



# RIPE NCC Webinar: Introduction for the participants of the IXP Tools Hackathon

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# Goals

- Goals for this webinar
  - Learn about RIPE NCC's data & available FLOSS tools
  - Get a glimpse of potential projects / challenges
  - Get your questions answered
- Goals for the hackathon
  - combine creative skills (&get feedback)
  - contribute useful tools for IXPs
  - make new connections
  - have fun!





# Overview

- Introduction to RIPE NCC's data
- Introduction to other data sources
- Existing projects that need input



# Hackathon Info & Contact

- [https://atlas.ripe.net/hackathon/ixp-tools/#!  
attendee-information](https://atlas.ripe.net/hackathon/ixp-tools/#!attendee-information)
- List:
  - <https://lists.ripe.net/mailman/listinfo/ixp-tools-hackathon>
- Pad:
  - <https://pad.riseup.net/p/ixp-tools-hackathon>
- an unofficial IRC channel: #ripeatlas @ Freenode
- optional Facebook group



# RIPE Atlas measurements



# RIPE Atlas Results

- Ongoing global measurements towards root name servers
  - Visualised as Internet traffic maps
- Ongoing regional measurements towards “anchors”
- Users can run customised measurements
  - Ping, traceroute, DNS, SSL/TLS, NTP and (limited) HTTP
- All data open and publicly available



# Credit System

- Running your own measurements cost credits
  - Ping = 10 credits, traceroute = 20, etc.
- Why? Fairness and to avoid overload
- Limits: daily spending and measurement results
- Hosting a RIPE Atlas probe earns credits
- Earn extra credits:
  - RIPE NCC members
  - Host an anchor
  - Sponsor probes



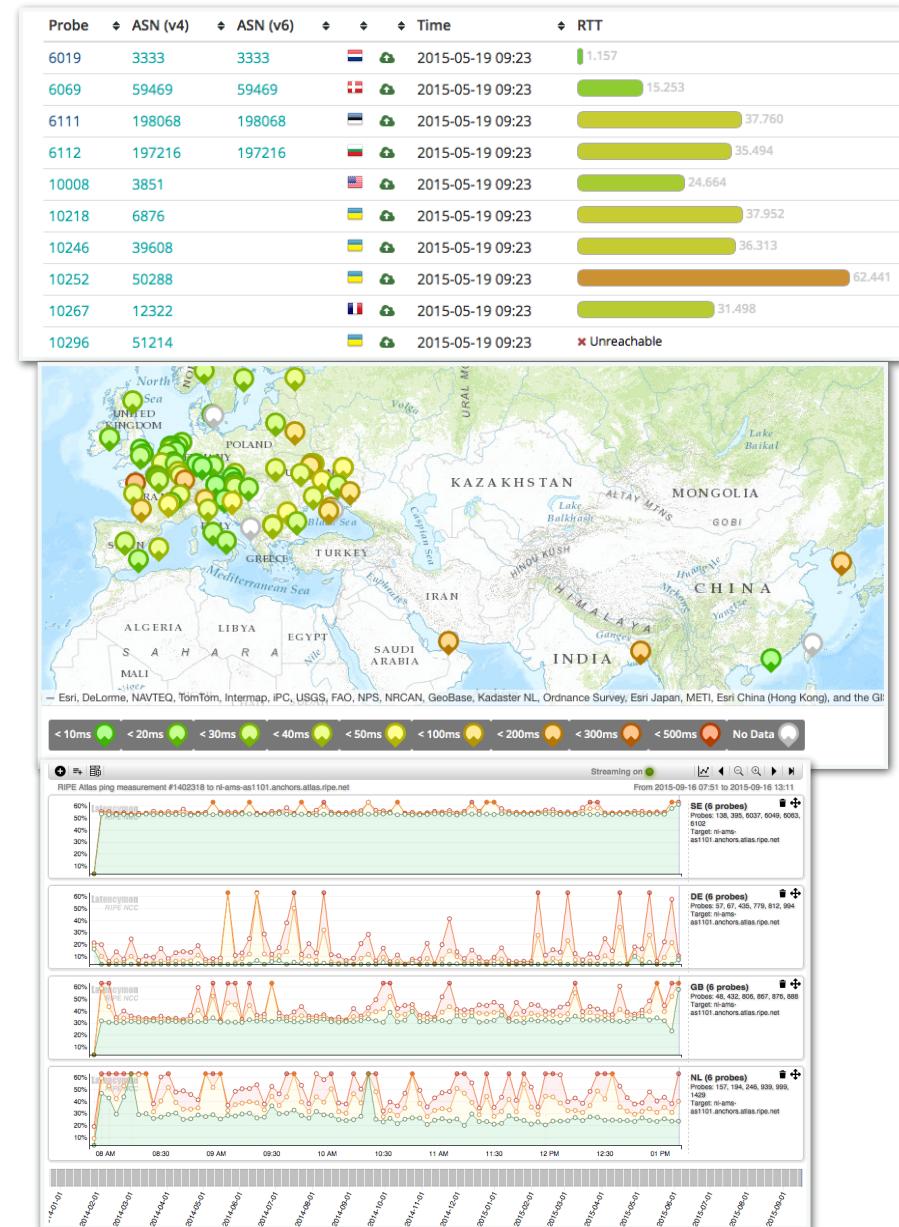
# Hackathon Vouchers

- If you have a RIPE NCC Access Account:
- “My Atlas” -> Credits -> Redeem Voucher
  - name: IXP-Tools-Hackathon
  - first 50 people will get 1.000.000 free credits ;-)



# Available visualisations: ping

- List of probes:  
sortable by RTT
- Map: colour-coded by RTT
- LatencyMON:  
compare multiple  
latency trends





RIPE Atlas data  
(API, streaming, CLI)



# RIPE Atlas REST APIs

- List of scheduled measurements
  - <https://atlas.ripe.net/api/v2/measurements/>
  - <https://atlas.ripe.net/api/v2/measurements/{TYPE}/>
- Information about a specific measurement
  - <https://atlas.ripe.net/api/v2/measurements/{ID}/>
- Results of a specific measurement
  - <https://atlas.ripe.net/api/v2/measurements/{ID}/results>



# RIPE Atlas REST APIs

- List of probes
  - <https://atlas.ripe.net/api/v2/probes/>
- Information about a specific probe
  - <https://atlas.ripe.net/api/v2/probes/{ID}>
- List of anchors
  - <https://atlas.ripe.net/api/v2/anchors/>
- Information about a specific anchor
  - <https://atlas.ripe.net/api/v2/anchors/{ID}>



# RIPE Atlas REST APIs

- List of measurements targeted to an anchor
  - <https://atlas.ripe.net/api/v2/anchor-measurements/>
- Info about a specific anchor measurement
  - <https://atlas.ripe.net/api/v2/anchor-measurements/{ID}>

**Reference:** <https://atlas.ripe.net/docs/api/v2/reference/>

**Manual:** <https://atlas.ripe.net/docs/api/v2/manual/>



# Using API to schedule a measurement

- Using command-line & scripting:
  - <https://atlas.ripe.net/docs/measurement-creation-api/>
  - <https://atlas.ripe.net/keys/>
- You will need API keys
  - To create measurements without logging in
  - To securely share your measurement data



# RIPE Atlas streaming

- RIPE Atlas streaming is an architecture that allows users to receive the measurement results as soon as they are sent by the probes
  - in real time
    - Publish/subscribe through web sockets
- There are three types of data:
  - Measurement results
  - Probe connection status events
  - Measurements metadata



# RIPE Atlas streaming

- Visualising network outages
  - <http://sg-pub.ripe.net/demo-area/atlas-stream/conn/>
- Real-time server and performance monitoring
- *Filtering and reusing measurement results*
- Documentation:
  - <https://atlas.ripe.net/docs/result-streaming/>



# Streaming: Example of results

```
Elements Network Sources Timeline Profiles Resources Audits | Console | AngularJS
<top frame> ▾  Preserve log
Filter  Regex All | Errors Warnings Info Logs Debug  Hide network messages
XHR finished loading: GET "http://atlas-stream.ripe.net/stream/socket.io/?EIO=2&transport=polling&t=1431095373684-0".
XHR finished loading: GET "http://atlas-stream.ripe.net/stream/socket.io/?EIO=2&transport=polling&t=1431095373739-1&sid=eB0kM7zfWFT2c-ScAAaH".
I received ► Object {af: 4, prb_id: 16669, result: Array[3], ttl: 42, avg: 326.841...}
I received ► Object {af: 4, prb_id: 16669, result: Array[3], ttl: 42, avg: 325.793333333...}
I received ► Object {af: 4, prb_id: 16669, result: Array[3], ttl: 42, avg: 326.048...}
I received ► Object {af: 4, prb_id: 16669, result: Array[3], ttl: 42, avg: 327.325333333...}
I received ► Object {af: 4, prb_id: 15965, result: Array[3], ttl: 45, avg: 47.631333333...}
I received ► Object {af: 4, prb_id: 15965, result: Array[3], ttl: 45, avg: 47.6996666667...}
I received ► Object {af: 4, prb_id: 15965, result: Array[3], ttl: 45, avg: 47.4816666667...}
I received ► Object {af: 4, prb_id: 19566, result: Array[3], ttl: 40, avg: 47.054...}
I received ► Object {af: 4, prb_id: 19566, result: Array[3], ttl: 40, avg: 47.8626666667...}
I received ► Object {af: 4, prb_id: 19566, result: Array[3], ttl: 40, avg: 47.5946666667...}
I received ► Object {af: 4, prb_id: 19566, result: Array[3], ttl: 40, avg: 47.500333333...}
I received ► Object {af: 4, prb_id: 18311, result: Array[3], ttl: 49, avg: 32.577...}
I received ► Object {af: 4, prb_id: 18311, result: Array[3], ttl: 49, avg: 34.084333333...}
I received ► Object {af: 4, prb_id: 18311, result: Array[3], ttl: 49, avg: 32.751333333...}
I received ► Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 182.446333333...}
I received ► Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 193.995333333...}
I received ► Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 182.291333333...}
I received ► Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 191.610333333...}
I received ► Object {af: 4, prb_id: 14918, result: Array[3], ttl: 49, avg: 34.817...}
I received ► Object {af: 4, prb_id: 14918, result: Array[3], ttl: 49, avg: 35.009333333...}
I received ► Object {af: 4, prb_id: 14918, result: Array[3], ttl: 49, avg: 35.084333333...}
I received ► Object {af: 4, prb_id: 20668, result: Array[3], ttl: 45, avg: 38.8846666667...}
I received ► Object {af: 4, prb_id: 20668, result: Array[3], ttl: 45, avg: 38.8626666667...}
I received ► Object {af: 4, prb_id: 20668, result: Array[3], ttl: 45, avg: 38.8806666667...}
I received ► Object {af: 4, prb_id: 6093, result: Array[3], ttl: 49, avg: 128.727333333...}
I received ► Object {af: 4, prb_id: 6093, result: Array[3], ttl: 49, avg: 128.737333333...}
I received ► Object {af: 4, prb_id: 6093, result: Array[3], ttl: 49, avg: 128.888333333...}
```



# RIPE Atlas Sagan

- A translation layer for RIPE Atlas measurement results
  - <https://github.com/RIPE-NCC/ripe.atlas.sagan>
  - pip install ripe.atlas.sagan
- Transforms JSON results in Python objects
- The output is firmware version transparent
- Pre-computes useful attributes (e.g. Does a traceroute reach the target host?)



# RIPE Atlas Cousteau

- A python wrapper around RIPE Atlas API
  - <https://github.com/RIPE-NCC/ripe-atlas-cousteau>
  - pip install ripe.atlas.cousteau
- Fetches results from API and streaming, and probe and measurement information
- You can manage measurements:
  - Create a measurement
  - Stop a measurement
  - Change probes involved



# RIPE Atlas CLI

- Network troubleshooting for command line pros
- 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>



# RIPE Atlas CLI

- Open source
  - RIPE NCC led community contribution
- Documentation
  - <https://ripe-atlas-tools.readthedocs.org/>
- Source:
  - <https://github.com/RIPE-NCC/ripe-atlas-tools/>
- How to contribute:
  - <https://github.com/RIPE-NCC/ripe-atlas-tools/blob/master/CONTRIBUTING.rst>



# Geolocation Data: OpenIPMap

# Crowdsourced Infrastructure Geolocation



- Developed by Emile Aben
- Visualising traceroutes on the map is difficult!
  - Routers' geolocation data is often very inaccurate
  - RIPE Atlas performs many traceroutes through Internet core
- Community of operators contributes data to OpenIPMap
  - Think OpenStreetMap for IPs
  - <https://marmot.ripe.net/openipmap/>
  - <https://github.com/RIPE-Atlas-Community/openipmap>



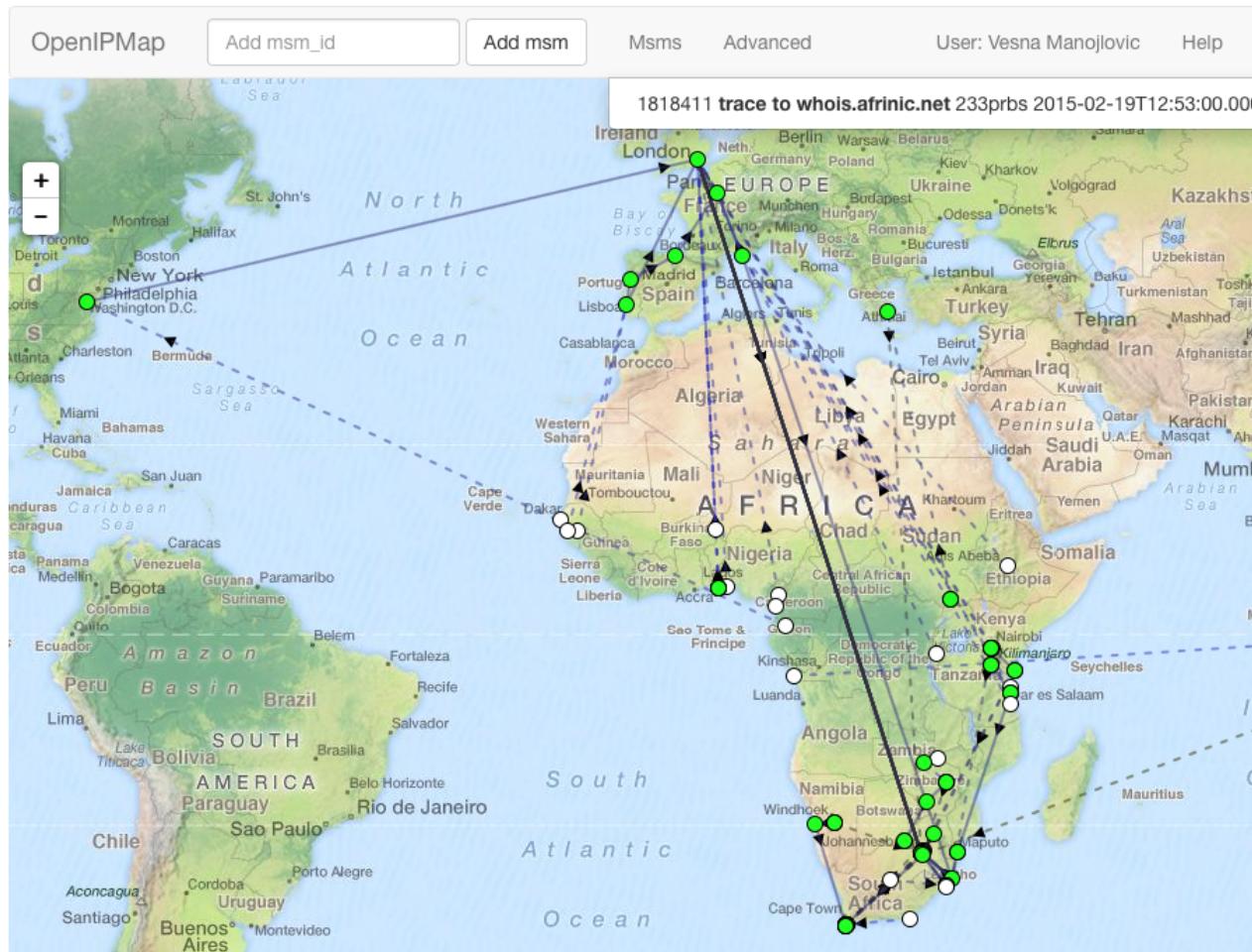
# OpenIPMap Interactive Interface

⚡ trace to whois.afrinic.net

General Information   Probes   Map   Latencymon (beta)   **OpenIPMap Prototype**   Results   Modification Log

Traceroute results on a geographical map.

OpenIPMap is a prototype visualisation that's attempting to visualise traceroute results geographically. The code is available publicly on [GitHub](#), and the complete project is available separately for those who might want to experiment with it.





# IXP Country Jedi



# IXP Country Jedi

- Tool and concept by Emile Aben
  - <https://github.com/emileaben/ixp-country-jedi>
  - <https://labs.ripe.net/Members/emileaben/measuring-ixps-with-ripe-atlas>
- Method:
  - Traceroute mesh between RIPE Atlas probes
  - Detect whether they go via local IXP's LAN IP
  - Hops geolocated using OpenIPMap database
- Data:
  - <http://sg-pub.ripe.net/emile/ixp-country-jedi/>



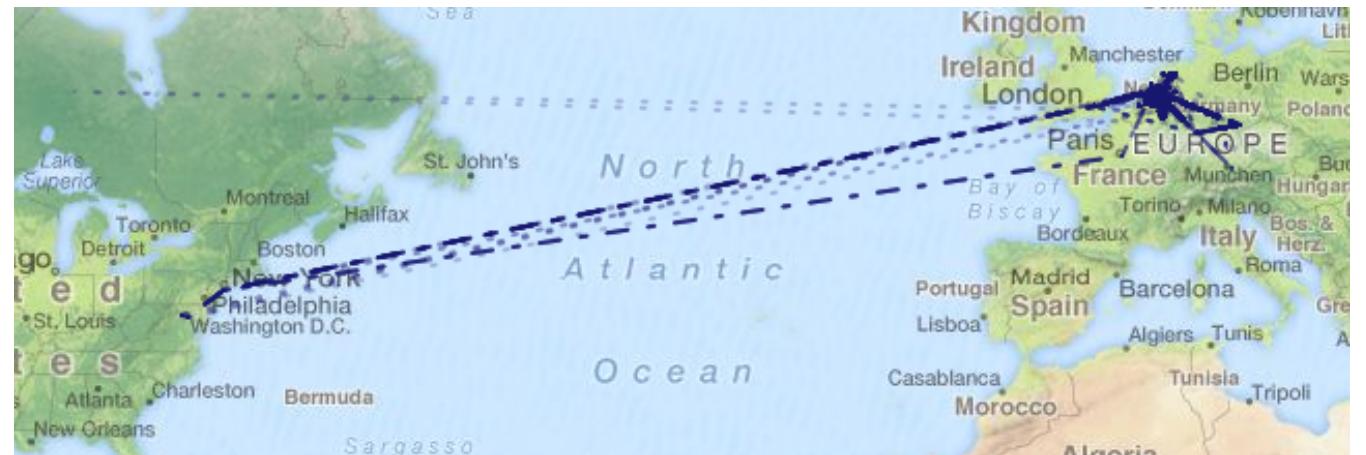
# IXP Country Jedi

- Benefits:
  - Shows how IXPs help keep traffic local
  - Comparing countries' performances with each other
  - Routing and traffic optimisation
  - Comparing IPv6 and IPv4



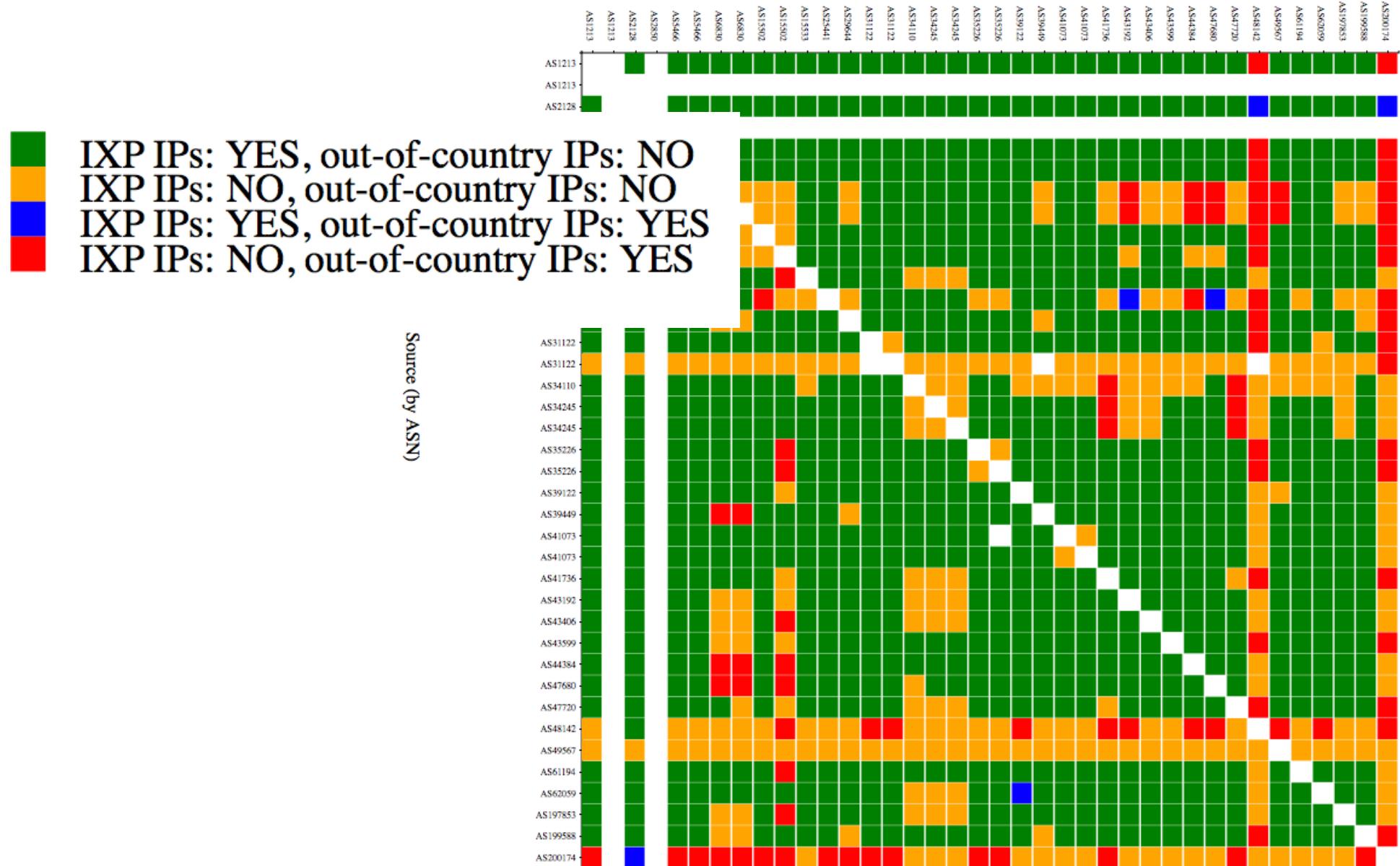
# Paths for Netherlands

IPv4

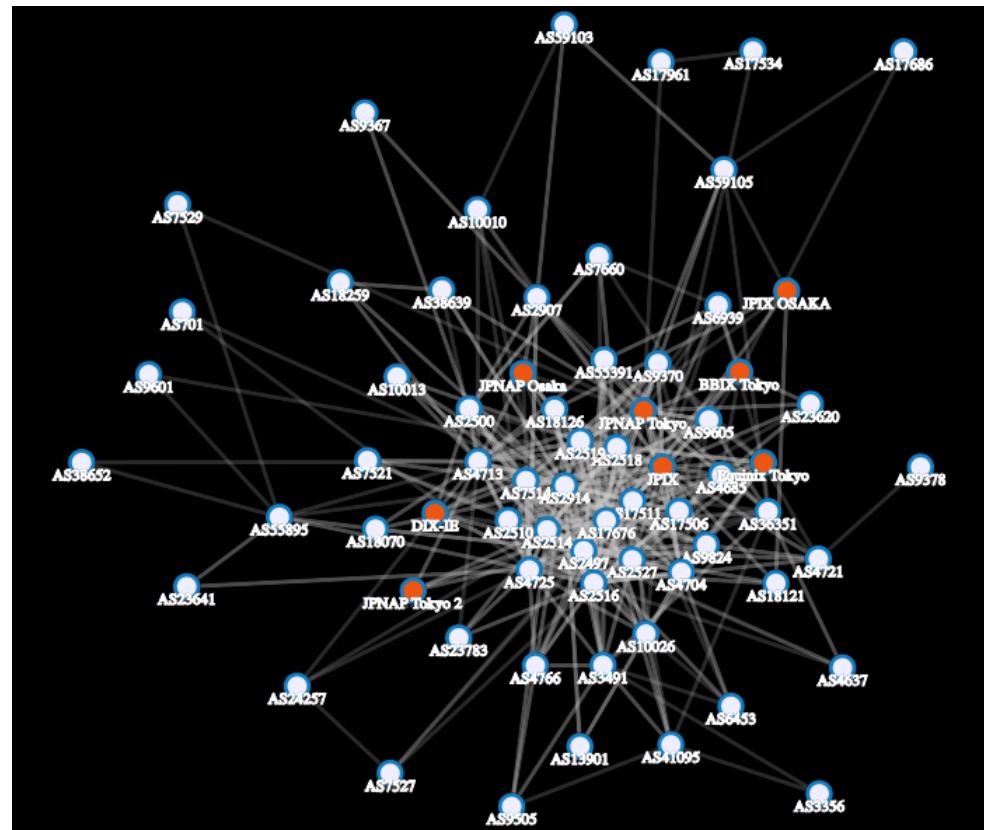
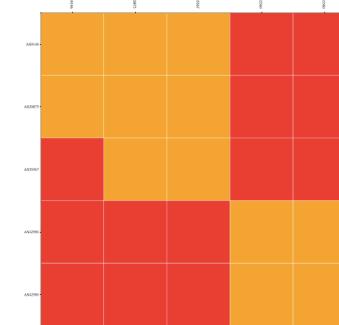
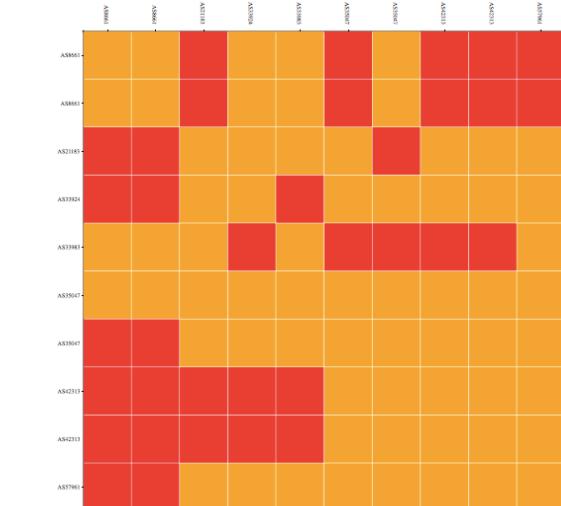
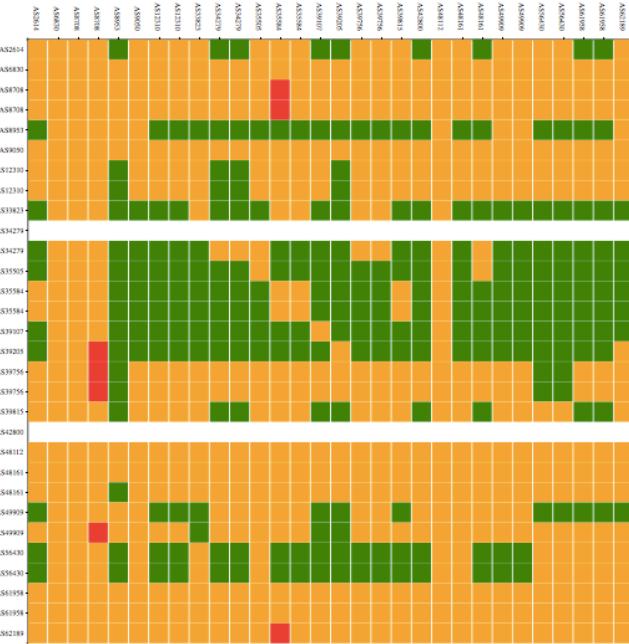


IPv6

# How Many Paths Go Via Local IXP?



# More Probes, Better Data



# Routing Diagnosis and Optimisation



- Interactive tool! (hover over the cell...)
  - <http://sg-pub.ripe.net/emile/ixp-country-jedi/latest/IE/>

```
## msm_id:3594219 prb_id:6007 dst:185.32.93.252 ts:2016-03-01 16:56:49 -00:00
1 (AS2128) gw2.v141.inex.ie [1.422, 1.479, 1.49] ||
2 (AS2128) te0-0-0-1-cr2-kp.hea.net [1.848, 1.919, 2.09] |Dublin,Leinster,IE|
3 (AS1213) be-600-cr2-cwt.hea.net [1.715, 1.772, 3.074] ||
4 (AS3257) xe-2-1-0.dub20.ip4.gtt.net [1.195, 1.213, 1.218] |Dublin,Leinster,IE|
5 (AS3257) xe-9-2-7.lon11.ip4.gtt.net [10.266, 10.315, 10.366] ||
6 (AS174) be3008.ccr21.lon01.atlas.cogentco.com [11.123, 11.164, 11.231] |London,England,GB|
7 (AS174) be2868.ccr41.lon13.atlas.cogentco.com [11.069, 11.073, 11.139] ||
8 (AS174) be2391.ccr21.lpl01.atlas.cogentco.com [18.534, 18.797, 22.348] |Liverpool,England,GB|
9 (AS174) be2590.rcr21.dub01.atlas.cogentco.com [24.562, 24.754, 24.756] |Dublin,Leinster,IE|
10 (AS174) be2530.rcr21.dub02.atlas.cogentco.com [25.249, 25.264, 25.506] |Dublin,Leinster,IE|
11 (AS174) be2041.nr11.b020478-0.dub02.atlas.cogentco.com [21.6, 21.653, 21.677] |Dublin,Leinster,IE|
12 (AS174) 149.11.37.114 [25.013, 25.054, 25.114] ||
13 (AS200174) 185.32.93.252 [32.185, 32.199, 32.268] ||
```

- Red or blue: the path is going out of country
  - If this is a surprise, talk to your upstream(s)
- Yellow: the path is not going via local IXP
  - If this is undesired, make a new peering agreement



# IXP-Country-Jedi at this hackathon

- Challenges for THIS hackathon
  - easily find interesting local destinations to measure
  - visualise if connectivity is 'direct', 'ixp', 'other'
  - visualise RTTs and correlation between having an IXP in the path or not



# Routing Information Service (RIS)



# What is RIS?

- <https://ris.ripe.net>
- Internet routing data collection and storage service
  - 21 remote route collectors (RRC) distributed globally
  - Since 2001
- Remote Route Collectors
  - Dual-stacked software routers running Linux & BGP daemons
  - Multiple BGP sessions per RRC
  - Announce/withdraw anchoring/beacon prefix at fixed intervals



# RIS Data

- What data does RIS record?
  - BGP messages sent by peers
  - prefix announcements and withdrawals
  - notification messages
  - BGP routing tables
- How can I get the data?
  - Compressed raw data available over FTP/HTTP
  - Distilled information available over restful APIs



# Real-time streaming of BGP data

- Public beta available
- Data from newest 4 RRCs only (RRC18-21)
- Client specifies filtering options, streaming service sends BGP
- Messages as they become available
- <http://stream-dev.ris.ripe.net/demo>



RIPEstat



# A few words about RIPEstat

The screenshot illustrates the RIPEstat web interface with several annotated components:

- Search box:** A large search bar at the top right with a "Search" button.
- Thematic tabs:** A sidebar on the left containing links to "At a Glance", "Routing", "DNS", "Anti Abuse", "Database", "Geographic", and "Activity".
- Widgets:** Four main content areas displayed as cards:
  - AS Overview (AS3333):** Shows RIPE-NCC-AS - Reseaux IP Europeens Network Coordination Centre (RIPE NCC). Results from 2013-08-30 00:00:00 UTC to 2013-08-30 08:00:00 UTC.
  - Registry Browser (AS3333):** Displays aut-num: AS3333 details, last updated on 2012-04-17 at 10:12:15 UTC. Includes contact information like as-name, descr, org, admin-c, admin-c, tech-c, mnt-by, and mnt-by.
  - Geoloc (AS3333):** A map showing the geographical location of AS3333 across Europe, with a callout for Amsterdam.
  - Routing Status (AS3333):** Shows AS3333 is visible by 97% of 107 IPv4 and 99% of 102 IPv6 RIS full peers. Includes history from Jan 2001, origin information, and BGP neighbor statistics.

- Data sources: <https://stat.ripe.net/data-sources>



# RIPEstat APIs

- Complete list: [https://stat.ripe.net/docs/data\\_api](https://stat.ripe.net/docs/data_api)
- Routing Data History
  - [https://stat.ripe.net/docs/data\\_api#BGPState](https://stat.ripe.net/docs/data_api#BGPState)
  - [https://stat.ripe.net/docs/data\\_api#BGPUpdates](https://stat.ripe.net/docs/data_api#BGPUpdates)
  - [https://stat.ripe.net/docs/data\\_api#BGPlay](https://stat.ripe.net/docs/data_api#BGPlay)
- Looking Glass
  - [https://stat.ripe.net/docs/data\\_api#LookingGlass](https://stat.ripe.net/docs/data_api#LookingGlass)



# RIPEstat APIs

- Resource Info
  - [https://stat.ripe.net/docs/data\\_api#PrefixOverview](https://stat.ripe.net/docs/data_api#PrefixOverview)
  - [https://stat.ripe.net/docs/data\\_api#RIR](https://stat.ripe.net/docs/data_api#RIR)
- DNS
  - [https://stat.ripe.net/docs/data\\_api#ReverseDnsIP](https://stat.ripe.net/docs/data_api#ReverseDnsIP)
- Bandwidth
  - [https://stat.ripe.net/docs/data\\_api#SpeedcheckerBandwidthMeasurements](https://stat.ripe.net/docs/data_api#SpeedcheckerBandwidthMeasurements)



# Other data sources



# BGP Stream, CAIDA

- BGPSream is an open-source software framework for live and historical BGP data analysis, supporting scientific research, operational monitoring, and post-event analysis. BGPSream allows users to quickly inspect raw BGP data from the command-line, develop Python apps, or build complex systems using a C/C++ API.  
BGPSream provides seamless and live access to both the Route Views and RIPE RIS data archives, and for the BGP Hackathon, experimental live access to a stream of BGP data generated by BMP-enabled Route Views collectors.
- Website: <https://bgpstream.caida.org>
- Documentation: <https://bgpstream.caida.org/docs>



# PeeringDB

- PeeringDB is a non-profit organization focused on facilitating a neutral platform for peering coordinators, Internet Exchanges and facilities to exchange information about peering.
- <https://peeringdb.com>
- <https://peeringdb.com/apidocs/>
- <http://peeringdb.github.io/django-peeringdb/>
- <http://peeringdb.github.io/peeringdb-py/>
- <https://github.com/grizz/pdb-examples>



# And more

- Euro-IX JSON data
  - <https://github.com/euro-ix/json-schemas>
- PCH BGP Data
  - [https://www.pch.net/resources/Routing\\_Data/](https://www.pch.net/resources/Routing_Data/)
- IXP-Country-Jedi Data
  - traceroute mesh data, per country
  - <http://sg-pub.ripe.net/emile/ixp-country-jedi/>



# Other projects



# IXP-related tools & projects

- IXP Manager
  - <https://github.com/inex/IXP-Manager>
- Detecting Asymmetric Routing over IXPs
  - <http://asymcheck.inex.ie/>
- IXP-maps
  - <https://www.ixmaps.ca>
- IXP-country-Jedi 2.0
  - <https://github.com/santiagorr/ixp-country-jedi>



# Projects from previous hackathons

- All code on GitHub:
  - <https://github.com/RIPE-Atlas-Community/ripe-atlas-community-contrib/blob/master/README.md>
- DataViz:
  - <https://labs.ripe.net/Members/becha/ripe-atlas-hackathon-results>
- “Tools for operators”
  - <https://labs.ripe.net/Members/becha/ripe-atlas-tools-hackathon-results>
- Interfaces
  - <https://labs.ripe.net/Members/becha/ripe-atlas-interface-hackathon-results>



# Learn more

- Basic RIPE Atlas course:
  - <http://www.ripe.net/lir-services/training/courses/tailor-made-workshops/#tools>
- ADD LINKS!!