RIPE NCC
RIPE NETWORK COORDINATION CENTRE

RIPE NCC and Academia

Gergana Petrova | e-Age 18 | 11-12 December 2019

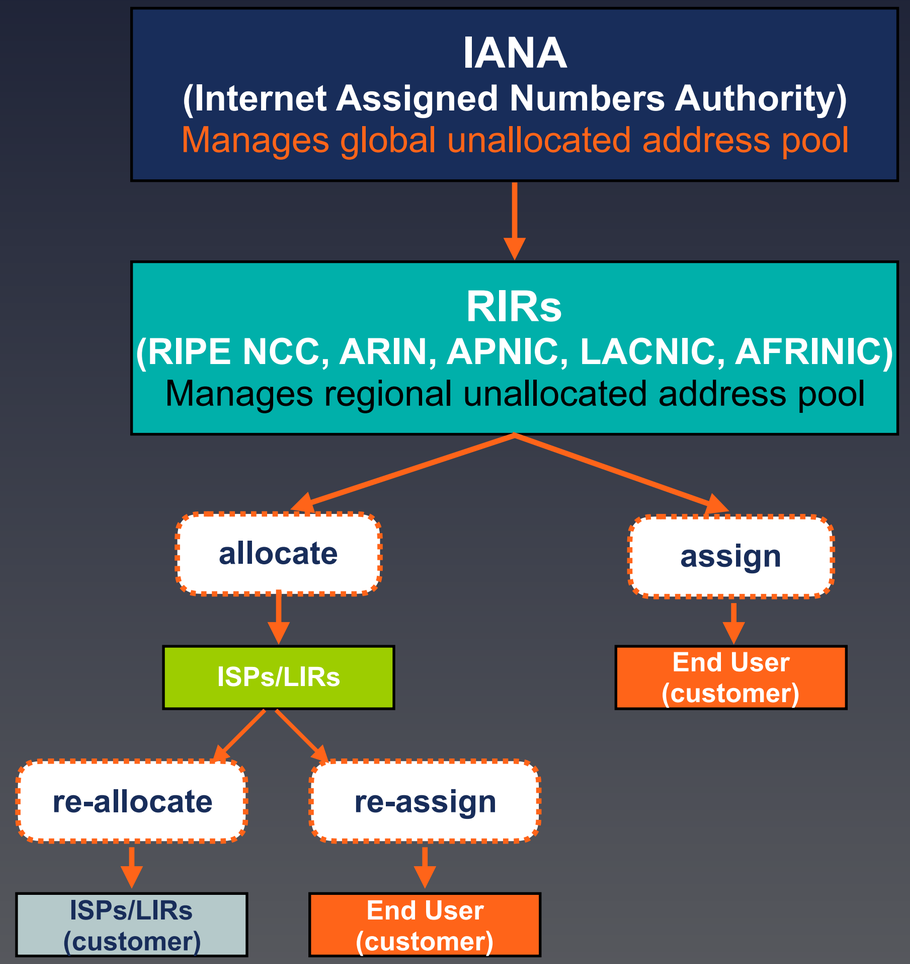
What is an RIR?

- A Regional Internet Registry (RIR) manages the allocation and registration of Internet number resources in a particular region of the world and maintains a unique registry of all IP numbers issued.
- Number resources include:
  - IP addresses (IPv4 and IPv6)
  - Autonomous System (AS) Numbers
- Independent, not-for-profit, membership organisation

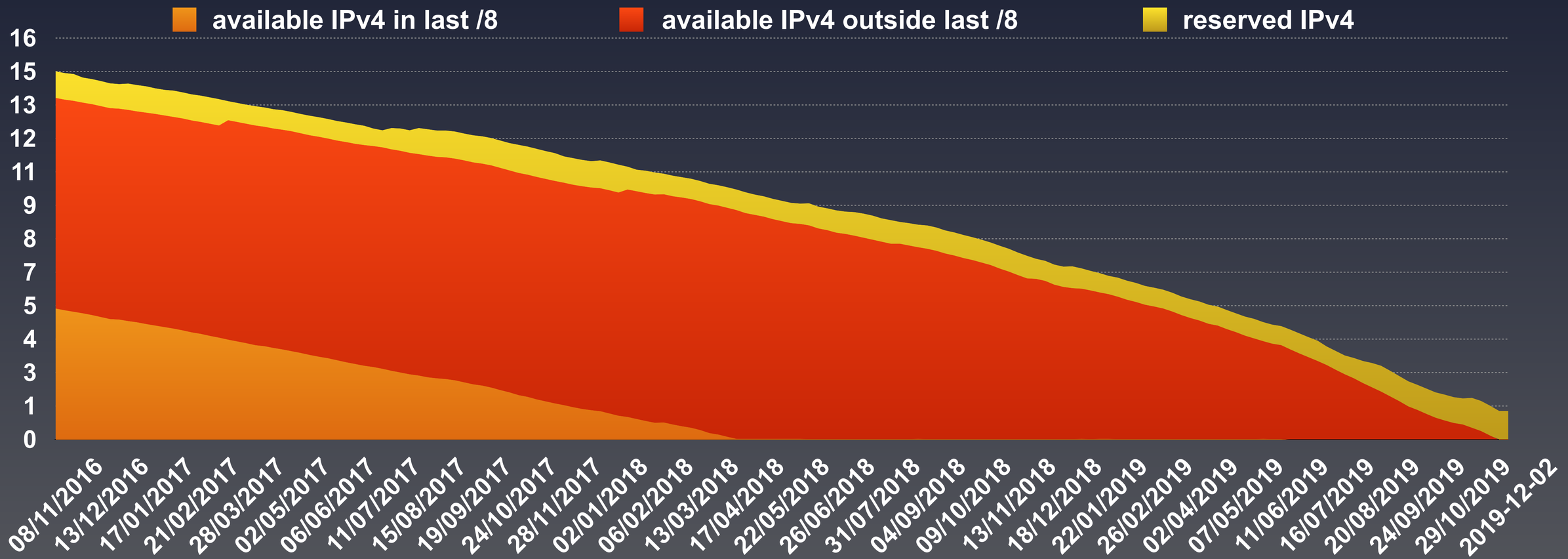
Where are the RIRs?

Core RIR Functions

- Receive large IP address blocks from IANA
  - Distribute those in smaller blocks to its members
  - Publish and maintain a list of who has which block
  - Implement the rules (policies) set by the RIPE community
- Support the infrastructure of the Internet through technical coordination
- Provide services for the benefit of the Internet community at large



RIPE NCC's IPv4 Address Pool



https://www.ripe.net/manage-ips-and-asns/ipv4/ipv4-available-pool

Still Recovering Some IPv4 bits

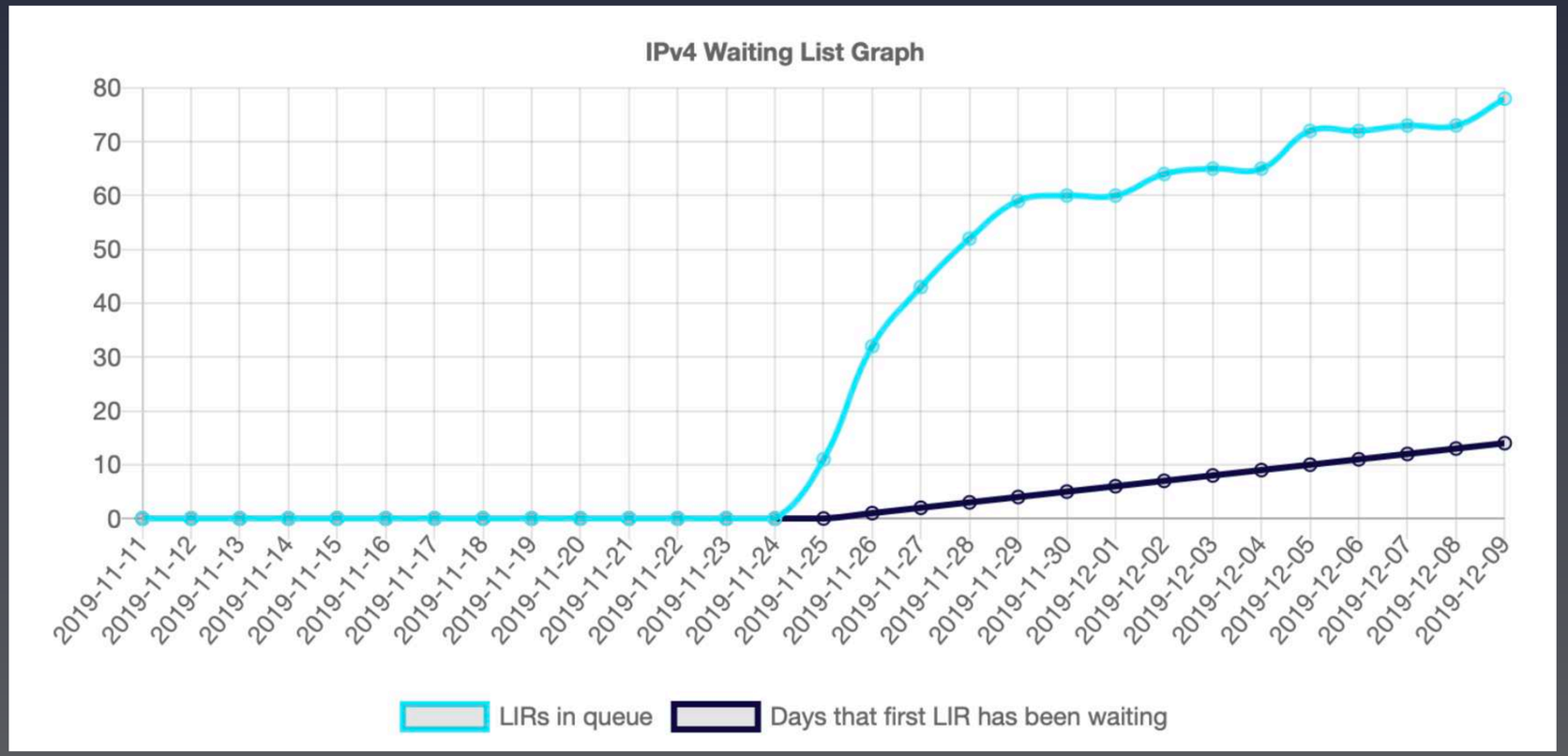
- from organisations that have gone out of business
- from closed LIR accounts
- from networks that return addresses they no longer need
- so far in 2019: recovered 2547 /24s
  - this was already redistributed before the 25 November runout

The Waiting List

Only LIRs that have never received an IPv4 allocation from the RIPE NCC (of any size) may request addresses from the waiting list, and they are only eligible to receive a single /24 allocation.

The Waiting List

- LIRs that have submitted an IPv4 request can see their position on the waiting list in the LIR Portal



What is in the RIPE Database?

- Registration information about
  - IP addresses and AS Numbers issued by the RIPE NCC
  - IP addresses and AS Numbers issued prior to the establishment of the RIRs (legacy space)
  - Original registration date
  - Organisations that hold these resources (ORGs)
  - Points of Contact for resources or organisations (POCs)
  - Customer reassignment information (from ISPs to their customers)
  - Referential information to the authoritative RIR

asrenorg.net
89.28.216.209

Responsible organisation: Abu-Ghazaleh Intellectual Property
Abuse contact info: abuse@tagorg.com

```
inetnum:        89.28.216.0 - 89.28.217.255
netname:        AGIP
descr:          Abu-Ghazaleh Intellectual Property
descr:          Infrastructure
country:        jo
org:            ORG-AIP1-RIPE
admin-c:        BK1302-RIPE
tech-c:         BK1302-RIPE
status:         ASSIGNED PA
mnt-by:         MNT-TAGO
created:        2007-05-16T13:44:39Z
last-modified:  2008-03-03T14:30:20Z
source:         RIPE
```

```
route:          89.28.216.0/21
origin:         AS38968
mnt-by:         MNT-TAGO
created:        2016-03-31T08:47:24Z
last-modified:  2016-03-31T08:47:24Z
source:         RIPE
```

What is not in the RIPE Database?

- Domain names
- Certain customer reassignments
  - Example: private residence
- Accurate geographic location of the network or end user customer

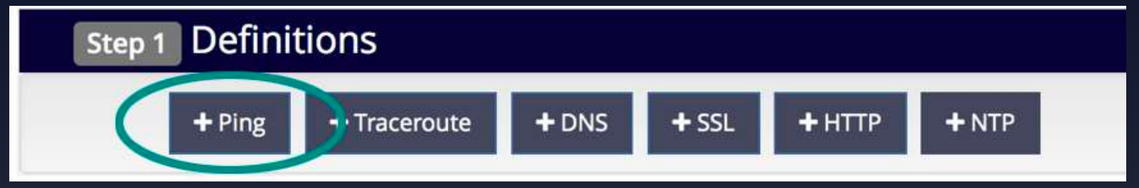
RIPE Atlas

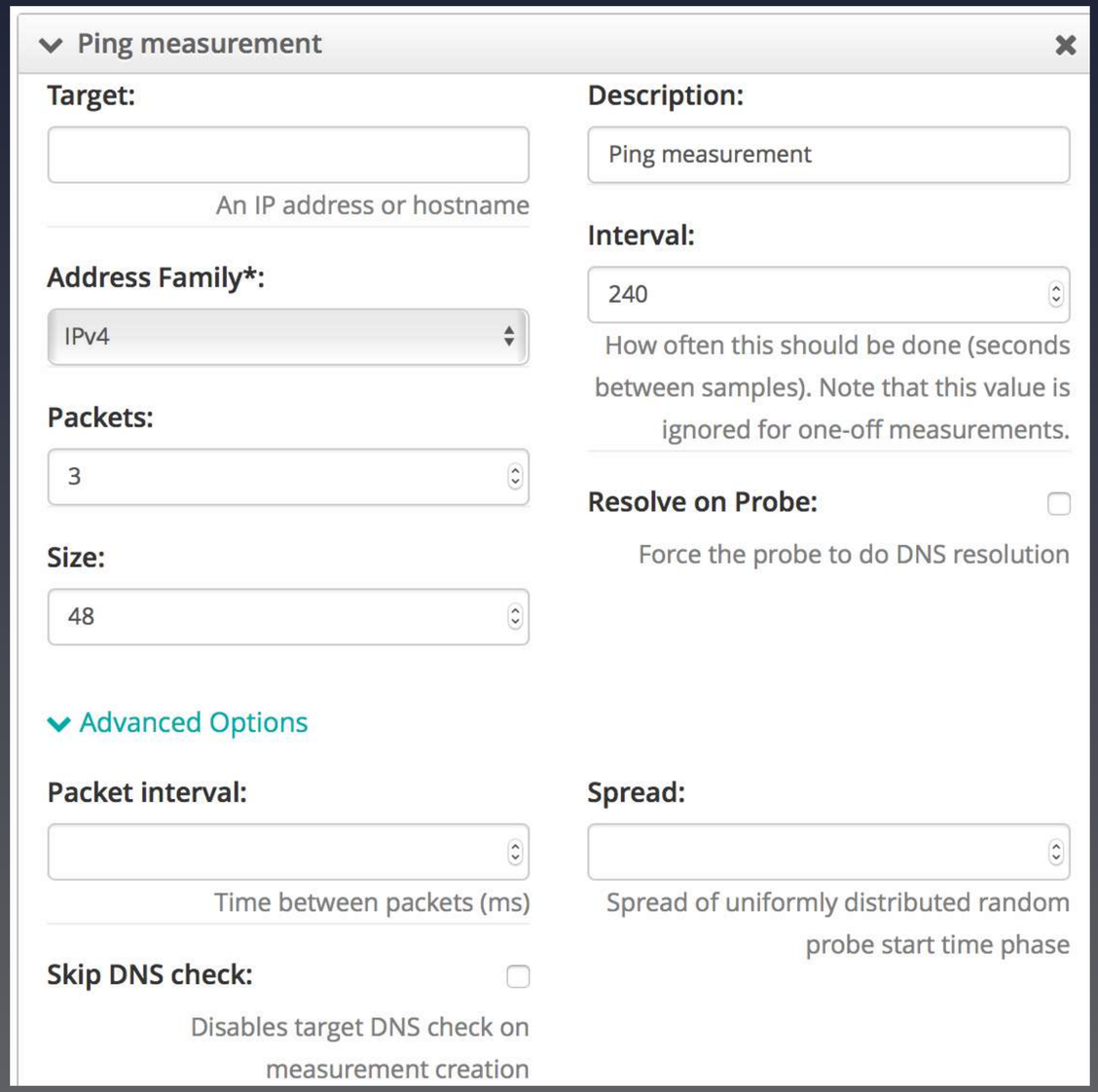
- Global Internet measurement platform
- More than 10,000 probes collecting nearly 8,000 results/sec
- Active measurements:
  - Ping
  - Traceroute
  - DNS
  - SSL/TLS
  - NTP
  - HTTP(S)

atlas.ripe.net

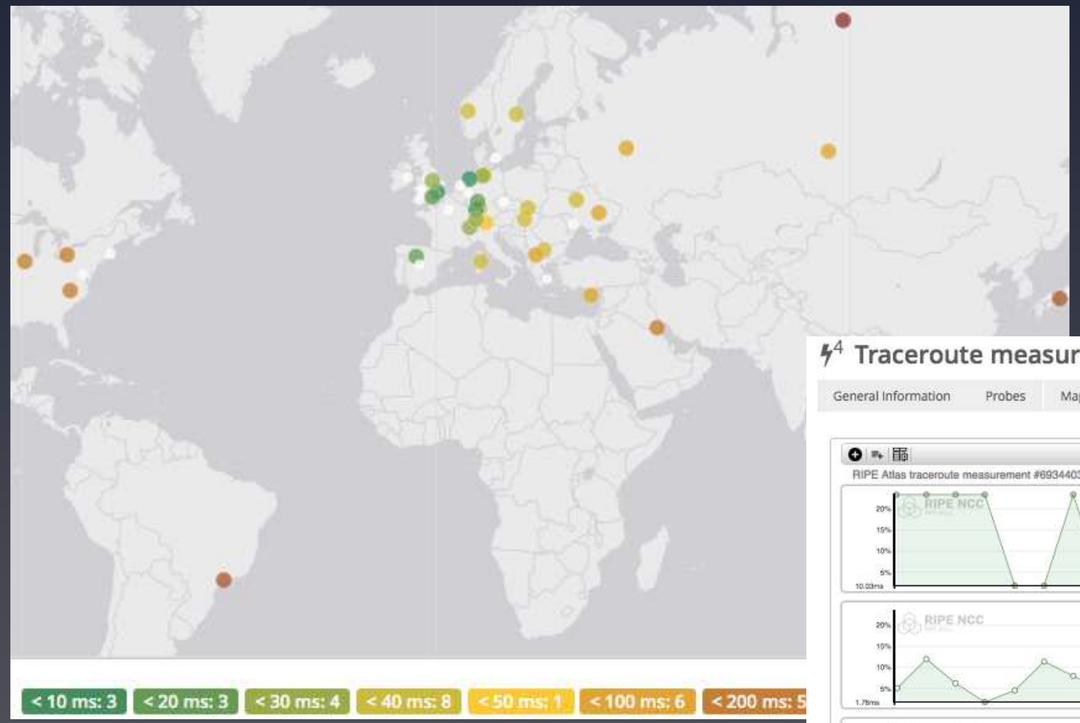
RIPE Atlas

- Monitor network reachability from thousands of global vantage points
- Troubleshoot network issues with quick connectivity checks
- Create alarms that work with your own monitoring tools
- Check responsiveness of DNS infrastructure, such as root name servers
- Test IPv6 connectivity





RIPE Atlas

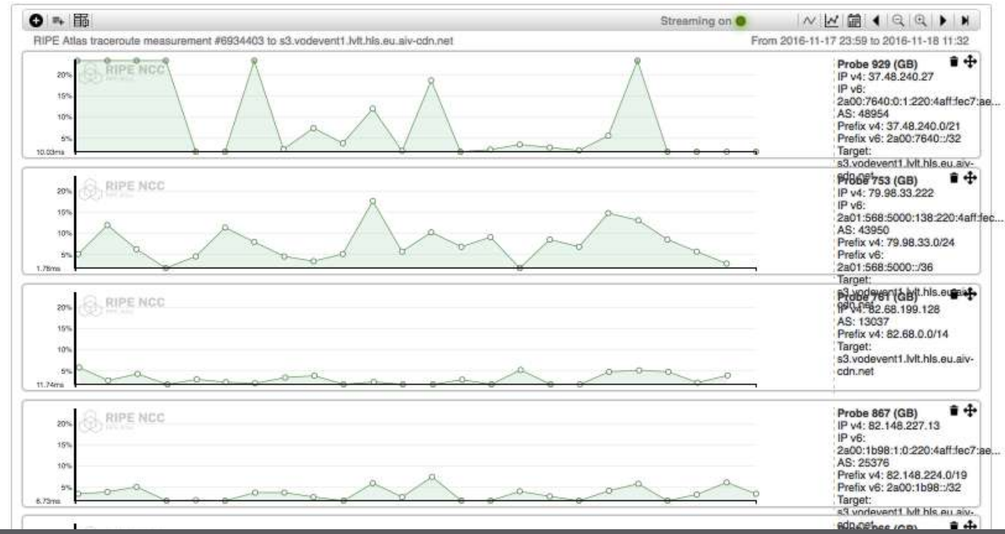


General Information | Probes | Map | LatencyMON | OpenIPMap Prototype | Results | Modification

Probe	ASN (IPv4)	ASN (IPv6)		Time (UTC)	RTT		Hops
2713	60706	60706		2016-11-18 10:52	33.192		14
2941	25394			2016-11-18 10:51	50.783		20
3055	6412			2016-11-18 10:53	150.683		15
3222	6829			2016-11-18 10:49	36.686		24
4166	50581			2016-11-18 10:52	39.533		16
4554	6703			2016-11-18 10:51	82.704		19
4952	3244			2016-11-18 10:51	35.700		19
6078	202040	202040		2016-11-18 10:47	9.279		14
6091	5459	5459		2016-11-18 10:50	9.719		14
					3.767		11
					16.946		19
					0.850		19
					2.699		11
					16.443		29

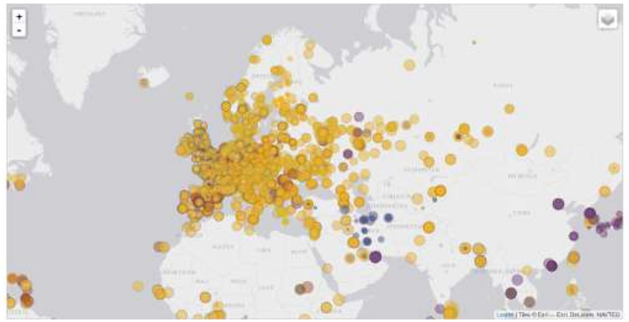
Traceroute measurement to s3.vodevent1.lvlt.hls.eu.aiv-cdn.net

General Information | Probes | Map | LatencyMON | OpenIPMap Prototype | Results | Modification Log



Internet Maps

DNS Root Instances



Comparative DNS Root RTT

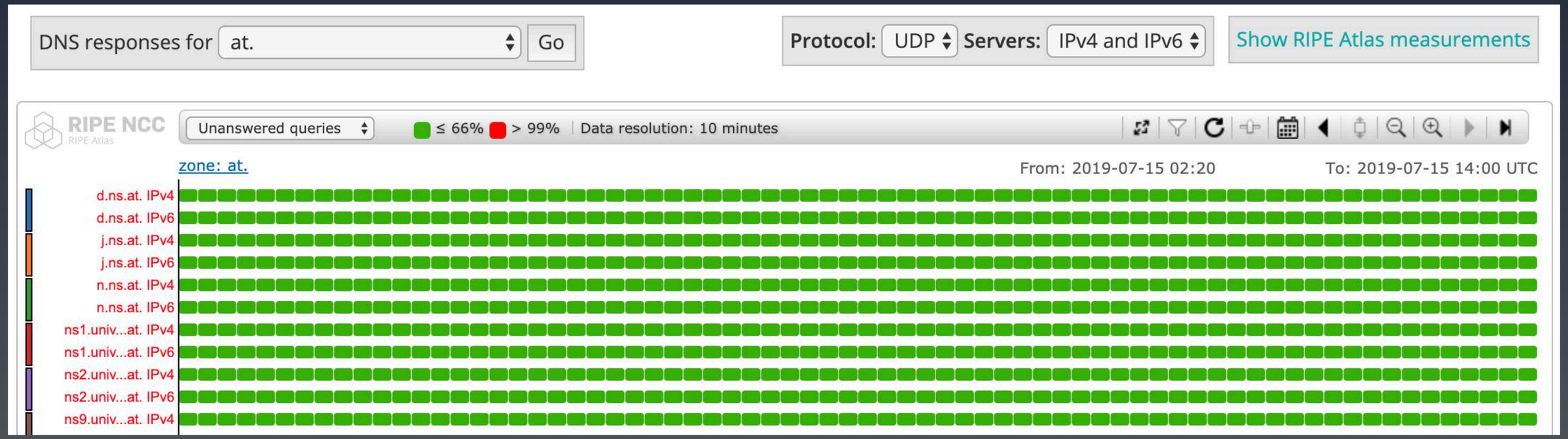
Root Server Performance

RTT to Fixed Destinations

Reachability of Fixed Destinations

Tools Based on RIPE Atlas

- DNSMON: Overview of quality of service offered by all DNS root and many TLD name servers



- DomainMON: Monitor DNS name servers for your own domain names

Tools Based on RIPE Atlas

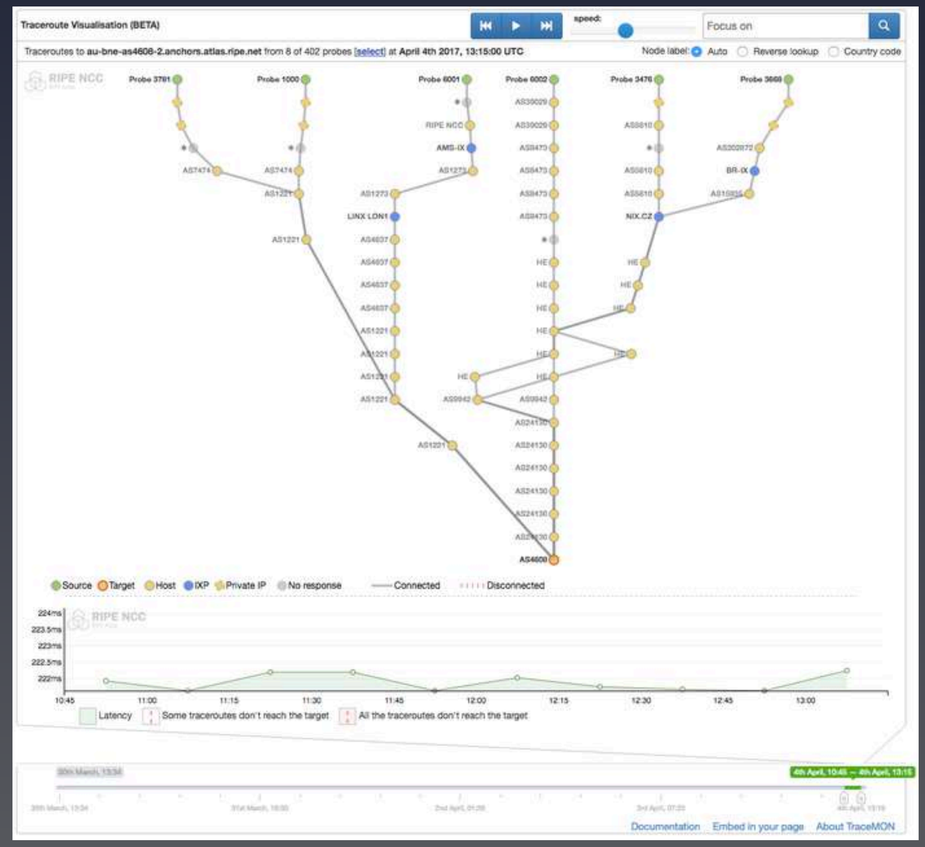
- LatencyMON: Visualise and compare latency trends

  - Performance comparisons reaching a service or website from different countries or providers
  - Comparing multiple ISPs or hosting providers at the same time, from vantage points with characteristics similar to those at the user or customer end
  - Measuring the spread of a network outage

https://labs.ripe.net/Members/massimo_candela/new-ripe-atlas-tool-latencymon

Tools Based on RIPE Atlas

- **TraceMON**: Investigate reachability and performance of targets in a network
  - Aggregates data from many sources (resource holder contacts, latency, Whois, BGP visibility, IP geolocation, IXP detection, reverse DNS lookup)
  - Provides information about each resource along the path
  - Detects IXPs traversed



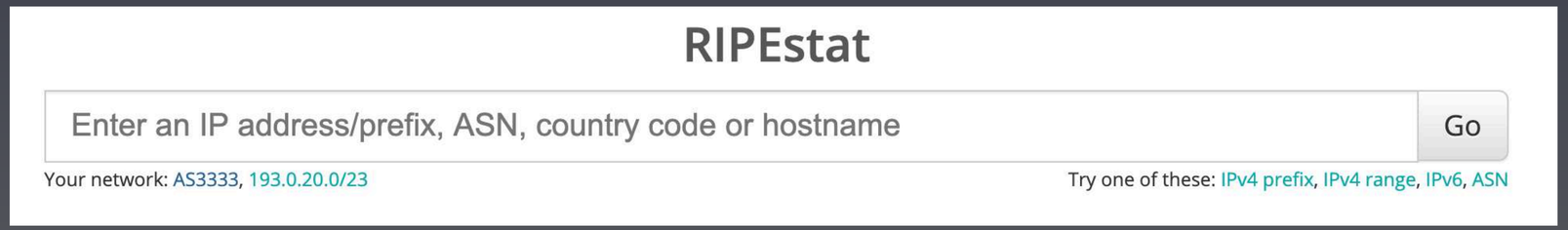
https://labs.ripe.net/Members/massimo_candela/tracemon-traceroute-visualisation-network-debugging-tool

RIPE Atlas

- Check out research papers using RIPE Atlas
  - https://en.wikipedia.org/wiki/RIPE_Atlas
- Check out RIPE Labs for ideas:
  - https://labs.ripe.net/atlas
- Apply for a probe or host an anchor
  - https://atlas.ripe.net/get-involved/become-a-host/
  - https://atlas.ripe.net/get-involved/become-an-anchor-host/
- Academics can ask for extra credits for free for research purposes

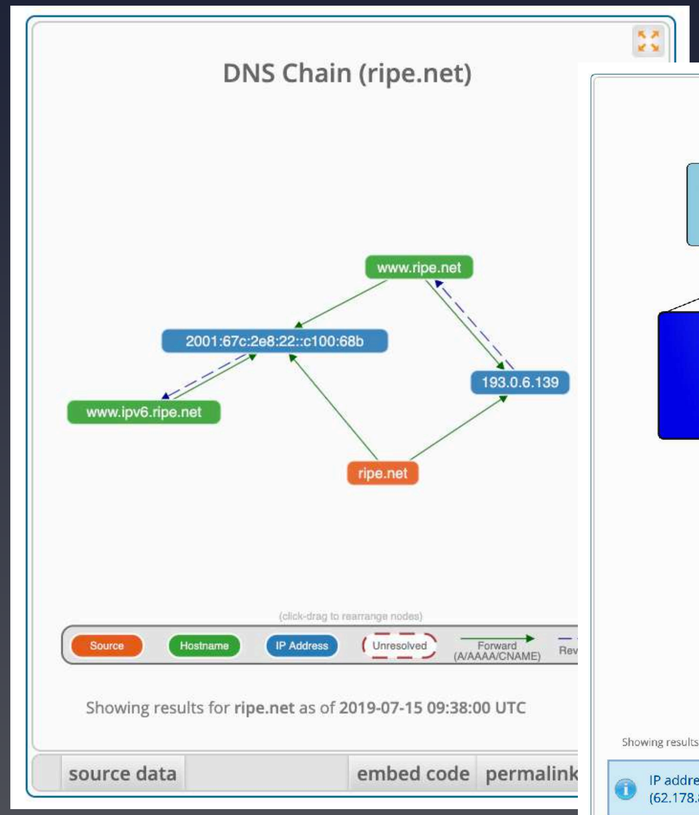
RIPE Stat

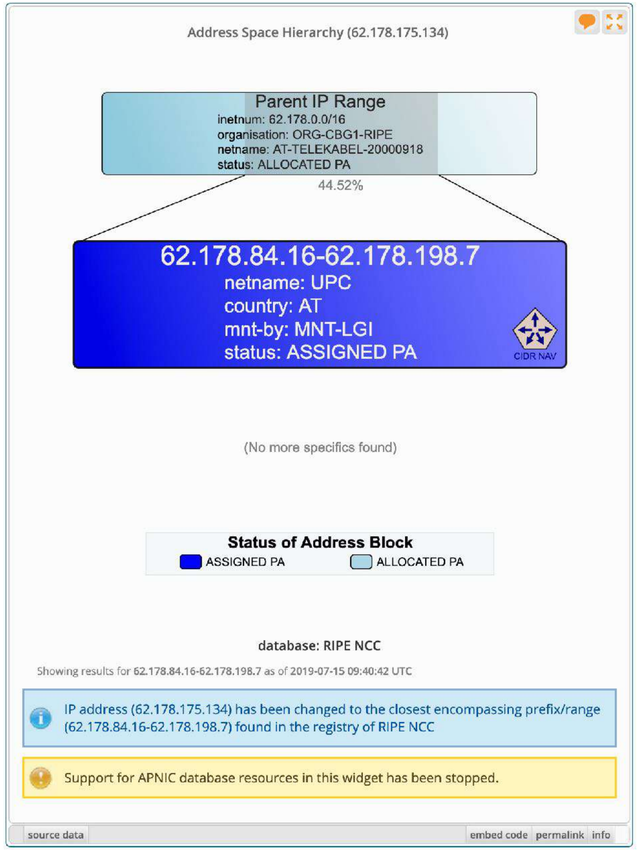
- Everything you want to know about Internet number resources
  - Registry data
  - Routing data
  - DNS data
  - Geolocation data
  - Abuse contacts

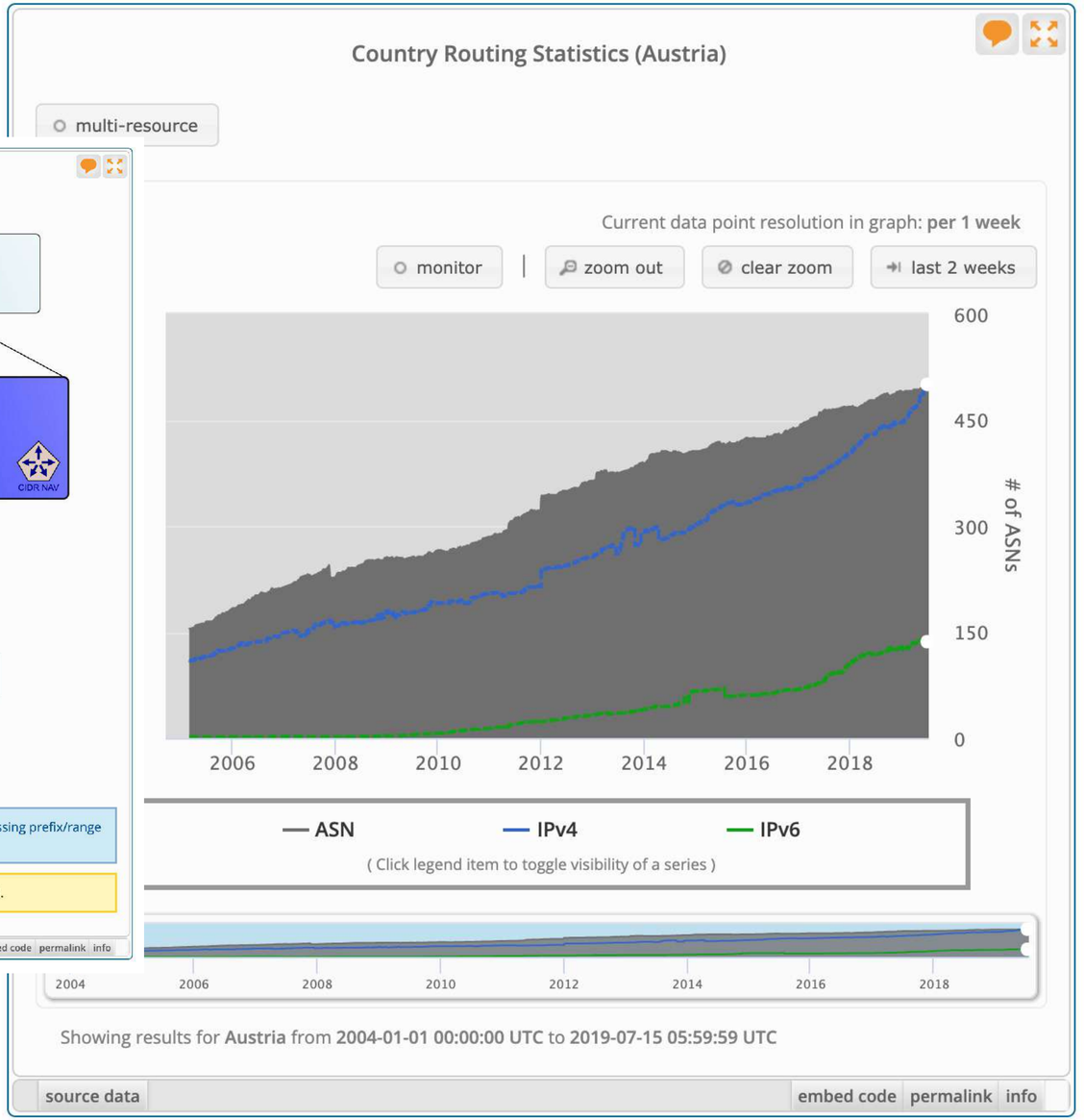


stat.ripe.net

RIPE Stat


DNS Chain (ripe.net)
www.ripe.net
2001:67c:2e8:22::c100:68b
193.0.6.139
www.ipv6.ripe.net
ripe.net
(click-drag to rearrange nodes)
Source
Hostname
IP Address
Unresolved
Forward (A/AAAA/CNAME)
Showing results for ripe.net as of 2019-07-15 09:38:00 UTC
source data
embed code
permalink

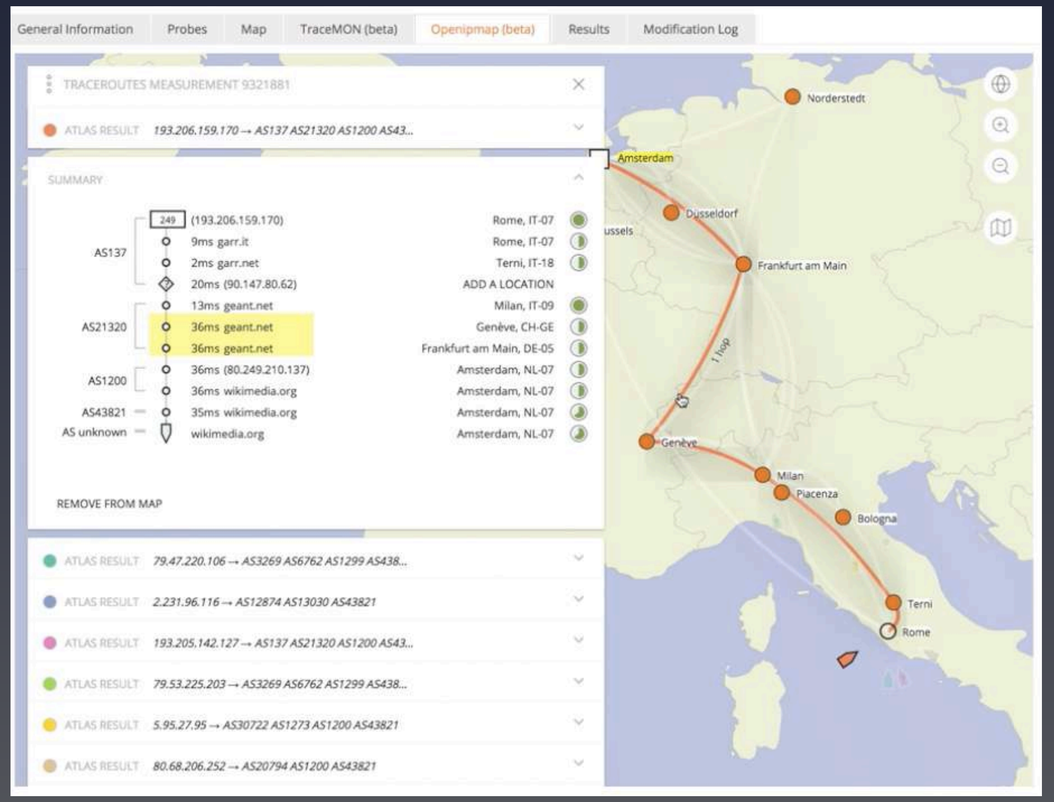

Address Space Hierarchy (62.178.175.134)
Parent IP Range
inetnum: 62.178.0.0/16
organisation: ORG-CBG1-RIPE
netname: AT-TELEKABEL-20000918
status: ALLOCATED PA
44.52%
62.178.84.16-62.178.198.7
netname: UPC
country: AT
mnt-by: MNT-LGI
status: ASSIGNED PA
CIDR NAV
(No more specifics found)
Status of Address Block
ASSIGNED PA
ALLOCATED PA
database: RIPE NCC
Showing results for 62.178.84.16-62.178.198.7 as of 2019-07-15 09:40:42 UTC
IP address (62.178.175.134) has been changed to the closest encompassing prefix/range (62.178.84.16-62.178.198.7) found in the registry of RIPE NCC
Support for APNIC database resources in this widget has been stopped.
source data
embed code
permalink
info


Country Routing Statistics (Austria)
multi-resource
Current data point resolution in graph: per 1 week
monitor
zoom out
clear zoom
last 2 weeks
600
450
300
150
0
# of ASNs
2006
2008
2010
2012
2014
2016
2018
ASN
IPv4
IPv6
(Click legend item to toggle visibility of a series)
2004
2006
2008
2010
2012
2014
2016
2018
Showing results for Austria from 2004-01-01 00:00:00 UTC to 2019-07-15 05:59:59 UTC
source data
embed code
permalink
info

RIPE IPmap

- Open, crowdsourced mapping of Internet infrastructure
  - There is an infrastructure gap in commercial geolocation products

ipmap.ripe.net



https://labs.ripe.net/Members/massimo_candela/ripe-ipmap-whats-under-the-hood

Online Learning

- The RIPE Academy (academy.ripe.net)
  - Local Internet Registry, RIPE Database, IPv6
  - Enrol and get a certificate (it's free!)
  - Down for maintenance 2-27 January; updated courses
- Webinars (ripe.net/support/training/learn-online/webinars)
  - RIPE Database, IPv6 addressing, RIPE Atlas, Internet Governance
  - You can also watch recordings of past webinars
- Coming soon: RIPE NCC Certified Professionals

RACI

The RIPE Academic Cooperation Initiative

What is RACI?

- Started in 2013 to connect the RIPE and research communities
- Allows academics to present and connect to industry, professionals
- Offers academics the chance to receive feedback from industry professionals
- Successful applicants receive meeting tickets, travel and accommodation to attend
- Applicants can publish their work through RIPE Labs (labs.ripe.net)

Examples of Relevant Topics

- Network measurements and analyses
- IPv6 deployment
- BGP routing
- Network security
- Internet governance
- Peering and interconnectivity
- Internet of Things

Submit short abstract and draft slides

By 19 January

- **MENOG 20: 15-19 March, Manama**
- **SEE 9: 20-21 April, Ljubljana**

By 9 February

- **RIPE 80: 11-15 May, Berlin**
- **ENOG 17: 8-9 June, Moscow**

ripe.net/raci

RACI so far

- about 75 applications per round (twice per year)
- 5-10 accepted for RIPE Meetings
- 2-3 accepted for MENOG, ENOG, SEE, RIPE NCC Days

- since 2015 - 78 academics from 32 countries funded
  - some multiple times

RACI at RIPE 78 in Reykjavik

Why take part?

- 77.50% made contact with industry professionals (network operators)
- 75.00% received useful feedback on their research
- 62.50% learnt about new ideas/tools/techniques which will be useful for future research
- 57.5% met people they could collaborate with
- 52.5% improved their presentation skills
- 50% made new academic contacts
- 15% made potential employment contacts

RACI in the RIPE community

- 30% of RACI attendees return to our meetings
- Chair RIPE Programme Committee
- Member SEE Programme Committee
- Member of Selection Committee for the RIPE NCC Community Projects Fund
- Done research at RIPE NCC offices
- Published multiple RIPE Labs articles

Testimonials

One of the best experiences in my PhD career.

The mentoring program was especially useful and vital for newcomers to get comfortable in the environment. I am still in contact with my mentor.

I was able to meet and interview many of the engineers whose decisions I was studying through measurements. This provided me with many insights that turned out the be crucial for my PhD.

RACI is a great opportunity to meet people that actually run today's networks, understanding relevant concerns and needs.

Usually, I attend conferences with people from similar expertise and research areas - mostly from academia. It was different at a RIPE Meeting. The dynamics, the range of expertise, as well as the diversity it represents, was quality.

The RIPE meeting is a unique event to meet the Internet community and share ideas. It is a friendly and supportive community, helping to expand our network for future research and jobs.

Testimonials

When I applied for the RACI programme in 2017, I had ***just started*** working on my master thesis, an empirical study about operators' view on security misconfigurations. Talking in front of ***my target group*** about things they knew way more about than I, ***was scary***. However, the study gained a lot of feedback, credibility and ***international interest***, and would not have been as successful without putting it out there.

Constanze Dietrich, then Technical University Berlin, now LEXTA Consultants

What are you waiting for?

- Presentations, videos and RIPE Labs articles of alumni:

  ripe.net/participate/ripe/raci/alumni

- Subscribe to the mailing List:

  ripe.net/raci/mailing-list

RACI Presentations at ENOG 16

- Oleksandr Tsaruk, École des Ponts Business School, France
  Hybrid Nature of Modern Threats for Cybersecurity and Information Security | Video

RACI Presentations at RIPE 78

- Ali Safari Khatouni, Dalhousie University, Canada
  Implications of Roaming in Europe | Video
- Carolina Are, University of London, UK
  Flaming Isn't Funny: Patterns Towards the Understanding of Online Abusers | Video | RIPE Labs article
- Danilo Giordano, Polytechnic University of Turin, Italy
  Five Years at the Edge: Watching Internet from the ISP Network | Video | RIPE Labs article
- Ignacio Castro, Queen Mary University of London, UK
  10 Years of IXP Growth and its Impact on End-to-End Paths | Video | RIPE Labs article
- Katarzyna Wasielewska, State University of Applied Sciences, Poland
  Available Bandwidth Estimation Problem – Network Calculus in Practice | Video
- Marijana Cosovic, University of East Sarajevo, Bosnia and Herzegovina
  Performance Evaluation of BGP Anomaly Classifiers
- Mattijs Jonker, University of Twente, Netherlands
  A First Joint Look at DoS Attacks and BGP Blackholing in the Wild | Video
- Niels ten Oever, University of Amsterdam, Netherlands
  Taking the High Route | Video
- Timmy Schüller, Osnabrück University, Germany
  Real-world Pitfalls of Segment Routing Traffic Engineering | Video

RACI Presentations at RIPE NCC Day Moscow

- Louis Pétiniaud, Institut Français de Géopolitique
  Geopolitics of Routing | Video | RIPE Labs article

RACI Presentations at MENOG 19

- Louis Pétiniaud, Institut Français de Géopolitique and Loqman Salamatian, Géode, France
  Geopolitics of Routing | Video 1 | Video 2
- Ahmed Aleroud, Yarmouk University, Jordan

Questions

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