RIPE NCC

Workshop: Advanced Topics in RIPE Atlas Usage

RIPE 69 - London - November 2014

Overview

- Introduction to RIPE Atlas
- Finding public measurements
  - Exercise: Analyse results
- Creating a measurement
  - Exercise: Create a measurement using API
- Network monitoring
  - Exercise: Setting up ‘Status Checks’
- More RIPE Atlas features
- Advanced topics
- Use cases and success stories
- RIPE Atlas anchors
- RIPE Atlas community

Assumptions

- We assume that you have already used RIPE Atlas
  - You have a RIPE NCC Access account
  - You have credits to spend
- Basics covered elsewhere:
  - http://www.ripe.net/lir-services/training/courses/tailor-made-workshops/#tools
  - https://ripe69.ripe.net/programme/meeting-plan/tutorials/
- Please let us know if these assumptions are not true!

RIPE Atlas 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 and SSL
- Data publicly available

RIPE Atlas Coverage

Global RIPE Atlas Network Coverage

This map shows the locations of all RIPE Atlas probes, including those that are connected, disconnected and abandoned (meaning they have not been connected for a long period of time).

Filter by ASN, prefix, or country. Just start typing:

Connected Disconnected Abandoned

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Measurement 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

RIPE Atlas in Numbers: October 2014

- 7,100+ probes connected
- 3,000+ active users this year

Country	Probes
United States	848
Germany	778
France	686
United Kingdom	534
Russia	414
Nederland	409
Czech Republic	195
Ukraine	185
Belgium	174
Switzerland	170

- 1,000+ built-in measurements daily
- 5,000+ user-defined measurements daily
  - Available to hosts and members
  - ping, traceroute, DNS, SSL

- Goal by end 2014:
  - 10000 connected probes

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

Finding Results of Public Measurements

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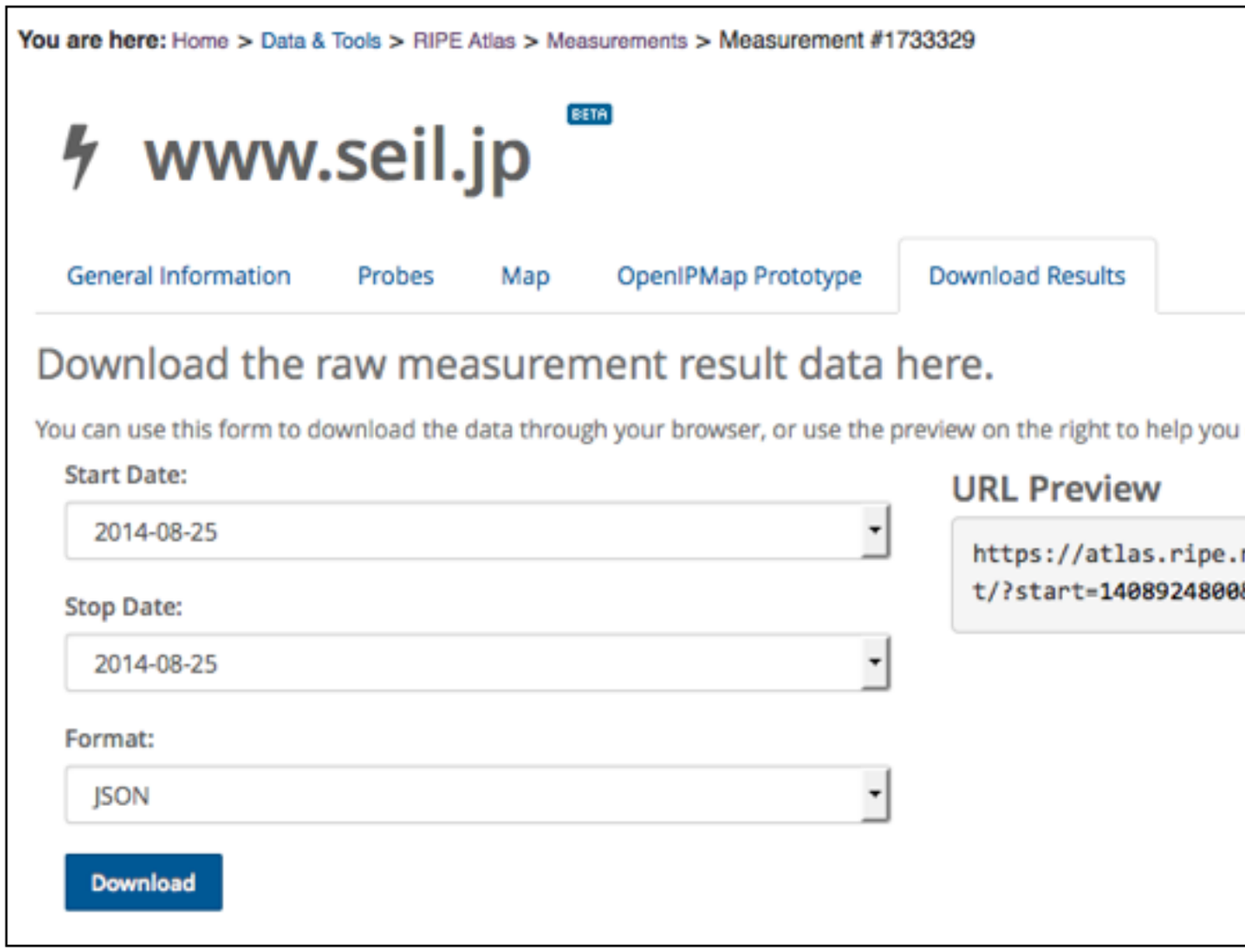
Logging In

- Create an RIPE NCC Access account
  - The same account used for the 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

Downloading Measurement Results

- Click on msm, then “Download”
  - Or go to URL
  - Or use the API



- Results in JSON
  - Libraries for parsing on gitHub

- https://github.com/RIPE-NCC/ripe.atlas.sagan
- https://github.com/RIPE-Atlas-Community/

Search 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
- Schedule your own measurement if you don't find what you're looking for

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 10 RIPE Atlas anchors

- https://labs.ripe.net/Members/suzanne_taylor_muzzin/ripe-atlas-latest-results-api-and-parsing-library

Exercise: Analyse Measurements Results

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Tasks:

- Get the msm-ID 1004005 (ping IPv6)
  - Measurement data from 2014-09-09 to 2014-09-11
  - https://atlas.ripe.net/api/v1/measurement/1004005/result/?start=1410220800&stop=1410479999
- Find out how many times RTT was above 60ms
  - Either by using Python or Javascript
  - For the Javascript solution, you can use this as a starting point:
  - https://stat.ripe.net/widgets/demo/script_me.html

Creating a Measurement

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Scheduling a Measurement via GUI

- Log in to 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

Scheduling a Measurement Using API

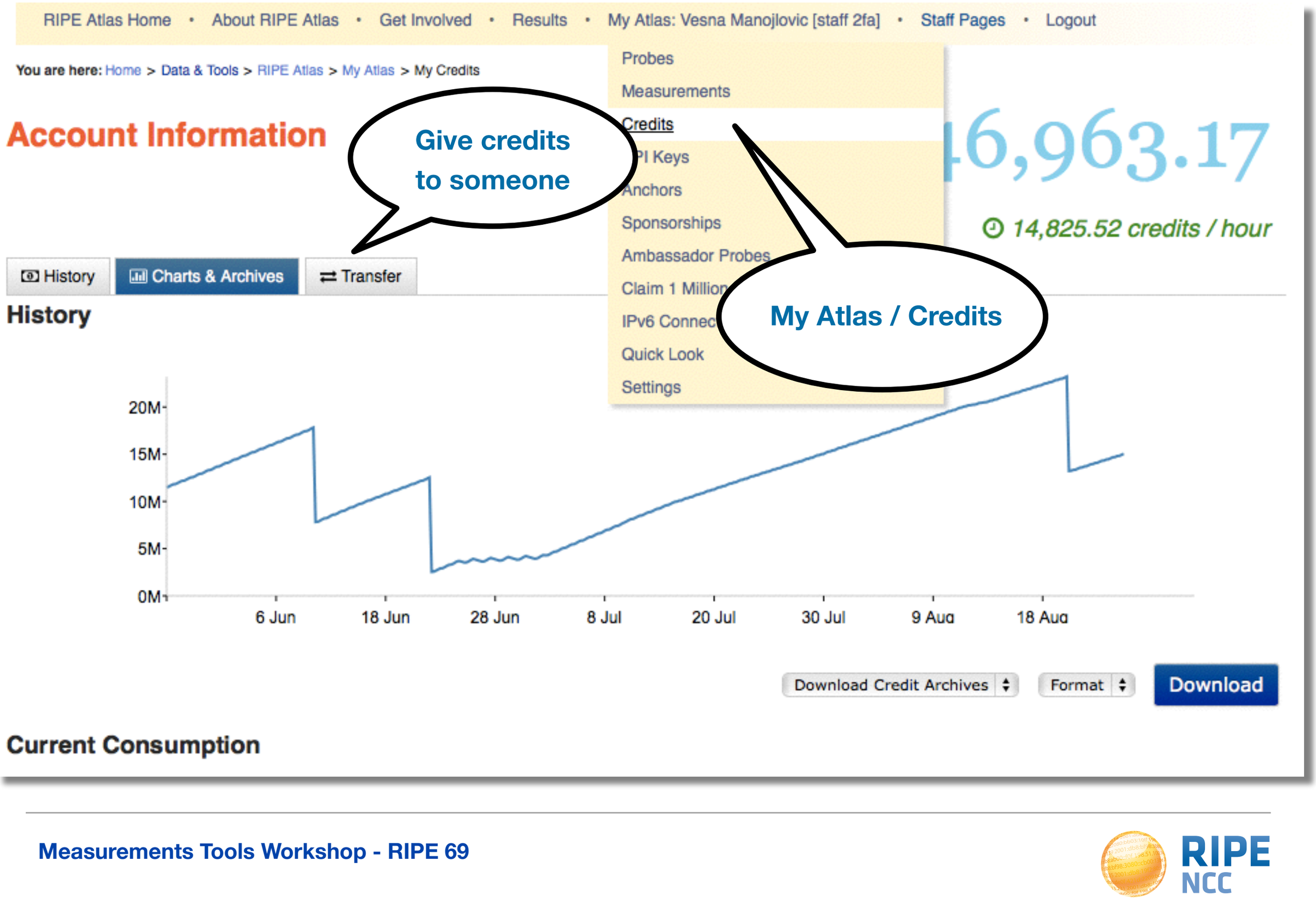
- You will need API keys
  - To create measurements without logging in
  - Also: to securely share your measurement data
- To create, manage and delete API keys:
  - https://atlas.ripe.net/keys/
  - https://atlas.ripe.net/docs/keys2/
- Examples:
  - https://atlas.ripe.net/docs/rest/
- API Documentation
  - https://atlas.ripe.net/docs/measurement-creation-api/

Credits System

- Measurements cost credits
  - ping = 10 credits, traceroute = 20, etc.
- Why? Fairness and to 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 Overview



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Exercise: Create a Measurement

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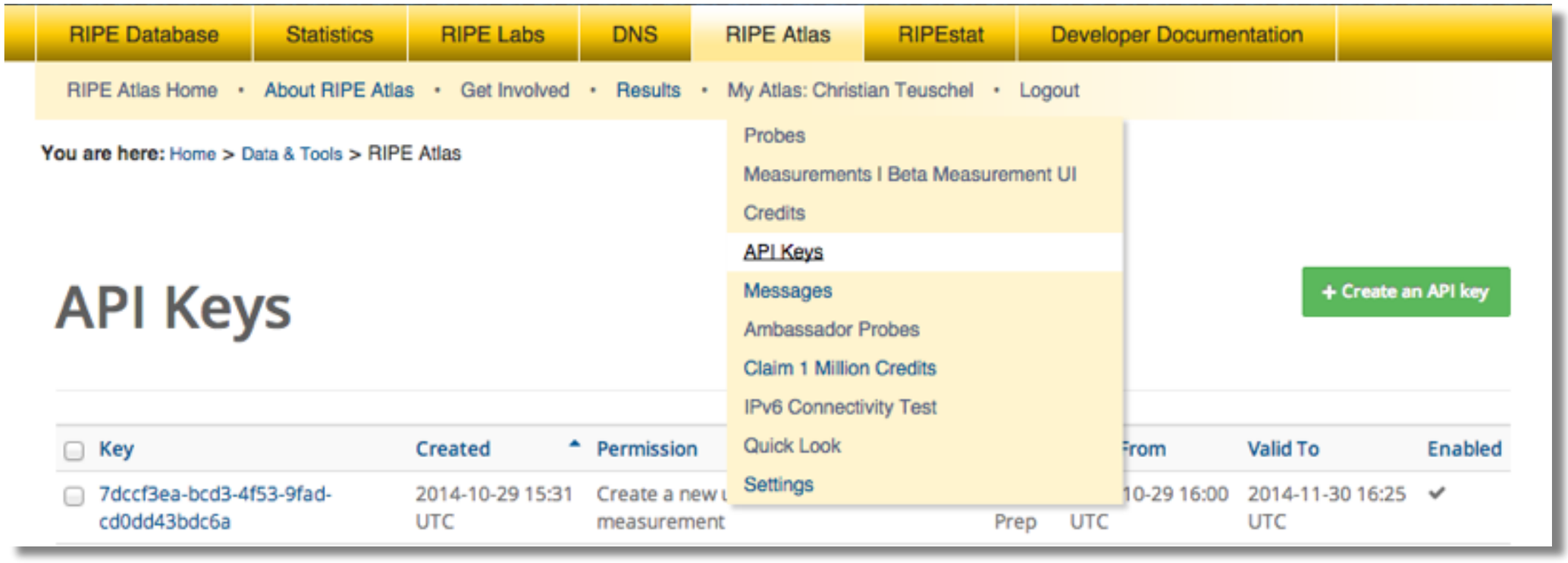
Tasks

- Create a measurement
  - Ping
  - Involving ten probes
  - To a target of your choice.
  - Source: your country
  - Duration: two days
- Use the RIPE Atlas API

Tasks

- First, we need to create an API key!



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

Network Monitoring

Network Monitoring

- Network operators use tools for monitoring network health
  - Nagios & Icinga
- Tools receive input from RIPE Atlas via the API
- Benefits:
  - pings from 500 out of 6000+ 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 of the most recent measurements to base it on
- What is the maximum packet loss acceptable
- 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: Setting up Status Checks

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Tasks

- Set up and configure a Status Check
  - for an existing IPv6 ping msm to www.google.com
  - https://atlas.ripe.net/api/v1/status-checks/1004005/
- Configure the Status Check in such a way that you will trigger an alert for this measurement

- One possible solution:
  - Set the median RTT to a lower level:
  - https://atlas.ripe.net/api/v1/status-checks/1004005/?median_rtt_threshold=10

Questions?

Advanced Topics

Success Stories

RIPE Atlas Anchors

RIPE Atlas Community

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RIPE Atlas Success Stories

https://labs.ripe.net/atlas/user-experiences

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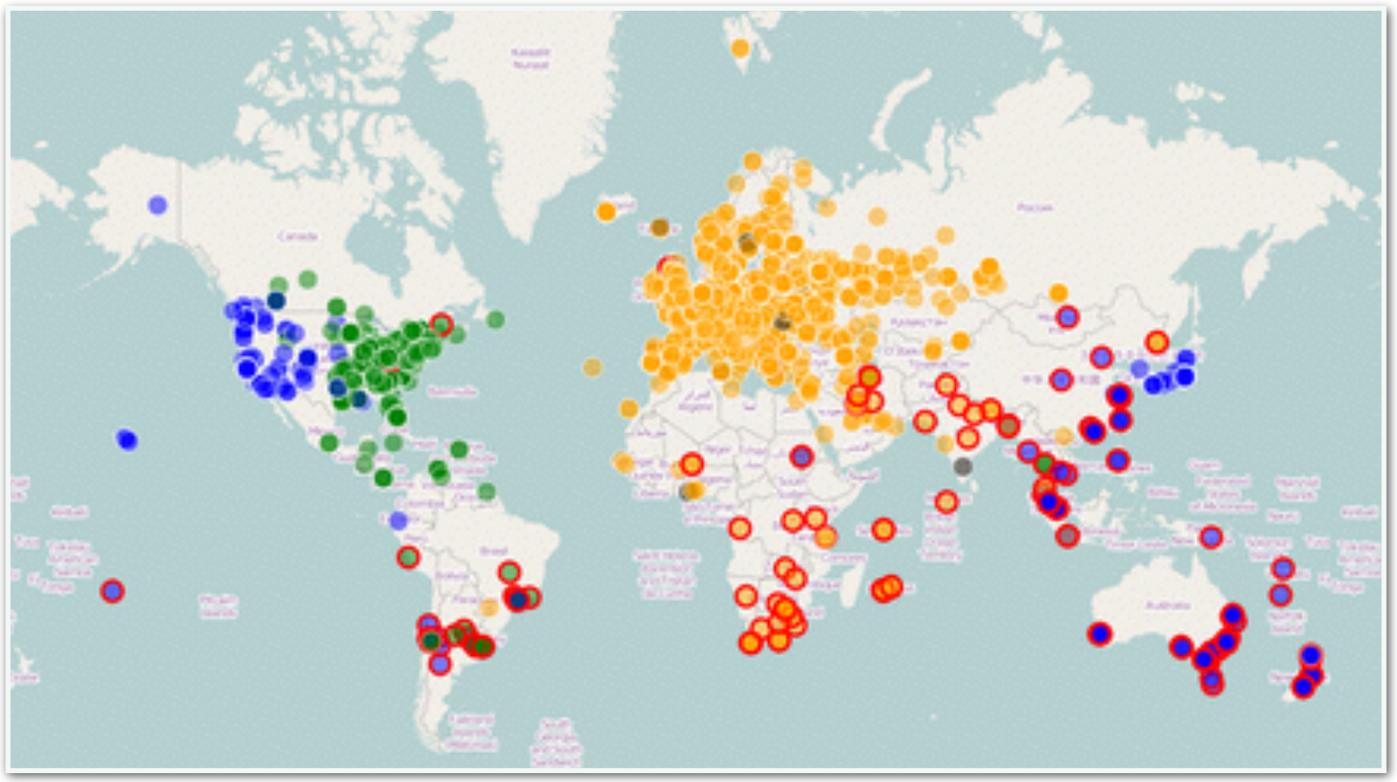
- How RIPE Atlas Helped Wikipedia Users
  - https://labs.ripe.net/Members/emileaben/how-ripe-atlas-helped-wikipedia-users
- How Fast the RIPE Atlas Anchor Has Paid Off
  - https://labs.ripe.net/Members/tim_kleefass/how-fast-the-ripe-atlas-anchor-has-paid-off
- Basic Evaluation of new IXP Peering Partners with RIPE Atlas and Zabbix
  - https://labs.ripe.net/Members/daniel_gomez/basic-evaluation-of-new-ixp-peering-partners-with-ripe-atlas-and-zabbix



- Measuring the latency of sites for users worldwide
  - Together, we identified ways to decrease latency and improve performance
- Map code is available - please contribute to improve it!
  - https://github.com/RIPE-Atlas-Community/datacentre-latency-map

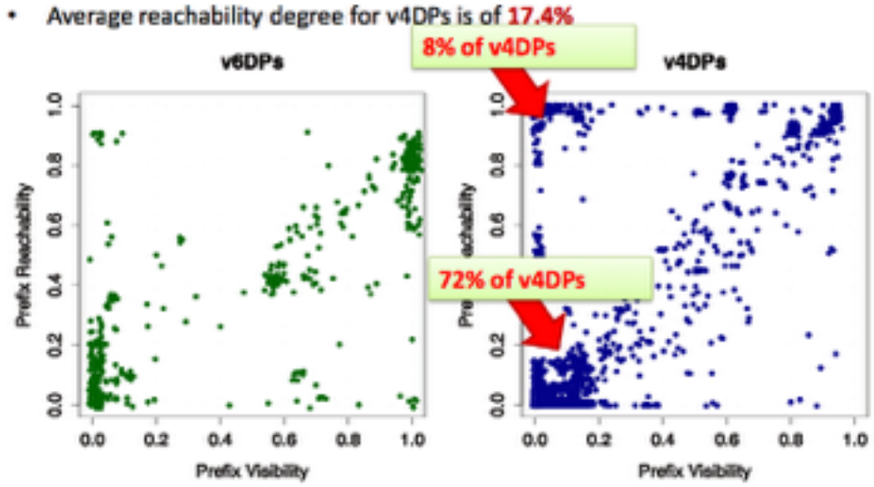
- Investigating problems of slow servers:
  - http://engineering.freeagent.com/2014/01/24/atlas-probes/
- Measuring packet loss to determine congested networks, Jared Mauch, NTT
- Selective blackholing (examples based on RIPE Atlas)
  - https://ripe68.ripe.net/presentations/176-RIPE68_JSnijders_DDoS_Damage_Control.pdf
- Anycast analysis:
  - https://labs.ripe.net/Members/stephane_bortzmeyer/the-many-instances-of-t root-name-server

Global Reachability Measurements

- We test the reachability of the globally-defined v6DPs using ***100 active probes*** within the RIPE Atlas platform

Results

- Average reachability degree for a v6DP is of **46.5%**
- Average reachability degree for v4DPs is of **17.4%**

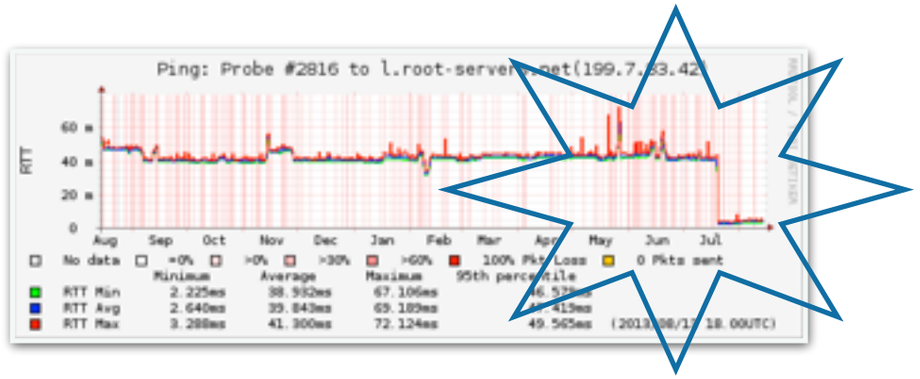


Help us to help you!

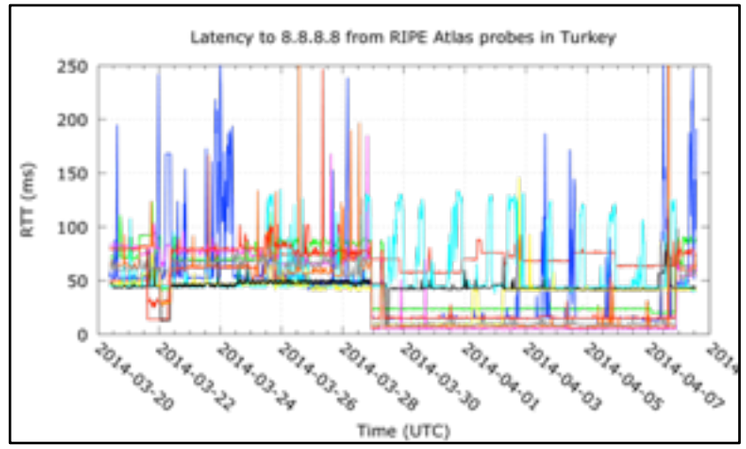
- Go to **visibility.it.uc3m.es**
- Check if the prefixes of an AS are LVPs/DPs– monitor the global visibility of your prefixes!
- … and tell us why the prefixes discovered have limited visibility in the first place: intended/unintended behaviour?

https://ripe68.ripe.net/presentations/226-Understanding_the_Reachability_of_IPv6_Limited_Visibility_Prefixes.pdf

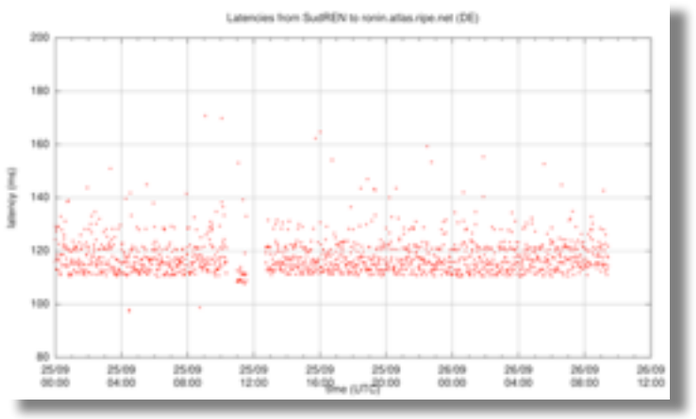
- IXP: Measuring the effect of installing L-root in Belgrade / SOX



- DNS: Looking for most popular instances of .FR anycast servers



- Events: Measuring Internet outages in Turkey and Sudan



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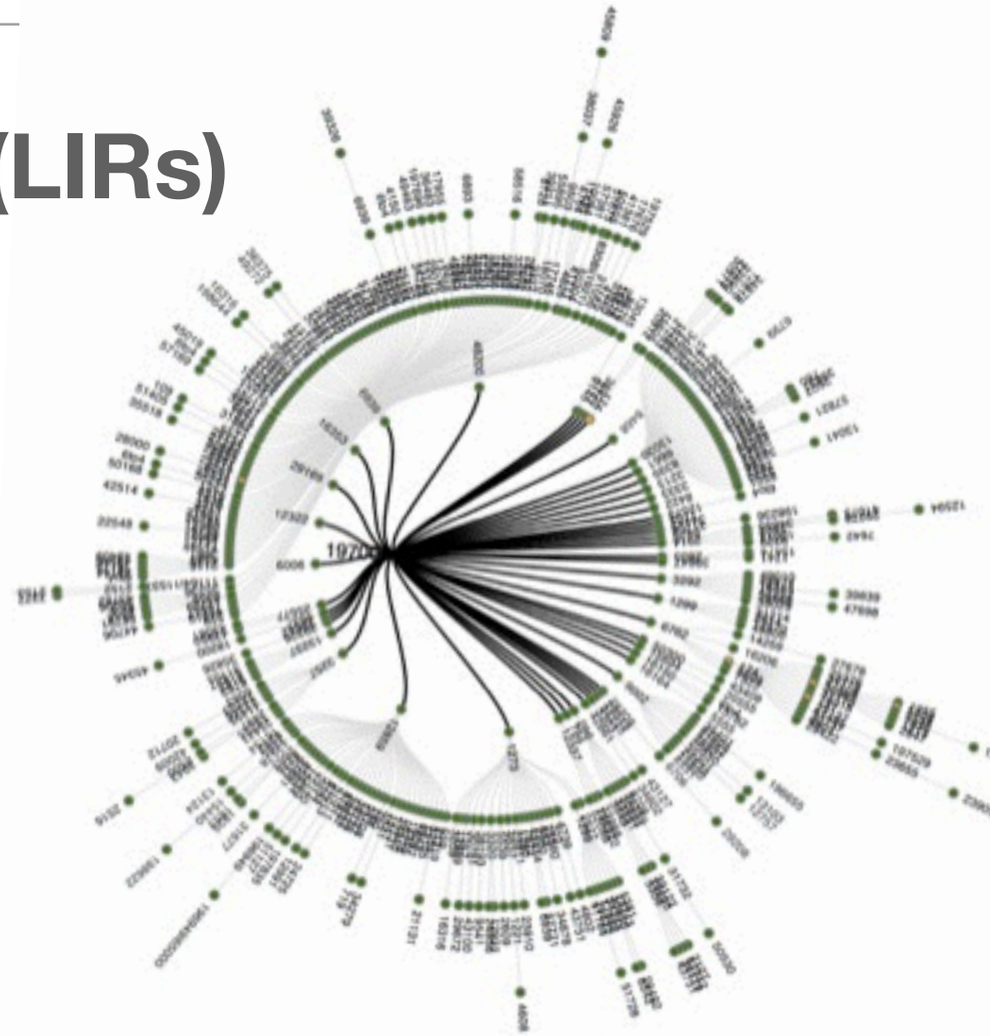
- Using RIPE Atlas to perform worldwide traces to measure round-trip times and other route measurements
  - We identified routes that can be optimised and sent to other POPs with much better response times
  - We also identified routes that can be optimised by changing the transit provider for the same POP

    https://labs.ripe.net/Members/becha/world-ipv6-launch-ripe-atlas-use-cases
- The success rate with IPv6-only domain names is much lower (~60%) than with "mixed" (both IPv4 and IPv6) domain names (~96%)

  https://labs.ripe.net/Members/stephane_bortzmeyer/how-many-ripe-atlas-probes-can-resolve-ipv6-only-domain-names

IPv6 Reachability Testing

- Only for RIPE NCC members! (LIRs)
- Via the LIR Portal
- Using 1,000 RIPE Atlas probes
- Visualising:
  - Completed paths
  - Unsuccessful paths
  - Clickable hops (ASNs)



- https://labs.ripe.net/Members/becha/test-your-ipv6-reachability-using-ripe-atlas
- https://labs.ripe.net/Members/emileaben/visualise-your-ipv6-connectivity-using-ripe-atlas

- **“It is quite common in the IPv6 world to have devices that believe they are connected to the IPv6 Internet while they are not”**

  “When you use RIPE Atlas to measure the connectivity of an IPv6 device, 90% success is the maximal reachability you'll get.”

https://labs.ripe.net/Members/stephane_bortzmeyer/how-many-atlas-probes-believe-they-have-ipv6-but-are-wrong

RIPE Atlas Anchors

https://atlas.ripe.net/about/anchors/

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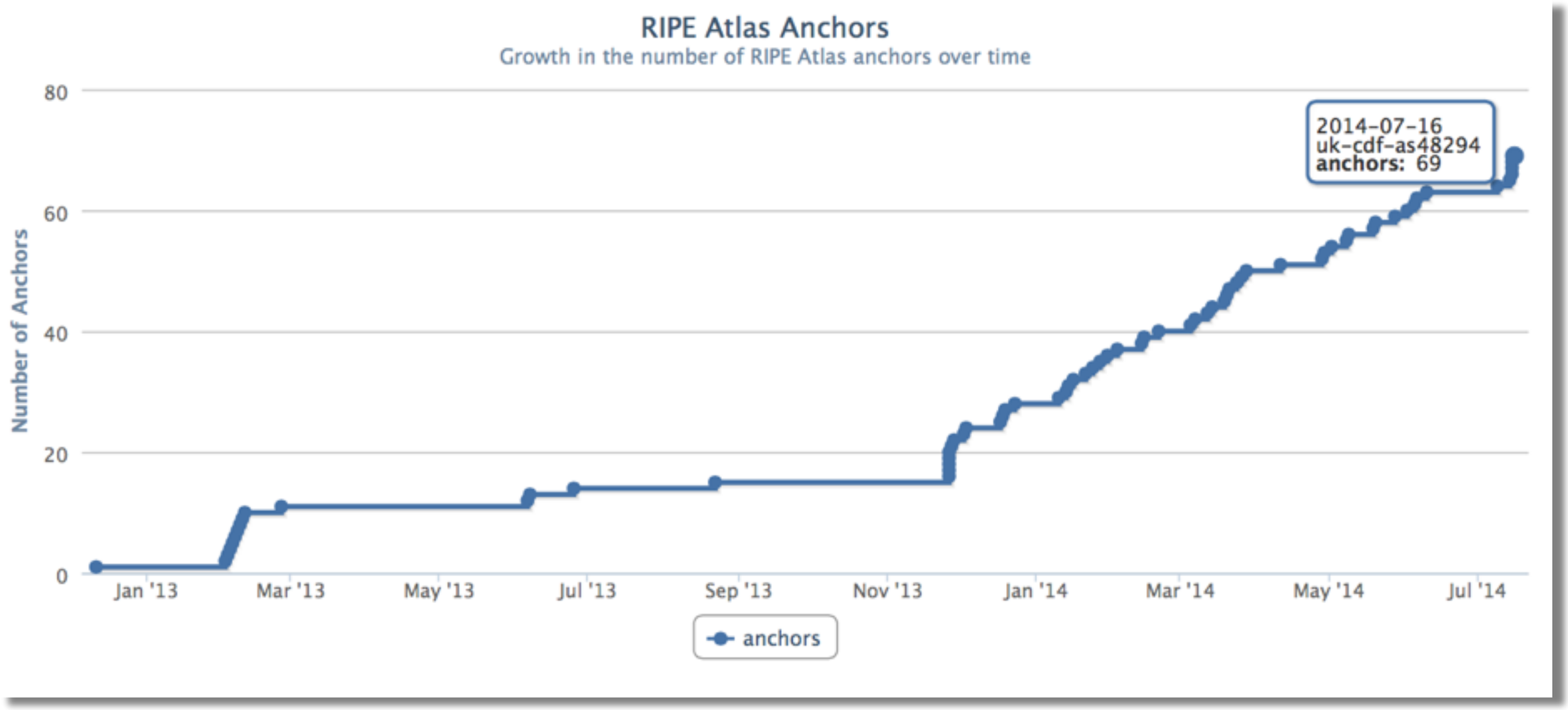
RIPE Atlas Anchors

- Anchors: well-known targets and powerful probes
  - Regional baseline & “future history”
- Anchoring measurements
  - Measurements between anchors
  - 200 probes targeting each anchor with measurements
  - Each probe measures 4-5 anchors
- Vantage points for new DNSMON service
- 80 RIPE Atlas anchors
  - Goal for 2014: 100 active anchors worldwide

RIPE Atlas Anchors

- Benefits of hosting an anchor:
  https://atlas.ripe.net/get-involved/become-an-anchor-host/
- Apply for an anchor:
  https://atlas.ripe.net/anchors/apply/
- List and map:
  https://atlas.ripe.net/anchors/list/
  https://atlas.ripe.net/anchors/map/
- Organisations hosting an anchor:
- https://atlas.ripe.net/get-involved/community/

RIPE Atlas Anchors



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RIPE Atlas Anchors

RIPE NCC

Anchor Hosts

Anchor Hosts

lacnic

ENNIT

ati

HEAnet
Ireland's National Education & Research Network

netnod

CSUC
Consorci de Serveis Universitaris de Catalunya

BLACKNIGHT SOLUTIONS

ausregistry

CERN

VIX
Vienna Internet eXchange

SIDN

ISZT
Council of Hungarian Internet Providers

rezopole

aiVivid
Information and Communications Technologies

FICIX

BelWü

PSNC

ISNIC

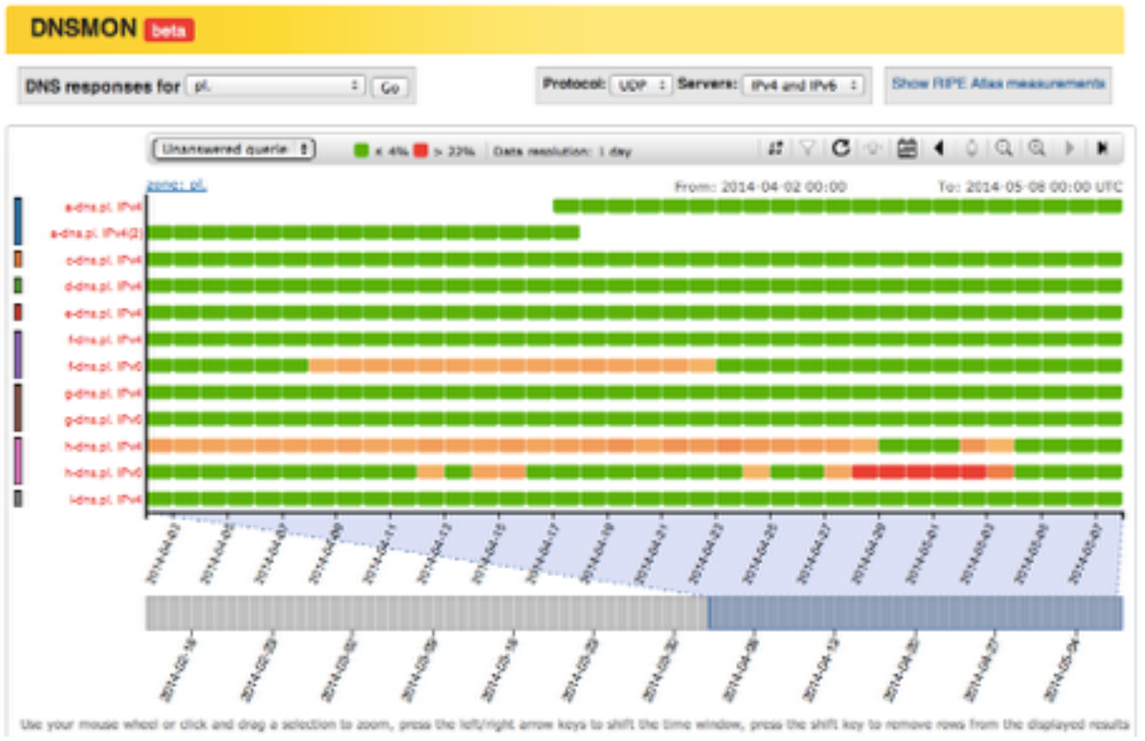
SURFNET

SOX
Serbian Open eXchange

DNSMON

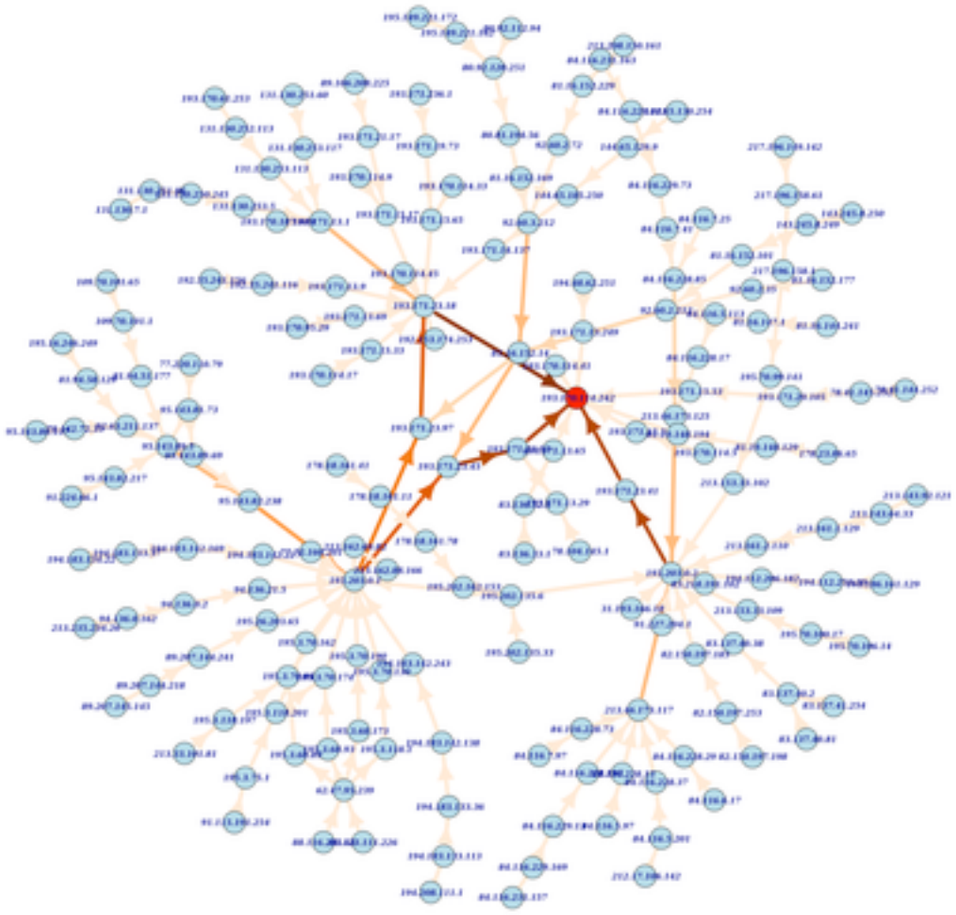
- Currently monitoring small selection of TLD zones
  - Root name servers & 30 ccTLDs & few gTLDs
  - New zones will be added later this year
- On the roadmap: “domain checks”

- https://atlas.ripe.net/dnsmon
- https://labs.ripe.net/Members/fatemah_mafi/an-updated-dns-monitoring-service



- Exploring the potential of RIPE Atlas for mapping the packet layer topology

- Using the example of RIPE Atlas anchor at VIX (Vienna)



- Pretty graphs (using R), useful information

https://labs.ripe.net/Members/dfk/map-a-ripe-atlas-anchor

- In beta: Matrix view of anchors mesh
- Interactive, gives more details on click

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RIPE Atlas Community

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RIPE Atlas on GitHub

- Programmers contribute analysis code:
  - https://github.com/RIPE-Atlas-Community/
- Code written by RIPE NCC:
  - https://github.com/RIPE-Atlas-Community/RIPE-Atlas-data-analysis
- Parsing library- “Sagan”:
  - https://github.com/RIPE-NCC/ripe.atlas.sagan
- Measurement source code available:
  - https://labs.ripe.net/Members/philip_homburg/ripe-atlas-measurements-source-code

Ambassadors

- Become an ambassador if you want to:
  - Help distribute probes outside the RIPE NCC service region
  - Give workshops, tutorials and promote RIPE Atlas
- To become an ambassador:
  - https://atlas.ripe.net/get-involved/become-a-ripe-atlas-ambassador/
  - Email **mcb@ripe.net** and we'll ship you some probes
- Change in distribution model:
  - https://labs.ripe.net/Members/fatemah_mafi/changes-to-the-distribution-model-for-ripe-atlas-probes

Sponsors

- Sponsor benefits:
  - Promotion on RIPE Atlas website
  - Community recognition
  - Double credits for every probe distributed

- Becoming a sponsor:
  - https://atlas.ripe.net/get-involved/become-a-sponsor/

- 2014 sponsors:

Microsoft

Annenberg
School for Communication
University of Pennsylvania

AS34288
CONNECTING EDUCATION TO THE WORLD

Sponsors

2012

Planned	In Progress
Additional features for RIPE Atlas anchors	Improve procedure for probe distribution by RIPE Atlas ambassadors
WiFi Measurements	Regularly publish metadata
Share my probe with a custom-made group	Regularly publish Names
Sharing credits with colleagues	Improved Measurements Pages
Restarting previous measurements	Improve number of connected probes
Vantage points dropping out of existing user-defined measurements	Increase number of active RIPE Atlas anchors
	Improve IPv6 probe selection

http://roadmap.ripe.net/ripe-atlas/