RIPE NCC
RIPE NETWORK COORDINATION CENTER

Internet Landscape and Network Resiliency

in South East Europe

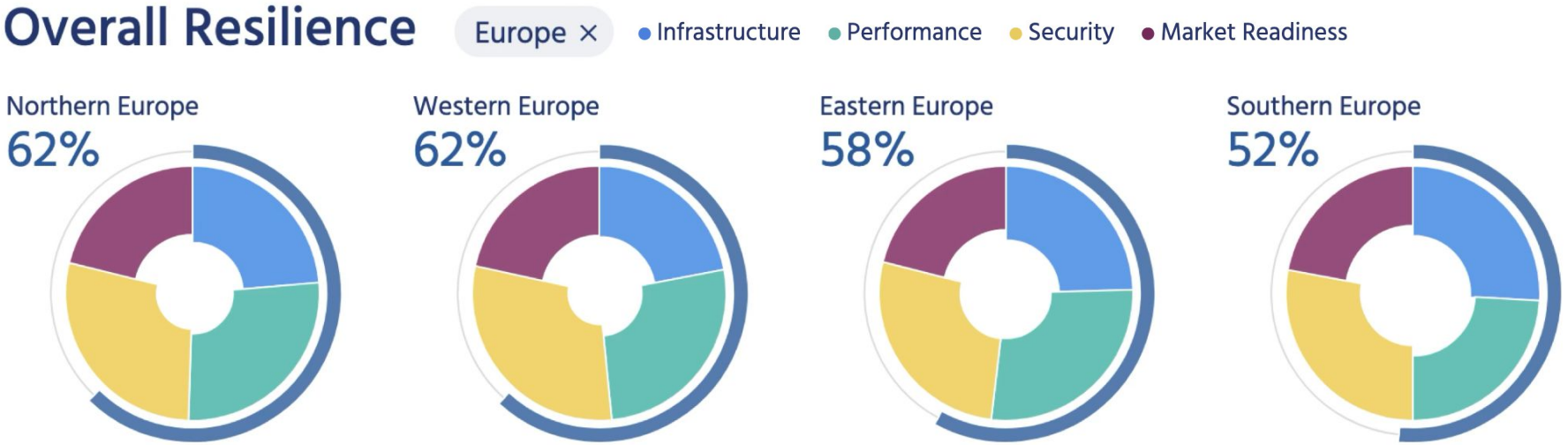
Jelena Ćosić |ANIX meeting| December 2024

Internet resilience

[ˈɪntənɛt rɪˈzɪlɪəns] noun

The capacity of a country or region's Internet infrastructure to maintain stable and reliable service despite disruptions.

Internet Resilience Index

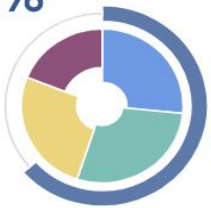


Internet Society Pulse:
pulse.internetsociety.org/resilience

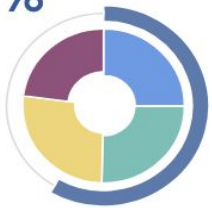
Internet Resilience Index

Overall Resilience · Infrastructure · Performance · Security · Market Readiness

Bulgaria
64%

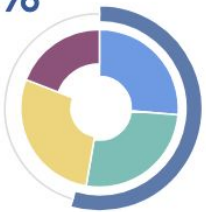


Romania
58%

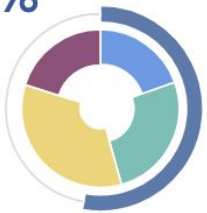


Greece
58%

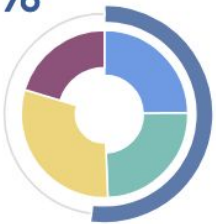
Croatia
55%



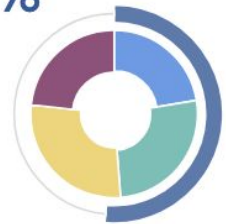
Slovenia
53%



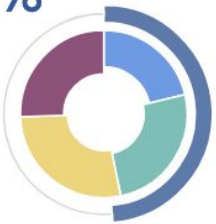
Serbia
52%



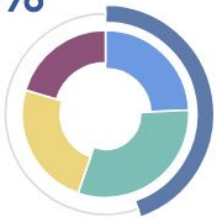
Montenegro
51%



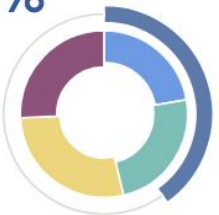
Albania
49%



North Macedonia
45%



Bosnia and Herzegovina
40%



Internet Resilience Index

Albania

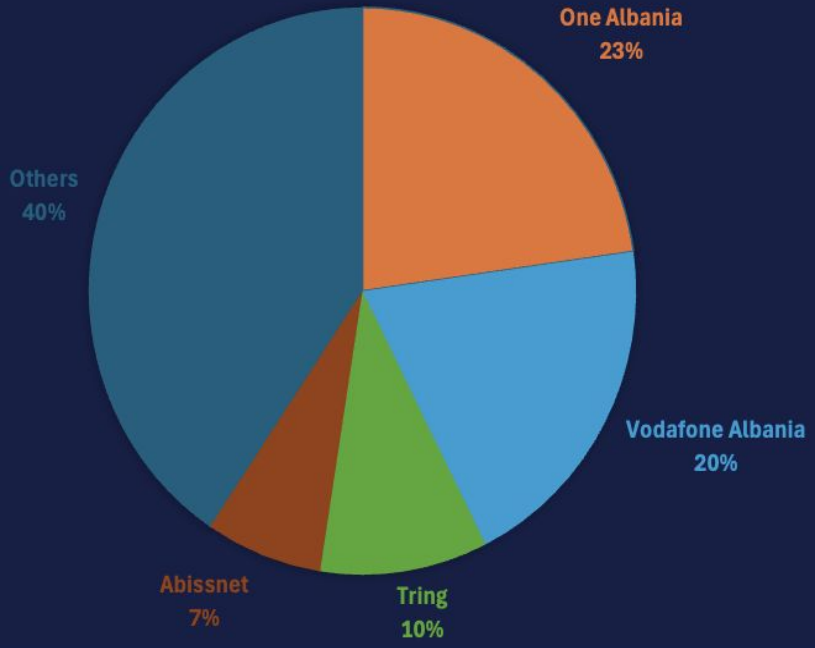
- Infrastructure 41%
  - Cable ecosystem 41%
  - Mobile connectivity 72%
  - Enabling infrastructure 11%
  - Fibre 10km reach 41%
  - Network coverage 81%
  - Spectrum allocation 51%
  - Data centers 12%
  - Number of IXPs 10%
- Performance 50%
  - Fixed networks 47%
  - Mobile networks 51%
  - Fixed download 20%
  - Fixed jitter 79%
  - Fixed latency 88%
  - Fixed upload 26%
  - Mobile download 38%
  - Mobile jitter 64%
  - Mobile latency 61%
  - Mobile upload 49%
- Security 54%
  - Enabling technologies 72%
  - Domain name system security 25%
  - Routing hygiene 62%
  - Security threat 69%
  - Secure web traffic 98%
  - IPv6 adoption 11%
  - DNSSEC adoption 0%
  - DNSSEC validation 49%
  - MANRS 84%
  - Upstream redundancy 39%
  - DDoS protection 89%
  - Global cybersecurity 64%
  - Secure Internet servers 55%
- Market readiness 50%
  - Market structure 66%
  - Traffic localization 34%
  - Affordability 90%
  - Upstream provider diversity 37%
  - Market diversity 69%
  - Domain count 5%
  - EGDI 74%
  - Peering efficiency 25%

Market readiness

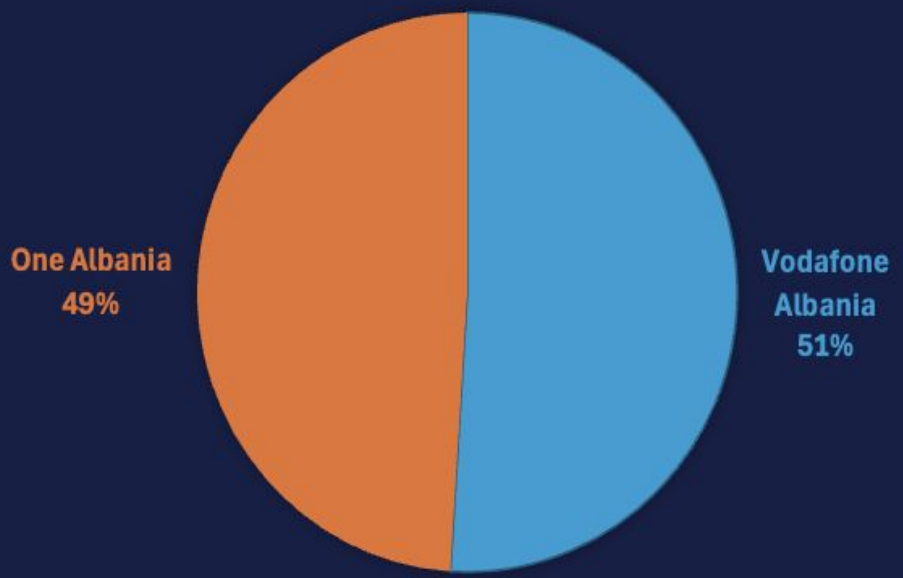
Market structure

Market structure - Albania

Broadband market shares from fixed networks



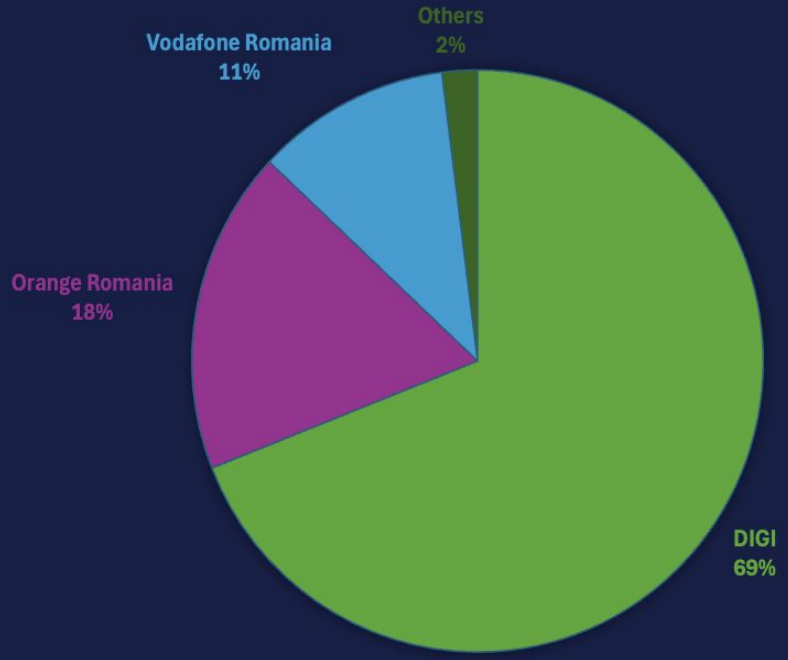
Number of active mobile phone users



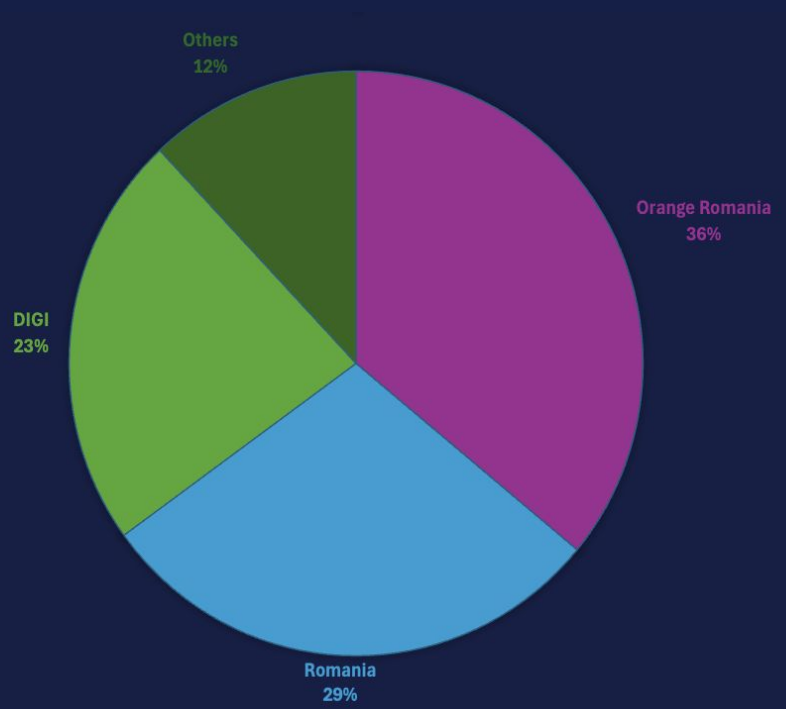
Data source: AKEP

Market structure - Romania

Broadband market shares from fixed networks



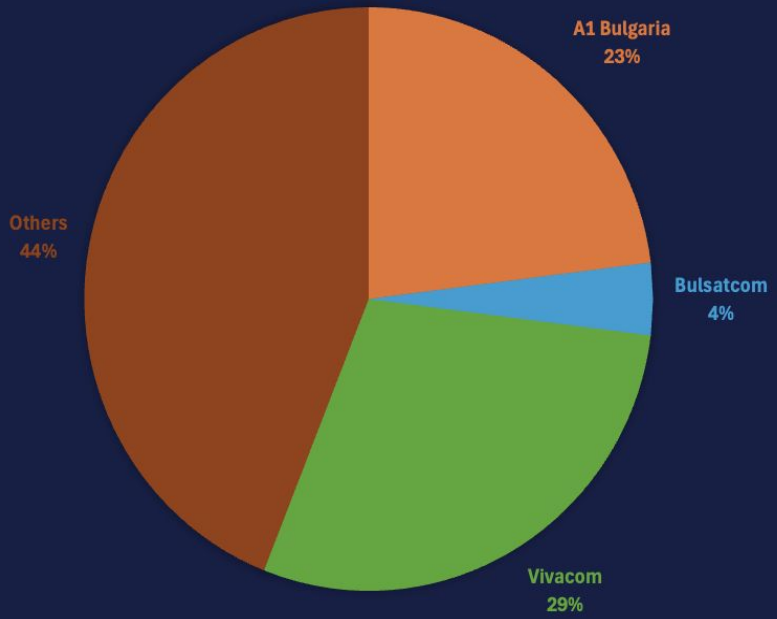
Number of active mobile phone users



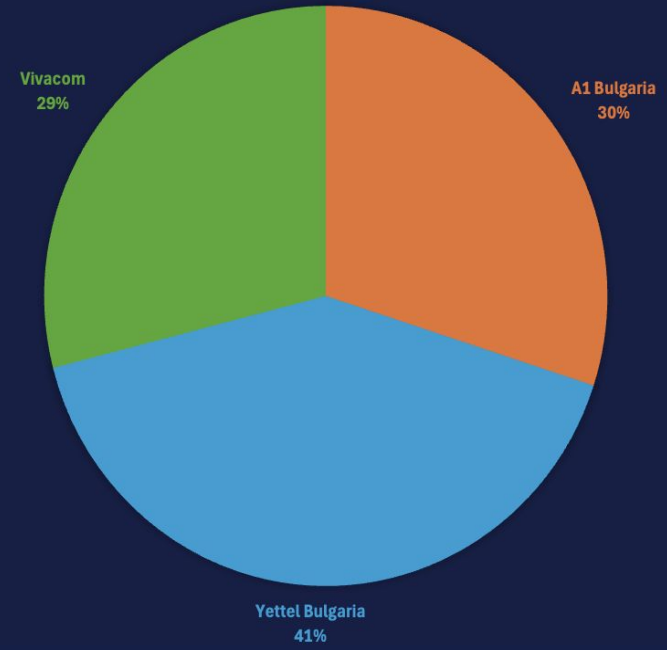
Data source: ANCOM

Market structure - Bulgaria

Broadband market shares from fixed networks



Number of active mobile phone users



Data source: CRC

Market structure

Country	HHI score
RO	0.418
GR	0.368
MK	0.368
SI	0.349
HR	0.346
ME	0.335
RS	0.283
BA	0.250
BG	0.178
AL	0.167 - 0.317

The Herfindahl-Hirschman Index (HHI) is an economic measure of market concentration.

We calculate the HHI using APNIC data on networks serving users in a specific country. Only networks with over 1% of users in that country are included.

By converting percentages to fractions, we obtain an HHI ranging from 0 (no concentration) to 1 (monopoly).

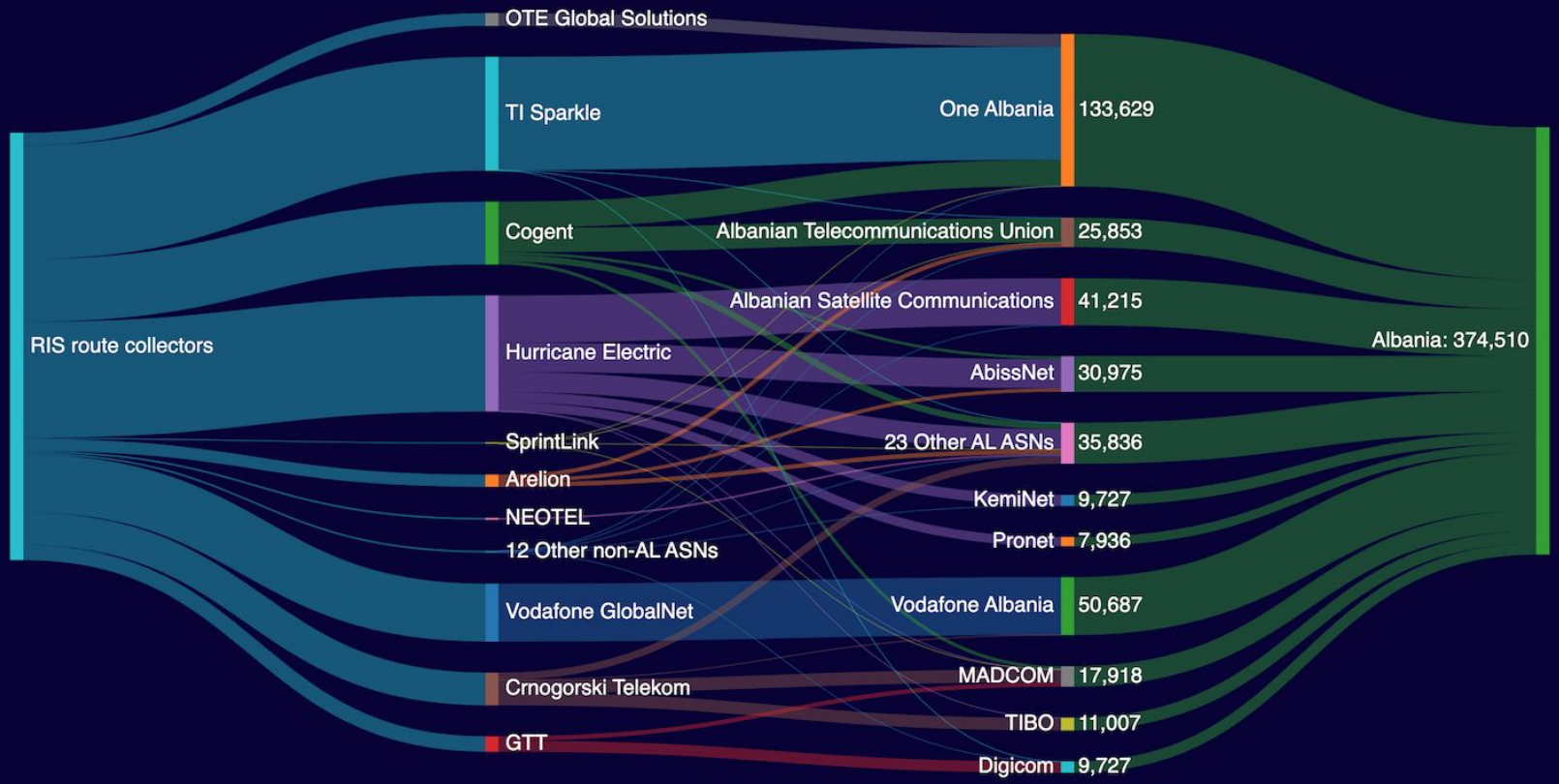
- HHI < 0.1: Unconcentrated (competitive market).
- 0.1 ≤ HHI < 0.18: Moderately concentrated.
- HHI ≥ 0.18: Highly concentrated (indicative of significant market power).

Data source: APNIC

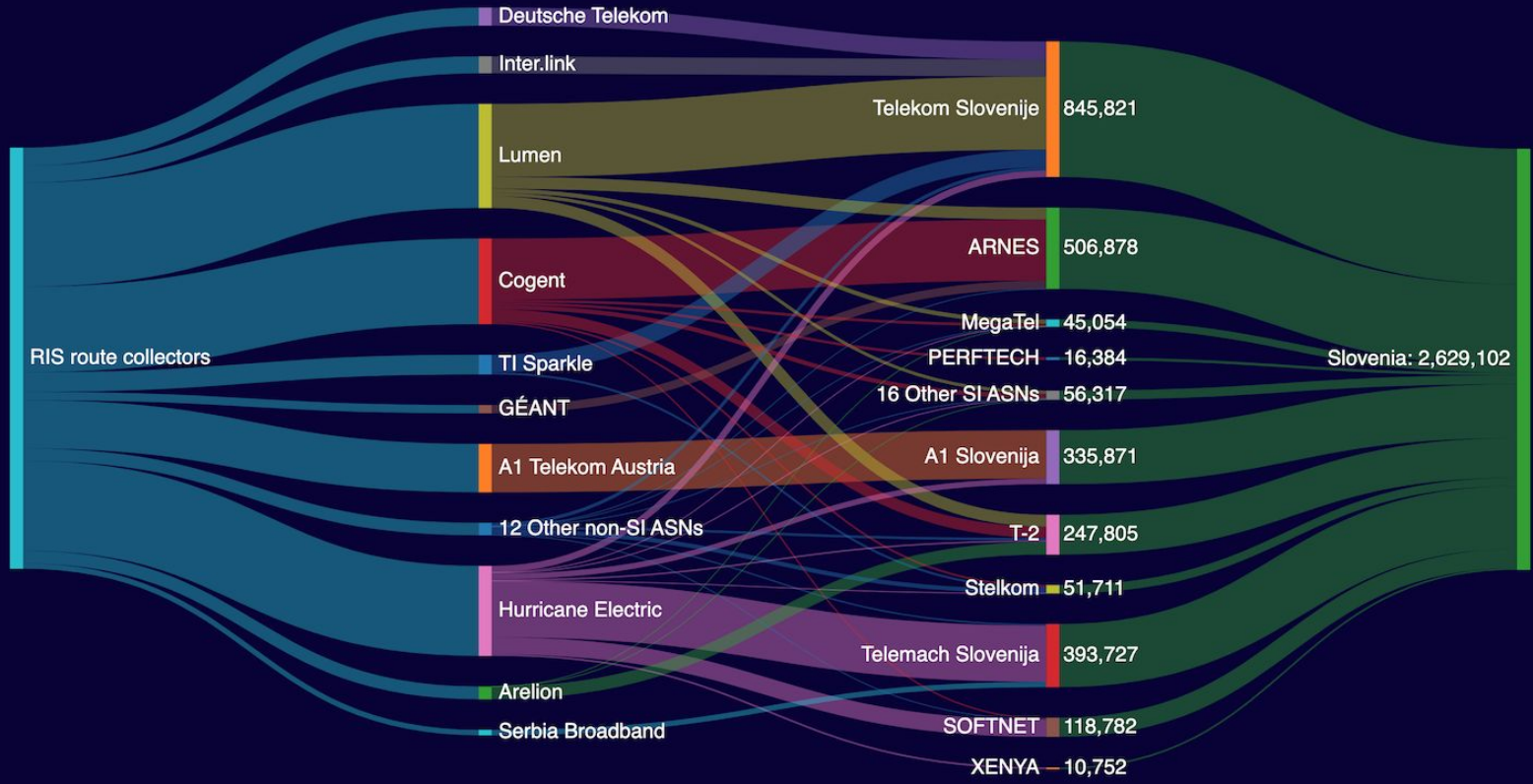
Market readiness

Upstream provider diversity

Upstream operators providing connectivity into Albania

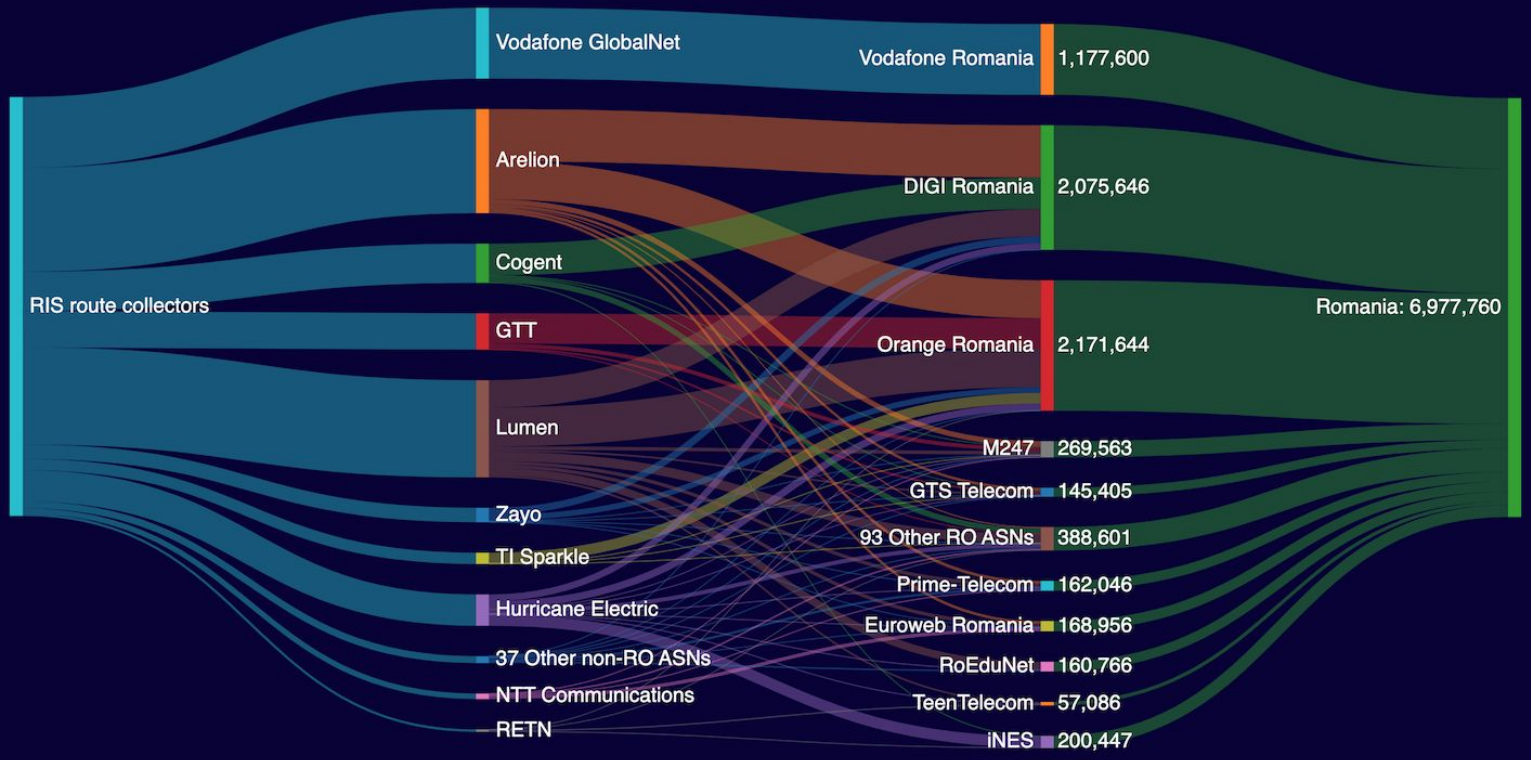


Upstream operators providing connectivity into Slovenia



Data source: RIPE RIS

Upstream operators providing connectivity into Romania



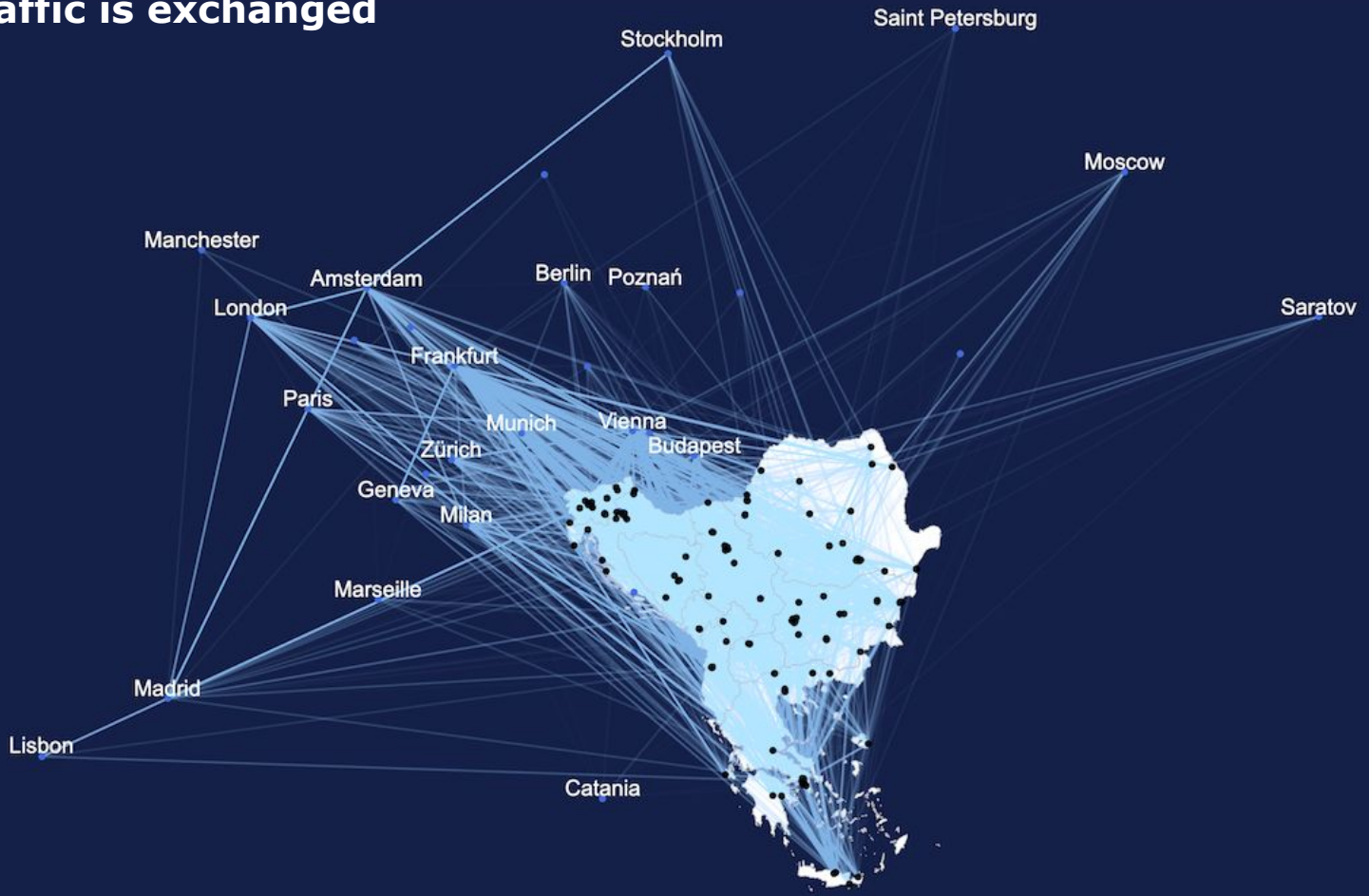
Data source: RIPE RIS

Market readiness

Traffic localisation

How regional traffic is exchanged

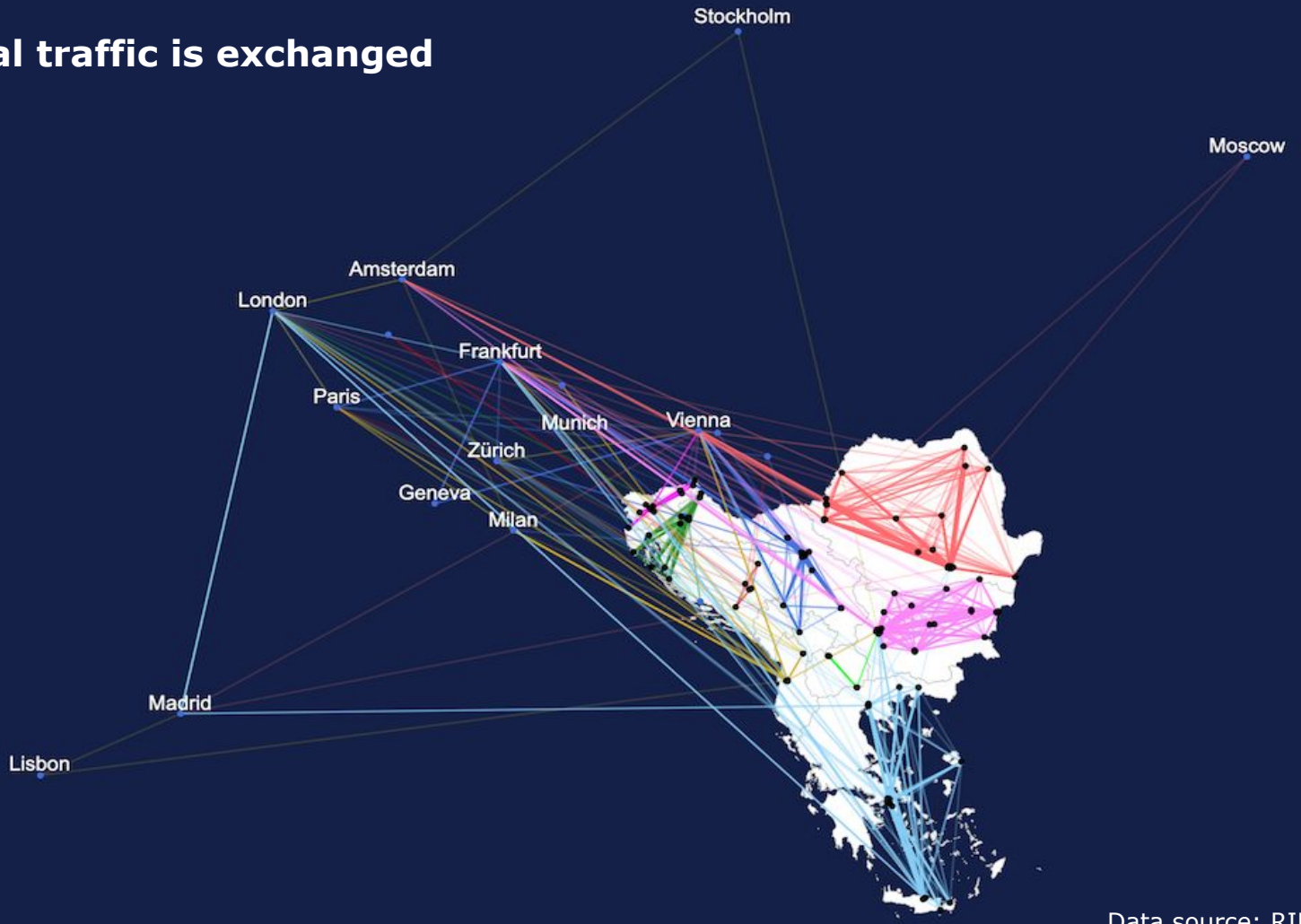
In region



Data source: RIPE Atlas

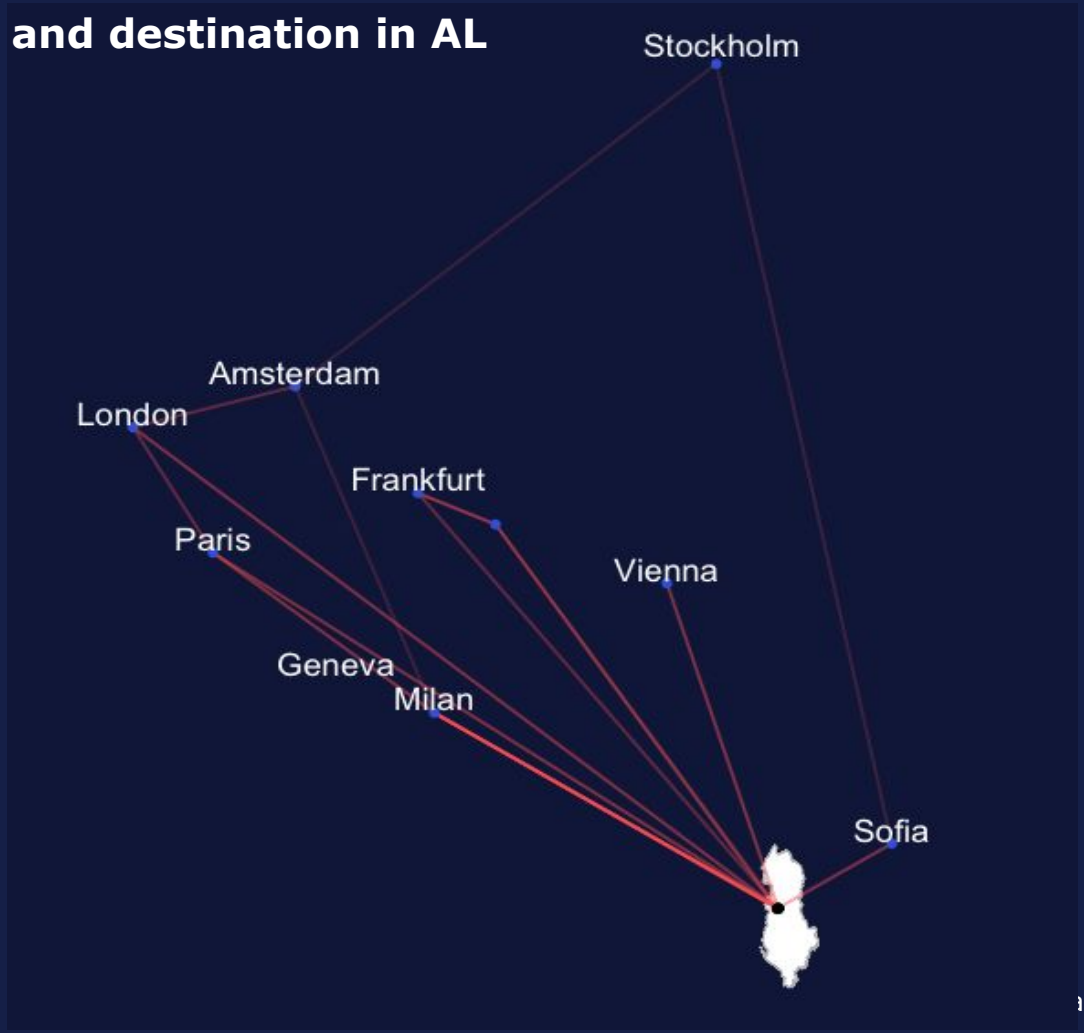
How regional traffic is exchanged

Per country



Data source: RIPE Atlas

Paths between origin and destination in AL



source: RIPE Atlas

Infrastructure

Enabling infrastructure

Number of IXPs

Data source: PeeringDB

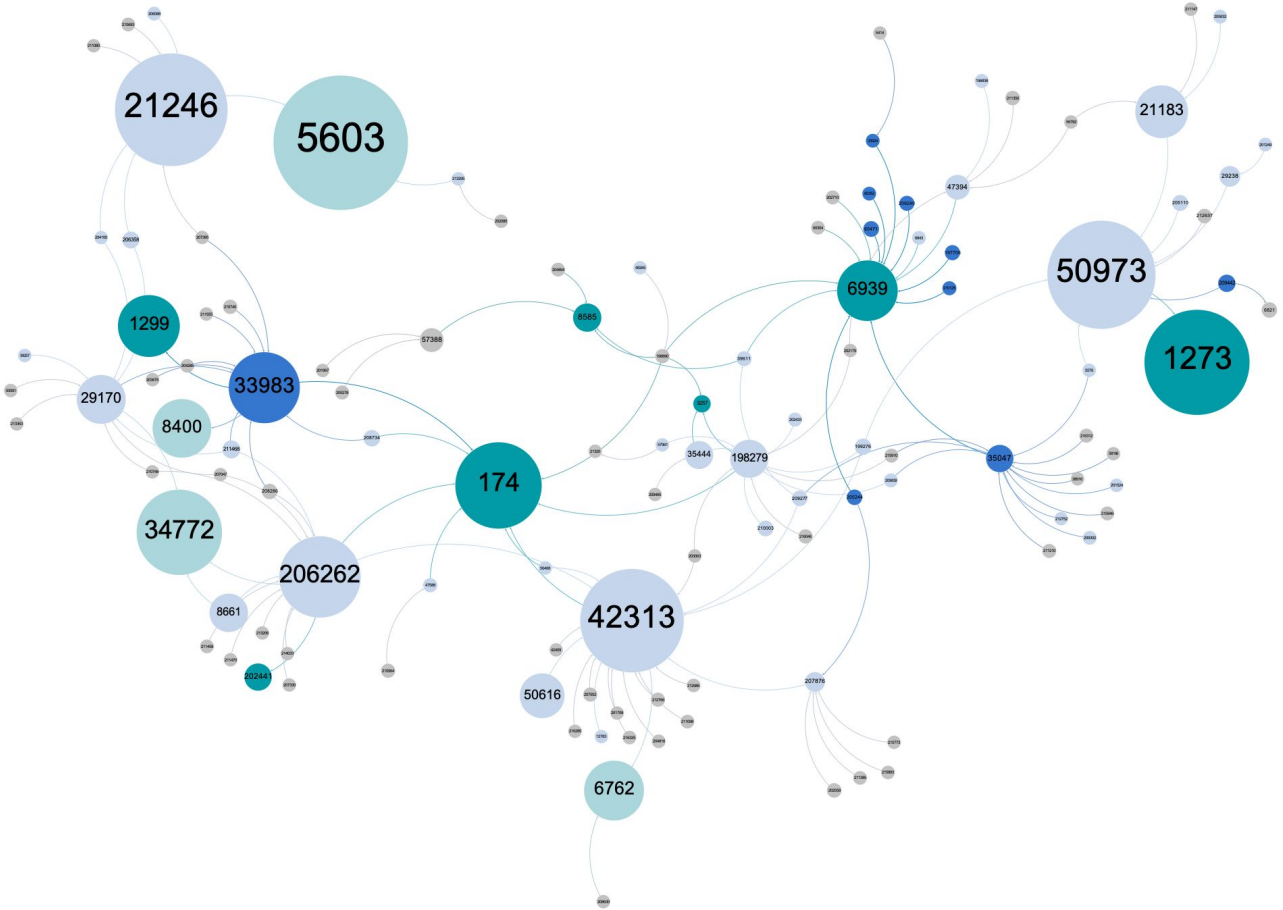
Cloud, CDN and OTT leaders in IXP participation

Provider	ANIX	SOX	InterLAN	RoNIX	CIX	BIX.BG	NetIX	GR-IX	IXP.mk
Google		100G	100G	40G		400G	400G		
Microsoft Azure		20G	20G		40G	200G	100G	200G	
Akamai			200G			40G	100G		
AWS		40G				200G		200G	
Meta	30G	200G	200G	200G		200G	220G		
Cloudflare		40G	100G	10G	40G	20G	200G	200G	20G
Fastly						200G			
Netflix	20G	40G	100G	100G					
ByteDance			100G				100G		

Security

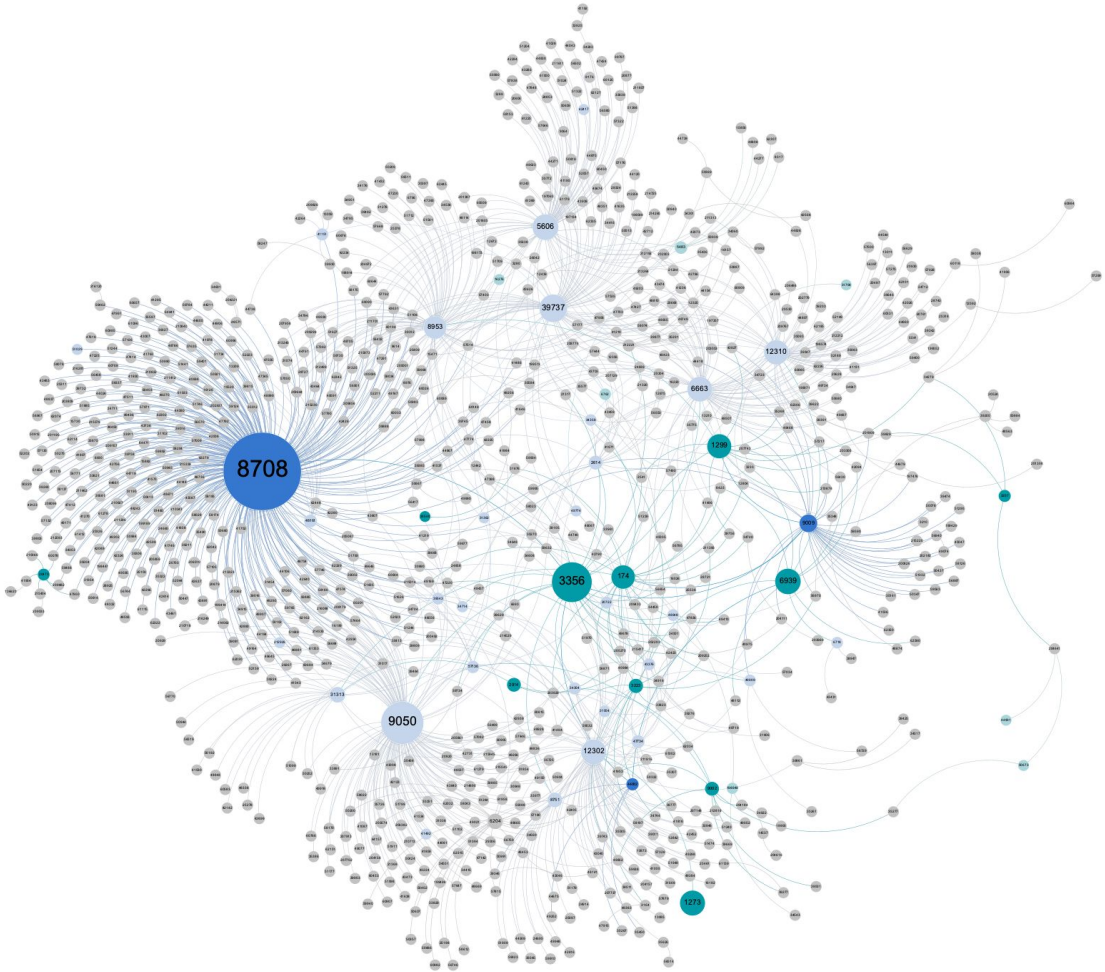
Routing Hygiene

Albania



Data sources:RoVista, AS Hegemony, RIPE RIS

Romania



Local AS Foreign AS

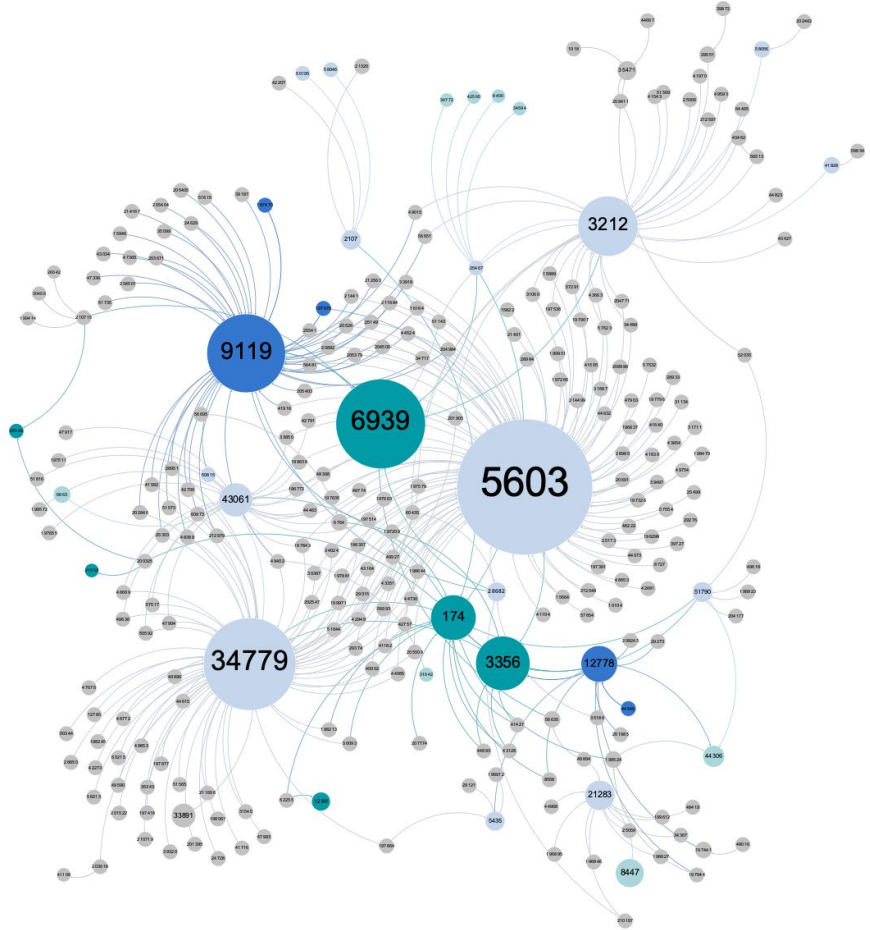
ROV

No ROV

No data

Data sources:RoVista, AS Hegemony, RIPE RIS

Slovenia



Local AS Foreign AS

ROV

No ROV

No data

Data sources:RoVista, AS Hegemony, RIPE RIS

“It's the people, stupid.”

The strength of a network lies not just in its infrastructure, but in the community that builds, sustains, and defends it.

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.
- Routing security could be further improved if more “central” ASNs deploy ROV, contributing to greater “collateral benefits”.

Help us increase RIPE Atlas coverage in Albania

ASN	Network name
50973	Vodafone Albania
21183	Vodafone Albania
50616	One Albania
35444	Digicom
35047	Abissnet
47394	ASC/Tring
57388	IBC

Questions & Comments

jcosic@ripe.net

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THANK YOU!