



RIPE NCC

RIPE NETWORK COORDINATION CENTRE

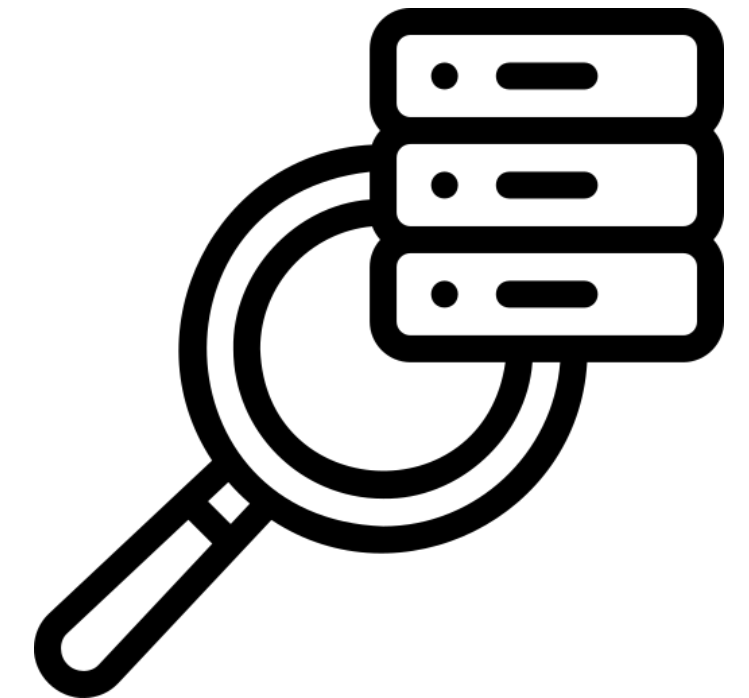
The RIS Project

Unleashing the power of BGP data

Once upon a time...



- **We gather a lot of data!**
- **After a year of war in Ukraine, we wanted to see**
 - What has changed?
 - What was affected?
- **So we dived into some datasets...**
 - Like RIS, AS Hegemony, RIR stats....
- **... and discovered some interesting facts!**



The Facts



	2022-01-01	2023-04-01	Diff
Number of UA ASNs	1781	1677	-110 (-6.2%)
Foreign upstream ASNs	112	99	-13 (-12%)
Country of Registration for Foreign upstream ASNs (Top 5)	RU 48 US 10 NL 8 GB 8 PL 6	RU 21 US 13 PL 10 NL 9 DE 7	
Domestic links	2055	1936	-119 (-5.8%)
Intl. upstream links	662	600	-62 (-9.4%)

The Ukrainian Internet 2022-01-01



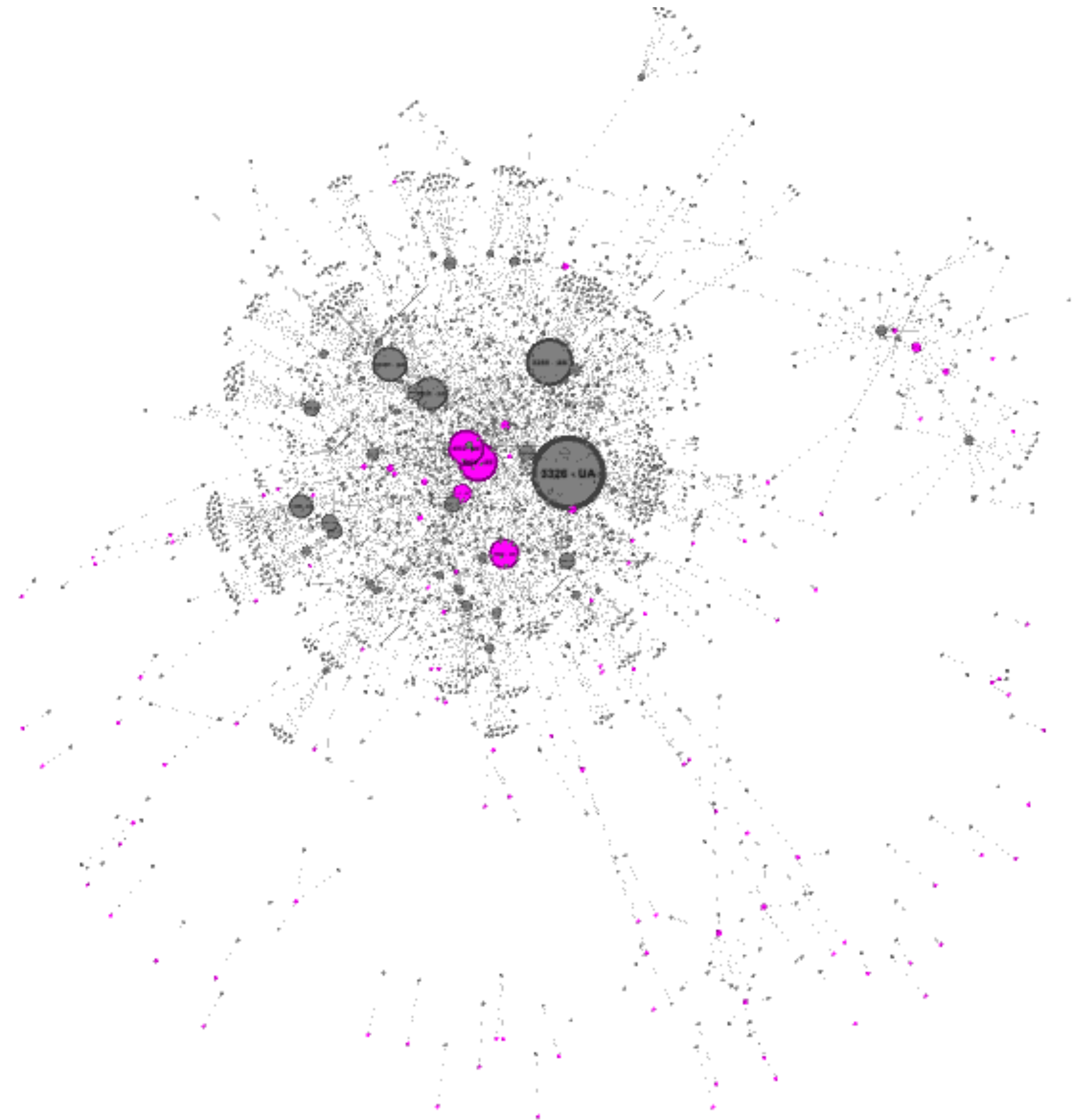
Grey nodes

Ukraine-registered
networks

Pink nodes

Foreign-registered
networks

The size of the nodes is
based on the number of
direct incoming links



The Ukrainian Internet 2022-01-01 vs 2023-04-01

Grey nodes

Ukraine-registered
networks

Blue nodes

Foreign-registered
networks

Red lines

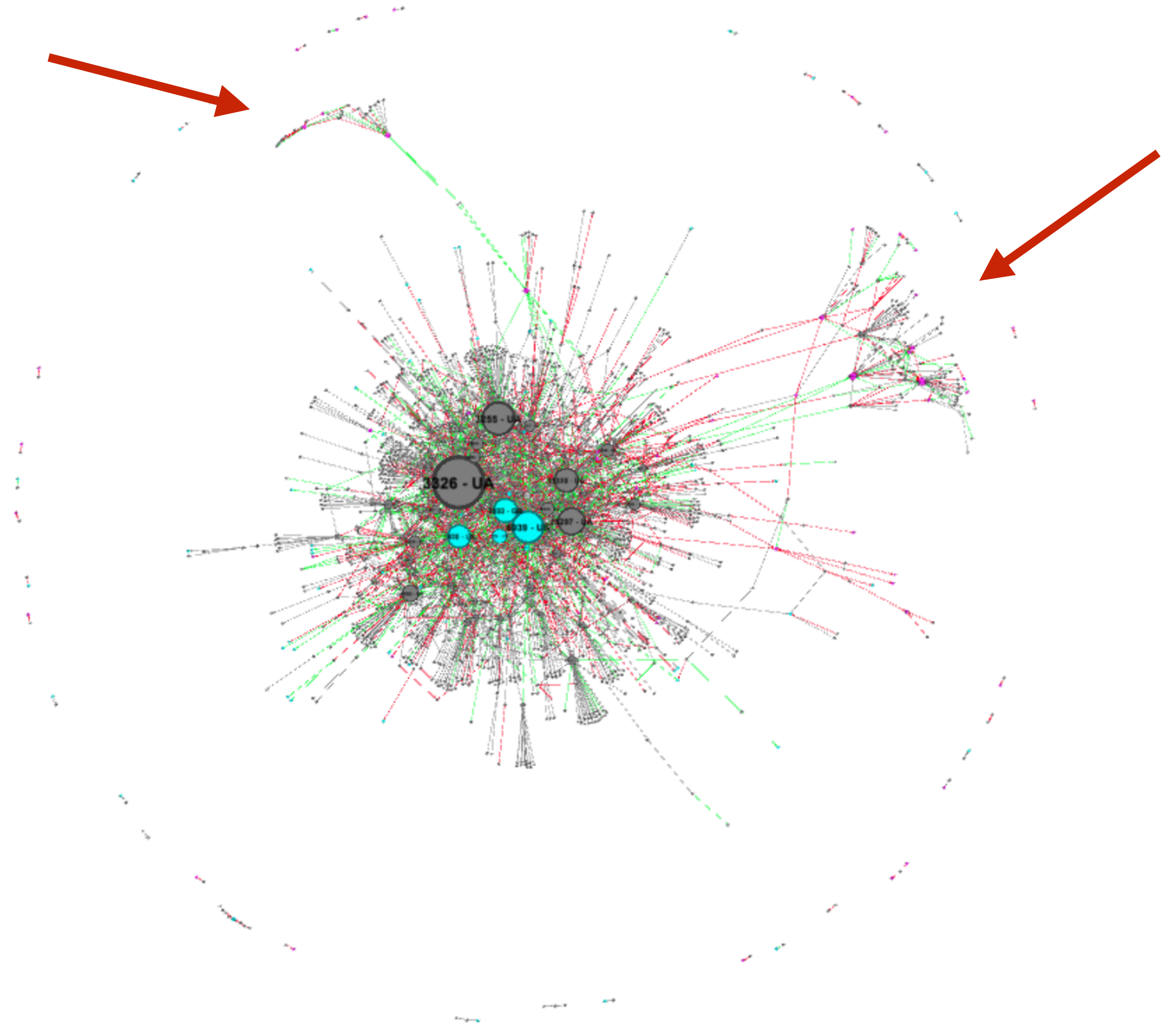
Lost links

Green lines

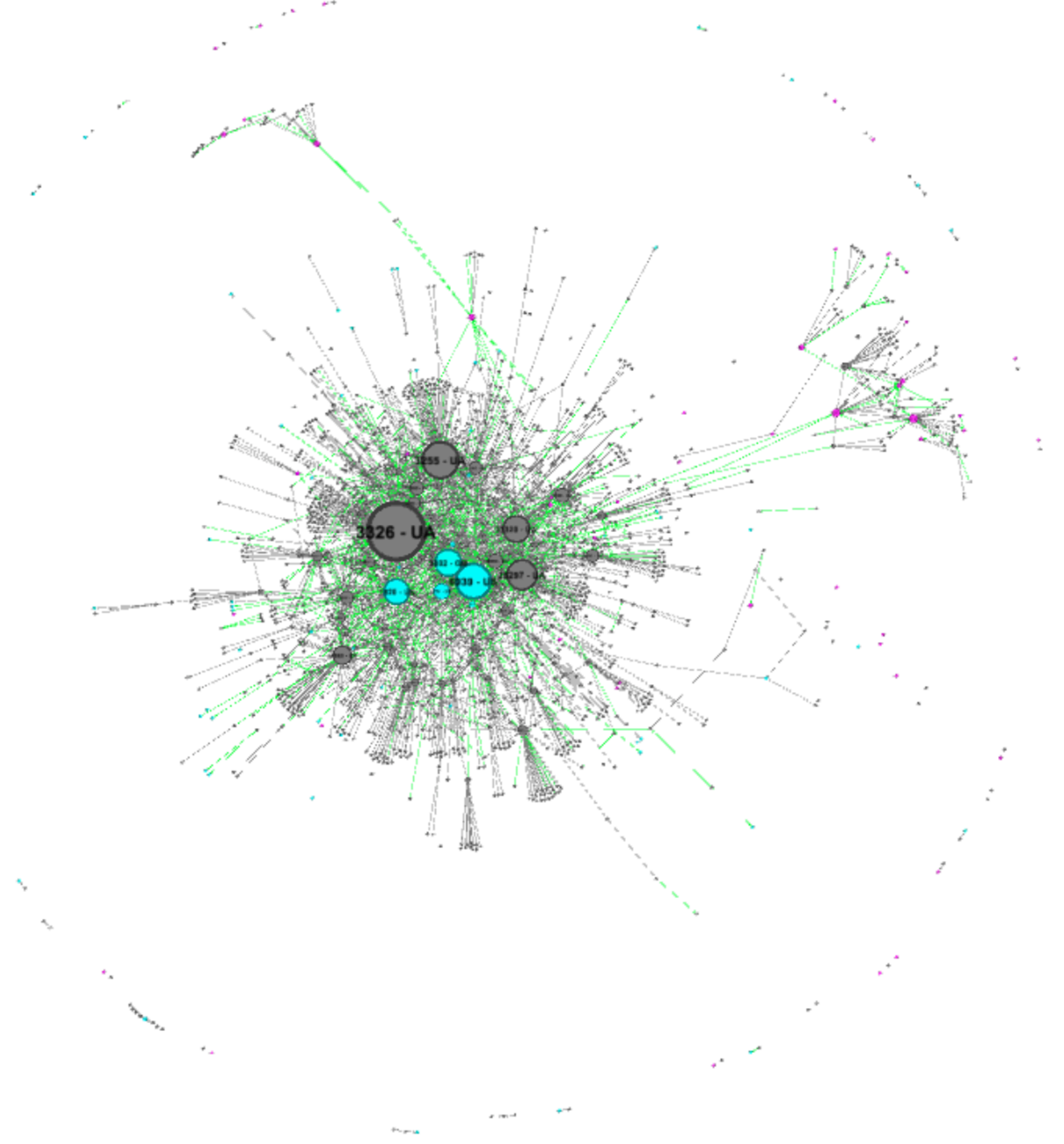
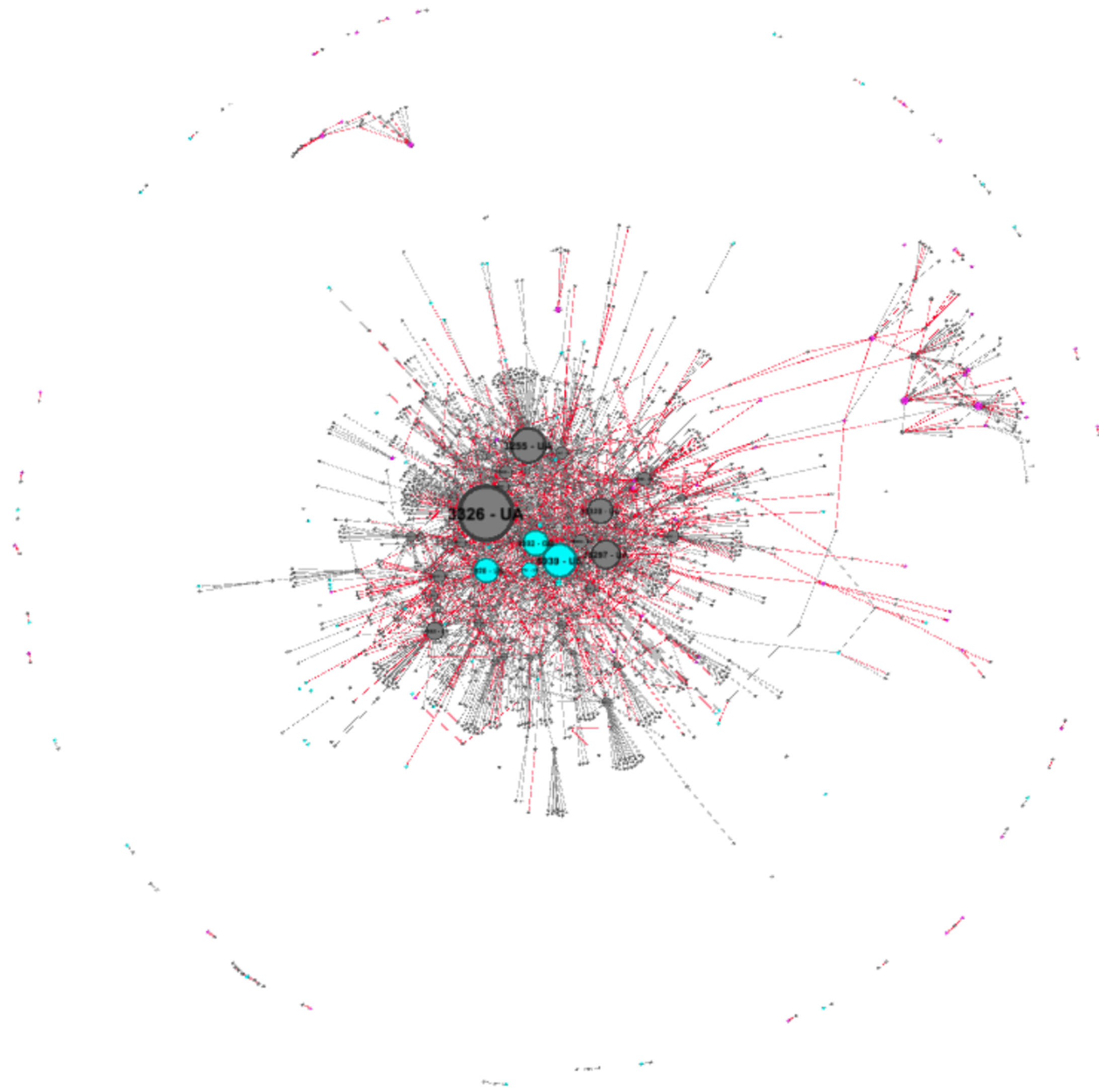
New links

Grey lines:

Stable



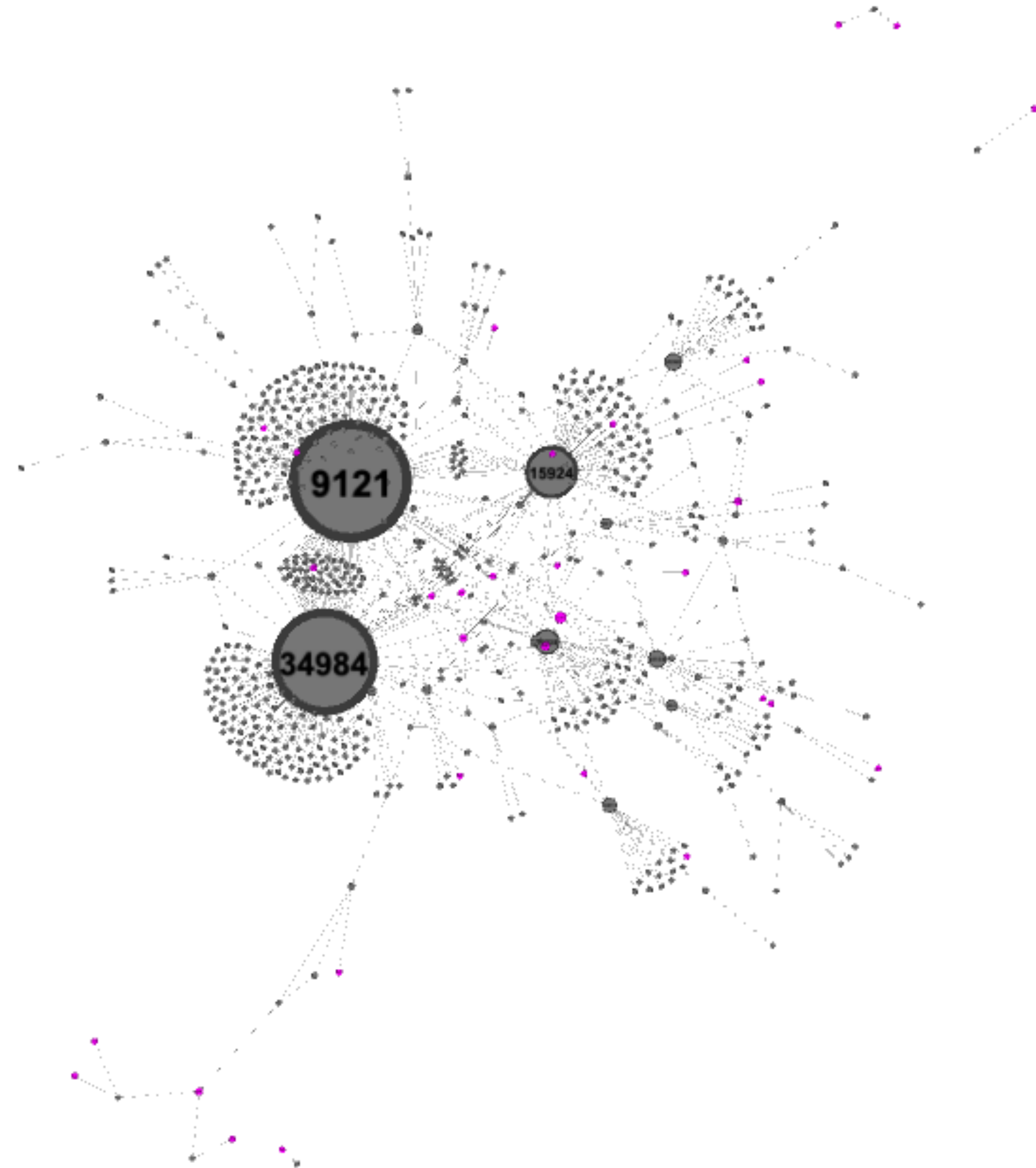
Lost Links vs New Links



The Turkish Internet 2022



- Much simpler structure
- Relatively large dependency on a few networks



The Bulgarian Internet 2023



Purple nodes

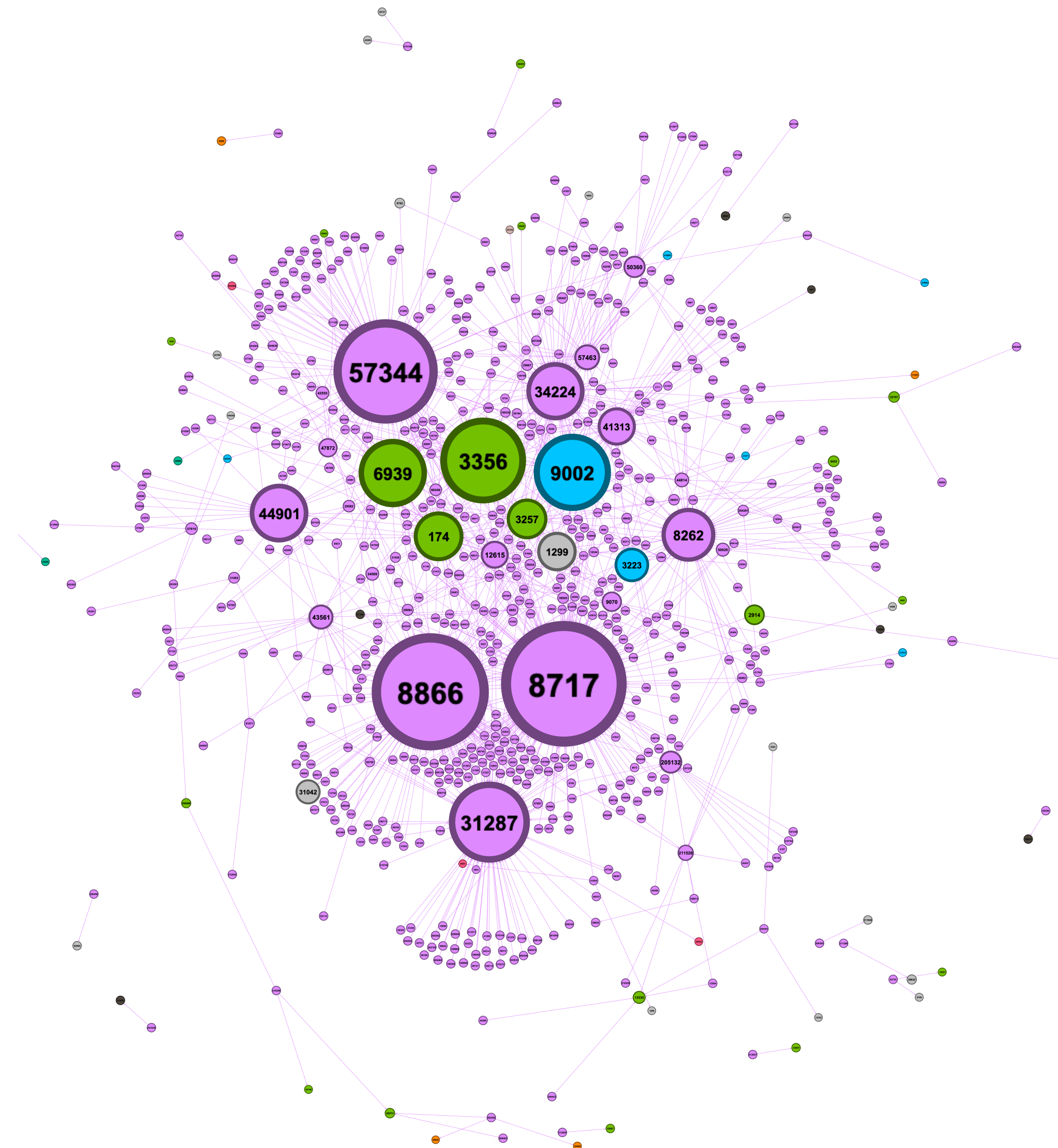
Bulgarian-registered networks

Blue nodes

Foreign-registered networks

Green nodes

Tier 1/Transit networks





What is RIS?

What is RIS?

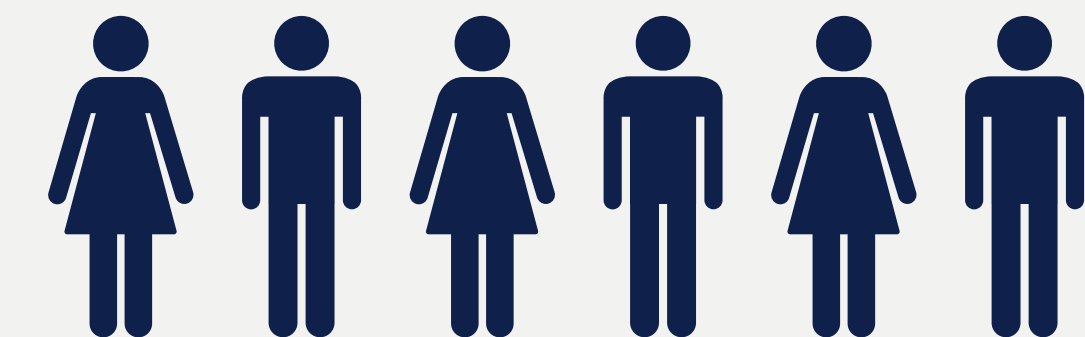


- RIS is a routing data collection platform
- Collecting BGP data since 1999
- Up-to-date routing information, as opposed to information in databases and routing registries, such as:
 - What is being announced
 - Which prefixes are seen and where
 - Which ones are not seen

THANK YOU TO OUR COMMUNITY



22 collectors



1500+ global peers

Why we collect BGP data



- The Internet routing system doesn't have in-built security mechanisms
- Security by visibility

Better visibility = greater security = lower risk of a BGP hijack

Who is RIS for?



- Network operators, policy makers
 - To check specific 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, Facebook outage, etc)

How can you use RIS?



- Available as:
 - Raw data
 - Live stream (RIS Live)
 - Whois query interface (RISwhois)
- Visualisations available in RIPEstat

The screenshot displays the RIPEstat web interface. The left sidebar contains navigation links: Launchpad (Search and Explore), Saved (Saved Searches), Use Cases (IP Use Cases), Address Space Hierarchy, Atlas Check, BGPlay, Historical WHOIS, Geo Check, Registration Check, Routing Check, Routing Consistency, RPKI Check, Documentation, and Preferences (Settings and Prefs). The main content area shows search results for the IP address/prefix 2001:67c:2e8:9::c100:14e6. The interface includes tabs for Relative, Absolute, and Latest views. The main content is organized into several panels:

- Prefix Status:** 2001:67c:2e8::/48 is announced by AS3333
- RIR Registration:** Registration of 2001:67c:2e8:9::c100:14e6 by RIPE NCC
- RPKI Origin Validation:** AS3333 is a VALID origin for 2001:67c:2e8::/48
- BGP Update Activity:** Found 37 items for 2001:67c:2e8:9::c100:14e6
- RIS Visibility:** 2001:67c:2e8::/48 has HIGH visibility
- RIS Looking Glass:** 394 records found for 2001:67c:2e8:9::c100:14e6
- Routing History:** 4 routed prefixes found for 2001:67c:2e8:9::c100:14e6

More tools to use RIS



- Others have developed tools based on RIS data
- bgp.he.net
 - This service uses RIS data and provides a dashboard with various aspects of the Internet routing system.
- BGPalerter
 - This software monitors RIS data in near real-time to detect route hijacks and other incidents.
- <https://ihr.iijlab.net/ihr/en-us/> (Internet Health Report) / CAIDA IODA
 - These research projects uses RIS data to build experimental views using Internet routing data.

RIS Collectors



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



Questions



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References



- **RIPE RIS**

- <https://www.ripe.net/analyse/internet-measurements/routing-information-service-ris/routing-information-service-ris>

- **The Resilience of the Internet in Ukraine - One Year**

- <https://labs.ripe.net/author/emileaben/the-resilience-of-the-internet-in-ukraine-one-year-on/>

- **AS Hegemony**

- https://labs.ripe.net/author/romain_fontugne/as-hegemony-measuring-as-interdependence/