Countries, IXPs and RIPE Atlas
RIPE Atlas
Coverage For Countries

- Some countries well covered, others not so much

- Can we create country-specific Internet measurements from RIPE Atlas?
  - Can this help make things better?

<table>
<thead>
<tr>
<th>Country</th>
<th>Probes</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America</td>
<td>1005</td>
</tr>
<tr>
<td>Germany</td>
<td>927</td>
</tr>
<tr>
<td>France</td>
<td>774</td>
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<tr>
<td>United Kingdom</td>
<td>578</td>
</tr>
<tr>
<td>Netherlands</td>
<td>531</td>
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<tr>
<td>Russia</td>
<td>463</td>
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<td>Czech Republic</td>
<td>259</td>
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<tr>
<td>Italy</td>
<td>245</td>
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<tr>
<td>Switzerland</td>
<td>235</td>
</tr>
<tr>
<td>Ukraine</td>
<td>223</td>
</tr>
</tbody>
</table>
“Keeping local traffic local”

- Is Internet traffic kept local?
- Arbitrary definition: local = within country
  - (studies can be repeated with other arbitrary boundaries)
- RIPE Atlas can measure paths (traceroute) between probes in a given country
  - Do we see IXPs in these paths?
  - Do we see out-of-country paths?
    - Do they need to be fixed?
Methodology

- Mesh of traceroutes between “public” probes
  - Max. 2 probes per ASN, example:
    - Full mesh France: 755 x 754 = 569,270 traceroutes
    - 1-2 probes/ASN France: 155 x 154 = 23,870 traceroutes (manageable)

- Geolocate IP hops: OpenIPMap
  - https://marmot.ripe.net/openipmap/

- Locate IXPs: Configurable
Limitations

• RIPE Atlas measures traffic **paths**, not traffic **volume**
  - Expectation: A lot of what we measure are paths that are not optimised

• RIPE Atlas vantage points are a **biased** sample of connectivity in a country
  - Expectation: Biased towards “clue core”

• Traceroute-limitations: ICMP rate-limiting, ICMP-blocking, doesn’t see layer 2, etc.
Case Study: Sweden

- Paths with out of country IP addresses:
  - IPv4: 12%
  - IPv6: 21%

https://labs.ripe.net/Members/emileaben/measuring-ixps-with-ripe-atlas
Case-study: Sweden

- What if “local” included Oslo and Copenhagen?

- “Keeping local traffic local” is not “keep all traffic within a country”
Case-study: France

- “Spiderweb”
  - Due to probe selection
- Some close-by cities were FR-FR paths go:
  - London
  - Amsterdam
  - Frankfurt

https://labs.ripe.net/Members/emileaben/looking-at-france-ix-with-ripe-atlas-and-ris
Case Study: Argentina + Chile

path contains out-of (CL,AR) IPs

no out-of (CL,AR) IPs in path
How: IXP-Country-Jedi

• Collection of scripts that, prepare, measure, analyse RIPE Atlas mesh-traceroutes

• Simplest config.json:

  ```json
  {"country": "RO"}
  ```

• [https://github.com/emileaben/ixp-country-jedi/](https://github.com/emileaben/ixp-country-jedi/)
Monthly IXP-Country-Jedi Runs

- Taking a monthly run for all countries with > 3 ASNs covered
- Latest run: 100+ countries
  
  http://sg-pub.ripe.net/emile/ixp-country-jedi/history/2016-01-01/

- Configs
  - http://sg-pub.ripe.net/emile/ixp-country-jedi/ixp-country-jedi-confs.tgz

- IXPs automatically filled in from peeringDB
  - not necessarily complete
Related Work

http://ip.topology.net.nz/
Action Points

• Network Operators
  - Explore, see if you can find where you can improve

• IXP
  - Find network ops that you can bring together and peer locally

• Programmer
  - Check out the code that does all this, and improve it
  - https://github.com/emileaben/ixp-country-jedi/

Feature requests welcome
Questions

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@vgcerf When you force localisation, you remove a great deal of resilience from the system: that's an engineer's point of view.

#IGF2015