RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Are Dutch Internet Paths Local?

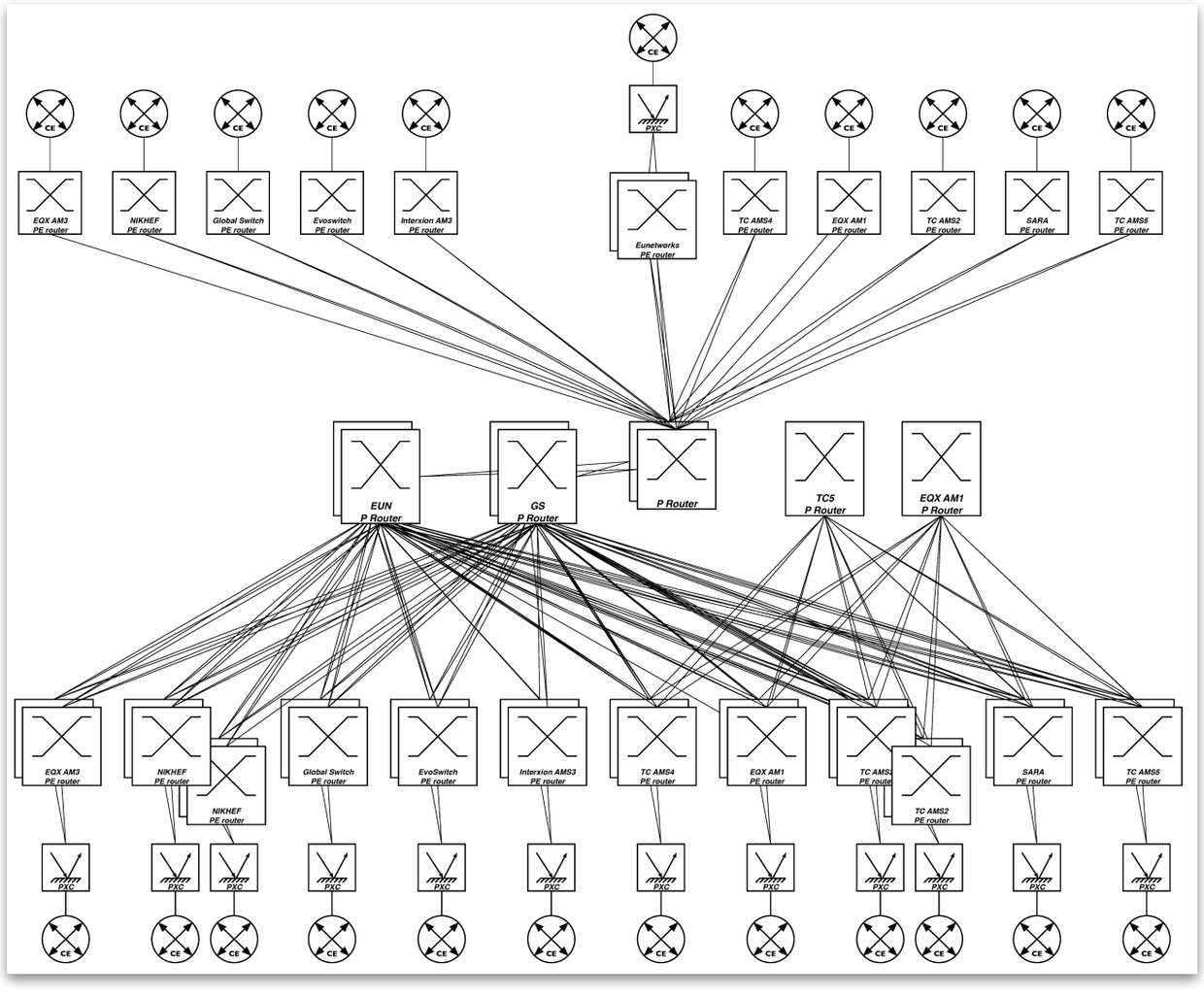
A Measurement Study Using RIPE Atlas

May 2016 | MORE-IP | emile.aben@ripe.net

Dutch Infrastructure

“Delta werken”

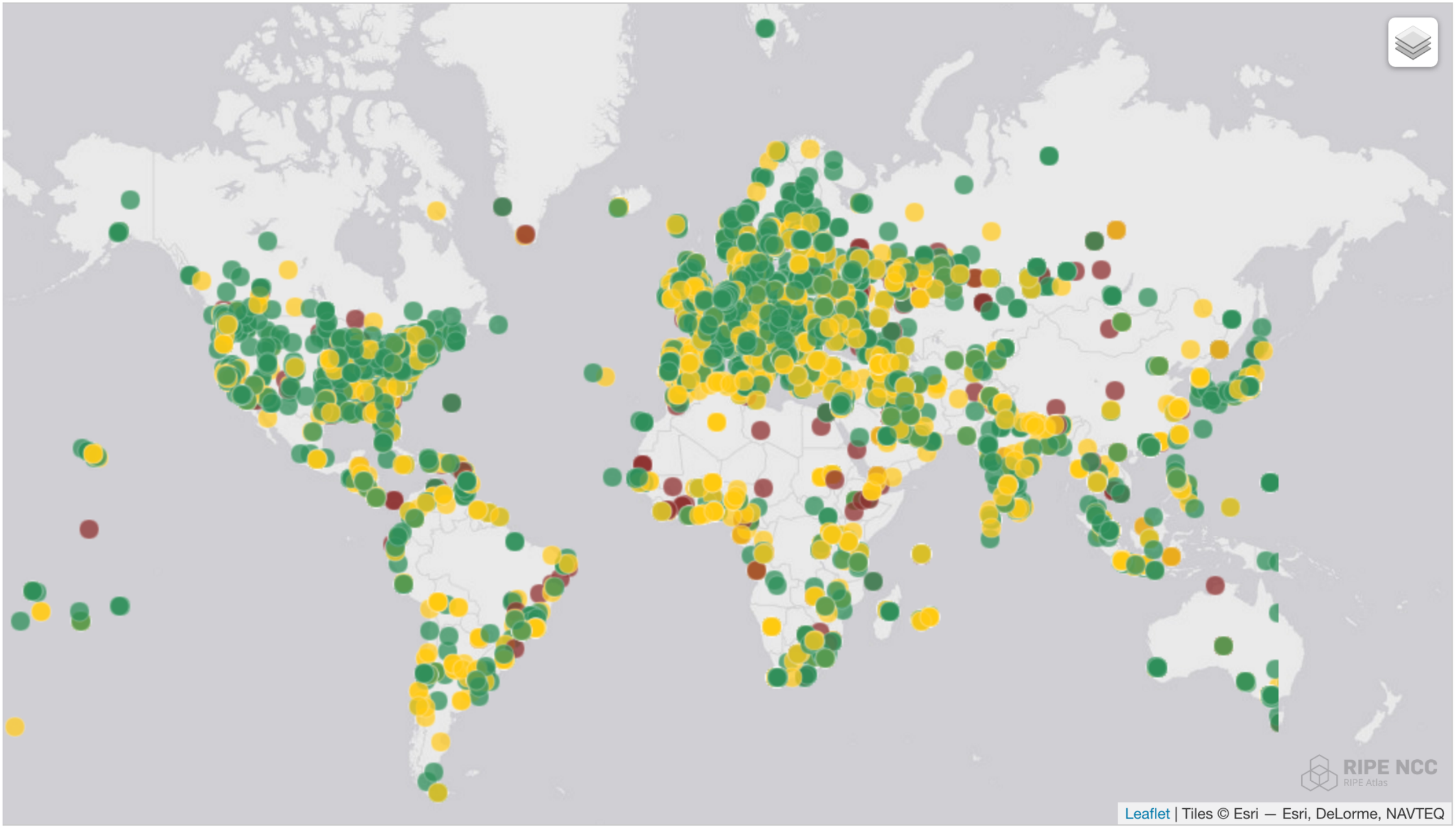
AMS-IX



How to Observe Dutch Internet?

- RIPE Atlas
- Thousands of measurement nodes
- Probes run different measurements
  - ping, traceroute, DNS, SSL
- https://atlas.ripe.net

RIPE Atlas Coverage



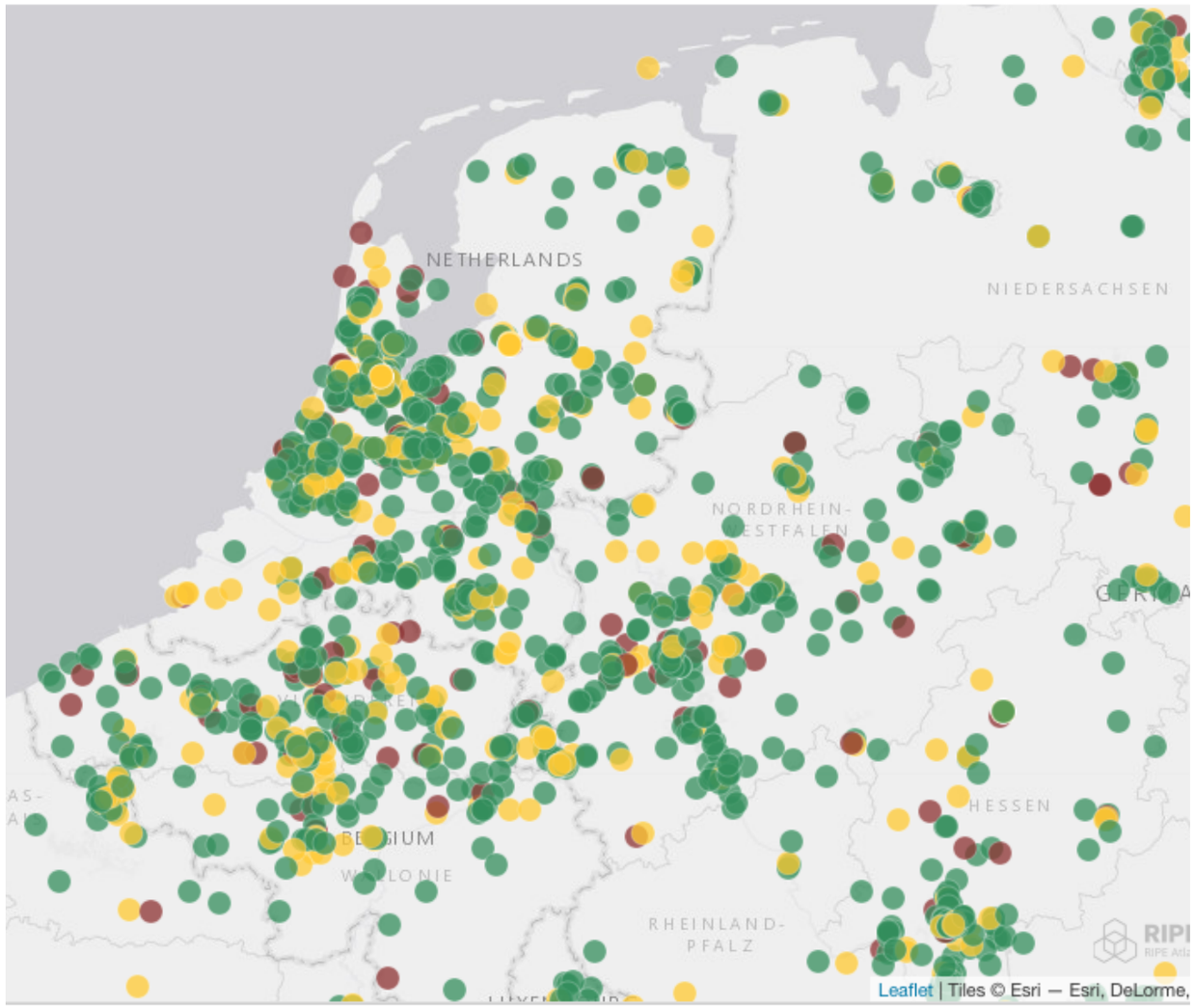
Connected: 9443 Disconnected: 4438 Abandoned: 1615

RIPE Atlas Infrastructure

- Probe distribution
  - 14,000 RIPE Atlas probes distributed
  - 9,400 RIPE Atlas probes active
  - 191 RIPE Atlas anchors active
- Coverage
  - 183 countries covered
  - Originating ASes covered:
    - IPv4: 3,384 (6.3%)
    - IPv6: 1,227 (10.7%)

RIPE Atlas Probes & Anchors in NL

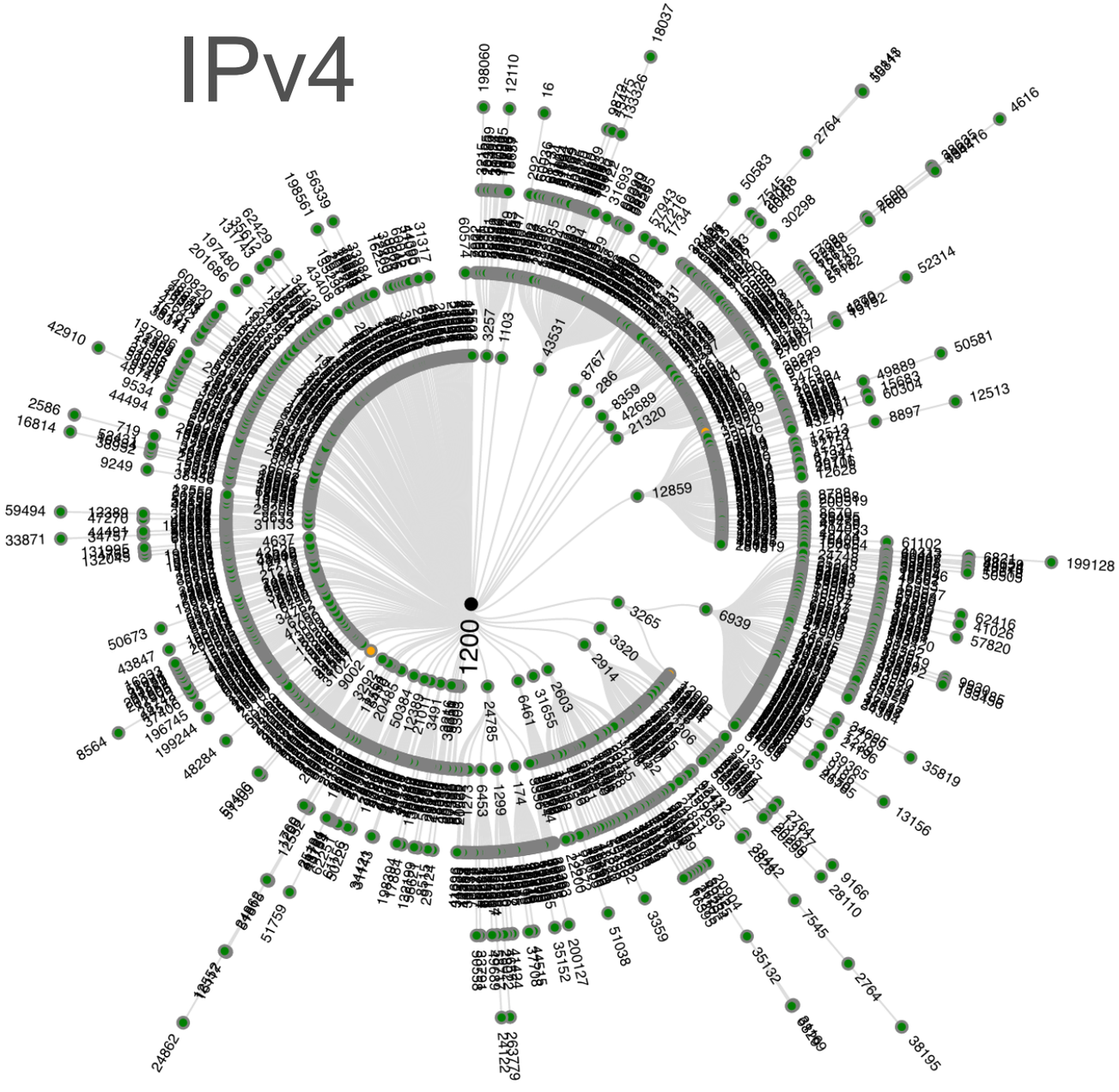
532 NL probes

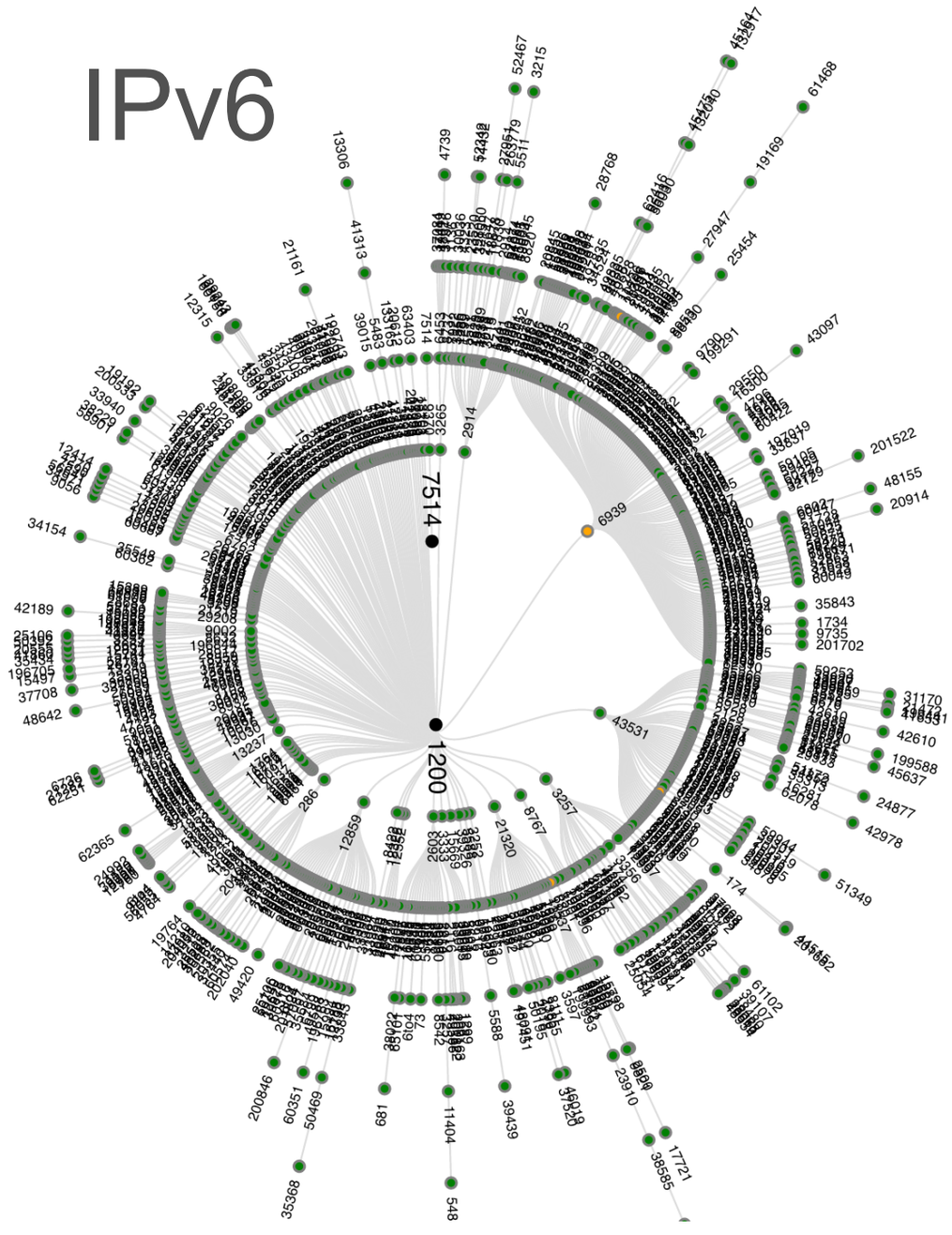


17 NL anchors

Hostname	ProbeID	Company
nl-ams-as1200	6194	AMS-IX B.V.

AMS-IX Topology (using Anchor)





https://labs.ripe.net/Members/emileaben/visualise-your-ipv6-connectivity-using-ripe-atlas

Measure a Country?

- IXP-Country-Jedi
  - Are the paths between ASes staying in the country?
  - What is the difference between IPv6 & IPv4?
  - How many paths go via a local IXP?
  - Which peer could you add to improve reachability?
- Experimental tool
  - Depends on probe distribution in a country
  - Feature requests welcome!

IXP Country Jedi

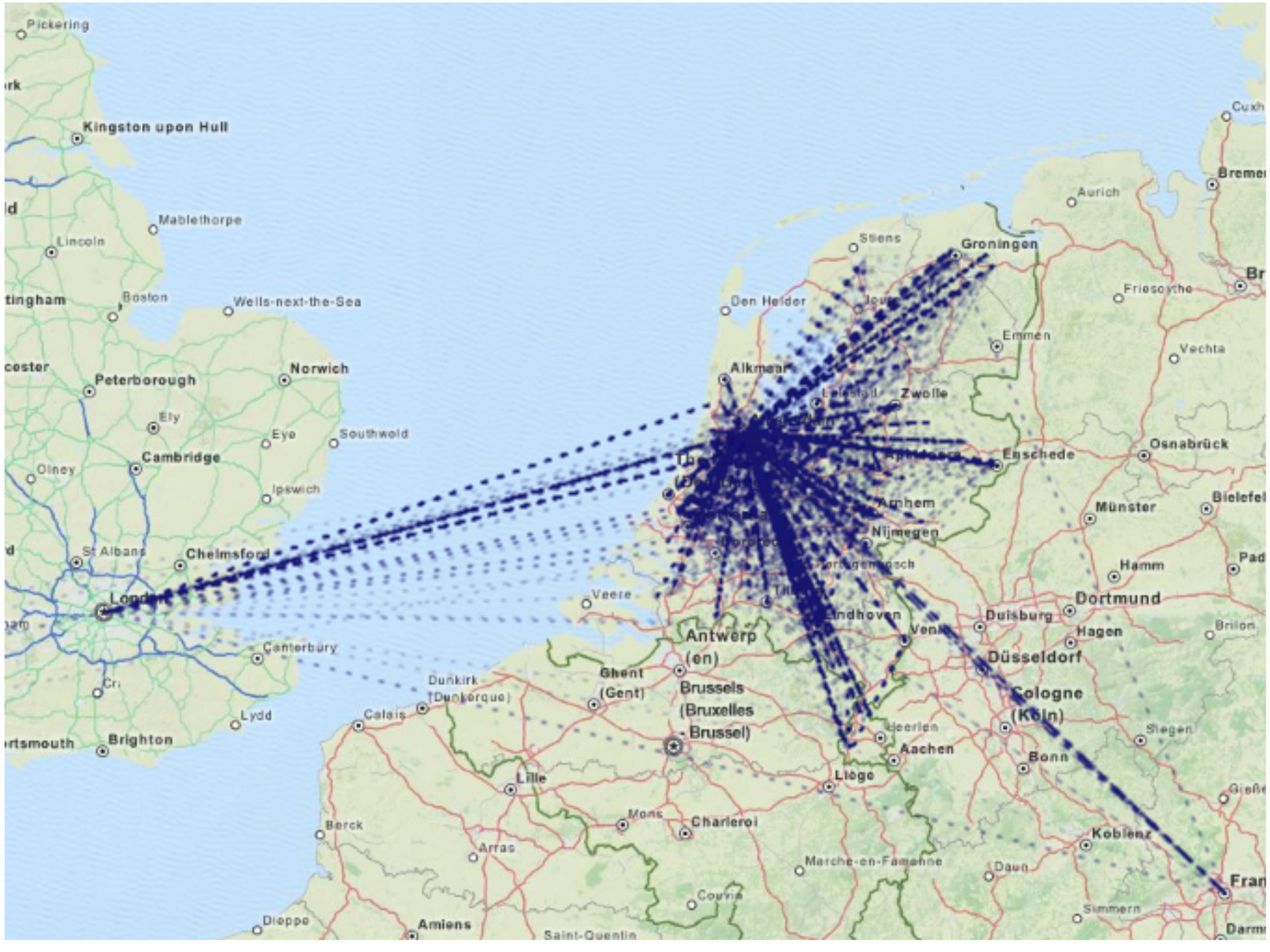
- Tool & concept:
  - https://github.com/emileaben/ixp-country-jedi
  - https://labs.ripe.net/Members/emileaben/measuring-ixps-with-ripe-atlas

IXP Country Jedi

- Traceroute mesh between RIPE Atlas probes
  - Identify ASNs in the country
  - Identify IXPs & IXP LANs using PeeringDB
  - Mesh: from a set of probes in a country to each other
  - Max two probes per ASN
  - Only “public” probes with “good” geolocation
  - Hops geolocated using “OpenIPMap” database

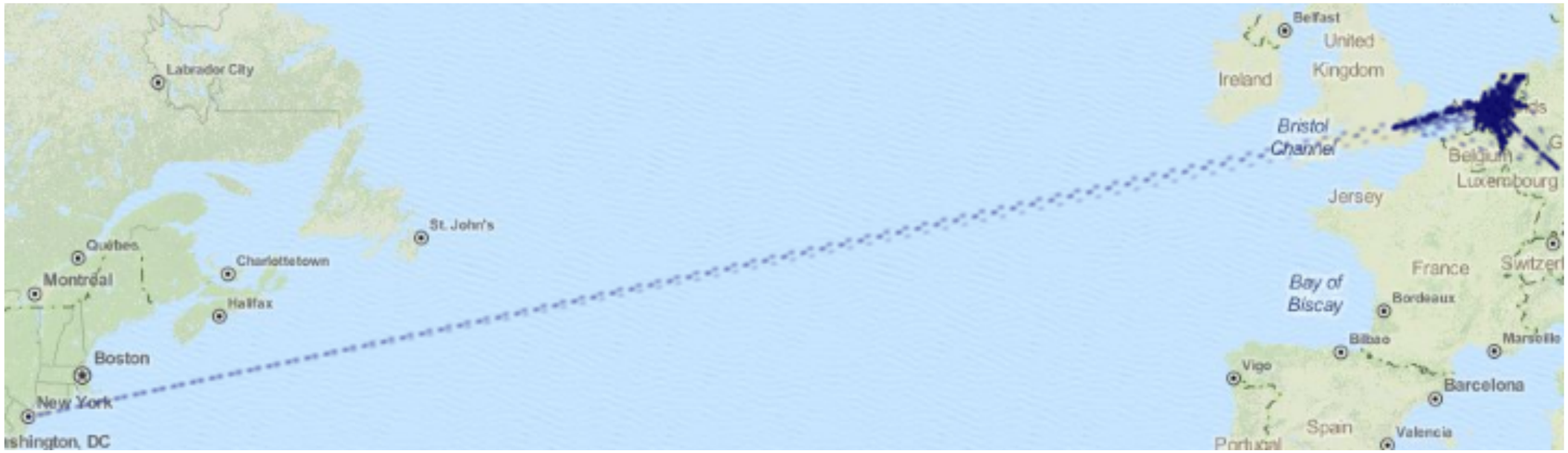
Do Paths Stay in the Country?

- Snapshot of the paths that do, or don’t, stay local



Do Paths Stay in the Country?

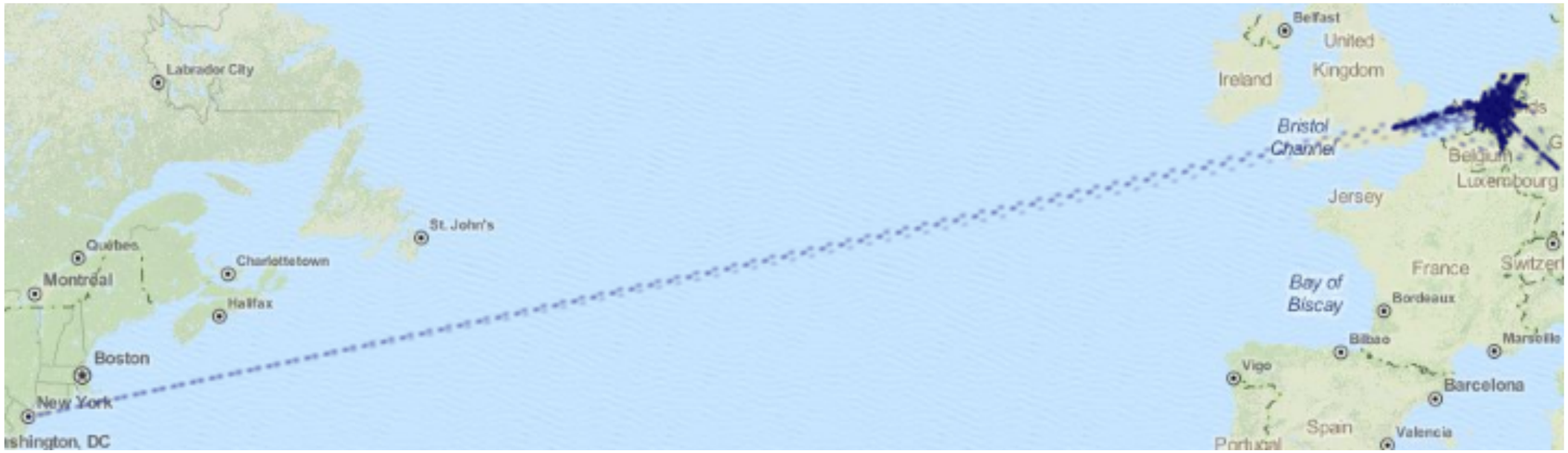
- Zoom out



- Fixed (after contacting network operators)

Do Paths Stay in the Country?

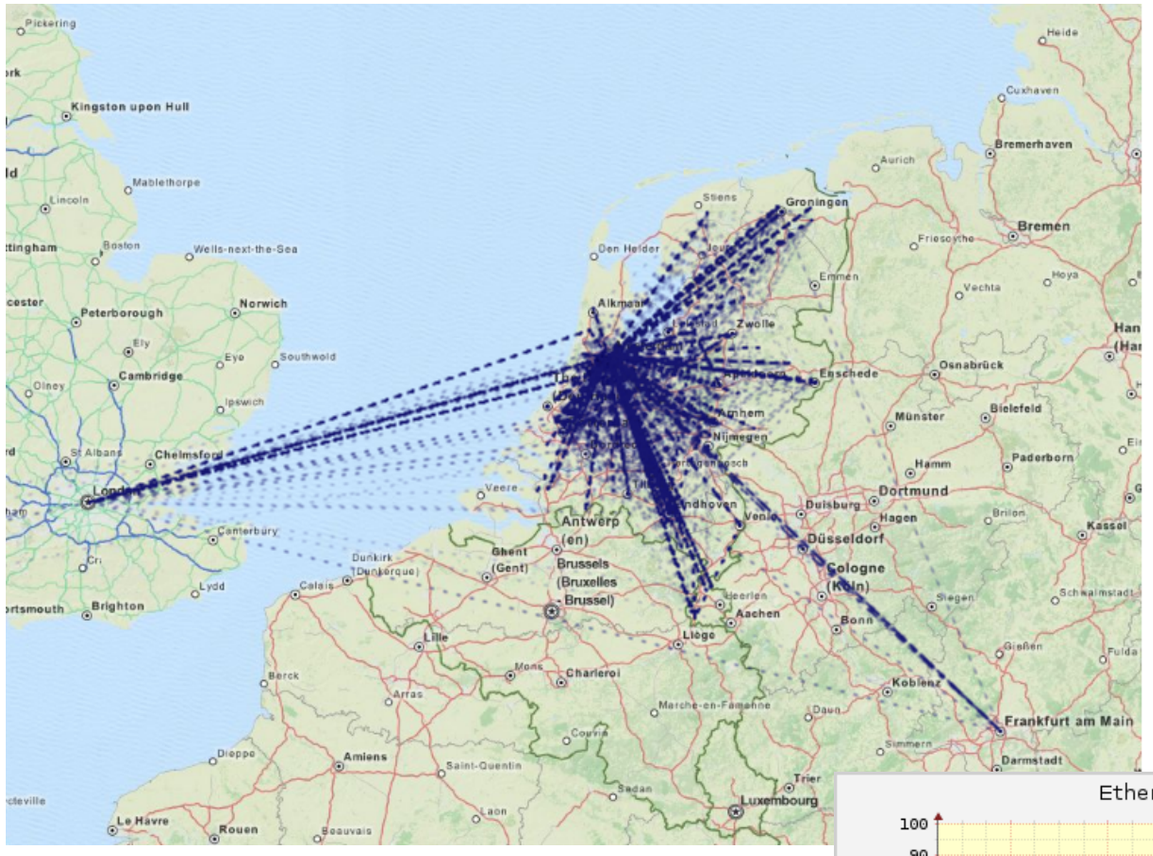
- Zoom out



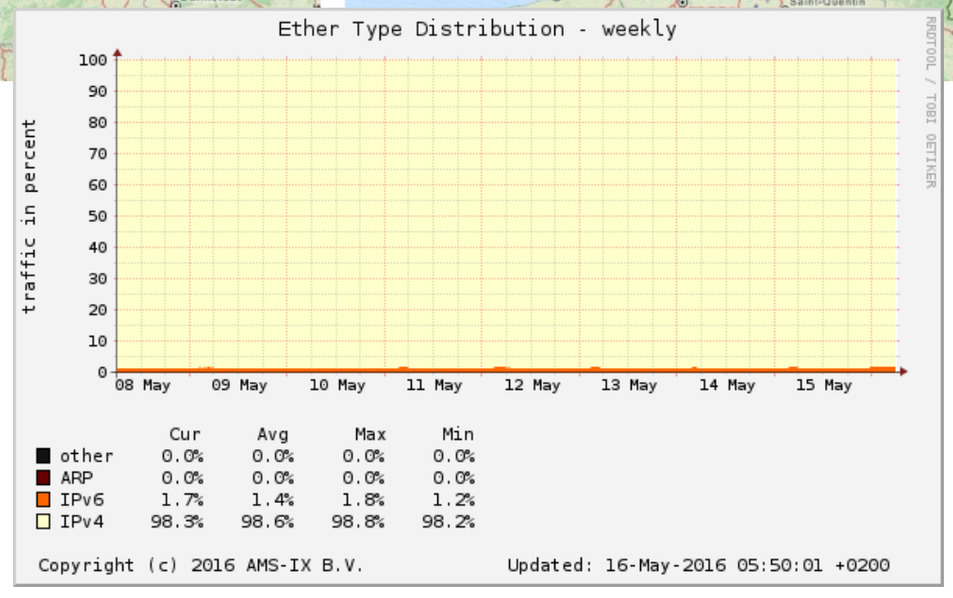
- Fixed (after contacting network operators)

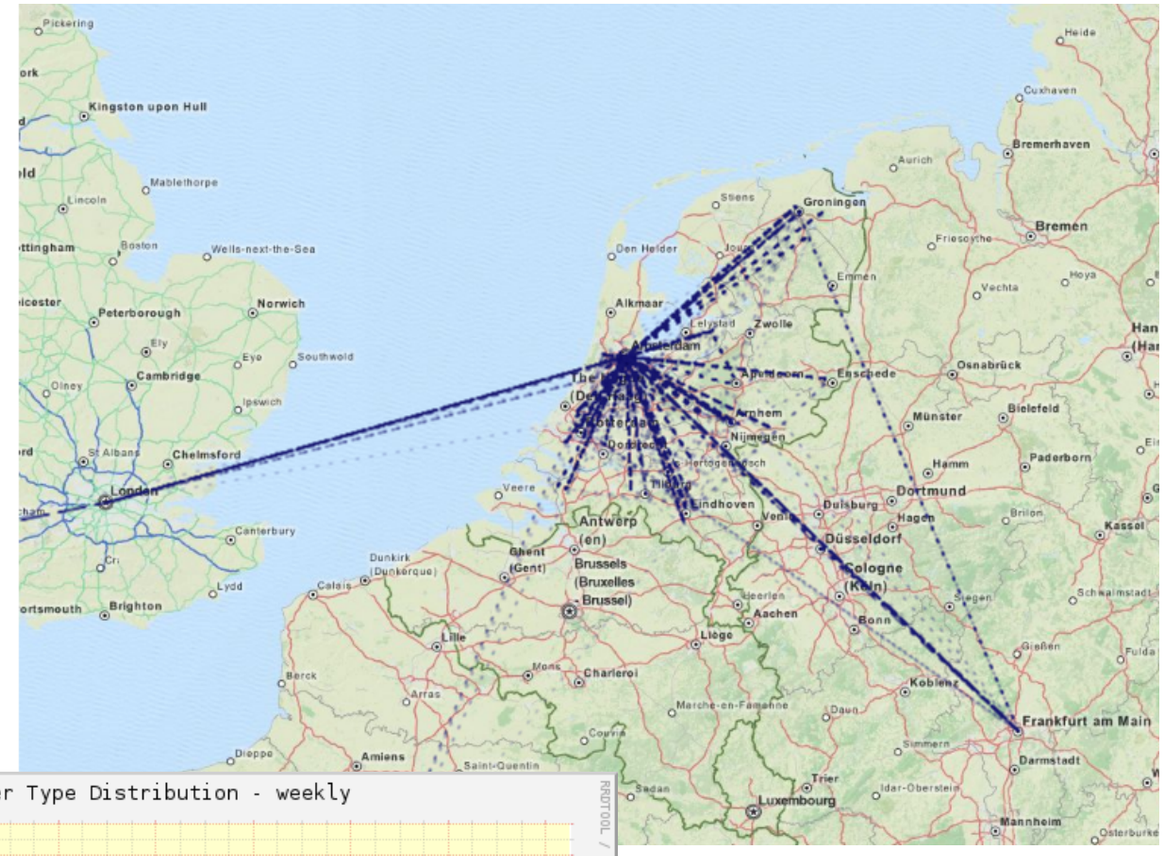
Difference Between IPv4 & IPv6

- Fewer RIPE Atlas probes support IPv6



IPv4





IPv6

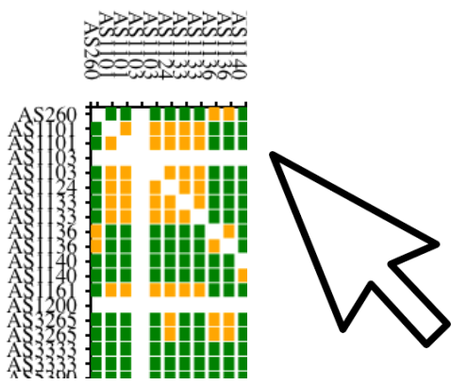
How Many Paths Go Via Local IXP?

- Row: source
- Column: destination
- Cell: path

IXP IPs: YES, out-of-country IPs: NO
IXP IPs: NO, out-of-country IPs: NO
IXP IPs: YES, out-of-country IPs: YES
IXP IPs: NO, out-of-country IPs: YES

Potential Routing Optimisation

- Interactive diagnosis tool (hover over the cell)
  - http://sg-pub.ripe.net/emile/ixp-country-jedi/latest/NL/ixpcountry

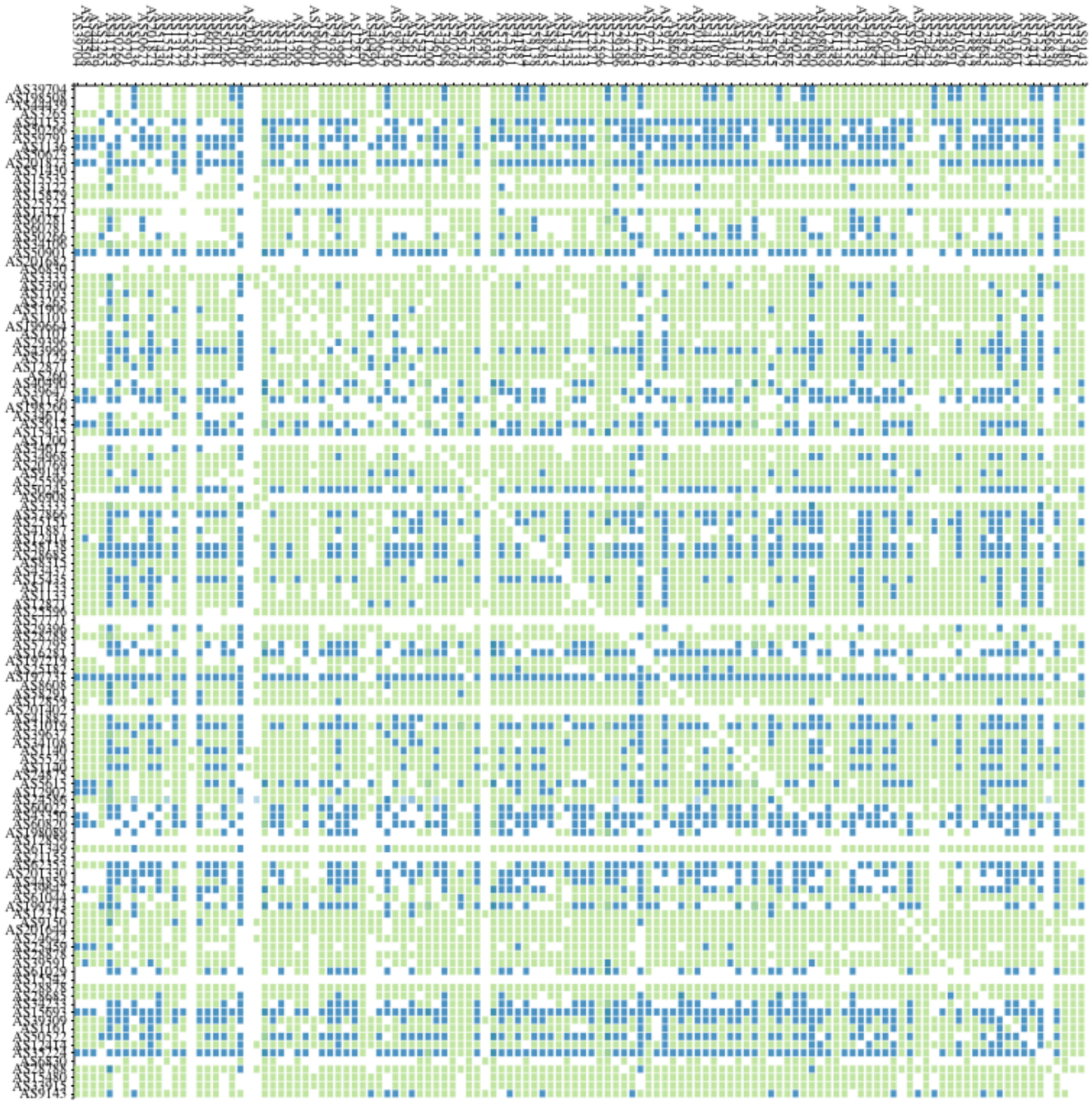


```
## msm_id:3743931 prb_id:6019 dst:145.220.0.55 ts:2016-05-02 17:25:40 -00:00
1 err:{u'x': u'*'}
2 (AS3333) gw.transit.telrtr.ripe.net [1.353, 1.823, 18.842] |Amsterdam,North Holland,NL|
3 (AS1200) ae2.jnr02.asd001a.surf.net [1.766, 1.908, 4.457] |Amsterdam,North Holland,NL|
4 (AS1103) onweer.surfnet.nl [1.735, 1.832, 1.963] ||
5 (AS1101) nl-ams-as1101.anchors.atlas.ripe.net [1.659, 2.468, 4.822] ||
```

- Red or blue: the path is going out of country
  - If this is a surprise/undesired: fix it!
- Yellow: the path is not going via a local IXP
  - If this is a surprise/undesired: fix it!

How Much of This is AMS-IX?

- 60% of paths via AMS-IX*
- 20% other NL IXPs
- 20% PNI or IXP invisible



*Paths in this experiment, i.e. NOT traffic

Benefits (1)

- Country: regulators, politicians, cyber-security
  - How many paths stay in the country? Where do they go?
- Operators
  - Routing and traffic optimisation
- IPv6 advocates
  - Comparing IPv4 and IPv6 paths

Benefits (2)

- IXP operators
  - Shows how IXPs help to keep traffic local and regional
- RIPE Atlas community
  - More probes in more networks and ASes = higher quality measurement data
- Geolocation data community
  - Use case for improving the data quality

Actions (1)

- Use this tool to find possible suboptimal routing
  - Find your ASN in the mesh, find the person from another ASN, have tea together :)
- To improve accuracy of this diagnostic tool
  - If your ASN is not on the graph, apply for a RIPE Atlas probe
  - If you move, remember to update your probe's geolocation

Actions (2)

- Re-use & re-write the code: it is free & open-source software
- Improve infrastructure geolocation: contribute data to OpenIPMap!

Questions

emile.aben@ripe.net

@meileaben

Not a typo!