RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Internet Landscape and Network Resiliency

in Southeast Europe and beyond

Alena Muravska | 7 Nov 2023 | SEEDIG8, Zagreb

RIPE NCC Engagement in Southeast Europe

- SEE Meetings organisation since 2011 - Archive
- Supporting Network Operator Groups (NOGs)
  - SINOG, GRNOG, RONOG, RSNOG, ALNOG, HRNOG (2022)
- Developing Internet Exchange Points (IXPs)
- Internet Governance Initiatives – support SEEDIG
- First Roundtable meetings for governments and regulators in 2023
- Funding opportunities
  - Community Projects Fund – Internet Atlas - Tools for Digital Literacy

Internet Resiliency

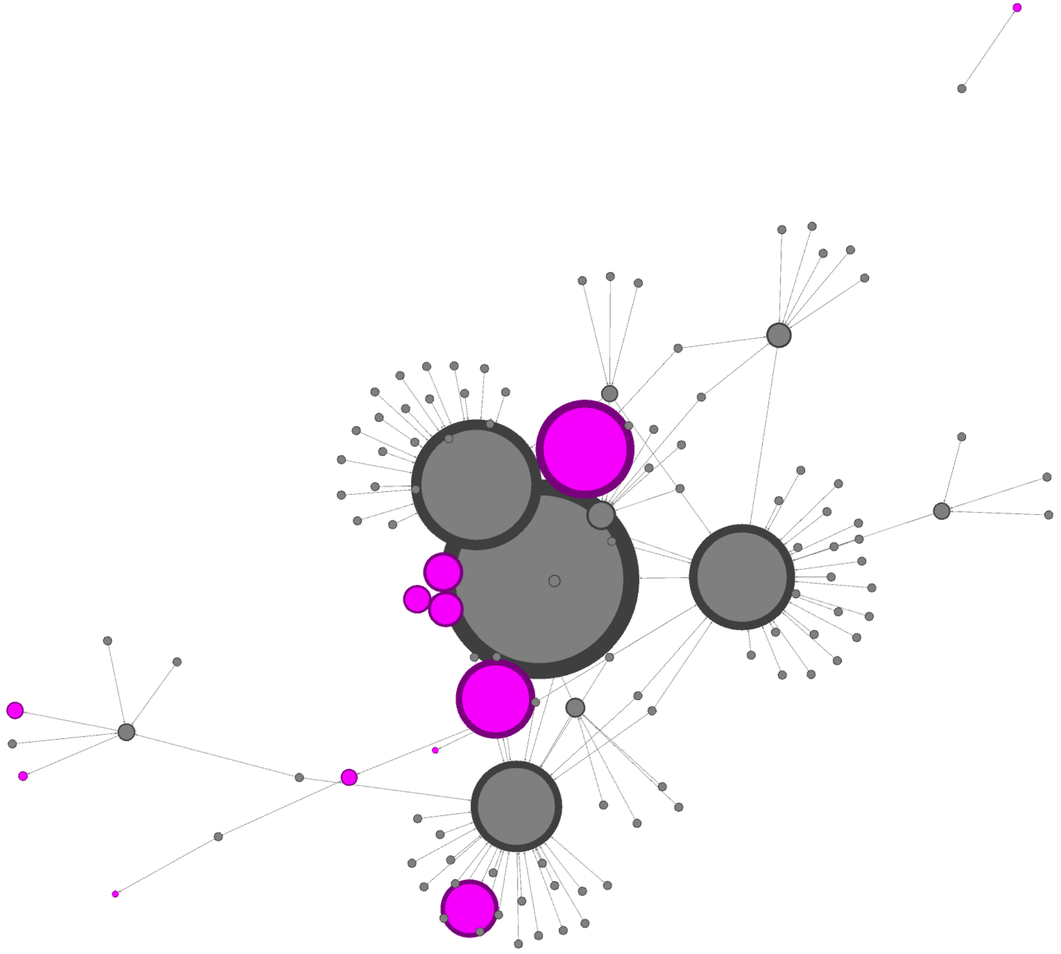
What is Resilient Internet?

- Technical aspects of resilience
  - Decentralised at multiple levels
  - Many interconnection options facilitated by local IXPs
- Reference: The Resilience of the Internet in Ukraine - One Year On

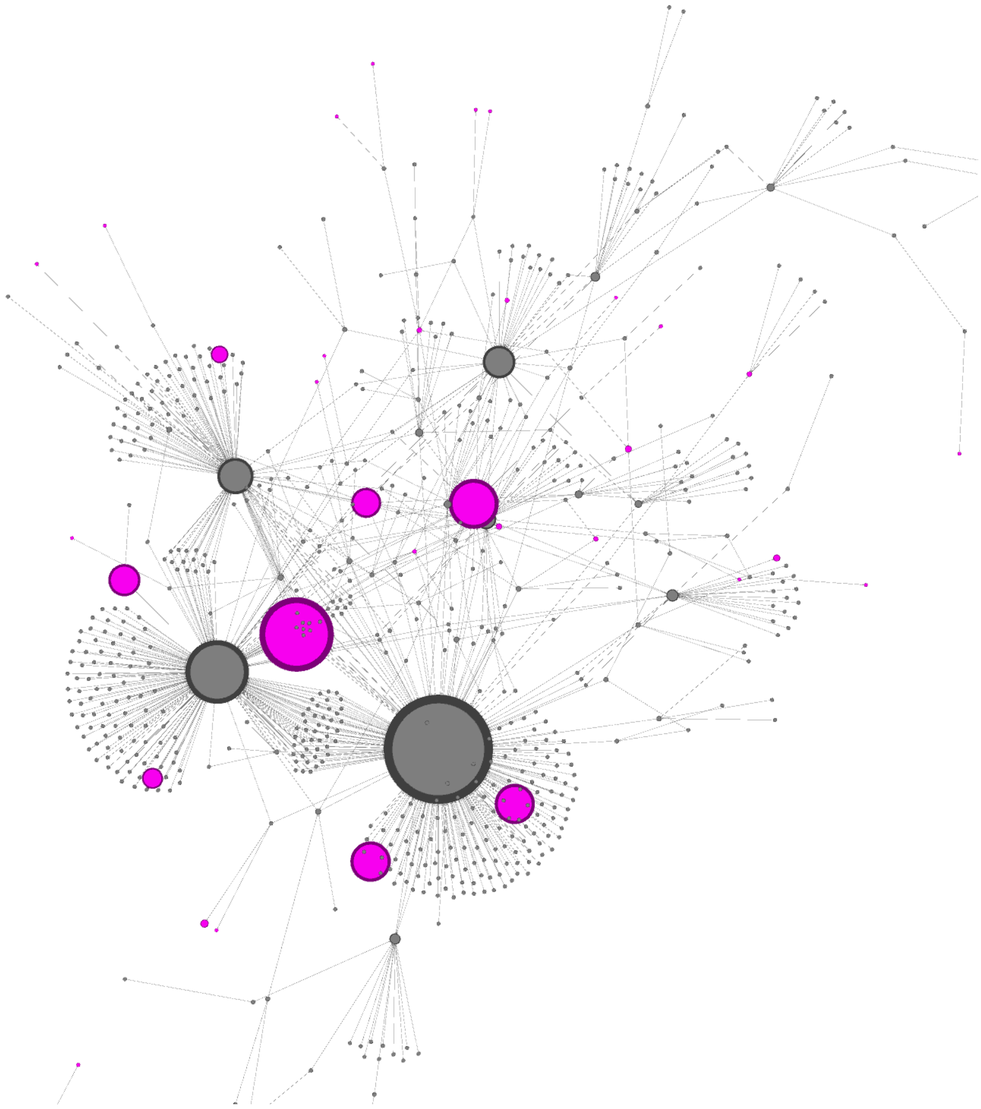
Let’s have a look at networks in…

- Belarus
- Ukraine
- Turkey
- Poland

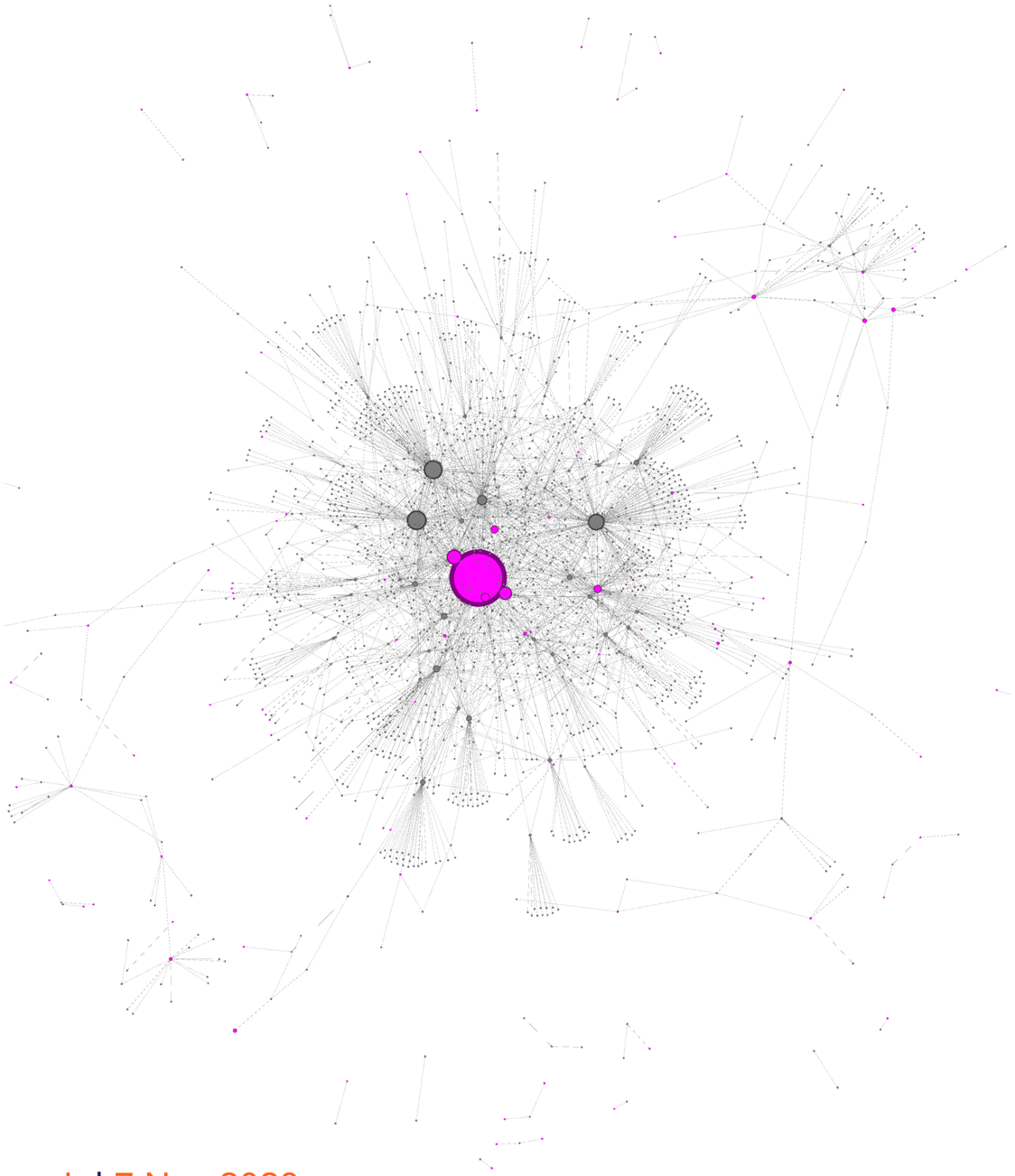
Belarus



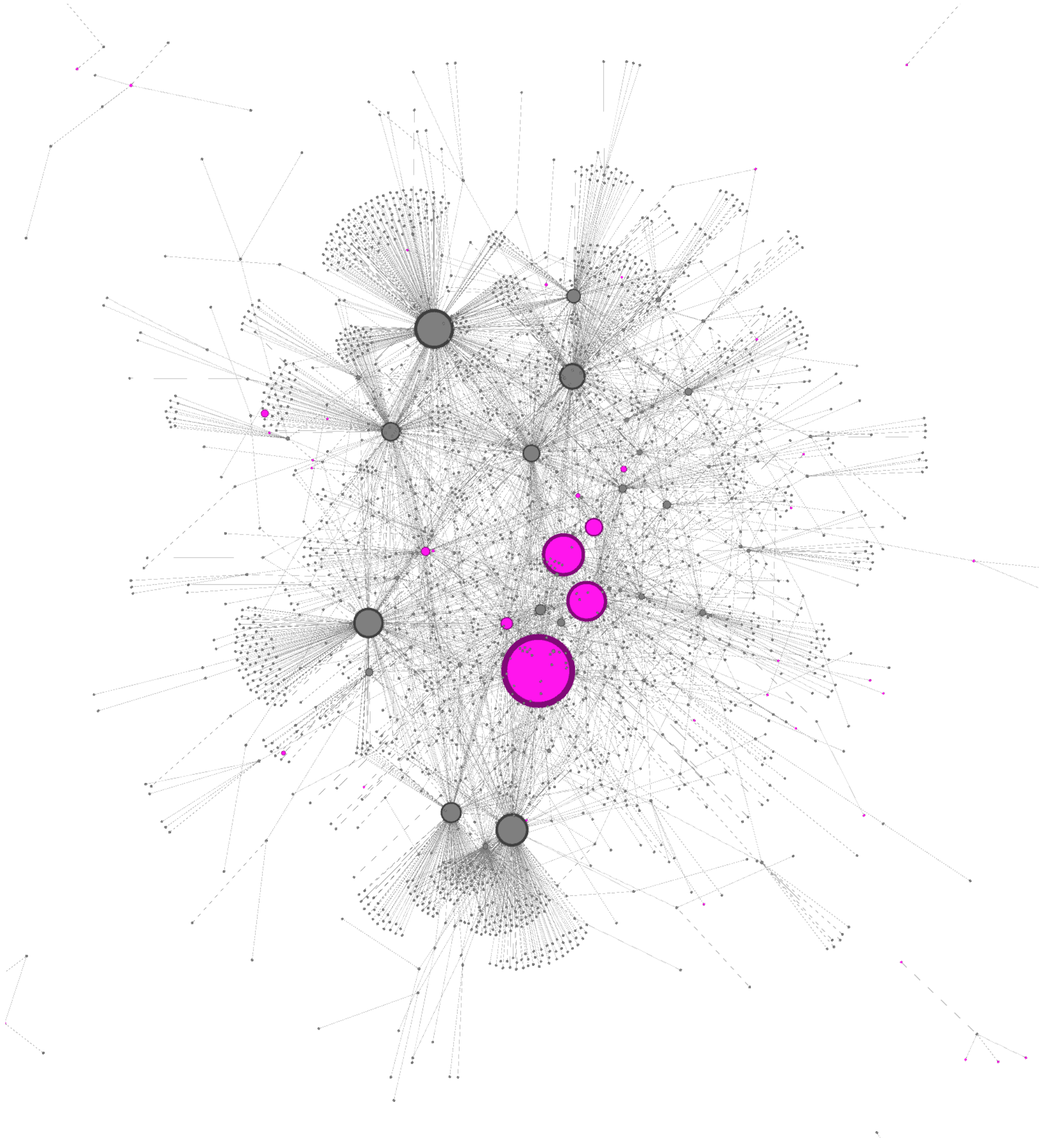
Turkey



Ukraine



Poland



What data have we used?

- Routing Information Service (RIS)
- Historical and live data
  - Historical data since 1999
  - All (historical) data is publicly available
- RIS shows you what is really happening on the Internet
  - which AS is announcing which address block
  - and where is it visible
  - right now or in the past

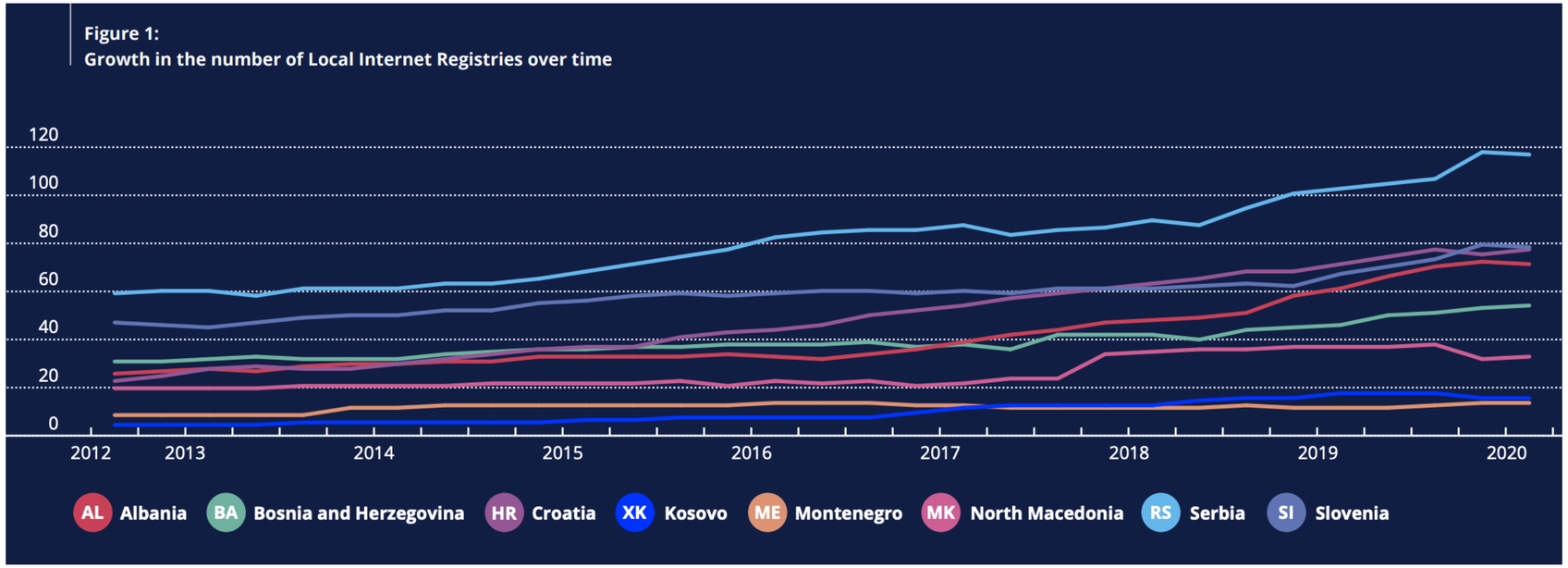
Internet Landscape

in Southeast Europe

Southeast Europe Country Report

- Albania
- Bosnia and Herzegovina
- Croatia
- Kosovo
- Montenegro
- North Macedonia
- Serbia
- Slovenia

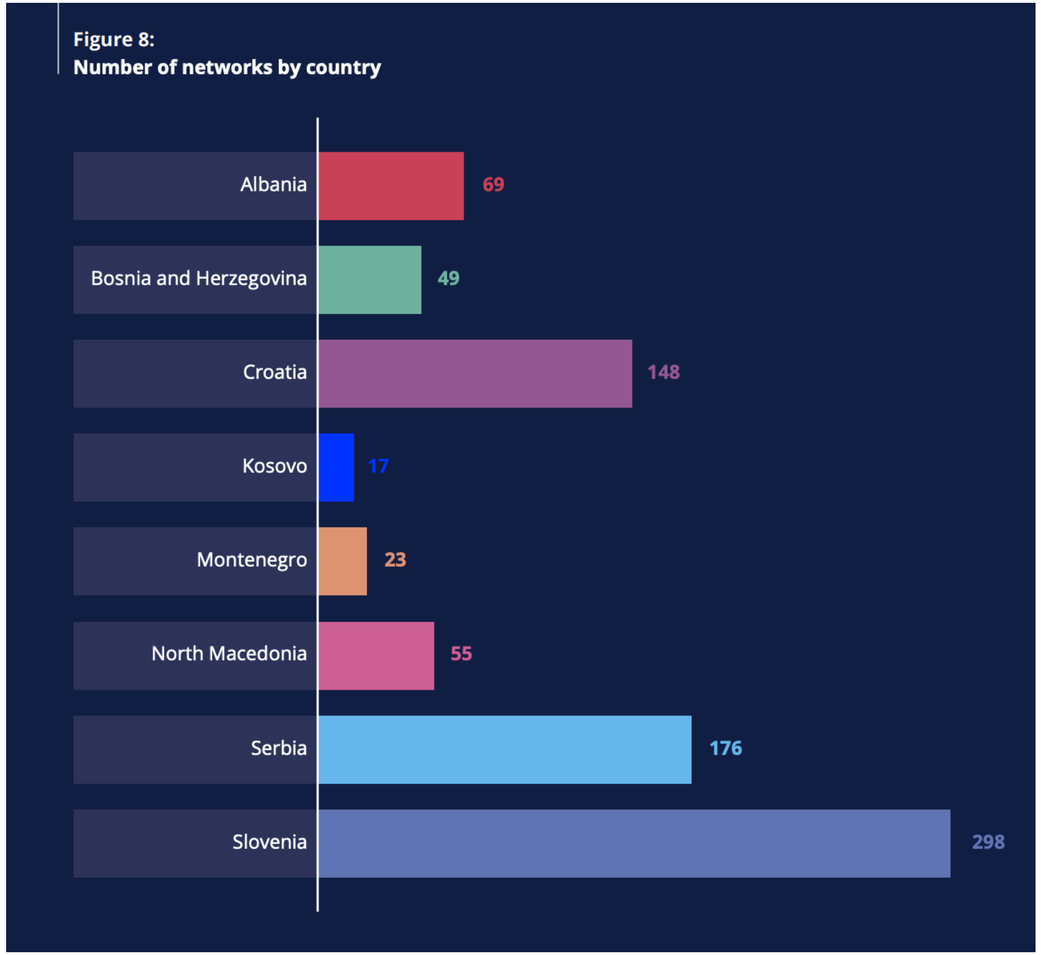
Is the SEE Market decentralised?(1)



- The number of Local Internet Registries (LIRs) corresponds with populations
  - **Slovenia** is the exception
- The number of LIRs generally corresponds to a larger number of IPs

Is the SEE Market decentralised? (2)

- A larger number of LIRs generally corresponds to a larger number of networks (Autonomous Systems)
- **Slovenia** has a much higher number (298) of networks compared to its population than the other countries in the region
- Of these 298, more than 100 are operated by small businesses

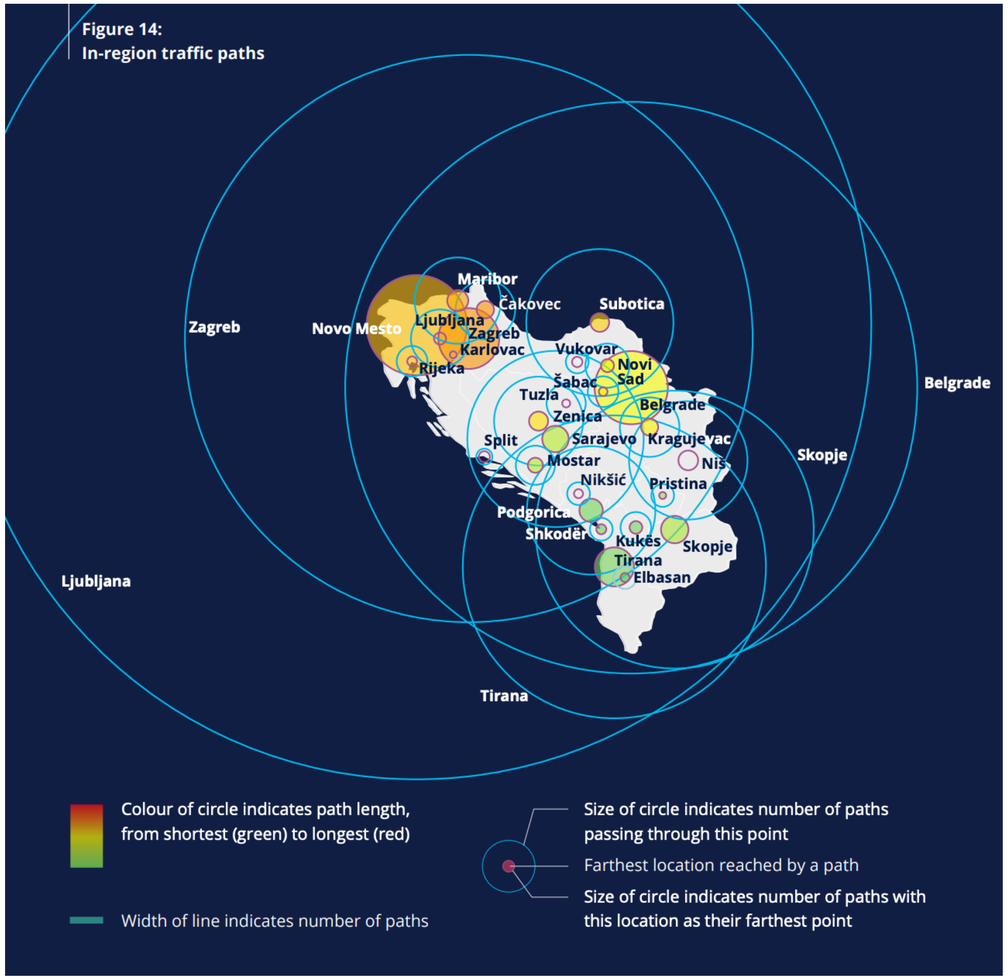


Exchange of regional traffic

- "Tromboning" effect
- The farther the path extends, the more inefficient it is
- Additional distance:
  - increases the risk of disruptions
  - creates more dependencies on external suppliers

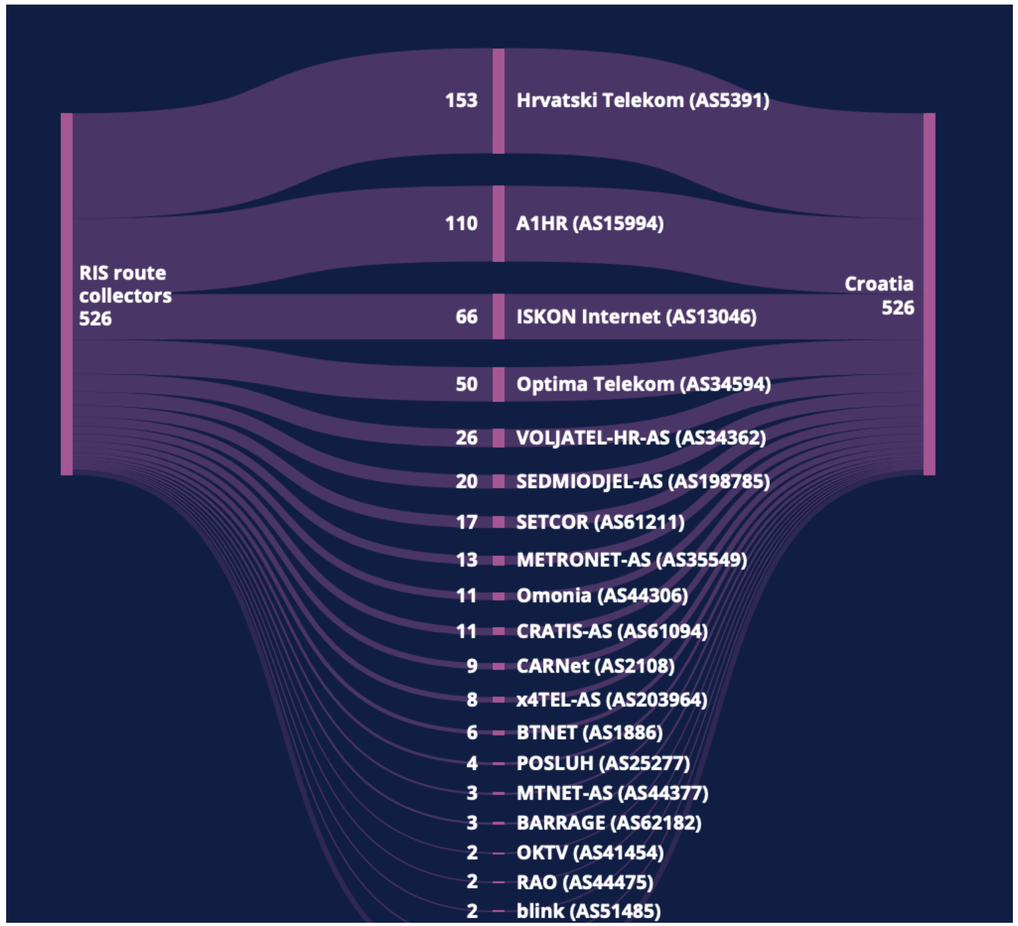
In region traffic paths

- Local Internet Exchange Points (IXPs)
  - mitigate effects of tromboning
  - encourage the local exchange of Internet traffic
- The role of IXPs in Ljubljana, Zagreb and Belgrade is more obvious



Market consolidation: Croatia

- A significant level of market consolidation, with a heavy reliance on a small number of larger providers
- Not unique for the region and for the whole Europe
- Consolidation can have a negative effect on innovation and market resilience



Highlights

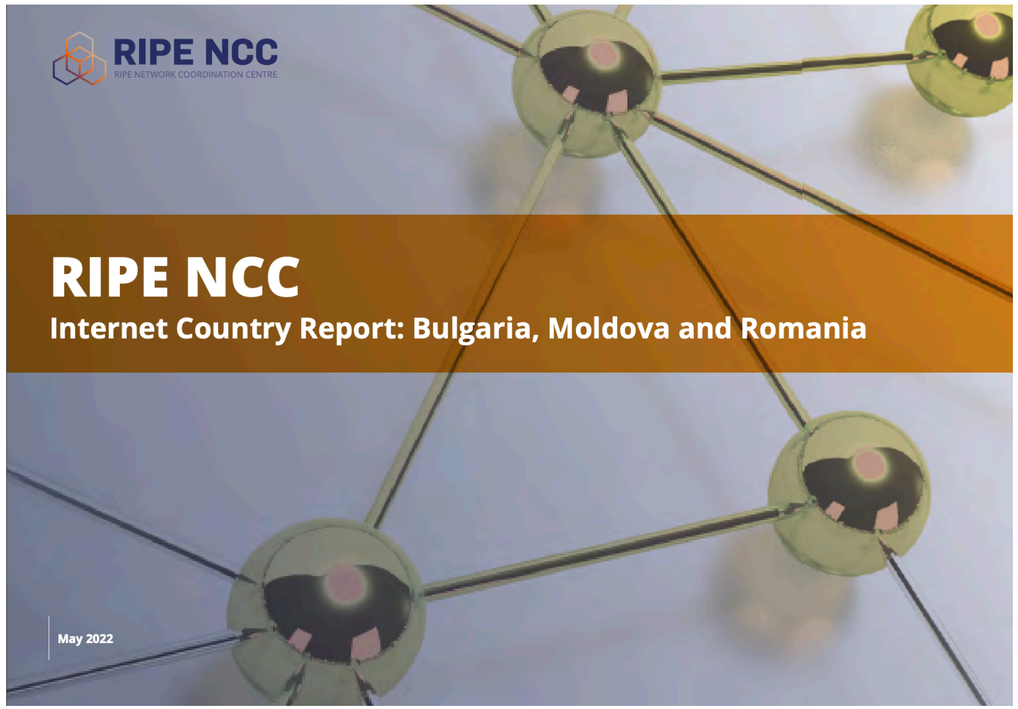
- The (former) state telecommunications operators still exert a lot of influence. There are **smaller numbers of independent providers** than we see in some other parts of Europe
- **Routing** within the region is generally efficient, although we observed a **few anomalies** that likely reflect the various peering arrangements that different networks have in place
- There is a **modest** amount of **diversity** in terms of the routes available to traffic flowing into the region, the dominant role played by incumbents

Data Sources

- RIPEstat
- RIPE Atlas
- Routing Information Service (RIS)
- RIPE Labs statistics
- RIPE Database
- RIPE IPmap
- K-root

Southeastern Europe Country Report (2)

- Bulgaria
- Moldova
- Romania



Central Europe Country Report

- Poland
- Czechia
- Hungary
- Slovakia

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RIPE 87
Rome, Italy
27 Nov - 1 Dec 2023

Questions

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