RIPE NCC
RIPE NETWORK COORDINATION CENTRE

# RIPE NCC Measurement Data Workshop

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Christian Teuschel

Viktor Naumov

Michela Galante

# Schedule

| | |
|---|---|
| 09:00 - 10:30 | **First session** |
| 10:30 - 11:00 | **Break** |
| 11:00 - 12:30 | **Second session** |
| | **Lunch** |

# Exercises

https://stat.ripe.net/**widgets**/workshops/**enog11**/exercises.pdf

Solutions:

https://stat.ripe.net/widgets/workshops/enog11/solutions.pdf

# Overview 1 - RIPEstat

RIPEstat

- ~~**Introduction to RIPE and the RIPE NCC**~~ - *not part of this workshop*
- **Introduction to RIPEstat**
- **More about widgets**
- ***List of widgets*** - *optional*
    - ***Exercise: Querying for a Resource***
- **Useful routing widgets**
    - ***Exercise: BGPlay***
- **Handling abuse**
    - ***Exercise: Handling Abuse***
- ***Personalising RIPEstat*** - *optional*
    - ***Exercise: MyView***
- **Comparing results**
    - ***Exercise: Comparing Results***
    - ***Exercise: RIPEstat Use Cases***

# Overview 2 - RIPE Atlas

RIPE Atlas

- Introduction to RIPE Atlas
- What you can get from RIPE Atlas as a visitor
- Exploring public probes
  - *Live Demo*
- Finding public measurements
  - *Exercise F: Analyse results*
- Creating a measurement
  - *Exercise G: Create a measurement*
- Network monitoring
  - *Exercise H: Setting up 'Status Checks'*
- *More RIPE Atlas features - optional*
- How to host a probe
- ~~Advanced topics~~ - *not part of this workshop*
  - ~~Use cases and success stories~~
  - ~~RIPE Atlas anchors~~
  - ~~RIPE Atlas community~~

# Introduction to RIPEstat

## Section 2

# What is RIPEstat?

One interface for viewing all Internet number resource data

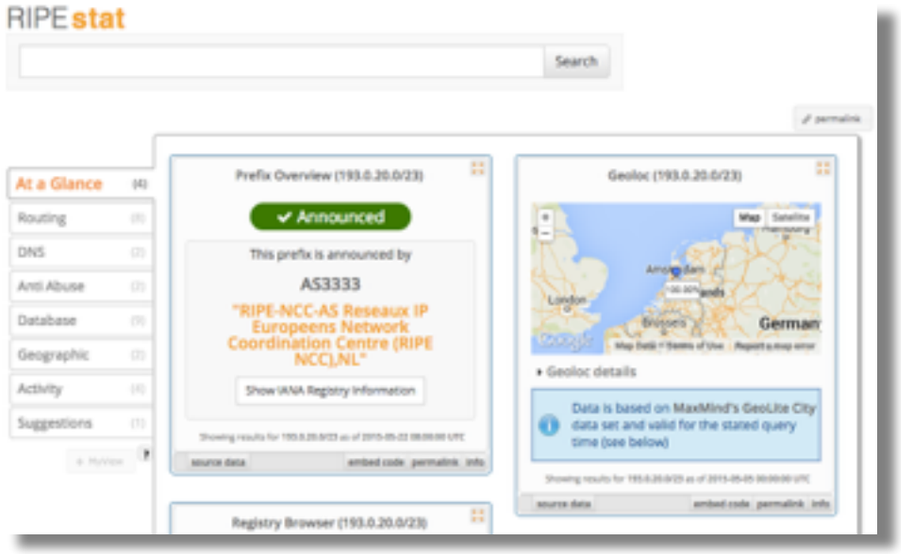
“One-stop shop”

# What data? What sources?

- RIPE Database
- Other RIR data
- BGP routing data (RIS)
- Active measurements (RIPE Atlas, DNSMON)
- Geolocation (third party)
- Blacklist data (third party)
- More…

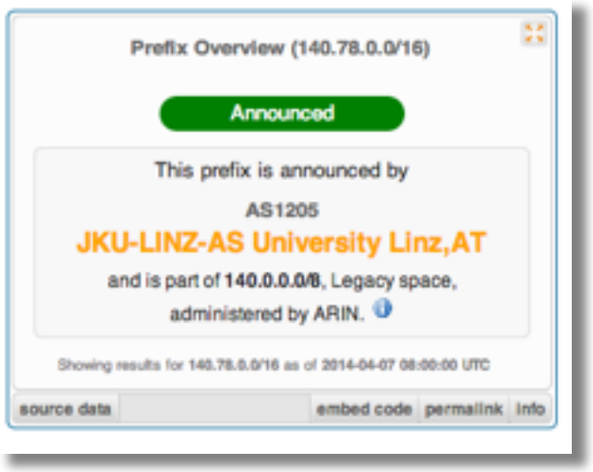
# RIPEstat APIs

- https://stat.ripe.net



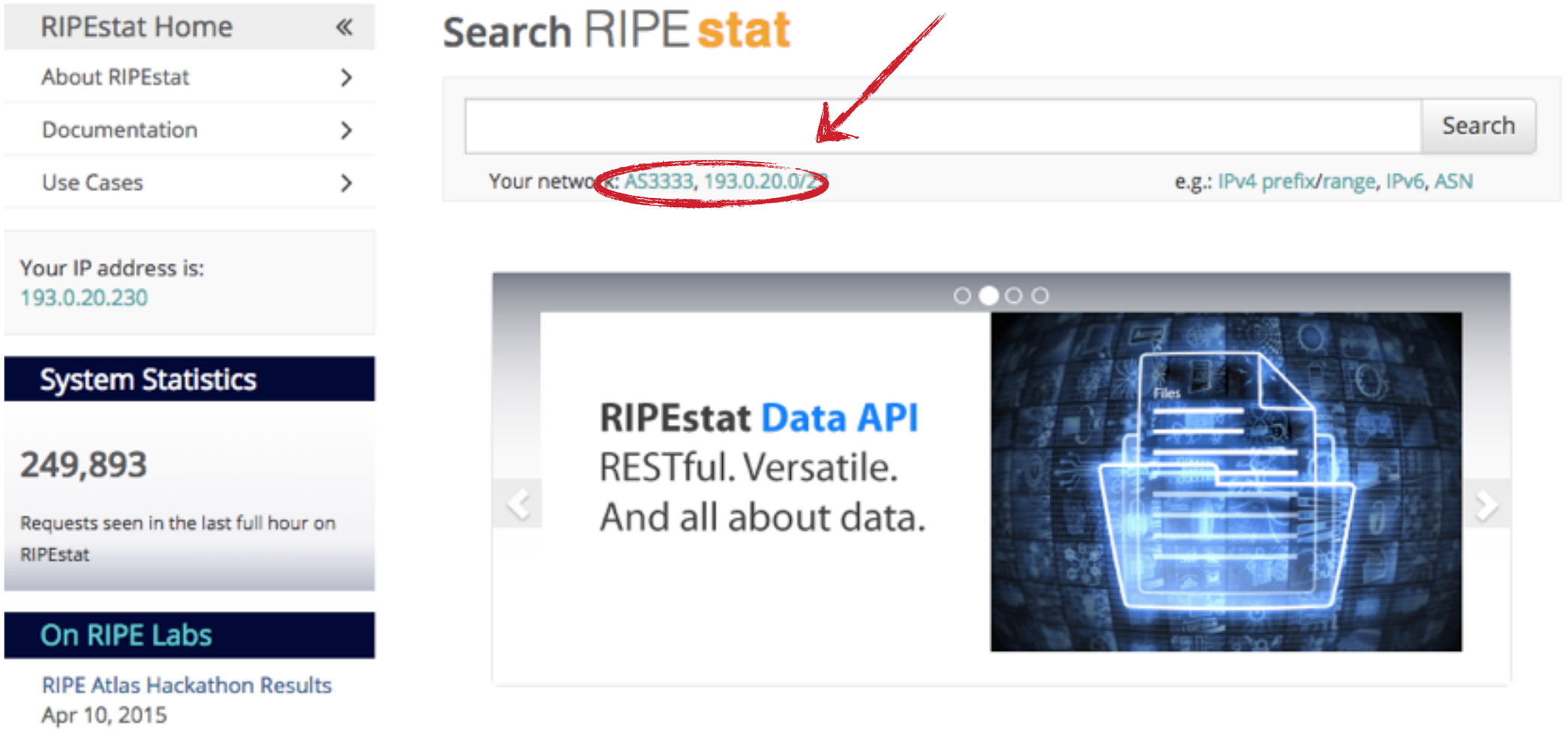

- RIPEstat widget API

- RIPEstat data API
  - https://stat.ripe.net/data/routing-status/data.json?resource=…



# Landing page

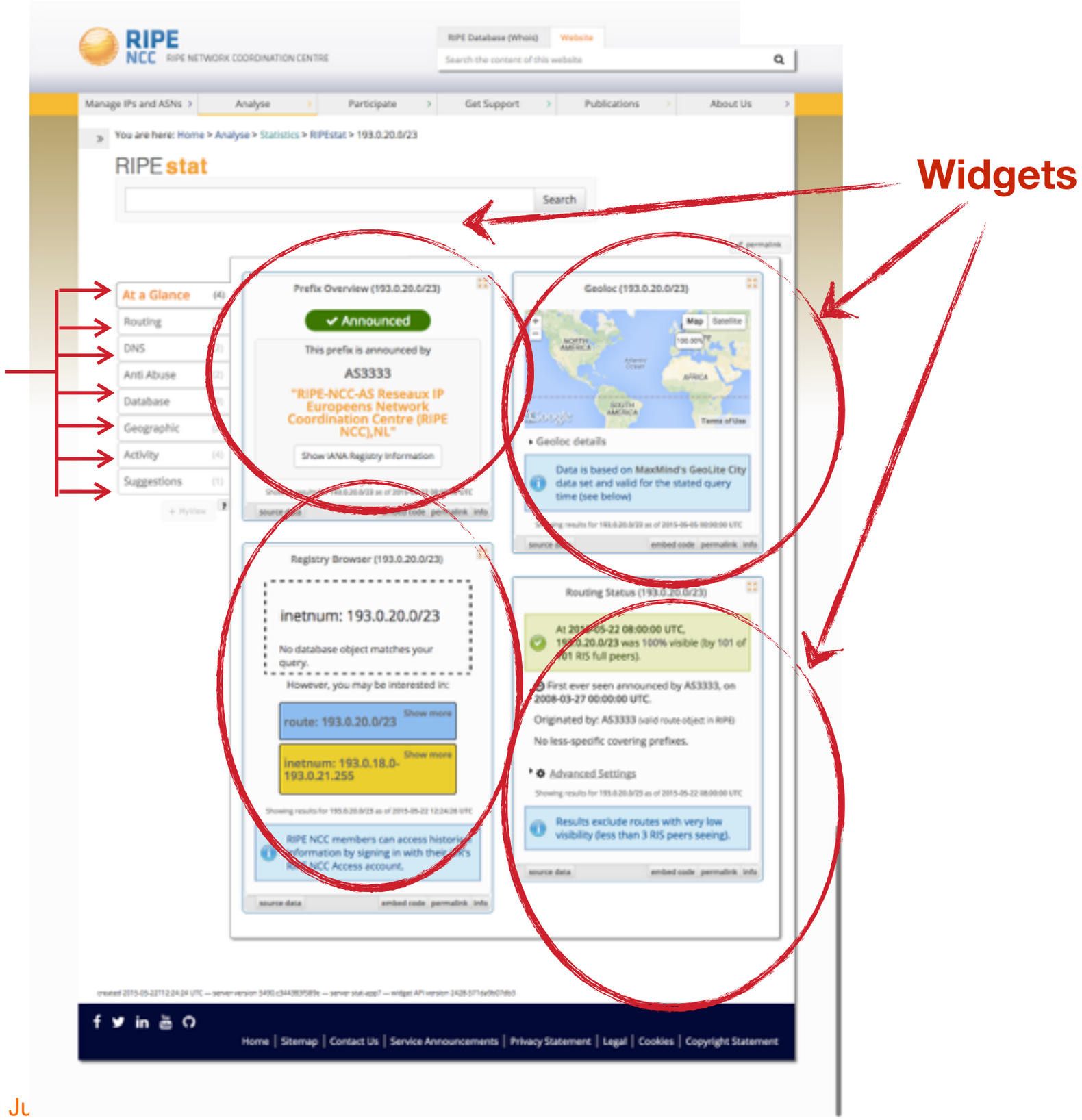
**RIPEstat shows your own IP/ASN**



# Query Types

- IPv6 address/prefix
- IPv4 address/prefix
- ASN
- Hostname
- Country code

# Results page



# Why use RIPEstat?

- For your own network:
  - Is someone else announcing my prefix?
  - How visible is my new IPv6 network?
  - Is my BGP routing consistent with the Routing Registry?
  - Are my DNS and reverse DNS consistent?
  - Location of my customers' prefixes
  - Was my prefix visible yesterday in Tokyo?

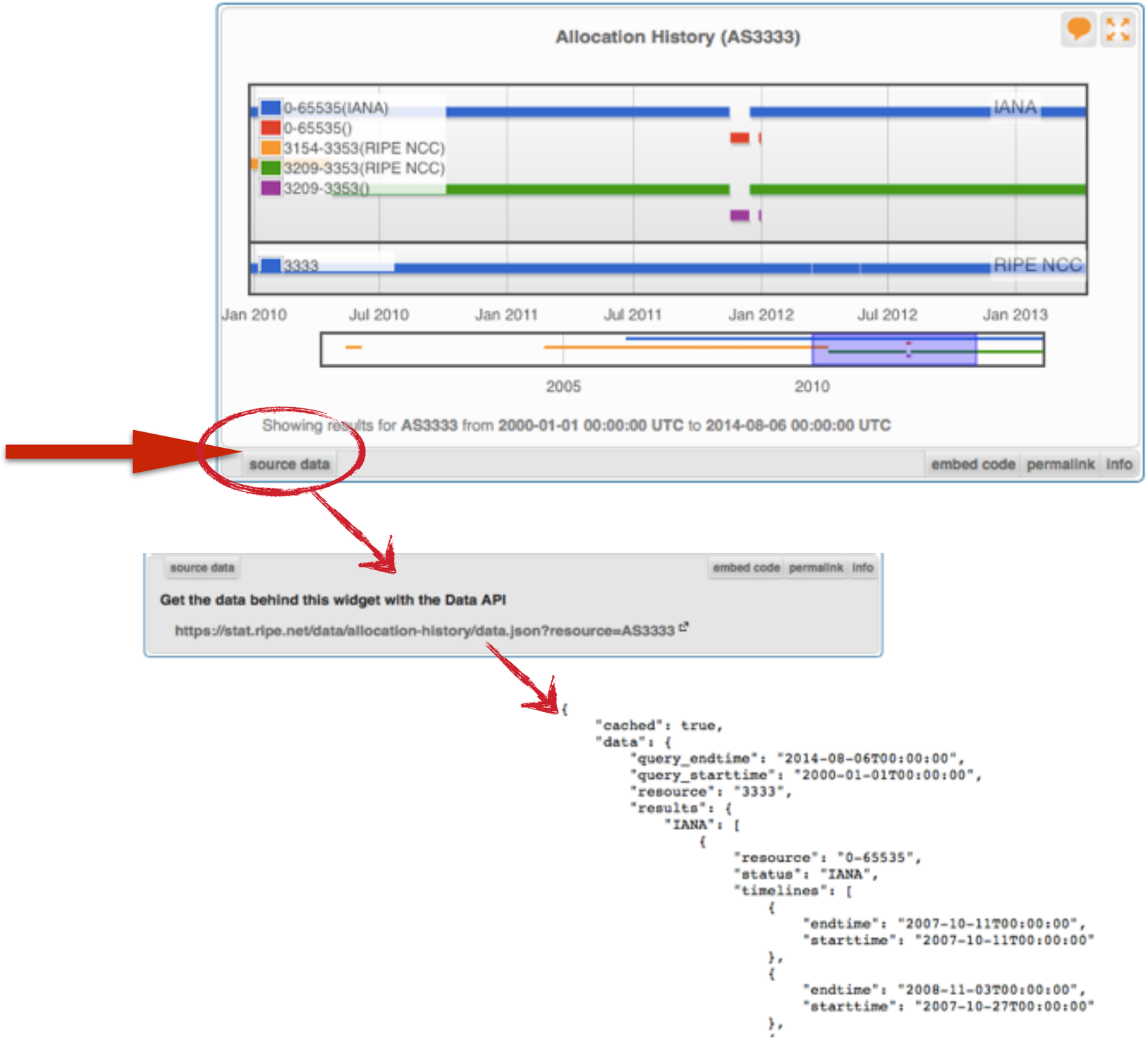
# Why use RIPEstat?

- For viewing other networks:
  - How many IPv6 prefixes are announced in my country?
  - IPv6 in my country compared to neighbours
  - Who has more peers, AS1 or AS2?
  - How does the upstream outage look?
  - Is the prefix/ASN that I want already announced?
  - Which ASN announces an IP?
  - Where can I report abuse from an IP?

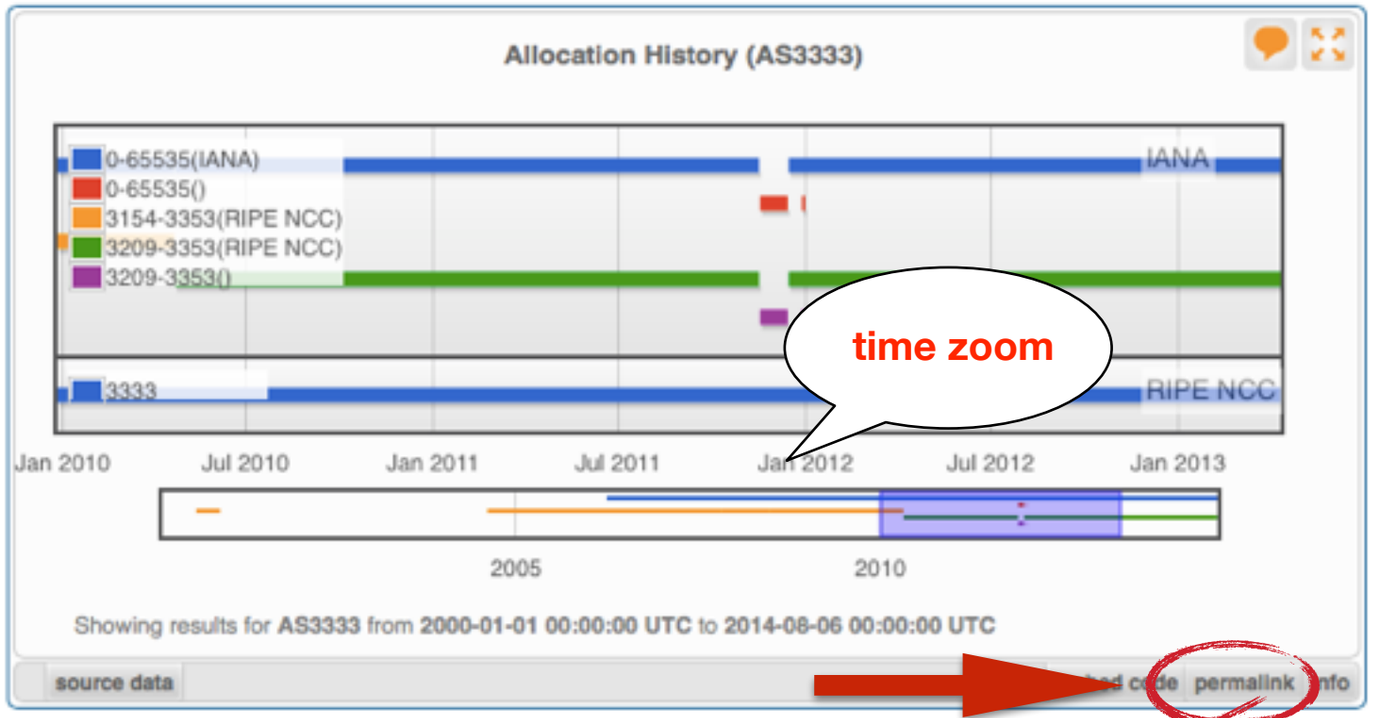
# More About Widgets

## Section 3

# Get the data behind the widget!

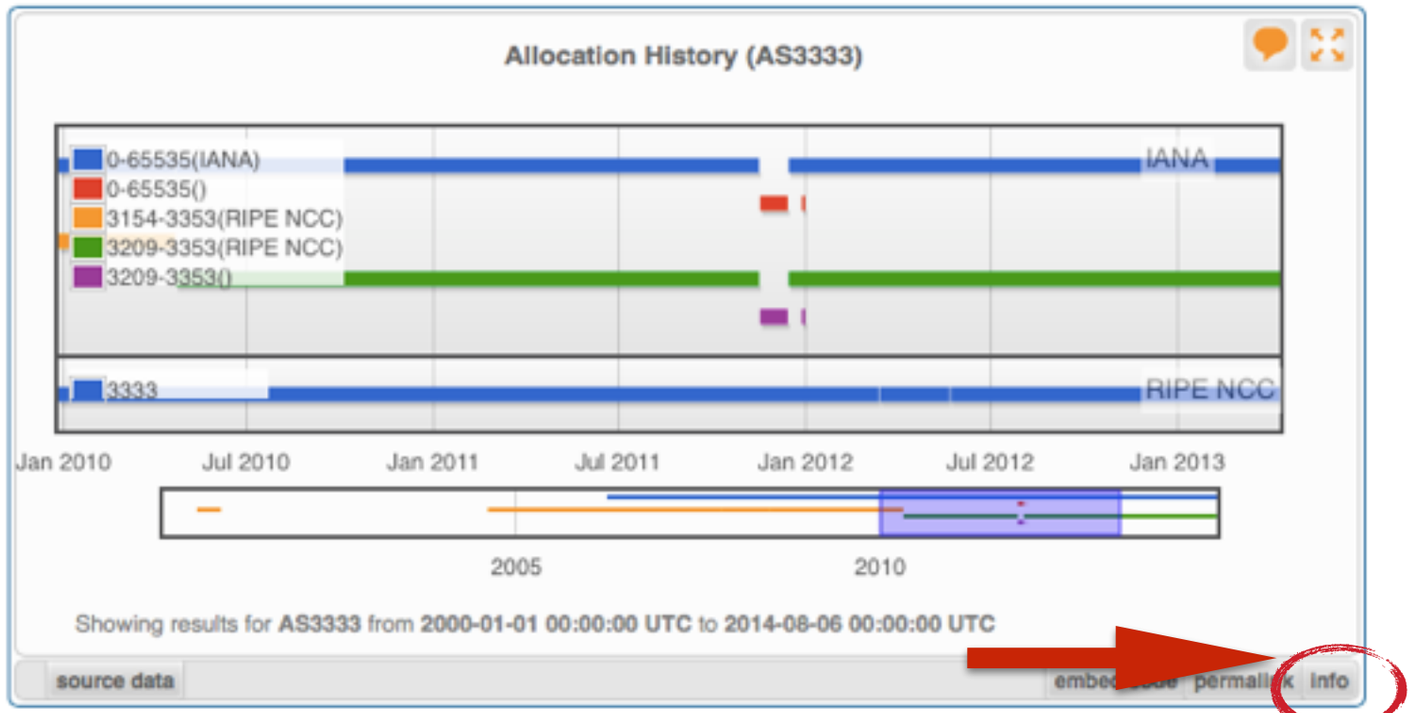


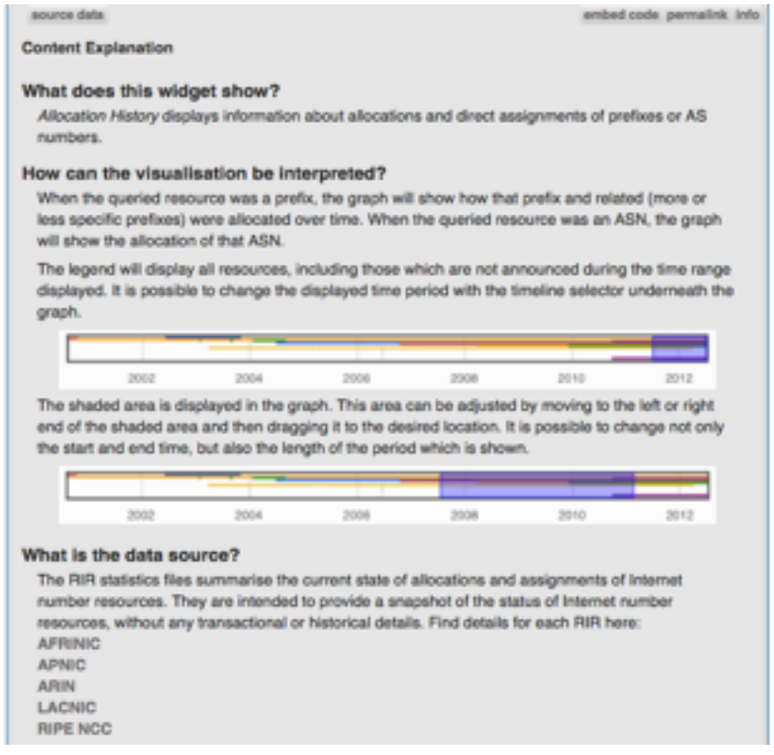
# Shareable results URL



- Immutable shareable URL for each result!
- URL includes:
  - Zoom
  - History

# Where’s the data from?





source data embed code permalink info

**Content Explanation**

**What does this widget show?**

*Allocation History* displays information about allocations and direct assignments of prefixes or AS numbers.

**How can the visualisation be interpreted?**

When the queried resource was a prefix, the graph will show how that prefix and related (more or less specific prefixes) were allocated over time. When the queried resource was an ASN, the graph will show the allocation of that ASN.

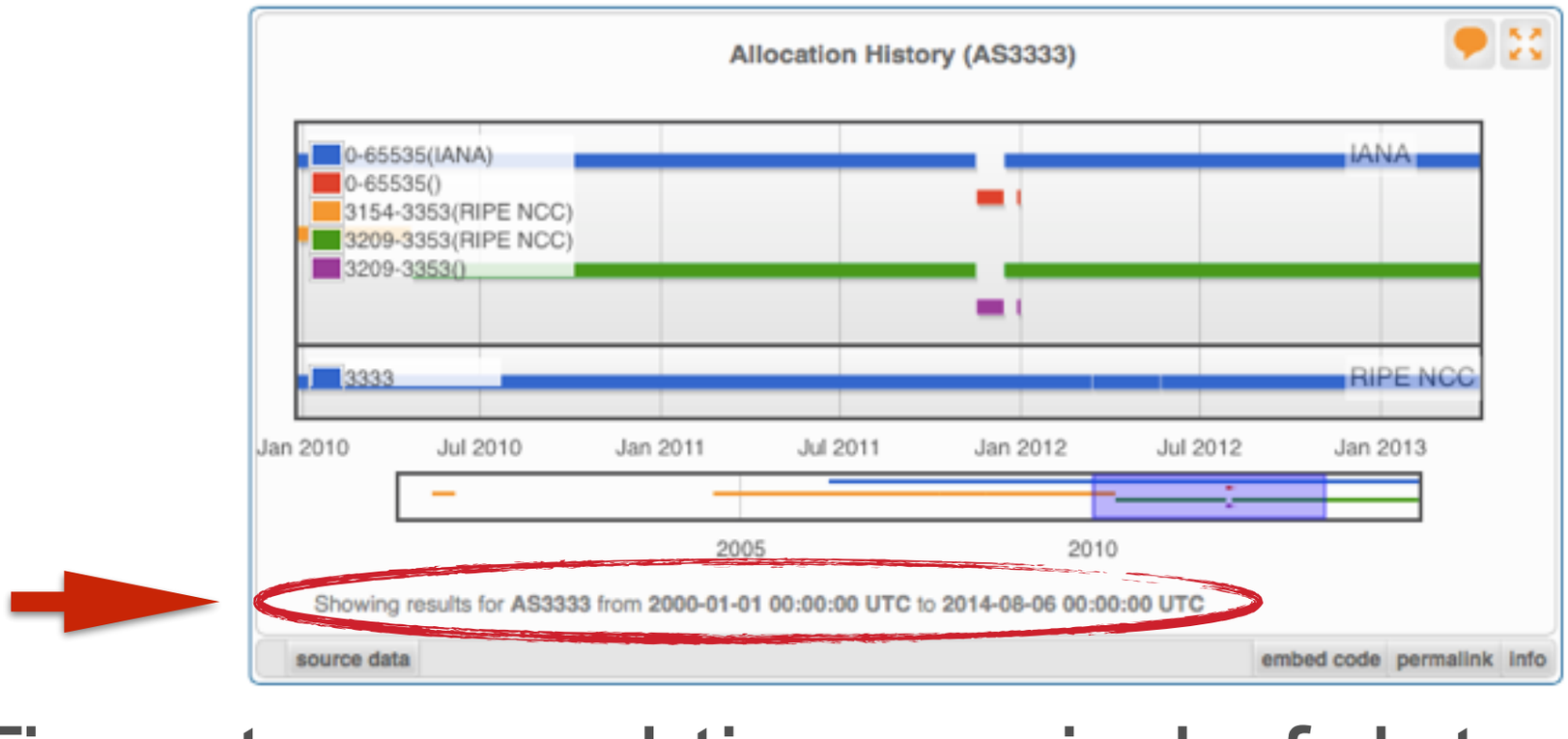
The legend will display all resources, including those which are not announced during the time range displayed. It is possible to change the displayed time period with the timeline selector underneath the graph.

The shaded area is displayed in the graph. This area can be adjusted by moving to the left or right end of the shaded area and then dragging it to the desired location. It is possible to change not only the start and end time, but also the length of the period which is shown.

**What is the data source?**

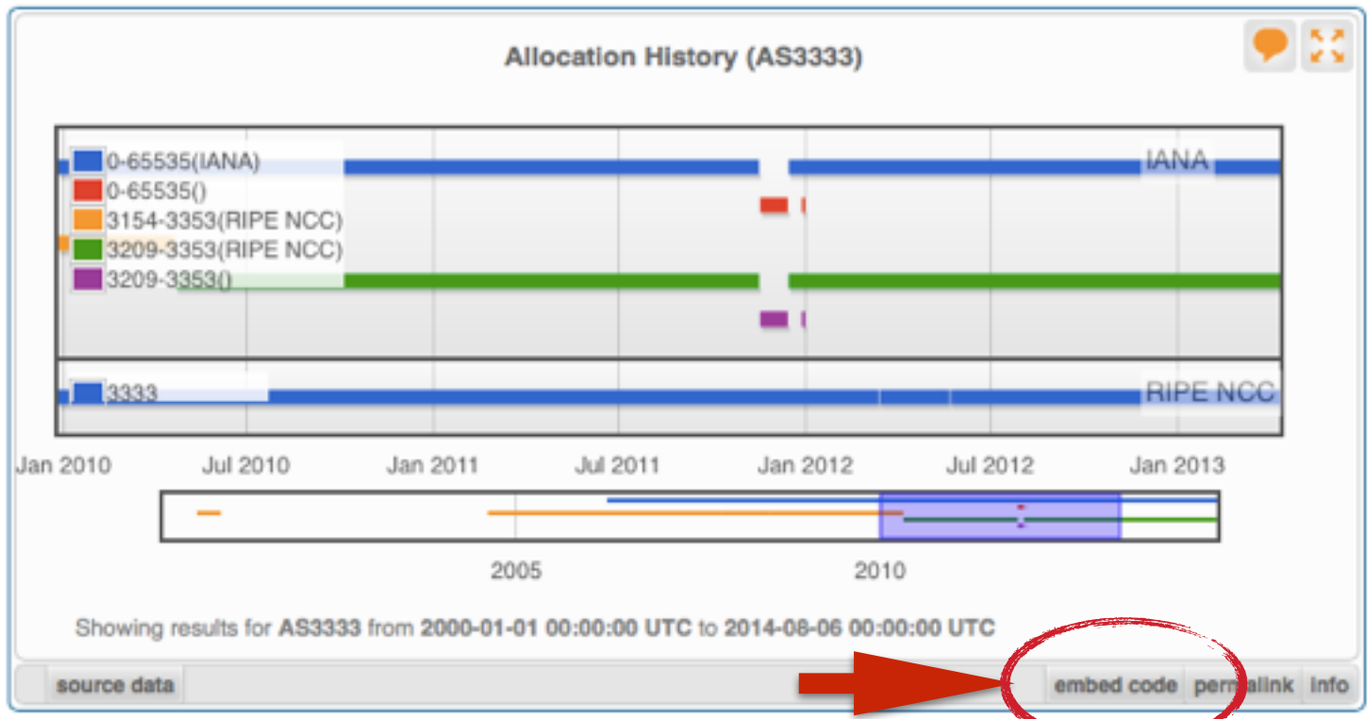
The RIR statistics files summarise the current state of allocations and assignments of Internet number resources. They are intended to provide a snapshot of the status of Internet number resources, without any transactional or historical details. Find details for each RIR here:
AFRINIC
APNIC
ARIN
LACNIC
RIPE NCC

# Freshness and timescale of the data




- Timestamp and time period of data
- Different widgets = different data update frequency
- Can be adjusted in most cases
  - Limits: different maximum granularities

# Embed the widget!

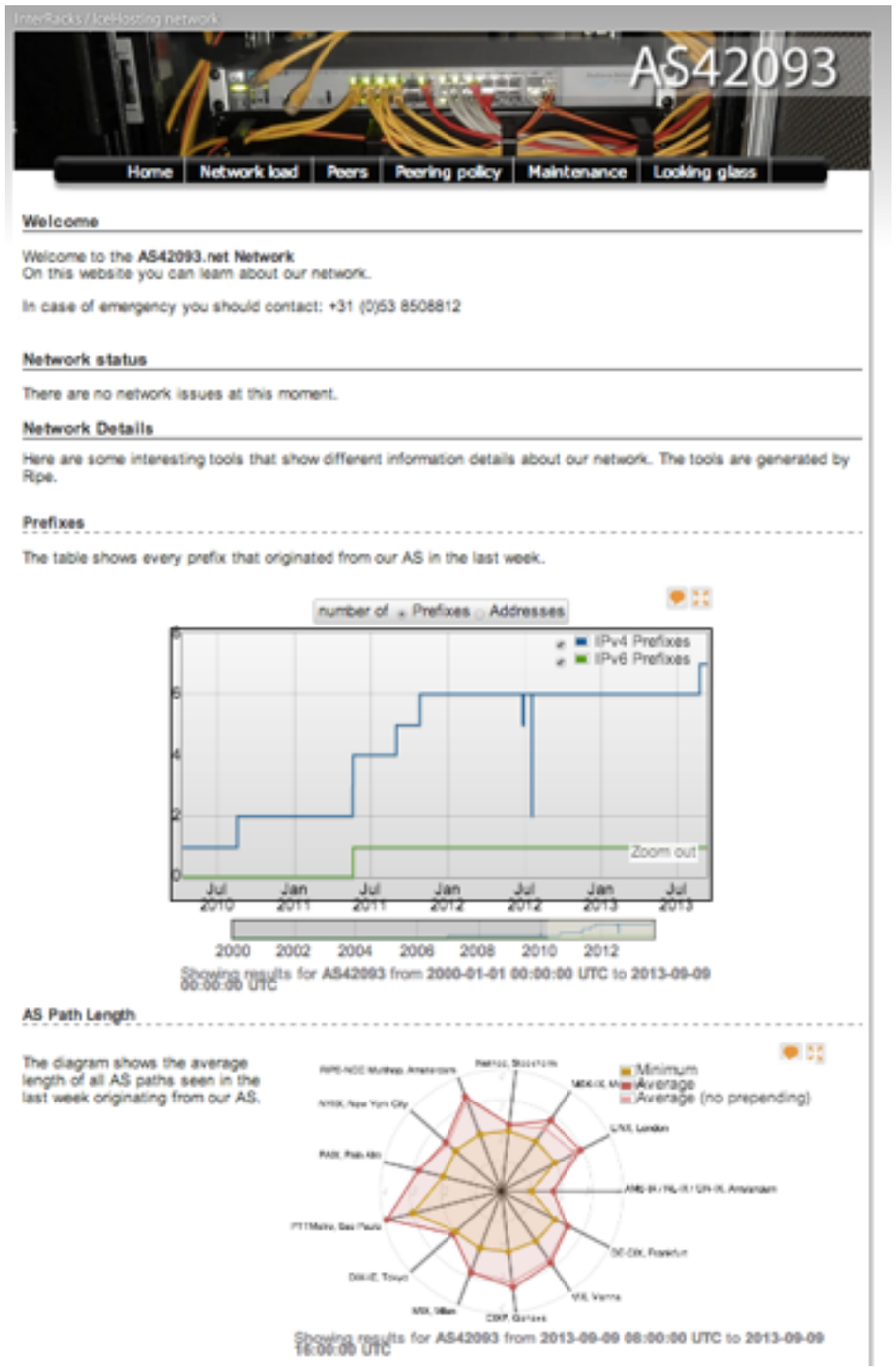


# Embedding widgets on your site

- This ISP embedded widgets on its page

Prefix Count widget

AS Path Length widget



# List Of Widgets

Section 4

# Widgets List

https://stat.ripe.net/widget/list

## RIPEstat Widgets

This is a complete list of all of the widgets that RIPEstat offers. Each of these widgets can be accessed using the links below.

When you view a widget you can also get code for **embedding** it in your own pages. The full procedure for embedding and configuring widgets is described in the Widget API Documentation.

Show 100 entries  Search:

| Title (show slug) | Example | Prefix | IP address | ASN | Hostname | Country code |
|---|---|---|---|---|---|---|
| Abuse Contact Finder | | ✓ | ✓ | ✓ | | |
| Address Space Hierarchy | | ✓ | ✓ | | | |
| Address Space Usage | | ✓ | ✓ | | | |
| Allocation History | | ✓ | ✓ | ✓ | | |
| Announced Prefixes | | | | ✓ | | |
| AS Overview | | | | ✓ | | |
| AS Path Length | | | | ✓ | | |
| AS Routing Consistency | | | | ✓ | | |
| ASN Neighbours | | | | ✓ | | |
| ASN Neighbours History | | | | ✓ | | |
| RIPE Atlas Probes | | ✓ | ✓ | ✓ | | ✓ |
| RIPE Atlas Measurement Targets | | ✓ | ✓ | ✓ | ✓ | |

# Exercise A

## Querying for a Resource

Refer to the exercise booklet

# Visualising BGP Routing Information

## Section 5

# Querying

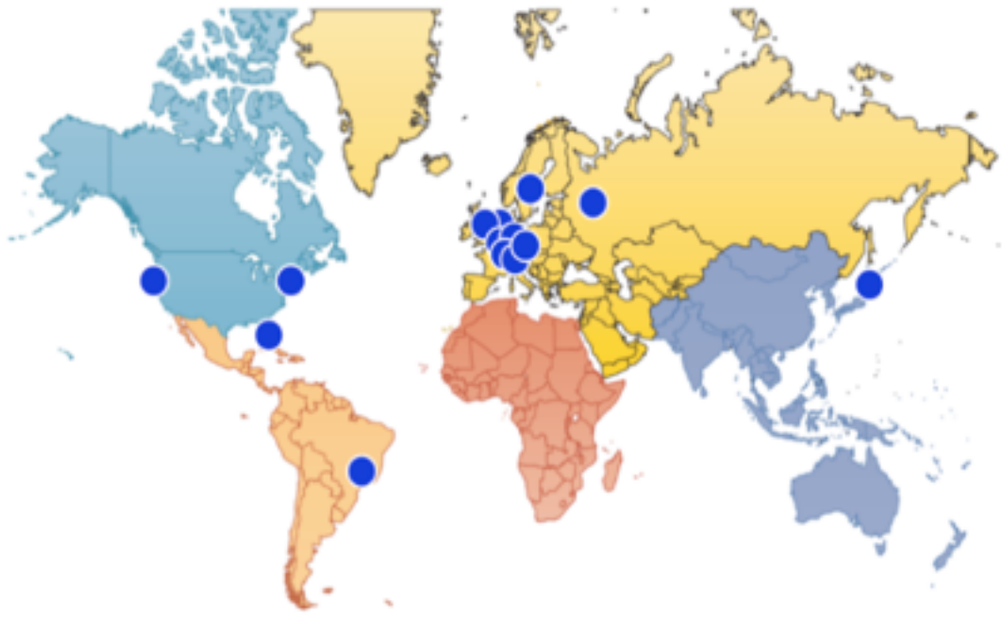
- IP or ASN queried?

  - You get different widgets!

- ASN often visualised based on the prefixes it announces

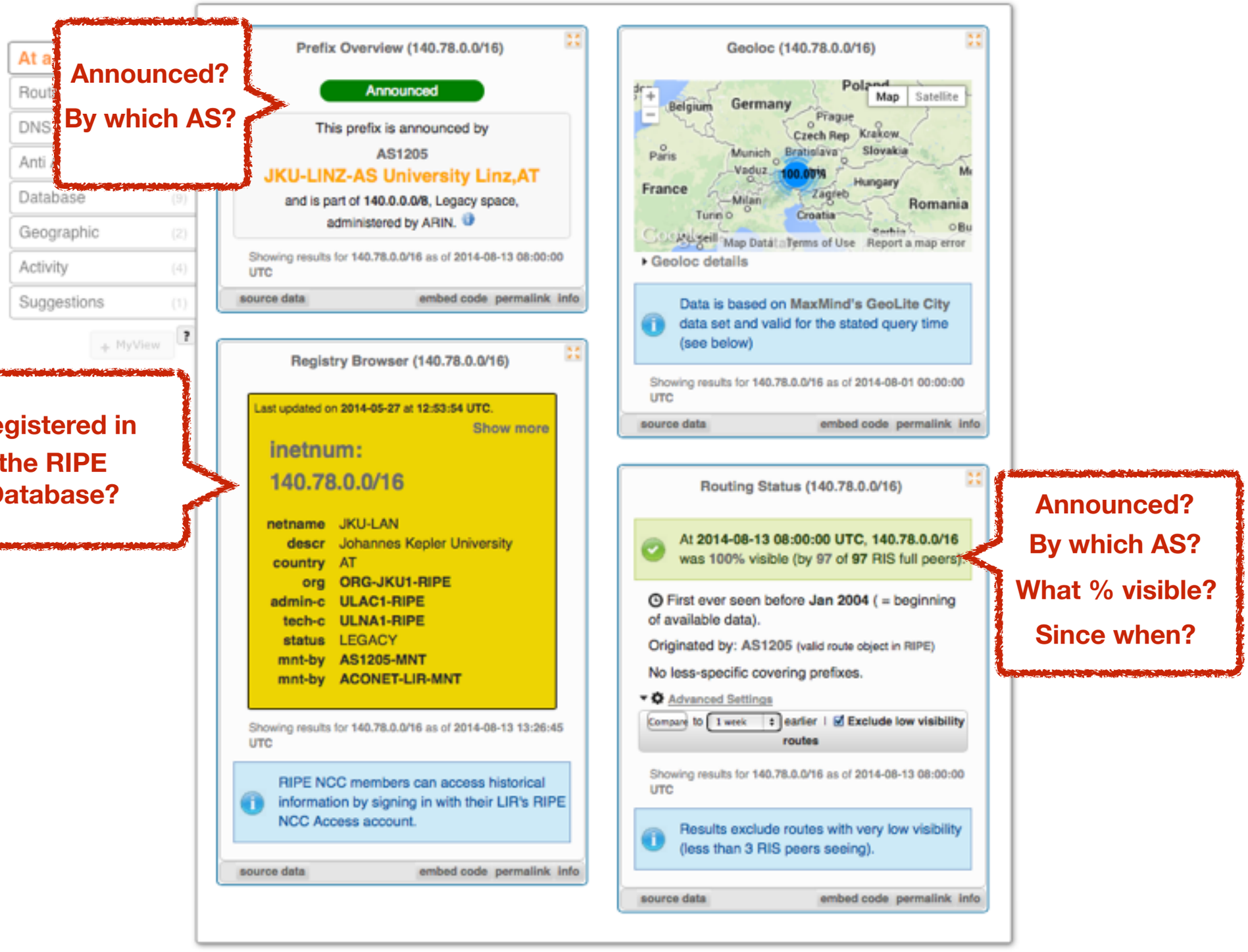
# RIS - Routing Information Service

- RIPE NCC has been collecting BGP information since 1999
  - Raw data: ris.ripe.net



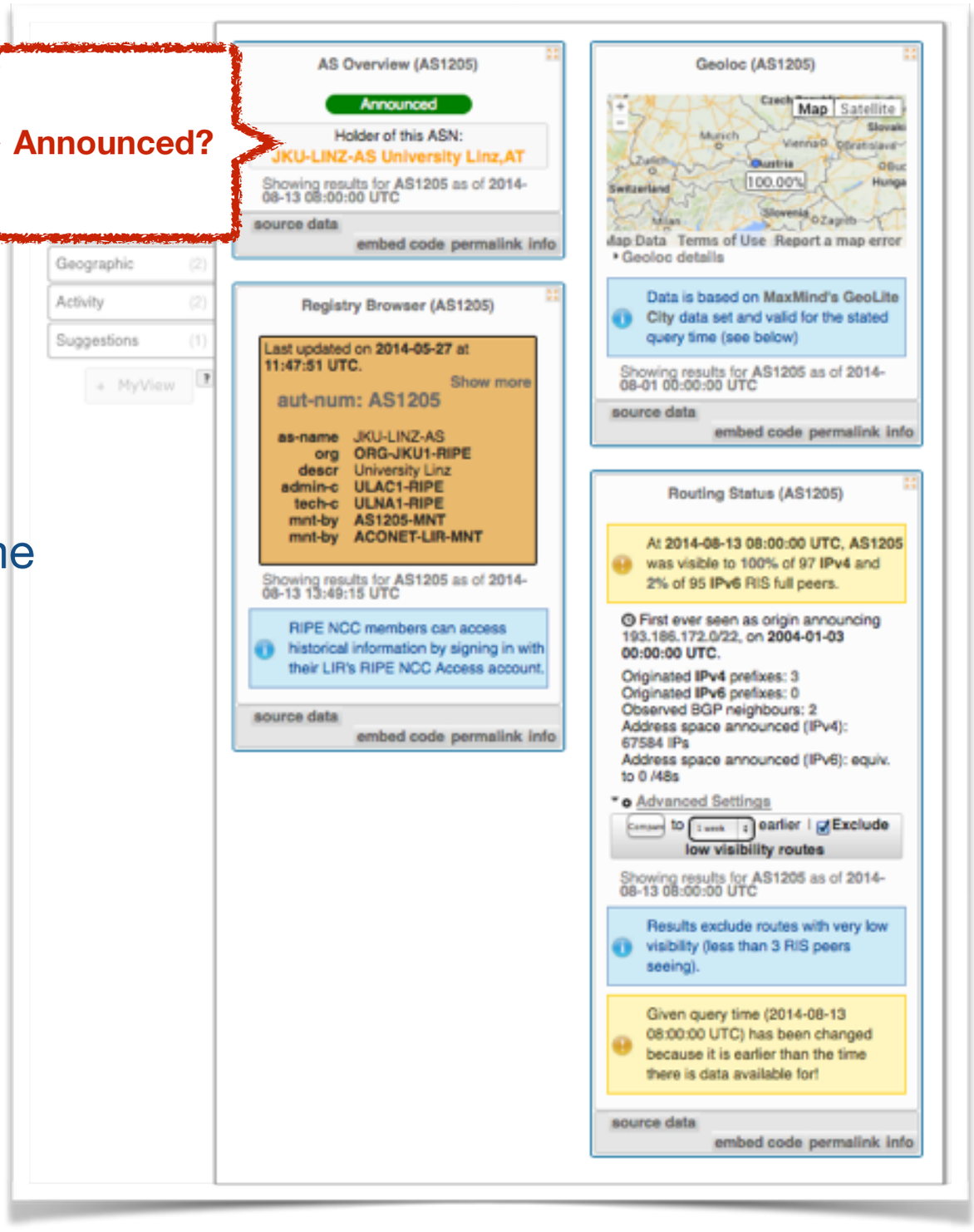
- RIS has 15 route collectors and 600+ peers
- RIPEstat visualises RIS data

# At-a-glance view: Prefix queried



# At-a-glance view: ASN queried

The rest is the same as for a prefix



# BGPlay

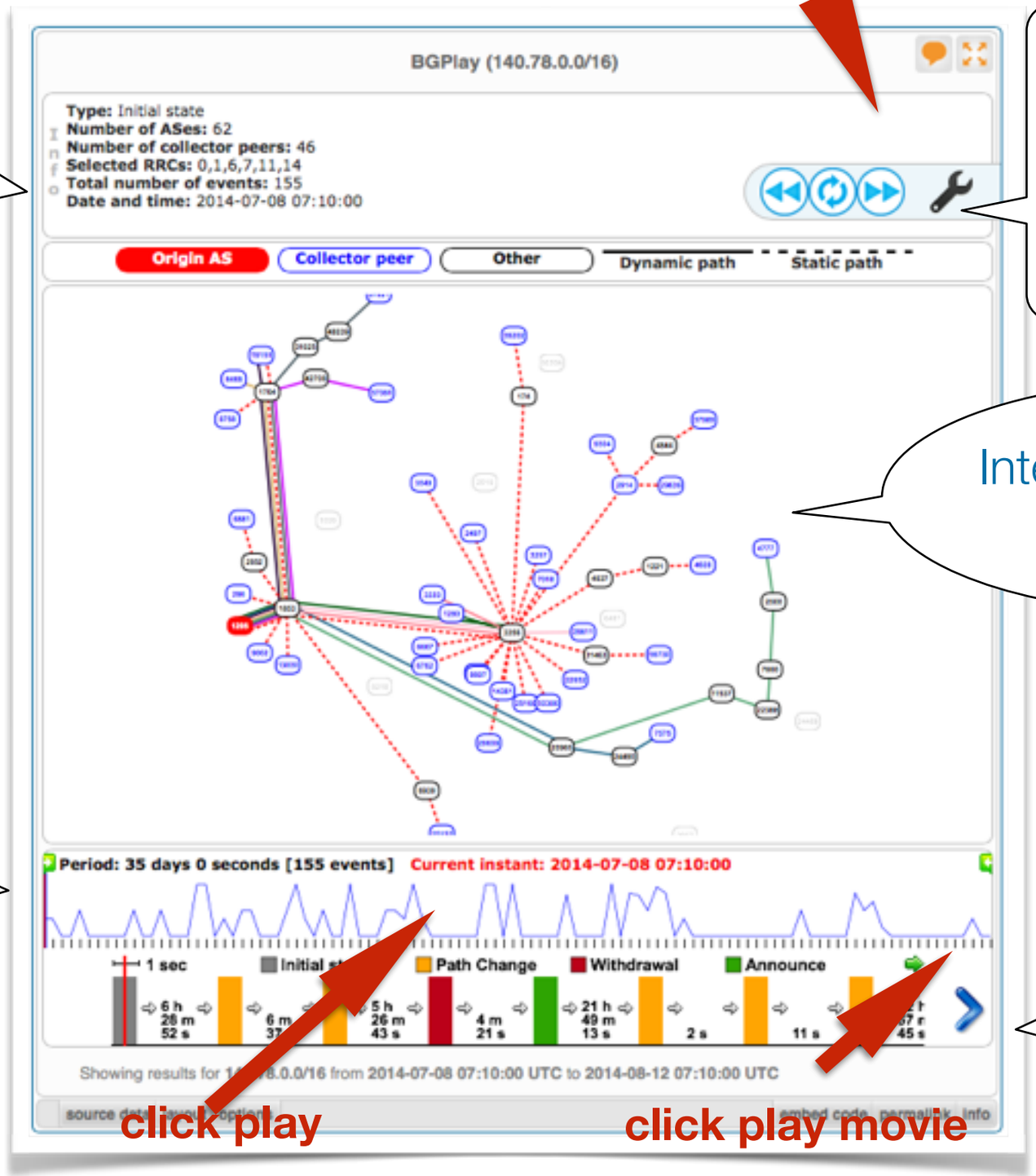
- See how your network is routed
  - Announcements
  - Withdrawals
  - Path changes
- BGPlay shows routing history
  - Animated graphic
  - Highly interactive

https://stat.ripe.net/widget/bgplay

# BGPlay

BGP event, ASN or ASN path details

click play




Control panel:

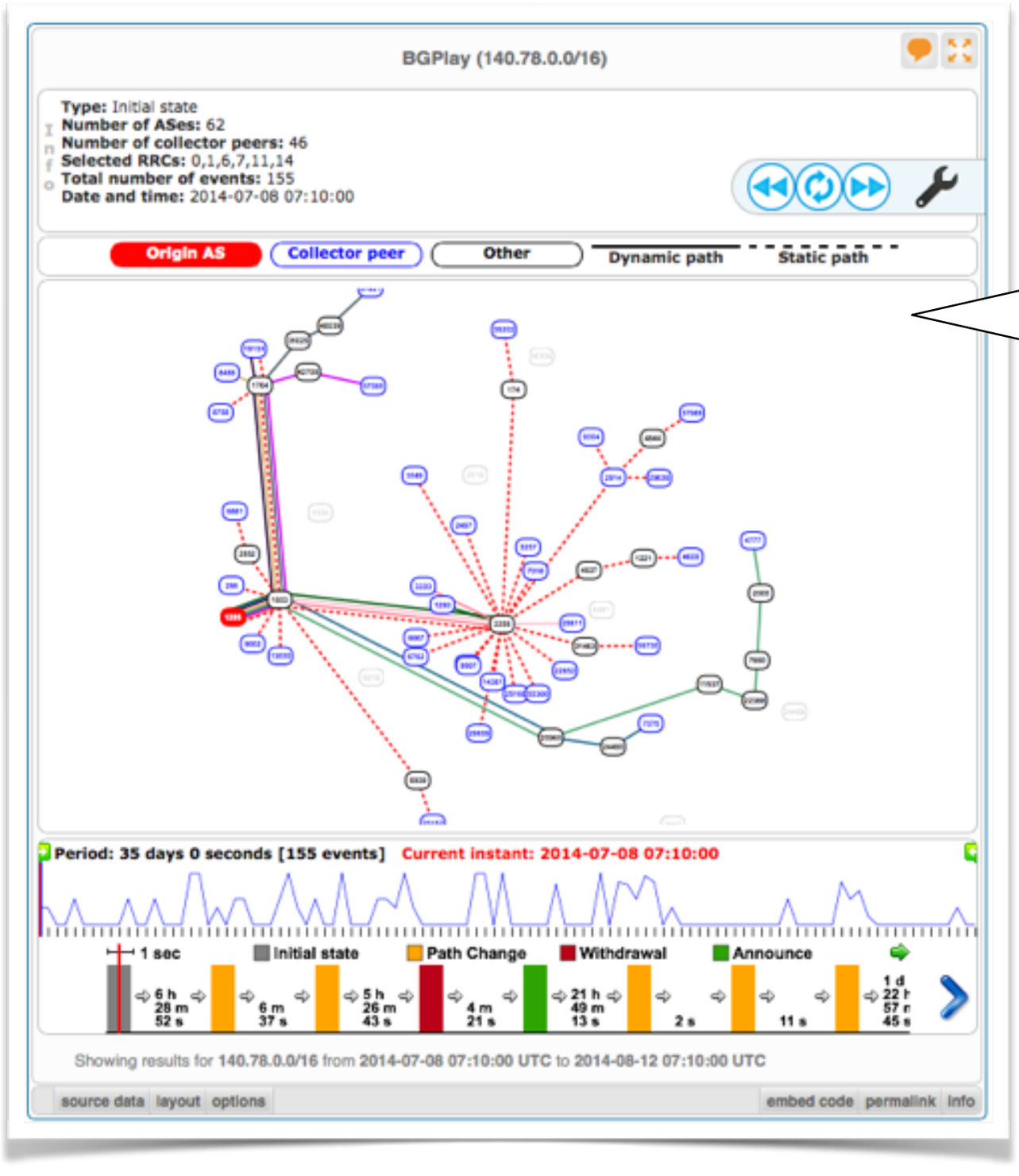
- Covered time period
- RRC selection

Interactive animated graph

Control timeline

Detailed timeline with events

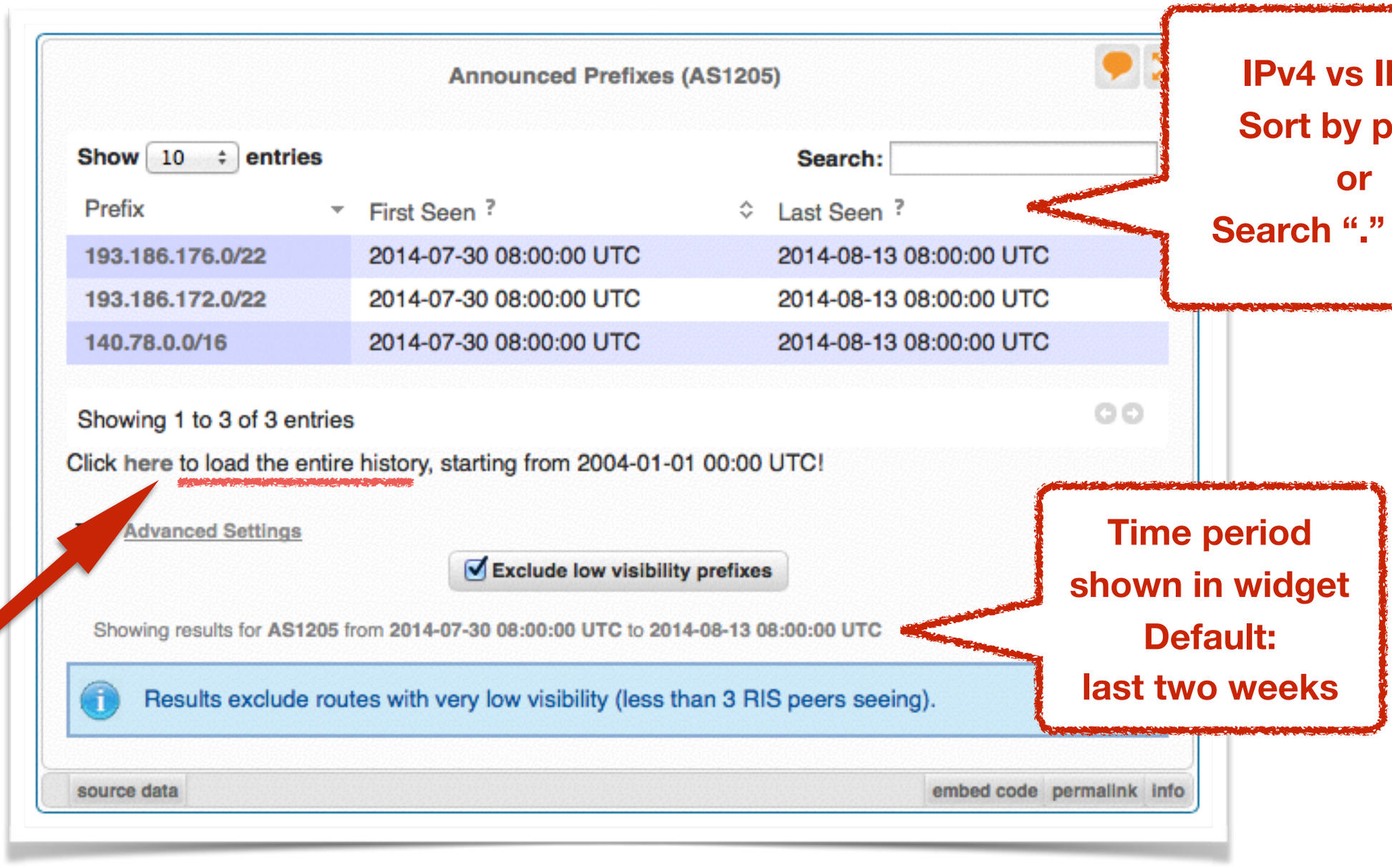
# BGPlay



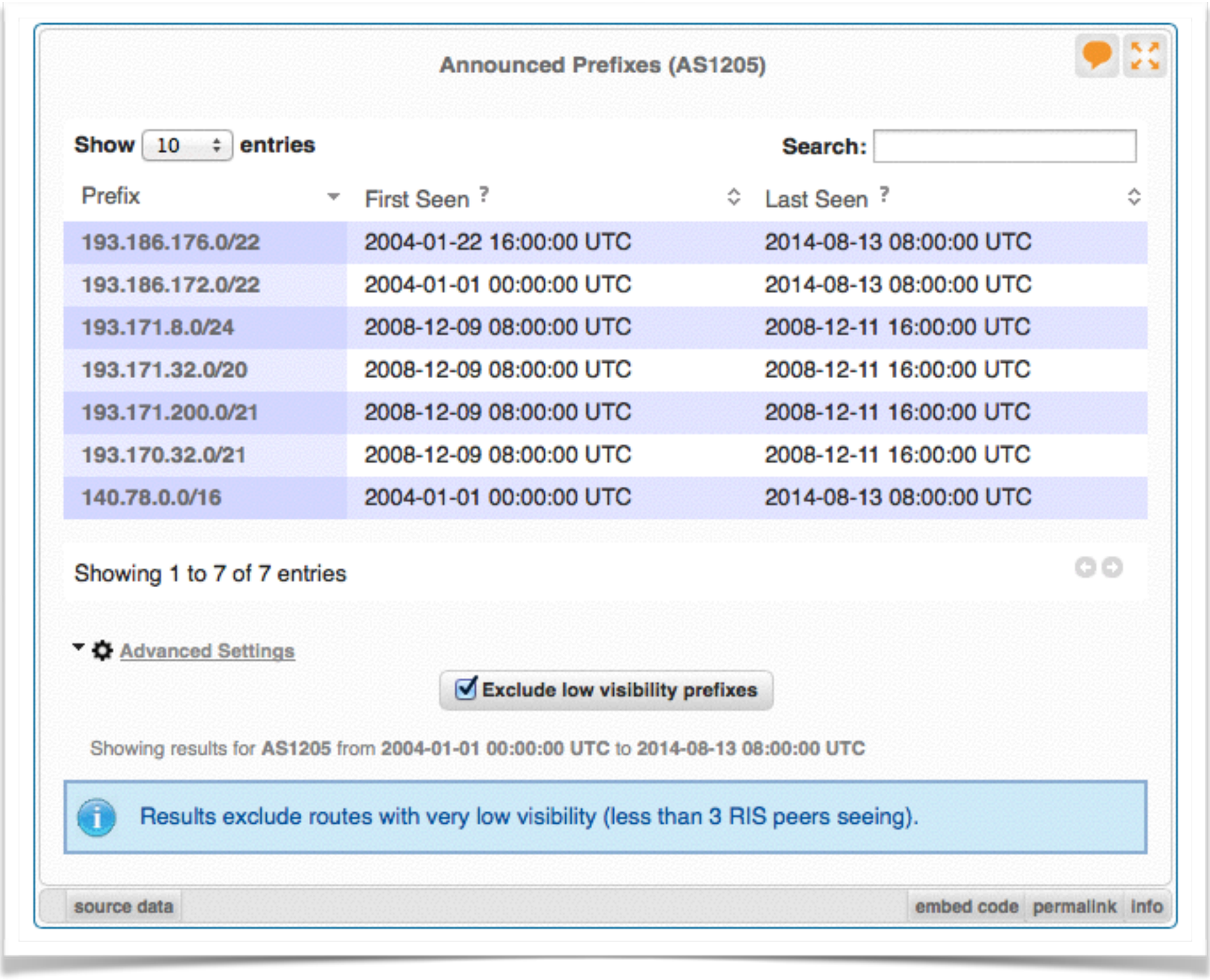

Examples: (2013/8/28-30)

- Prefix with announcements & withdrawals: 84.205.64.0/24
- Check IPv6 connectivity: 2001:67c:2e8::/48
- Multi-homed prefix: 199.7.80.0/24
- BGP hijacking
  2008-02-28: 208.65.153.0/24
  Youtube traffic by Pakistan Telecom AS17557
- Blackholing: 193.33.96.64

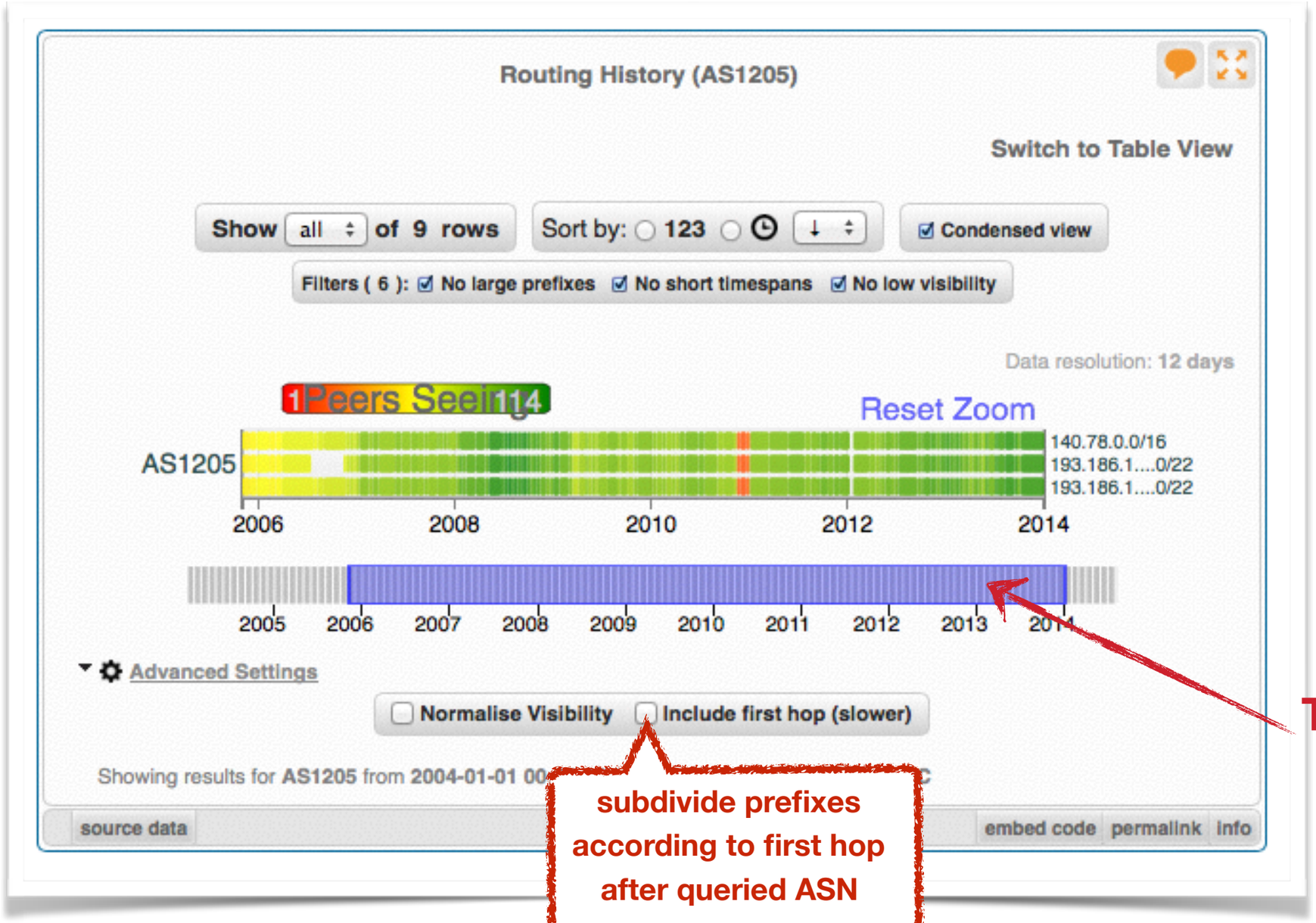
# Prefixes visible for this ASN



# Announced Prefixes: useful for ASN



# History of prefixes announced by ASN



# Exercise B

## BGPlay

Refer to the exercise booklet

# Reporting Abuse

Section 6

# Reporting Abuse

**DON’T PANIC!**

# What to do if your network is attacked?

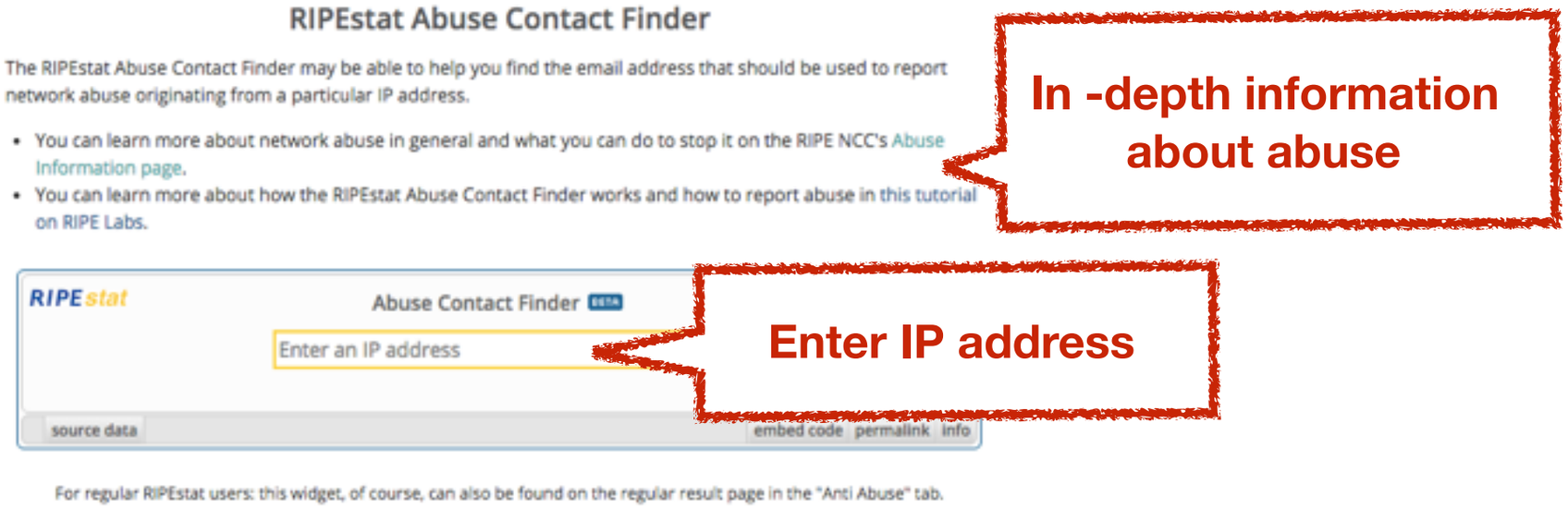
- Spam or unauthorised access?
  - Find IP in message headers or logs
- Want to contact their admin?
  - Find the correct email for reporting abuse
- RIPE Database
  - Contact details for every ASN and IP address
  - In Europe, the Middle East and parts of Central Asia

https://labs.ripe.net/Members/cteusche/finding-anti-abuse-contact-information-with-ripestat

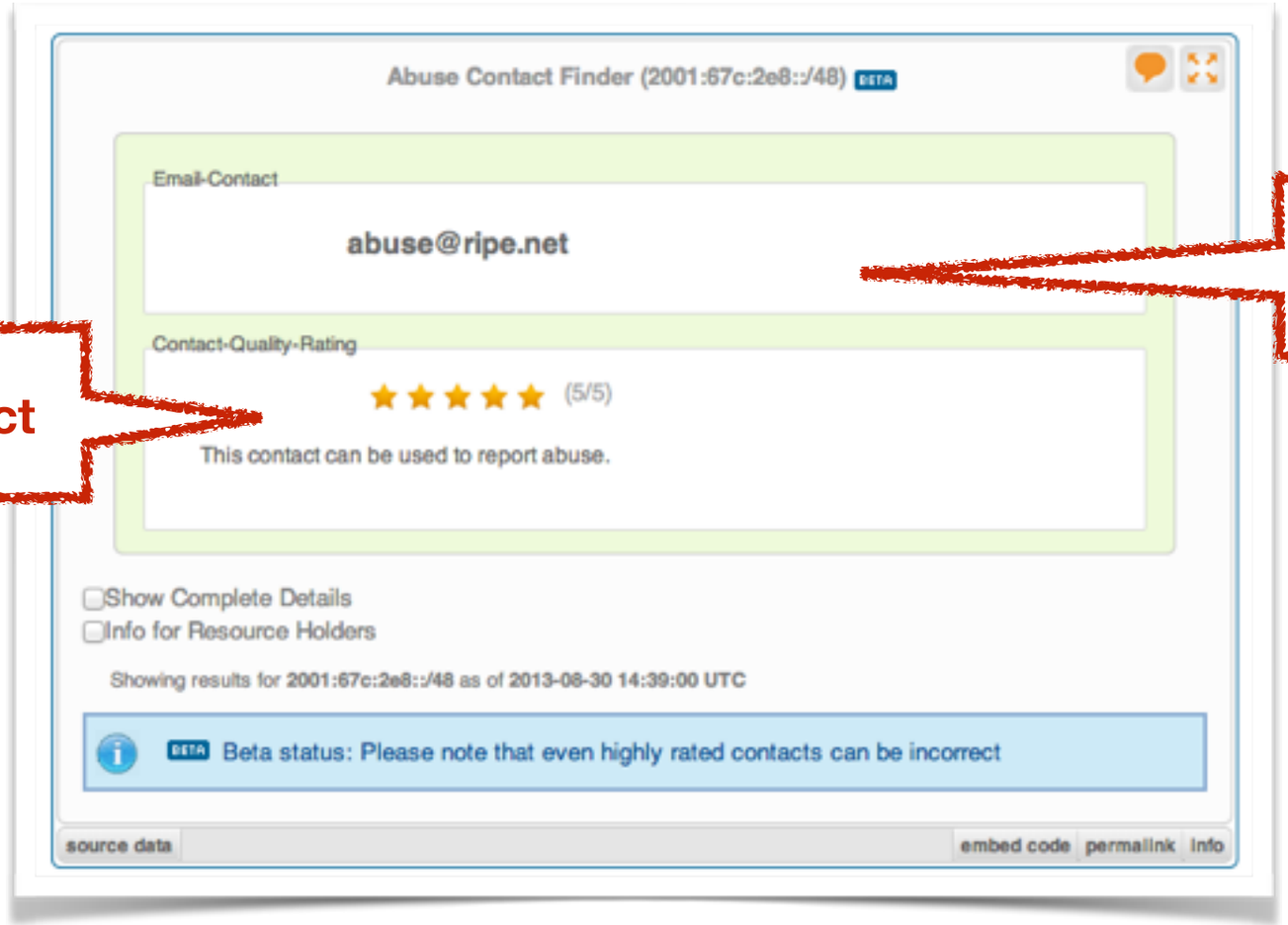
# Reporting Abuse

- Take action with the Abuse Contact Finder

  https://stat.ripe.net/abuse



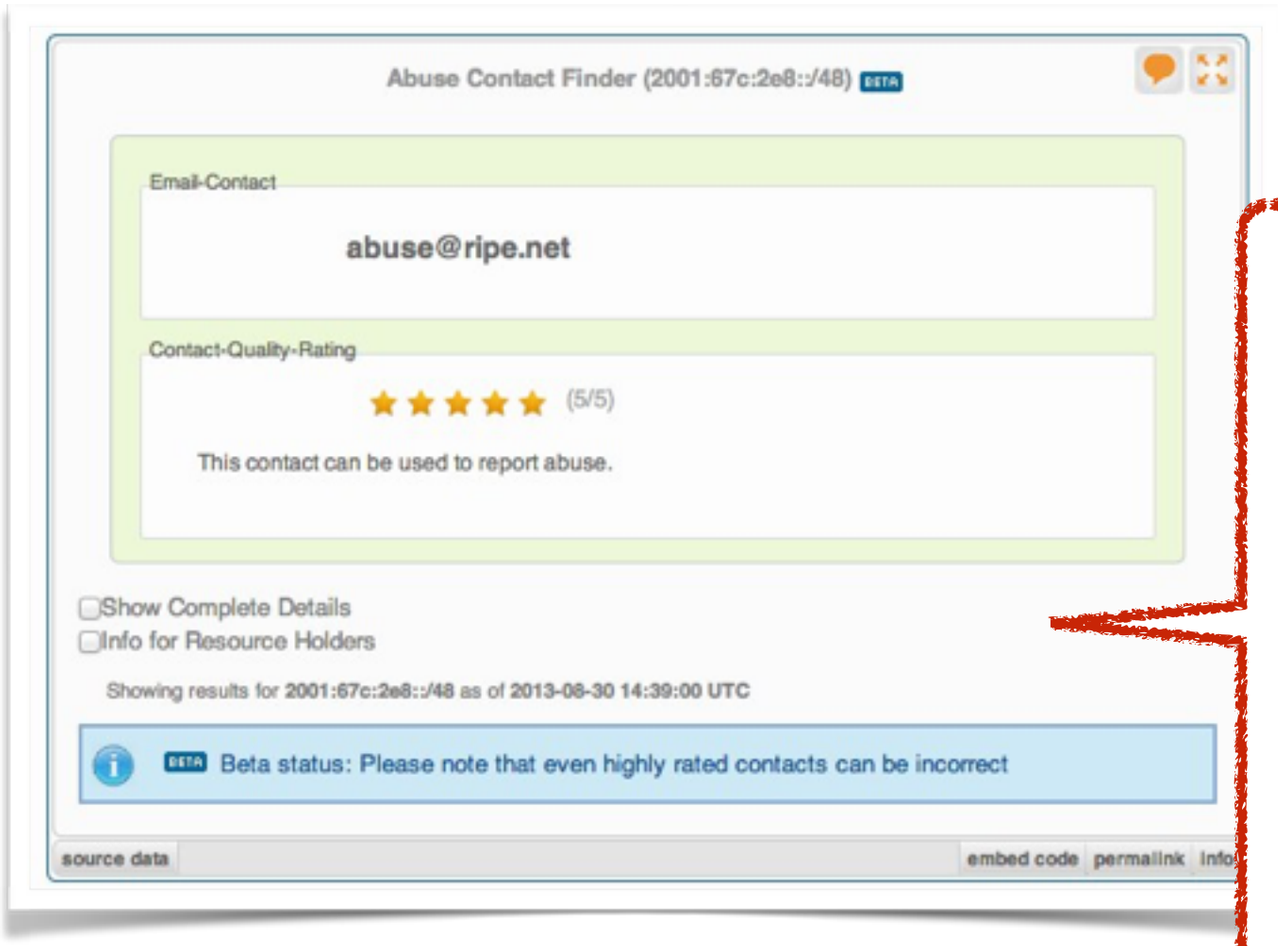
# Reporting Abuse



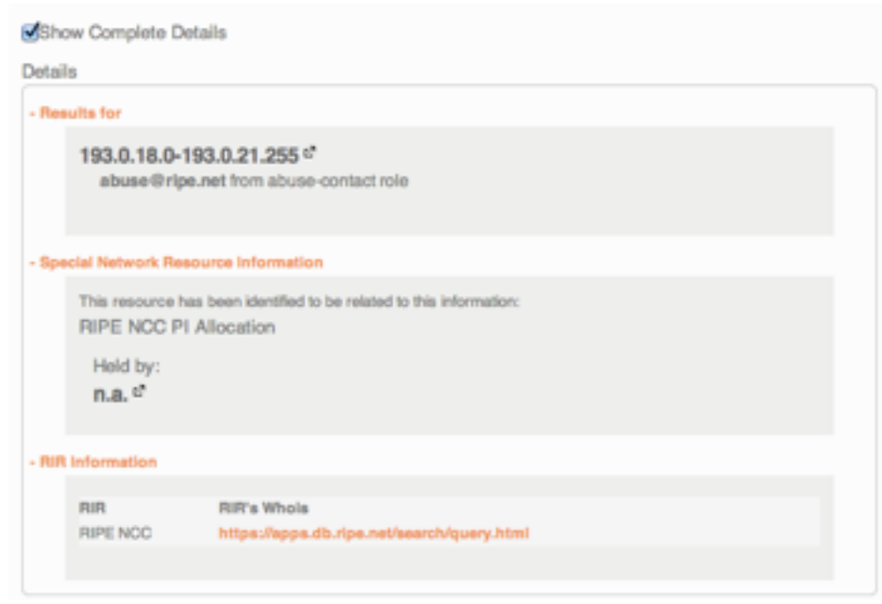

Email contact to report abuse

Rating of the contact

# Reporting Abuse




Details about the resource and abuse contact:



# Exercise C

## Handling abuse

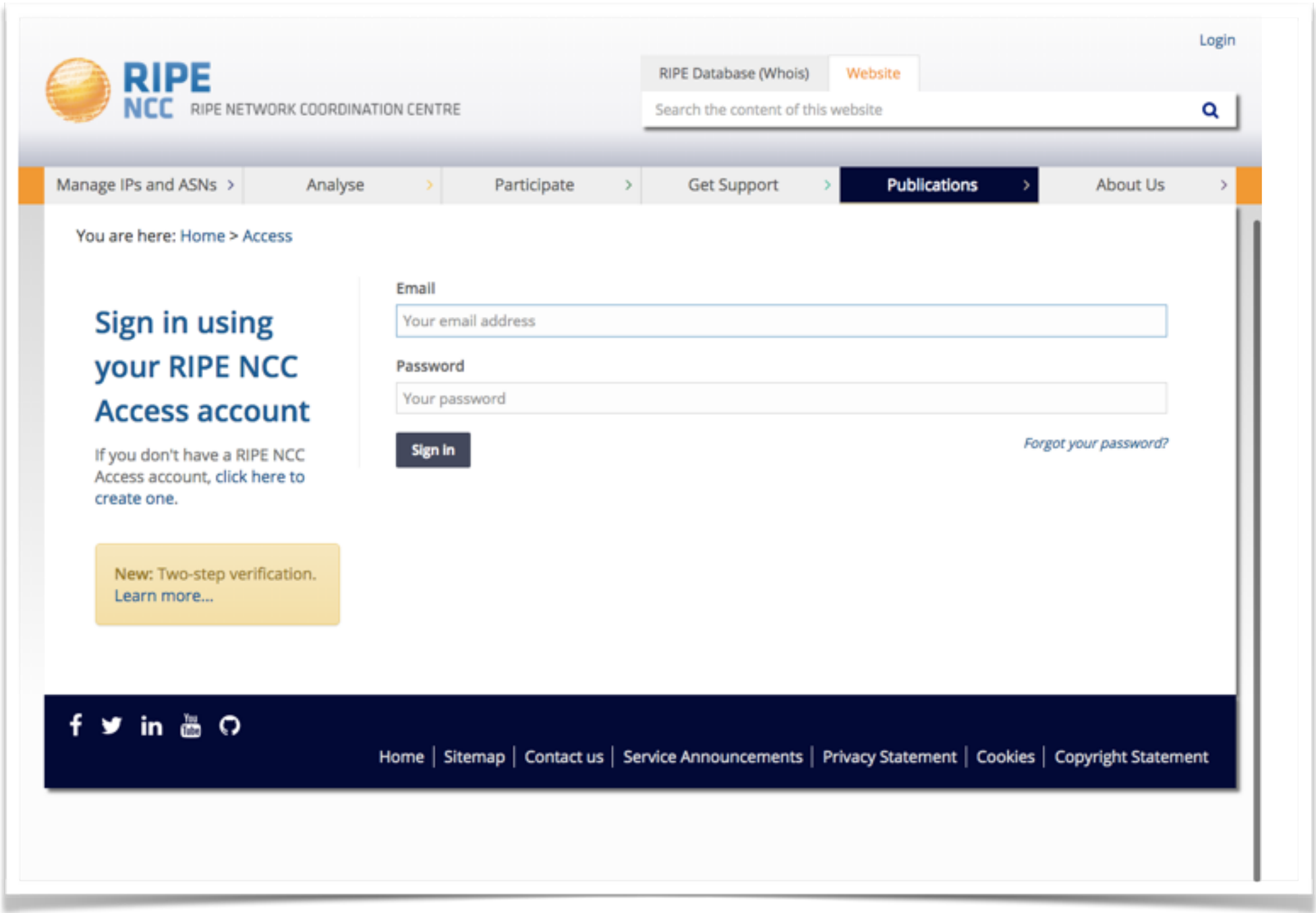
Refer to the exercise booklet

# Personalising RIPEstat

## Section 6

# Create a RIPE NCC Access Account

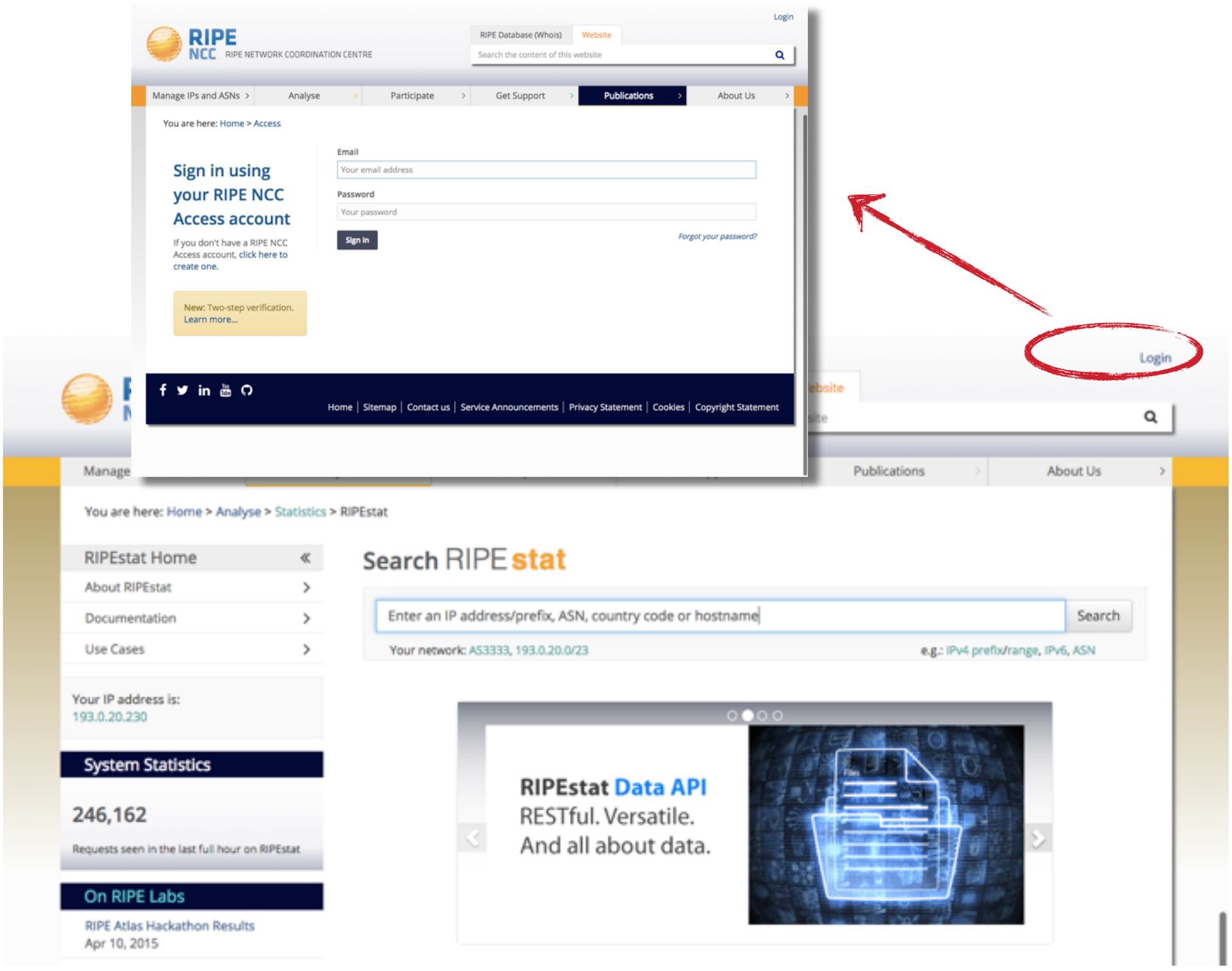
## https://access.ripe.net



# Why personalise RIPEstat?

- If you have recurring lookup tasks that involve different widgets spread over multiple tabs
- Building a “history” of your lookups

# Log into RIPE NCC Access Account



# MyView

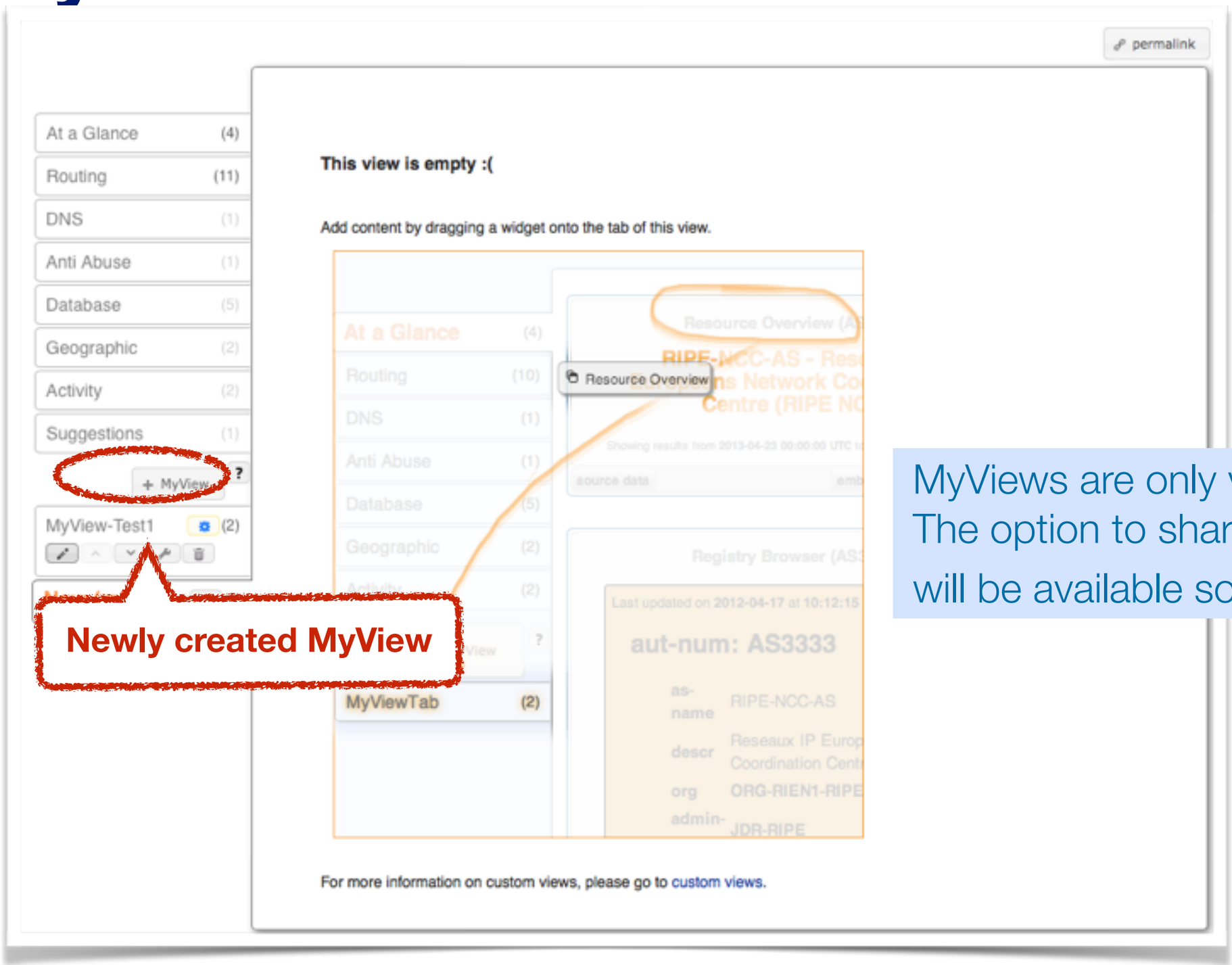
- Create custom views

  - Click the “MyView” button

  - Drag and drop the widgets you want on the MyView tab

- Created under “ASN” or “IP”

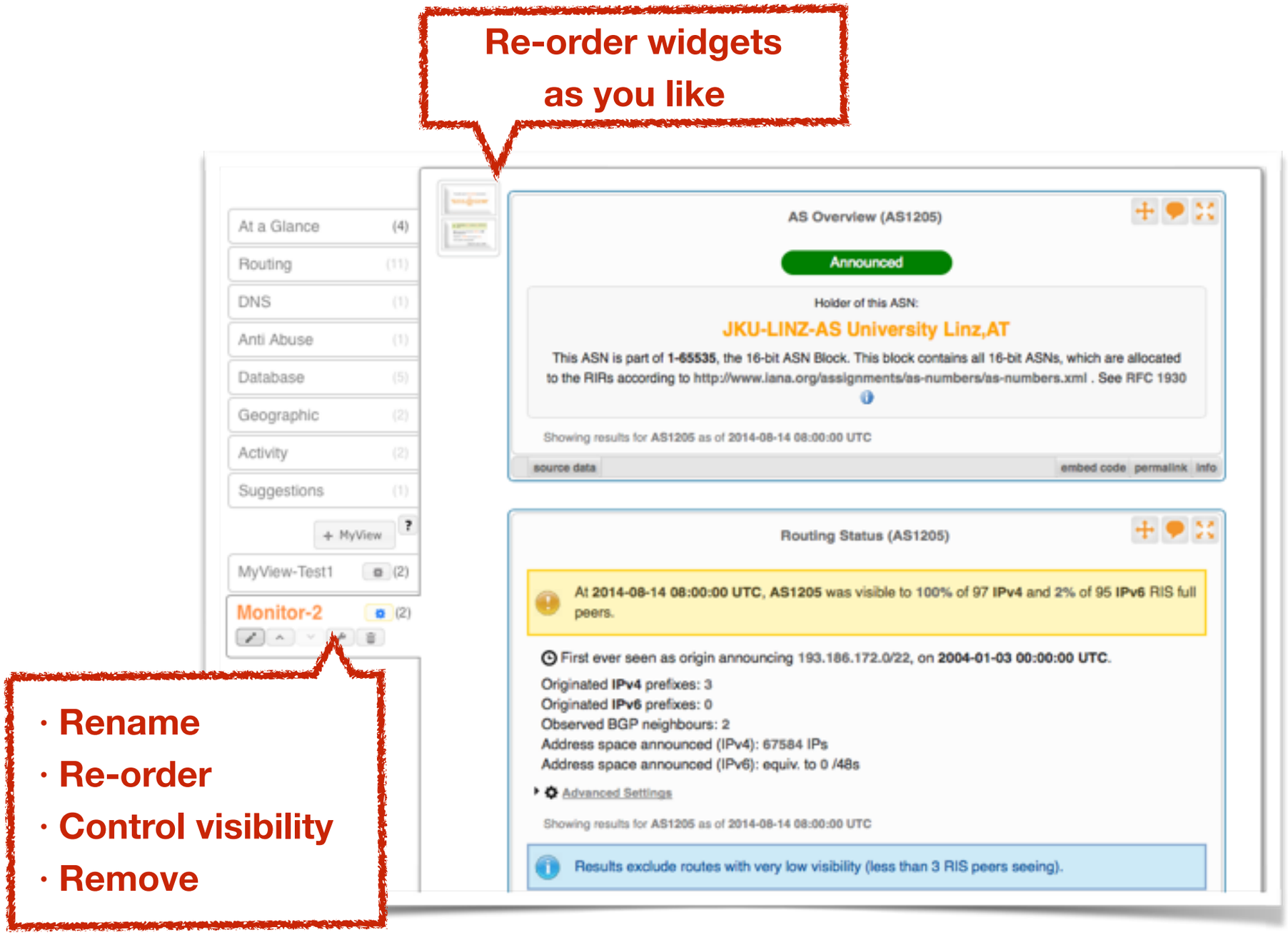
# MyView




MyViews are only visible to you.

The option to share your views will be available soon!

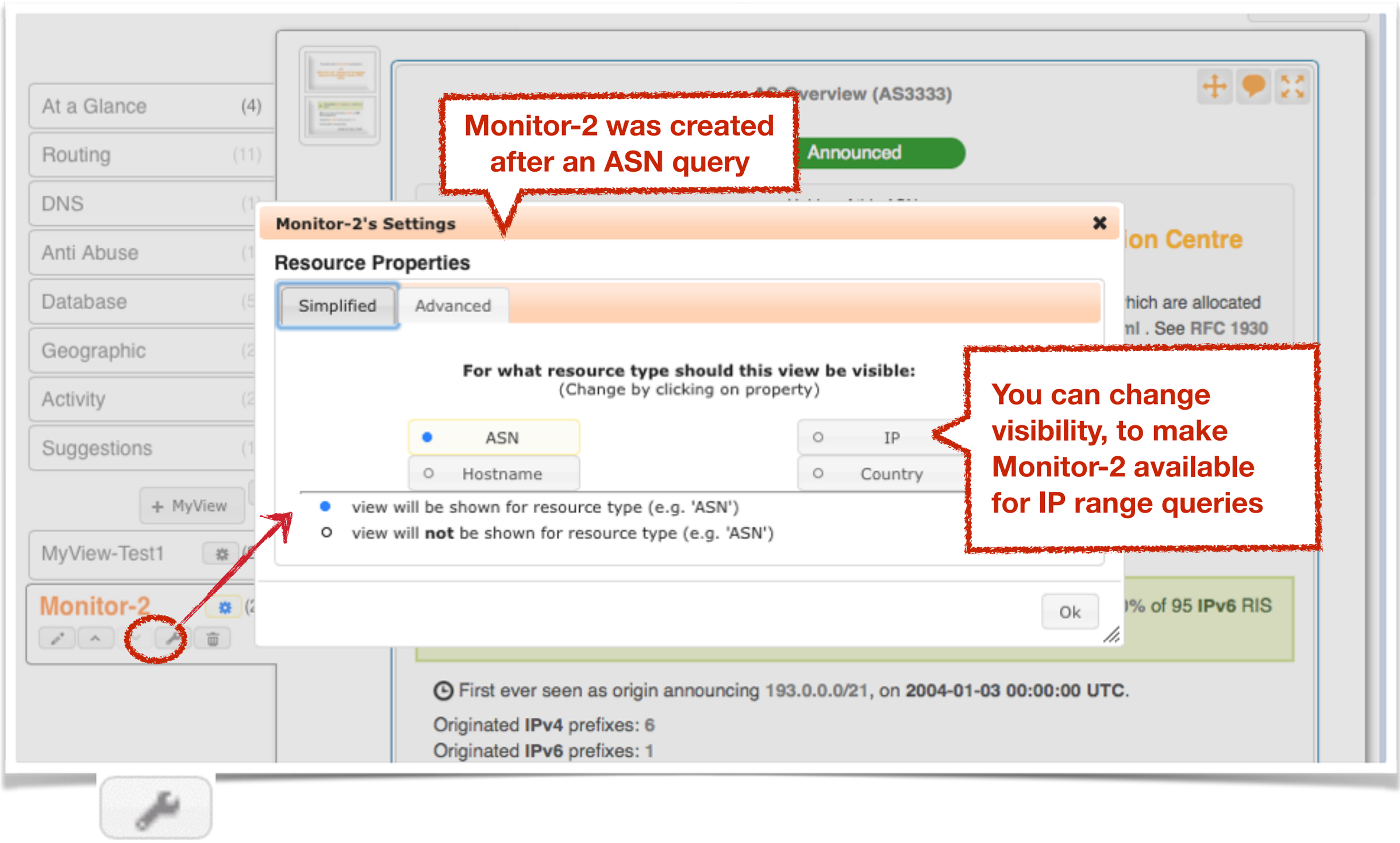
# Customise MyView



# Visibility of MyView

- MyView is only accessible after you have queried an ASN or IP
- A MyView created after an ASN query is only visible for other ASN queries
- A MyView created after IP query is only visible for other IP queries
- This can be changed via settings

# Controlling Visibility



# MyView Summary

- RIPE NCC Access login required
- Customised selection of widgets
- It’s like an extra tab, specifically for your queries
- By default, available for one type of resource (ASN or IP)
- Can’t be shared

# Exercise D

## MyView

Refer to the exercise booklet

# Comparing Networks

## Section 8

# Why compare networks?

- Want to peer with AS-X?

  - Learn by opening multiple widgets about AS-X

- Choosing upstream ?

  - Compare AS-X with AS-Y by opening same widget loaded with two different ASNs

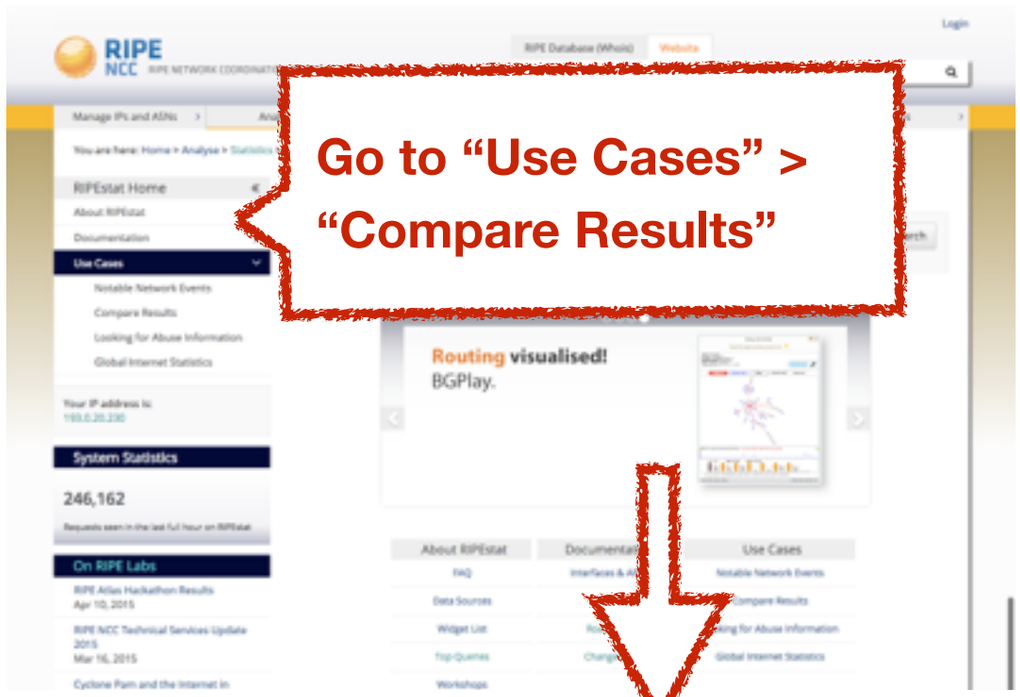
- Internet outage in a country?

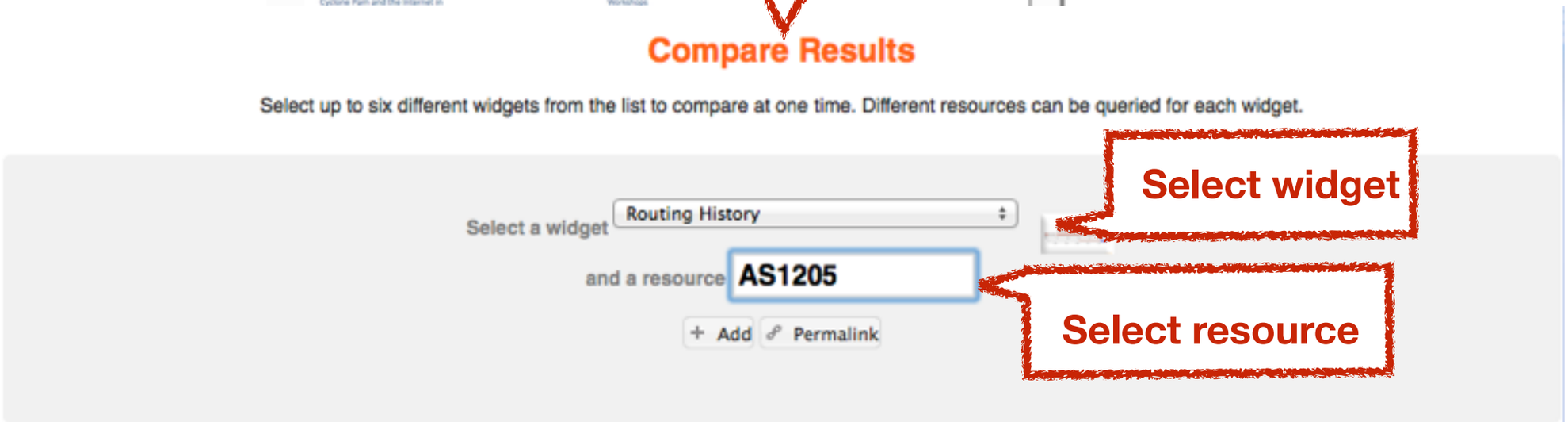
  - Open multiple country-related widgets in same view

https://labs.ripe.net/Members/suzanne_taylor_muzzin/ripestats-multiple-widget-and-resource-comparison

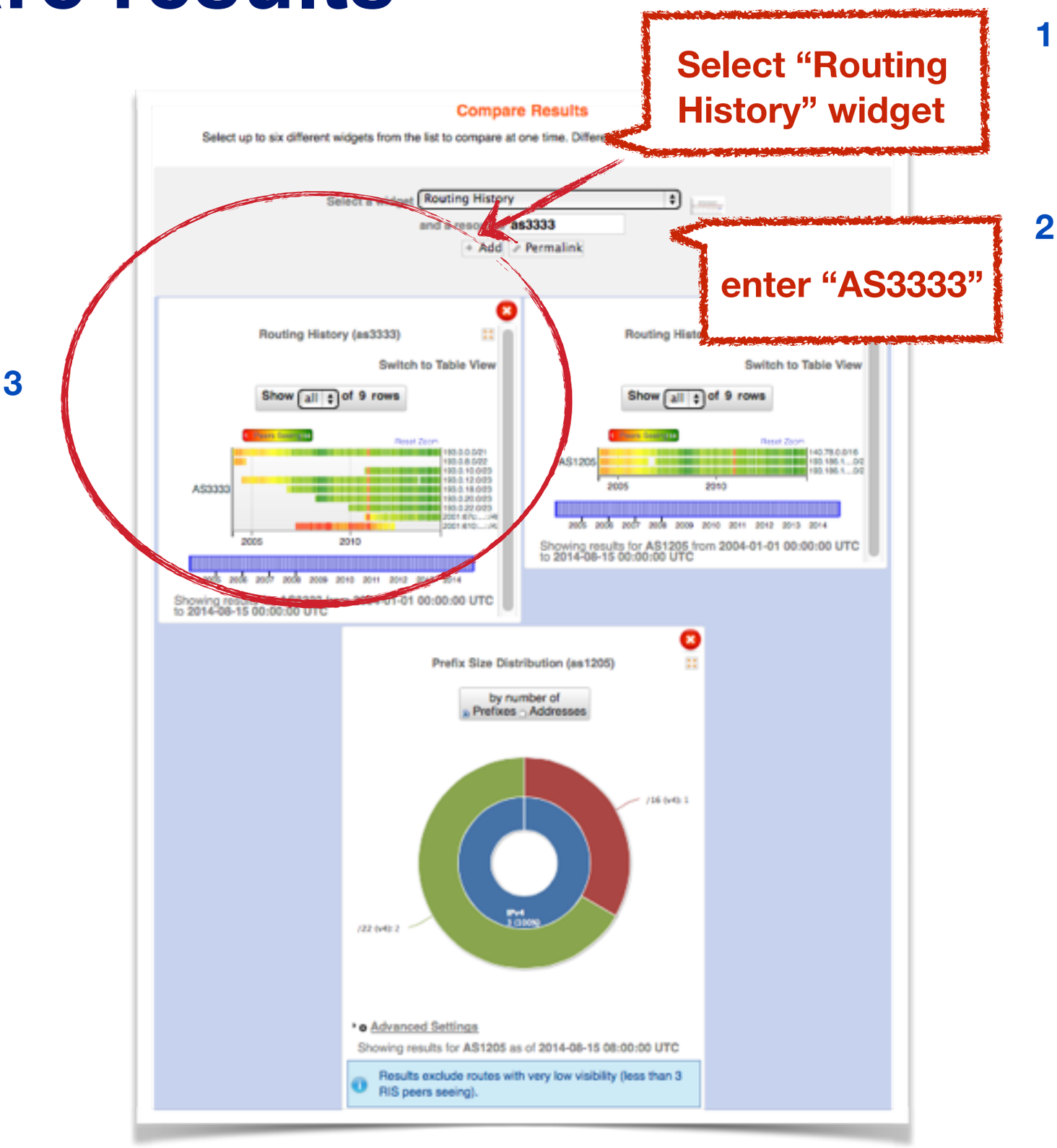
# How to compare

- Compare results in different widgets

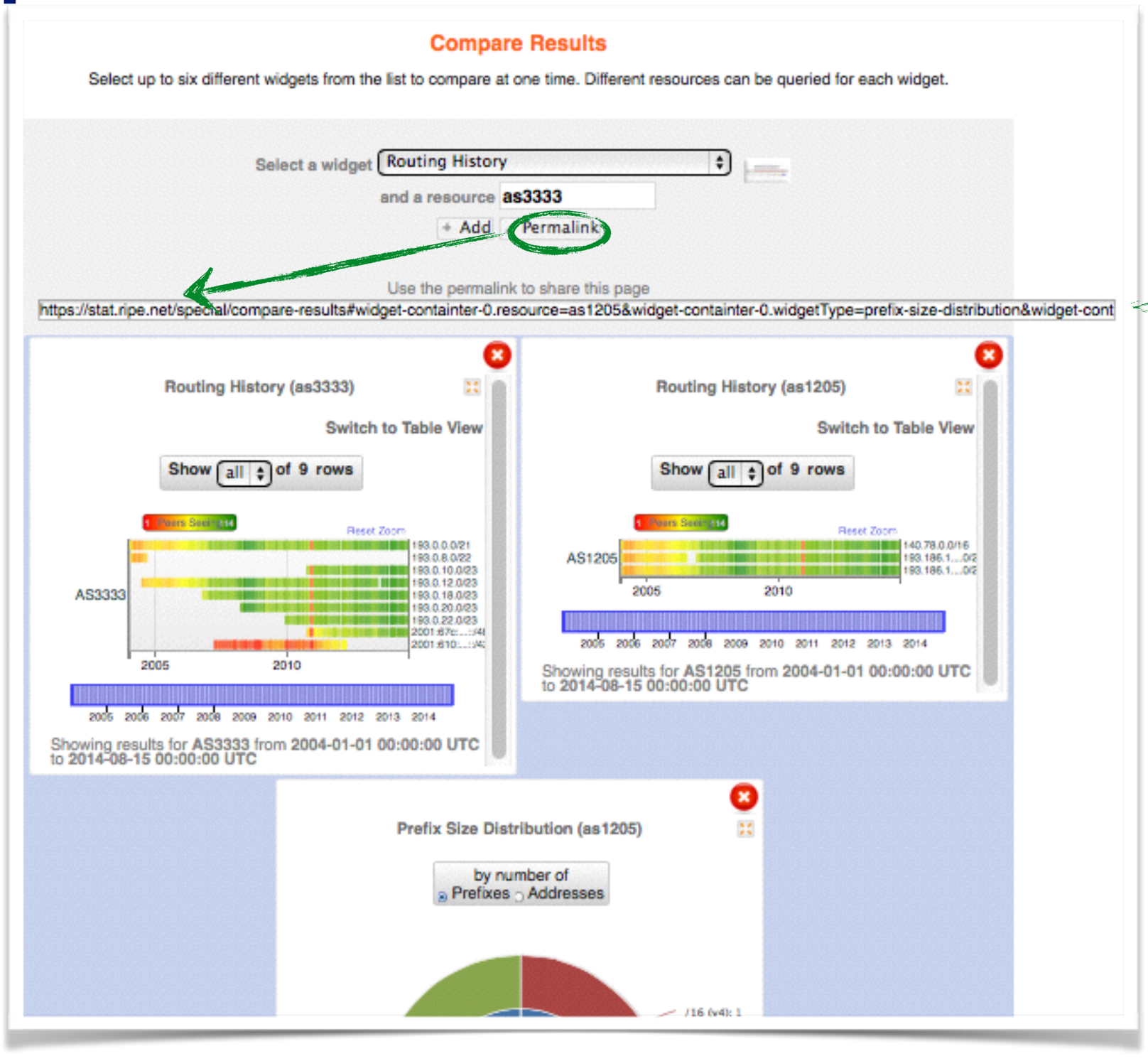


# Compare results



# Compare results




Share via “Permalink”

# Compare resources summary

- No login required
- Add widgets AND input query for each widget (ASN, IP, etc.)
- It is a result page with widgets and query results
- Share it via a permalink

# Comparing countries in one widget

- Compare the growth of ASNs in DE and NL
- See IPv6 adoption rate in four countries at the same time
- Analyse IP hijacking with ‘BGP Update Activity Widget’

https://labs.ripe.net/Members/wilhelm/bgp-leaks-in-indonesia)

https://labs.ripe.net/Members/suzanne_taylor_muzzin/new-in-ripestat-in-widget-comparison-and-monitoring

# In-widget comparison

- Country Routing Statistics

# Exercise E

## Comparing Results

Refer to the exercise booklet

# Exercise F

## RIPEstat Use Cases

# Use Cases

- How can you see whether someone has hijacked your prefixes?

- How can you see whether you had an outage?

# Questions

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@cteuschel

# RIPE Atlas

# Overview 2 - RIPE Atlas

RIPE Atlas

- Introduction to RIPE Atlas
- What you can get from RIPE Atlas as a visitor
- Exploring public probes
  - *Live Demo*
- Finding public measurements
  - *Exercise F: Analyse results*
- Creating a measurement
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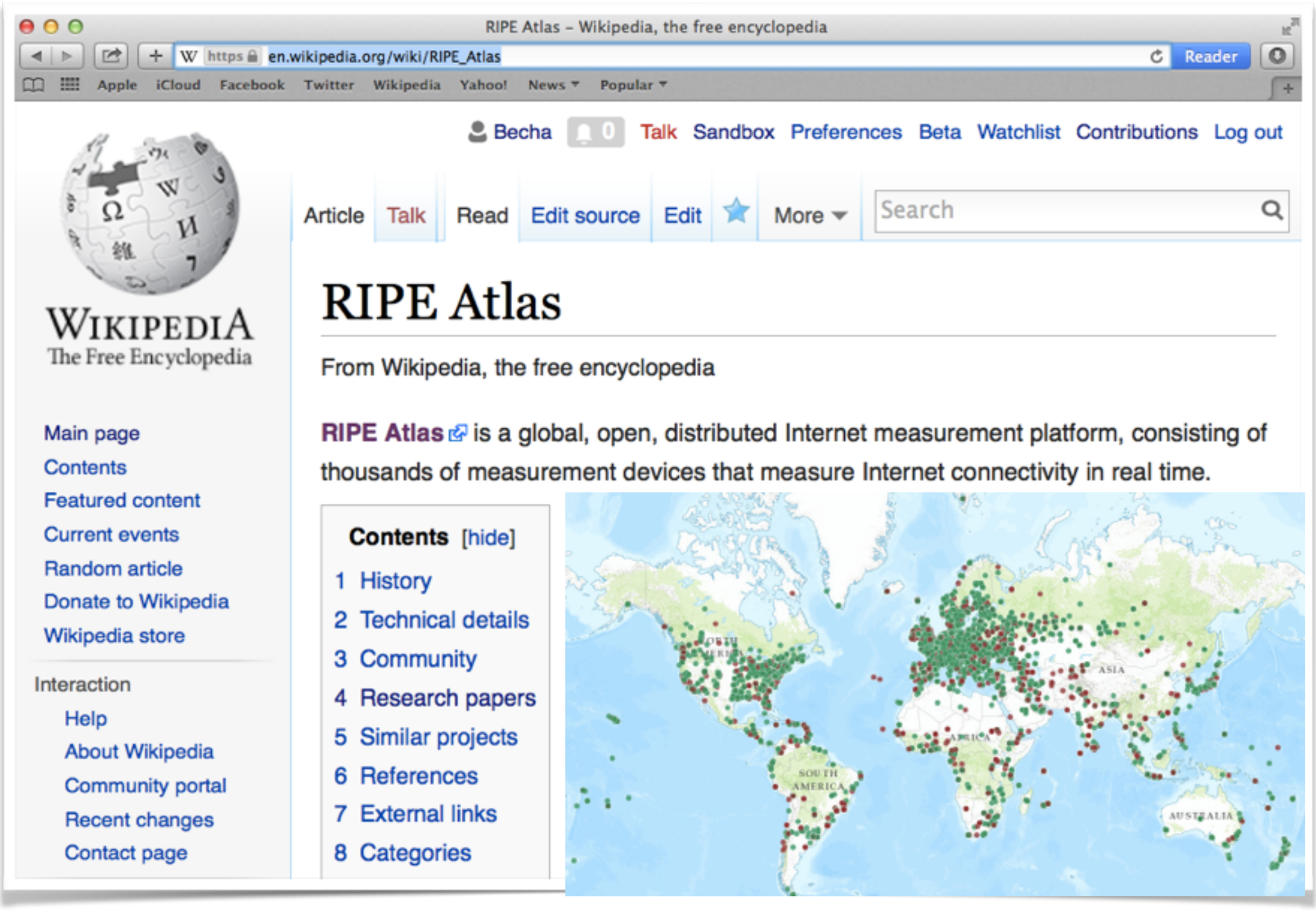
- ~~Advanced topics~~ - *not part of this workshop*
  - ~~Use cases and success stories~~
  - ~~RIPE Atlas anchors~~
  - ~~RIPE Atlas community~~

# Introduction to RIPE Atlas

## Section 9

# RIPE Atlas


RIPE Atlas – Wikipedia, the free encyclopedia
https
en.wikipedia.org/wiki/RIPE_Atlas
Reader
Apple
iCloud
Facebook
Twitter
Wikipedia
Yahoo!
News
Popular
Becha
0
Talk
Sandbox
Preferences
Beta
Watchlist
Contributions
Log out
Article
Talk
Read
Edit source
Edit
More
Search
WIKIPEDIA
The Free Encyclopedia
Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store
Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page
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
ASIA
SOUTH AMERICA
AUSTRALIA

# Definition

- RIPE Atlas = global active measurements platform
- Goal: View Internet reachability
- Probes hosted by volunteers
- Measurements performed towards root name servers

  - Visualised as Internet traffic maps

- Users can also run customised measurements

  - ping, traceroute, DNS & SSL/TLS, NTP and HTTP*

# RIPE Atlas in numbers: April 2016

- 9,300+ probes connected
- 350+ active probes in SEE countries
- Countries: 181
- Originating ASNs:

  3,398 (IPv4) = 6,4% coverage
  1,246 (IPv6) = 11,21% coverage

## Overview on SEE countries

| | Connected | Disconnected | Anchor |
|---|---|---|---|
| Albania (AL) | 19 | 7 | 0 |
| Slovenia (SI) | 46 | 5 | 1 |
| Serbia (RS) | 42 | 6 | 2 |
| Kosovo (XK) | 0 | 0 | 0 |
| Croatia (HR) | 43 | 6 | 0 |
| Macedonia (MK) | 16 | 4 | 0 |
| Romania (RO) | 56 | 9 | 1 |
| Bulgaria (BG) | 81 | 18 | 3 |
| Bosnia and Herzegovina | 9 | 3 | 0 |
| Montenegro (ME) | 4 | 0 | 0 |

# Measurements Devices

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

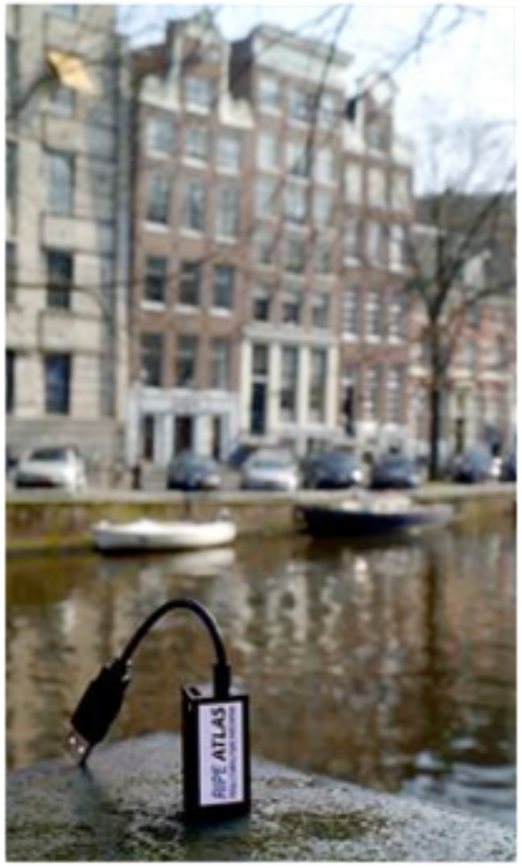
  - Does not work as a wireless router
  - Same functionality as the old probe

- RIPE Atlas anchor: Soekris net6501-70

# 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
- New: “Time Travel”, LatencyMON, DomainMON
- Status checks (Icinga & Nagios)

# Probe Photos



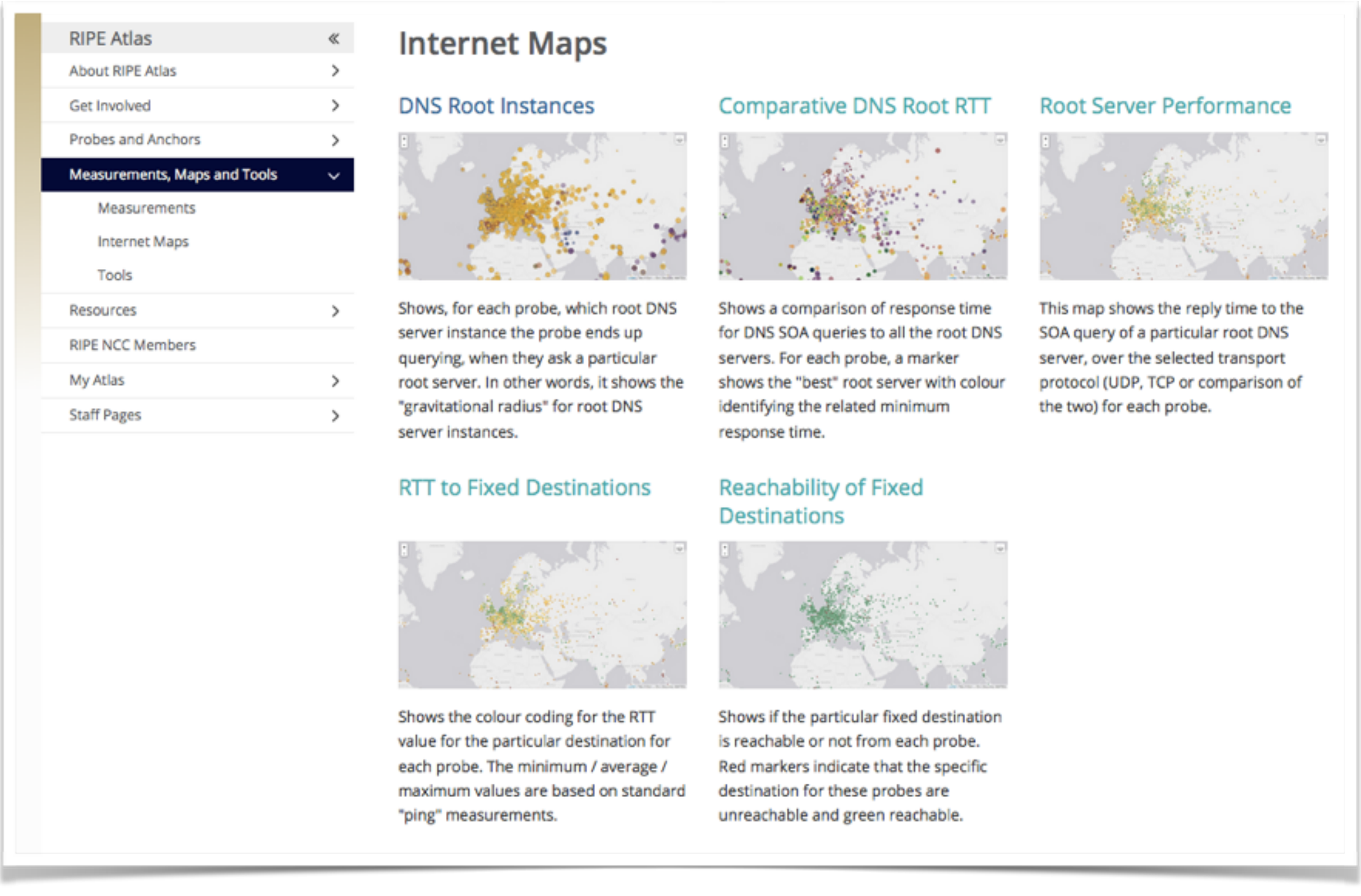
# Contacting RIPE Atlas

- https://atlas.ripe.net
- Users mailing list: ripe-atlas@ripe.net
- Articles & updates on RIPE Labs: https://labs.ripe.net/atlas
- Questions and bugs: atlas@ripe.net
- Twitter: @RIPE_Atlas and #RIPEAtlas

# What You Can Get From RIPE Atlas As A Visitor

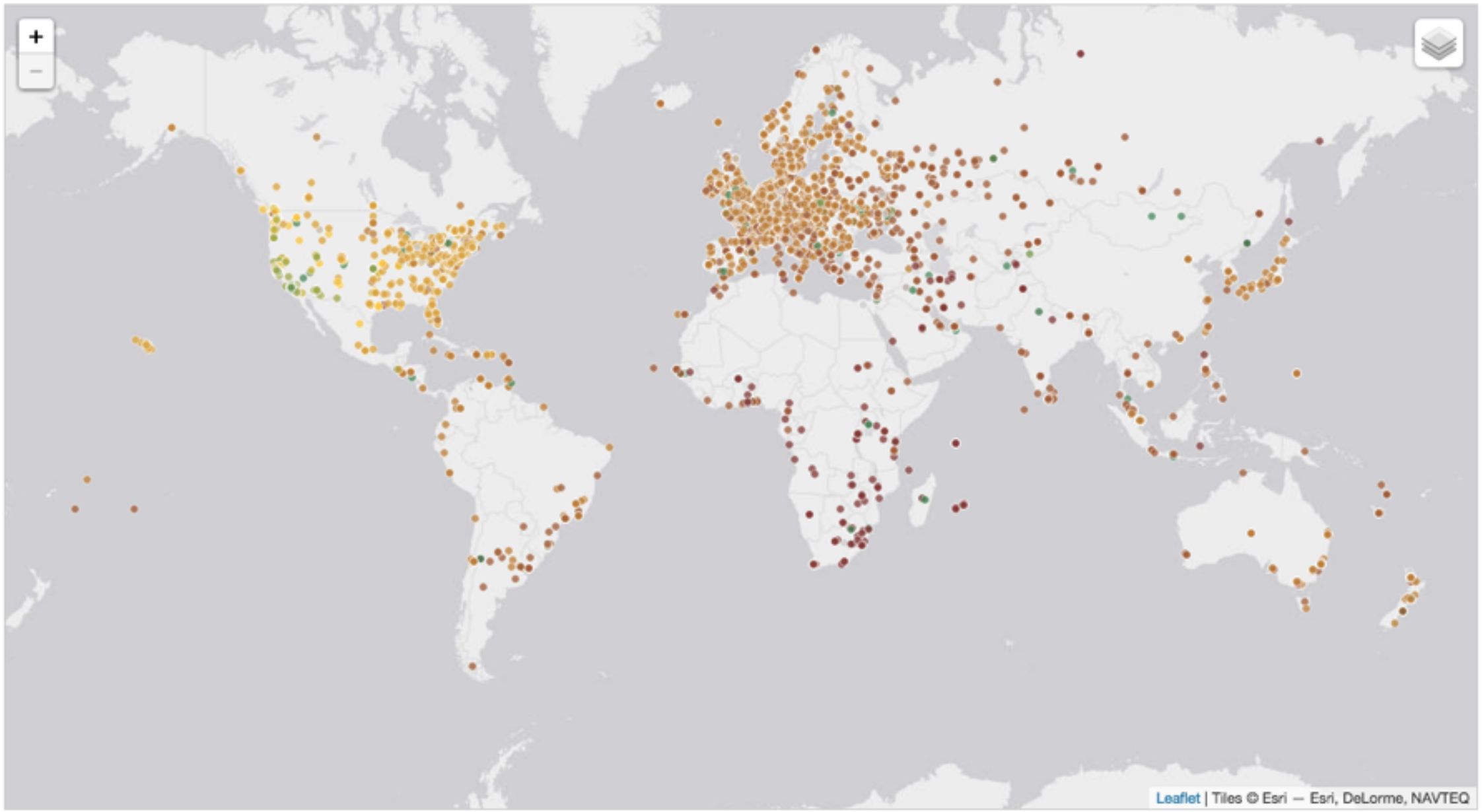
Section 10

# Internet Traffic Maps



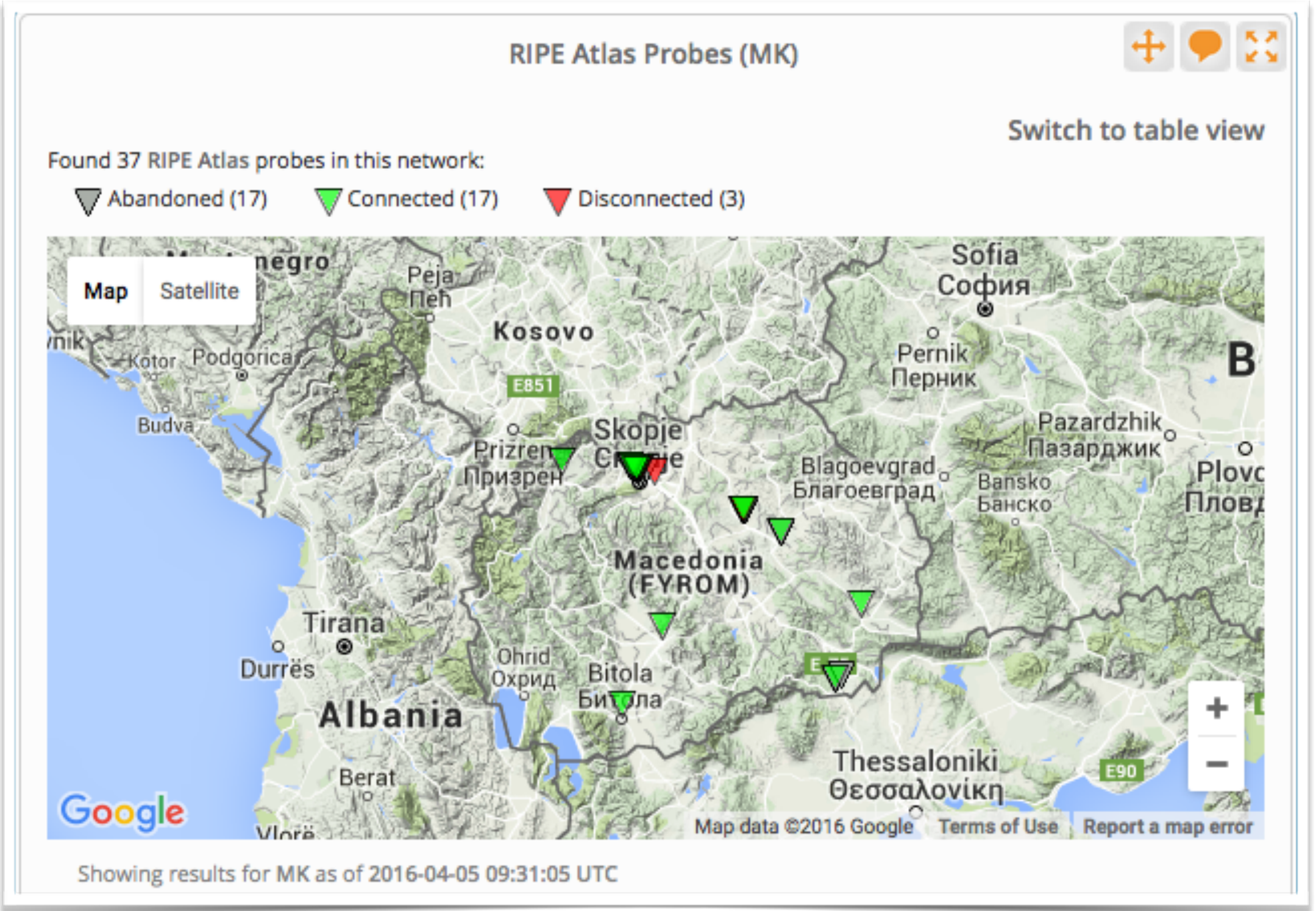
# Where is B-root?

We display measurement results from the last hour only.

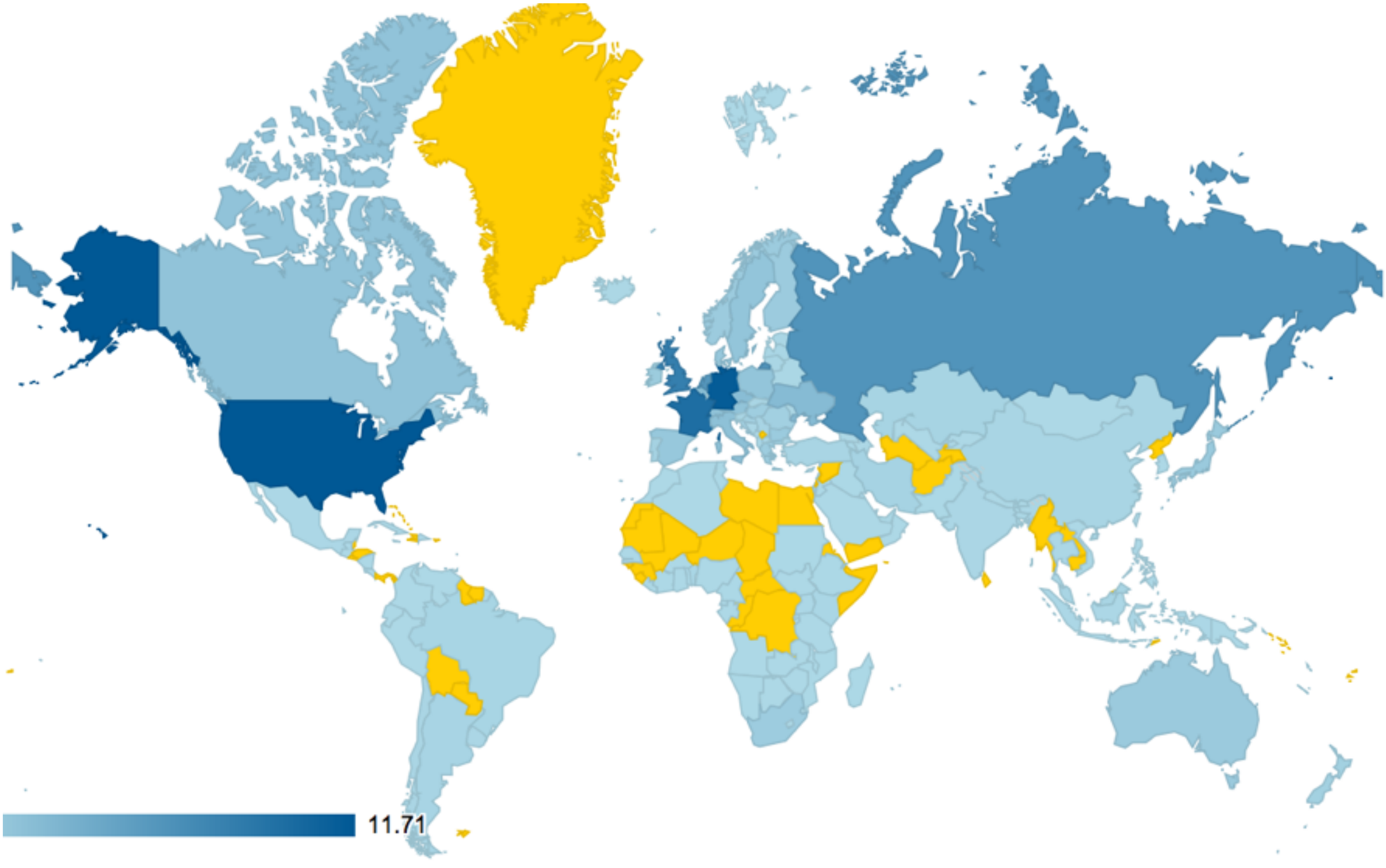



< 10ms: 225 | < 20ms: 84 | < 30ms: 112 | < 40ms: 83 | < 50ms: 74 | < 100ms: 666 | < 200ms: 5078 | < 300ms: 1385 | > 300ms: 315 | No Data: 260 | Unreachable: 0

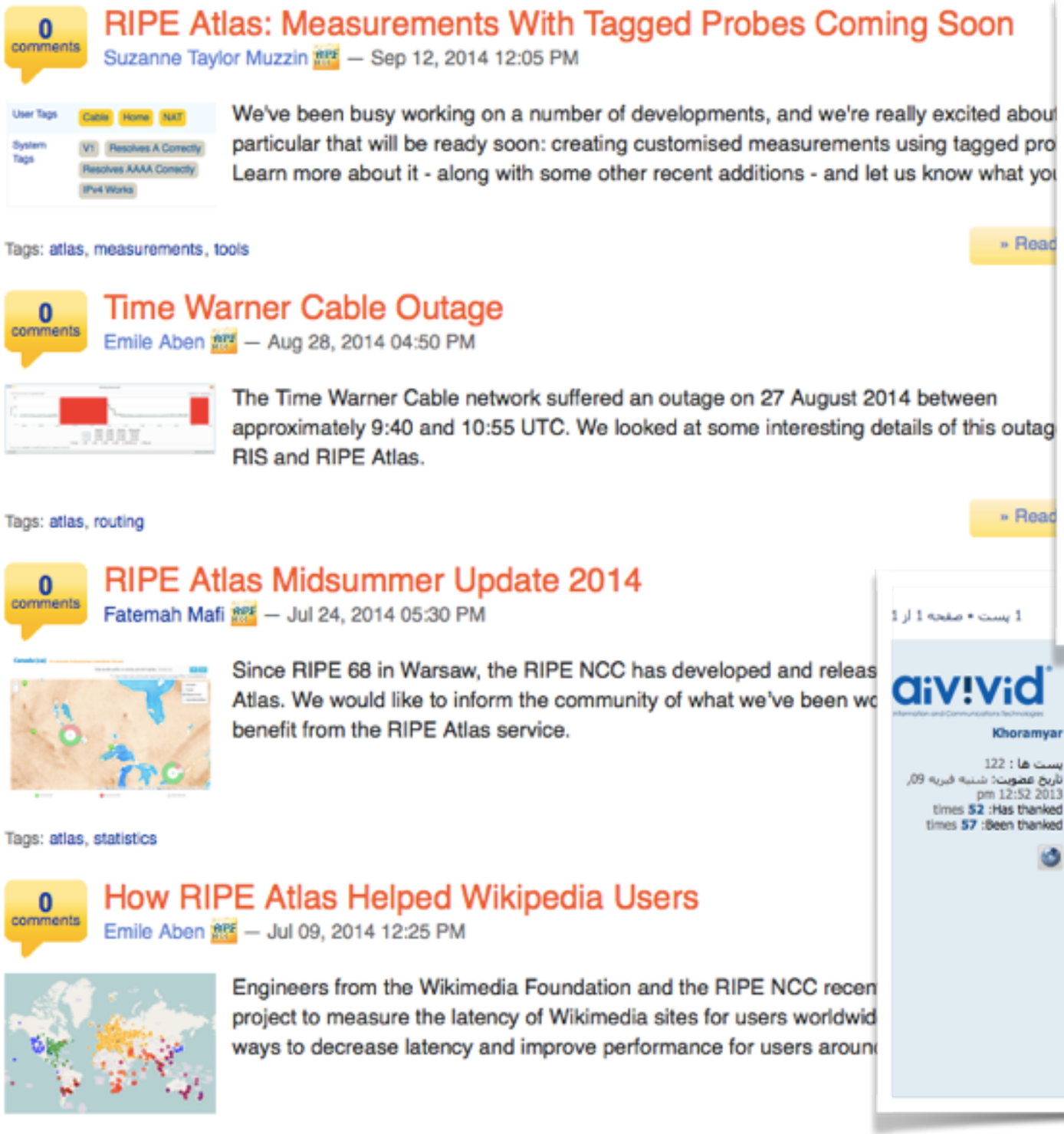
# Probes per ASN (in RIPEstat)



# Where we want to place probes



# Articles, papers, use cases, experiences

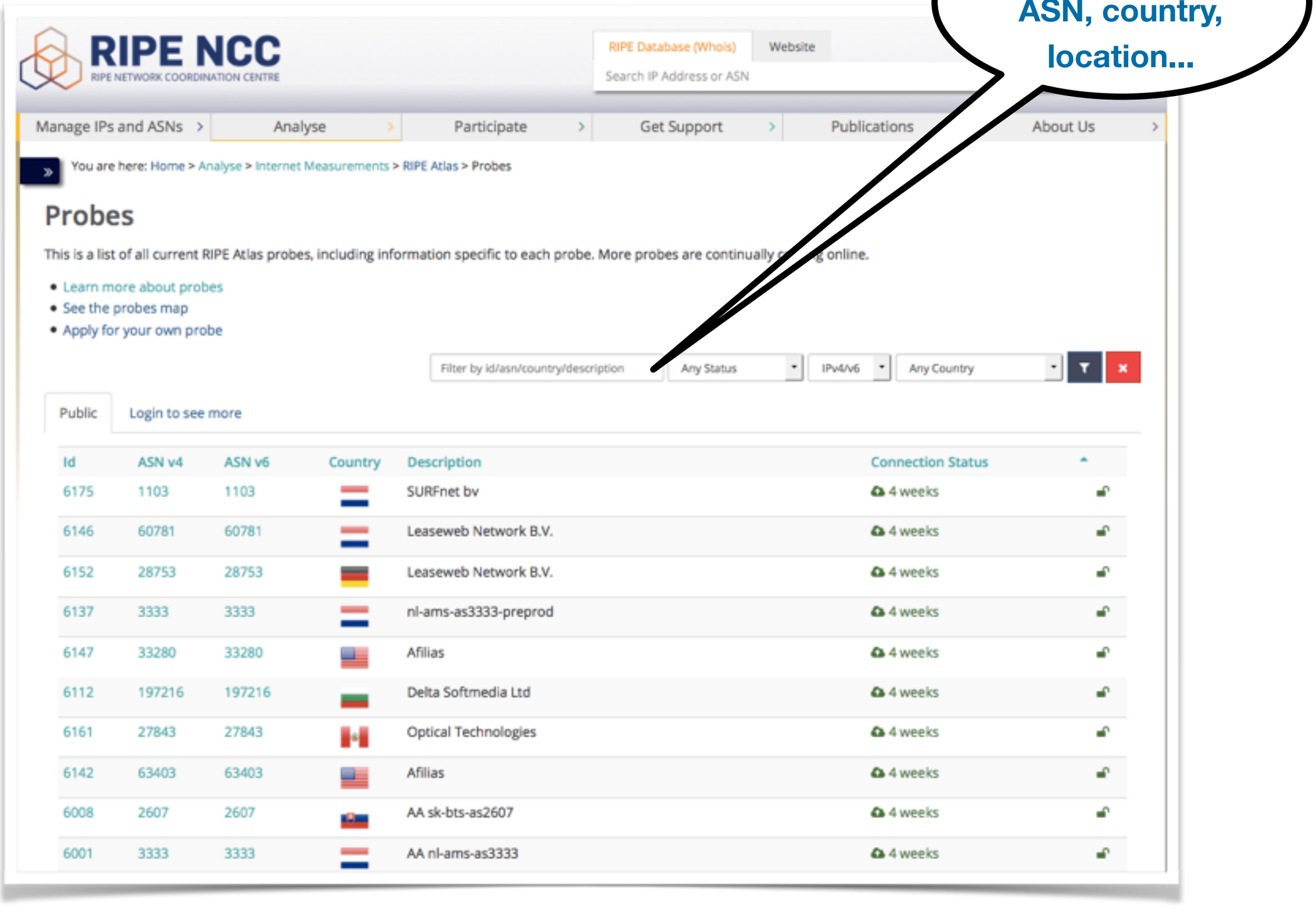


# Looking Up Public Probes

## Section 11

# Searching for probes

- https://atlas.ripe.net/probes/



# Probe page - Live demo

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

## Probe #10010 (Register)

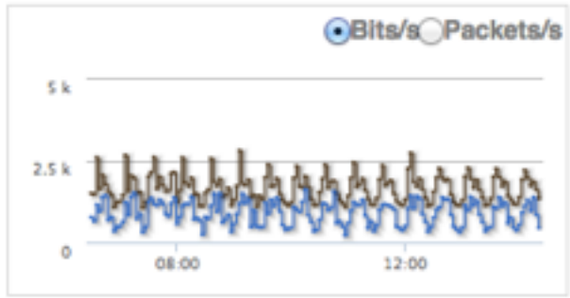
General | Network | Built-in Measurements | User-defined Measurements

### General Information

Edit

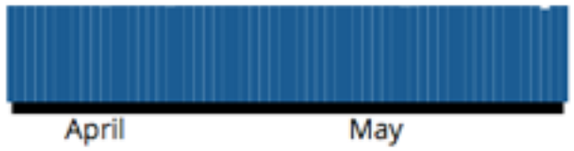
| | |
|---|---|
| Id | 10010 |
| MAC Address | F8:D1:11:A9:F3:2C |
| Architecture | tl-mr3020 |
| Firmware Version | 4680 (1070) |
| Router Type | |
| Bandwidth Limit | Not set |
| DNS Entry | Off |
| Shared Publicly | Yes |
| User Tags | NAT, Chello 200MB |
| System Tags | V3, Resolves A Correctly,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

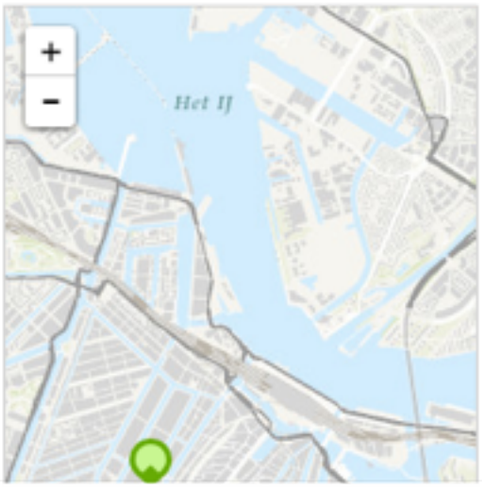
Architecture tl-mr3020

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



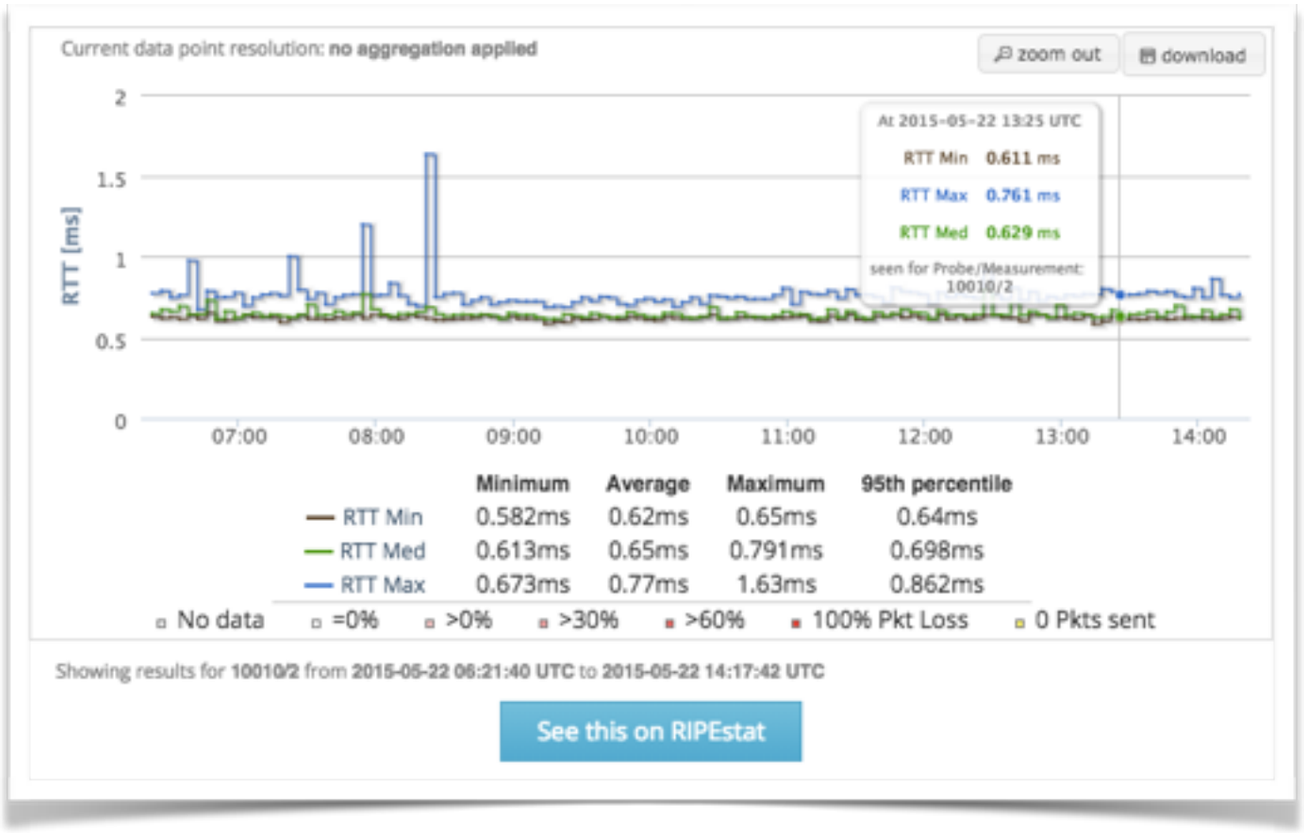

### Management Sharing

Edit

Only the probe host is permitted to administer this probe.

# Zoomable Ping Graph

- Replace multiple RRDs graphs: zoom in/out in time, in the same graph
- Easier visualisation of an event's details
- Selection of RTT class (max, min, average)

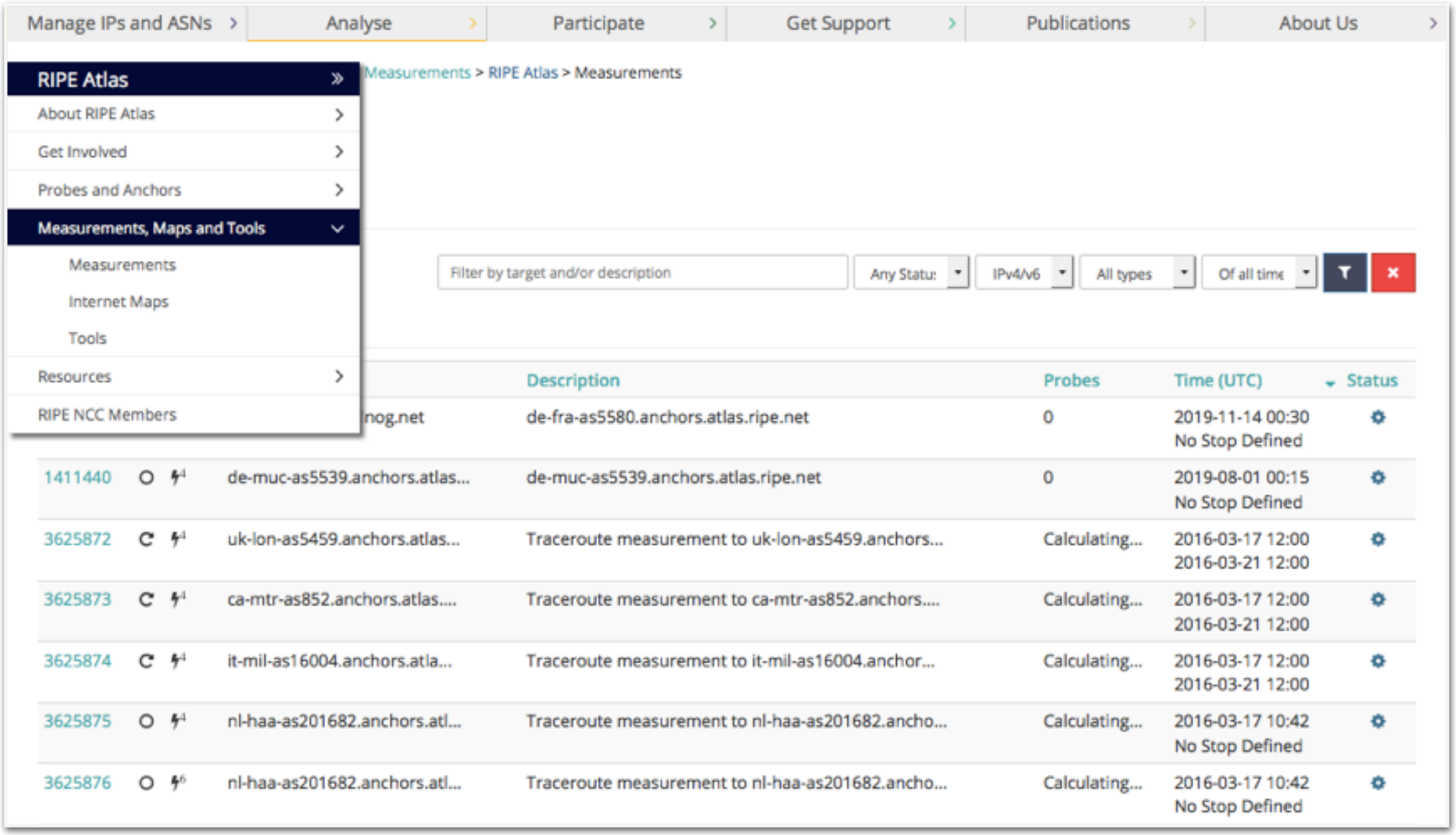


# Finding Results of Public Measurements

Section 12

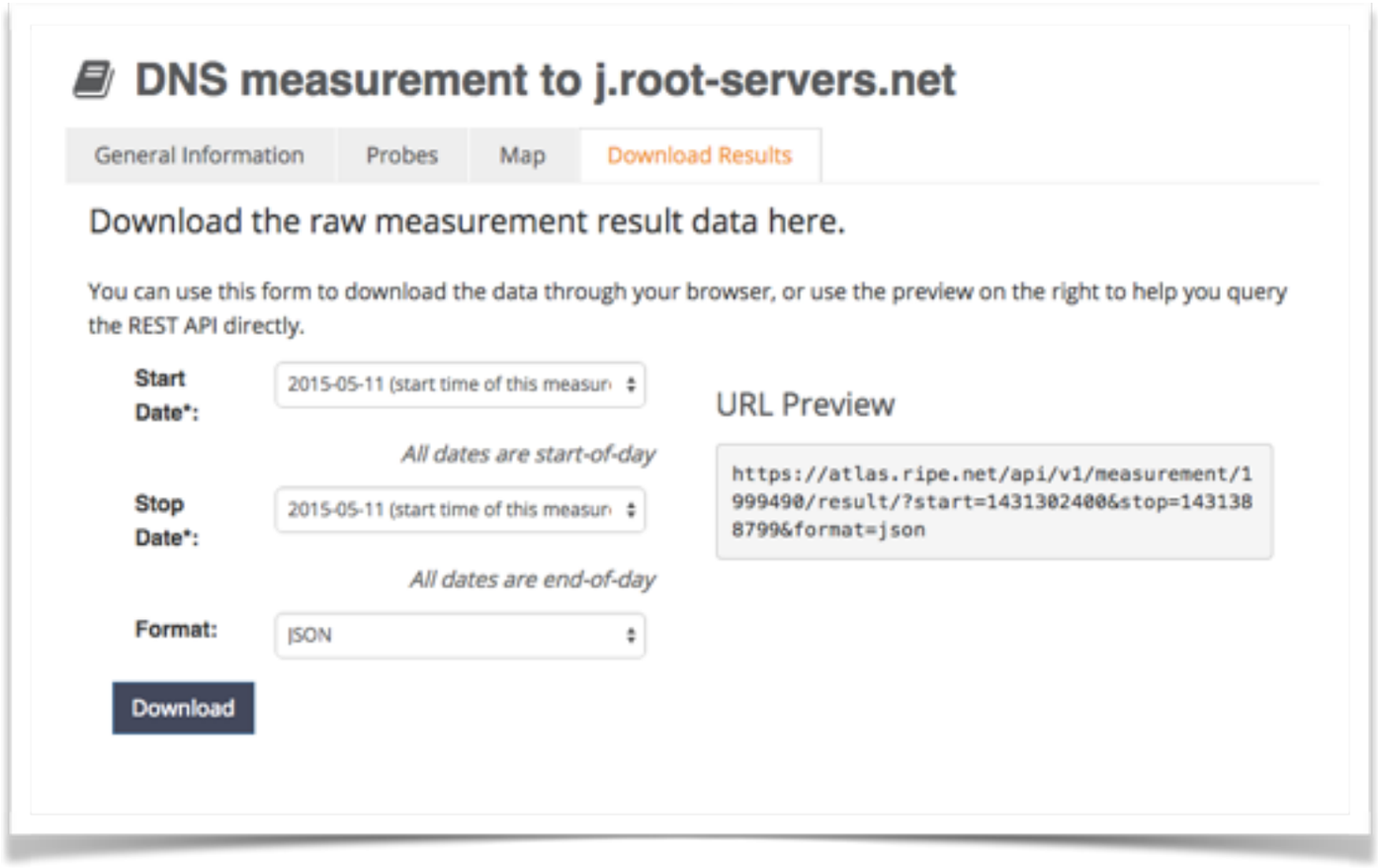
# Looking up Measurements Results

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



# Downloading Measurements Results

- Click on msm, then “Download”
- Or go to URL
- Or use the API
- Results in JSON
- Libraries for parsing available on GitHub
  - **https://github.com/RIPE-NCC/ripe.atlas.sagan**
  - **https://github.com/RIPE-Atlas-Community/**



# Search for Measurements by Target in RIPEstat

Go to “RIPEstat > “RIPE Atlas Activity”

RIPEstat — Internet Measurements and Analysis

https stat.ripe.net/widget/atlas-targets#w.resource=8.8.8.8

You are here: Home > Data & Tools > RIPEstat > atlas-targets

RIPE Atlas Measurement Targets (8.8.8.8)

8.8.8.8

Show 10 targets/page Search:

| Measurement ID | Stopped | Type | Target IP | Target Hostname |
|---|---|---|---|---|
| 1040720 | ongoing | ping | 8.8.8.8 | google-public-dns-a.google.com |
| 1006491 | ongoing | traceroute | 8.8.8.8 | not specified |
| 1006192 | ongoing | ping | 8.8.8.8 | not specified |
| 1004827 | ongoing | traceroute | 8.8.8.8 | not specified |
| 1002630 | ongoing | ping | 8.8.8.8 | not specified |
| 1478085 | 2014-02-24 13:41 UTC | dns | 8.8.8.5 | not specified |

# Use Existing Measurements

- There are many measurements already running!
- Search for existing public measurements first…
- Only then schedule your own measurement if you don’t find what you’re looking for

# Exercise G

## Analyse Measurements Results

Refer to the exercise booklet

# Creating a Measurement

Section 13

# Logging In

- Create a RIPE NCC Access account

  - Same for LIR Portal, RIPE Atlas, RIPEstat, RIPE Labs...

- Advanced

- ‘LIR contact’: additional benefits!

  - Membership benefits for RIPE Atlas

  - Share probe management with LIR colleagues

  - Historical RIPE Database view in RIPEstat

- Add yourself as ‘contact’ in LIR Portal

# Scheduling a Measurement

- Log into atlas.ripe.net
- “My Atlas” > “Measurements”
- “New Measurement” or “One-off”

  - Most are periodic and last a long time

  - Choose type, target, frequency, # of probes, region...

  - You will spend credits

- https://atlas.ripe.net/doc/udm
- Or use the API:

https://atlas.ripe.net/docs/measurement-creation-api/

# Credit System

- Measurements cost credits
  - ping = 10 credits, traceroute = 20, etc.
- Why? Fairness and avoid overload
- Hosting a probe earns credits
- Earn extra credits by:
  - Being a member
  - Hosting an anchor
  - Sponsoring probes

https://atlas.ripe.net/doc/credits

# Credits

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

RIPE Atlas
- About RIPE Atlas
- Get Involved
- Results
- **My Atlas**
  - Probes
  - Measurements
  - Credits
  - API Keys
  - Messages
  - Ambassador Probes
  - LIR Benefits
    - Claim 1 Million Credits
    - IPv6 Connectivity Test
    - Quick Look
  - Settings

## Account Information

This is where you're able to view the history of your credit use. There are visualisations available, and you can also transfer credits to someone else.

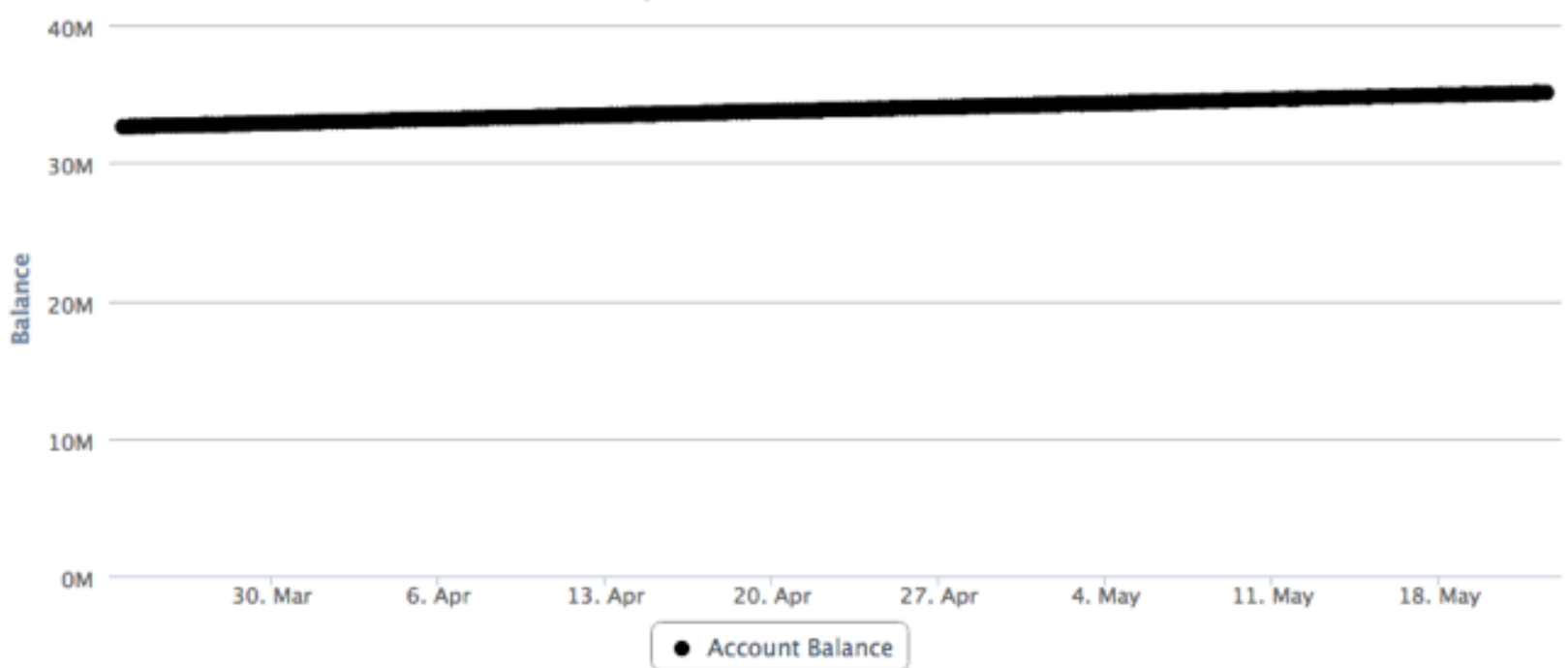
**35,107,046**

*1,760.00 credits / hour*

History | Charts & Archives | Transfer

Give credits to someone

## History



# Exercise H

## Create A Measurement

Refer to the exercise booklet

# Network Monitoring

## Section 13

# Network Monitoring

- Network operators use tools to monitor network health

  - Nagios & Icinga

- Tools receive input from RIPE Atlas via the API

- Benefits:

  - Pings from 1000 out of thousands of probes around the world

  - See your network from the outside

  - Plug into your existing practices

# Integration with Monitoring Systems

1. Create a RIPE Atlas ping measurement

2. Go to “Status Checks” URL

3. Add your alerts in Icinga or Nagios

# Creating Status Checks

- Status Checks work via RIPE Atlas' RESTful API
  - https://atlas.ripe.net/api/v1/status-checks/MEASUREMENT_ID/
- You define the alert parameters, for example:
  - Threshold for the percentage of probes that successfully received a reply
  - How many most recent measurements to base it on
- What is the maximum packet loss acceptable
- Documentation:
  - https://atlas.ripe.net/docs/status-checks/

# Icinga Examples

- Community of operators contributed configuration code!
  - Making use of the built-in “check_http” plugin
- GitHub repo examples:
  - https://github.com/RIPE-Atlas-Community/ripe-atlas-community-contrib/blob/master/scripts_for_nagios_icinga_alerts
- Post on Icinga blog:
  - https://www.icinga.org/2014/03/05/monitoring-ripe-atlas-status-with-icinga-2/

# Exercise I

## Setting Up Status Checks

Refer to the exercise booklet

# More RIPE Atlas Features

## Section 15

# Latest Results API

- https://atlas.ripe.net/docs/measurement-latest-api/
  - Widget monitoring value in real time (100 probes pinging websites worldwide)
  - Alert based on average measurements per hour
  - Big network event, e.g. Internet outage in a region
  - DNS domain monitoring; configurable measurements using ten RIPE Atlas anchors
- https://labs.ripe.net/Members/suzanne_taylor_muzzin/ripe-atlas-latest-results-api-and-parsing-library

# Secure Measurement creation and sharing

- Use API keys to:
  - Create measurements without logging in
  - Securely share your measurement data with others
- To create, manage and delete API keys:
  - https://atlas.ripe.net/keys/
  - https://atlas.ripe.net/docs/keys2/
- Examples:
  - https://atlas.ripe.net/docs/rest/

# 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”
  - Inverse ssh tunnels
- Source code published

# Additional Membership Benefits

- RIPE Atlas:
  - Guaranteed approval to host a probe
  - Do NOT have to host a probe in order to perform customised measurements
  - 1,000,000 extra credits monthly via LIR Portal
  - “Quick Look” measurements via LIR Portal
  - IPv6 reachability testing (free - no credits needed)
  - Sharing probe management with LIR colleagues
- RIPEstat:
  - Historical view of RIPE Database objects

# Take part in the RIPE Atlas community

Section 16

# RIPE Atlas community (part 1)

- Individual volunteers host probes in homes or offices
- Organisations host RIPE Atlas anchors
- Sponsor organisations give financial support or host multiple probes in their own networks

# RIPE Atlas community (part 2)

- Ambassadors help distribute probes at conferences, give presentations, etc.
- Developers contribute free and open software
- Network operators create measurements to monitor and troubleshoot
- Researchers and students write papers

# Hosting a probe

- Create a RIPE NCC Access account
- Go to https://atlas.ripe.net/apply
- You will receive a probe by post
- Register your probe

- Plug in your probe
- If you receive a probe from an ambassador (trainer, sponsor, someone at a conference), just register it and plug it in!

# More Hackathons!

- Join the hackathons in 2016
  - Before each RIPE Meeting - save the dates!
  - 21-22 May, Copenhagen
  - 22-23 October, Madrid

# Questions

atlas@ripe.net
@RIPE_Atlas

The End!

Край

Y Diwedd

Fí

Finis

النهاية

Соңы

վերջ

Liðugt

Ende

Finvezh

Кінець

Konec

Kraj

Ënn

Fund

پایان

Son

Kpaj

Lõpp

Beigas

Vége

An Críoch

הסוף

Endir

Sfârşit

Fine

Fin

Τέλος

Einde

Канец

Конец

Slut

Slutt

დასასრული

Pabaiga

Tmiem

Fim

Amaia

Loppu

Koniec