



RIPE NCC

RIPE NETWORK COORDINATION CENTRE

RIPE Atlas Tutorial

Vesna Manojlovic | 27 January 2016 | SANOG27



Goals

- Learn how to:
 - Benefit from using RIPE Atlas measurements for network monitoring and troubleshooting
 - Use API calls to create measurements
 - Contribute to open-source tools
- Opportunity for hands-on practice
- Get your questions answered



Overview

- Introduction to RIPE Atlas
- What can you get from RIPE Atlas as a visitor
- Creating a measurement & exercise
- Command Line Interface (CLI) Toolset
- Real-time performance monitoring & exercise
- Additional Topics
 - Other features
 - Network monitoring & exercise: 'Status Checks'



Prerequisites

- Do you have a RIPE NCC Access account?
 - If not - quickly create one: ripe.net/register
- Do you have credits to spend?
 - If not - tell me your account (time permitting!)
- **Alternatively:**
 - user: testripeatlas@yahoo.com
 - password: sanog2626



Warm-up question

- What is your background?
 - network operator?
 - software engineer / programmer?
 - data scientist?
 - sysadmin?
 - other? please specify :-)



Introduction to 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 & SSL
- Data publicly available

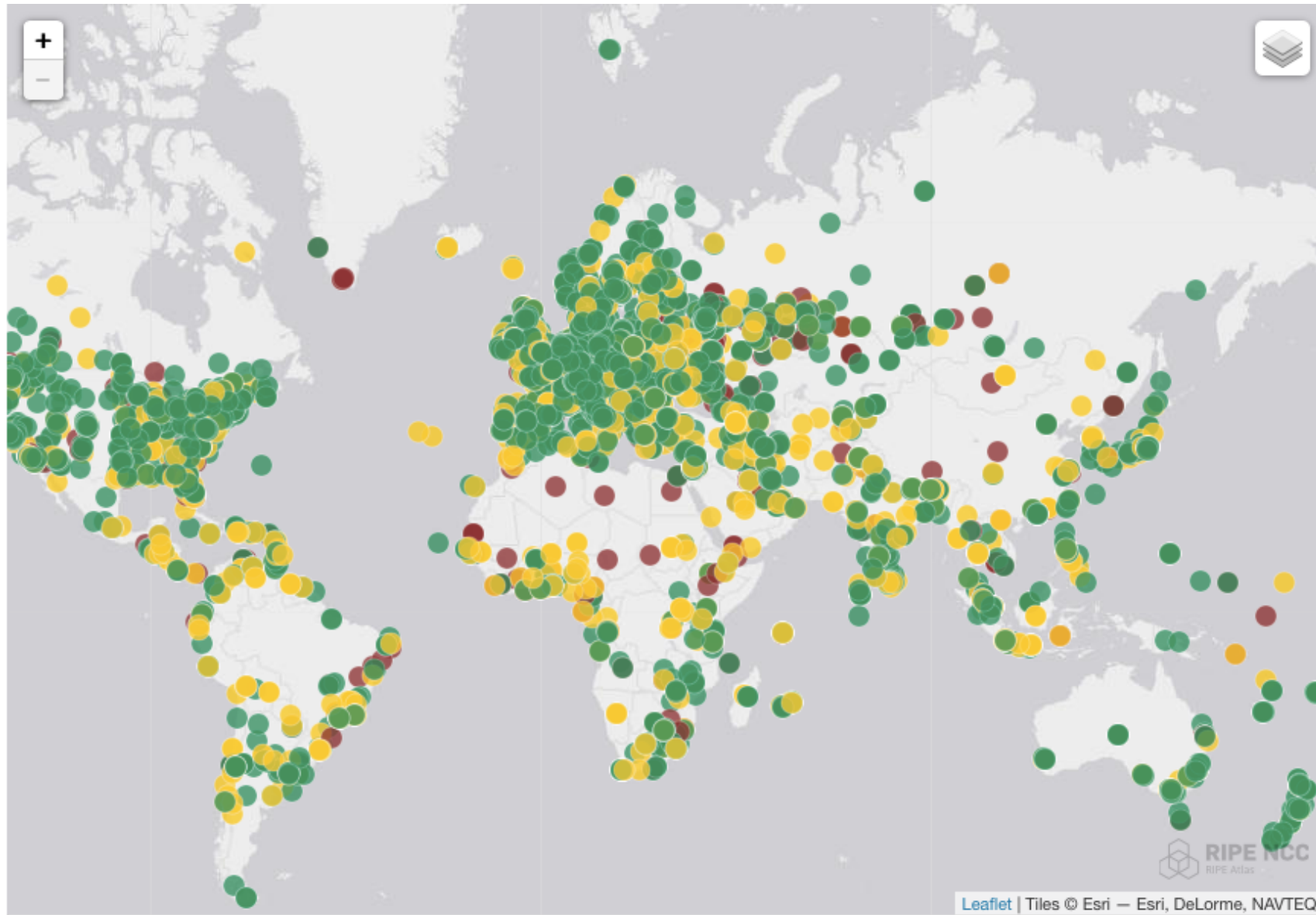


RIPE Atlas in numbers

- Countries: 181
- Originating ASNs:
 - 3,333 (IPv4) = 6,33% coverage
 - 1,212 (IPv6) = 11,22% coverage
- 9,200+ active probes
- Active users: 10,000 in 2015
- 166 RIPE Atlas anchors

Country	Probes
United States of America	1032
Germany	966
France	772
United Kingdom	610
Netherlands	514
Russia	481
Czech Republic	262
Italy	260
Switzerland	256
Ukraine	220

RIPE Atlas Coverage



Connected: 9240 Disconnected: 3425 Abandoned: 1554



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



Probe Photos





Hosting a probe

1. Create a RIPE NCC Access account
 2. Go to <https://atlas.ripe.net/apply>
 3. You will receive a probe by post
 4. Register your probe
 4. 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!



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](https://twitter.com/RIPE_Atlas) and [#RIPEAtlas](https://twitter.com/hashtag/RIPEAtlas)



What You Can Get From RIPE Atlas As A Visitor

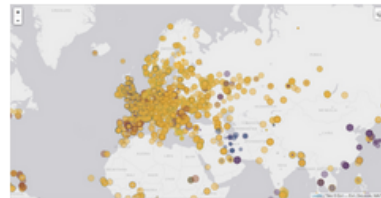
Internet Traffic Maps + Time Travel!



- RIPE Atlas <<
- About RIPE Atlas >
- Get Involved >
- Results** v
- Internet Maps
- Coverage & Statistics
- Analyses & Use Cases
- Graphs
- RIPE Atlas Anchors

RIPE Atlas - Map Visualisations

DNS Root Instances



Shows, for each probe, which root DNS server instance the probe ends up querying, when they ask a particular root server. In other words, it shows the "gravitational radius" for root DNS server instances.

Comparative DNS Root RTT



Shows a comparison of response time for DNS SOA queries to all the root DNS servers. For each probe, a marker shows the "best" root server with colour identifying the related minimum response time.

Root Server Performance



This map shows the reply time to the SOA query of a particular root DNS server, over the selected transport protocol (UDP, TCP or comparison of the two) for each probe.

RTT to Fixed Destinations



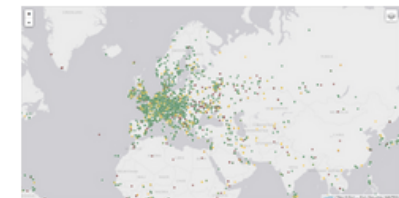
Shows the colour coding for the RTT value for the particular destination for each probe. The minimum / average / maximum values are based on standard "ping" measurements.

Reachability of Fixed Destinations



Shows if the particular fixed destination is reachable or not from each probe. Red markers indicate that the specific destination for these probes are unreachable and green reachable.

RIPE Atlas network extent

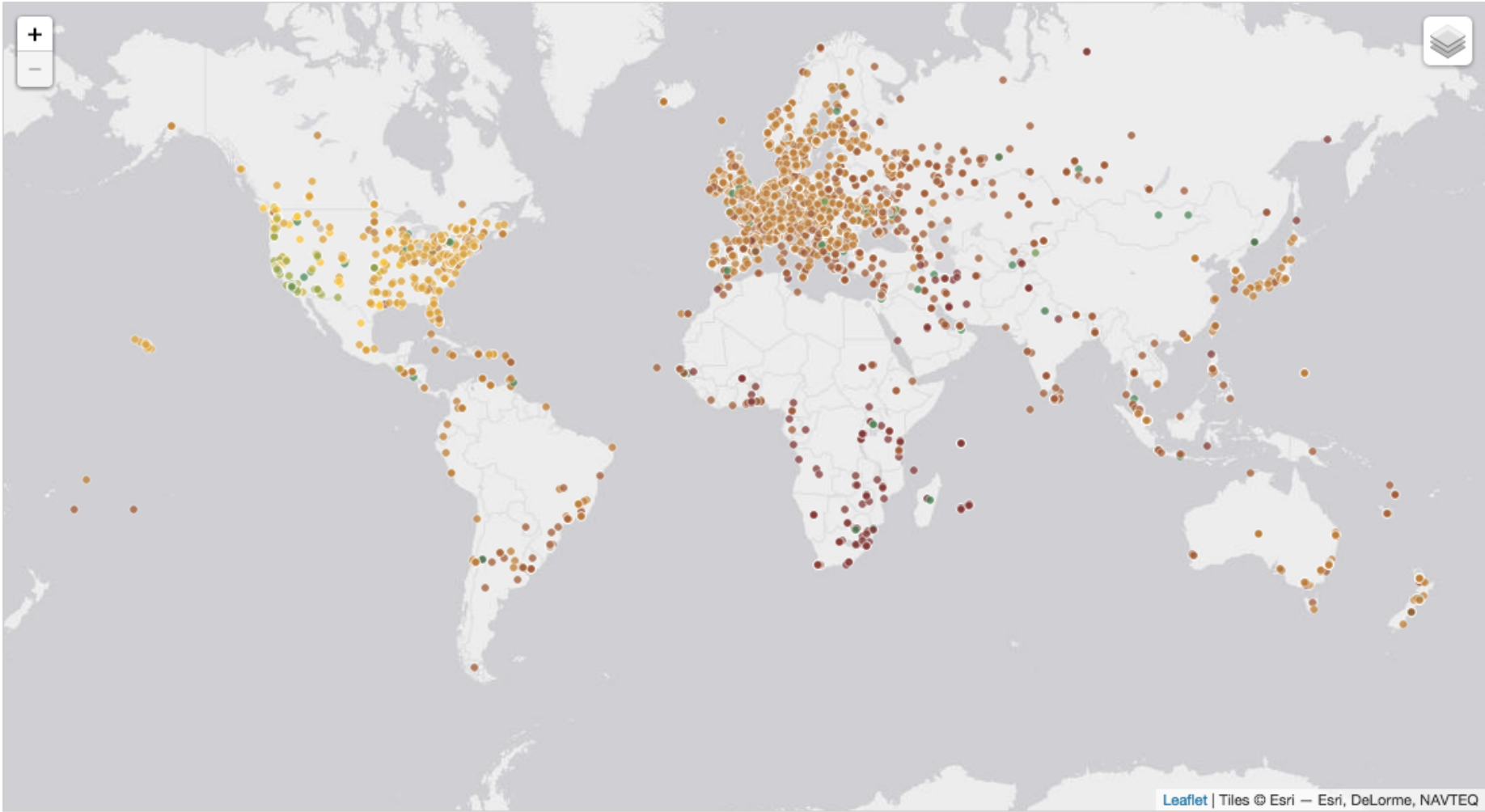


Shows the extent of the RIPE Atlas network, with all active and inactive probes.

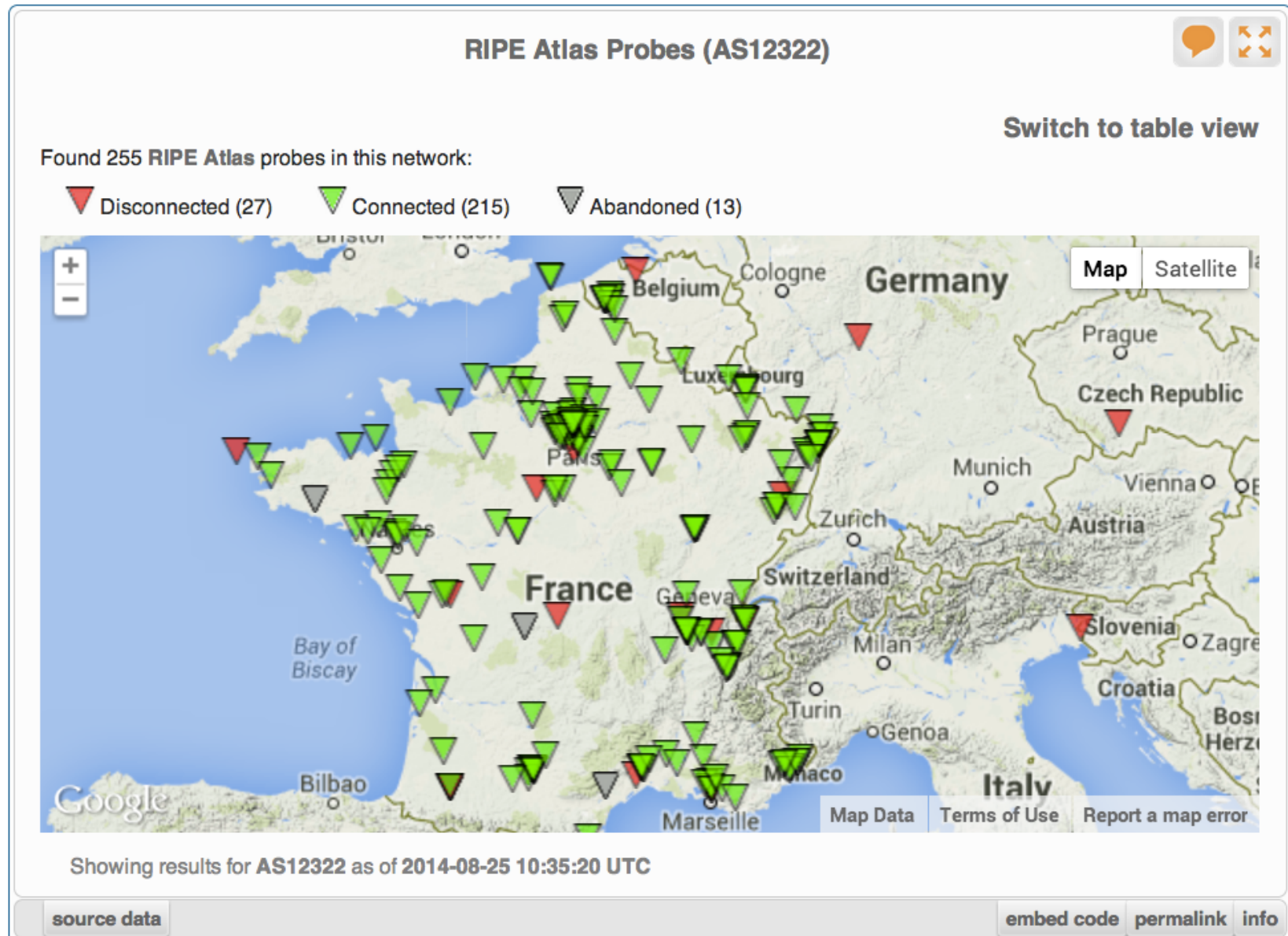


Where is B-root?

We display measurement results from the last hour only.



Probes per ASN (in RIPEstat)



Articles, papers, use cases, experiences



0 comments **RIPE Atlas: Measurements With Tagged Probes Coming Soon** Suzanne Taylor Muzzin — Sep 12, 2014 12:05 PM

User Tags: Cable, Home, NAT
System Tags: V1 (Resolves A Correctly), Resolves AAAA Correctly, IPv4 Works

We've been busy working on a number of developments, and we're really excited about particular that will be ready soon: creating customised measurements using tagged probes. Learn more about it - along with some other recent additions - and let us know what you

Tags: atlas, measurements, tools

» Read

0 comments **Time Warner Cable Outage** Emile Aben — Aug 28, 2014 04:50 PM

The Time Warner Cable network suffered an outage on 27 August 2014 between approximately 9:40 and 10:55 UTC. We looked at some interesting details of this outage in RIS and RIPE Atlas.

Tags: atlas, routing

» Read

0 comments **RIPE Atlas Midsummer Update 2014** Fatemah Mafi — Jul 24, 2014 05:30 PM

Since RIPE 68 in Warsaw, the RIPE NCC has developed and released RIPE Atlas. We would like to inform the community of what we've been working on and how you can benefit from the RIPE Atlas service.

Tags: atlas, statistics

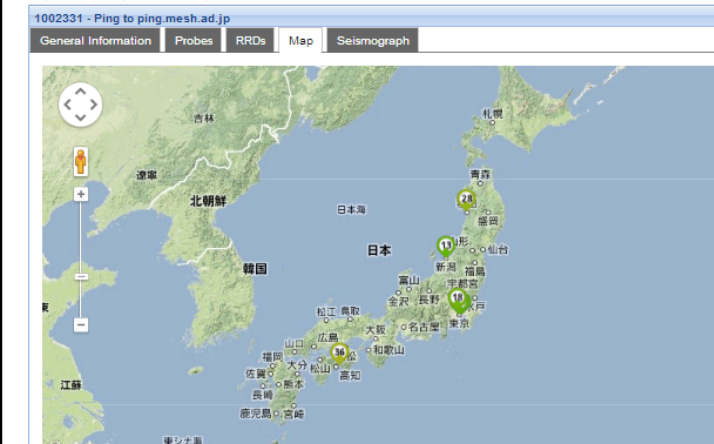
0 comments **How RIPE Atlas Helped Wikipedia Users** Emile Aben — Jul 09, 2014 12:25 PM

Engineers from the Wikimedia Foundation and the RIPE NCC recently launched a project to measure the latency of Wikimedia sites for users worldwide in order to find ways to decrease latency and improve performance for users around the world.

標準以外の計測先の追加

任意の宛先 (UDM) を登録して計測を行うことも可能です。My Atlas>Measurements>New リックして計測先を作成します。任意の宛先への計測には「クレジット」が必要になります。プロブ稼働時間に応じて (24時間連続稼働すると21,600クレジットが貯まる) 溜まっていき、TraceRouteを行う度に消費 (pingは1回につき3クレジットを消費) されます。

biglobe (ping.mesh.ad.jp) へのUDM



1 پست • صفحه 1 از 1

aiv!vid
Integration and Communications Technologies

Khoramyar

پست ها : 122
تاریخ عضویت: شنبه فبره 09, 1392
pm 12:52 2013
times 52 :Has thanked
times 57 :Been thanked

پروژه بین المللی سنجش اینترنت - رایب اطلس

توسط Khoramyar « سه شنبه مارس 18, 2014 1:42 pm

سازمان رایب - <http://www.ripe.net> - به عنوان یکی از پنج سازمان متولی منابع اینترنت جهانی پروژه بسیار جالب و جذابی را به نام پروژه اطلس شروع کرده است.

وب سایت رسمی پروژه اطلس: <https://atlas.ripe.net>

کاشگران کوچک شبکه:

سازمان رایب، با تغییر دادن نرم افزار مودم های کوچکی از شرکت TPLink آنها را به Probe ها یا کاشگر های کوچکی تبدیل کرده و آنها را به رایگان در اختیار متقاضیان میگذارد. متقاضیان از کشور های مختلفی آنها را دریافت میکنند و به اینترنت های منازل و محل کارشان متصل میکنند و این کاشگرها از نزدیک ترین مودم به پروتکل DHCP آی پی دریافت کرده و از خط اینترنت با مراکز سنجش رایب تماس میگیرند. مراکز سنجش رایب، به صورت ریموت به این کاشگر ها دستور میدهند که چه سنجش هایی را انجام دهند.

این سنجش ها شامل دستور های ساده شبکه مثل Ping - Traceroute و چند سنجش دیگر مثل DNS و امانال آنها است.

عکس یک کاشگر رایب اطلس:



Searching for probes

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

Filter based on
ASN, country,
location...

Can mark
probes as
favourites

The screenshot shows the RIPE Atlas Probes page. At the top, there is a search bar for IP addresses or ASNs. Below the navigation menu, the breadcrumb trail reads: Home > Analyse > Internet Measurements > RIPE Atlas > Probes. The main heading is "Probes".

Filtering options include: "Filter by id/asn/location/country/descript", "Connected" (dropdown), "IPv4/v6" (dropdown), and "Any Country" (dropdown). There are also buttons for "Filter" and "Reset".

Below the filters, there are tabs for "Mine", "Favourites", "Hidden", "Sponsored", "Ambassadorships", and "Public".

Id	ASN v4	ASN v6	Country	Description	Connection Status	Actions
23477	9143			PR-MON-01	🟢 1 week, 2 days	👤 👁️ ⭐
23474	34569				🟢 5 days, 10 hours	👤 👁️ ⭐
23452	5769				🟢 3 hours, 5 minutes	👤 👁️ ⭐
23442	4739				🟢 2 days, 10 hours	👤 👁️ ⭐
23441	4804				🟢 1 week, 2 days	👤 👁️ ⭐
23434	20657			XLA SOA Probe	🟢 1 week, 2 days	👤 👁️ ⭐
23433	5421	5421		DCE - Sofia University	🟢 1 week, 2 days	👤 👁️ ⭐
23387	12322			CC&C Office, Echallon, France	🟢 1 week, 2 days	👤 👁️ ⭐
23381	9143			T-Home	🟢 1 day, 19 hours	👤 👁️ ⭐

Probe page - Live demo



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

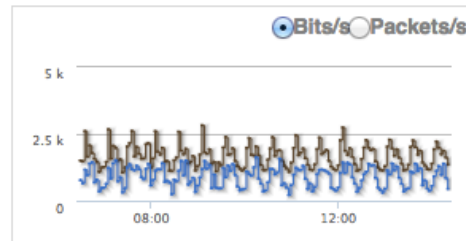
Probe #10010 [\(Register\)](#)

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

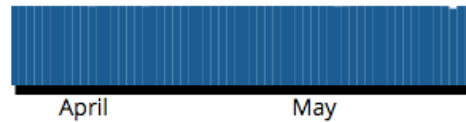
General Information [Edit](#)

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 **#10010**
4680

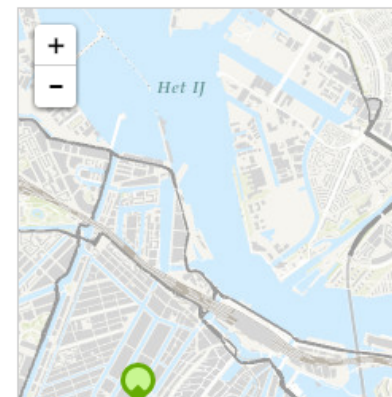
Architecture 
tl-mr3020

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](#) [↗](#)



[Edit](#) [↗](#)

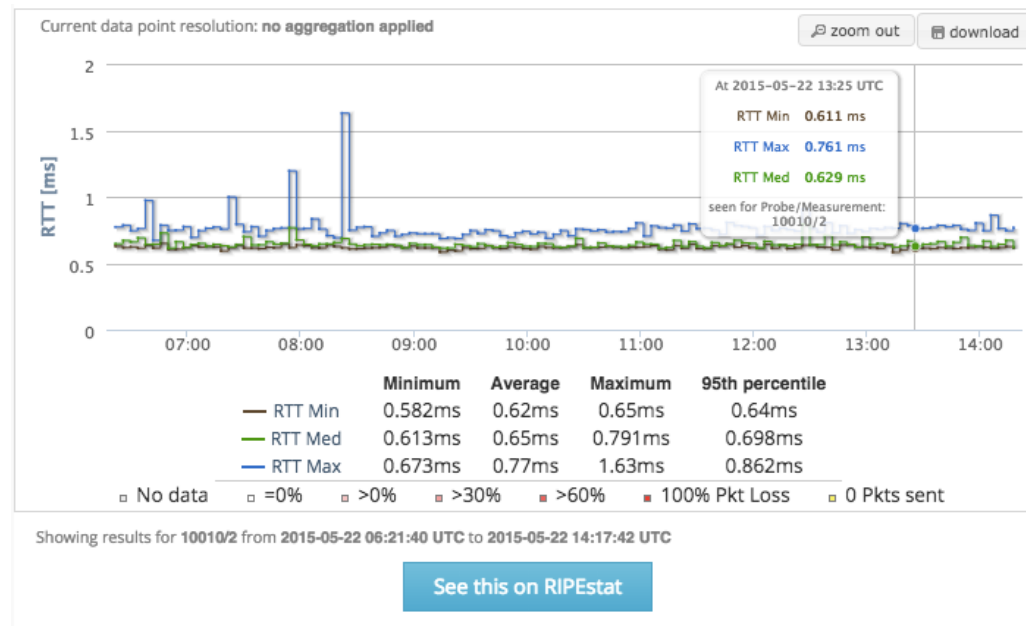
Management Sharing

Only the probe host is permitted to administer this probe.



Zoomable Ping Graph

- Zoom in / out in time, in the same graph
- Easier visualisation of an event's details
- Selection of RTT class (max, min, average)



Looking up Measurements Results





- <https://atlas.ripe.net/measurements/>
- Or go to “My Atlas” > “Measurements”













Measurements

+ Create a Measurement

Filter by target and/or description

Any Status ▾ IPv4/v6 ▾ All types ▾ Of all time ▾  

Mine Favourites Hidden Public

Id	Type	Target	Description	Probes	Time (UTC)	Status
1999490	○ IPv4 dns	j.root-servers.net	DNS measurement to j.root-servers.net	13	2015-05-11 14:59 2015-05-11 15:05	■  
1999479	○ IPv4 dns	j.root-servers.net	DNS measurement to j.root-servers.net	30	2015-05-11 14:50 2015-05-11 15:00	■  
1999477	○ IPv4 dns	j.root-servers.net	DNS measurement to j.root-servers.net	3	2015-05-11 14:47 2015-05-11 14:55	■  
1999476	○ IPv4 dns	j.root-servers.net	DNS measurement to j.root-servers.net	1	2015-05-11 14:45 2015-05-11 14:55	■  
1999465	○ IPv4 dns	j.root-servers.org	DNS measurement to j.root-servers.org	1	2015-05-11 14:42 2015-05-11 14:50	■  
1999459	○ IPv4 dns	j.root-servers.net	UDP V4 Measurement	64	2015-05-11 14:09 2015-05-11 14:15	■  

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/>

DNS measurement to j.root-servers.net

General Information | Probes | Map | **Download Results**

Download the raw measurement result data here.

You can use this form to download the data through your browser, or use the preview on the right to help you query the REST API directly.

Start Date*: 2015-05-11 (start time of this measur...
All dates are start-of-day

Stop Date*: 2015-05-11 (start time of this measur...
All dates are end-of-day

Format: JSON

Download

URL Preview

```
https://atlas.ripe.net/api/v1/measurement/1999490/result/?start=1431302400&stop=1431388799&format=json
```



Looking at the result

```
[{"af":6,"avg" 61.32,  
"dst_addr":"2a00:1450:4004:802::1014","dst_name":"www.google.com",  
"dup":0,  
"from":"2001:8a0:7f00:b201:220:4aff:fec5:5b5b",  
"fw":4660,"lts":411,  
"max":62.148,"min":60.372,  
"msm_id":1004005,"msm_name":"Ping",  
"prb_id":722,"proto":"ICMP","rcvd":10  
"result":[{"rtt":62.148}, {"rtt":61.437}, {"rtt":61.444}, {"rtt":61.448},  
{"rtt":61.794}, {"rtt":61.533}, {"rtt":60.372}, {"rtt":60.373}, {"rtt":61.384},  
{"rtt":61.267}],  
"sent":10,"size"64,  
"src_addr":"2001:8a0:7f00:b201:220:4aff:fec5:5b5b",  
"step":240,"timestamp":1410220847,"ttl":54,"type":"ping"},
```

Destination (IP & name)

Reference (msm ID)

Source (probe public IP address)

Packet loss: difference between sent & received!

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



Creating a Measurement

Benefits of your own measurements



- A customer reports a problem: they cannot reach one of your servers
 - You can schedule pings or traceroutes from up to 500 RIPE Atlas probes from a particular region to check where the problem might be
- Measuring packet loss on a suspected “bad” link
- Testing anycast deployment



Credits system

- Running your own measurements cost credits
 - ping = 10 credits, traceroute = 20, etc.
- Why? Fairness and to avoid overload
- Daily spending limit & max measurements user can create
- Hosting a RIPE Atlas probe earns credits
- Earn extra credits by:
 - Being a RIPE NCC member
 - Hosting an anchor
 - Sponsoring probes



Scheduling a measurement

- Log in to atlas.ripe.net
- “My Atlas” > “Measurements”
- Three methods:
 1. Quick & Easy
 - Choose measurement type
 - Specify target
 - Done!
 2. Advanced GUI usage
 3. CLI scripting using API

2: Using GUI to schedule a measurement



- Mostly used for a periodic, long time measurement
 - If just once, ASAP, choose “One-off”
- Choose type, target, frequency, # of probes, region...
 - Interactive interface helps you at each step
- Each measurement will have unique ID
- “API Compatible Specification” is generated by the GUI

3: Using API to schedule a measurement



- Using command-line & scripting:
Application Programming Interface (API)
 - <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

API documentation



- <https://atlas.ripe.net/docs/measurement-creation-api/>
 - <https://atlas.ripe.net/doc/credits>
 - <https://atlas.ripe.net/doc/udm>
- <https://atlas.ripe.net/keys/>
- <https://atlas.ripe.net/docs/keys2/>

Looking up measurements results



- Go to “My Atlas” > “Measurements”

Measurements - RIPE Atlas — RIPE Network Coordination Centre

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

RIPE NCC RIPE NETWORK COORDINATION CENTRE

Manage IPs and ASNs > **Analyse** > Participate > Get Support > Publications > About Us >

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

RIPE Atlas <<
About RIPE Atlas >
Get Involved >
Results >
My Atlas >
Measurements
Credits
API Keys
Messages (72 new)

Measurements

+ Create a Measurement

Filter by target and/or description Any Status IPv4/v6 All types Ping Traceroute DNS HTTP SSL Certificate (UTC) Status

Id	Type	Target	Description	(UTC)	Status
1965015	IPv4 ping	b92.net	Ping measurement to b92.net	49 2015-04-21 08:20 2015-04-21 08:30	👁️⭐



Available visualisations: ping

- List of probes: sortable k

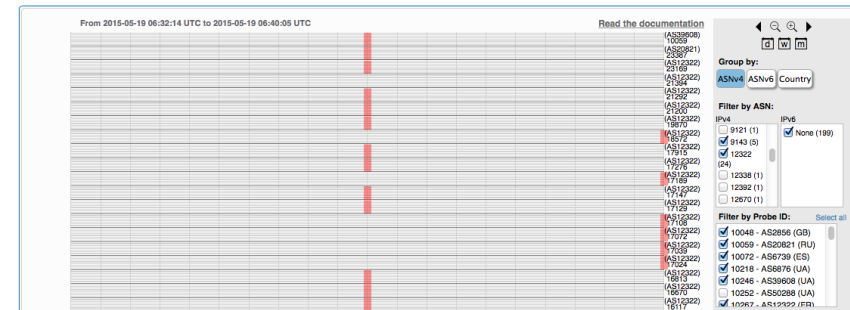
Probe	ASN (v4)	ASN (v6)		Time	RTT
6019	3333	3333		2015-05-19 09:23	1.157
6069	59469	59469		2015-05-19 09:23	15.253
6111	198068	198068		2015-05-19 09:23	37.760
6112	197216	197216		2015-05-19 09:23	35.494
10008	3851			2015-05-19 09:23	24.664
10218	6876			2015-05-19 09:23	37.952
10246	39608			2015-05-19 09:23	36.313
10252	50288			2015-05-19 09:23	62.441
10267	12322			2015-05-19 09:23	31.498
10296	51214			2015-05-19 09:23	Unreachable

- Map: colour-coded by RTT



- Seismograph: stacked m packet loss

An interactive visualisation for ping measurements.





Exercise

Create a Measurement



Tasks

- Create a **ping** measurement:

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

1. Warm-up: Create a measurement using the GUI

2. Create API Key

3. Schedule a measurement using the API



Sub-task 1: Use web interface

- RIPE Atlas <<
- About RIPE Atlas >
- Get Involved >
- Results >
- My Atlas** v
- Probes
- Measurements
- Credits
- API Keys
- Messages (81 new)
- Anchors
- Sponsorships

Measurements

+ Create a Measurement

Filter by target and/or description

Any Status IPv4/v6 All types Of all time

Mine Favourites Hidden Public All

Id	Type	Target	Description	Probes	Time (UTC)	Status
1965015	Vesna Manojlovic IPv4 ping	b92.net	Ping measurement to b92.net	49	2015-04-21 08:20 2015-04-21 08:30	■ 👁️ ⭐
1940389	Vesna Manojlovic IPv4 sslcert	twitter.com	SSL measurement to twitter.com	104	2015-04-07 09:39 2015-04-07 09:45	■ 👁️ ⭐

- Useful hint: once you generate a measurement, copy “API Compatible Specification” to text file
- Note Measurement-ID

Create a New Measurement

Step 1 Definitions

Please select the type of measurement you want to create

+ Ping + Traceroute + DNS + SSL + NTP

Step 2 Probe Selection

Worldwide 50

+ New Set - wizard + New Set - manual + IDs List + Reuse a set from a measurement

Step 3 Timing

This is a One-off:

Start time: As soon as possible Stop time: Never

> Measurement API Compatible Specification

Create My Measurement(s)



Sub-task 2: Create API key

RIPE Atlas <<

About RIPE Atlas >

Get Involved >

Results >

My Atlas v

Probes

Measurements

Credits

[API Keys](#)

Messages (81 new)

Anchors

API Keys

[+ Create an API key](#)

<input type="checkbox"/> Key	Created	Permission	Object	Label	Valid From	Valid To	Enabled
<input type="checkbox"/> 984a774c-33ce-4b97-9767-fb48efda6c12	2013-01-31 13:05 UTC	Download results of a user defined measurement	1002953 b.hosteddnsservice.com				✓
<input type="checkbox"/> e5ba646b-abf1-4f01-8bf1-5267a9dd56ce	2013-01-31 12:52 UTC	Download results collected by a specific probe	13: k13				✓
<input type="checkbox"/> 9788b7e0-9d4b-4787-8a42-fce8f2f2e929	2013-01-11 14:53 UTC	Download results of a user defined measurement	1002676 www.google.com				✓

- Click on “Create an API Key”
- Choose type: “create a new user-defined measurement”
- “Object” is not applicable (N/A) for this type
- Give it a label
- Give it a duration of validity (leave empty for defaults)
- “Key” value to be passed on to the API call (next step)



Sub-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

- Example:

```
$ curl -H "Content-Type: application/json" -H "Accept: application/json" -X POST  
-d '{ "definitions": [ { "target": "ping.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
```




```
Terminal Shell Edit View Window Help 0 b/s 0 b/s [icons] 100% wo 12:
becha — bash — 72x24
air-becha:~ becha$ curl -H "Content-Type: application/json" -H "Accept:
application/json" -X POST -d '{ "definitions": [ { "target": "ping.xs4al
l.nl", "description": "My First Measurement", "type": "ping", "af": 4 }
], "probes": [ { "requested": 10, "type": "country", "value": "RS" } ] }
' https://atlas.ripe.net/api/v1/measurement/?key=7b4c3441-4504-4d83-9ed7
-fbf1a007d060
{"measurements": [2421551]}air-becha:~ becha$
```



Command Line Interface (CLI) Toolset



Why CLI RIPE Atlas tools

- Access RIPE Atlas from the terminal / shell console
- Quick & dirty shortcuts for network troubleshooting
- FLOSS (open source) tools
 - written & maintained by RIPE NCC
 - open for contributions by the community
- Before you can use the toolset
 - download the tools
 - install
 - configure



Use cases for CLI tools

1. create a measurement
2. generate a simple report about ongoing measurement
3. look at the results
4. collect results from the ongoing measurement (streaming)



Creating ping measurement

- Simplest: one-off, using default values: (50 probes to “target”)
- `$ ripe-atlas measure ping --target wikipedia.org`

```
Terminal
(2015-11-02 14:55:44) $ ripe-atlas measure ping --target wikipedia.org
Looking good! Your measurement was created and details about it can be found here:
https://atlas.ripe.net/measurements/2904352/

Connecting to stream...
48 bytes from probe #10218 46.151.195.130 to 91.198.174.192 (91.198.174.192): ttl=58 times:46.213, 45.994, 45.972,
48 bytes from probe #22628 109.68.46.106 to 91.198.174.192 (91.198.174.192): ttl=55 times:35.662, 35.331, 35.359,
48 bytes from probe #18566 81.201.61.39 to 91.198.174.192 (91.198.174.192): ttl=59 times:17.79, 18.442, 17.882,
48 bytes from probe #20350 82.113.54.198 to 91.198.174.192 (91.198.174.192): ttl=56 times:22.789, 22.465, 22.666,
48 bytes from probe #17129 88.184.60.220 to 91.198.174.192 (91.198.174.192): ttl=55 times:22.135, 21.617, 21.978,
48 bytes from probe #16893 79.194.220.192 to 91.198.174.192 (91.198.174.192): ttl=57 times:28.603, 27.745, 27.795,
48 bytes from probe #19084 27.122.15.216 to 91.198.174.192 (91.198.174.192): ttl=57 times:227.216, 227.051, 225.372,
48 bytes from probe #16651 81.157.15.155 to 91.198.174.192 (91.198.174.192): ttl=50 times:22.73, 16.033, 16.583,
48 bytes from probe #20511 89.101.106.27 to 91.198.174.192 (91.198.174.192): ttl=52 times:31.829, 31.628, 32.272,
48 bytes from probe #17930 212.158.157.8 to 91.198.174.192 (91.198.174.192): ttl=53 times:24.271, 24.009, 33.372,
48 bytes from probe #20372 82.208.31.38 to 91.198.174.192 (91.198.174.192): ttl=55 times:19.358, 19.555, 20.386,
48 bytes from probe #14898 212.59.56.113 to 91.198.174.192 (91.198.174.192): ttl=57 times:15.564, 16.186, 15.162,
48 bytes from probe #18697 185.75.198.141 to 91.198.174.192 (91.198.174.192): ttl=47 times:25.74, 24.899, 24.948,
48 bytes from probe #18068 93.88.224.8 to 91.198.174.192 (91.198.174.192): ttl=60 times:17.606, 17.66, 17.785,
48 bytes from probe #24599 87.104.31.93 to 91.198.174.192 (91.198.174.192): ttl=56 times:11.439, 11.212, 11.306,
48 bytes from probe #17515 83.105.126.208 to 91.198.174.192 (91.198.174.192): ttl=55 times:39.78, 39.492, 39.796,
48 bytes from probe #22511 65.190.176.14 to 91.198.174.192 (91.198.174.192): ttl=47 times:131.451, 125.54, 122.173,
48 bytes from probe #19139 162.226.230.169 to 91.198.174.192 (91.198.174.192): ttl=47 times:122.889, 121.986, 122.019,
48 bytes from probe #16713 90.32.217.67 to 91.198.174.192 (91.198.174.192): ttl=49 times:47.695, 45.995, 47.142,
48 bytes from probe #13414 86.184.50.10 to 91.198.174.192 (91.198.174.192): ttl=53 times:16.523, 16.87, 16.877,
48 bytes from probe #18444 188.175.7.132 to 91.198.174.192 (91.198.174.192): ttl=55 times:24.727, 24.534, 24.551,
48 bytes from probe #20623 94.199.192.180 to 91.198.174.192 (91.198.174.192): ttl=57 times:26.421, 26.102, 26.383,
48 bytes from probe #11334 212.185.87.38 to 91.198.174.192 (91.198.174.192): ttl=57 times:16.389, 16.317, 16.263,
48 bytes from probe #16771 89.74.189.186 to 91.198.174.192 (91.198.174.192): ttl=51 times:33.142, 33.336, 33.39,
48 bytes from probe #16168 84.242.85.91 to 91.198.174.192 (91.198.174.192): ttl=52 times:31.078, 30.997, 31.459,
48 bytes from probe #22608 207.38.156.228 to 91.198.174.192 (91.198.174.192): ttl=54 times:91.974, 91.746, 90.971,
48 bytes from probe #17915 82.230.179.223 to 91.198.174.192 (91.198.174.192): ttl=58 times:67.069, 65.520, 67.286,
48 bytes from probe #23879 84.28.4.6 to 91.198.174.192 (91.198.174.192): ttl=59 times:201.169, 16.039, 9.765,
48 bytes from probe #11643 213.46.66.217 to 91.198.174.192 (91.198.174.192): ttl=58 times:9.102, 8.897, 7.653,
48 bytes from probe #18433 94.112.176.45 to 91.198.174.192 (91.198.174.192): ttl=50 times:40.459, 39.253, 38.474,
48 bytes from probe #18635 92.225.9.253 to 91.198.174.192 (91.198.174.192): ttl=52 times:36.214, 35.388, 35.011,
48 bytes from probe #20236 94.112.19.136 to 91.198.174.192 (91.198.174.192): ttl=52 times:32.036, 31.315, 31.616,
48 bytes from probe #13627 5.83.189.162 to 91.198.174.192 (91.198.174.192): ttl=57 times:9.078, 8.865, 9.046,
48 bytes from probe #25047 112.118.195.171 to 91.198.174.192 (91.198.174.192): ttl=57 times:316.169, 316.591, 316.473,
48 bytes from probe #23411 124.198.160.1 to 91.198.174.192 (91.198.174.192): ttl=51 times:264.655, 265.057, 264.989,
48 bytes from probe #14974 193.104.37.249 to 91.198.174.192 (91.198.174.192): ttl=58 times:22.11, 10.32, 10.408,
48 bytes from probe #22573 89.176.43.44 to 91.198.174.192 (91.198.174.192): ttl=52 times:32.782, 32.476, 32.372,
48 bytes from probe #17189 88.166.162.43 to 91.198.174.192 (91.198.174.192): ttl=57 times:48.633, 47.839, 48.979,
48 bytes from probe #16265 37.24.137.141 to 91.198.174.192 (91.198.174.192): ttl=54 times:21.328, 21.949, 21.781,
48 bytes from probe #11213 212.67.89.66 to 91.198.174.192 (91.198.174.192): ttl=56 times:18.134, 18.063, 18.072,
48 bytes from probe #13580 86.181.90.51 to 91.198.174.192 (91.198.174.192): ttl=53 times:11.823, 11.668, 11.498,
48 bytes from probe #20560 193.86.23.19 to 91.198.174.192 (91.198.174.192): ttl=55 times:42.168, 67.495, 54.532,
48 bytes from probe #16270 188.66.77.211 to 91.198.174.192 (91.198.174.192): ttl=54 times:16.95, 17.16, 16.886,
48 bytes from probe #24314 173.35.72.65 to 91.198.174.192 (91.198.174.192): ttl=52 times:108.039, 121.712, 106.547,
48 bytes from probe #18898 71.179.141.140 to 91.198.174.192 (91.198.174.192): ttl=50 times:97.083, 98.468, 97.011,
48 bytes from probe #19152 70.42.233.238 to 91.198.174.192 (91.198.174.192): ttl=55 times:165.898, 165.874, 165.801,
48 bytes from probe #11851 185.13.208.200 to 91.198.174.192 (91.198.174.192): ttl=57 times:11.761, 11.593, 11.665,
48 bytes from probe #16731 188.134.205.252 to 91.198.174.192 (91.198.174.192): ttl=53 times:30.634, 30.464, 30.316,
48 bytes from probe #11421 92.77.26.34 to 91.198.174.192 (91.198.174.192): ttl=56 times:23.531, 23.106, 22.65,

Disconnecting from stream
You can find details about this measurement here:
https://atlas.ripe.net/measurements/2904352/
```



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
```

Traceroute

- Report for the traceroute

```
$ ripe-atlas  
measure traceroute  
\  
  --probes 2  
\  
  --target  
google.ca
```

```
Terminal  
(2015-11-02 19:34:25) $ ripe-atlas measure traceroute --probes 2 --target google.ca  
Looking good! Your measurement was created and details about it can be found here:  
https://atlas.ripe.net/measurements/2904858/  
  
Connecting to stream...  
  
Probe #10663  
 1 10.254.251.13      15.411ms    0.457ms    0.419ms  
 2 162.217.72.1       2.495ms     3.031ms    2.479ms  
 3 172.17.18.82       3.914ms     7.36ms     2.478ms  
 4 172.17.17.130      3.618ms     3.84ms     2.294ms  
 5 172.17.18.90       3.621ms     4.222ms    25.349ms  
 6 172.17.18.2        3.319ms     4.438ms    4.119ms  
 7 208.69.43.140      4.092ms     4.234ms    4.22ms  
 8 208.69.43.194      4.224ms     5.496ms    3.511ms  
 9 208.76.187.13      3.639ms     3.255ms    3.462ms  
10 208.76.185.18       4.829ms     4.297ms    4.091ms  
11 72.14.204.109       6.55ms      6.035ms    6.999ms  
12 209.85.249.5        5.601ms     5.701ms    7.148ms  
13 209.85.246.20       5.724ms     5.858ms    5.886ms  
14 216.239.46.212     72.449ms    55.478ms   54.985ms  
15 216.239.51.168     78.764ms    89.09ms    72.288ms  
16 209.85.244.82      56.77ms     54.386ms   54.447ms  
17 209.85.143.214     71.201ms    71.888ms   71.303ms  
18 209.85.254.250     142.758ms   141.019ms  141.557ms  
19 209.85.253.68      150.371ms   149.74ms   149.984ms  
20 216.239.56.74       153.8ms     153.093ms  153.521ms  
21 216.239.56.83      154.186ms   153.589ms  153.1ms  
22 None               None ms     None ms    None ms  
23 74.125.136.94      153.18ms    152.445ms  152.818ms  
  
Probe #16940  
 1 192.168.1.234      17.391ms    0.537ms    0.525ms  
 2 95.140.15.46       195.899ms   136.709ms  107.218ms  
 3 95.140.15.41       51.503ms    119.094ms  132.108ms  
 4 213.200.76.185     131.306ms   326.224ms  38.032ms  
 5 89.149.181.141     85.066ms    51.023ms   66.33ms  
 6 72.14.215.238      95.743ms    107.734ms  139.804ms  
 7 72.14.239.205      79.432ms    75.24ms    141.722ms  
 8 209.85.245.72      63.215ms    125.553ms  93.301ms  
 9 209.85.242.229     150.569ms   111.643ms  107.425ms  
10 209.85.240.220     178.939ms   164.764ms  126.063ms  
11 209.85.255.75      116.381ms   88.085ms   72.565ms  
12 216.239.49.36      111.364ms   54.734ms   54.516ms  
13 None               None ms     None ms    None ms  
14 74.125.136.94      54.982ms    54.685ms   54.285ms  
  
Disconnecting from stream  
  
You can find details about this measurement here:  
https://atlas.ripe.net/measurements/2904858/
```

Searching for existing measurements



```
Terminal
(2015-11-02 19:12:56) $ ripe-atlas measurements --af 6 --status ongoing --limit 15 --search google

Filters:
  Search: google
  Af: 6
  Status in: (2,)
```

Id	Type	Description	Status
1004005	ping	google - v6	Ongoing
1004732	traceroute	google v6 traceroute	Ongoing
1007128	dns	Google.fi AAAA reply	Ongoing
1012449	sslcert	www.google.com	Ongoing
1024911	ping	IPv6 Google DNS	Ongoing
1404300	ping	IPv6 Ping to Google	Ongoing
1665737	ping	google.com - 2404:6800:4003:c00::71	Ongoing
1796260	ping	Ping measurement to www.google.com	Ongoing
1889086	traceroute	Traceroute measurement to ipv6.google.com	Ongoing
2062542	traceroute	Traceroute measurement to ipv6.google.com	Ongoing
2062543	ping	Ping measurement to ipv6.google.com	Ongoing
2143865	ping	Ping measurement to ipv6.google.com	Ongoing
2486602	traceroute	IPv6 Traceroute measurement to snapchat.com	Ongoing
2486820	ping	Google IPv6	Ongoing

```
Showing 14 of 14 total measurements
```


Searching for very specific probes



```
Terminal
(2015-11-02 19:27:57) $ ripe-atlas probes --asn 3333 --field id --field asn_v6 --field country --field is_public --field description --field status
Filters:
  ASN: 3333
```

ID	Asn_v6	Country	Public	Description	Status
9	3333	nl	✓	SG office 1	Connected
14	3333	nl	✓	vty probe	Connected
15	3333	nl	✓	SG office 2	Connected
111	3333	br	✗	NIC.br	Disconnected
237	3333	nl	✓	The Traveling Probe	Connected
1108	3333	us	✓	probe 1	Disconnected
2009	3333	nl	✓	NCC Office 2009	Connected
3497	3333	nl	✗		Disconnected
6001	3333	nl	✓	AA nl-ams-as3333	Connected
6012	3333	nl	✗	AA pre-production	Connected
6018	3333	nl	✗		Disconnected
6019	3333	nl	✓	RIPE NCC Anchor v2	Disconnected
6137	3333	nl	✓	nl-ams-as3333-preprod	Connected
10004	3333	nl	✓	RIPE NCC R&D Office	Disconnected
10105	3333	nl	✗		Disconnected
10888	3333	nl	✓	Ridderkerk - UPC 120/10Mbits	Disconnected
12989	3333	de	✓	TeraStream Test Lab	Disconnected
13343	3333	ch	✓	FSIT AG - CH-DIE001 - out of 0	Disconnected
14004	3333	nl	✗		Disconnected
14013	3333	nl	✗		Disconnected
14020	3333	nl	✗		Disconnected
14024	3333	nl	✗		Disconnected
14026	3333	nl	✗		Disconnected
14754	3333	us	✓	RETURNED TO RIPE FOR REPAIR	Disconnected
15027	3333	nl	✗		Disconnected

```
Showing 25 of 33 total probes
```



CLI toolset - links

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



Real-time performance monitoring



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 two types of data:
 - Measurement results
 - Probe connection status events

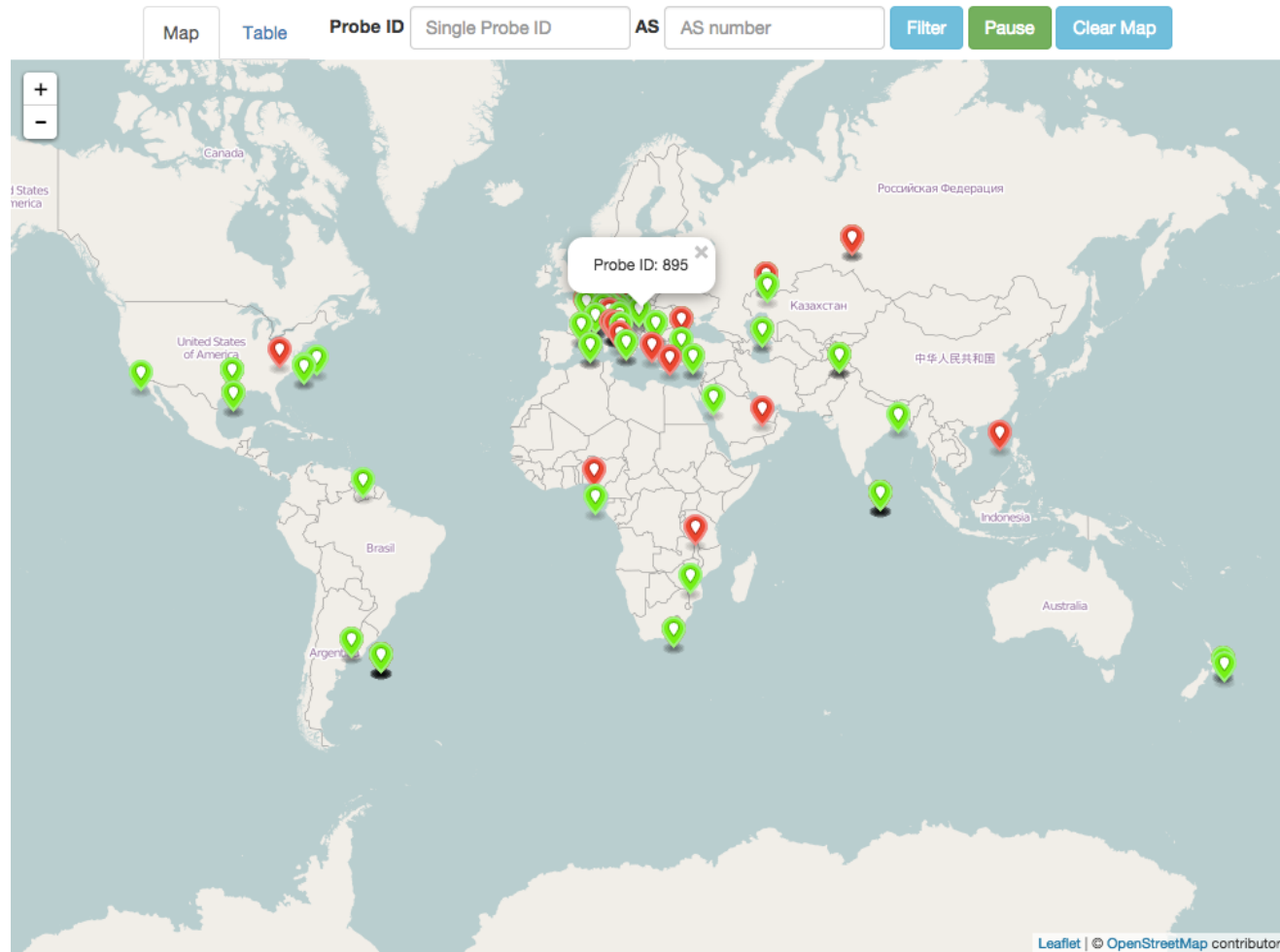


Real time streaming uses

- Visualising network outages
- Server and performance monitoring
- In March 2015: used by almost all hackathon teams:
 - <https://labs.ripe.net/Members/becha/ripe-atlas-hackathon-results>
- Documentation:
 - <https://atlas.ripe.net/docs/result-streaming/>
 - https://labs.ripe.net/Members/suzanne_taylor_muzzin/data-streaming-in-ripe-atlas



Probe (dis)connection events



https://labs.ripe.net/Members/andreas_strikos/amsterdam-power-outage-as-seen-by-ripe-atlas



Exercise

Using streaming API

Monitoring server reachability



- Scenario: customers are complaining that it occasionally takes a long time to reach your service or server
- Action: ping your server from 500 probes
 - Decide what is acceptable latency threshold to apply
 - Notice and react when you start receiving samples
- Task: Use the ping measurement ID 2340408
 - Choose which threshold (e.g. greater than 30ms)
 - Imposes the threshold on “min” (the minimum result of the three ping attempts)

Steps



1. Go to
<http://atlas.ripe.net/webinar/streaming01.html>
2. Open the development console
3. Wait for results to arrive
4. Optional: Save the HTML file locally and edit the code to your liking

Page Source



```
view-source:sg-pub.ripe.net/webinar/streaming01.html
1 <!DOCTYPE html>
2 <html>
3   <head>
4     <title>Streaming exercise 01</title>
5     <meta charset="UTF-8">
6     <meta name="viewport" content="width=device-width, initial-scale=1.0">
7   </head>
8   <body>
9     <div>Current maximum RTT: <b><span id="output">nothing yet</span></b></div>
10    <div>Open the source code to see how it works. Create your tool/visualisation with the
11    RIPE Atlas streaming!</div>
12  </body>
13  <script src="https://stat.ripe.net/widgets/lib/js/jquery/jquery-1.11.2.min.js"></script>
14
15  <!-- The following file is needed for the streaming -->
16  <script src="https://atlas-stream.ripe.net/socket.io.js"></script>
17  <script>
18    var $outputDiv = $("#output");
19
20    // Create a connection
21    var socket = io("https://atlas-stream.ripe.net", { path : "/stream/socket.io" });
22
23    // Declare a callback to be executed when a measurement result is received
24    socket.on("atlas_result", function(result){
25
26      console.log("I received ", result); // Print the result in the console
27
28      if (result.hasOwnProperty("max")) {
29        $outputDiv.html(result["max"]); // Print the result in the html page
30      }
31    });
32
33    // Subscribe to results coming from all the probes involved in the measurement 2340408
34    socket.emit("atlas_subscribe", { stream_type: "result", msm: 2340408 });
35
36  </script>
37 </html>
38
39
40
41
```

Example of results



```
Q 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/?EI0=2&transport=polling&t=1431095373684-0".
XHR finished loading: GET "http://atlas-stream.ripe.net/stream/socket.io/?EI0=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: 325.7933333333...}
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: 327.3253333333...}
I received ▶ Object {af: 4, prb_id: 15965, result: Array[3], ttl: 45, avg: 47.6313333333...}
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: 47.5003333333...}
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: 34.0843333333...}
I received ▶ Object {af: 4, prb_id: 18311, result: Array[3], ttl: 49, avg: 32.7513333333...}
I received ▶ Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 182.4463333333...}
I received ▶ Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 193.9953333333...}
I received ▶ Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 182.2913333333...}
I received ▶ Object {af: 4, prb_id: 16010, result: Array[3], ttl: 46, avg: 191.6103333333...}
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: 35.0093333333...}
I received ▶ Object {af: 4, prb_id: 14918, result: Array[3], ttl: 49, avg: 35.0843333333...}
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: 128.7273333333...}
I received ▶ Object {af: 4, prb_id: 6093, result: Array[3], ttl: 49, avg: 128.7373333333...}
I received ▶ Object {af: 4, prb_id: 6093, result: Array[3], ttl: 49, avg: 128.8883333333...}
```



Questions



BECHA@ripe.net

[@RIPE_Atlas](#)

The End!

Край

Y Diwedd

النهاية

Соңы

ჟღერჟ

Fí

Finis

Ende

Finvezh

Liðugt

Кінець

Konec

Kraj

Ěnn

Fund

پایان

Lõpp

Beigas

Vége

Son

Край

An Críoch

הסוף

Fine

Endir

Sfârșit

Fin

Τέλος

Einde

Конец

Канец

Slut

Slutt

დასასრული

Pabaiga

Fim

Amaia

Loppu

Tmiem

Koniec



More RIPE Atlas Features



Most Popular Features

- Six types of measurements: ping, traceroute, DNS, SSL/TLS, NTP and HTTP (to anchors)
- APIs to start measurements and get results
- Powerful and informative visualisations
- CLI tools
- Streaming data: real-time results
- Plus: “Time Travel”, LatencyMON, DomainMON
- Roadmap



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
- Reported vulnerabilities:
 - <https://atlas.ripe.net/docs/security/>



Crowdsourced Infrastructure Geolocation: OpenIPMap

- 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 Open IP Map (think: OpenStreetMap for IPs)
 - <https://marmot.ripe.net/openipmap/>
- You can modify, reuse and improve the code
 - <https://github.com/RIPE-Atlas-Community/openipmap>



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
 - Hops geolocated using “OpenIPMap” database



Network Monitoring



Network Monitoring

- Network operators use tools to monitor network health
 - Nagios & Icinga
- Tools receive input from RIPE Atlas via the API
- Benefits:
 - Pings from 500 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

Setting up “Status Checks”



Tasks

- Set up and configure a “status check”
 - For an existing ping measurement <https://atlas.ripe.net/measurements/2340408/>
 - Hint: <https://atlas.ripe.net/api/v1/status-checks/2340408/>
- Configure the status check in such a way that you will trigger an alert for this measurement
- Optional: set-up status check for your own ping measurement!



Solution

- One possible solution:
 - Set the median RTT to a lower level:
 - https://atlas.ripe.net/api/v1/status-checks/2340408/?median_rtt_threshold=10

- Example of the alerts

```
{"total_alerts":32,"global_alert":true,
"probes":{
"18433":{"all":[null,null,null],"last":null,"last_packet_loss":100.0,"alert":true,"source":"Area: WW","alert_reasons":["loss"]},
"15041":{"source":"Area: WW","last_packet_loss":0.0,"last":19.928,"alert":false},
"18696":{"all":[null,null,null],"last":null,"last_packet_loss":100.0,"alert":true,"source":"Area: WW","alert_reasons":["loss"]},
"16265":{"source":"Area: WW","last_packet_loss":0.0,"last":22.72,"alert":false},
"20236":{"all":[null,null,null],"last":null,"last_packet_loss":100.0,"alert":true,"source":"Area: WW","alert_reasons":["loss"]},
"12944":{"all":[null,null,null],"last":null,"last_packet_loss":100.0,"alert":true,"source":"Area: WW","alert_reasons":["loss"]},
"2195":{"all":[null,null,null],"last":null,"last_packet_loss":100.0,"alert":true,"source":"Area: WW","alert_reasons":["loss"]},
```