

## Measurements and Tools

## RIPE Atlas coverage



## Take the Poll!

How much experience do you have with RIPE Atlas?



2 min

P1

3

## Take Another Poll!

What is an "active measurement"?



2 min

4

## Course Goals

- **Monitor** your network and troubleshoot in with **RIPE Atlas**
- **Create** specific tailor-made **measurements** that suit your exact needs using API calls or the command line interface



## Prerequisites



- We assume you have already used RIPE Atlas
- Do you have a **RIPE NCC Access** account?
  - If not - quickly create one: [access.ripe.net](https://access.ripe.net)
- Do you have credits to spend?

6

## Overview



Introduction to RIPE Atlas

Creating a Measurement

Demo A: Creating a Measurement

Command Line Interface (CLI) Toolset

DEMO B: Using RIPE Atlas CLI

Monitoring

Exercise A: Kahoot

7



# Introduction to RIPE Atlas

Section 1

## An Introduction



- RIPE Atlas is a **global active measurements platform**
- Goal: view Internet reachability
- Probes hosted by volunteers
- Data **publicly available**

8

## 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\*

10

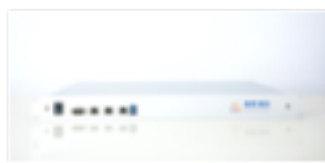
## Probes and Anchors



- **11,000+** probes connected (**600+** RIPE Atlas Anchors)
- **10,000+** results collected per second
- **23,000+** measurements currently running



RIPE Atlas probe



RIPE Atlas anchor

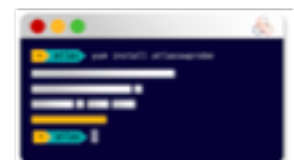
11

## New: RIPE Atlas Software Probes

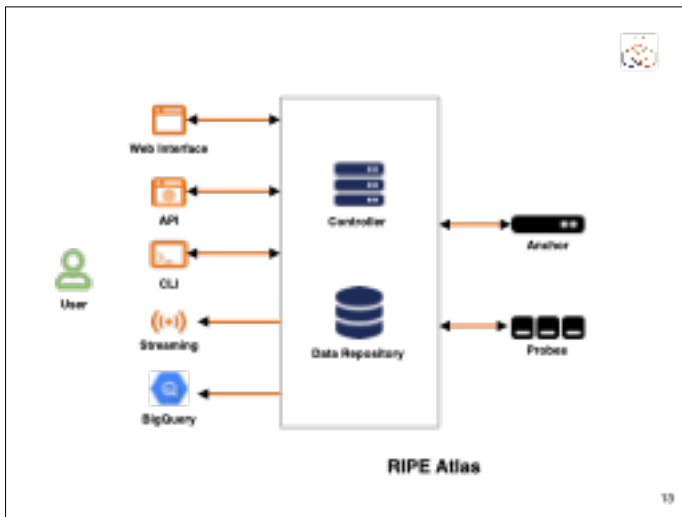


- Software packages that work like regular probes
- Install and run on your (virtual), machines, routers, servers etc
- Currently supporting:
  - CentOS 7 and 8; Debian (9 and 10) and Raspbian; Docker; Turris Routers
- Further information: [atlas.ripe.net/docs/software-probe/](https://atlas.ripe.net/docs/software-probe/)

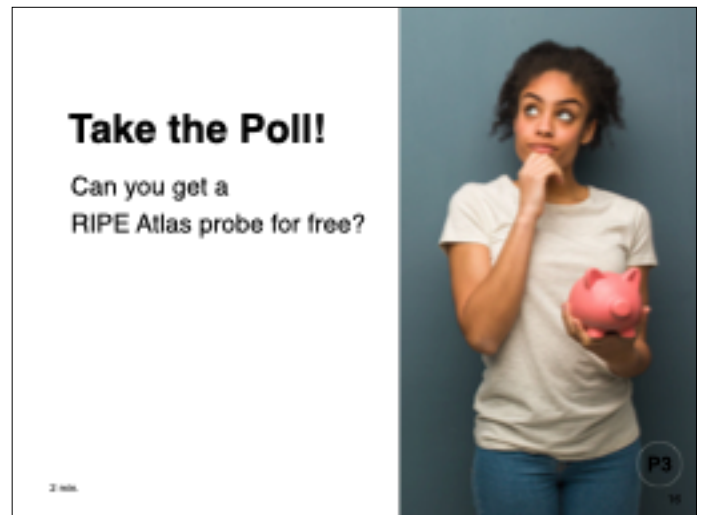
Apply to host a software probe:  
<https://atlas.ripe.net/apply/>



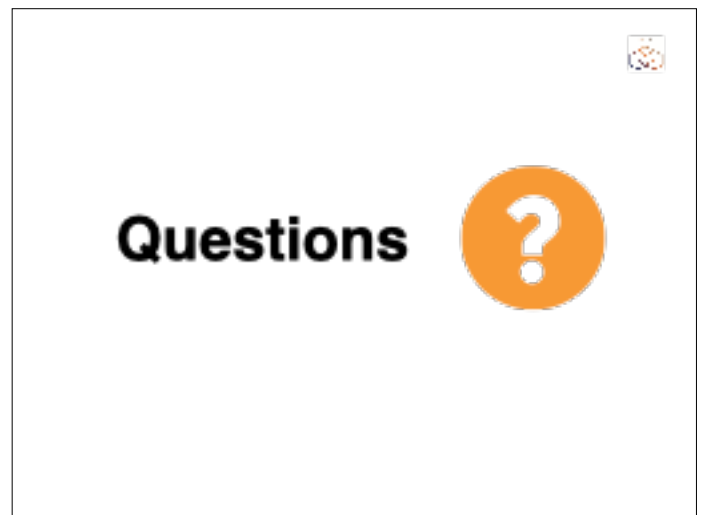
12



- ### Steps to Take
1. Get a probe (optional)
  2. Get a **RIPE NCC Access** account
  3. Register the probe (if you received one)
  4. Get credits
  5. **Create measurements** as needed
  6. **Troubleshoot and monitor** your network



- ### Why?
- Why get a free RIPE Atlas probe?
    - to help the community effort in building the largest Internet measurement network: RIPE Atlas
    - to help everyone and yourself to create better measurements
  - Why get credits and create a RIPE NCC Access Account?
    - to be able to create measurements and troubleshoot





# Creating a Measurement

## Section 2

## 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 verify where the problem is;
- **Measuring** packet loss on suspected "bad" link;
- **Testing** anycast deployment.

20

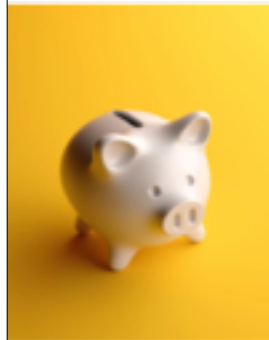
## Credits System



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

21

## How Can you Earn Credits?



- Hosting a RIPE Atlas probe
- Being a RIPE NCC member
- Hosting an anchor
- Sponsoring probes

22

## Credits Overview



My Atlas > Credits

Measurement	Cost
Ping	10
Traceroute	20
...	...

23

## Scheduling a Measurement



- Log in to **atlas.ripe.net**
- Four methods:
  1. Quick and easy
  2. Advanced GUI usage
  3. API (curl and JSON code)
  4. CLI

24

## 1. Quick and Easy



26

## 2. Use GUI



- Mostly used for a periodic, long-term measurement
  - Or "One-off"
- Choose type, target, frequency, start/end time, # of probes, region...
- Each measurement will have **unique ID**
- "API Compatible Specification" is generated too

26

## 2. Advanced GUI



27

## 3. Use API



- **Using command-line and scripting:**
  - Application Programming Interface (API)
  - <https://atlas.ripe.net/docs/api/v2/manual/measurements/types/>
  - <https://atlas.ripe.net/keys/>
- **You will need API keys**
  - To create measurements without logging in
  - To securely share your measurement data

28

## 3. API Compatible



29

## [cont...] 3. API Compatible



```
Measurement API Compatible Specification
{
  "application": "API v2",
  "definition": {
    "target": "local",
    "type": "S",
    "year": "2018",
    "description": "Ping measurement to local",
    "interval": "240",
    "receive_on_probe": false,
    "skip_dns_check": false,
    "reason": "test"
  }
}
```

Copy to Clipboard

30

## Create API Key



1. Go to MyAtlas
2. Click on "Create an API Key"
3. Choose type: "create a new user-defined measurement"
4. "Object" is not applicable (N/A) for this type
5. Give it a label

31

## Looking Up Measurements Results

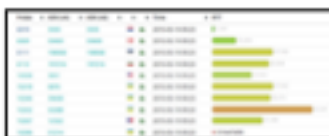


Go to "Measurements, Maps and Tools" > "Measurements"

D

32

## Available Visualisations: Ping



**List of probes**  
sortable by RTT

**Map**  
colour-coded by RTT



**LatencyMON**  
compare multiple latency trends

33

## Available visualisations: traceroute



**TraceMON:**  
network topology, latency and nodes information



**IPMap(beta):**  
IPs geolocation on map (prototype)

34

## Available visualisations: DNS



**Map:**  
colour-coded response time or diversity



**List of probes:**  
sortable by response time

35

## Raw Measurement Data download

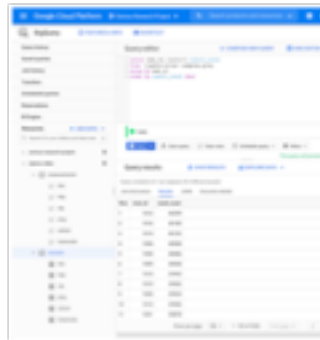


36

## RIPE Atlas Data on BigQuery



- RIPE Atlas measurement results available via Google BigQuery
- General purpose data warehouse
- SQL query language on top
- Great for rapid investigation
- Build complex analyses, or just heavy filtering prior to local analysis



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

<https://labs.ripe.net/tools/>

37

## Take the Poll!

Can you create as many measurements as you want?



2 min

P4

## Questions



## Demo A

Create a Measurement

## Exercise



We will create a **ping** measurement:

- Involving **ten probes**
- To a target of your choice
- Source is **your country**
- Duration of **two days**

## Tasks



1. Warm-up: Create a measurement using the GUI
2. Create API Key
3. Schedule a measurement using the API

D

41

D

42

## Task 1: Use Web Interface



- Once you generate a measurement, copy "API Compatible Specification" to text file
- Take note of the **measurement ID!**

create measurement



43

## Task 2: Create API key



1. Click on "Create an API Key"
2. Permission: "schedule a new measurement"
3. "Target" is not applicable (N/A) for this type



D  
API key

44

## [cont...] Task 2: Create API key



4. Give it a label
5. Give it a duration of validity (leave empty for defaults)
6. "Key" value to be passed on to the API call (next step)

45

## Task 3: Use API



### Schedule a measurement using API

- Use the "key" you just generated
- Hint: copy and past API call syntax from the measurement generated by the GUI

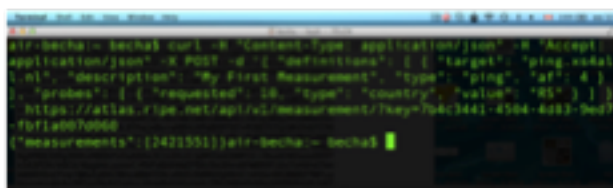
### An example:

```
curl -H "Content-Type: application/json" -H "Accept: application/json" -X POST -d '{ "definitions": [ { "target": "psg.xs4all.nl", "description": "My First API Measurement", "type": "ping", "af": 4 } ], "probes": [ { "requested": 10, "type": "country", "value": "RS" } ] }' https://atlas.ripe.net/api/v1/measurement/?key=YOUR_API_KEY
```

D

46

## Task 3: Use API



D

47

# Questions







## Command-line Interface (CLI) Toolset

Section 3

### RIPE Atlas CLI



- Familiar output (ping, dig, traceroute)
- Linux/OSX
  - <http://ripe-atlas-tools.readthedocs.org/en/latest/installation.html#requirements-and-installation>
- Windows [experimental]
  - <https://github.com/chrisamin/ripe-atlas-tools-win32>

**Installing the CLI tool**

52

### RIPE Atlas CLI



- Open source
  - RIPE NCC led community contribution
- Documentation
  - <https://ripe-atlas-tools.readthedocs.org/>
- Source, if you want to contribute:
  - <https://github.com/RIPE-NCC/ripe-atlas-tools/>

**Installing the CLI tool**

53

### Install RIPE Atlas Tools



- OSX:
  - `sudo easy_install pip`
  - `sudo pip install ripe-atlas-tools`
- Linux:
  - Available from many package repositories
  - ...or same as in OSX

**Installing the CLI tool**

54

## Configure RIPE Atlas CLI



- Reuse the API key of the previous exercise
  - Or create a new one at <https://atlas.ripe.net/keys/>
- Configure your CLI
  - `ripe-atlas configure --set authorisation.create=MY_API_KEY`

55

## Fetch an Existing Measurement

Fetch the ping measurement 2340408

- `ripe-atlas report 2340408`



56

## Search probes



- Search all probes in AS 3333
  - `ripe-atlas probe-search --asn 3333`
- Show specific fields
  - `ripe-atlas probe-search --asn 3333 --field asn_v6 --field country --field description --field status`

D

57

## Create a Measurement



Create a ping measurement to wikipedia.org

- One-off, default parameters
- `ripe-atlas measure ping --target wikipedia.org`

```
Getting ready... Your measurement will be created and details about it can be found here:
https://atlas.ripe.net/measurements/3488750/

CONNECTING TO 209.246.100...
## System Probe probe #10000 94.133.174.49 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.462 96.766
## System Probe probe #10011 97.101.208.288 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 100.100 100.100
## System Probe probe #10049 176.163.48.212 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.478 93.482
## System Probe probe #10014 9.105.108.0 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.478 93.482
## System Probe probe #10119 94.176.40.48 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.712 93.698
## System Probe probe #10410 94.17.47.58 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.712 93.272
## System Probe probe #10005 78.52.130.137 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.498 93.712
## System Probe probe #10010 92.245.135.46 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.492 93.698
## System Probe probe #17512 92.43.108.0 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.462 93.698
## System Probe probe #12048 94.173.92.289 to 93.258.174.200 [93.258.174.200] [100.000] [209.246.100] 93.598 93.698
```

D

58

## Other Examples of Ping



Geo-specific from 20 probes from Canada:

- `ripe-atlas measure ping --target example.com --probes 20 --from-country ca`

20 Canadian probes that definitely support IPv6:

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

Create a recurring measurement:

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

59

## Take a Poll!

How do you identify yourself (for credit accounting) when using CLI?



2 min.

P5

60



# Questions



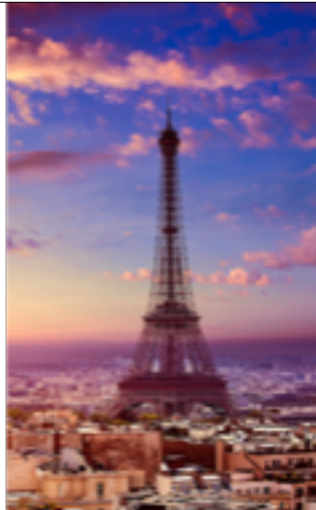
## Demo B

Using RIPE Atlas CLI

### Search Probes

Use the `traceroute` command to test the reachability of

- `wikipedia.org`
- on TCP port `443`
- from `20 probes`
- in `France`.

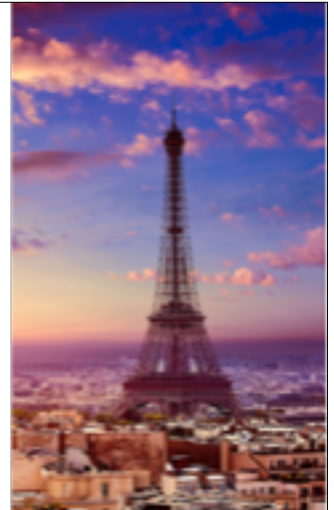


### Search Probes

Use the `traceroute` command to test the reachability of

- `wikipedia.org`
- on TCP port `443`
- from `20 probes`
- in `France`.

```
ripe-atlas measure
traceroute --protocol TCP
--target wikipedia.org --
port 443 --probes 20 --
from-country fr
```



# Questions



## Take a Poll!

Which method gives you greater **flexibility** in creating measurements and in looking up results?



## Demo C

### Installing a RIPE Atlas software Probe

## Installing the RIPE Atlas SW Probe



- All info over installing SW probes:
  - <https://atlas.ripe.net/docs/software-probe/>
  - instructions, videos
- Many different platforms
- We will now demo one of them

68

- <https://atlas.ripe.net/docs/software-probe/>



### Good to Know

The (future) host of a RIPE Atlas software probe is expected to:

- Understand what it means to operate a probe for the RIPE Atlas network, including what benefits they themselves gain from this and what services they thereby provide to the RIPE network and its users. You can read more on the [RIPE Atlas about page](#).
- Install the software package that is applicable for their intended target hardware and OS. This software package can come from a variety of sources such as an official repository on GitHub. At the moment the RIPE NCC maintains a binary RPM package.
- Register their probe following the software probe application procedure.
- Keep the version of their software up-to-date by upgrading to newer versions as they become available.
- Should the access credentials for their probe change (for example after having to reinstall a server that runs the software probe), they need to re-register the new access credentials.

69

## Platform Specific Installation Instructions



- <https://atlas.ripe.net/docs/software-probe/>

### Platform-specific installation instructions

Show you can help with installing the RIPE Atlas software probe.

Platform	Support	Installation Method	Installation Status
CentOS 7 binary	RIPE NCC	<a href="#">Binary</a>	English
CentOS 7 binary	RIPE NCC	<a href="#">Binary</a>	French
CentOS 7 & Ubuntu	RIPE NCC	<a href="#">Binary</a>	Non-validated
Ubuntu Precise	RIPE NCC	<a href="#">Binary</a>	Non-validated
Ubuntu 12.04 LTS	RIPE NCC	<a href="#">Binary</a>	English
Debian 6	RIPE NCC	<a href="#">Binary</a>	Non-validated
Debian 7	RIPE NCC	<a href="#">Binary</a>	English
OpenSUSE	Community	<a href="#">Binary</a>	English
Ubuntu	Community	<a href="#">Binary</a>	English
Debian	Community	<a href="#">Binary</a>	English
CentOS	Community	<a href="#">Binary</a>	English
Ubuntu	Community	<a href="#">Binary</a>	English

We are maintaining a [GitHub page](#) for releases in different languages. Please let us know if you are able to help with translations.

70



## DEMO



- We will demo the RIPE Atlas Probe installation on CentOS 7
- <https://atlas.ripe.net/docs/software-probe/>
- Instructions:  
<https://github.com/RIPE-NCC/ripe-atlas-probe-doc/blob/master/manuals/CentOS-7-binary.en.md>
- Instruction video: <https://youtu.be/SNecvBNYI20>

71



## Monitoring

### Section 4

## Question!

- Do you use **network monitoring**?
- If yes, what kind?

Type your answer in the chat window.



2 min.

## Network Monitoring



- Integrate "**status checks**" with existing monitoring tools (Icinga, Nagios)
- Using **real-time data streaming**
  - Server monitoring
  - Detecting and visualising outages

74

## Steps for Integration



1. Create a RIPE Atlas ping measurement
2. Go to "status checks" URL (RESTful API call)
  - [https://atlas.ripe.net/api/v2/measurements/2340408/status-check?max\\_packet\\_loss=20](https://atlas.ripe.net/api/v2/measurements/2340408/status-check?max_packet_loss=20)
3. Documentation:
  - <https://atlas.ripe.net/docs/api/v2/manual/measurements/status-checks.html>
4. Add your alerts in Nagios or Icinga

75

## Security Aspects



- Probes:
  - Hardware trust material (regular server address, keys)
  - No open ports; initiate connection; NAT is okay
  - Don't listen to local traffic
  - No passive measurements
- Measurements triggered by "command servers"
  - SSH connections from probe to server
  - Initiated by probe
- Measurement code published

76

## Contact Us



- <https://atlas.ripe.net>
- Users' mailing list: [ripe-atlas@ripe.net](mailto:ripe-atlas@ripe.net)
- Articles and updates: <https://labs.ripe.net/atlas>
- In the works: <https://atlas.ripe.net/docs/in-the-works/>
- Questions and bugs: [atlas@ripe.net](mailto:atlas@ripe.net)
- Twitter: @ripennoc and #RIPEAtlas

77

# Questions



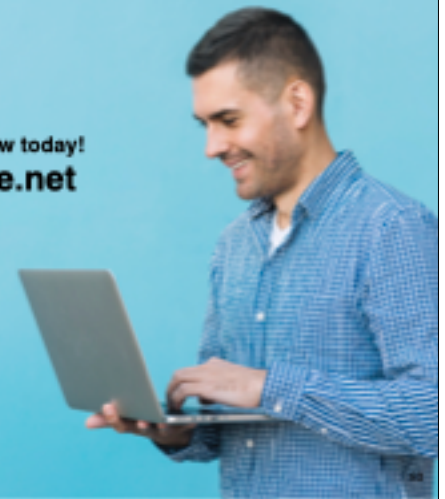


# Kahoot

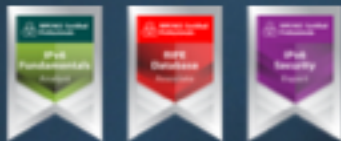
Exercise A



Learn something new today!  
**academy.ripe.net**



RIPE NCC Certified Professionals



<https://getcertified.ripe.net/>



## We want your feedback!



What did you think about this session?

Take our survey at:

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



## The End!

Край

Y Diwedd

النهاية

Соңы

අනෙකු

Fí

Finis

Ende

Finvezh

Liðugt

Кінець

Koniec

Kraj

Énn

Fund

پایان

Kraj

Löpp

Beigas

Vége

Son

An Críoch

Fine

הסוף

Endir

Sfârșit

Fin

Tέλος

Einde

Конец

Канец

Slut

Slutt

დასასრული

Pabaiga

Fim

Amáia

Loppu

Tmiem

Koniec