



RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE Atlas & RIPE NCC Internet Measurement Tools

For the Good of the Internet

Vesna Manojlović | LUNOG7 | November 2024

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 tools and services:
 - RIPE Atlas
 - RIPE Routing Information Service (RIPE RIS)
 - RIPEstat



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, reachability and performance
- 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?



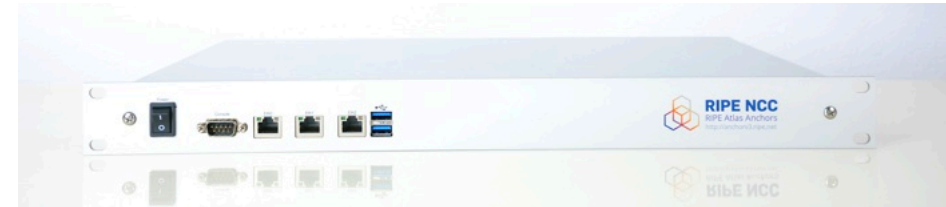
- 12,000+ RIPE Atlas probes connected in 169 countries
- 785 RIPE Atlas Anchors
- 15,000+ results collected per second
- 32,000+ measurements currently running
- More information at: atlas.ripe.net



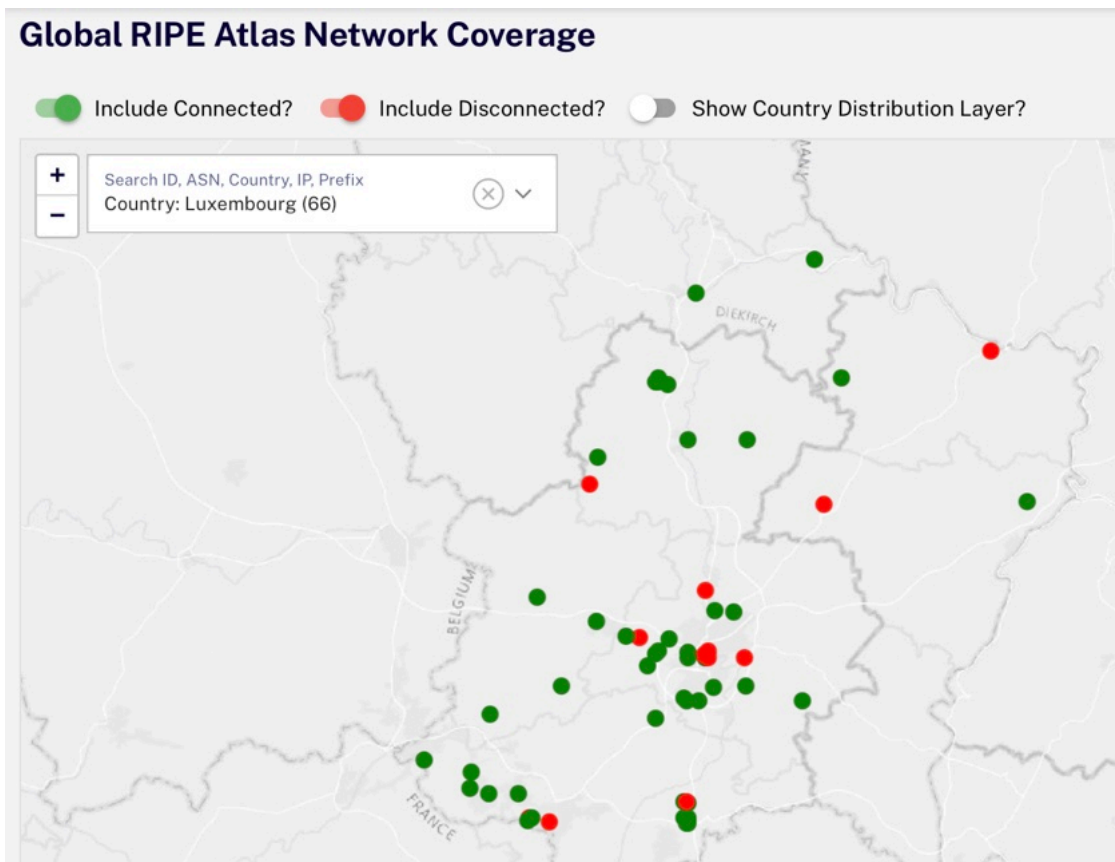
RIPE Atlas Anchors



- More robust probes mostly for data centres
- Either physical hardware or a virtual machine
- Generally more reliable and better connected than probes
- Have all features of probes plus extra server features
 - DNS server
 - HTTP(S) server
- Full mesh of ping and traceroute measurements is scheduled between all anchors



RIPE Atlas in Luxembourg



- <https://atlas.ripe.net/coverage/?filter=LU>

Networks Coverage in Luxembourg



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
6661	EPT-LU	48.46	7	0	7	2	0	2	View
56665	TANGO-TELINDUS	18.77	3	0	3	0	0	0	View
53667	PONYNET	8.91	5	0	5	2	0	2	View
204279	ELTRONA	4.76	1	0	1	1	0	1	View
199524	GCORE	4.53	1	0	1	1	0	1	View
47377	Orange_Belgium_SA	4.35	1	0	1	0	0	0	View
8632	LOL-AS	2.49	4	1	5	1	0	1	View
9008	ASN-VO	1.39	3	0	3	2	0	2	View
56369	OrangeBE	1.28	0	0	0	0	0	0	Apply for a probe
2602	RESTENA	0.78	3	1	4	3	1	4	View

- https://sg-pub.ripe.net/petros/population_coverage/country.html?name=LU

RIPE Atlas Measurements



- **Built-in global** measurements towards root nameservers
 - Visualised as Internet traffic maps
- **Built-in regional** measurements towards “anchors”
- **Customised** measurements run by users

Want to Learn More?



- Check our webinars:
 - Using RIPE Atlas
 - RIPEstat
- RIPE Atlas use cases
- Our quarterly plans for our services/tools

RIPE Atlas Use Cases



A distributed view of the Internet

https://labs.ripe.net/author/alun_davies/ripe-atlas-a-distributed-view-of-the-internet/

The Kazakhstan outage as seen from RIPE Atlas

<https://labs.ripe.net/author/emileaben/the-kazakhstan-outage-as-seen-from-ripe-atlas/>

Detecting DNS root manipulation

<https://labs.ripe.net/author/qasim-lone/detecting-dns-root-manipulation/>

DNS vulnerability, configuration errors that can cause DDoS

https://labs.ripe.net/author/giovane_moura/dns-vulnerability-configuration-errors-that-can-cause-ddos/

RIPE Atlas Community



- RIPE Atlas Ambassadors & Sponsors
 - <https://www.ripe.net/analyse/internet-measurements/ripe-atlas/ripe-atlas-community/>
- FLOSS Community & RIPE Atlas
 - <https://github.com/RIPE-Atlas-Community>
- Hackerspaces & RIPE Atlas
 - https://wiki.hackerspaces.org/RIPE_Atlas
 - <https://labs.ripe.net/author/becha/the-next-42-ripe-atlas-probes-at-hackerspaces/>
- Hackathons
 - December 2024 <https://labs.ripe.net/author/becha/announcing-the-green-tech-hackathon/>
 - March 2025 <https://labs.ripe.net/author/becha/join-the-dns-hackathon-2025/>



RIPE RIS

RIPE Routing Information Service (RIPE RIS)



- RIPE RIS is a routing data collection platform
 - It collects raw BGP data from peers
 - and stores BGP messages and routing table dumps
- Historical and live data
 - Historical data since 1999
 - All (historical) data is publicly available



Remote Route Collectors (RRCs)



- 23 Route collectors deployed at IXPs
 - 1500+ peering sessions
 - 600+ peer ASes
- They collect raw BGP data from peers





Actual Routing Data

- RIS shows you what is really happening on the Internet
 - which AS is announcing which address block
 - and where it is visible
 - right now or in the past
- As opposed to information in the RIPE Database and other Routing registries:
 - Route object in the RIPE Database may be out of date
 - RIS includes real routing information
 - “Routing consistency check” tool can help with this



Why Collect BGP Data?

- BGP doesn't have in-built security mechanisms and routing incidents are common
- Troubleshooting is difficult
 - Routing problems and Looking glasses are temporary
- BGP history is recorded to track what has happened
 - It allows operators to identify and address security risks
 - Better visibility → Greater security → Lower risk of a BGP attacks



Who is RIS for?

- Network operators
 - To monitor Internet routing and to troubleshoot accidents
 - Build open source tools based on RIS Data
- Researchers
 - To investigate notable routing incidents (i.e. network disruptions in specific countries, service outages, etc.)
- Policy makers
 - To develop future plans based on routing trends

How Can You Use RIS?



- Raw data - archived MRT files
- RIS Live - Live stream
- RISwhois - Whois query interface
- RIPEstat - Routing check, BGPlay visualisations
- Find more at ris.ripe.net



Routing Information Service Live (RIS Live)

RIS Live is a feed that offers BGP messages in real-time. It collects information from the RIS Route Collectors (RRCs) and uses a WebSocket JSON API to monitor and detect routing events around the world. A non-interactive full stream ("firehose") is also available.

RIS Live is one way of accessing RIS, together with RIPEstat and the [RIS Raw Data dumps](#). Any bug reports or queries should be sent to rislive@ripe.net.

RIS Live has been used by some organisations for academic and research purposes. In 2017, [INSPIRE group](#) and [CAIDA](#) used RIS Live to develop [ARTEMIS](#), a real-time BGP hijack detection tool. It is also a backend for [BGPalerter](#), a real-time BGP monitoring tool, pre-configured for visibility loss and hijacks detection.

[Get started using the RIS Live Manual](#)

Demo

Subscriptions to the stream are sent as a JSON object containing various filter parameters. You can adjust the parameters below and see the messages that are streamed on the right.

```
{  "prefix": null,  "path": null,  "type": null,  "require": null,  "moreSpecific": true,  "lessSpecific": false,  "host": "rrc85.ripe.net",  "peer": null,  "socketOptions": {    "includeRaw": false,    "acknowledge": true  }}
```

Live RIS BGP messages

Connected 294 matching messages -176 kbit/s

```
// Received at 20:35:09 (2.87 second delay)
{
  "timestamp": 1697989706.7,
  "peer": "2001:7f8:30:0:2:1:3:4288",
  "peer_asn": "34288",
  "id": "2001:7f8:30:0:2:1:3:4288-018b534e0fcc0000",
  "host": "rrc85.ripe.net",
  "type": "KEEPALIVE"
}
```

```
// Received at 20:35:09 (2.87 second delay)
{
  "timestamp": 1697989706.7,
  "peer": "193.283.0.136",
  "peer_asn": "21385",
  "id": "193.283.0.136-018b534e0fcc0001",
  "host": "rrc85.ripe.net",
  "type": "KEEPALIVE"
}
```

```
// Received at 20:35:09 (2.87 second delay)
{
  "timestamp": 1697989706.7,
  "peer": "193.283.0.105",
```

Code examples

Below are simple examples of using the RIS Live WebSocket interface. For a full guide, see the [RIS Live manual](#).

javascript Python

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Other Tools That Use RIS



- Hurricane Electric BGP Toolkit
 - Provides a **dashboard** to locate Internet number resources and access network data
- BGPalerter
 - This software **monitors** RIS data in near real-time to detect route hijacks and other incidents
- Internet Health Report, Georgia Tech/IODA
 - These research projects use RIS data to build experimental views using Internet routing data

RIS Future Plans



- Improvements to RIS data through peering coordination
 - We aim to add at least one peer per country in our service region that is not yet covered in RIS
 - Working on our new peering strategy
- Define a process to get access to kafka directly
- Open-source RIS Live
- [View our quarterly planning for RIPE RIS](#)

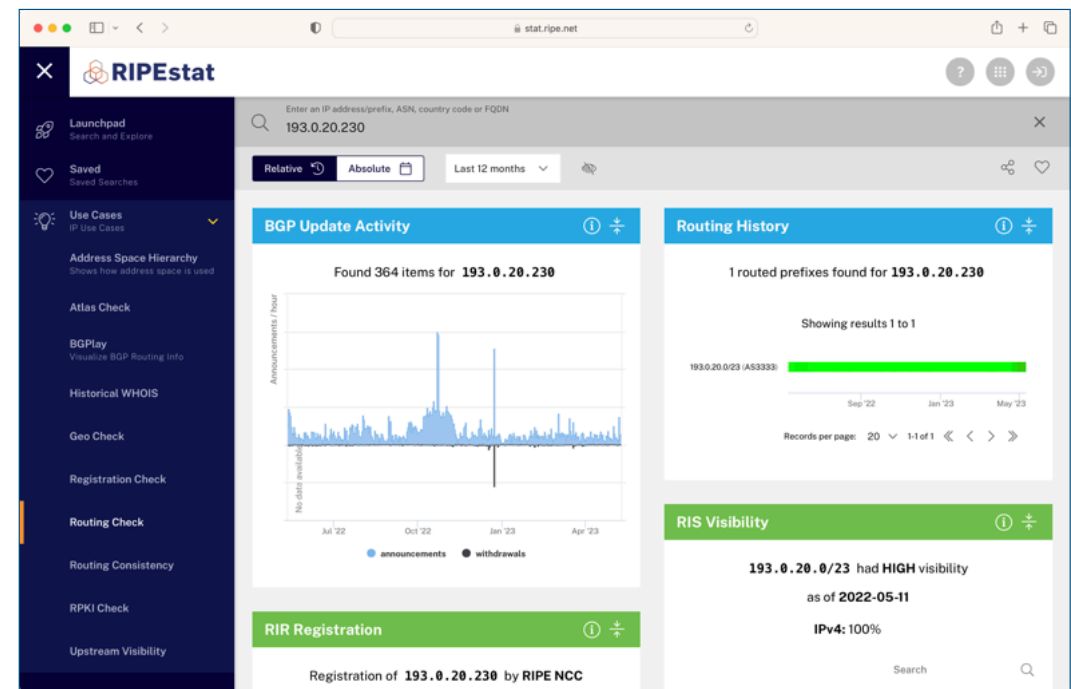


RIPEstat

What is RIPEstat?



- Information service for Internet-related data
- RIPEstat provides:
 - information on IP address space and Autonomous System Numbers (ASNs)
 - statistics on specific hostnames and countries
 - visualisations of Internet routing

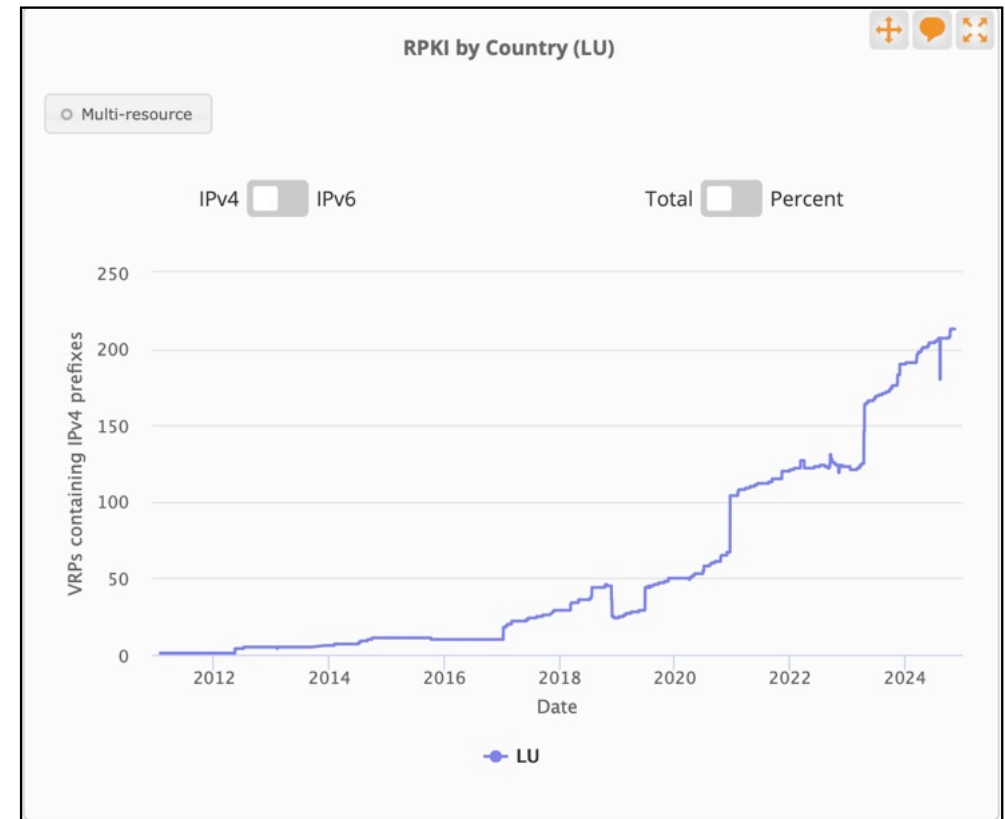
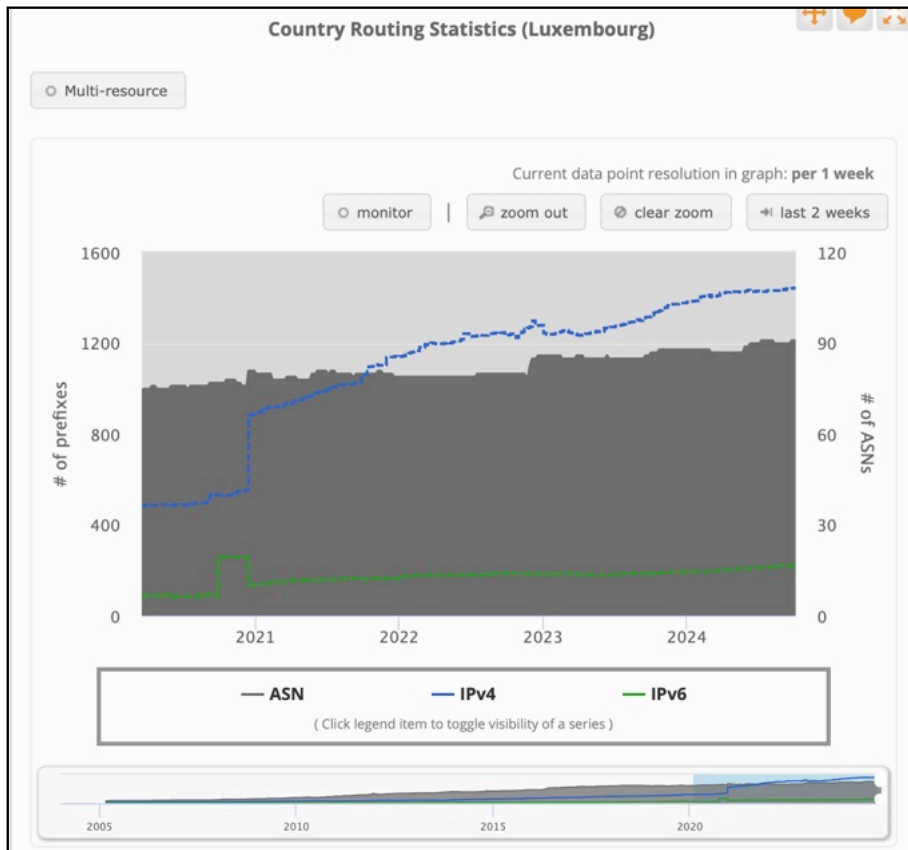


RIPEstat Data Sources



- More than 35 different datasets
 - RIPE Database and the registry data from other RIRs
 - BGP routing data (RIS)
 - RIPE Atlas
 - Geolocation
 - RPKI
 - M-Lab, Speedchecker, etc.
 - 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

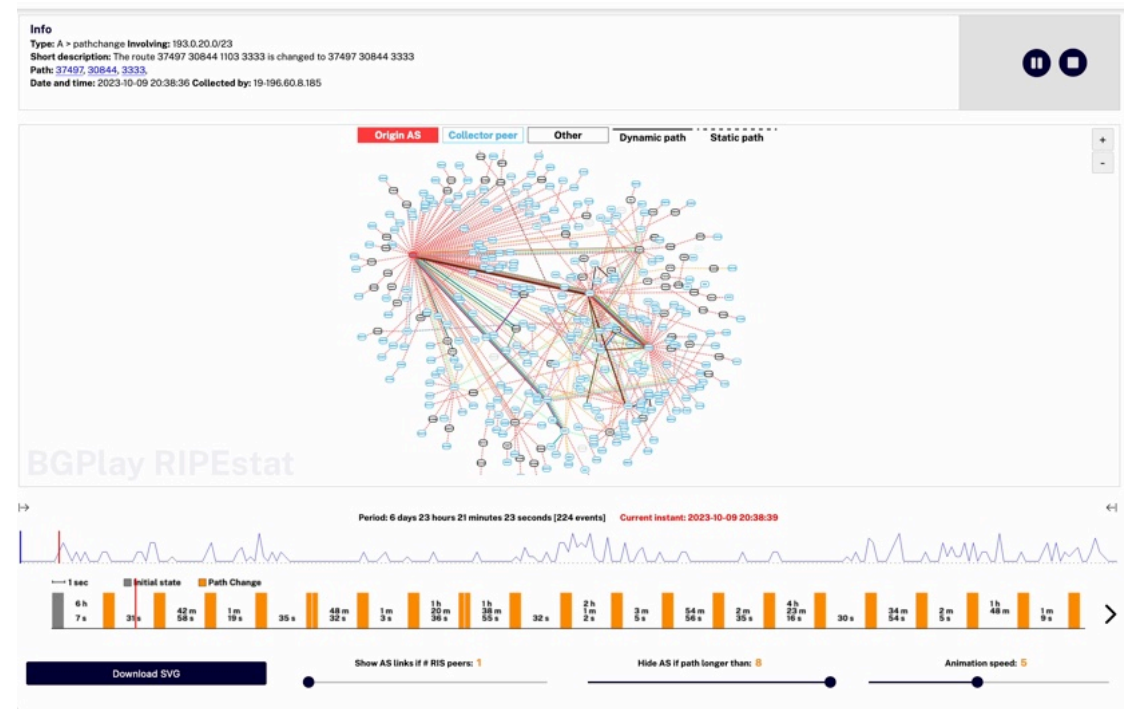
Use Cases: Country Stats – LU



Use Cases: BGPlay



- BGPlay shows the routing history related to a specific set of resources (prefixes, Autonomous Systems, IPs)
- BGPlay visualises changes in BGP announcements for a specific destination over time
- As seen by RIS





Questions



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