



RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE Atlas in Eyeball Networks

Towards an Eyeball Jedi...

Motivation



- Is RIPE Atlas deployed in networks with the largest user populations?
- How are these networks interconnected?
- How is this different between countries?
 - Does this correlate with other information about the country?

IXP Country Jedi



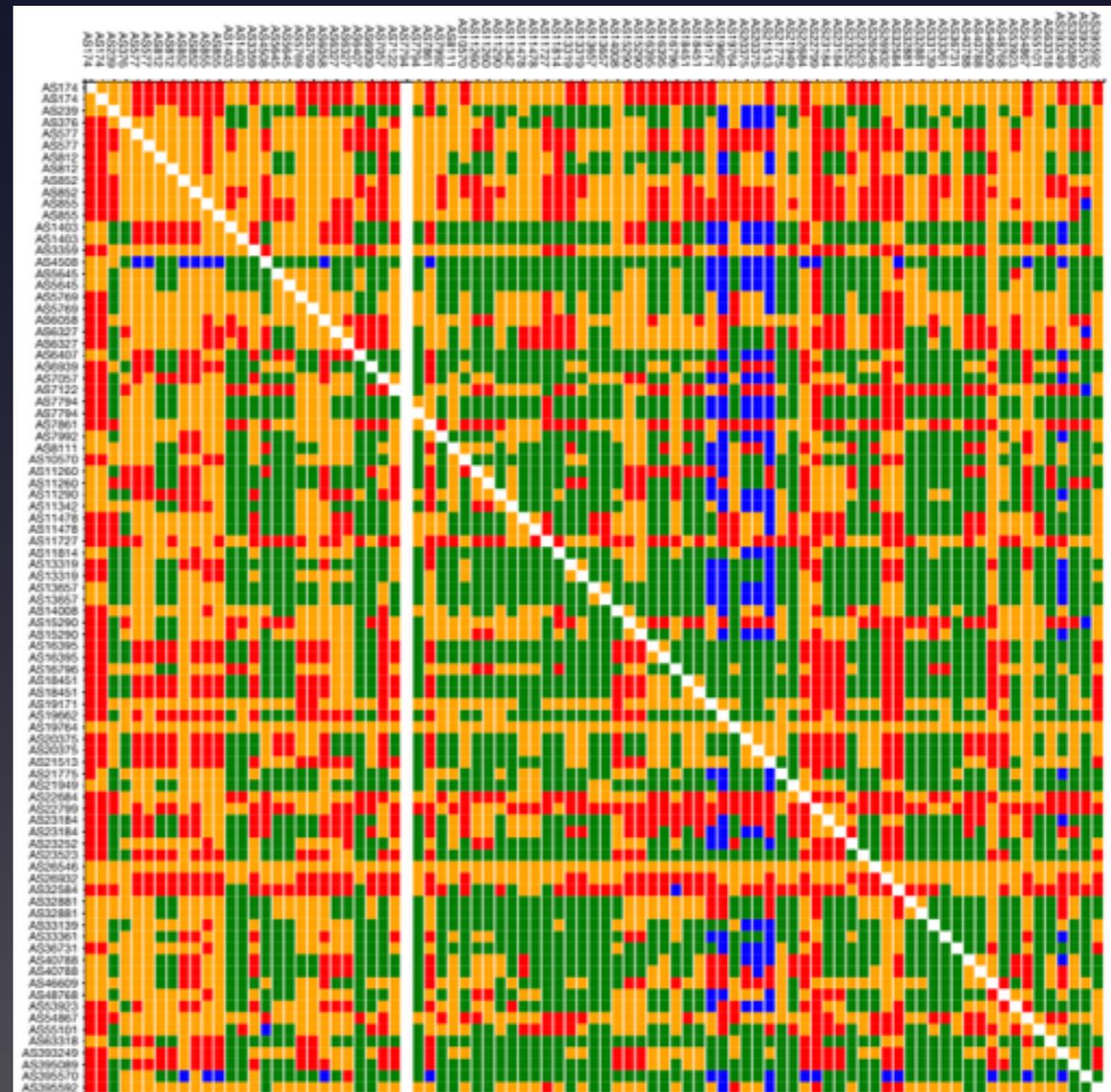
Canada

Snapshot: 1 April 2017

- Selected 99 ASNs
- Full mesh measurement
 - Public probes only
 - Max. 2 probes per ASN
- Geolocate IP hops: OpenIPMap

Available online at:

<http://sg-pub.ripe.net/emile/ixp-country-jedi/history>



Legend:
Yellow: IXP IPs: NO, out-of-country IPs: NO
Green: IXP IPs: YES, out-of-country IPs: NO
Blue: IXP IPs: YES, out-of-country IPs: YES
Red: IXP IPs: NO, out-of-country IPs: YES

RIPE Labs article:

Measuring Countries and IXPs with RIPE Atlas

<https://labs.ripe.net/Members/emileaben/measuring-ixps-with-ripe-atlas>

Eyeball Networks



- The user-facing networks with the largest user populations
- APNIC provides user estimates per ASN ^[1]
- Two thresholds to select ASNs:
 - Only using ASNs with > 1% users
 - Cumulative fraction of 95% of the Internet users in that country
- Average coverage 90.5% of population per country
 - Russia is an outlier (due to highly diverse eyeball ecosystem)

[1] APNIC User population per ASN data: stats.labs.apnic.net/aspop

Eyeball to Eyeball Matrix

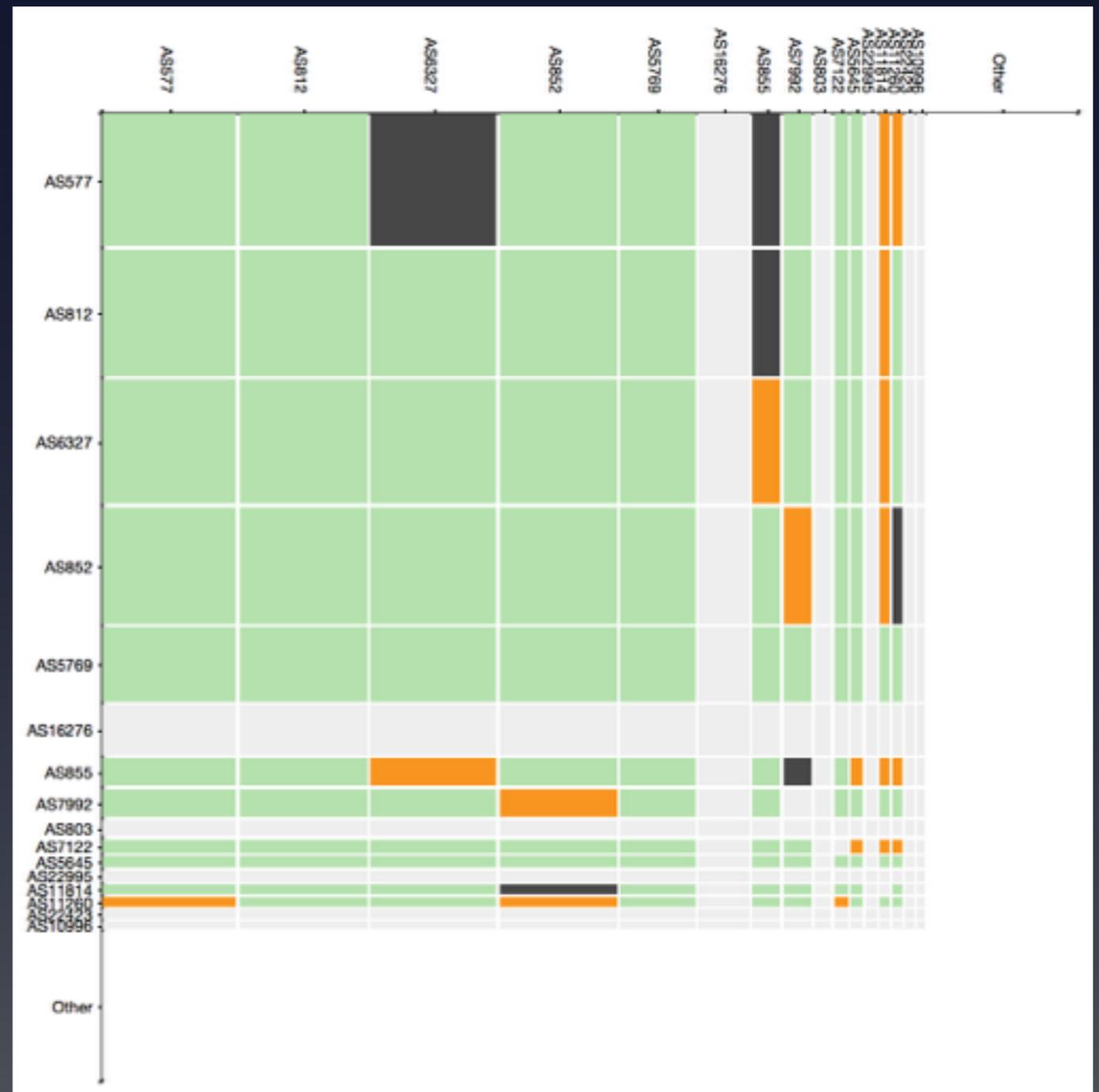


Canada

Snapshot: 1 April 2017

In-country	47,11%
Out-of-country	3,06%
No coverage	18,07%
Inconsistencies	3,17%
Not measured	28,58%

- The boxes are sized according to the APNIC estimates of Internet users per ASN
- The box area is used as a metric to calculate percentages of user-to-user connections with certain characteristics.



Available online for 104 countries at: <http://sg-pub.ripe.net/petros/eyeball-jedi>

Eyeball to Eyeball Matrix

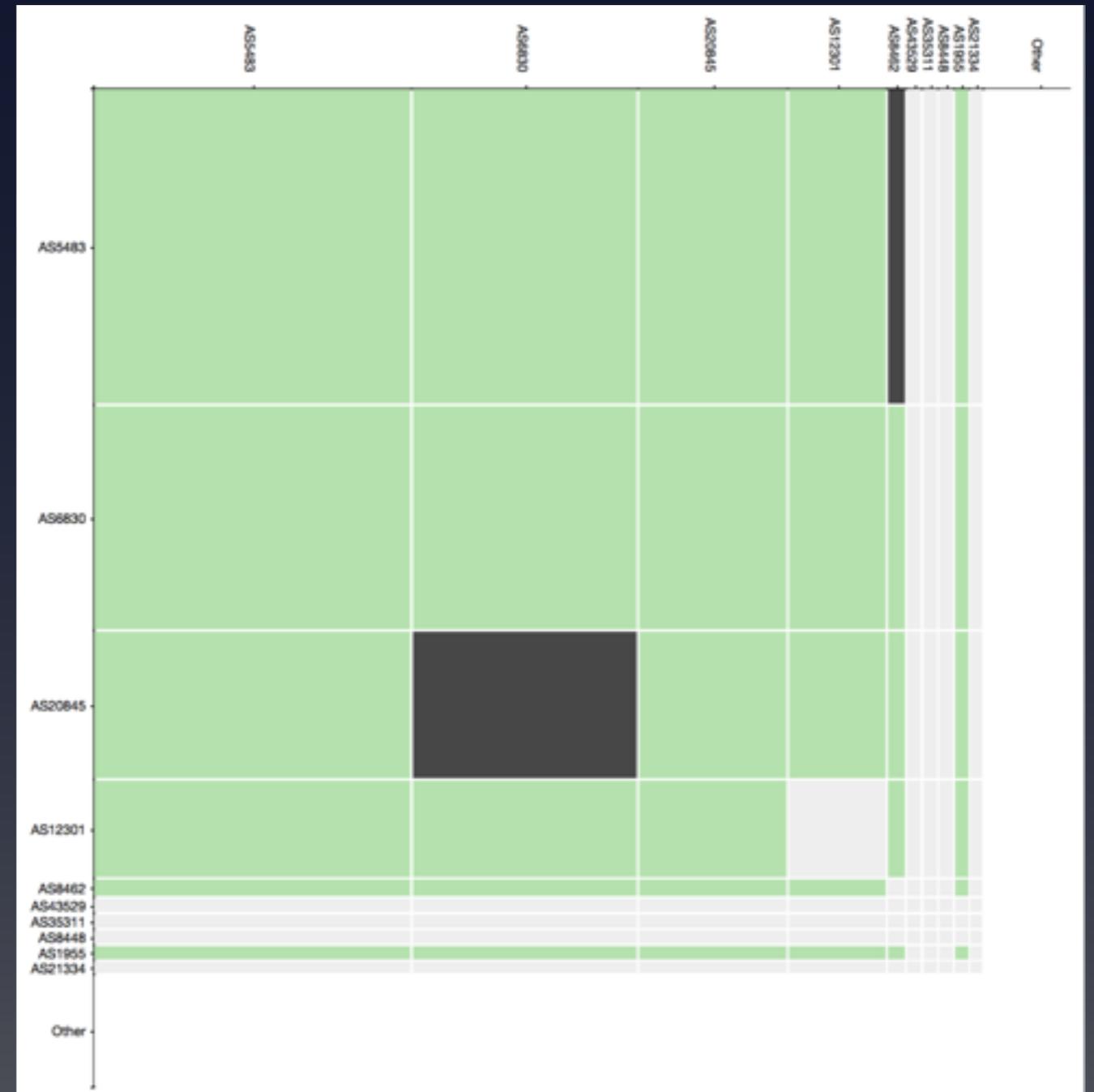


Hungary

Snapshot: 1 April 2017

In-country	63,22%
Out-of-country	0,00%
No coverage	11,66%
Inconsistencies	3,97%
Not measured	21,15%

- The boxes are sized according to the APNIC estimates of Internet users per ASN
- The box area is used as a metric to calculate percentages of user-to-user connections with certain characteristics.



Available online for 104 countries at: <http://sg-pub.ripe.net/petros/eyeball-jedi>

Eyeball to Eyeball Matrix



Russia

Snapshot: 1 April 2017

In-country	7,01%
Out-of-country	0,00%
No coverage	1,29%
Inconsistencies	0,51%
Not measured	91,18%

- The boxes are sized according to the APNIC estimates of Internet users per ASN
- The box area is used as a metric to calculate percentages of user-to-user connections with certain characteristics.

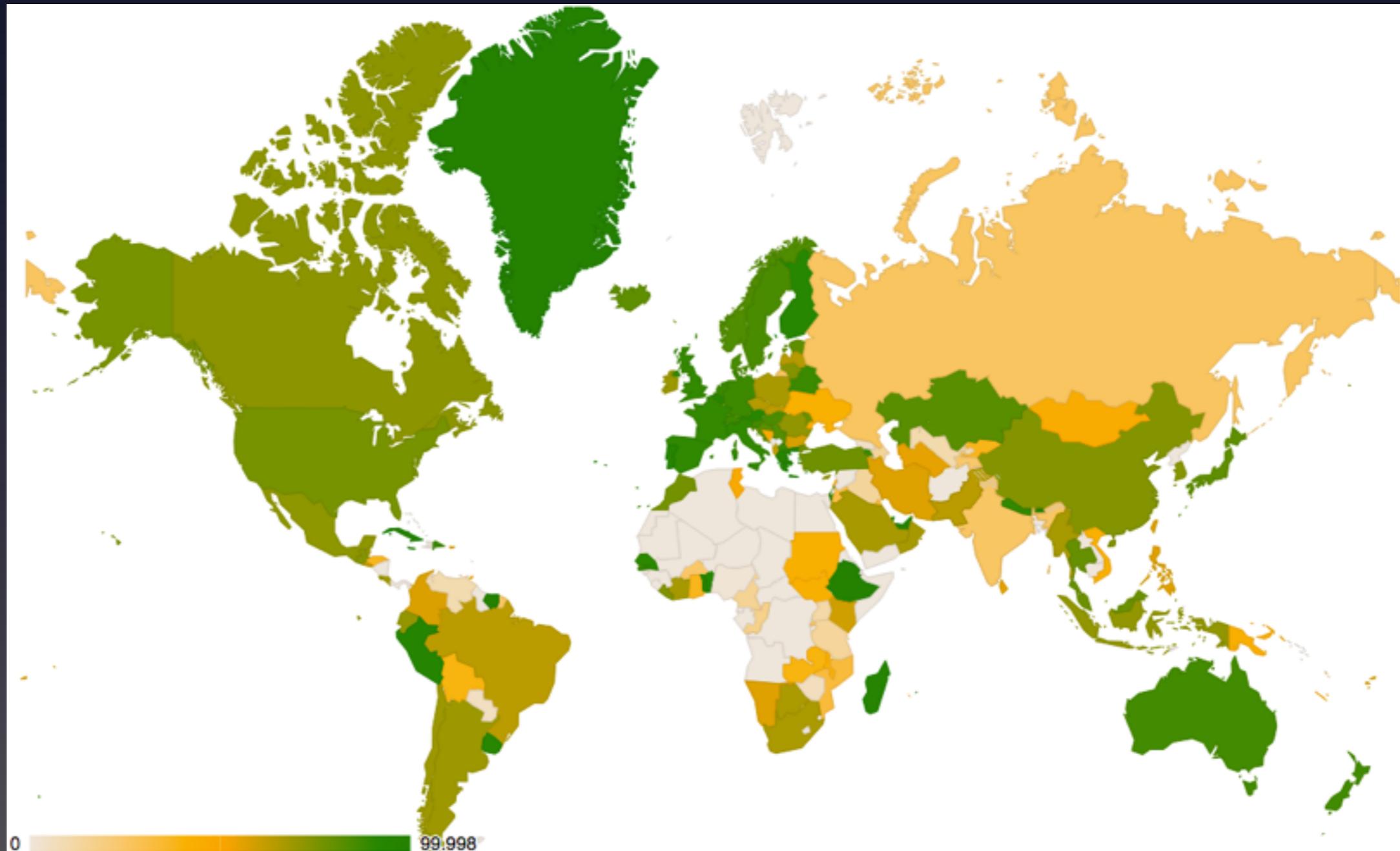


Available online for 104 countries at: <http://sg-pub.ripe.net/petros/eyeball-jedi>

RIPE Atlas Coverage of Eyeball Networks



IPv4 (Public & Private) Probes



Available online for 249 countries at: http://sg-pub.ripe.net/petros/population_coverage

Limitations



- RIPE Atlas measures traffic **paths** and not traffic volume
- RIPE Atlas vantage points are a biased sample of connectivity in a country
- Geolocation accuracy
- Ground-truth for validation of APNIC estimates (user per ASN)

Future Work



- Investigate more sophisticated probe selection strategies
- Identify intermediate ASNs
- Eyeball to neighbour country eyeball traffic
- Eyeball networks towards CDNs



Eyeball Jedi is publicly available at:

<http://sg-pub.ripe.net/petros/eyeball-jedi>

Actions



- Deploy probes on the no coverage networks
(http://sg-pub.ripe.net/petros/population_coverage)
- Give us feedback
 - What we should focus on?
- Look up your country/network
(<http://sg-pub.ripe.net/petros/eyeball-jedi>)
- Provide new data sources (user per ASN)



Questions



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