of credits:** Ensure fairness and prevent system overload
- **Credit costs:** For different measurement types (e.g., ping = 10 credits, traceroute = 20)
- **Credit limits:** Spending limit and max number of measurements
- **Ways to earn credits:**
 - Hosting a RIPE Atlas probe
 - Being a RIPE Atlas sponsor
 - Being a RIPE NCC member
 - Through credit transfer



RIPE Atlas Interfaces





Questions





Getting Started

Getting Started with RIPE Atlas



Create Access account

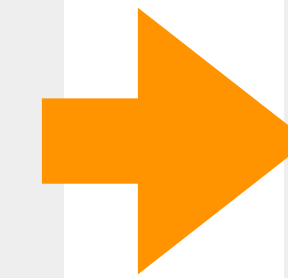
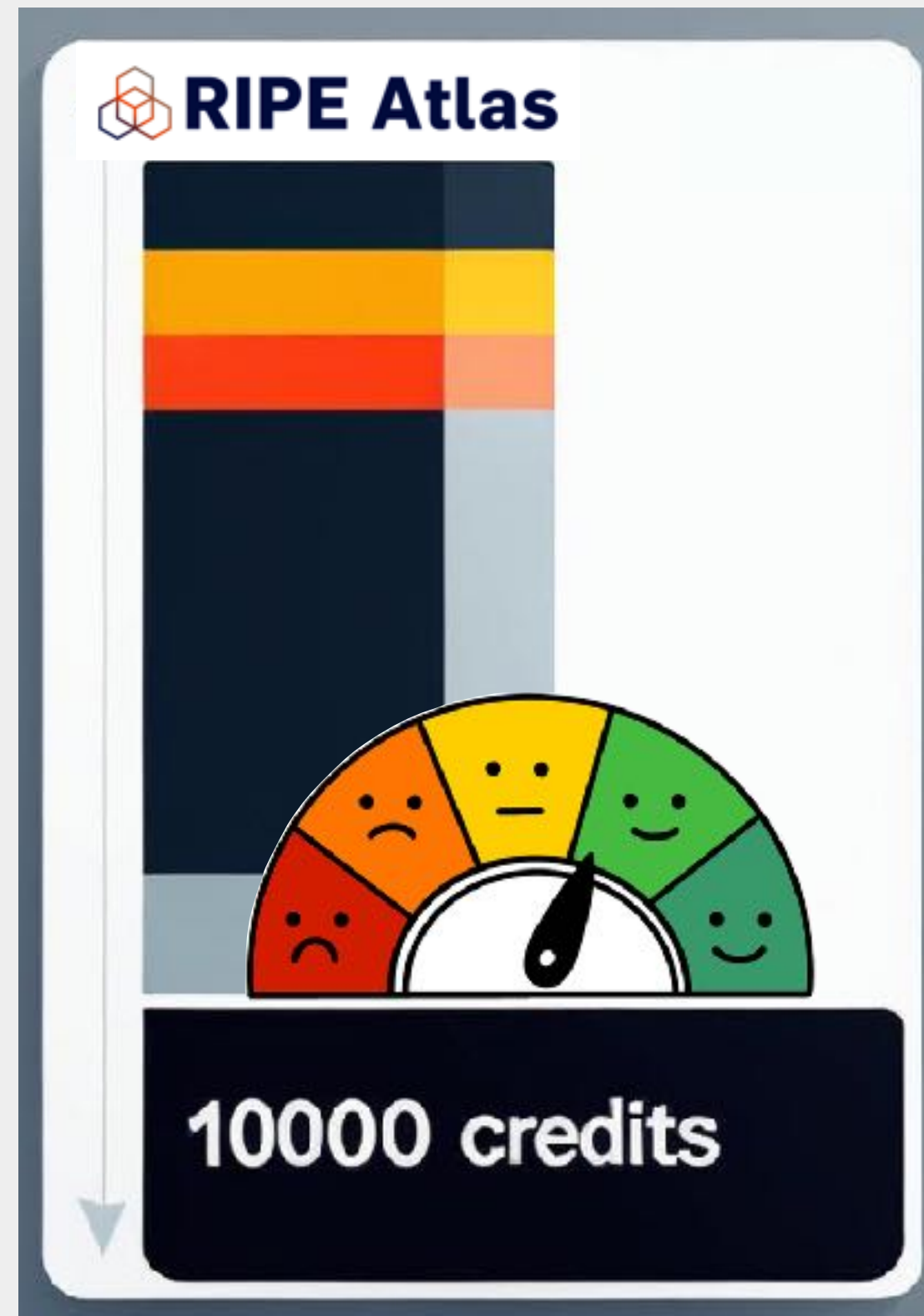
 **RIPE NCC Access**



<https://access.ripe.net>



Get enough credits



Use RIPE Atlas



RIPE Atlas Web UI - Not Logged In



RIPE Atlas

?

→

Navigation

Documentation

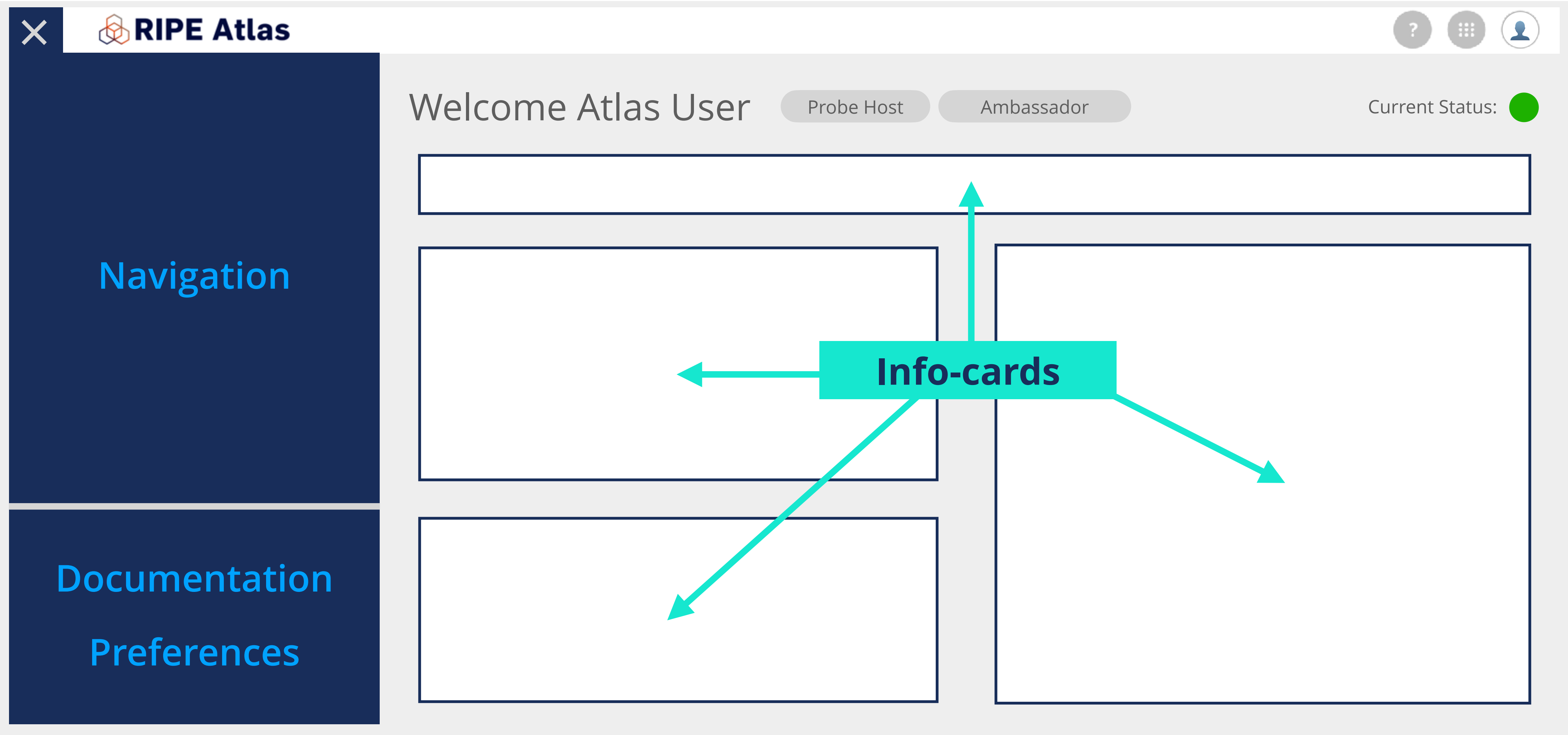
Preferences

Hello!

Please [log in](#) to see your personalised dashboard.

Dashboard

RIPE Atlas Web UI - Logged In





Viewing Measurements

In RIPE Atlas

Measurements Page



PUBLIC

MINE

Search Measurements

AllBuilt-InAnchoring

ID	Type All ▾	IPv4/v6 All ▾	Target	Description	Probes	Interval All ▾	Time (UTC)
#####	Which type	Protocol	IP or hostname	Some text to make it unique	###	one-off or ms	▶When it started
<u>978321</u>	ping	6	www.ripe.net	Ping test to RIPE web server	75	one-off	▶2023-07-01 10:05
<u>978321</u>	trace	4	203.0.113.0	Some host with reachability issues	250	900	▶2023-02-18 12:30

Measurement Overview



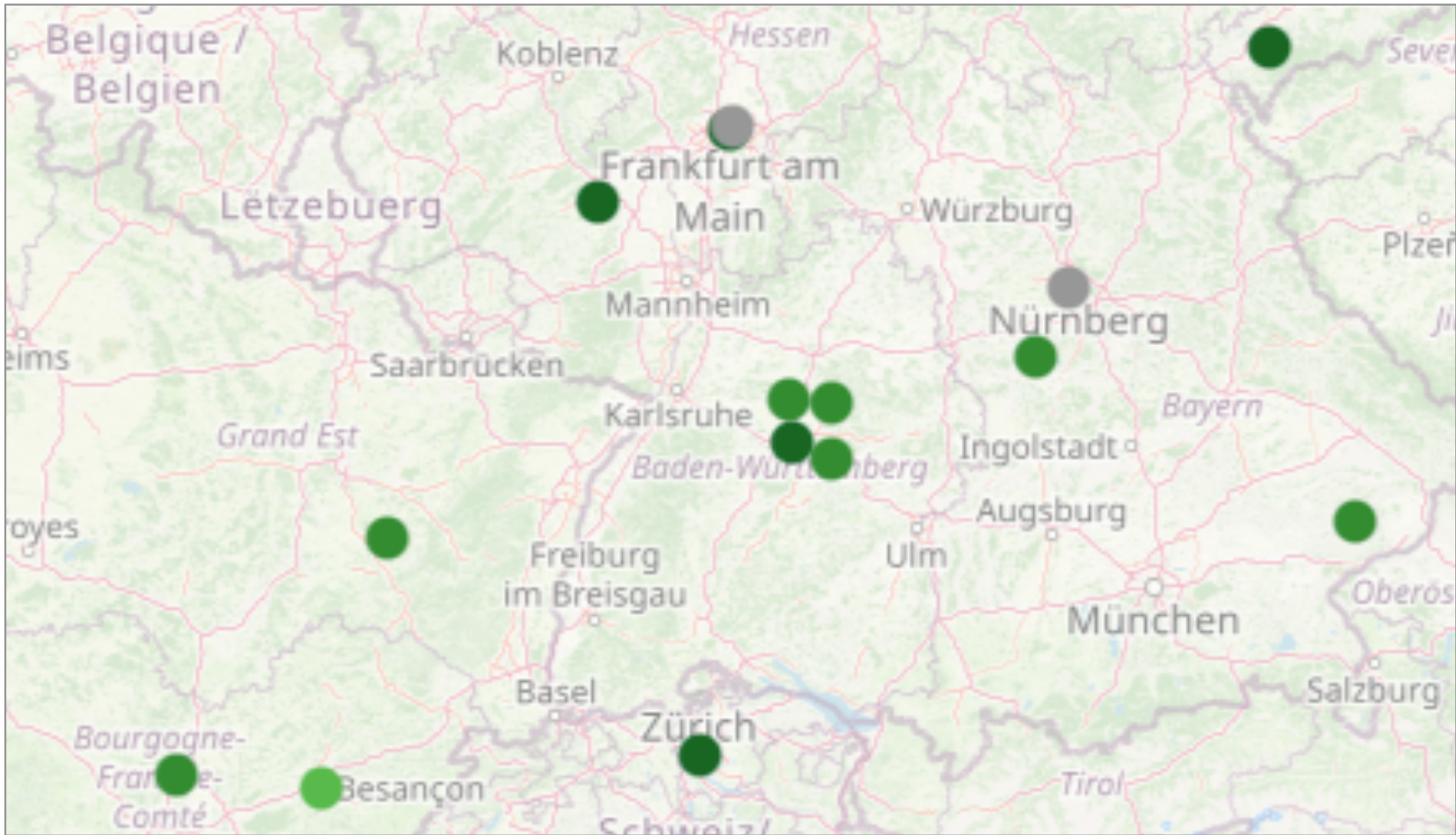
Measurement #####

Description of the measurement

OVERVIEW

RESULTS

DETAILS



Result summary (latest, as of 2024-05-22 11:50 UTC):

43 probes reached their target.



7 probes did not.

Min RTT: 0.666

Mean RTT: 9.167

Measurement Results



OVERVIEW			RESULTS		DETAILS
<div><div></div>Search Results</div>					<div>DOWNLOAD RESULTS</div>
Probe	ASN	Country All ▾	Time (UTC)	Min RTT	Packet Loss
<u>#####</u>	<u>#####</u>	Where probe is located	When probe did it	RTT in milliseconds	Percent of packets lost
<u>6025</u>	<u>8839</u>		2024-05-28 09:42:13	13.309 ms	0.00%
<u>6352</u>	<u>13041</u>		2024-05-28 09:42:13	39.749 ms	0.00%

Measurement Details



OVERVIEW		RESULTS	DETAILS
OVERVIEW		SETTINGS	STATUS & TIMING
OWNERSHIP	COSTS	PROBES	

Measurement Management



OVERVIEWRESULTSDETAILSMANAGE

STOP MEASUREMENT

REMOVE PROBES

ADD PROBES

Participation Requests

ID	Created	Action	Type	Value
CHANGES TO THE PROBES				



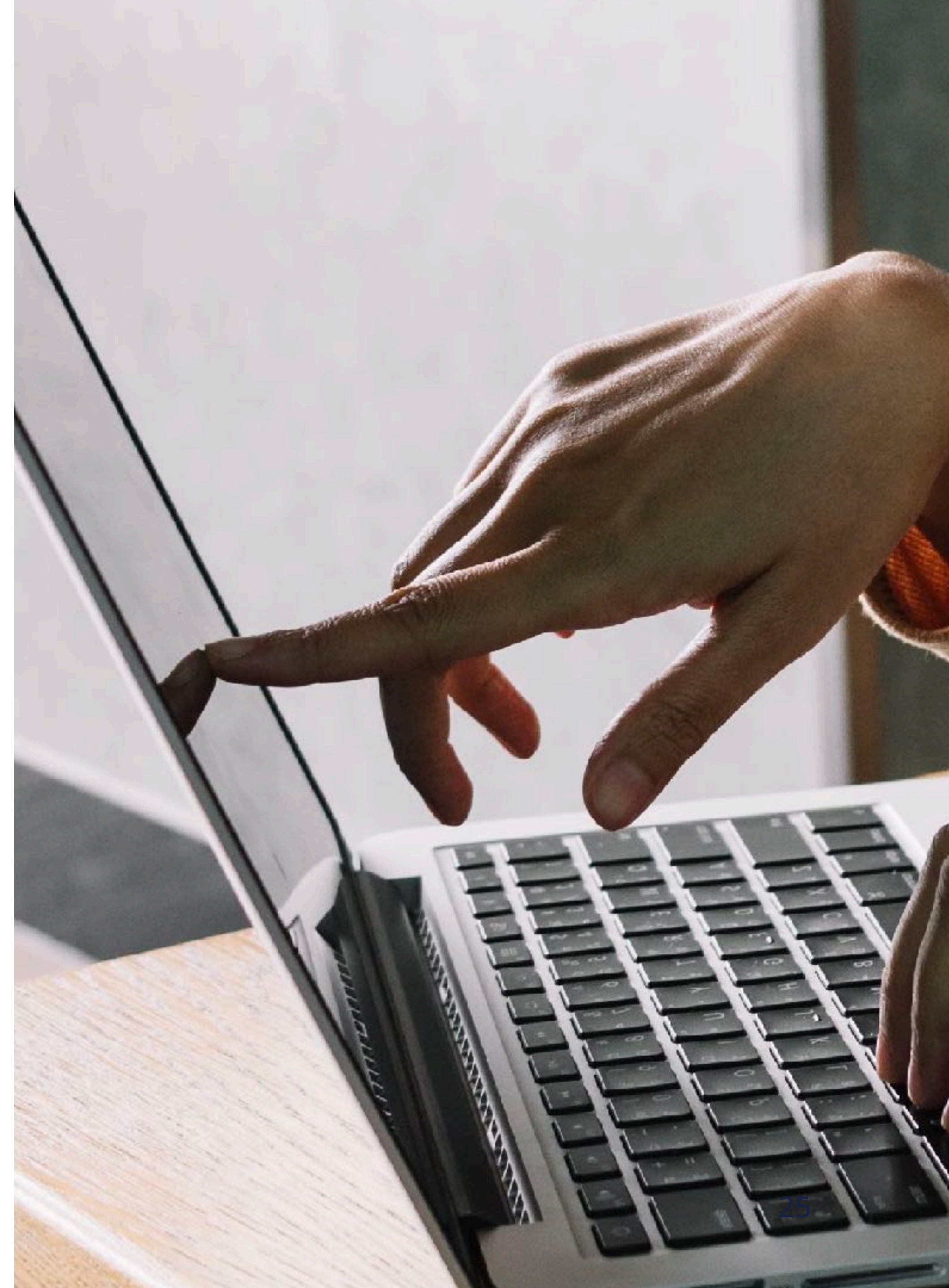
Viewing Measurements

Demo

Demo time!

Let's look at a measurement...

We will look at the results of
measurement **64393469**





Questions





Creating Measurements

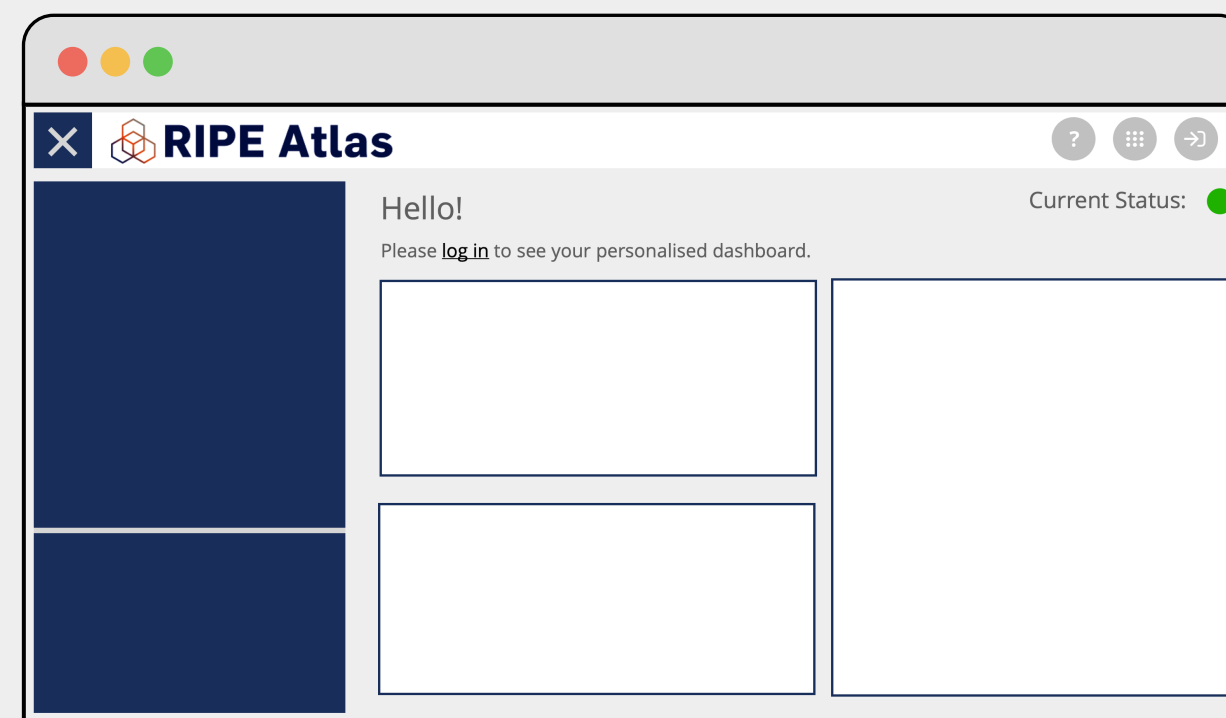
In RIPE Atlas



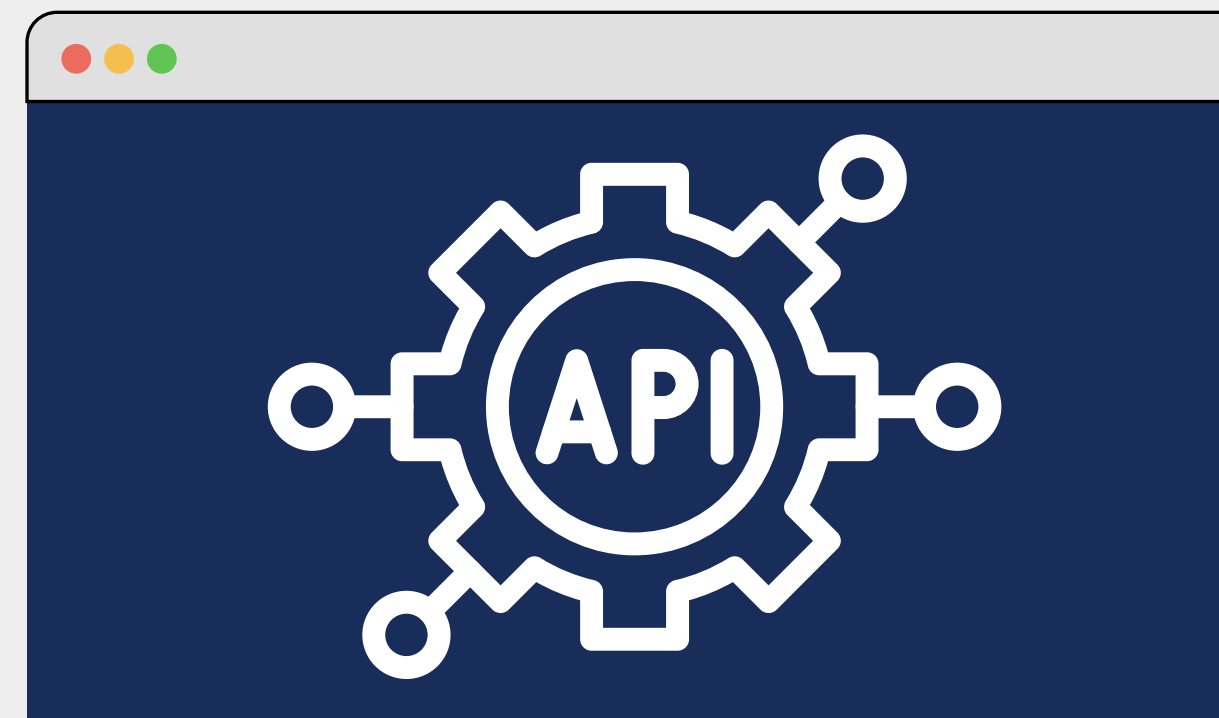
Scheduling Measurements

- Three main ways to **create measurements**

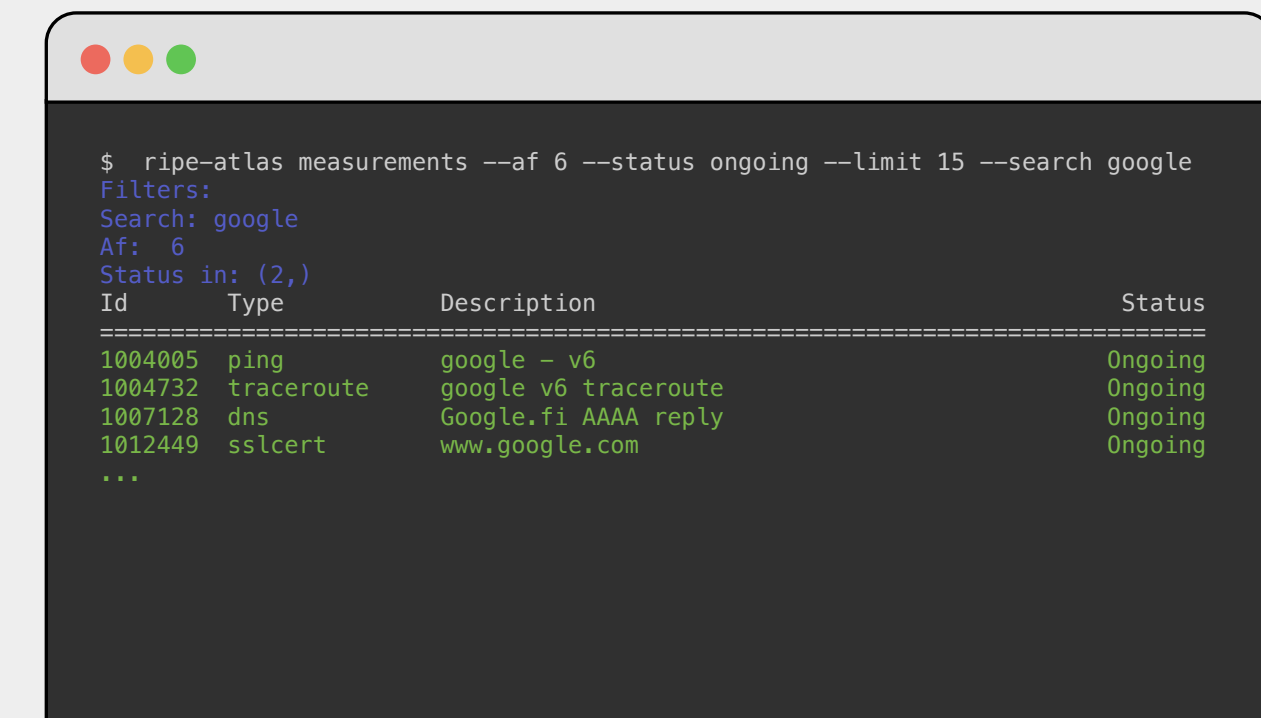
Web Interface (GUI)



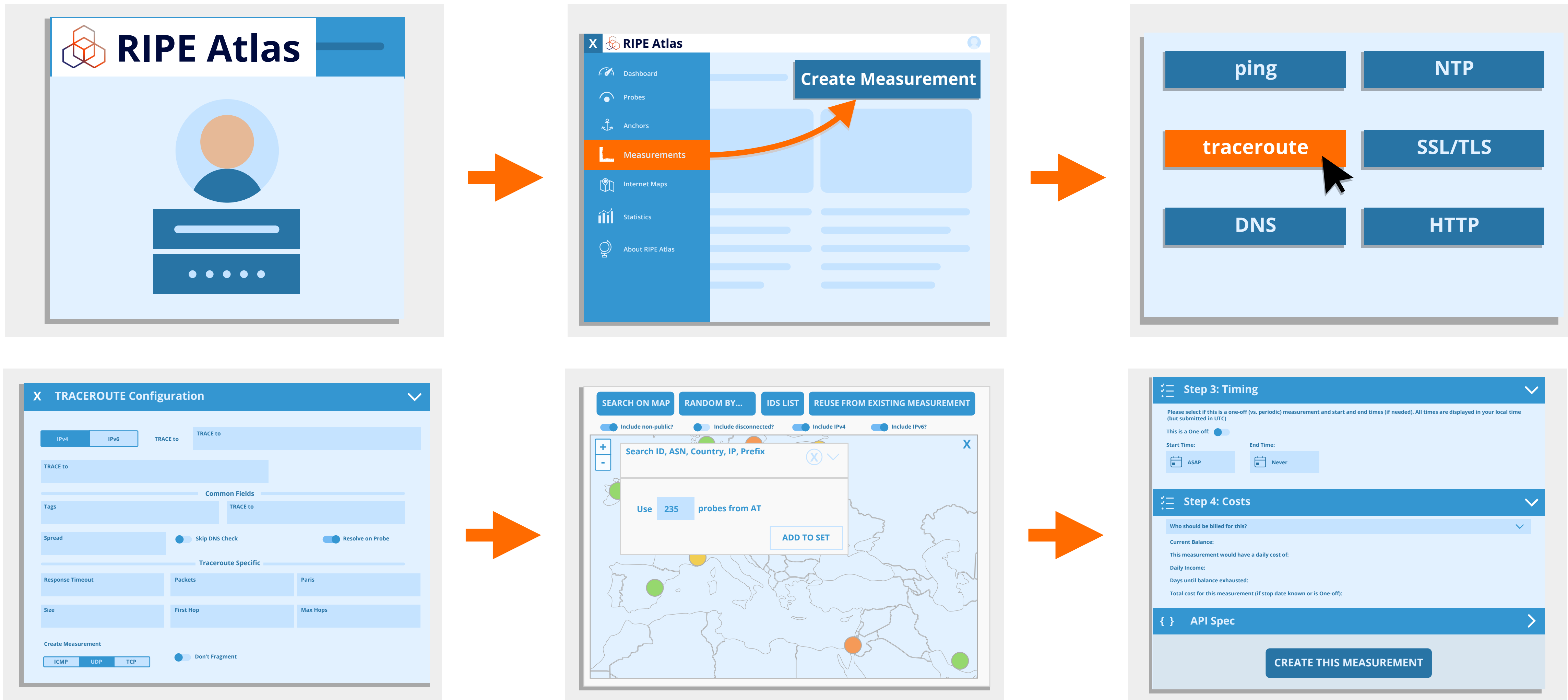
Application Programming Interface (API)



Command-line Interface (CLI)



Using the Web Interface (GUI)



Take the poll!

Which method do you **primarily** use
for creating/scheduling RIPE Atlas
measurements?



1 min.





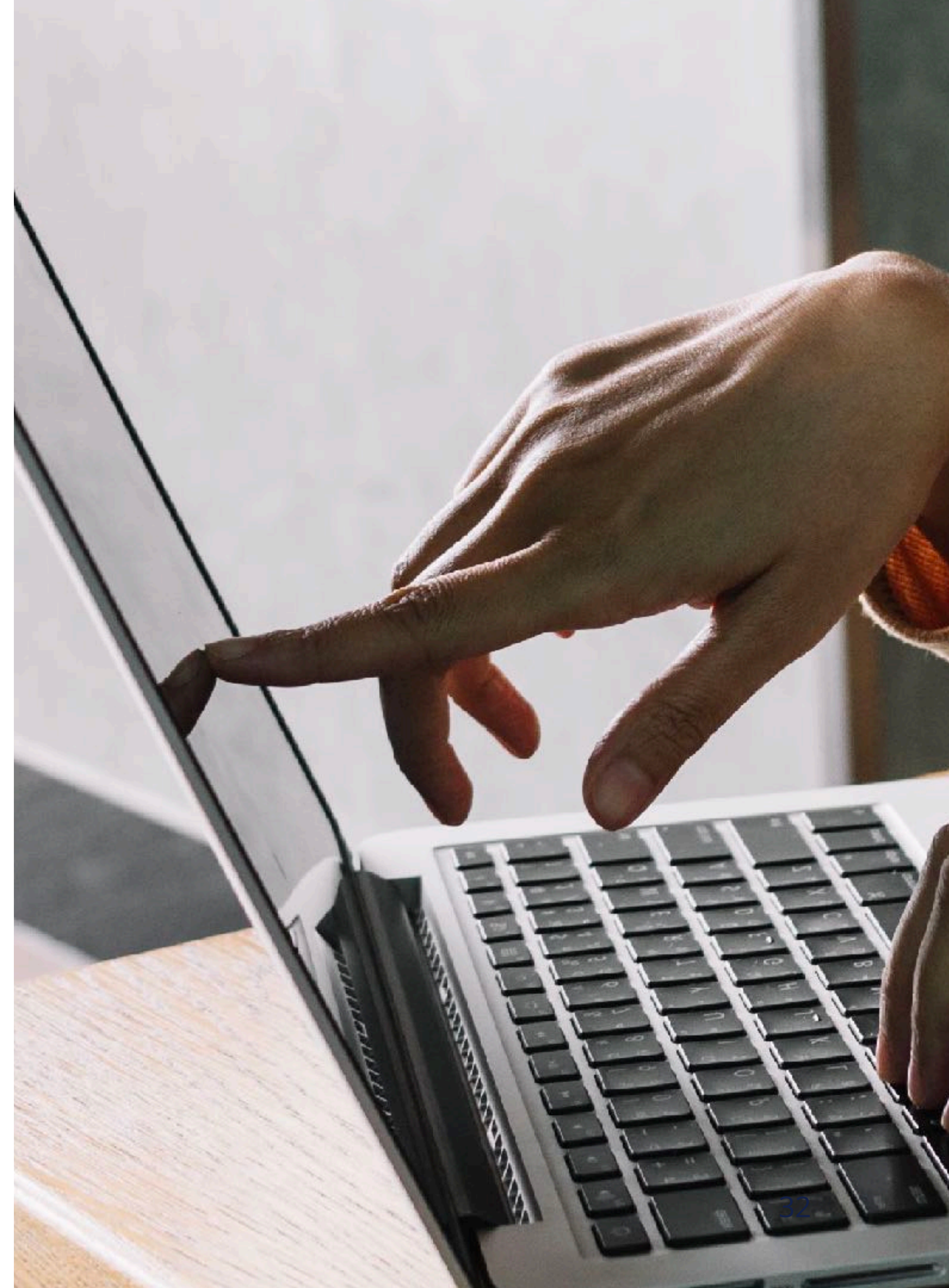
Creating a Measurement

Demo

Demo time!

Let's create a measurement for this scenario:

- How is the server performing where **www.ripe.net** is hosted?
- How reachable is it from **ten** major networks in Europe?
- How is the connectivity from these networks over a period of **24 hours**?





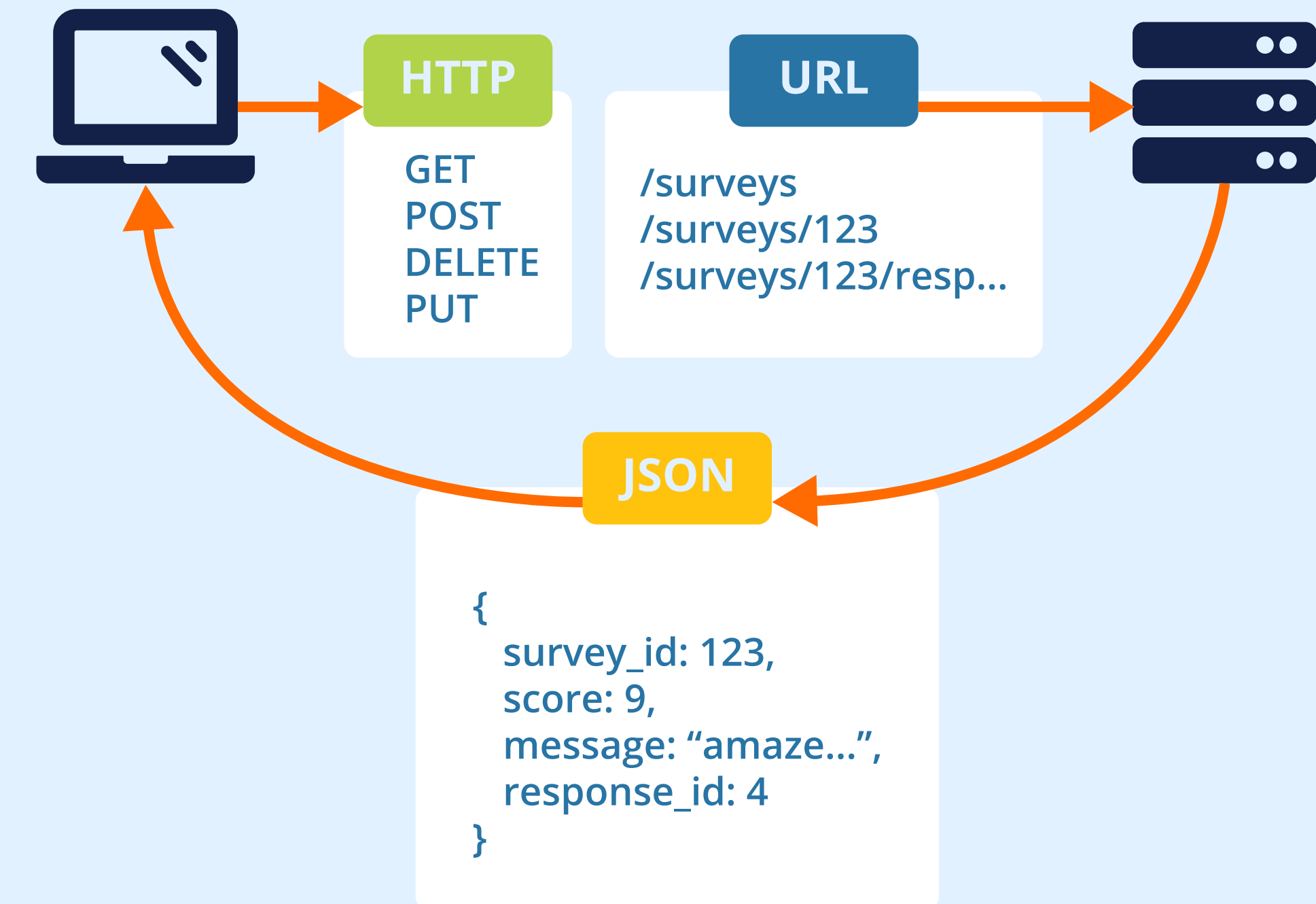
The REST API

For Automation

The RIPE Atlas API

- Powerful tool for programmatic access to RIPE Atlas
- Key benefits:
 - Automate measurement creation and analysis
 - Integrate with your existing systems
 - Perform bulk operations efficiently


What is a REST API?



<https://atlas.ripe.net/docs/apis/rest-api-manual/>

Creating API Keys

- **API keys:** Your secure access to RIPE Atlas
- Creating an API key:
 - Log in to RIPE Atlas
 - Go to the API Keys section: <https://atlas.ripe.net/keys/>
 - Generate a new key
 - Set key permissions
i.e. *"Schedule a new measurement"*

 Create an API Key X

Label

Created

YYYY-MM-DD

UUID

XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXX

Copy UUID


This is the only time this key will be shown. please copy it and keep it somewhere safe

Enabled


ON

☒

Valid From



Valid To



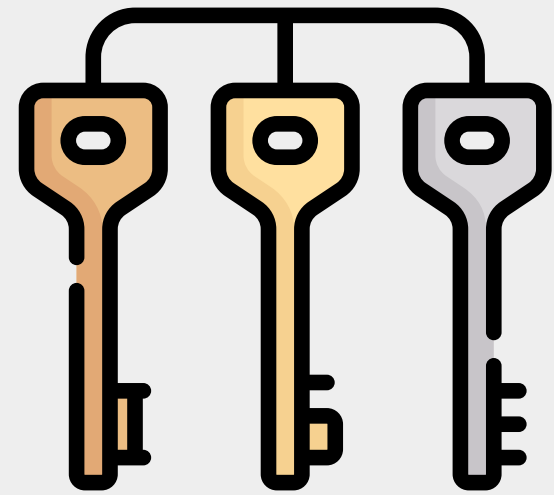
Permissions

+

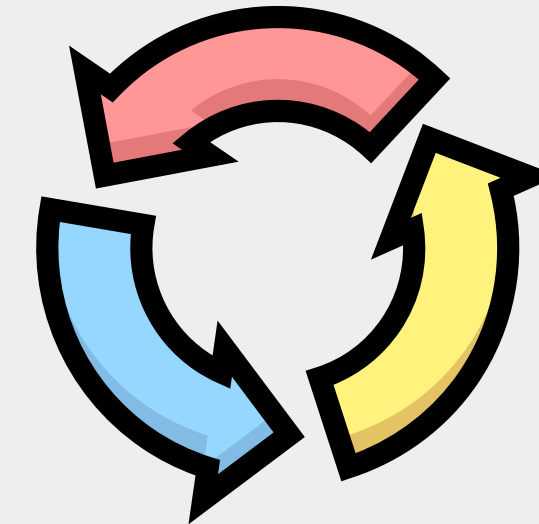
DELETE

SAVE

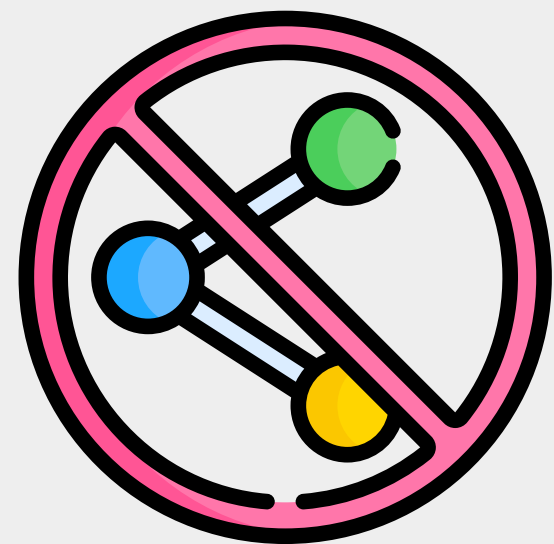
Best Practices for Managing API Keys



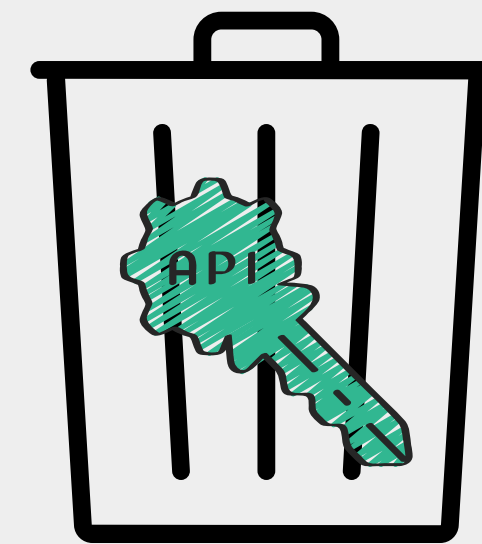
Use separate keys for different applications or projects



Regularly rotate keys for added security



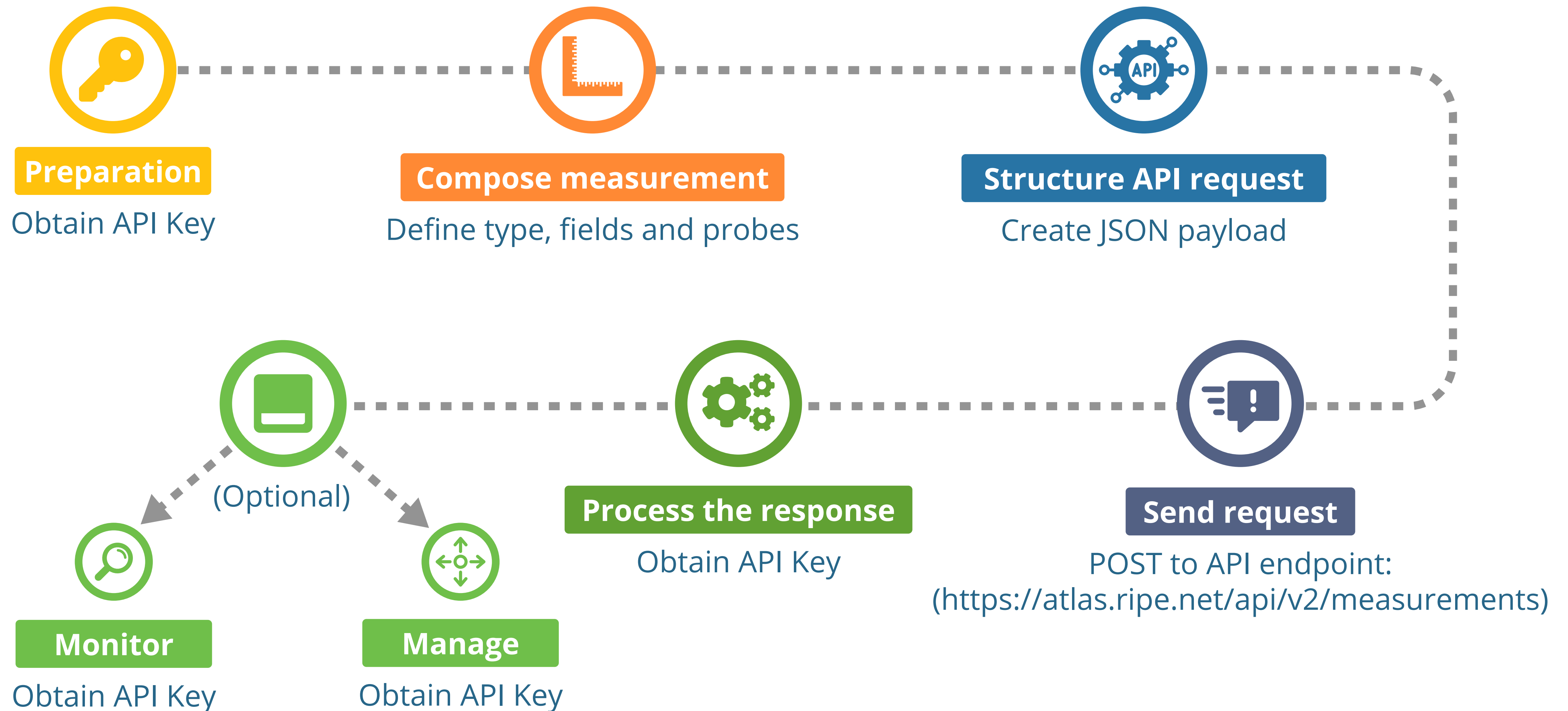
Never share your API keys publicly



Revoke keys that are compromised or no longer used



Using the RIPE Atlas API





A Simple Example

```
curl --location 'https://atlas.ripe.net/api/v2/measurements/' \
  --header 'Authorization: Key ----' \
  --data @filename_of_JSON_payload
```



```
{
  "definitions": [
    {
      "target": "ripe.net",
      "description": "My First Measurement",
      "type": "ping",
      "af": 4
    }
  ],
  "probes": [
    {
      "requested": 50,
      "type": "area",
      "value": "WW"
    }
  ]
}
```

JSON Payload with measurement definition



Using the CLI Tool

For Power Users



Command-Line Interface (CLI)

- Command-line tool for interacting with RIPE Atlas
- Powerful alternative to the web interface

- **Key Benefits:**

- Automate measurement tasks
- Create and run scripts
- Efficient for advanced users

- **Ideal for:**

- Bulk operations
- Integration with other tools
- Customised workflows

```
$ ripe-atlas measurements --af 6 --status ongoing --limit 15 --search google
Filters:
Search: google
Af: 6
Status in: (2,)
Id      Type      Description      Status
=====
1004005 ping      google - v6      Ongoing
1004732 traceroute google v6 traceroute Ongoing
1007128 dns      Google.fi AAAA reply Ongoing
1012449 sslcert  www.google.com   Ongoing
1024911 ping      IPv6 Google DNS  Ongoing
1404300 ping      IPv6 Ping to Google Ongoing
1665737 ping      google.com - 2404:6800:4003:c00::7 Ongoing
1796260 ping      Ping measurement to www.google.com Ongoing
1889086 traceroute Traceroute measurement to ipv6.google.com Ongoing
2062542 traceroute Traceroute measurement to ipv6.google.com Ongoing
2062543 ping      Ping measurement to ipv6.google.com Ongoing
2143865 ping      Ping measurement to ipv6.google.com Ongoing
2486602 traceroute IPv6 Traceroute measurement to snapchat.com Ongoing
2486820 ping      Google IPv6      Ongoing
=====
Showing 14 of 14 total measurements
```



Installation and Configuration

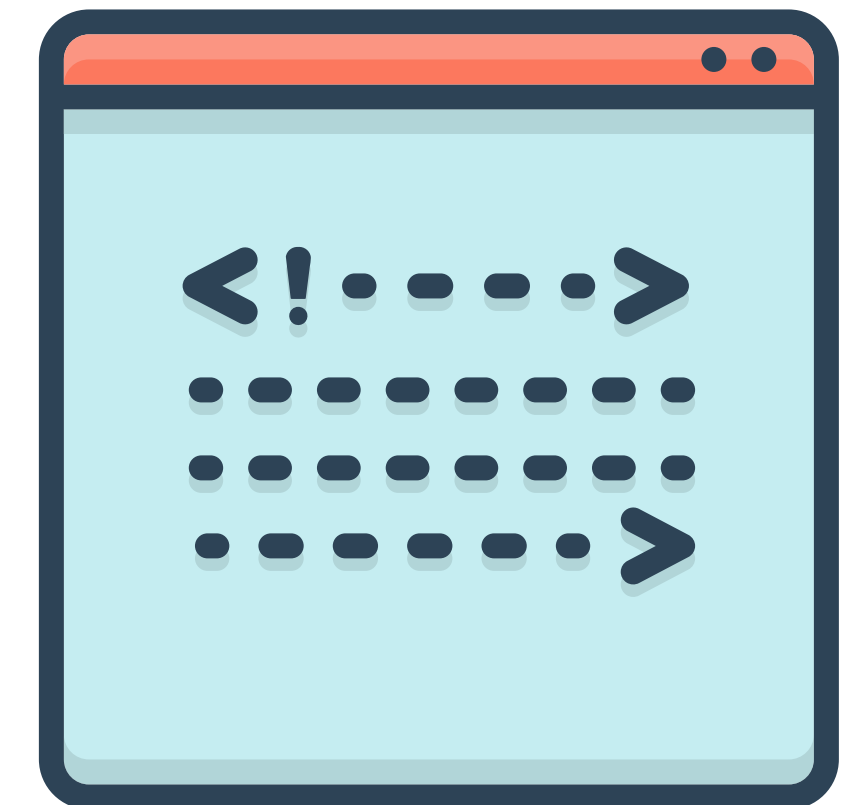
- **Install and configure virtualenv**
 - virtualenv is a tool for creating isolated virtual Python environments
 - <https://virtualenv.pypa.io/en/latest/installation.html>
- **Install RIPE Atlas Tools from within virtualenv**
 - `pip install ripe.atlas.tools`
 - Alternative methods are available
 - <https://ripe-atlas-tools.readthedocs.io/en/latest/installation.html>
- **Initial Setup**
 - Configure an API key
 - Set the default options





Using the CLI Tools

- **Basic syntax:** `ripe-atlas <command> [options] <arguments>`
 - **Commands:** measure, probe-search, report, etc.
 - **Options:** modify command behaviour (e.g., `--format`)
 - **Arguments:** specific to each command
- **Common structure:**
 - Specify the action (e.g., create measurement, search probes)
 - Define parameters (e.g., measurement type, target, probes)
 - Set additional options (e.g., output format, filters)
- **Get help:**
 - General help: `ripe-atlas --help`
 - Command-specific help: `ripe-atlas <command> --help`



RIPE Atlas CLI Examples



Reporting and Searching

Report the results of measurement 2340408

```
$ ripe-atlas report 2340408
```

Get a list of ongoing measurements that conform to IPv6

```
$ ripe-atlas measurement-search --status ongoing --af 6
```



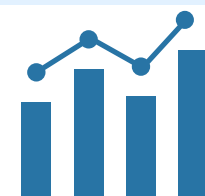
Probe Information

Search all probes in AS3333

```
$ ripe-atlas probe-search --asn 3333
```

Show specific probe fields

```
$ ripe-atlas probe-search --asn 3333 --field an_v6 --field country --field descriptions --field status
```



Creating Measurements

Create a ping measurement using 20 probes that support IPv6

```
$ ripe-atlas measure ping --target example.com --probes 20 --include-tag system-ipv6-works
```

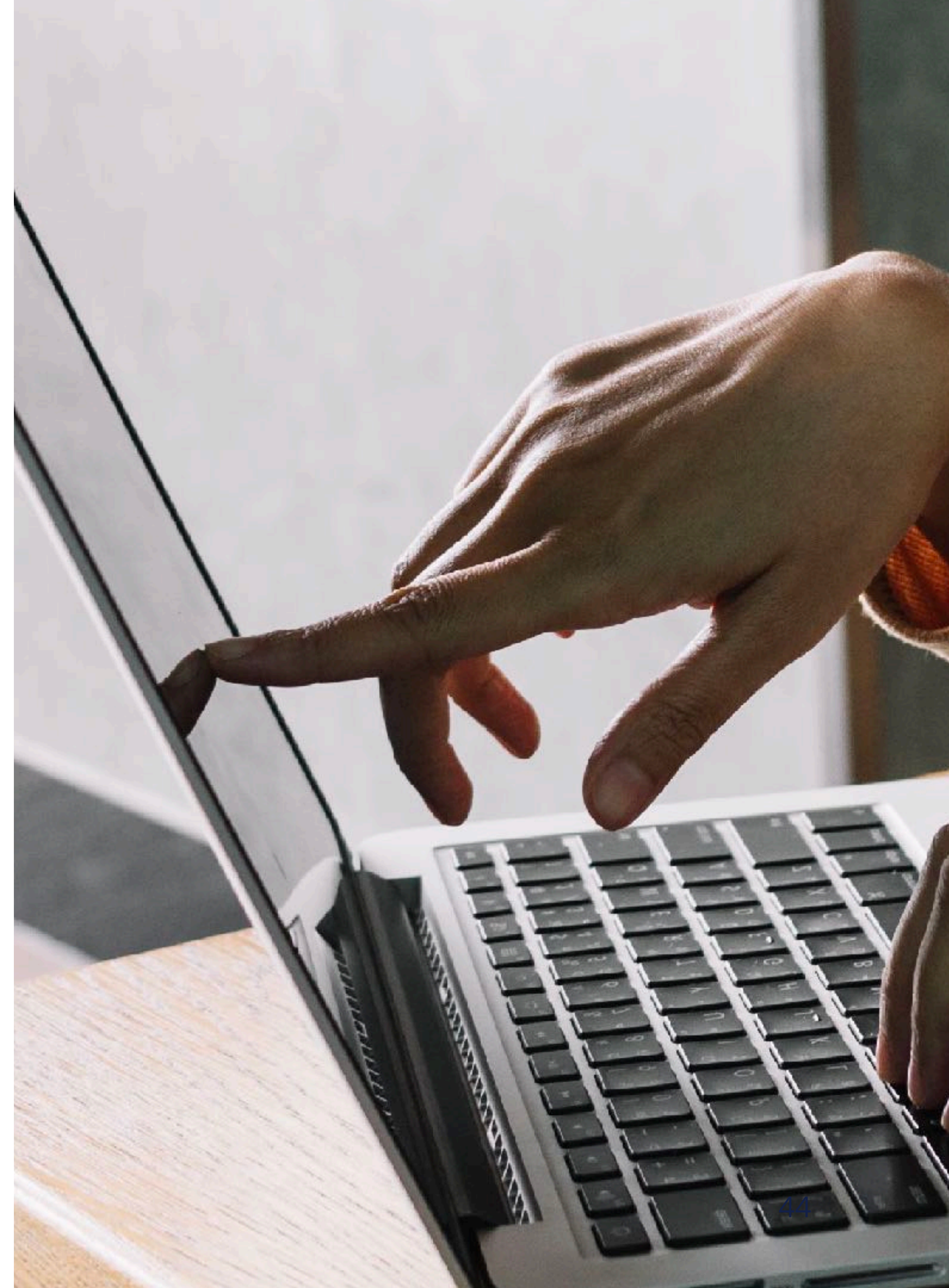
Create a recurring ping measurement

```
$ ripe-atlas measure ping --target example.com --interval 3600
```


Demo time!

We will demo the activity on the screen.

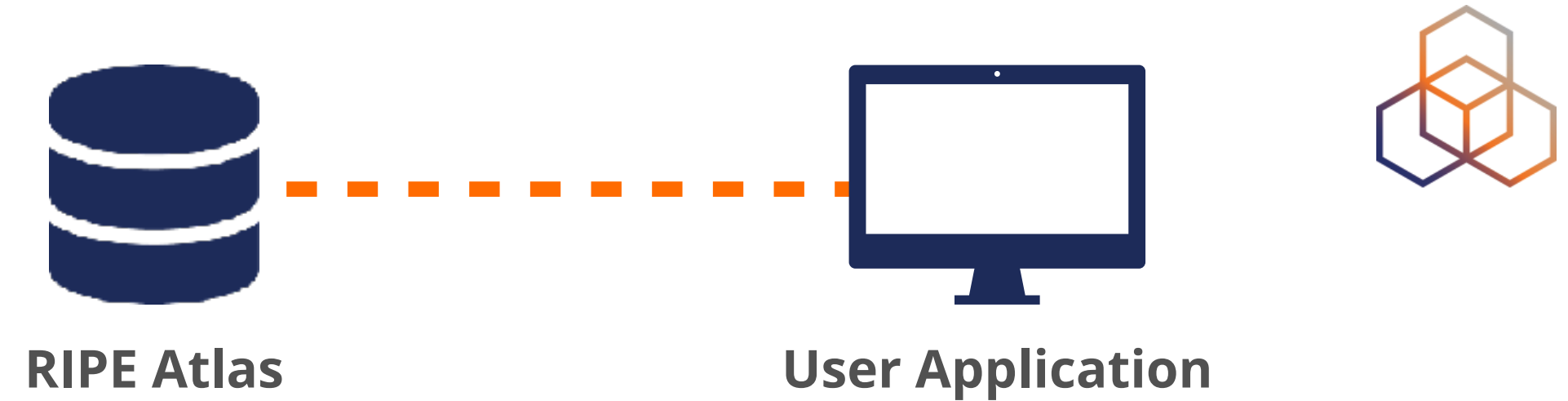
Watch what we do.





Advanced Data Access and Analysis

The Streaming Service



I. Introduction

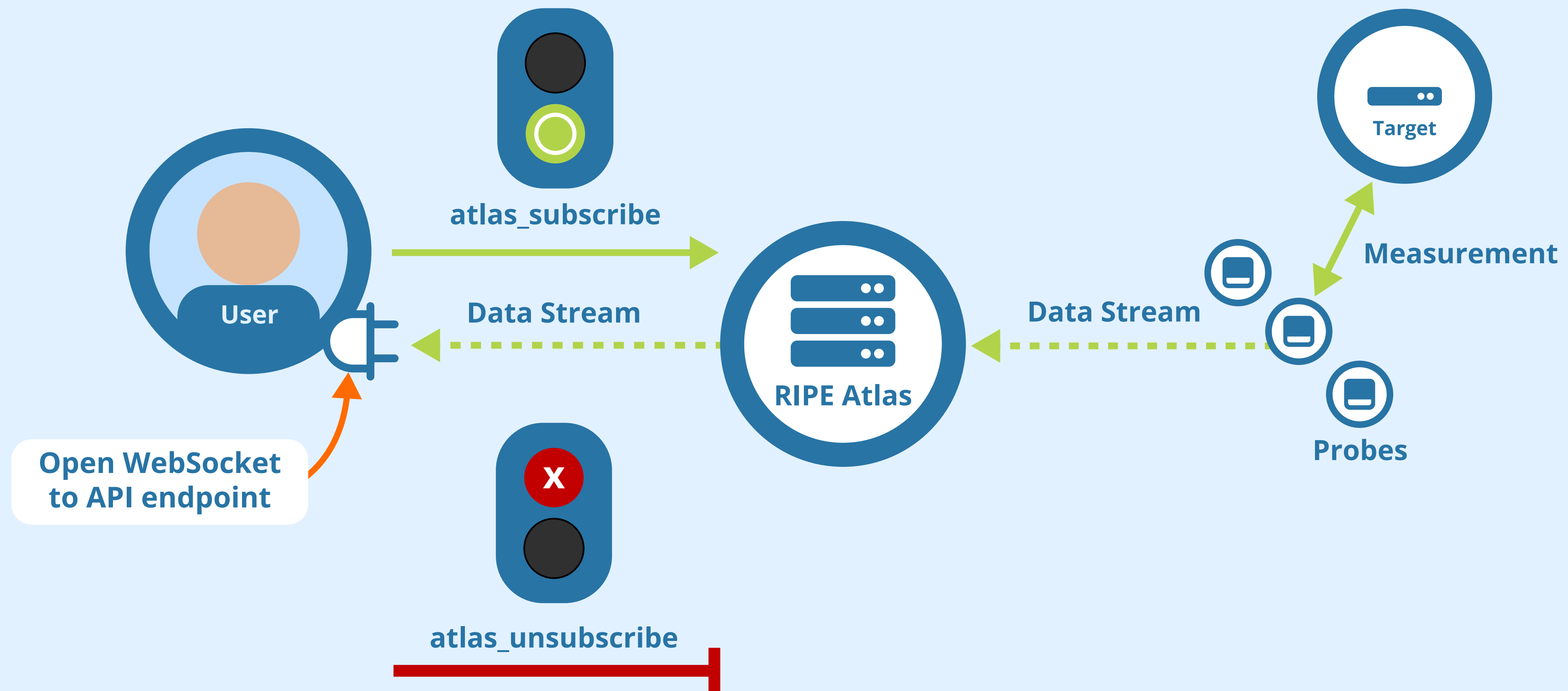
- Real-time access to RIPE Atlas data flow
- Allows tapping into public measurement results, probe status updates, and metadata
- Accessible via WebSocket, HTTP GET, or legacy Socket.IO

II. Types of Data Available

- Measurement results (ping, traceroute, DNS, SSL, HTTP, NTP)
- Probe connection and disconnection events
- Measurement metadata (creation and updates)

<https://atlas.ripe.net/docs/apis/streaming-api/>

How the Streaming Service Works





Quick Example Using Javascript

```
const socket = new WebSocket("wss://atlas-stream.ripe.net/stream/");
```

```
const params = { streamType: "result", msm: 1001 }
```

```
socket.onmessage = function (event) {  
    console.log(event.data);  
};
```

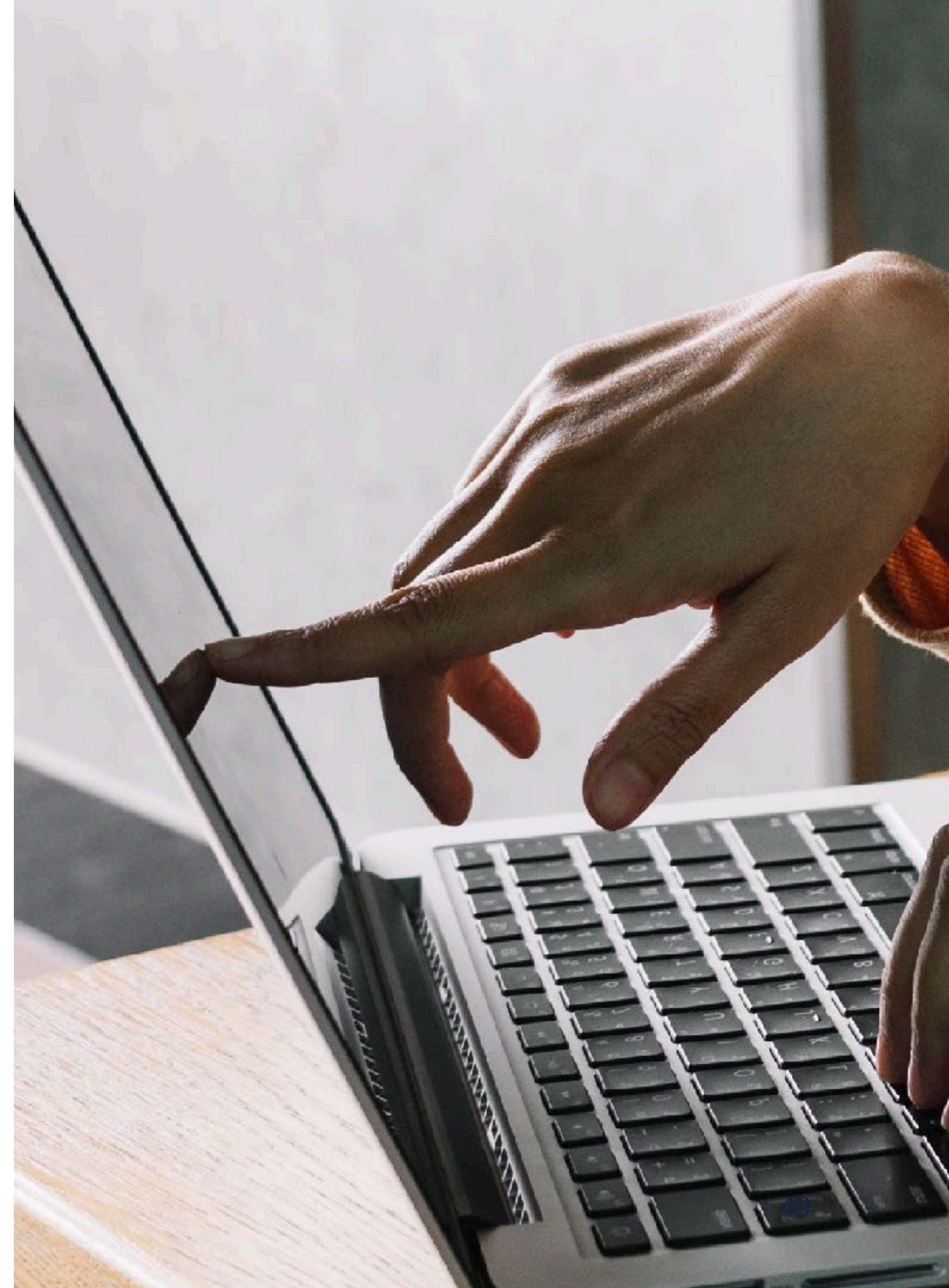
```
socket.onopen = function (event) {  
    this.send(JSON.stringify(["atlas_subscribe", params]));  
};
```


Demo time!

We will demo the activity on the screen.

Watch what we do.

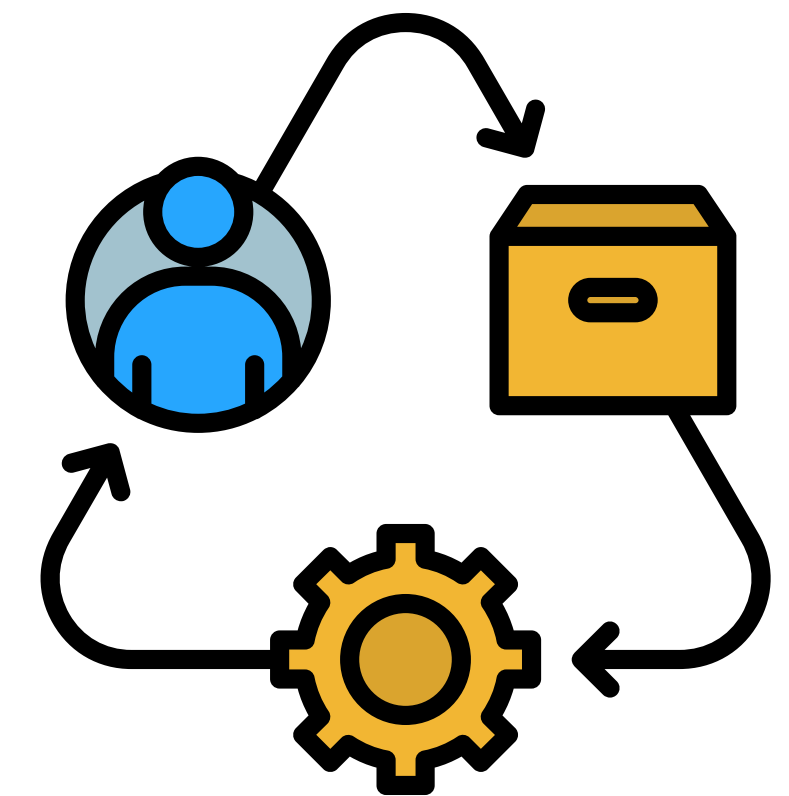
Let's look at a sample page that uses the streaming service to show results in real time...





Use Cases

- Potential use cases for the **RIPE Atlas Streaming API** are:
 - **Real-time network performance monitoring**
Track latency, packet loss, and other metrics across multiple geographical locations instantly
 - **Internet outage detection**
Quickly identify when specific regions or ISPs experience connectivity issues
 - **Network path visualisation**
Create real-time visualisations of network paths between different points on the Internet, helping to identify bottlenecks or changes in routing
 - **DNS infrastructure health monitoring**
Track DNS query responses across multiple root servers and top-level domains to detect issues



The BigQuery Service



- Fast query-based access to RIPE Atlas data
- Enhanced computation and analysis capabilities
- Includes sample and full measurement datasets
- Covers various measurement types (DNS, HTTP, ping, etc.)
- Data available: latest 90 days



<https://github.com/RIPE-NCC/ripe-atlas-bigquery/>



RIPE Atlas Daily Archives

- Aggregates daily RIPE Atlas measurement data for easy retrieval
- **Data Organisation**
 - Bundles all measurements of a particular type into one archive
 - Generates archives per hour for manageable file sizes
- **Data Retention and Usage**
 - Archives hold data for about one month from collection date
 - Usage falls under regular RIPE NCC Terms of Service



<https://data-store.ripe.net/datasets/atlas-daily-dumps>



RIPE Atlas Use Cases

Practical Applications

Take the poll!

How do you **currently** use or **plan** to use RIPE Atlas?



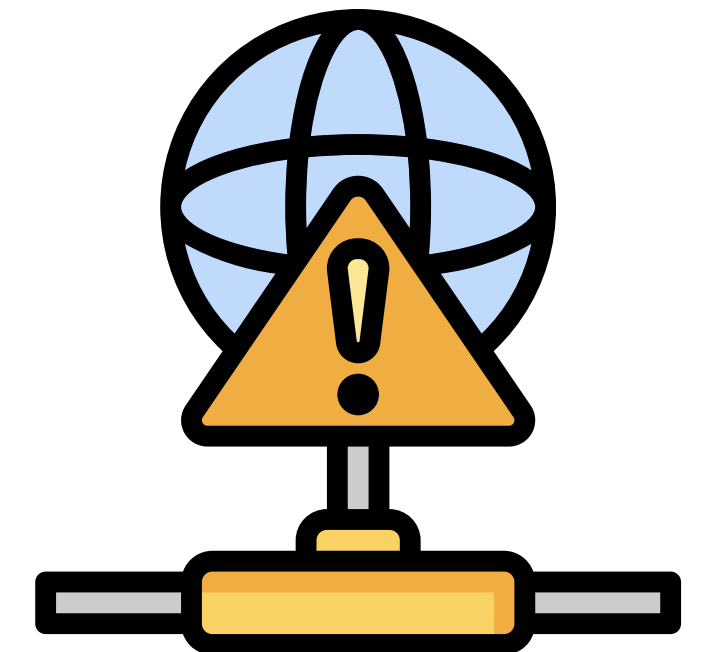
1 min.





Identifying Network Outages

- **Use RIPE Atlas to detect and localise network outages**
 - **Create targeted measurements**
Set up specific tests (e.g., ping, traceroute) to suspected problem areas
 - **Analyse results from multiple probes**
Compare data from various global locations to pinpoint the issue
 - **Correlate data with BGP announcements**
Check if routing changes coincide with observed outages





DNS Resolution Issues

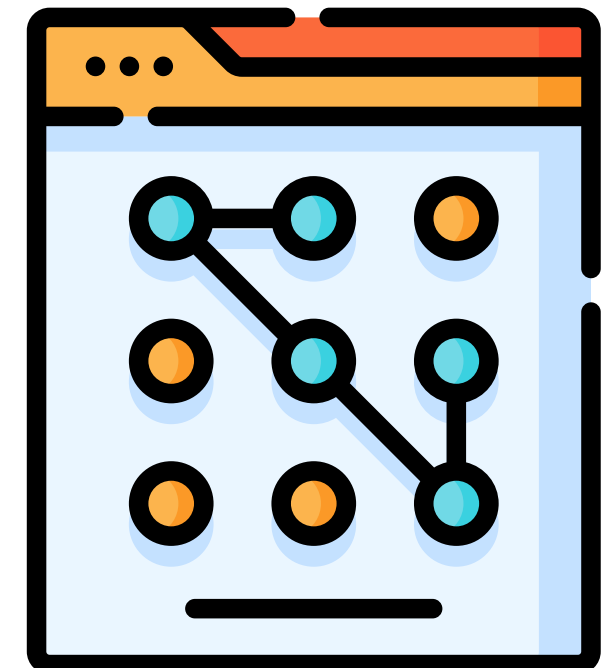
- **Use RIPE Atlas to identify and resolve DNS issues**
 - **Configure DNS measurements**
Set up tests querying multiple DNS servers to identify widespread or localised issues
 - **Analyse performance metrics**
Compare response times and failure rates to detect slow or unreliable DNS resolvers
 - **Detect response inconsistencies**
Look for discrepancies in returned IP addresses or other DNS record data across different resolvers





Routing Anomalies

- **Detect and Analyse Routing Anomalies with RIPE Atlas**
 - **Map network paths**
Use traceroute measurements to identify unexpected path changes
 - **Compare routing perspectives**
Analyse AS paths from different global vantage points
 - **Integrate BGP data**
Correlate traceroute results with BGP announcements for comprehensive analysis
 - **Apply to real-world incidents**
Use these techniques to investigate potential route hijacking scenarios





Latency Tracking

- **Implement Latency Monitoring with RIPE Atlas**
 - **Configure regular measurements**
Set up recurring ping tests to key network destinations
 - **Visualise latency data**
Create custom dashboards to display and analyse latency trends
 - **Implement proactive alerts**
Establish thresholds for automated notifications on latency spikes
 - **Optimise long-term tracking**
Apply best practices for sustained performance monitoring





IPv6 Deployment Monitoring

- **Monitor IPv6 Deployment with RIPE Atlas**
 - **Assess IPv6 reachability**
Set up measurements to test connectivity to key services over IPv6
 - **Conduct performance comparison**
Analyse and compare latency and packet loss between IPv4 and IPv6
 - **Evaluate transition mechanisms**
Identify and troubleshoot issues with IPv6 transition technologies like tunnels and translations





Questions



We want your feedback!



What did you think about this session? Take our survey at:

<https://www.ripe.net/training/feedback/mat2/>





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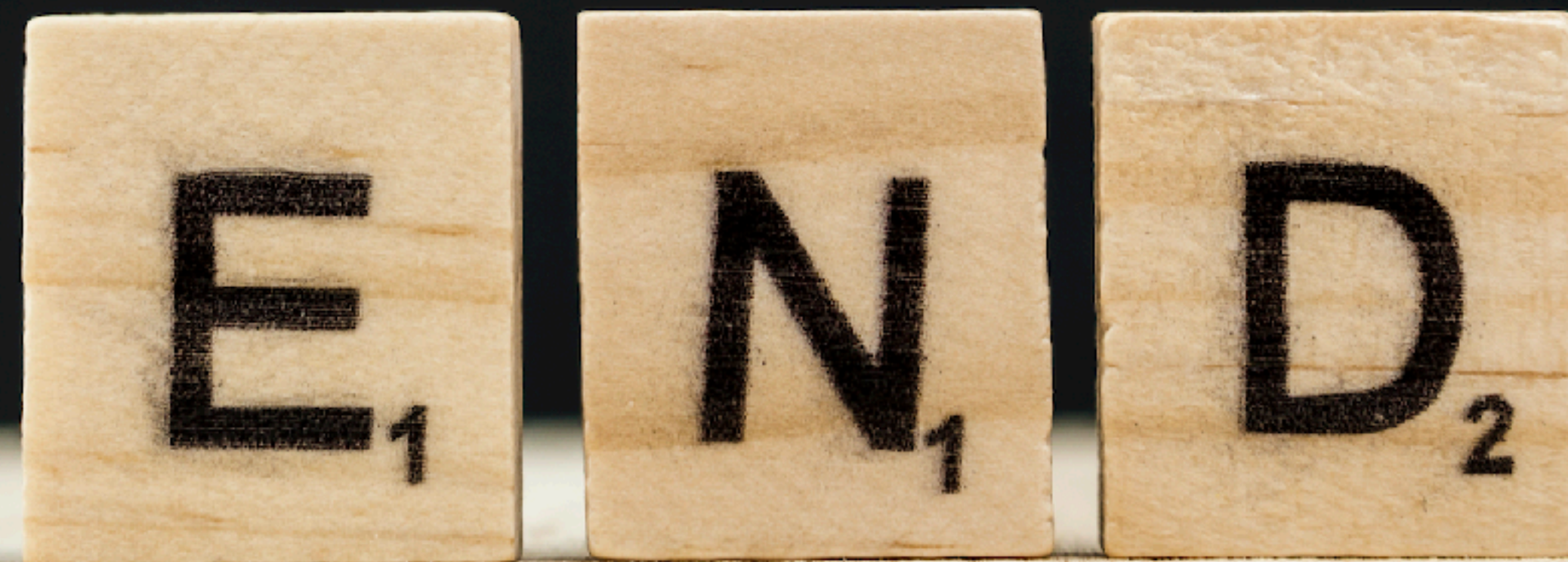


Have more questions? Ask us!

academy@ripe.net



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Kraj	Sfârșit	النهاية	Конец	Konec	Fund
Fine	Fin	Einde	Fí	Край	Beigas
					Τέλος
Fim	Slut				Pabaiga



What's Next in Measurements and Tools



Webinars

**Attend another webinar
live wherever you are.**

❖ Using RIPE Atlas (2 hrs)



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