



**RIPE NCC**

RIPE NETWORK COORDINATION CENTRE

# RIPE NCC Internet Measurement Tools

for the Good of the Internet

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# Agenda



- Who we are?
- RIPE NCC Internet Measurement services:
  - Routing Information Service (RIS)
  - RIPEstat
  - RIPE Atlas
- RIPE NCC Internet Country report: a sneak peek
- Upcoming events announcement



**RIPE NCC**

# Who we are?



- The RIPE NCC is the Regional Internet Registry (RIR) for Europe, the Middle East and parts of Central Asia
- We allocate and register Internet number resources
- We are not-for-profit organisation that works to support the open RIPE community and the development of the Internet in general

# What we do?



- As an **authority on unique Internet number resources**, we enable people to operate and develop the Internet
- As the **Secretariat for the RIPE community**, we are a trusted steward of the open, inclusive, collaborative Internet model, engaging and connecting people and communities
- As a **neutral source of information and knowledge**, we actively contribute to the stability and evolution of the Internet

# RIPE NCC Strategy 2021–2026



- “Be a **centre of excellence for data, measurements and tools** that provide insight on the Internet and its operations”
- RIPE NCC Internet measurement services:
  - Routing Information Service (RIS)
  - RIPEstat
  - RIPE Atlas



# Routing Information Service

# Routing Information Service (RIS)



- RIS is a routing data collection platform, started in 1999
  - all historical data is publicly available
- Deployed at Internet Exchange Points
- Collects raw BGP data from peers
  - stores BGP messages and routing table dumps
- Real-time routing information, as opposed to information in databases and routing registries
- Is a source of data for many other services



# Why collect BGP data?



- BGP doesn't have in-built security mechanisms and routing incidents are not rare
- Routing problems and Looking glasses are temporary
- BGP history is recorded to track what is happening and what has happened
- Better visibility → greater security → lower risk of a BGP attacks

# Collector Locations



- 23 route collectors
- 1,490 peering sessions
- 579 peer ASes



# RIS collectors



Collector	Location	IXP	Deployed	Removed	Collector	Location	IXP	Deployed	
<b>RRC00</b>	Amsterdam	Multi-hop	1999		<b>RRC13</b>	Moscow	MSK-IX	2005	
<b>RRC01</b>	London	LINX	2000		<b>RRC14</b>	Palo Alto	PAIX	2005	
<b>RRC02</b>	Paris	SFINX	2001	2008	<b>RRC15</b>	Sao Paulo	PTT-Metro SP	2006	
<b>RRC03</b>	Amsterdam	AMS-IX	2001		<b>RRC16</b>	Miami	NOTA	2008	
<b>RRC04</b>	Geneva	CIXP	2001		<b>RRC18</b>	Barcelona	CATNIX	2015	
<b>RRC05</b>	Vienna	VIX	2001		<b>RRC19</b>	Johannesburg	NAPAfrica JB	2016	
<b>RRC06</b>	Tokyo	DIX-IE	2001		<b>RRC20</b>	Zurich	SwissIX	2015	
<b>RRC07</b>	Stockholm	Netnod	2002		<b>RRC21</b>	Paris	FranceIX	2015	
<b>RRC08</b>	San Jose	MAE-West	2002	2004	<b>RRC22</b>	Bucharest	InterLAN	2017	
<b>RRC09</b>	Zurich	TIX	2003	2004	<b>RRC23</b>	Singapore	Equinix SG	2017	
<b>RRC10</b>	Milan	MIX	2003		<b>RRC24</b>	Montevideo	LACNIC multi-hop	2019	
<b>RRC11</b>	New York	NYIIX	2004		<b>RRC25</b>	Amsterdam	Multi-hop	2021	
<b>RRC12</b>	Frankfurt	DE-CIX	2004		<b>RRC26</b>	Dubai	UAE-IX	2021	

# Who is RIS for?



- Network operators, network policy makers
  - To check specific routes and routing incidents
  - To troubleshoot Internet routing
  - To develop future plans based on routing trends
- Researchers
  - To investigate notable events occurring in the Internet (i.e. network disruptions in specific countries, service outages, etc.)

# How can you use RIS?



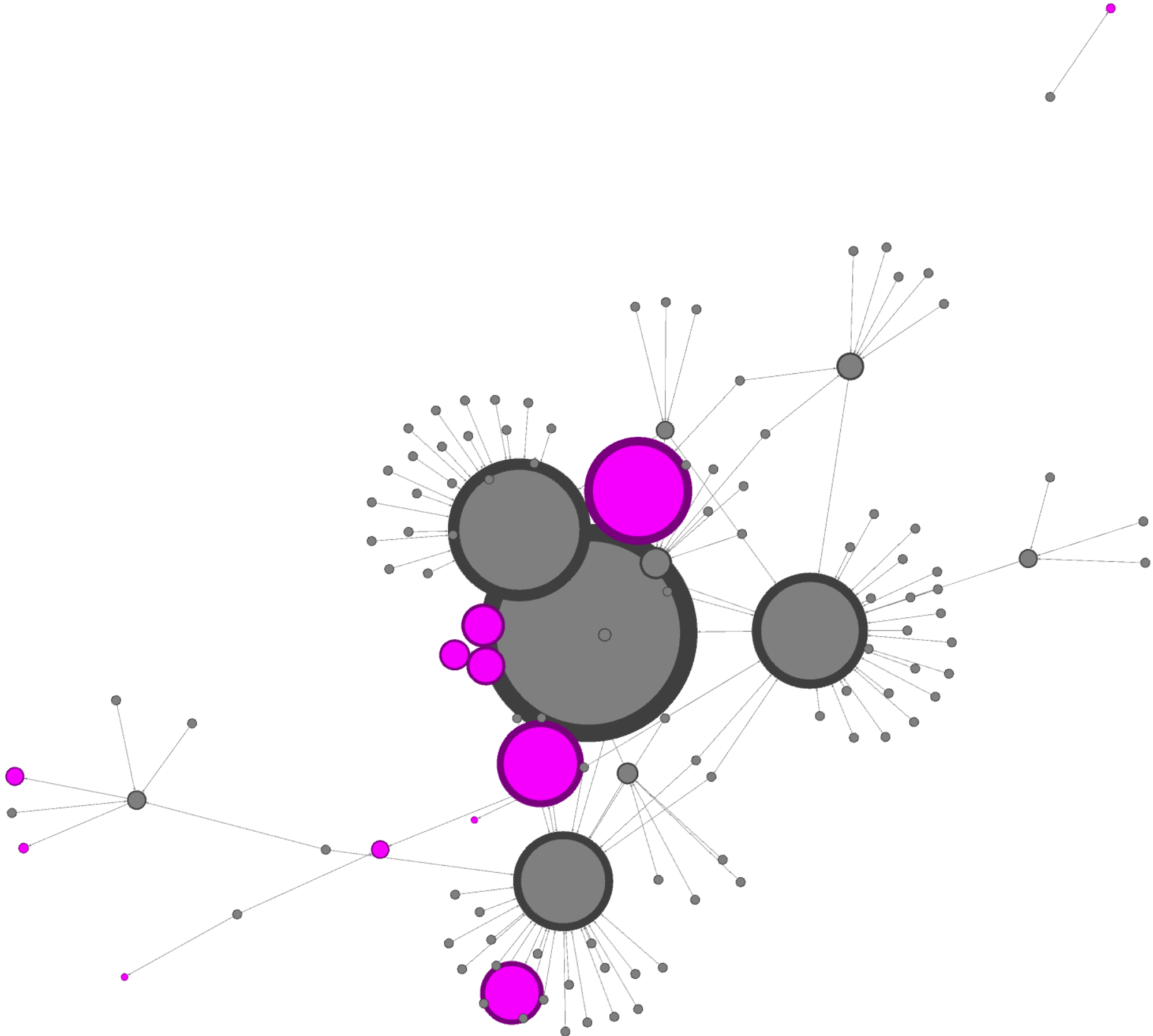
- Available as:
  - Raw data (archived MRT files)
  - Live stream – RIS Live
  - Whois query interface – RISwhois
  - Visualisations in RIPEstat

- Find more at [ris.ripe.net](https://ris.ripe.net)

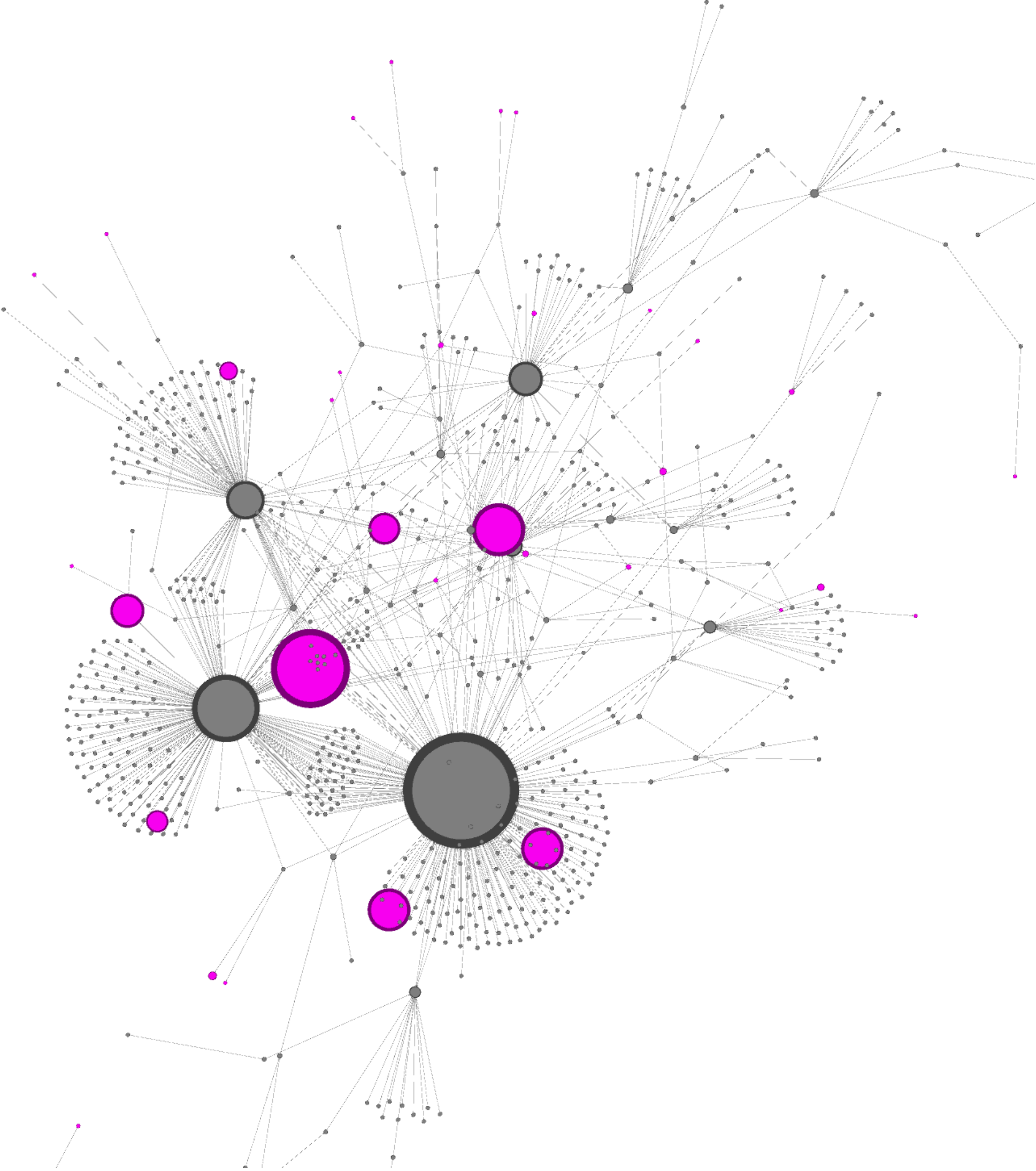


The screenshot shows the RIS Live interface at [ris-live.ripe.net](https://ris-live.ripe.net). It features a 'Demo' section with a configuration form for subscriptions, a 'Live RIS BGP messages' section with a 'Connected' status and '3814 matching messages ~379 kbit/s', and a 'Code examples' section with JavaScript and Python snippets. The JavaScript example shows a WebSocket subscription configuration, and the Python example shows a similar subscription setup. The live messages section displays two JSON objects representing BGP update messages, including details like timestamp, peer, id, host, type, path, and community.

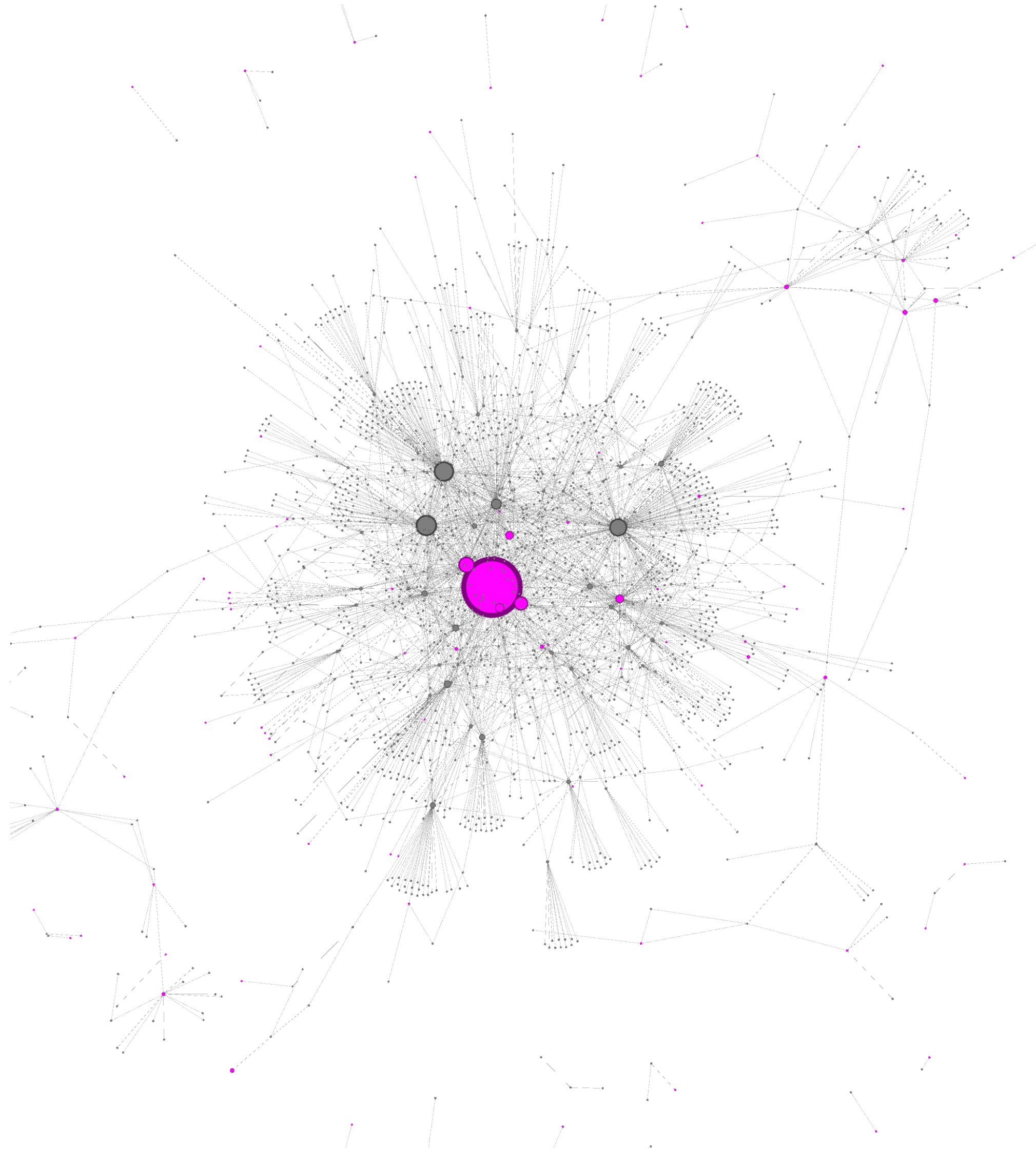
# RIS data 2023-05-01 – Belarus



# RIS data 2023-05-01 – Turkey

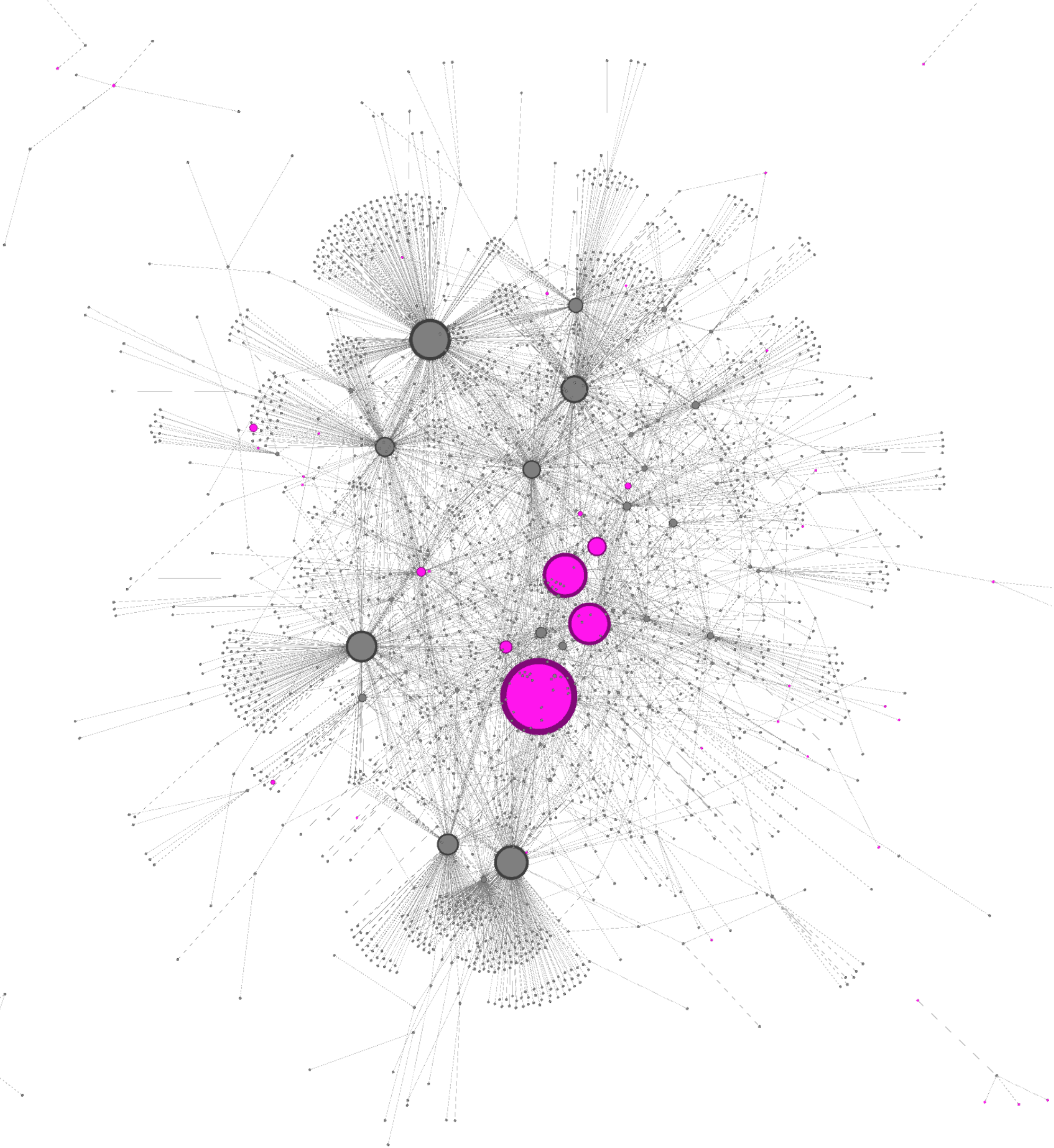


# RIS data 2023-05-01 – Ukraine





# RIS data 2023-05-01 – Poland



# Foreign peering transits



PL 2022-01-01	PL 2023-01-01	PL 2023-05-01	UA 2023-05-01	BY 2023-05-01	TR 2023-05-01
US 17	US 18	US 20	RU 22	RU 3	US 14
DE 7	GB 5	DE 6	US 15	US 3	DE 8
GB 6	RO 4	GB 4	PL 11	NL 2	GB 5
UA 4	UA 4	RO 3	NL 9	UA 1	NL 5
RU 4	DE 4	UA 3	DE 7	GB 1	IN 2

# Summary (snapshot 2023-05-01)



	PL	UA	BY	TR
<b>Nr. domestic ASNs in routing</b>	2117	1671	107	648
<b>Nr. foreign ASNs in routing</b>	56	100	12	42
<b>Nr. domestic transit links</b>	2960	1938	117	784
<b>Nr. international transit links</b>	548	620	15	90

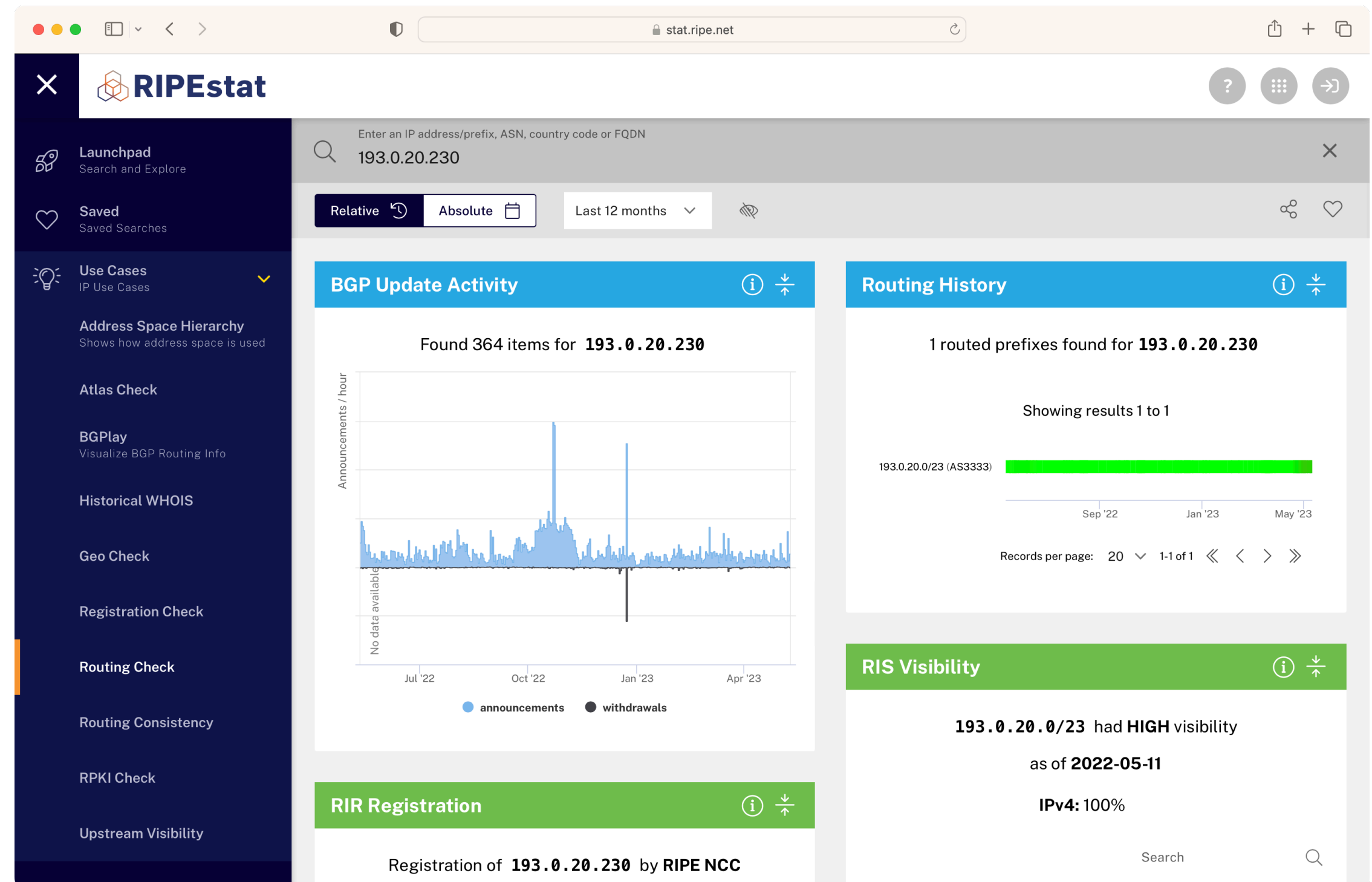


**RIPEstat**

# What is RIPEstat?



- Information service for Internet-related data
- Open data platform of the RIPE NCC data
- RIPEstat provides:
  - information on IP address space and Autonomous System Numbers (ASNs)
  - statistics on specific hostnames and countries



# RIPEstat Data Sources



- More than 35 different datasets
  - RIPE Database and the registry data from other RIRs
  - BGP routing data (RIS)
  - RIPE Atlas
  - M-Lab, Speedchecker, etc.
  - Geolocation
  - RPKI
  - More details at <https://stat.ripe.net/data-sources>
- New datasets are constantly added!
  - E.g. new feature to check multiple DNS-based blocklists in real-time

# Quick intro (1)



- Search by IP address/prefix (IPv4, IPv6), ASN, country code or fully qualified domain name (FQDN)
- Launchpad suggestions are pulled from your network or are random suggestions

RIPEstat  
Calendar  
https://www.google.com/calendar/render

Launchpad  
Search and Explore

Saved  
Saved Searches

Use Cases

Documentation

Preferences  
Settings and Prefs

Enter an IP address/prefix, ASN, country code or FQDN

SEARCH

Launchpad  
Search above or start with one of the suggestions below

Your IP: 2001:67c:2e8:9::c100:14e6

Your Prefix: 2001:67c:2e8::/48

Your ASN: 3333

Your Country: Netherlands (NL)

Random IPv4 Prefix: 69.6.173.0/24

Random IPv6 Prefix: 2620:10a:a001::/48

Random ASN: 61302

Random Country: Guadeloupe (GP)

Want to change language, theme, column layouts, and more? Configure these in [Preferences](#).



# Quick intro (2)



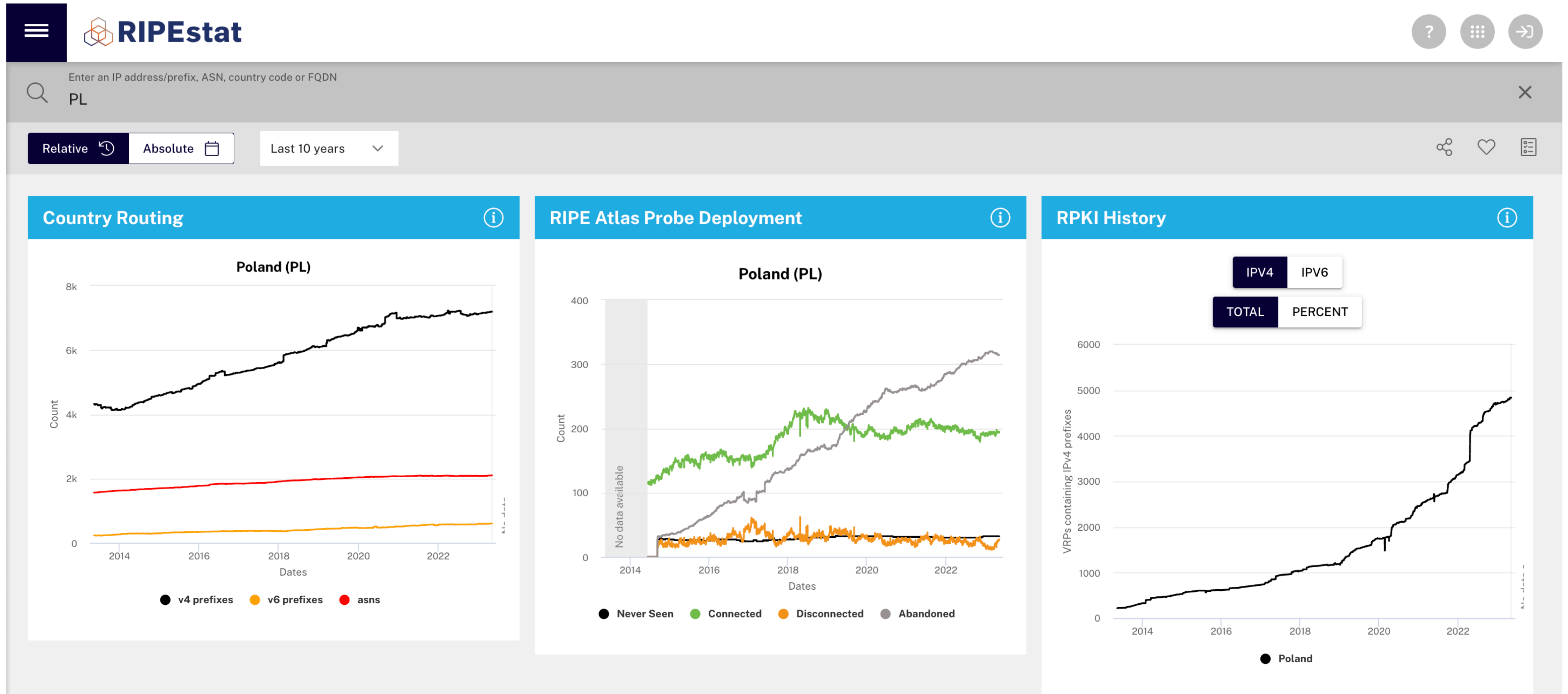
- Use cases are based on the resource type/search:
  - IP address/prefix (IPv4, IPv6),
  - ASN,
  - country code,
  - fully qualified domain name (FQDN)

The screenshot shows the RIPEstat website interface. The search bar at the top contains the value '3333'. The left sidebar is open to the 'Use Cases' section, which lists various tools like 'Atlas Check', 'Historical WHOIS', 'Geo Check', etc. The main content area displays several information cards for AS3333:

- Abuse Contact:** abuse@ripe.net
- Allocation History:** Records were found in IANA, RIPE NCC
- Announced Prefixes:** AS3333 has 7 prefixes
- AS Name:** AS3333, RIPE-NCC-AS - Reseaux IP Europeens Network Coordination Centre (RIPE NCC)
- AS Neighbours:** Unique ASNs: 853; IPv4: 36 left, 2 right, 821 uncertain; IPv6: 32 left, 2 right, 685 uncertain
- AS Path Length:** AS3333 has a median average path length of 3.14



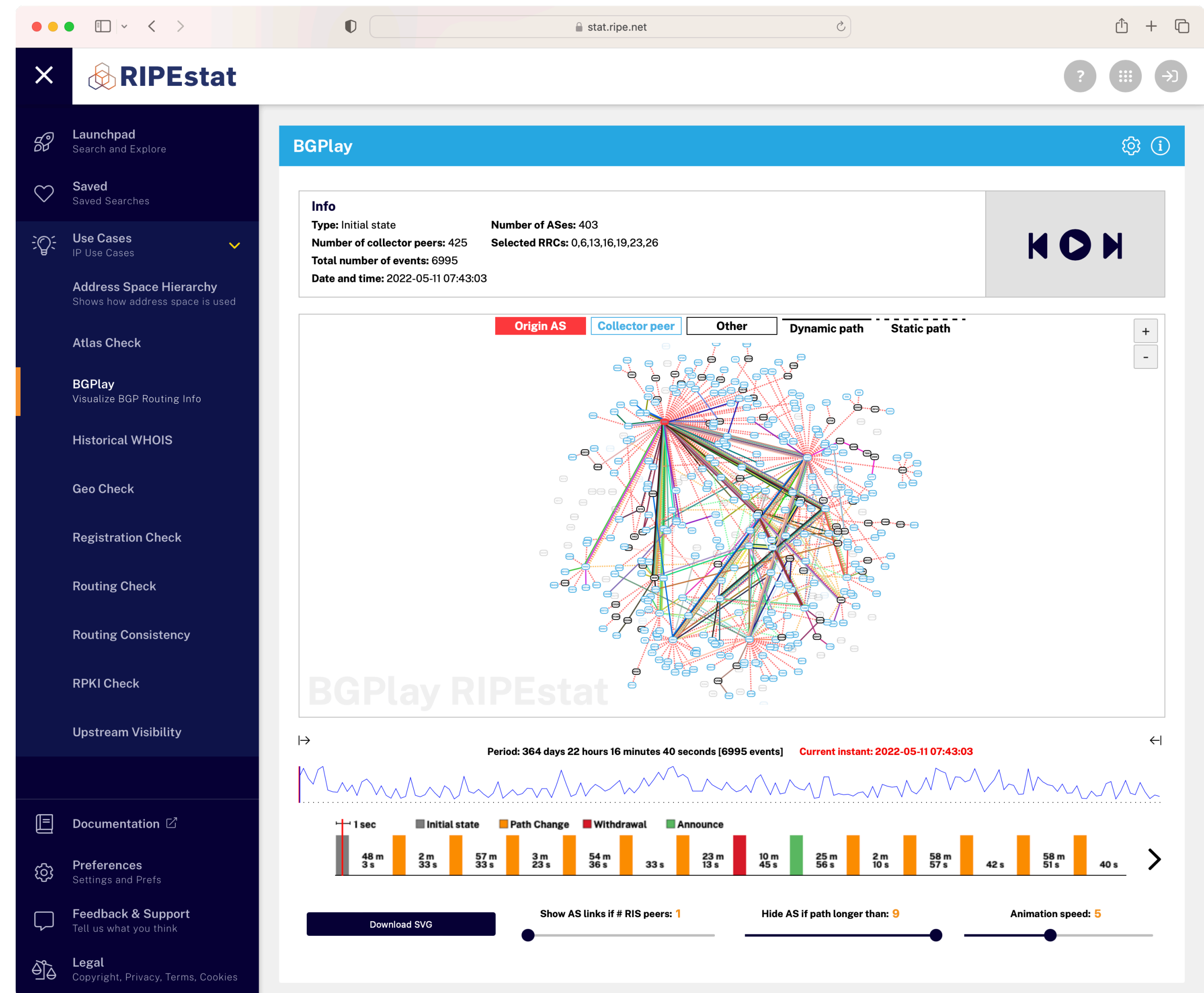
# Use Cases: County Stats – PL



# Use cases: BGPlay



- BGPlay shows the routing history related to a specific set of resources (prefixes, Autonomous Systems, IPs), as seen by RIS
- It provides a graphical representation of the links across all AS paths between the BGP collection points and the target resource(s)



# Use cases: Routing consistency



- Routing Consistency compares:
  - objects in Routing Registries with observed real-world routing (seen by RIS)
  - RPKI validation status where applicable

The screenshot shows the RIPEstat interface for the IP address 193.0.20.230. The 'Routing Consistency' section displays one record with the following details:

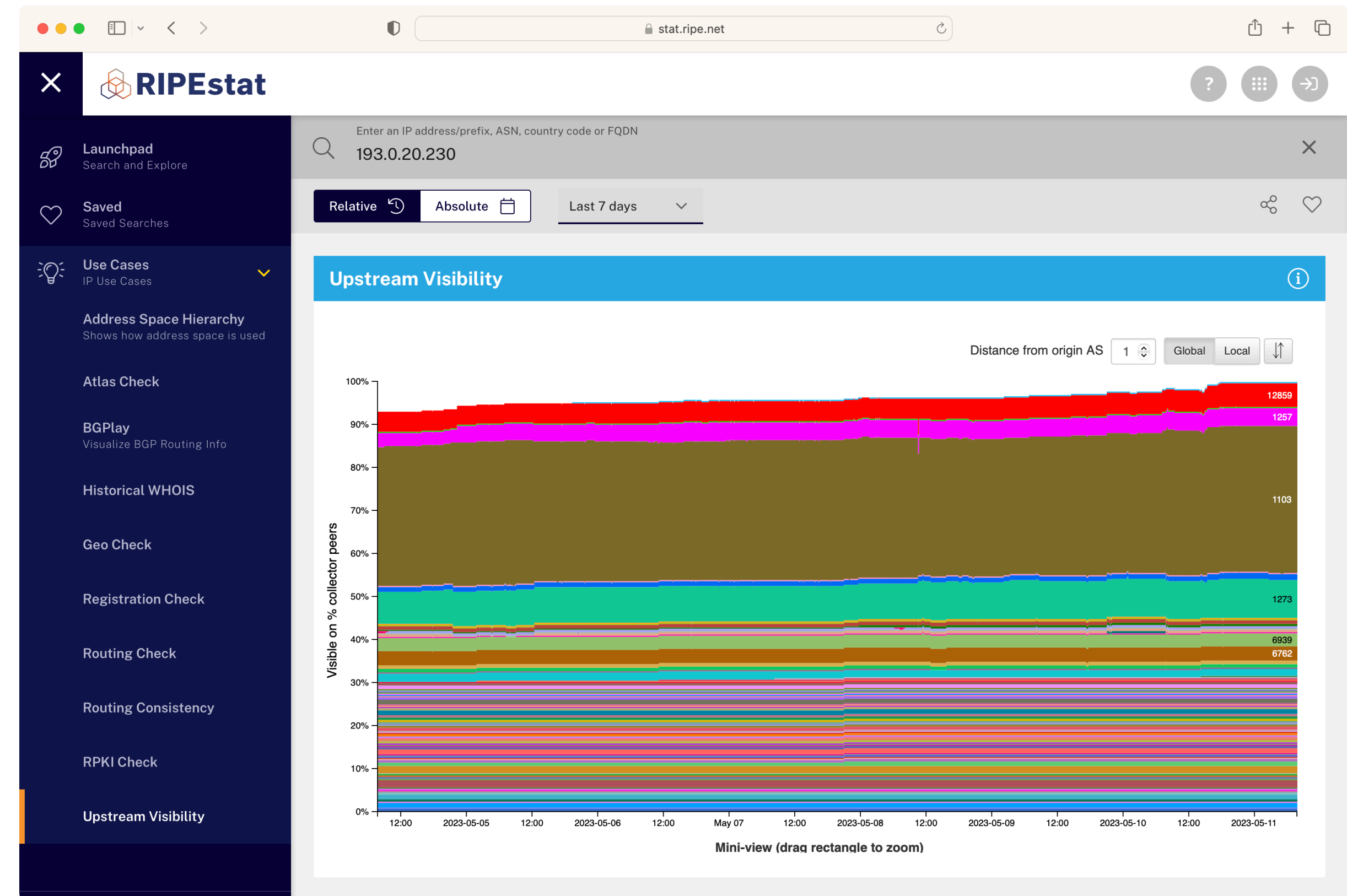
Prefix ↑	Origin	in BGP (RIS)	IRRs	RPKI ROV	VRPs
193.0.20.0/23	3333	✓	RIPE	😊	✓ maxLength: 23

Records per page: 10 | 1-1 of 1

# Use cases: Upstream visibility



- The Upstream Visibility provides a concise way of visualising routing data of a specified prefix



# Use cases: Routing check (1)



- Prefix Status
- RIS Looking Glass
- RPKI Origin Validation

The screenshot shows the RIPEstat website interface. The search bar contains the IP address 193.0.20.230. The main content area is divided into three panels:

- Prefix Status:** Shows that 193.0.20.0/23 is announced by AS3333. A table indicates that 193.0.20.230 is covered by this prefix. The originator is AS3333 (RIPE-NCC-AS - Reseaux IP Europeens Network Coordination Centre (RIPE NCC)).
- RPKI Origin Validation:** Confirms that AS3333 is a valid origin for 193.0.20.0/23. A table shows the following details:

VRP	
ORIGIN	3333
PREFIX	193.0.20.0/23
MAX_LENGTH	23
- RIS Looking Glass:** Displays 407 records for 193.0.20.230. It shows a filter for RRC00 Amsterdam, Netherlands, and lists 48 peers for AS3333. A table shows the following AS paths:

Last Updated	AS Path
2023-05-03	34854 3333
2023-05-05	59919 12779 3333
2023-03-29	202365 1103 3333
2023-05-04	49134 53356 6939 3333
2023-03-29	50304 1103 3333

# Use cases: Routing check (2)



- BGP Update Activity
- RIR Registration
- Routing History
- RIS Visibility
- RIPEstat Data API



The screenshot displays the RIPEstat web interface for the IP address 193.0.20.230. The interface includes a search bar at the top with the IP address entered. Below the search bar, there are tabs for 'Relative' and 'Absolute' views, and a dropdown menu for 'Last 12 months'. The main content area is divided into several sections:

- BGP Update Activity:** A line chart showing 'Announcements / hour' over time. The chart indicates 'Found 364 items for 193.0.20.230'. The x-axis shows dates from Jul '22 to Apr '23. The y-axis is labeled 'Announcements / hour'. The chart shows a significant spike in announcements around Oct '22 and Jan '23.
- Routing History:** A section showing '1 routed prefixes found for 193.0.20.230'. It displays a bar chart for the prefix 193.0.20.0/23 (AS3333) with a green bar indicating high visibility. The x-axis shows dates from Sep '22 to May '23. Below the chart, it says 'Showing results 1 to 1' and 'Records per page: 20 1-1 of 1'.
- RIS Visibility:** A section showing '193.0.20.0/23 had HIGH visibility as of 2022-05-11'. It also indicates 'IPv4: 100%'.
- RIR Registration:** A section showing 'Registration of 193.0.20.230 by RIPE NCC'.



**RIPE Atlas**

# RIPE Atlas



- RIPE Atlas is the RIPE NCC's Internet measurement platform
- It is a global network of devices that actively measure Internet connectivity
- Anyone can access this data via Internet traffic maps, streaming data visualisations, and an API
- RIPE Atlas users can also perform customised measurements to gain information about their own networks



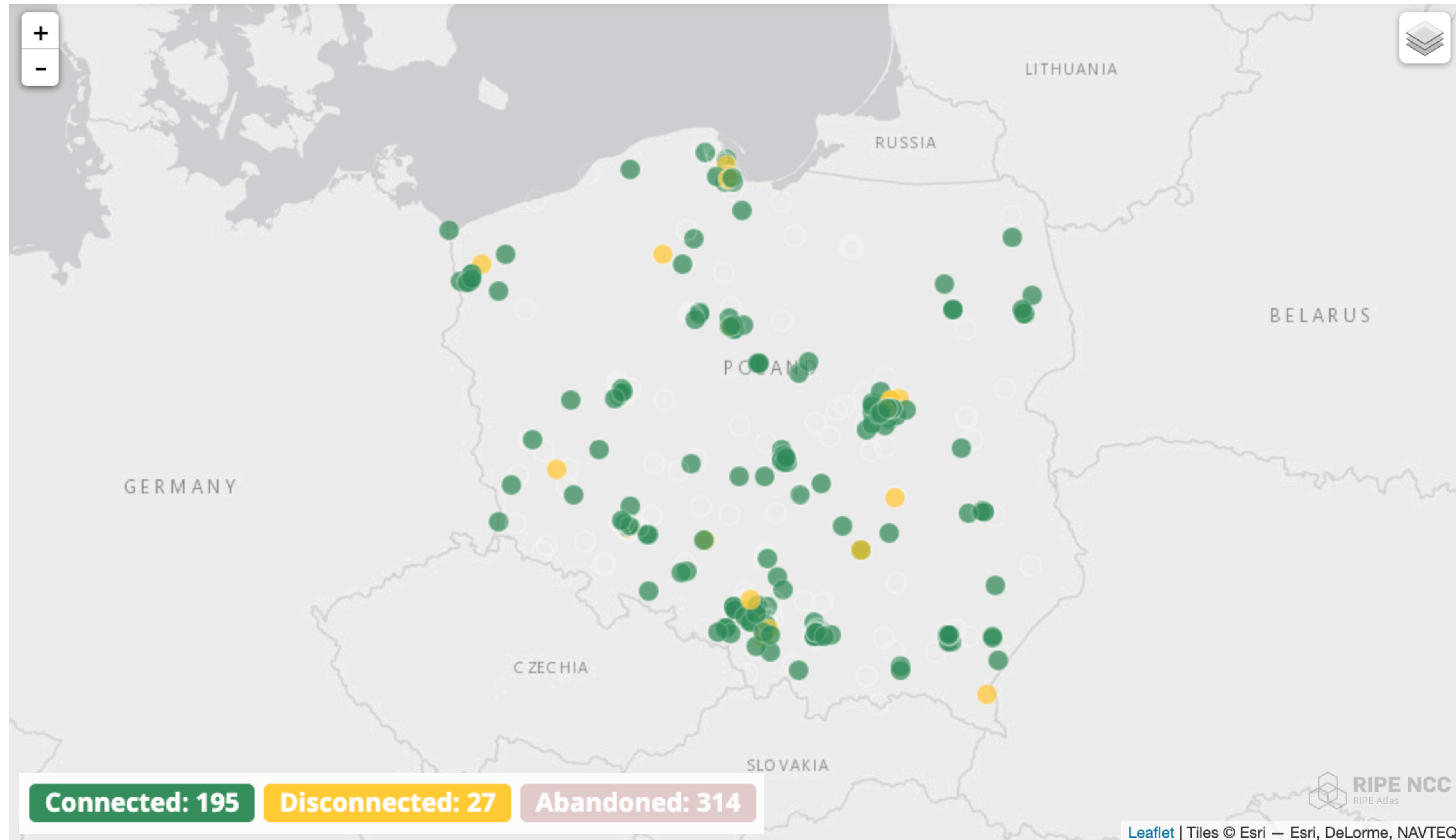


# How we collect data?

- 12,000+ RIPE Atlas probes connected in 169 countries
- 787 RIPE Atlas Anchors
- 14,000+ results collected per second
- 33,000+ measurements currently running



# RIPE Atlas in Poland – Geographical Distribution



# Networks coverage in Poland



Eyeball networks coverage

Home Countries Table Map About

- Details for : **Poland ( PL )** | [View Poland on RIPEstat](#)

60.44

Total Internet Users: **27922152**

Internet Users in networks with RIPE Atlas probes: **16875091**

Internet users coverage is estimated using percentage of IPv4 Public probes.

■ IPv4 Public Probes >= 3

■ 3 > IPv4 Public Probes > 1

Search:

Network (ASN)	Network Name	Estimated User Population %	IPv4 Public Probes	IPv4 Private Probes	IPv4 Total Probes	IPv6 Public Probes	IPv6 Private Probes	IPv6 Total Probes	More
5617	TPNET	23.14	17	5	22	2	0	2	<a href="#">View</a>
8374	PLUSNET	10.79	0	0	0	0	0	0	<a href="#">Apply for a probe</a>
39603	P4NET	10.31	0	0	0	0	0	0	<a href="#">Apply for a probe</a>
12912	TMPL	9.73	3	0	3	0	0	0	<a href="#">View</a>
6830	LibertyGlobal	9.27	4	1	5	0	0	0	<a href="#">View</a>
29314	VECTRANET-AS	4.71	3	5	8	1	0	1	<a href="#">View</a>
12741	AS-NETIA	3.55	5	2	7	0	0	0	<a href="#">View</a>
201019	P4NET_POZ	1.95	0	0	0	0	0	0	<a href="#">Apply for a probe</a>
13110	INEA-AS	1.9	2	1	3	0	0	0	<a href="#">View</a>
21021	MULTIMEDIA-AS	1.6	1	0	1	0	0	0	<a href="#">View</a>



# What Can I Do With RIPE Atlas?



- RIPE Atlas customised measurements allow hosts and sponsors to conduct measurements on their own network(s) using other probes within the RIPE Atlas network:
  - Continuously monitor network reachability from thousands of vantage points around the globe
  - Investigate and troubleshoot network issues with quick, flexible connectivity checks
  - Create alarms using RIPE Atlas status checks, which work with your own monitoring tools
  - Check the responsiveness of DNS infrastructure, such as root name servers
  - Test IPv6 connectivity
- A complete collection of use cases, published research and analyses based on RIPE Atlas is published on [RIPE Labs](#)



# Customised Measurements



- RIPE Atlas customised measurements are available to:
  - RIPE Atlas probe hosts
  - anchor hosts
  - sponsors
  - RIPE NCC members
- How it works?
  - earn credits by hosting or sponsoring one or more probes
  - pick your destination and customise your measurements



**RIPE NCC**

# **Internet Country Report**

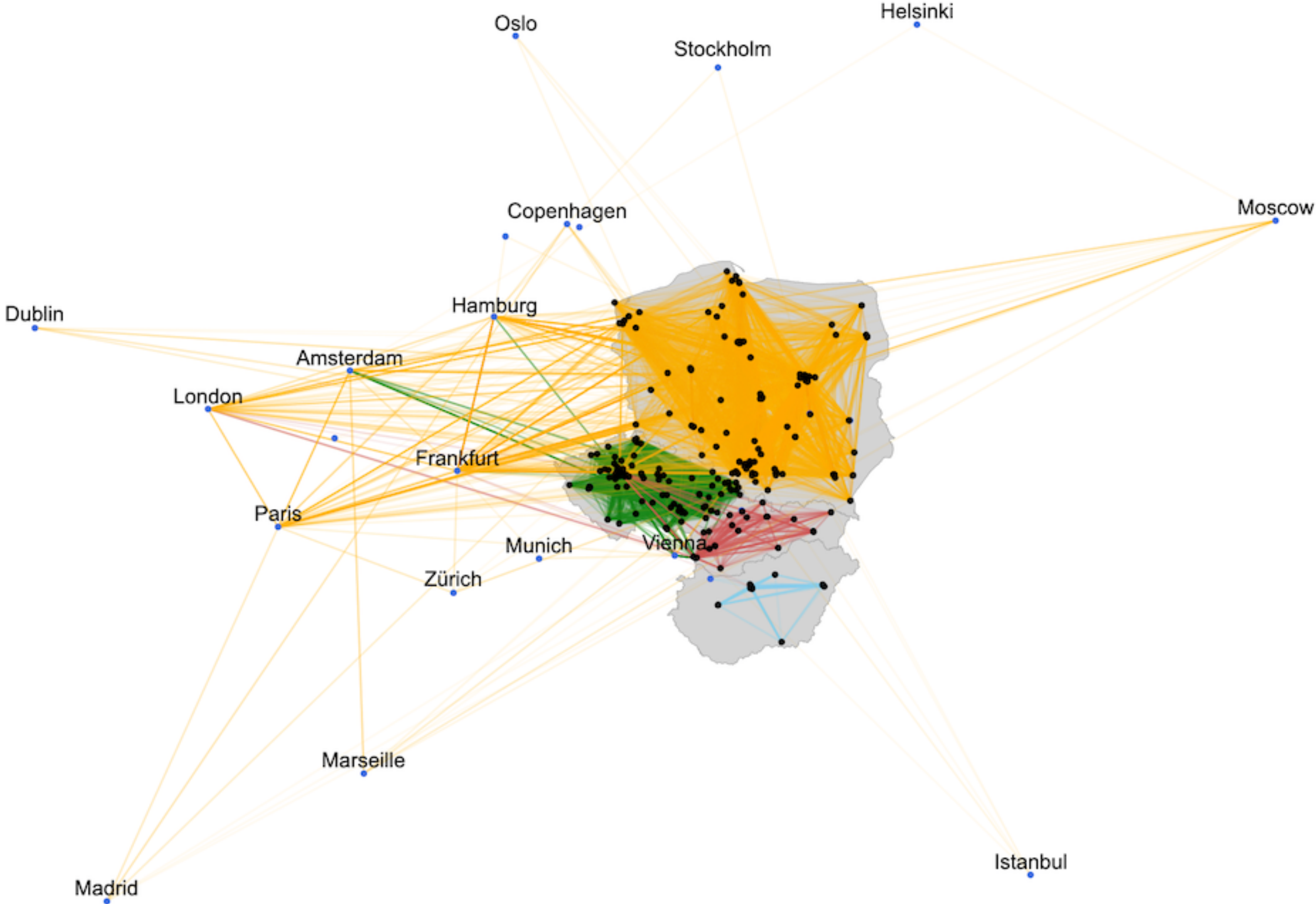
Poland, Hungary, Slovakia,  
Czech Republic

# RIPE NCC Internet Country Reports



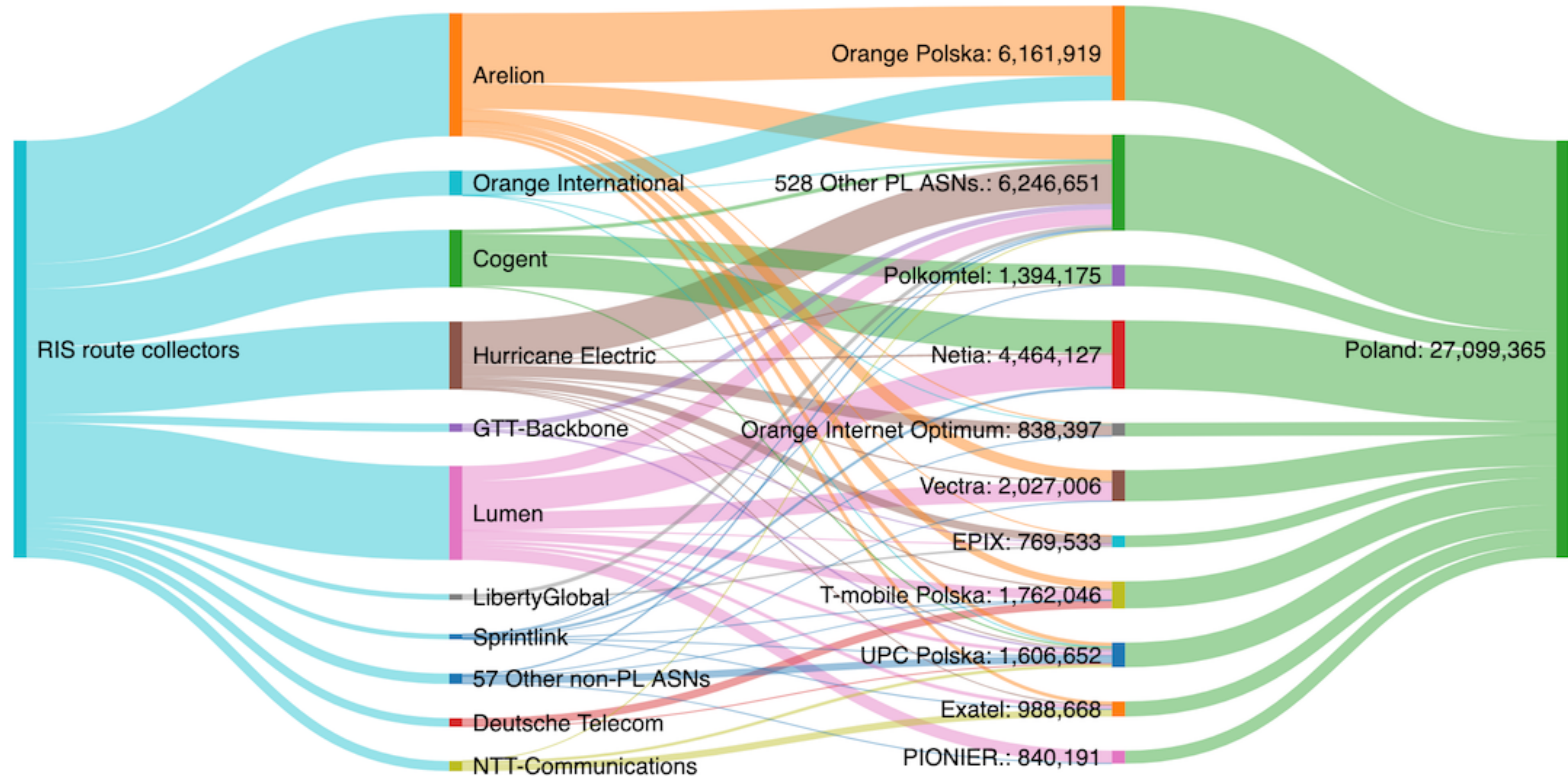
- Major market players analysis
- Internet number resource holdings and transfers
- IPv6 readiness
- Current state of Internet development and capacity for future growth
- Relationship between different networks in the countries and regions
- International connectivity to the global Internet
- Access to K-root
- Traffic paths and routing security

# Out-of-country paths (IPv4)





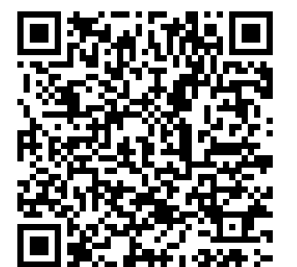
# Poland's international connectivity



# Keep an eye on the announcements



- Internet Country Report on Poland, Hungary, Slovakia, Czech Republic will be published on 20 June 2023
- All reports are available on <https://labs.ripe.net/author/ripe-labs-editor/country-reports/>
- Highlights from the reports are presented at the Open Houses - online events
- Follow us on Twitter [@RIPELABS](https://twitter.com/RIPELABS) or [LinkedIn](#)





# Upcoming events



Join us at

**RIPE 86**  
Rotterdam, Netherlands  
22 - 26 May 2023





**RIPE NCC Days**  
**Sofia**

**Join us!**

27-28 June 2023 · Sofia – Bulgaria



[www.ripe.net/ripe-ncc-days-sofia](http://www.ripe.net/ripe-ncc-days-sofia)



# Questions



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