Using RIPE Atlas to detect routing issues

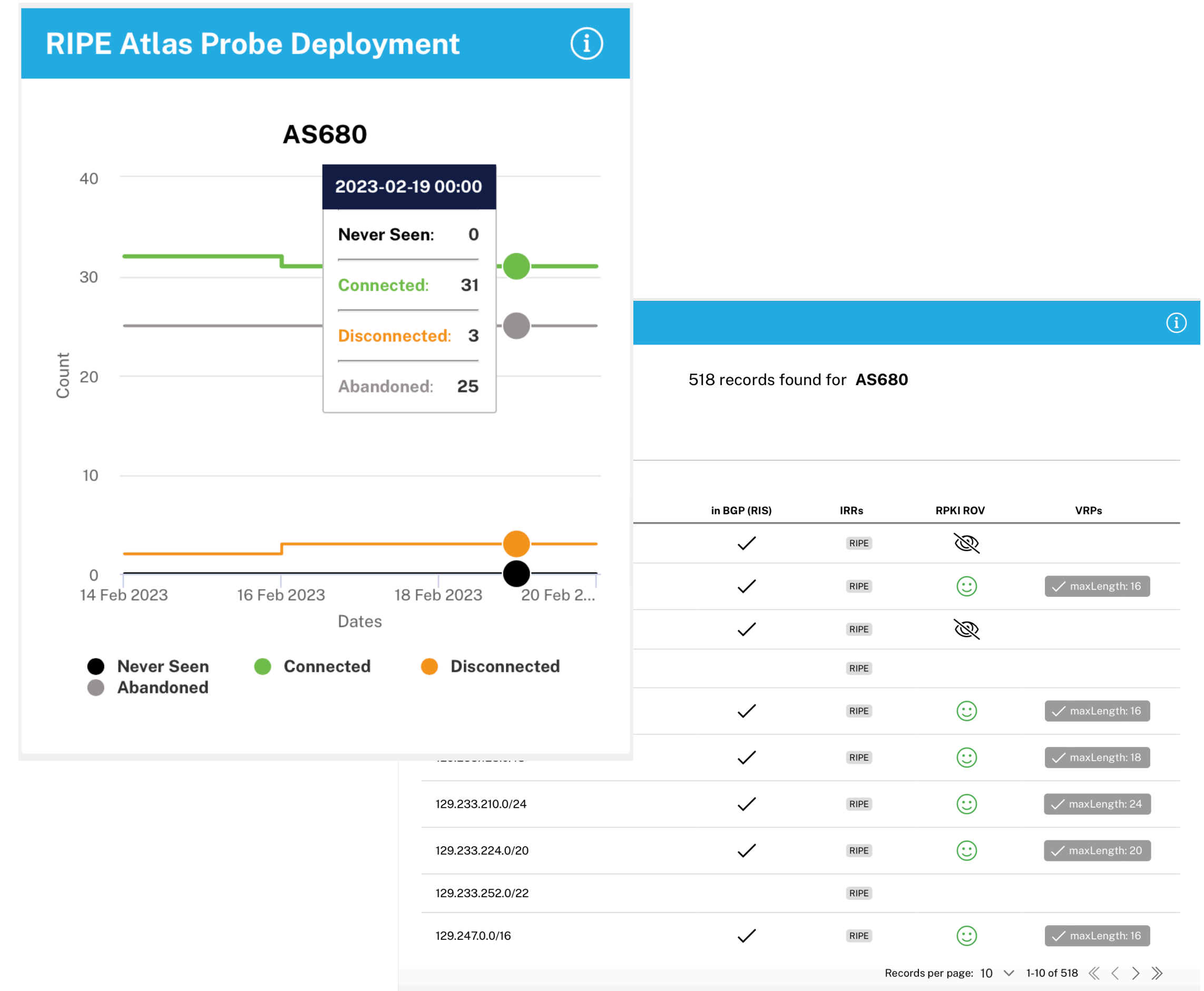Johan ter Beest | 21-02-2023 | Routing Working Group
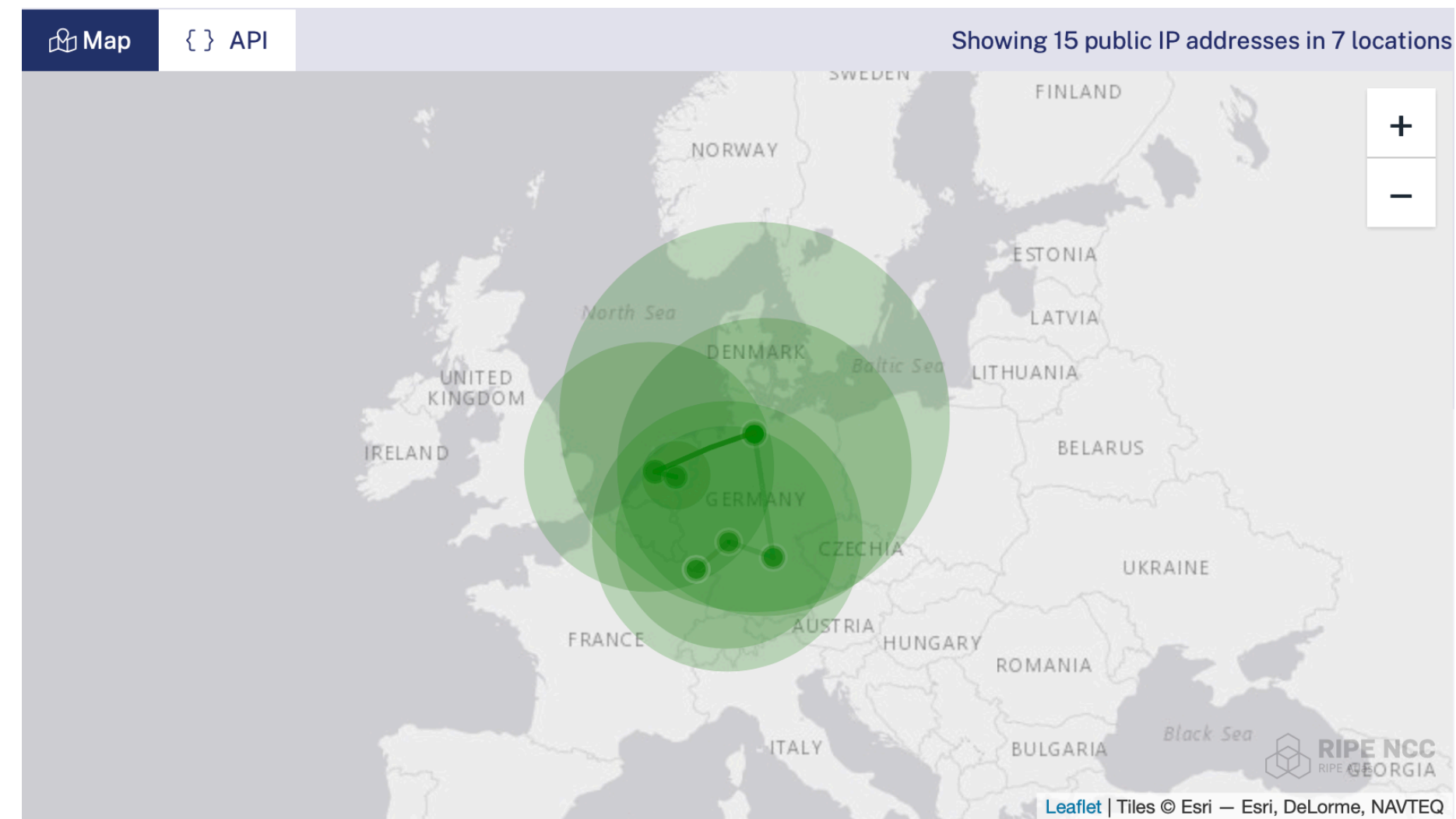
Other Tools

RIPEstat

- ## We can use it for result enrichment:

  - AS lookups

  - RPKI information

  - Looking glass

  - Atlas probe deployment info

IPMap

- We can use it for geo lookups for middle boxes
  - Uses RIPE Atlas under the hood

- Database of hostnames

- Geographic path visualisations

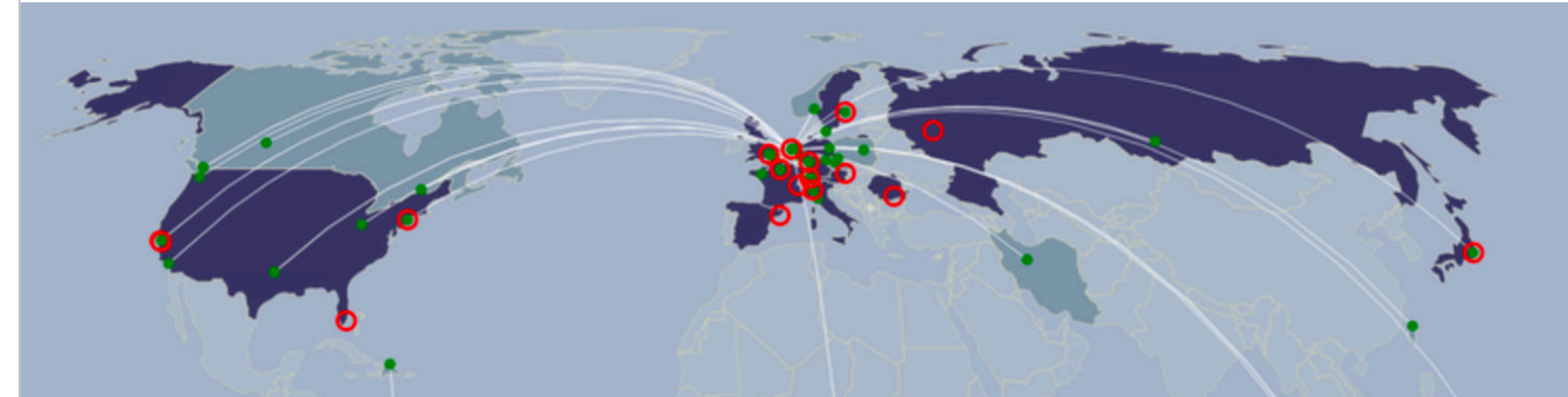- API can do geo lookups for (yet) unknown locations

RIS & RIS Live

- We can use it to get real time routing information

- We can use RIS directly or through one of the various other tools that use it

  - Internet Health Report

  - BGPAlerter

Routing Information Service (RIS)

```
"""
Subscribe to a RIS Live stream and output every message
to stdout.

IMPORTANT: this example requires 'websocket-client' for
Python 2 or 3.

If you use the 'websockets' package instead (Python 3
only) you will need to change the code because it has a
somewhat different API.
"""
import json
import websocket

ws = websocket.WebSocket()
ws.connect("wss://ris-live.ripe.net/v1/ws/?client=py-example-1")
params = {
    "moreSpecific": True,
    "host": "rrc21",
    "socketOptions": {
        "includeRaw": True
    }
}
ws.send(json.dumps({
        "type": "ris_subscribe",
        "data": params
}))
for data in ws:
    parsed = json.loads(data)
    print(parsed["type"], parsed["data"])
```

What do we need?

Requirements if we want to
use RIPE Atlas to help with
routing issues

Anchor or Probe deployment

- At minimum we need 1 anchor or probe in every AS in your network

    - We need a list of all ASN's in the network

    - Some universities have an anchor but it's in an AS that is not on my list

- Every physical location needs a probe

    - Geographical location is used in the sense of a datacenter or university

Current situation

- We have 11 anchors in the network

  - Most are in Germany

  - Only 2 are not in Europe

  - We had 2 anchors outside of Europe but they stopped hosting them

- We have 166 connected probes in the network

  - These probes cover 25 unique ASN's

  - I currently know of 73 ASN's in the network so we cover roughly ⅓

- We also see 215 disconnected or abandoned probes

  - Those probes cover only 4 additional ASN's

Problem Statement

What do we want to solve?

Problem Statement

- The IRNC network consists of multiple (national) NREN networks spanning various ASN's

- Traffic between the NREN networks should follow a path within this network, ie do not use commodity networks

- Traffic should follow the most efficient path

- Can we find out if IPv4 and IPv6 follow the same paths?

RIPE Atlas Traceroutes

- We have different types of trace route measurements

  - ICMP

  - UDP

  - TCP

- Results from different types do not match up properly

- Due to configuration issues with middle boxes, reverse trace routes may not show the same information as the forward path

- As a result, it's very hard to properly match forward and reverse paths, even just on the AS level

Things we can do

- A special type of traceroute where we automatically schedule both the forward and the reverse measurement

  - Can only work on measurements between probes or anchors

  - Officially, you can not schedule a measurement towards a probe

- We can use IPmap to visualise these traceroutes

- We can use RIPEstat to enrich the results with AS info and possibly more

IXP Country Jedi

- A tool to visualise paths between probes in the same country

- We can use this as a starting point but instead of paths between probes in a country, we visualise paths of probes in an AS network
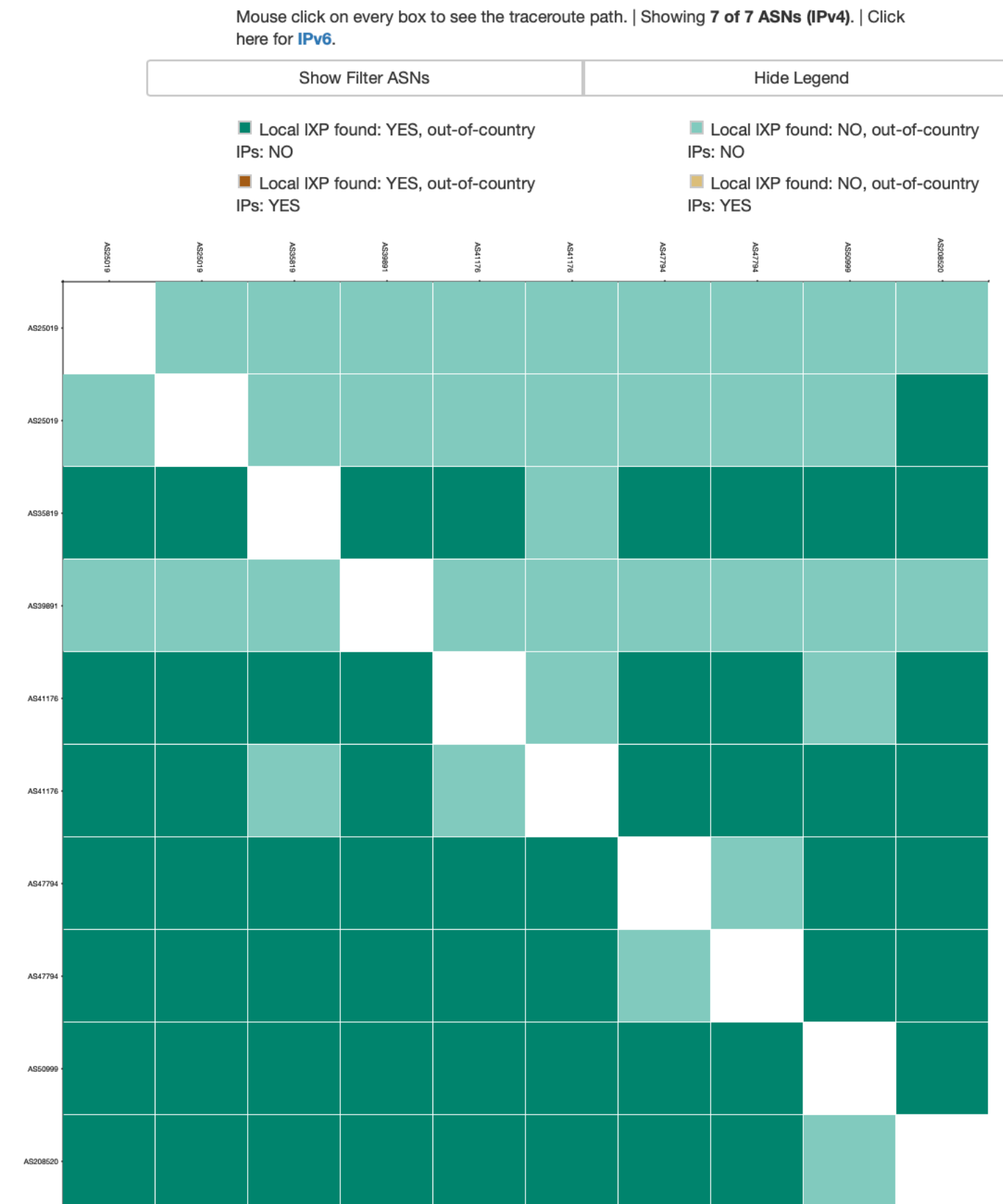
What I will do

- Collect data using measurements between the probes we currently have

  - Use ICMP, UDP and TCP to compare differences

- With the help of our researchers, try to come up with an algorithm to detect asymmetrical routes

  - Several papers described different approaches, often using Atlas but nothing yet is fool proof

- We will share the outcome of this with the Routing Working Group to see if it's useful to expand the prototype and get more probes into the missing ASN's

Questions ?

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