Network Visualisation Workshop

Focus: RIPE Atlas
Workshop Requirements

• Please make sure you have a RIPE NCC Access account!
  
  https://access.ripe.net

• Voucher for 5,000 Atlas credits
Network Visualisation
Overview
Network Visualisation

• Bringing raw data to life, help with interpretation and understanding

• Three main types of data:
  - Registry data
  - Routing data (BGP)
  - Active measurement data (RIPE Atlas, MLab, etc.)
Registry Data

- **Source:** RIR databases
  - AFRINIC, ARIN, APNIC, LACNIC and RIPE NCC
- **Useful as supporting data set**

https://stat.ripe.net/widget/address-space-hierarchy

https://stat.ripe.net/widget/allocation-history
Routing Data

- RIPE NCC’s RIS
  - http://ris.ripe.net
  - https://stat.ripe.net/widget/bgplay
Routing Data

- RIPE NCC’s RIS
  - http://ris.ripe.net
  - https://stat.ripe.net/widget/routing-history
Active Measurement Data

- RIPE Atlas
- MLab by Google
- Bandwidth measurements
  - Speedchecker, Ookla, …

- Google ad measurements done by APNIC
RIPE Atlas

Introduction
RIPE Atlas

- A brief introduction
  - Global network for Internet measurements
RIPE Atlas

• Standard Probe
  - TP-Link MR3020
  - Version 3

• Atlas Anchor
  - Higher capacity
  - Currently 216 nodes
  - Soekris Net6501-70
  - https://atlas.ripe.net/anchors/
RIPE Atlas
RIPE Atlas

- RIPE Atlas probes in South Africa

389 registered ASNs

263 routed ASNs

https://stat.ripe.net/za#tabId=activity
RIPE Atlas

- RIPE Atlas probes in South Africa

https://stat.ripe.net/za#tabId=activity
RIPE Atlas anchors in South Africa

<table>
<thead>
<tr>
<th>Hostname</th>
<th>Probe</th>
<th>Company</th>
<th>City</th>
<th>Country</th>
<th>Capabilities</th>
</tr>
</thead>
</table>

https://atlas.ripe.net/anchors/list/
Agenda

• Introduction to web UI
• Measurements
• Tools
  - LatencyMon, QuickLook, DNSSMON, DomainMON and IXP-Country-Jedi
• Command line tools
• RIPE Atlas APIs
• DIY workshop
RIPE Atlas
Web UI
Web UI

RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Welcome to RIPE Atlas!

With your help, the RIPE NCC is building the largest Internet measurement network ever made. RIPE Atlas employs a global network of probes that measure Internet connectivity and reachability, providing an unprecedented understanding of the state of the Internet in real time.
Exercise I

- Go to https://atlas.ripe.net
- Check if you can log in with your RIPE NCC Access account!
**Build-In Measurements**

- **What is it?**

[https://atlas.ripe.net/measurements/](https://atlas.ripe.net/measurements/)

<table>
<thead>
<tr>
<th>Id</th>
<th>Type</th>
<th>Target</th>
<th>Description</th>
<th>Probes</th>
<th>Time (UTC)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>C</td>
<td>k.root-servers.net</td>
<td></td>
<td>(all)</td>
<td>2010-10-01 00:00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2020-01-01 00:00</td>
<td></td>
</tr>
<tr>
<td>1002</td>
<td>C</td>
<td>tt01.ripe.net</td>
<td></td>
<td>(all)</td>
<td>2010-10-01 00:00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2020-01-01 00:00</td>
<td></td>
</tr>
<tr>
<td>1003</td>
<td>C</td>
<td>ns.ripe.net</td>
<td></td>
<td>(all)</td>
<td>2010-10-01 00:00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2020-01-01 00:00</td>
<td></td>
</tr>
</tbody>
</table>

*First check for existing measurements*
### Build-In Measurements

- **Probe view**

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

### Probes

This is a list of all current RIPE Atlas probes, including information specific to each probe. More probes are continually coming online.

- Learn more about probes
- See the probes map
- Apply for your own probe

#### Probes Table

<table>
<thead>
<tr>
<th>Id</th>
<th>ASN v4</th>
<th>ASN v6</th>
<th>Country</th>
<th>Description</th>
<th>Connection Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3265</td>
<td>3265</td>
<td>Greece</td>
<td>Ανδρέας@Αμπερνταμ</td>
<td>1 week, 2 days</td>
</tr>
<tr>
<td>4</td>
<td>3265</td>
<td></td>
<td></td>
<td>xs4all adsl 52/5 IPv6</td>
<td>1 day, 2 hours</td>
</tr>
<tr>
<td>5</td>
<td>3265</td>
<td></td>
<td></td>
<td>Bert's home; xs4all vDSL 40/4 IPv6</td>
<td>5 months, 2 weeks</td>
</tr>
<tr>
<td>7</td>
<td>9143</td>
<td></td>
<td></td>
<td>@dfk ziggo cable 40/4 Mbit/s</td>
<td>2 weeks, 3 days</td>
</tr>
<tr>
<td>8</td>
<td>3265</td>
<td>3265</td>
<td></td>
<td>@dfk xs4all 500/500Mbit/s FTTH</td>
<td>1 day, 14 hours</td>
</tr>
</tbody>
</table>
Exercise II

- Pick a probe and look up build-in measurement results!
Build-In Measurements

- Global view

https://atlas.ripe.net/results/maps/
User-Defined Measurements

- Custom measurements
  - All measurement types possible
  - Credit system to keep the resource allocation fair
User-Defined Measurements

- Credit system

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

Credits

Here you can see the history of your credit use and current consumption, transfer credits to someone else, and redeem a voucher for credits if you have one.

<table>
<thead>
<tr>
<th>Time</th>
<th>Comment</th>
<th>Change</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-08-02 08:34 UTC</td>
<td>Administrative: Voucher CapeTownUniveristyAug2016</td>
<td>+ 2,000</td>
<td>935,356</td>
</tr>
<tr>
<td>2016-04-19 01:08 UTC</td>
<td>Probe ID:27063 Probe uptime Ambassador</td>
<td>+ 2,160</td>
<td>933,356</td>
</tr>
<tr>
<td>2016-04-19 01:07 UTC</td>
<td>Probe ID:20937 Probe uptime Ambassador</td>
<td>+ 2,160</td>
<td>931,196</td>
</tr>
<tr>
<td>2016-04-18 17:01 UTC</td>
<td>Probe ID:25615 Probe uptime Ambassador</td>
<td>+ 2,160</td>
<td>929,036</td>
</tr>
<tr>
<td>2016-04-18 17:01 UTC</td>
<td>Probe ID:25416 Probe uptime Ambassador</td>
<td>+ 2,152</td>
<td>926,876</td>
</tr>
<tr>
<td>2016-04-18 17:01 UTC</td>
<td>Probe ID:25402 Probe uptime Ambassador</td>
<td>+ 2,160</td>
<td>924,724</td>
</tr>
</tbody>
</table>
Exercise III

• Redeem your voucher “iweek_2016”
https://atlas.ripe.net/user/credits
Exercise IV

• Create a ping measurement

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

Measurements
RIPE Atlas

LatencyMON
LatencyMON

- Every running ping measurement
  
  https://atlas.ripe.net/measurements

Traceroute measurement to uz.wikipedia.org
LatencyMON

RIPE Atlas ping measurement #1422318 to nl-ams-as1101.anchors.atlas.ripe.net

SE (6 probes)
Probes: 136, 395, 6037, 6049, 6063, 6102
Target: nl-ams-as1101.anchors.atlas.ripe.net

DE (6 probes)
Probes: 57, 67, 435, 779, 812, 984
Target: nl-ams-as1101.anchors.atlas.ripe.net

GB (6 probes)
Probes: 48, 432, 806, 807, 879, 883
Target: nl-ams-as1101.anchors.atlas.ripe.net

NL (6 probes)
Probes: 187, 194, 246, 933, 999, 1629
Target: nl-ams-as1101.anchors.atlas.ripe.net
DNS root and many TLD name servers

https://atlas.ripe.net/dnsmon/
DomainMON

- Same visualisation as DNSMON
- For any domain server
- Runs on RIPE Atlas credits
- [https://atlas.ripe.net/domainmon/](https://atlas.ripe.net/domainmon/)
RIPE Atlas

IXP-Country-Jedi
IXP-Country-Jedi

http://sg-pub.ripe.net/emile/ixp-country-jedi/latest/ZA/geopath/
Command Line Tool

• Access RIPE Atlas from the terminal / shell console

• Quick and dirty shortcuts for network troubleshooting

• FLOSS (free software / open-source) tools
  - Written and maintained by the RIPE NCC
  - Open to community contributions
Command Line Tool

• Before you can use the toolset:
  - Download the tools
  - Install
  - Configure
  - ripe-atlas configure --set authorisation.create=MY_API_KEY

• You need to have one (or more) API Keys
  - https://atlas.ripe.net/keys/
Command Line Tool

• Source:
  - https://github.com/RIPE-NCC/ripe-atlas-tools/

• Documentation:
  - https://ripe-atlas-tools.readthedocs.org/

• Included in the Linux / BSD distributions:
  - OpenBSD, FreeBSD, Gentoo, Arch, Debian and Ubuntu
    (in progress: Fedora, Windows)
Command Line Tool

• Simple: one-off, using default values (50 probes to “target”)

• $ ripe-atlas measure ping --target wikipedia.org
Command Line Tool

• Geo-specific using 20 probes from ZA:
  - $ ripe-atlas measure ping --target example.com --probes 20 --from-country za

• 20 ZA probes that support IPv6:
  - $ ripe-atlas measure ping --target example.com --probes 20 --from-country za —include-tag system-ipv6-works

• Create a recurring measurement:
  - $ ripe-atlas measure ping —target example.com --interval 3600
Exercise V

• Make a note to try it at home!
RIPE Atlas

RIPE Atlas APIs
Rest API

- [https://atlas.ripe.net/docs/api/v2/manual/](https://atlas.ripe.net/docs/api/v2/manual/)
Streaming API

• RIPE Atlas streaming allows users to receive measurement results as soon as the probes send them, in real time
  - Publish / subscribe through web sockets
  - https://atlas.ripe.net/docs/result-streaming/

• Two types of data:
  - Measurement results
  - Probe connection status events
User-Defined Measurements

- Credit system

http://sg-pub.ripe.net/demo-area/atlas-stream/dns-instances.html
RIPE Atlas

DIY Visualisation
DIY Visualisation

• Build a simple visualisation
  - https://atlas.ripe.net/webinar/streaming01.html
  - Open the console of your browser
  - Download the source code and edit the behaviour
Questions

christian.teuschel@ripe.net
@cteusche