RIPE NCC
RIPE NETWORK COORDINATION CENTER

RIPE Atlas 101

PIMF - APRICOT - FEB 2025

Alastair Strachan | RIPE NCC | 24 Feb 2025

Introduction

- RIPE Atlas is an active Internet measurement network
- Built and operated by the RIPE NCC
- Based on the community to deploy and host vantage points (“probes”)
- Operating since 2010 - almost 14 years now!
- World-wide presence, though the focus is our service region
- Primary objective: support network operations
- Secondary objectives:
    - Understanding the state of the Internet
    - Support research

Main Uses

- To measure a network “target” from virtually anywhere in the world
- Can use ping, traceroute, DNS, NTP, SSL/TLS, and limited HTTP
- Continuous monitoring, anomaly detection
  - When you want to establish a baseline
  - Or monitor planned or unplanned changes, improvements, anomalies, etc.
  - These measurements run periodically
- Ad hoc, immediate tests
  - When there’s a problem to be discovered or understood
  - Support pinpointing where a current problem is, thereby helping recovery

Concepts: Probes

- **Variations: hardware (~8200), software (~3500), anchors (~800)**
- **Hardware**
  - Limited supply, one needs to apply to get one
  - We aim to distribute new hardware probes to increase diversity
  - Plug-and-play: auto-configured, automatically updated, no maintenance needed
- **Software**
  - Same functionality but without the hardware
  - Installable on almost any Linux machine
  - Needs more expertise: run the underlying OS plus upgrade the probe every now and then

Concepts: Anchors

- An anchor is a probe and a willing measurement target
- Meant to be installed in the core network with stable connectivity
- Can be hardware or VM
- The OS, the services and the probe firmwareis managed by the RIPE NCC
- Automatically measured by every other anchor in a full mesh
  - Ping, traceroute, HTTP
  - Therefore there's a constant data flow about connectivity to the anchor's network

Concepts: Hosts

- Each probe/anchor has a “host” who owns it
- The host is responsible to keep the probe connected
- The host role can be shared within the LIR/ISP
- Hosts earn credits proportionally to the uptime of the probe
- Anyone can host multiple probes
    - Including hardware, software and anchor

Concepts: Measurements

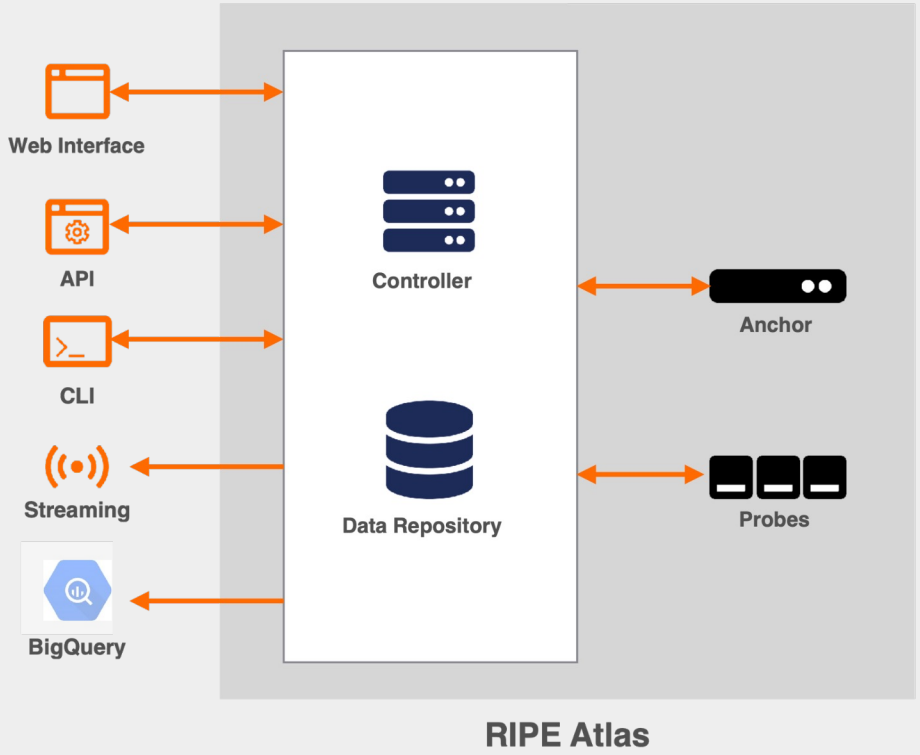
- All measurements have a single target and multiple vantage points
- Periodic measurements:
  - They have a predefined interval
  - The set of probes to use is set at the beginning, can be changed later
  - They can have a predefined start and stop time
  - Relevant use case: monitoring, determining a baseline, tracking changes
- One-off measurements
  - The only run once - most likely “immediately”
  - Response time is measured in seconds
  - Relevant use case: issue resolution, debugging, ad-hoc questions

Concepts: Credits

- Measurements cost credits
  - Proportional to the number of results and me
- Credits can be earned:
  - By hosting a probe or anchor
  - By being a RIPE NCC member
  - By being a sponsor
  - By getting a transfer from another user
- Credits can be pooled, given access to, …

Concepts: Data

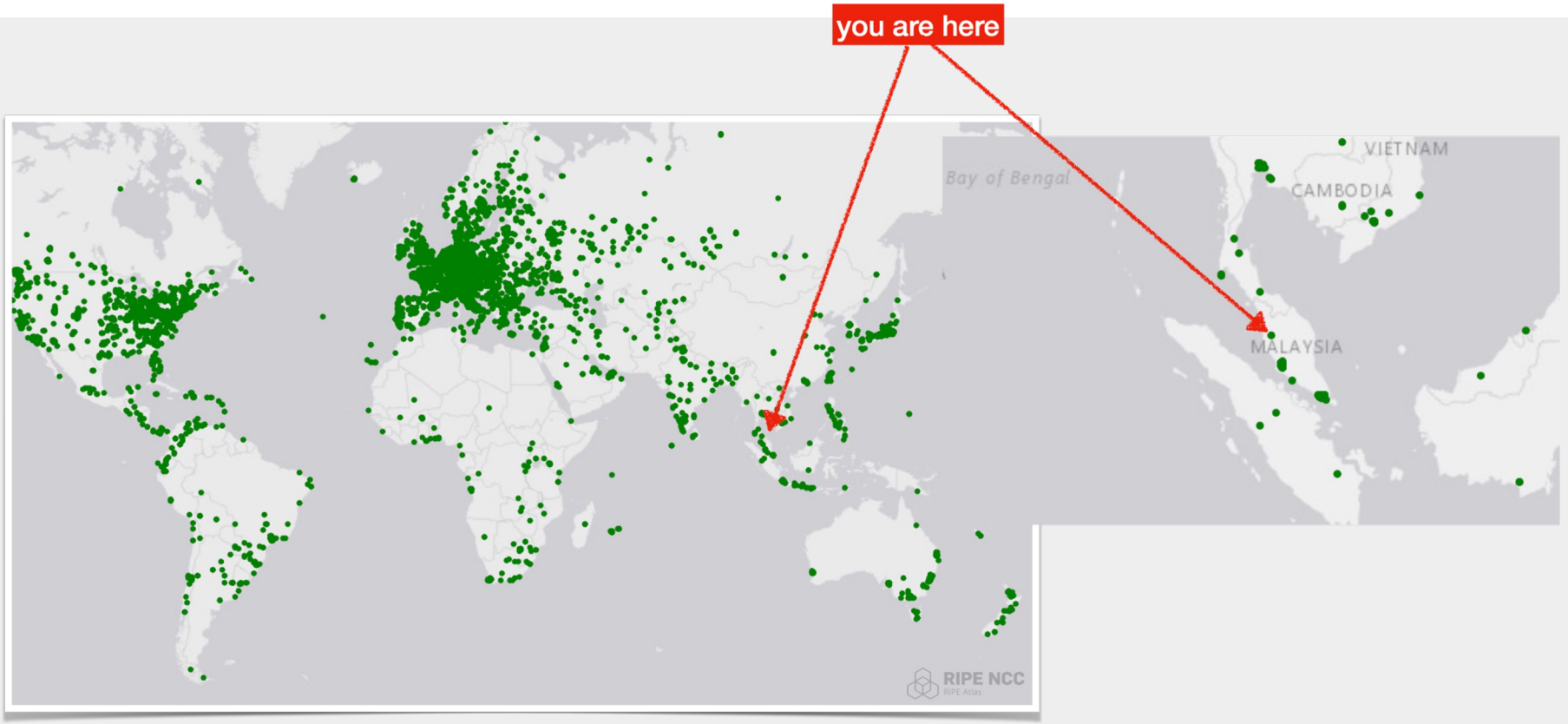
- **User Access**
  - Users interact through a Web Interface, API, CLI, Streaming, and BigQuery.
- **Data Flow**
  - The Controller connects to Anchors and Probes to collect and store data.



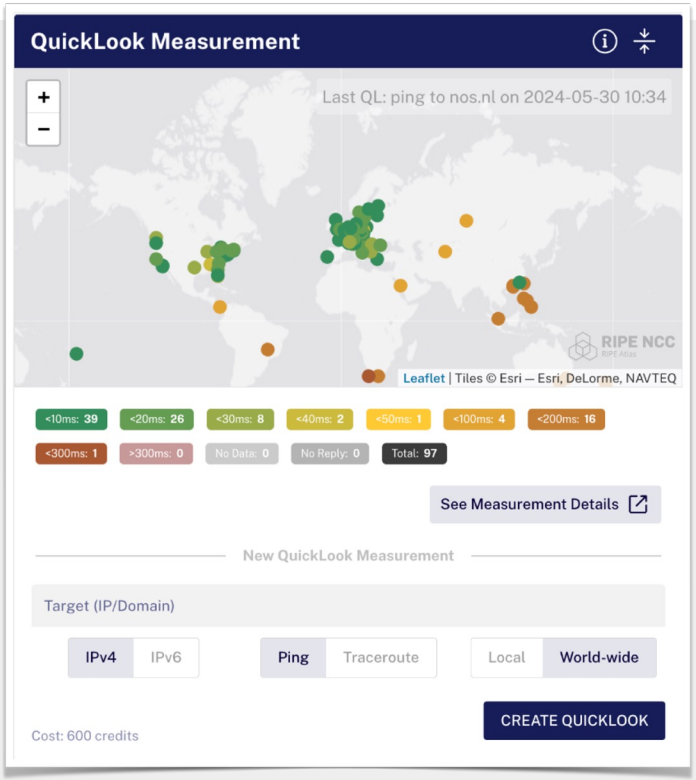
Concepts: Ambassadors & Sponsors

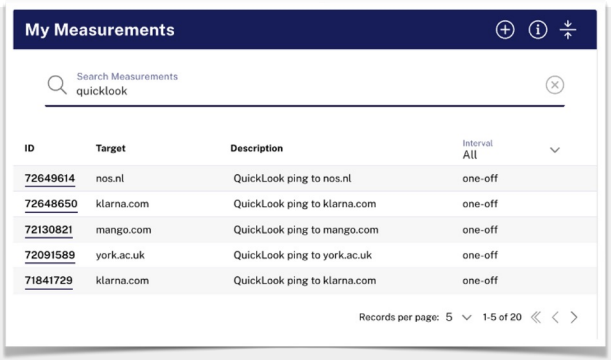
- **Ambassadors: individuals or institutions**
  - Help with the distribution of hardware probes
  - Help spreading the word and supporting (local) users
- **Sponsors**
  - They provide monetary support for RIPE Atlas. In return they get:
  - Recognition and visibility in the system
  - A number of hardware probes
  - Becoming time-limited sponsors for other probes - and credits income from that
  - One-off credits
  - Ability to run many anchors

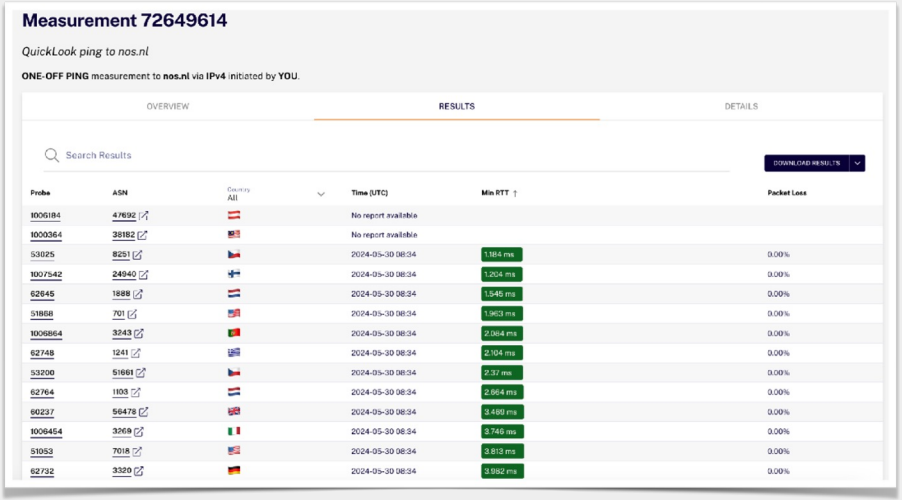
Current Status



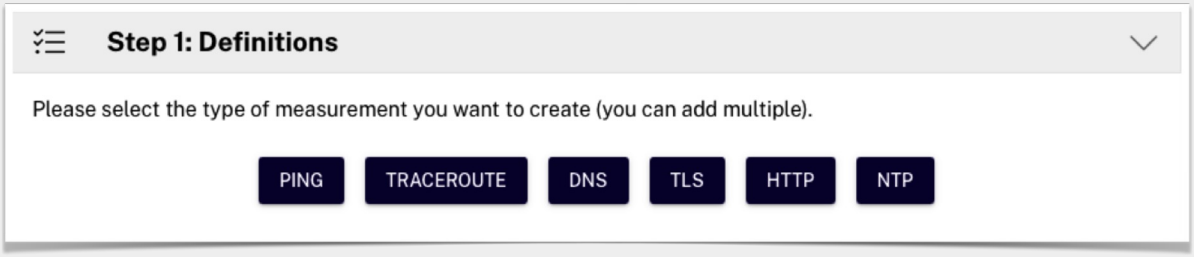
Measurements: Quick Look

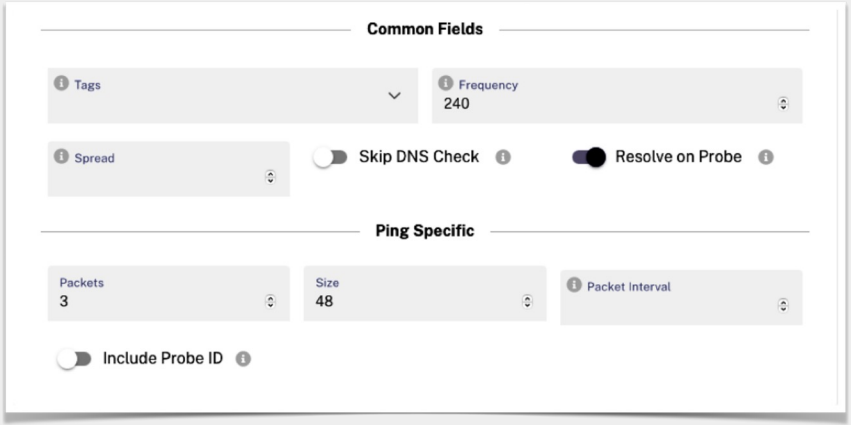




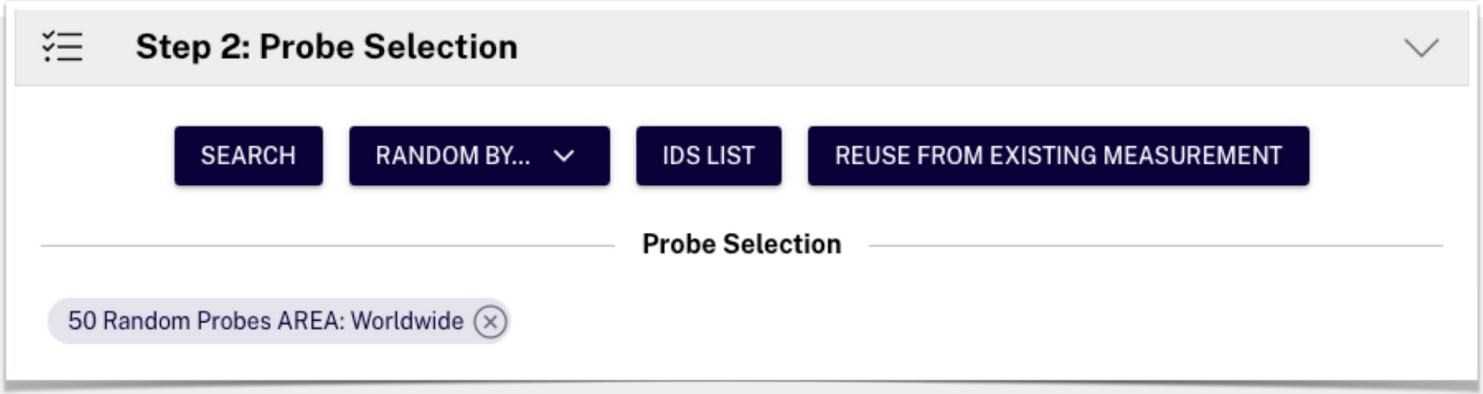


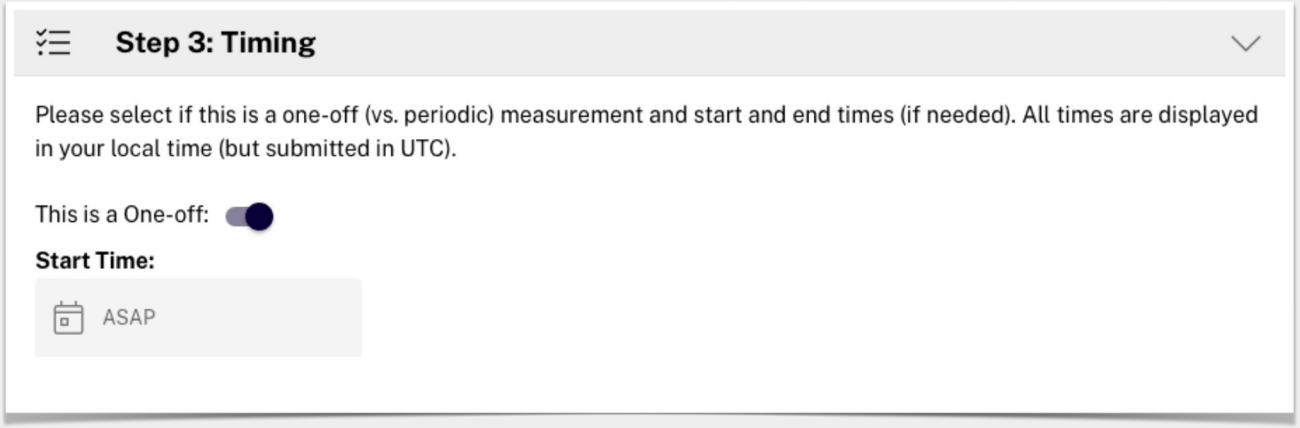
Measurements: Specification



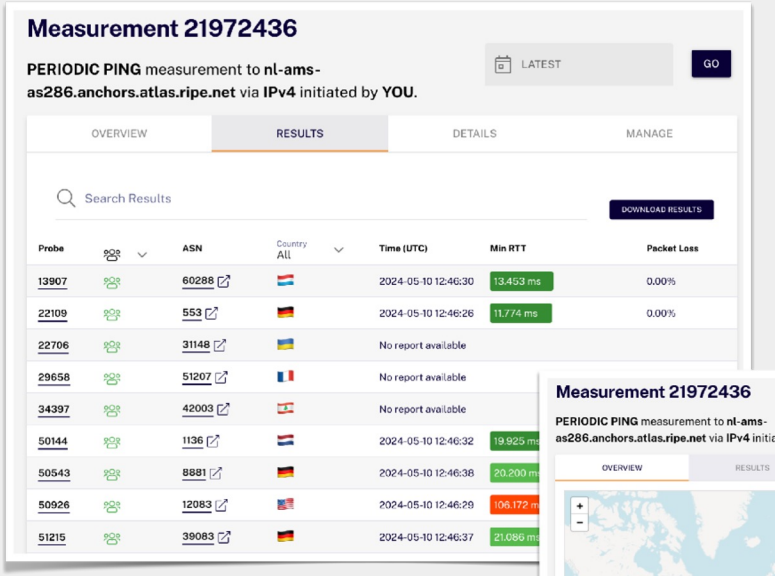


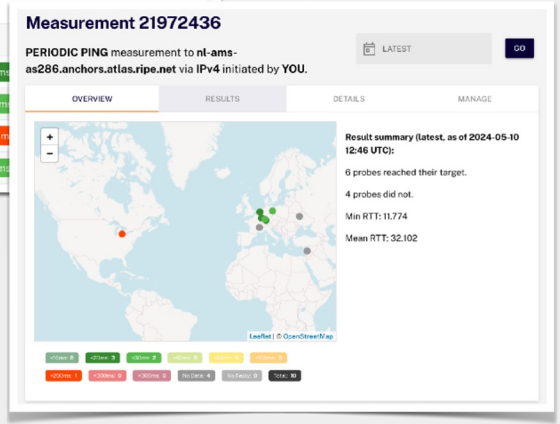
Measurements: Specification

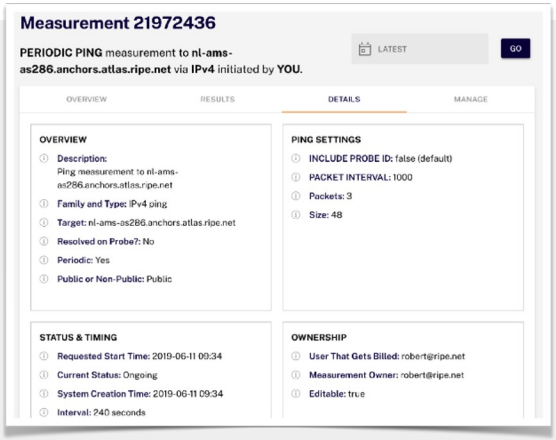


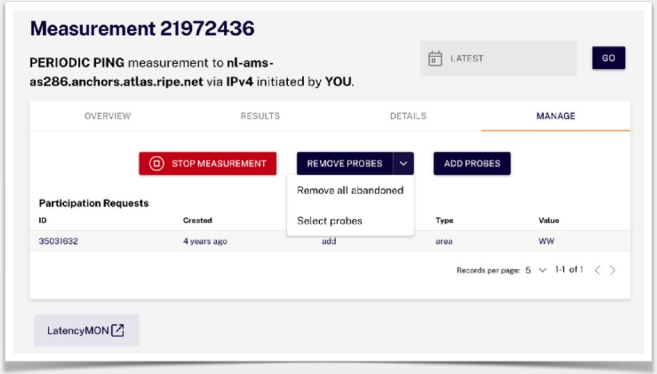


Measurements: Results







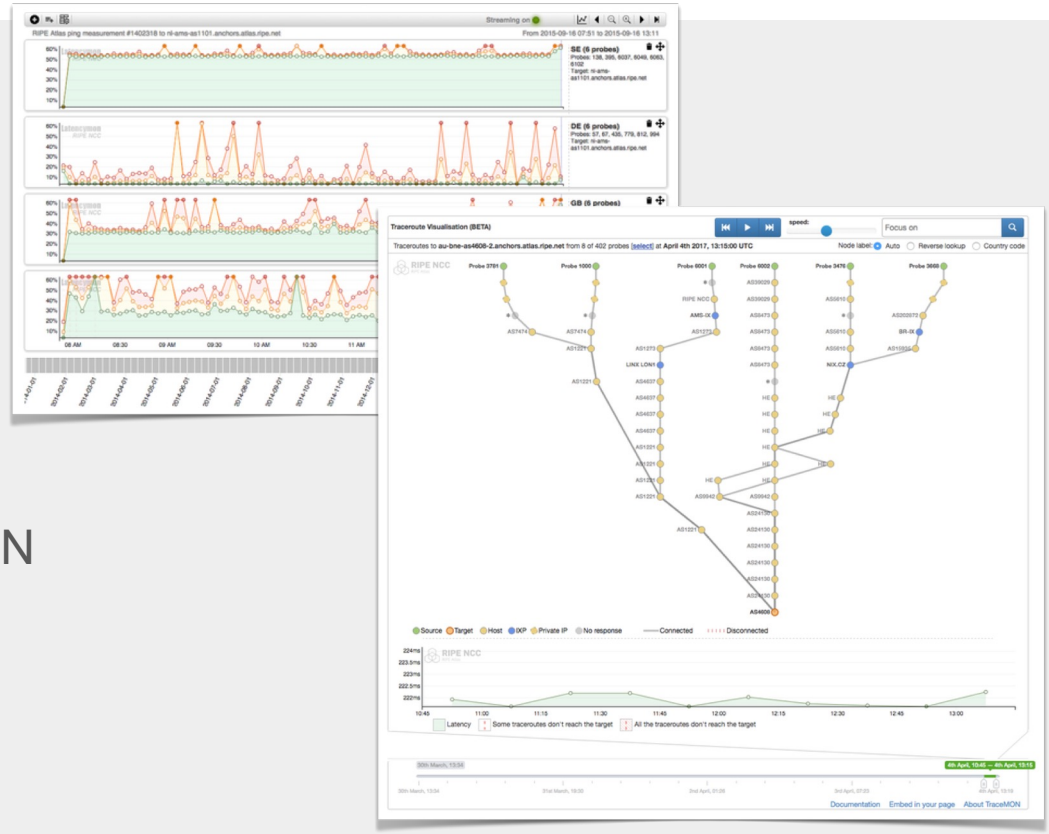


Using the CLIs

- **RIPE NCC's Python based tools have been available for some time now**
  - RIPE Atlas Sagan: raw result parser
  - RIPE Atlas Cousteau: API wrapper
  - RIPE Atlas Magellan: command line tools
- **New**
  - goat, a Go implementation of an API wrapper / result parser / CLI
  - CLI binaries are available if you don't want to compile
- **All these are open source**

But Wait, There's More!

- APIs
- LatencyMON, TraceMON
- Data analysis
  - Daily dumps
  - BigQuery
- Related services
  - DNSMON / DomainMON
  - IPmap



Who Knows What The Future Brings?

- **Current activities:**
  - Renewing the UI and the infrastructure
  - Easier use (packaging) of the probe software package

- **This year…**
  - Improve support and simpler access to known use cases
  - Increasing RIPE NCC members' benefits

Questions & Comments

atlas@ripe.net