RIPE NCC
RIPE NETWORK COORDINATION CENTRE

The State of the (Romanian) Internet

Interpreting RIPE NCC Data and Measurements

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Introduction

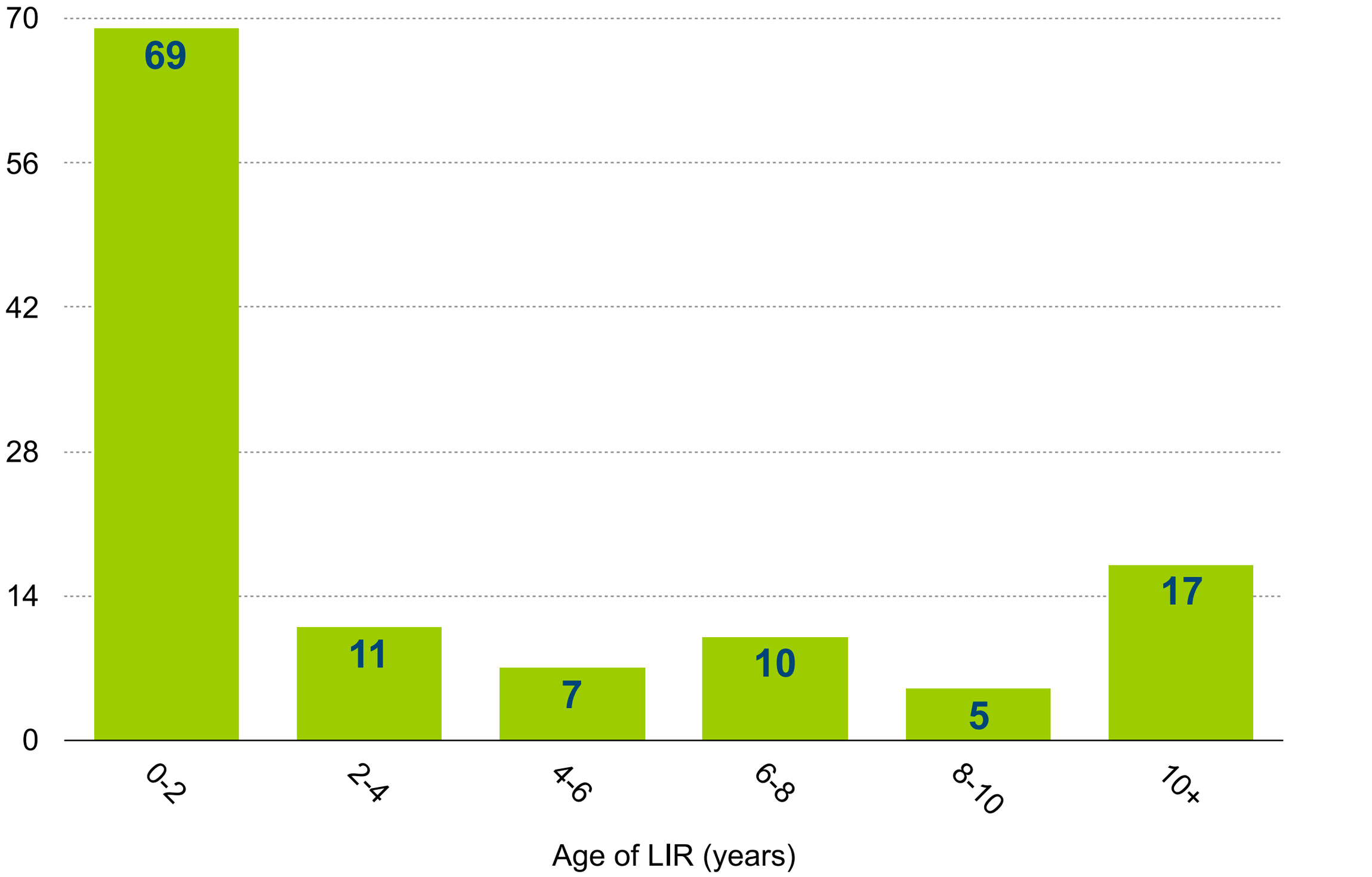
- RIPE NCC: The Regional Internet Registry for Europe, the Middle East and parts of Central Asia.
- Allocating and registering number resources (IPv4, IPv6, ASN) but also providing tools and measurements for the networking community
- Some examples: RIPE Atlas, RIPEstat, internal data and statistics

Data and Measurements

Number of LIRs

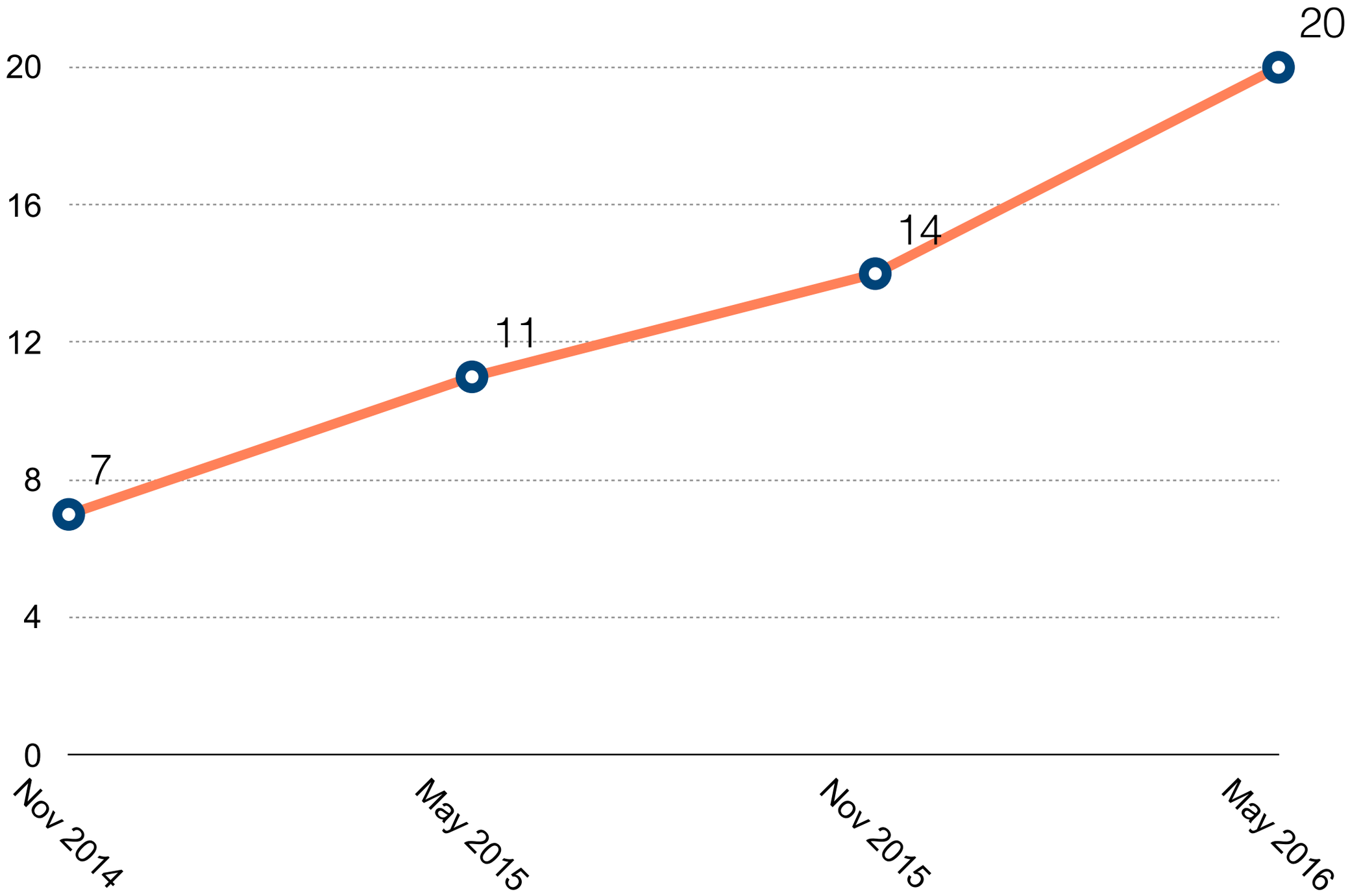
- Total (as of 7 October 2016): **14,511**
- Romania: **119** (101 with the last /22)
- Other countries in the region:
  - Bulgaria: 123
  - Hungary: 133
  - Moldova: 39
  - Ukraine: 239
  - Serbia: 93

LIRs by age

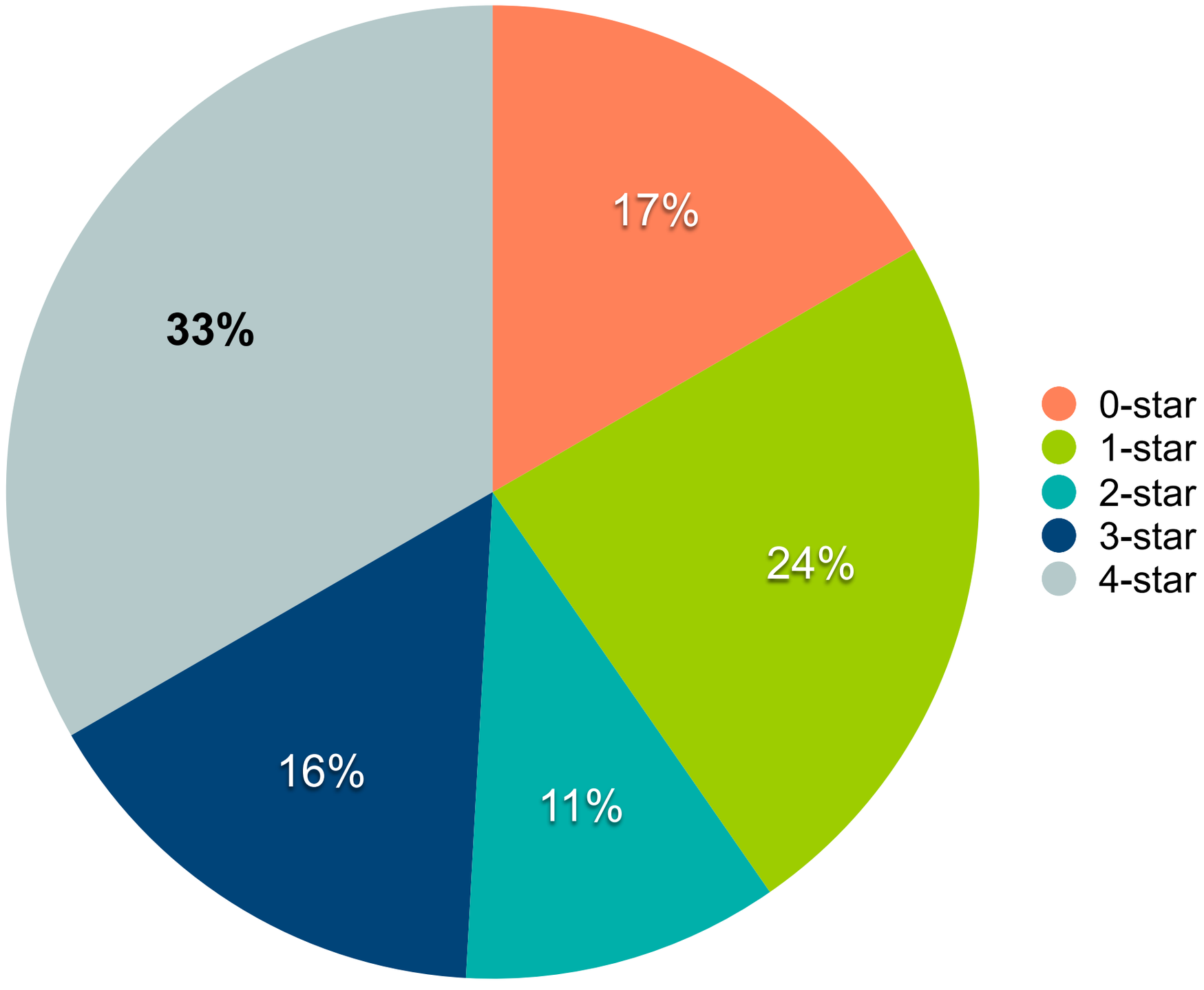


RO GM vote registrations

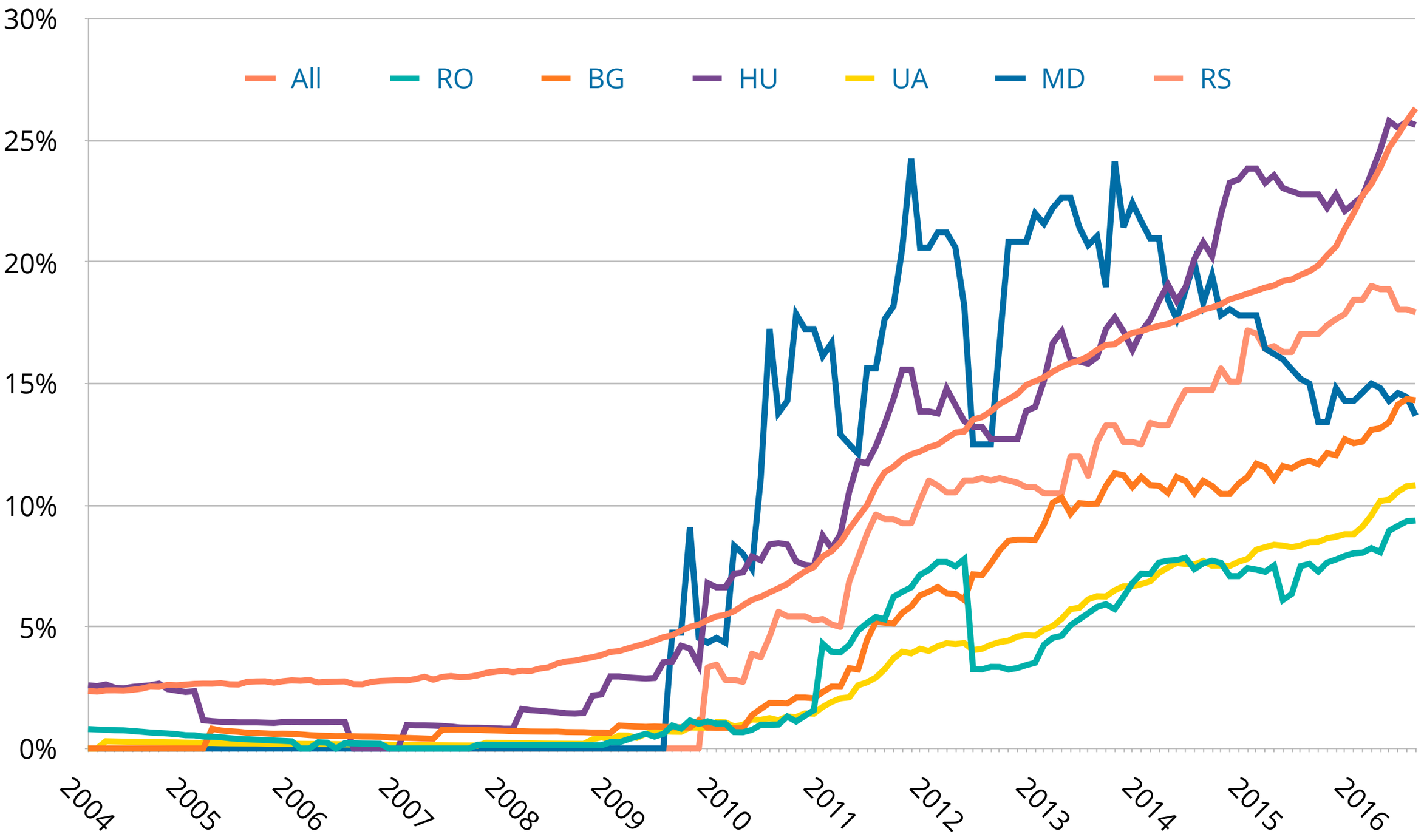
(1,191 total - May 2016)



IPv6 RIPEness - Romania



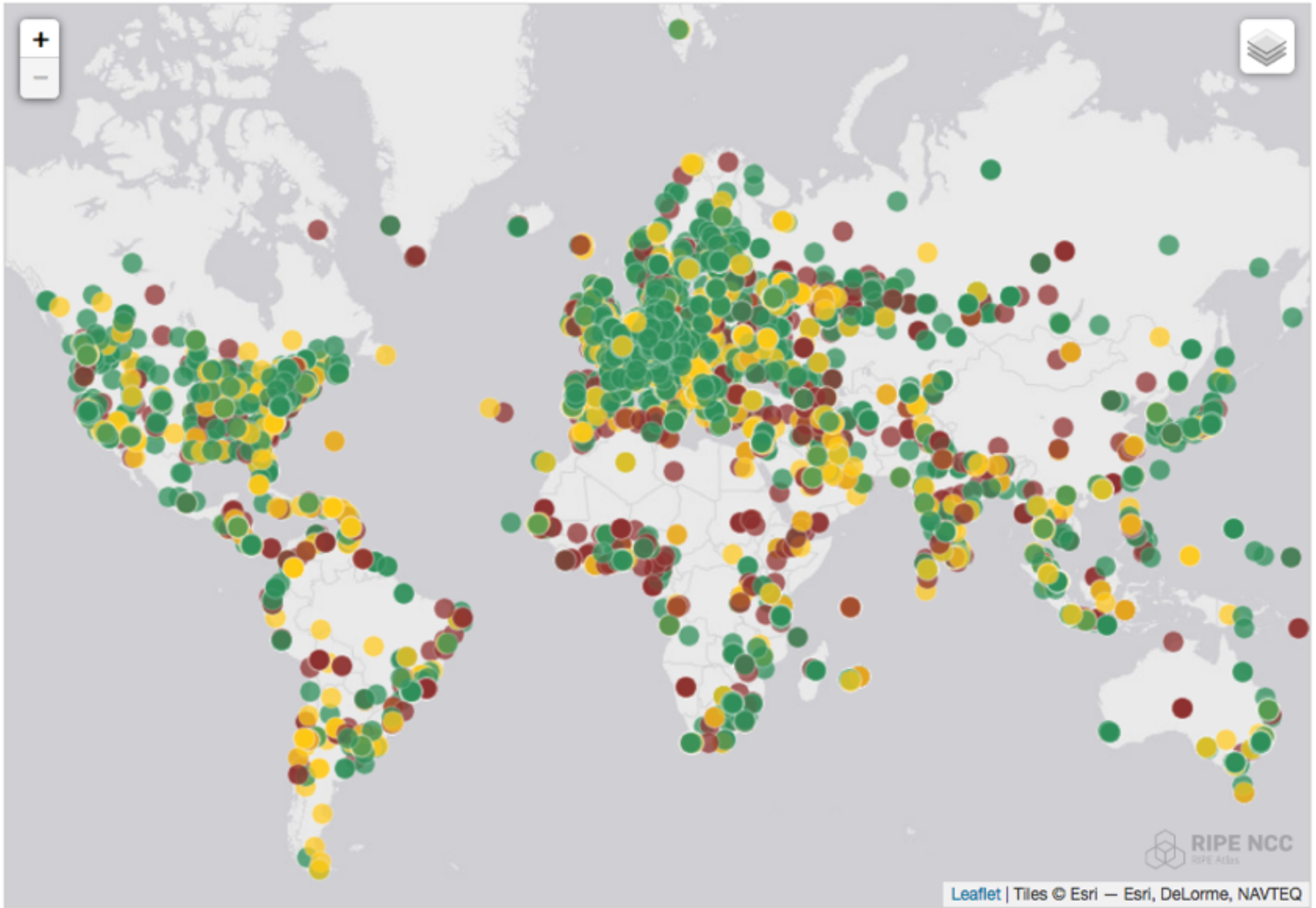
ASNs announcing IPv6



How to observe Romanian Internet?

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

RIPE Atlas coverage



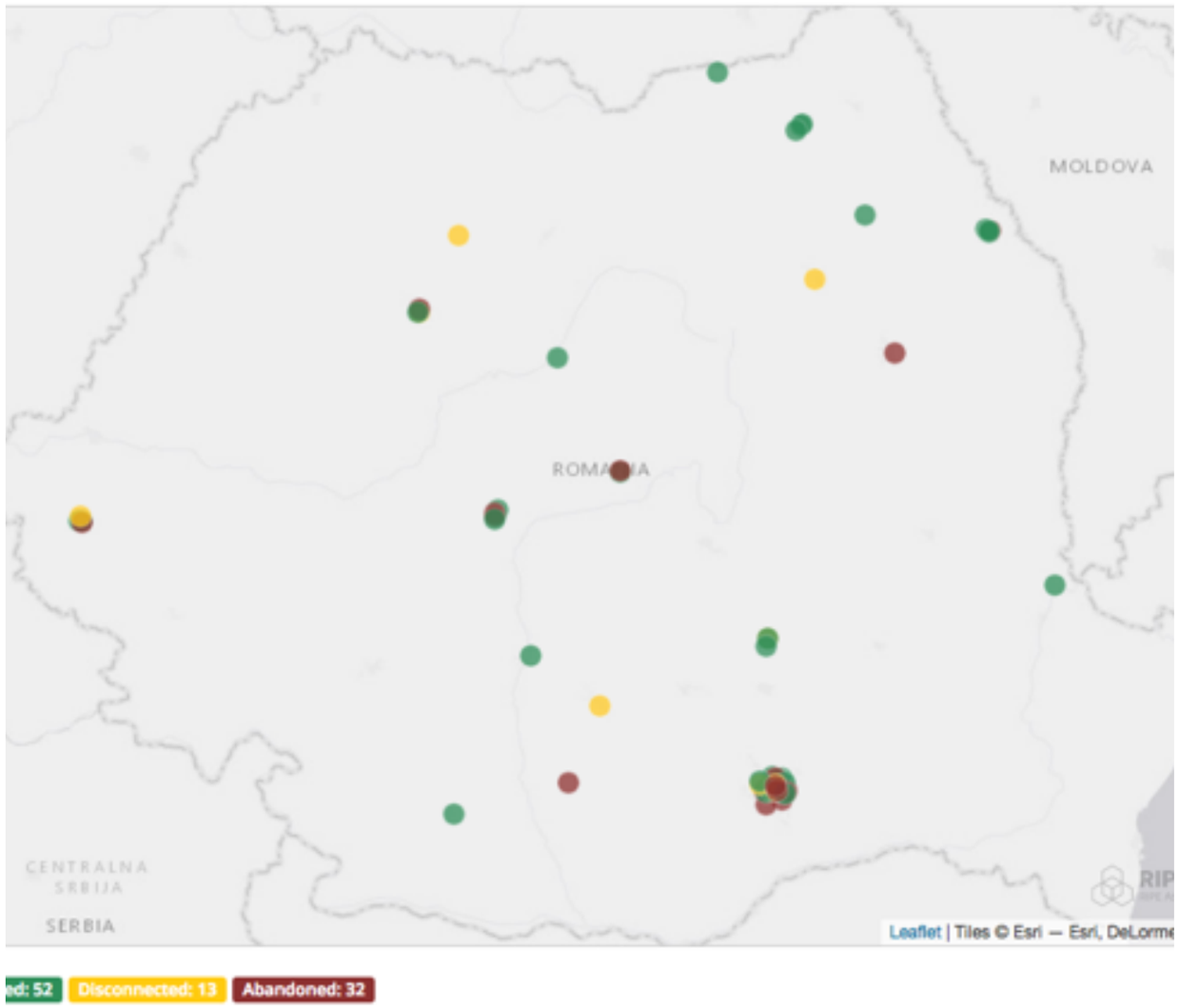
Connected: 9365 Disconnected: 2710 Abandoned: 4654

RIPE Atlas infrastructure

- Probe distribution
  - 14,000 RIPE Atlas probes distributed
  - 9,300 RIPE Atlas probes active
  - 200 RIPE Atlas anchors active
- Coverage
  - 183 countries covered
  - Originating ASes covered:
    - IPv4: 3,384 (6.3%)
    - IPv6: 1,227 (10.7%)

RIPE Atlas probes and anchors in RO

52 active probes



1 active anchor

ro-buh-as39107	6154	Asociatia Interlan *Sponsored by: RIPE NCC*	Bucharest

Measure a country?

- IXP-Country-Jedi
  - Are the paths between ASes staying in the country?
  - What is the difference between IPv6 and 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 and 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 and 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

Difference between IPv4 and IPv6

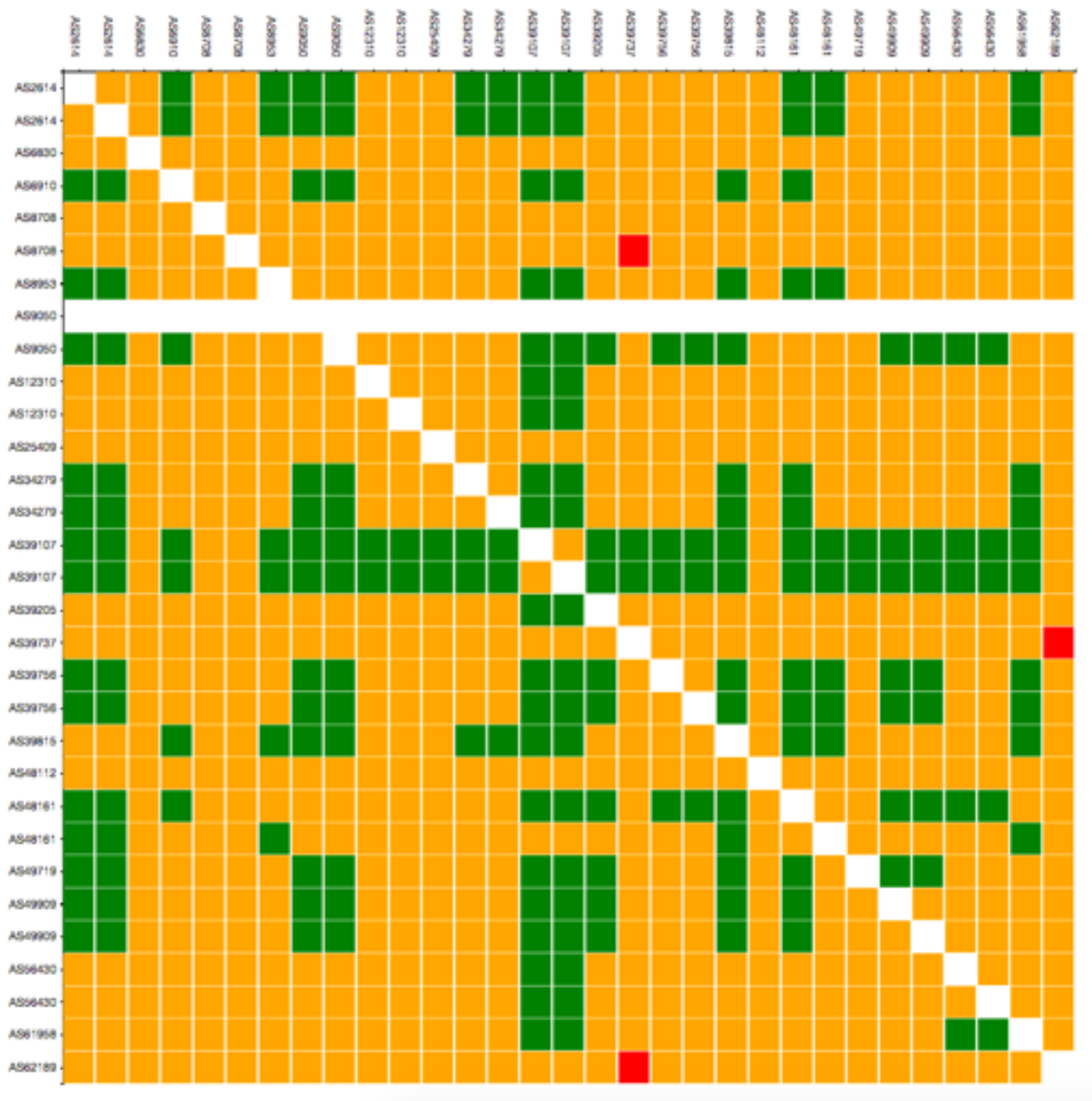
- Fewer RIPE Atlas probes support IPv6

IPv4

IPv6

How many paths go via local IXP?

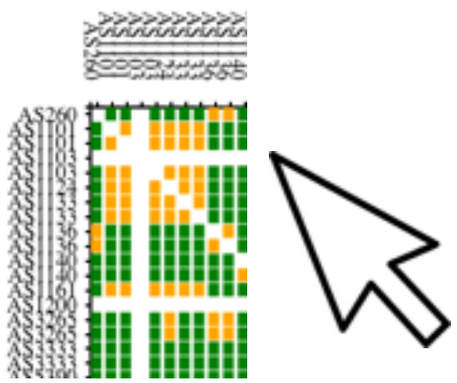
- Row: source
- Column: destination
- Cell: path



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/RO/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!

Benefits

- 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

Actions

- 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

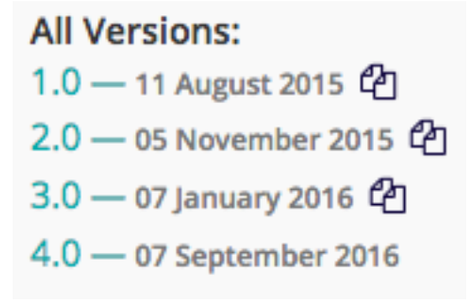
Tools and Services

RIPE NCC Membership Survey

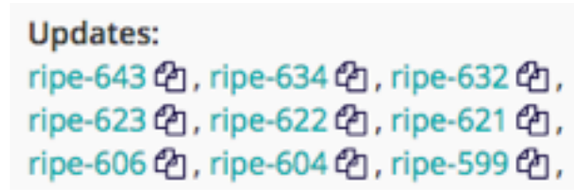
- 51 Romanian members participated (43%)
- More than 50% of them from the Telecommunications sector
- Most comments centred around the IPv4 transfer market and the level of fees — please join the discussion on the members-discuss@ripe.net mailing list and the Address Policy WG.

www.ripe.net

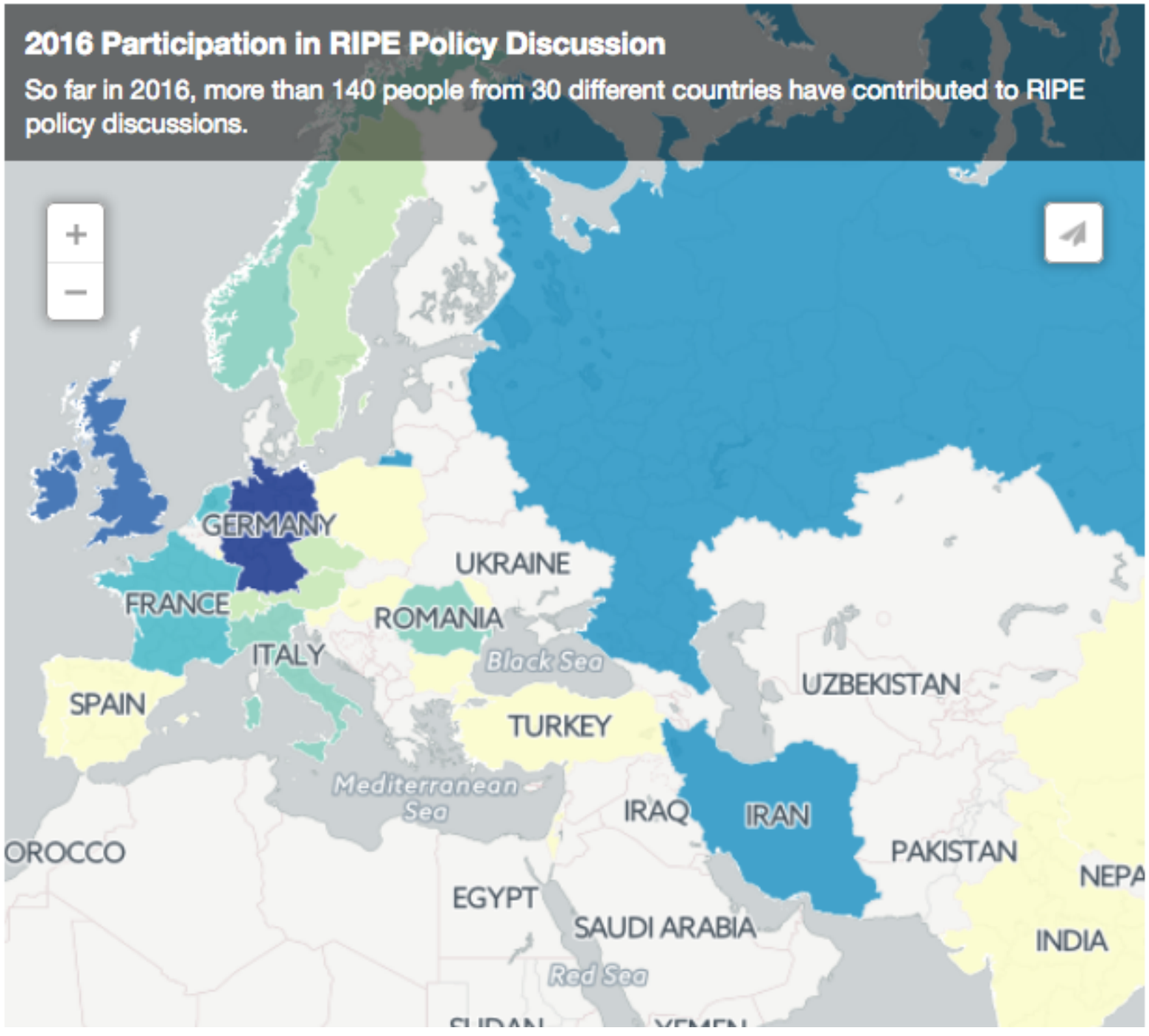
- RIPE Forum
  - https://www.ripe.net/participate/mail/forum/
- Policy Development Process
  - https://www.ripe.net/participate/policies/proposals/2015-04



- RIPE Documents (with diff tool)
  - https://www.ripe.net/publications/docs/ripe-649



Participation in the PDP



Tools

- RIPEstat
  - https://stat.ripe.net/RO
- RIPE Labs
  - https://labs.ripe.net/@@search?SearchableText=romania&path=%2Flabs
- Training Services
  - Later this week, two training courses fully booked
  - Check out the RIPE NCC Academy: https://academy.ripe.net/

RACI - RIPE Academic Cooperation Initiative

- Connects the RIPE and the research communities
  - Offers academics the chance to present to industry, make connections and get feedback
  - Successful applicants receive **complimentary tickets, travel and accommodation** to meetings
  - Join: ripe.net/raci/mailing-list
- Examples of relevant topics:
  - Network measurement and analysis, IPv6 deployment, BGP routing, Network security, Internet governance, Internet of Things

Questions

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