RIPE NCC
RIPE NETWORK COORDINATION CENTRE

ANNUAL
REPORT 2019

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The RIPE NCC Management Team consists of (from left to right):
Felipe Victolla Silveira, *Chief Operations Officer*
Kaveh Ranjbar, *Chief Information Officer*
Gwen van Berne, *Chief Financial Officer*
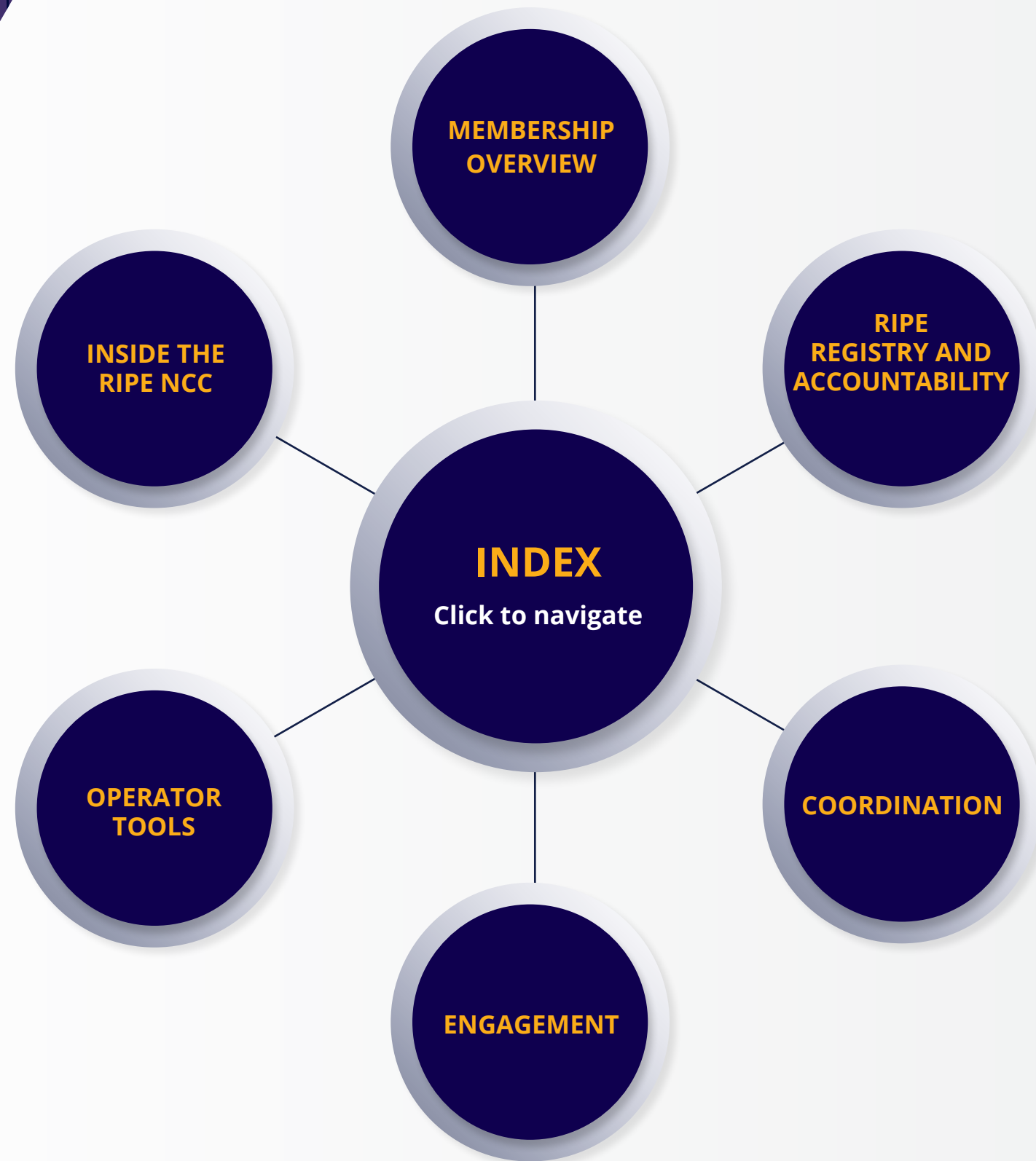
WELCOME TO THE RIPE NCC'S ANNUAL REPORT

This report gives you an overview of everything that happened at the RIPE NCC in 2019 and aligns with our Activity Plan and Budget 2019.

2019 was a transition year at the RIPE NCC. We had to handle a sharp increase in our membership, IPv4 runout, an organisational structure change and the departure of RIPE NCC's Managing Director, Axel Pawlik. It was not easy, but we've learnt a lot along the way.

The year started with a Roundtable meeting in Brussels where we talked to governments, regulators and other stakeholders. Cooperation is key to ensure the future growth and continued stability of the Internet, and we've made significant progress in establishing partnerships to help us navigate the complex waters of national and international regulations.

The biggest story of 2019 was, of course, IPv4 runout. Our staff worked tirelessly for months ahead of the runout to iron out every detail and prepare the transition to the waiting list. Parallel to that, our membership skyrocketed, and we had to process an unprecedented amount of registration requests in a very short time. In the end, everything went smoothly thanks to the outstanding work of our colleagues, and we were relieved that nothing broke.

We were also pleased to see that our call for more considerable progress on IPv6 resonated with many of our members. We will continue to do our best to support them in transitioning from IPv4 to IPv6.

Throughout the year, we continued our efforts to decentralise management, empower our staff and decrease bureaucracy as part of our culture change programme. Change takes time, and we faced many hurdles to implement this new system, but we are now on track to transform the organisation for the better.

Every three years, we take the pulse of our membership to listen to their needs and set new priorities. The 2019 RIPE NCC Survey had an impressive turnout, with 4,161 respondents, and gave us great insights into how our service and tools are perceived by members and highlighted areas of improvements. This survey will help shape our activities for the coming years. We also worked closely with our Executive Board over the past year to ensure that our actions are aligned with membership needs.

Lastly, Axel Pawlik announced that he was moving on after 20 years as Managing Director of the RIPE NCC. While we were saddened to see Axel leave, we are deeply grateful for all of his work at the head of the RIPE NCC. After Axel's departure, we've done our best to run the organisation during the transition period and are now happy to hand it over to Hans Petter Holen, the RIPE NCC's new Managing Director.

VIEW FROM THE RIPE NCC EXECUTIVE BOARD

CHRISTIAN KAUFMANN, EXECUTIVE BOARD CHAIRMAN

From left to right,
Falk von Bornstaedt,
Christian Kaufmann,
Maria Häll,
Remco van Mook,
Piotr Strzyżewski,
Salam Yamout,
Ondřej Filip

The long-predicted and much-discussed exhaustion of the RIPE NCC's pool of available IPv4 addresses finally took place in November 2019. The months leading up to the runout involved lot of meticulous preparation, including making changes to processes, setting up the Waiting List, handling a huge rise in membership applications while ensuring due diligence was maintained, managing policy developments and of course, keeping members well-informed.

Another big change that took place was Axel Pawlik's decision to step down as Managing Director of the RIPE NCC after 20 years. Axel's leadership has seen the RIPE NCC grow from a small membership organisation to one that counts nearly 20,000 members. He has seen the evolution of the RIPE community from a core group of technical experts to a much wider range of stakeholders and was instrumental in guiding this expansion. We have worked closely with Axel over the past two decades, and I would like to thank him for the years he has dedicated to the RIPE NCC and the RIPE community.

The Executive Board has since appointed Hans Petter Holen as the new Managing Director. He is a long-standing member of the RIPE community and brings extensive Management and Change Management experience with him. We look forward to a productive and strong working relationship with him in the years to come.

The RIPE NCC has also been undergoing a structured organisational change programme, to transition from a top-down hierarchy to a flatter, self-organised structure. The organisation is now halfway through this transition, and we expect that all teams will have moved to the new system by the end of 2020. This is aimed at improving the ease of collaboration across teams, increasing the organisational agility to respond to changing scenarios and empowering staff, to ensure that the RIPE N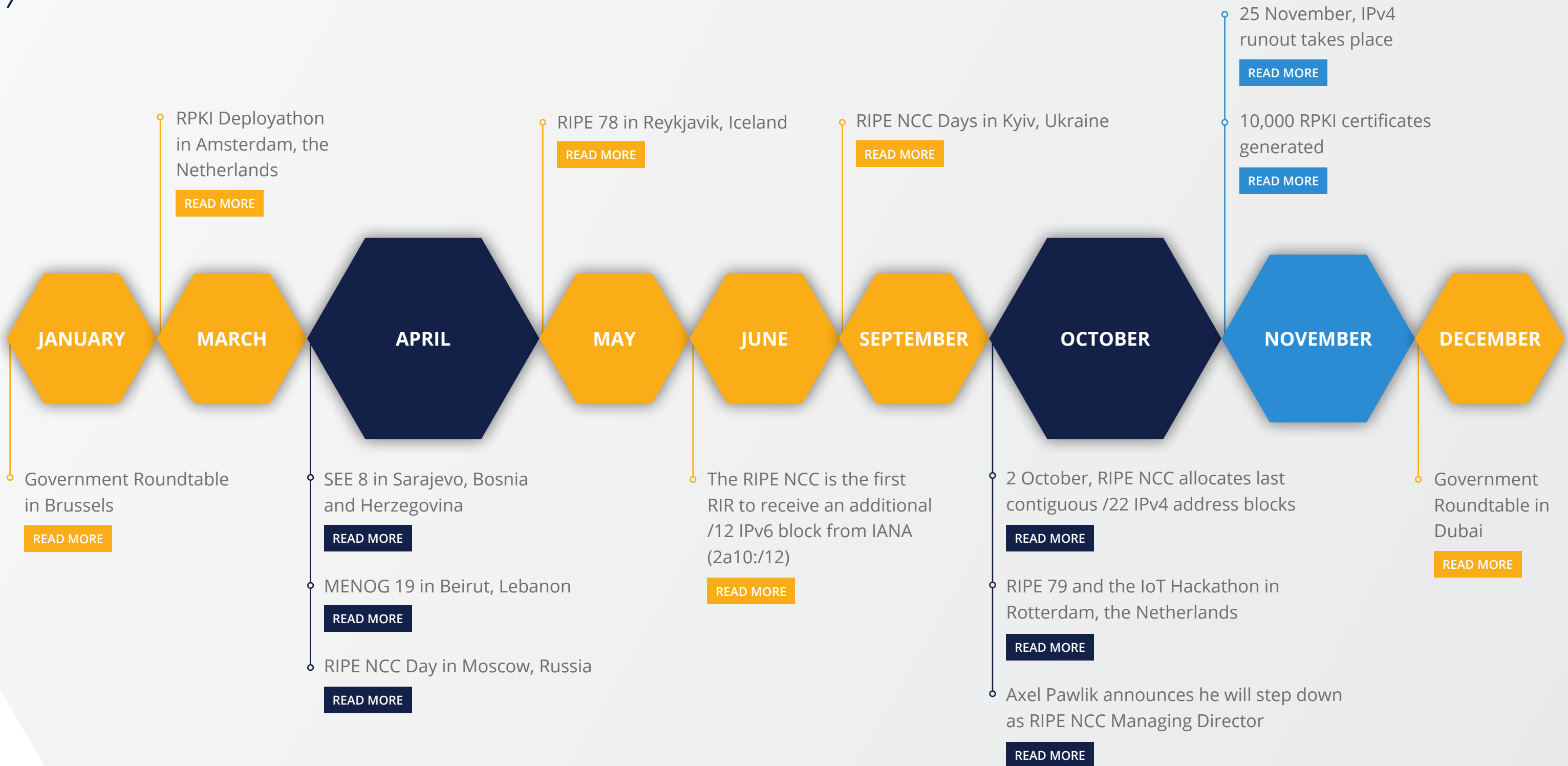CC is ready to meet the challenges of the coming years. We also constantly endeavour to improve the transparency of RIPE NCC's operations and will ensure that major expenditures are more clearly reported going forward.

We received 4,161 responses to the RIPE NCC Survey in 2019 and this has given us several insights into what creates value for our membership. The survey showed that members appreciate our overall service delivery and shed light on their concerns regarding issues such as IPv4 scarcity, IPv6 deployment, security, regulation and more. We will use this data to inform the RIPE NCC's strategy and actions over the coming years.

We now have the highest number of new members and LIRs in our 30-year history. The Executive Board welcomes hearing from all of our members, whether in person at the many events we attend or on the mailing lists. As our membership numbers grow, hearing a range of voices is crucial for the Board to make balanced decisions. We are here to listen to you.

The Executive Board is responsible for ensuring that the RIPE NCC serves member needs and is well-placed to meet commitments to various stakeholders. IPv4 exhaustion brings in its wake new challenges such as strengthening due diligence to safeguard resource holders. With RPKI use growing rapidly, we also have a role to play in helping operators secure routing, and as the survey showed, network operators are increasingly turning to RIPEstat and RIPE Atlas, our Internet measurement tools. The insights provided by country or regional reports have been appreciated by governments and industry alike, and training remains a much-demanded service. Delivering value to our members remains at the core of all our activities. 2019 has been a year of change, but we are confident that we are well-positioned for the challenges of the year ahead.

HIGHLIGHTS OF THE YEAR

RPKI Deployathon in Amsterdam, the Netherlands

READ MORE

RIPE 78 in Reykjavik, Iceland

READ MORE

RIPE NCC Days in Kyiv, Ukraine

READ MORE

25 November, IPv4 runout takes place

READ MORE

10,000 RPKI certificates generated

READ MORE

JANUARY   MARCH   APRIL   MAY   JUNE   SEPTEMBER   OCTOBER   NOVEMBER   DECEMBER

Government Roundtable in Brussels

READ MORE

SEE 8 in Sarajevo, Bosnia and Herzegovina

READ MORE

MENOG 19 in Beirut, Lebanon

READ MORE

RIPE NCC Day in Moscow, Russia

READ MORE

The RIPE NCC is the first RIR to receive an additional /12 IPv6 block from IANA (2a10:/12)

READ MORE

2 October, RIPE NCC allocates last contiguous /22 IPv4 address blocks

READ MORE

RIPE 79 and the IoT Hackathon in Rotterdam, the Netherlands

READ MORE

Axel Pawlik announces he will step down as RIPE NCC Managing Director

READ MORE

Government Roundtable in Dubai
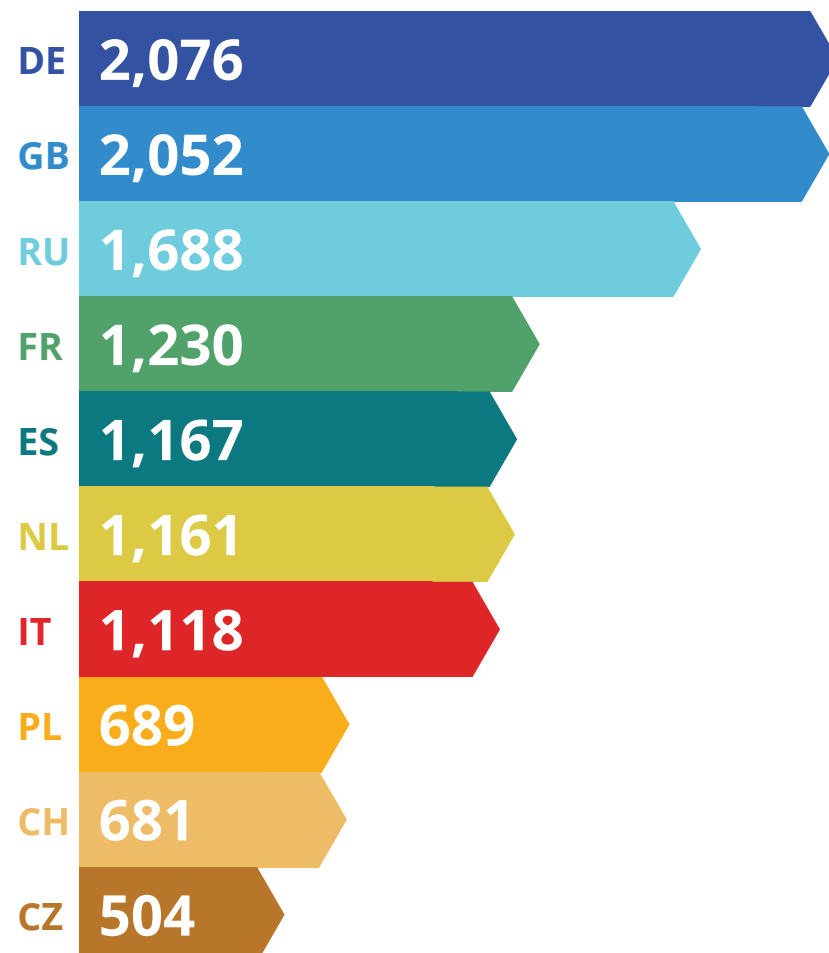
READ MORE

MEMBERSHIP OVERVIEW

We saw our highest membership growth ever in 2019. While membership has been growing steadily over the past few years, IPv4 runout pushed our numbers to an all-time high of 25,125 LIRs as of 31 December 2019. In the years to come, we expect to see more consolidation as LIR accounts merge, and lower growth rates. Managing this membership growth and maintaining a high standard of service delivery was one of our focus areas for 2019. We also carried out a member survey, which takes place once every three years.
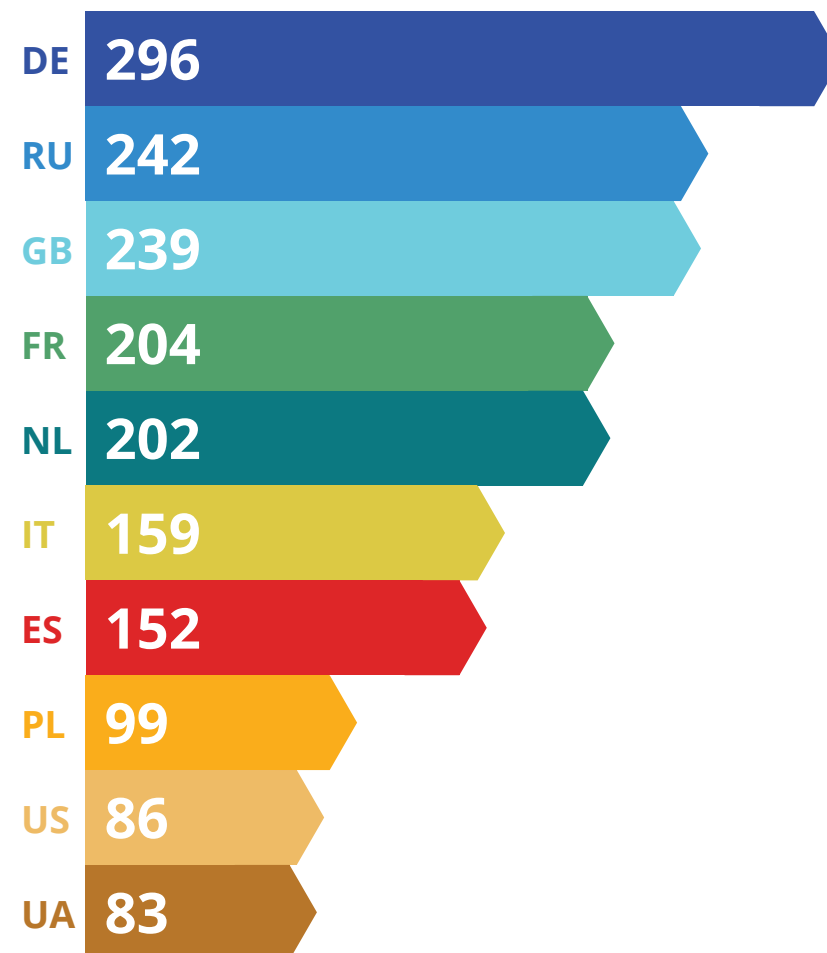
MEMBERSHIP OVERVIEW

All numbers are as of 31 December 2019. Please note that a member can hold more than one LIR.
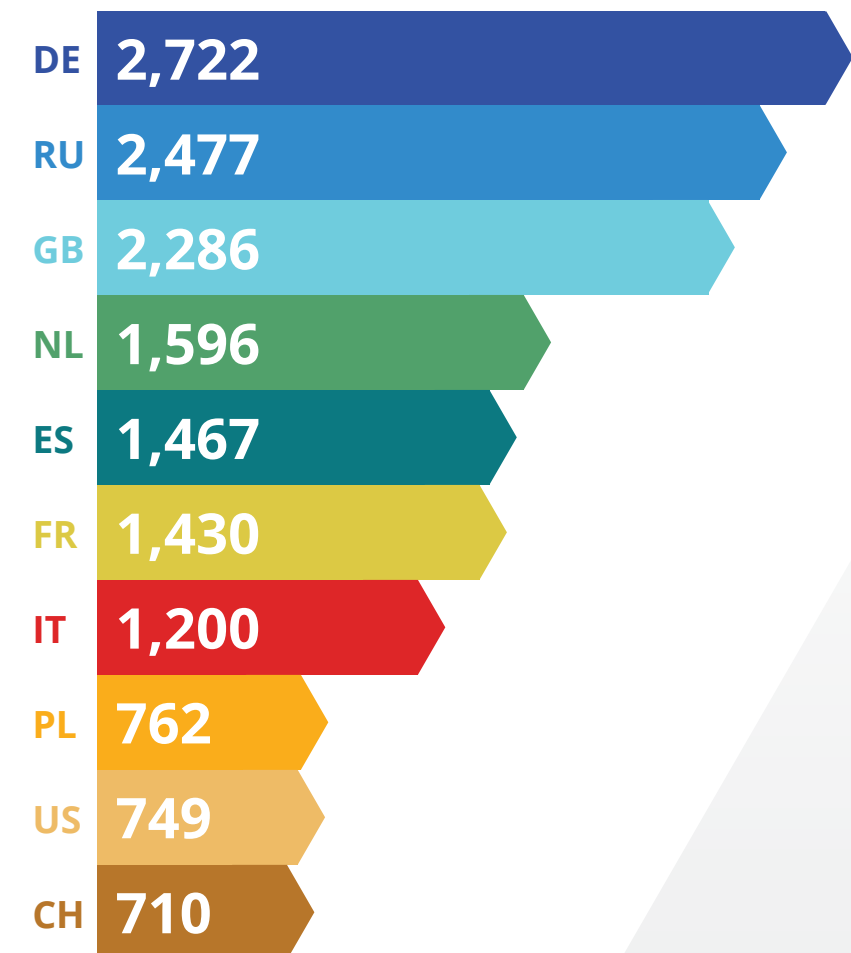
25,125	6,060	118	19,981	14,762
Active LIRs	New LIRs	Member countries	Total number of active members	Members with an IPv6 allocation

MEMBERS BY COUNTRY TOP 10

DE	2,076
GB	2,052
RU	1,688
FR	1,230
ES	1,167
NL	1,161
IT	1,118
PL	689
CH	681
CZ	504

NEW MEMBERS BY COUNTRY TOP 10

DE	296
RU	242
GB	239
FR	204
NL	202
IT	159
ES	152
PL	99
US	86
UA	83

LIRS BY COUNTRY TOP 10

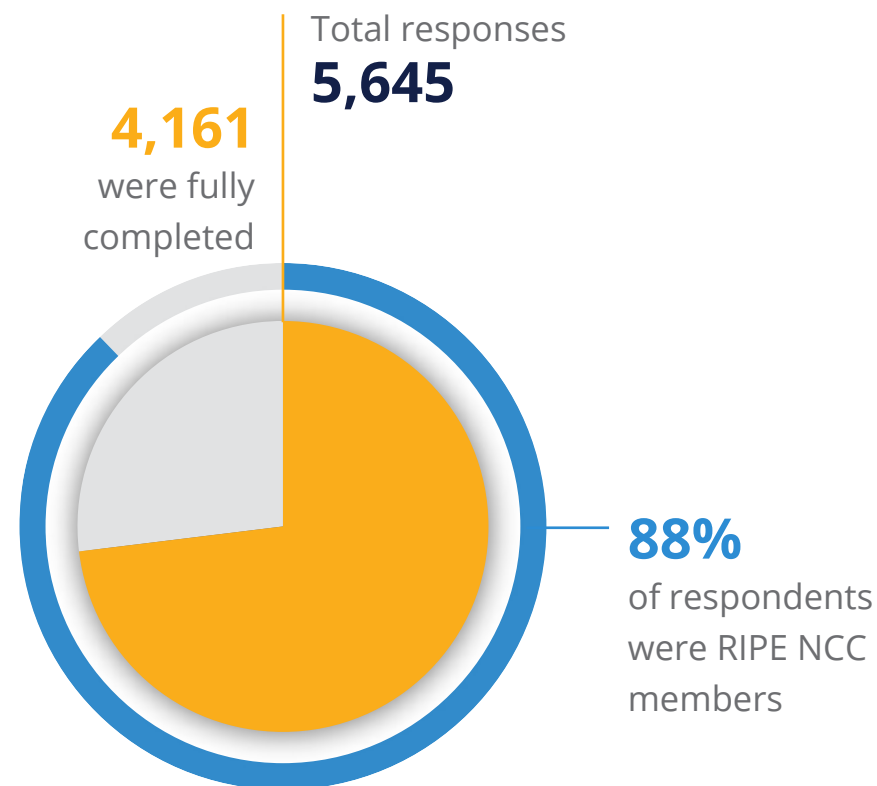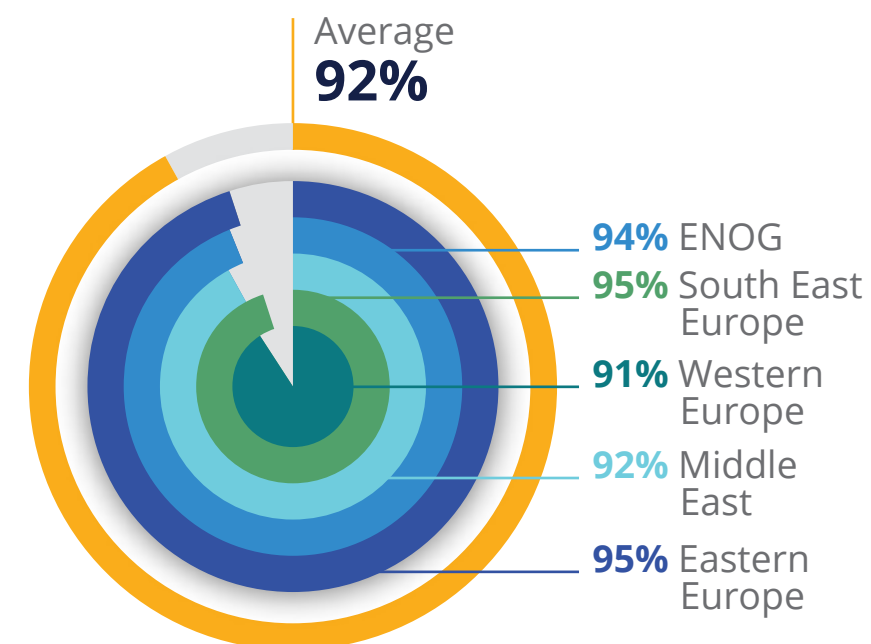|	
DE	2,722
RU	2,477
GB	2,286
NL	1,596
ES	1,467
FR	1,430
IT	1,200
PL	762
US	749
CH	710

THE RIPE NCC SURVEY 2019

Conducted once every three years, the RIPE NCC Survey helps us to better understand the needs of our members and to shape our future priorities. The survey was conducted by Survey Matters, a research and analytics agency specialised in member-based organisations.

For the first time, we translated the survey and made it available in Arabic, Farsi, French, Italian, Polish, Russian, Spanish and Turkish in addition to English. 44% of responses were in a language other than English.

READ MORE

Total responses
5,645

4,161
were fully
completed

88%
of respondents
were RIPE NCC
members

RIPE NCC QUALITY OF SERVICE DELIVERY FROM SURVEY FEEDBACK

Average
92%

94% ENOG
95% South East Europe
91% Western Europe
92% Middle East
95% Eastern Europe

In a nutshell:

- The quality of RIPE NCC service delivery was rated 'Good' or 'Excellent' by 92% on average.

- 51% said network security is one of the top three challenges facing their organisation.

- 53% indicated a need for more IPv4 addresses in the coming 2-3 years.

- 27% believe that changes in government regulation will affect their organisation.

- RIPEstat is our most used tool, with 34% saying they use it often.

- 22% of respondents have fully deployed IPv6, and another 30% stated that they have only very recently started deployment or are testing IPv6.
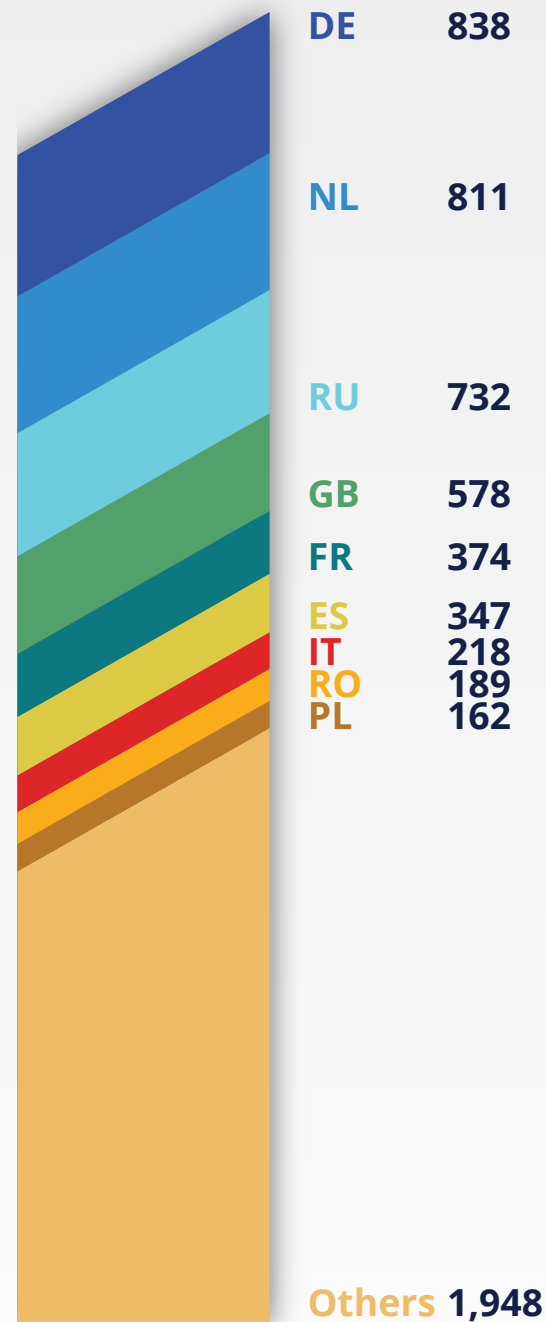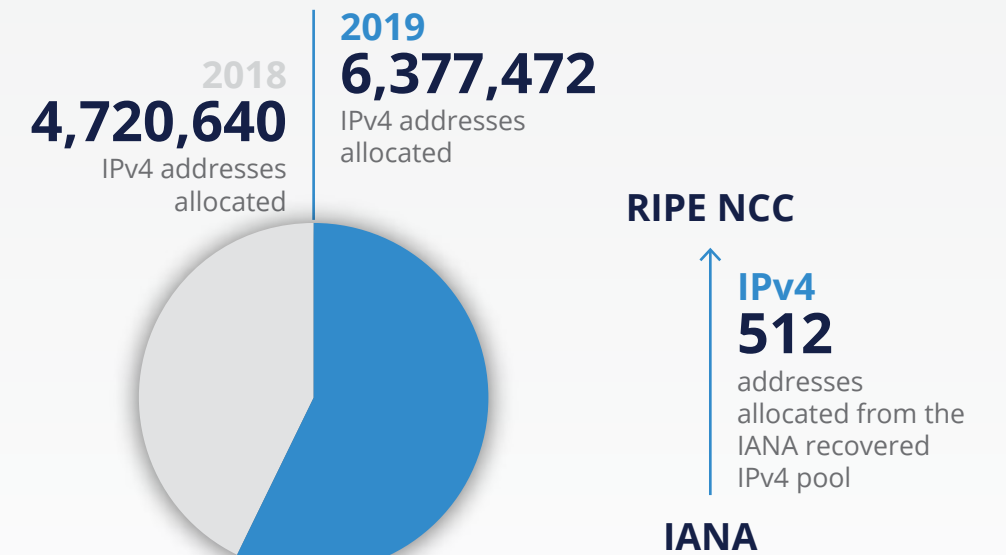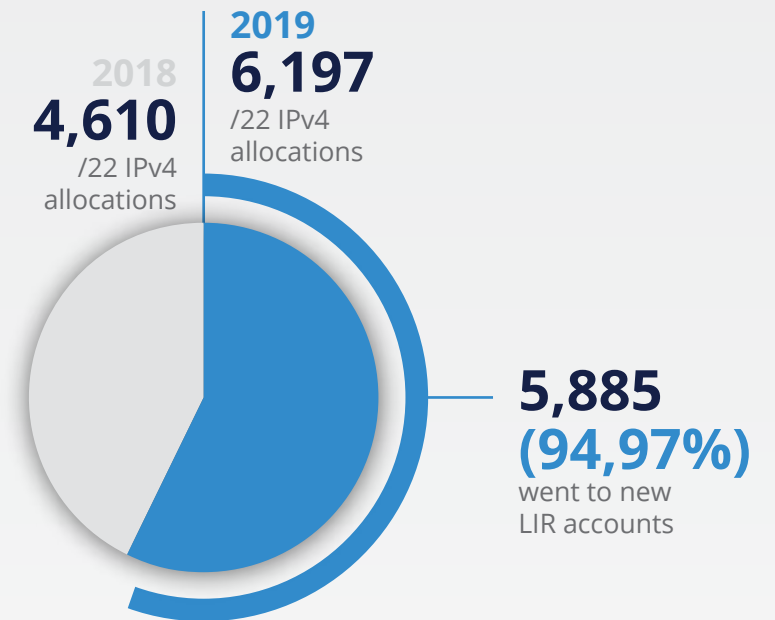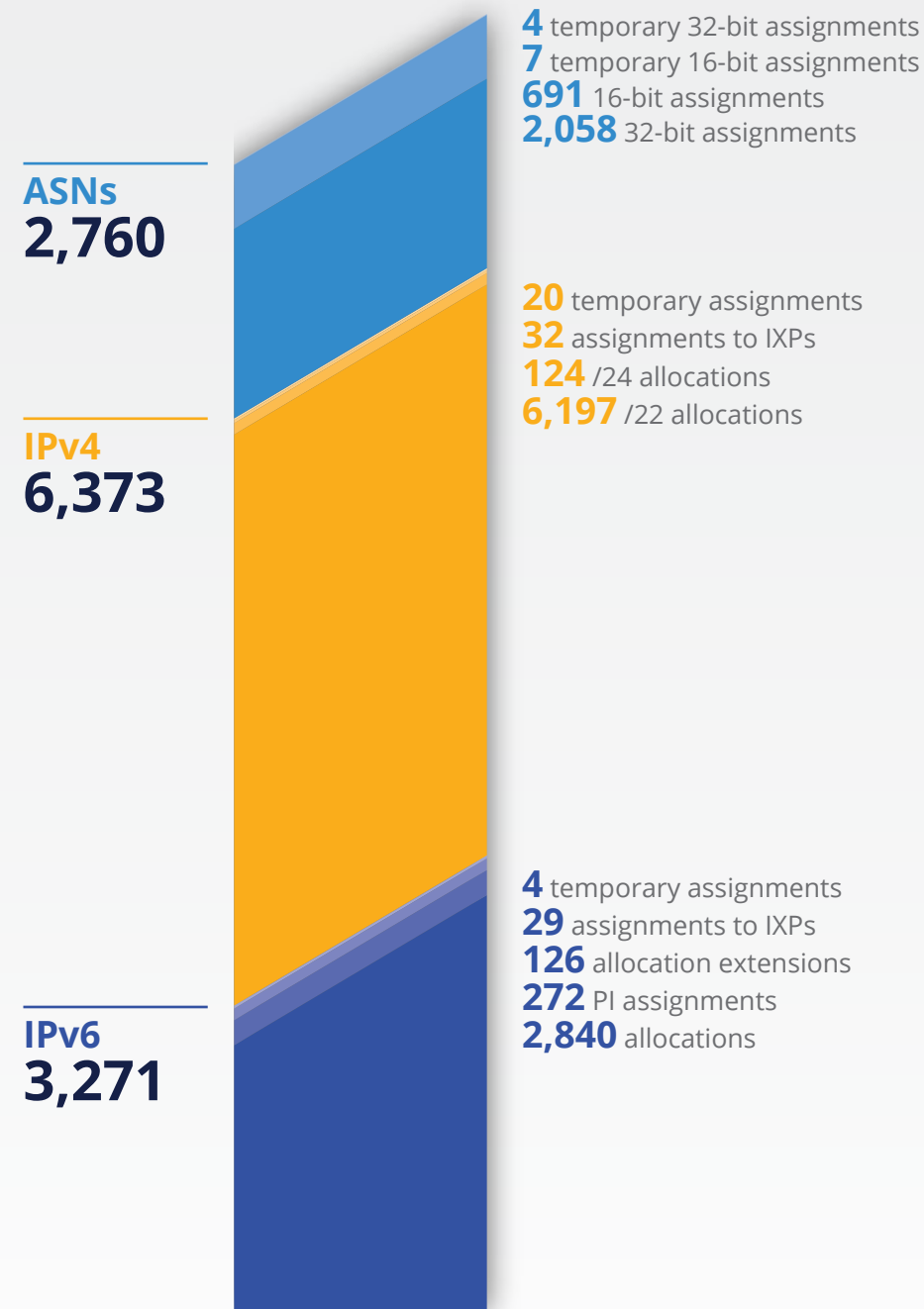
RIPE REGISTRY AND ACCOUNTABILITY

In 2019, we stepped-up our due-diligence efforts to tackle abuse and ensure the accuracy of the RIPE Registry. We increased our Assisted Registry Checks (ARCs), investigated a high number of hijacks, handled abuse reports and validated a large part of the abuse-c contact information stored in the RIPE Database.

INTERNET NUMBER RESOURCES OVERVIEW

IPV4 /22 ALLOCATIONS BY COUNTRY

DE	838
NL	811
RU	732
GB	578
FR	374
ES	347
IT	218
RO	189
PL	162
Others	1,948

ALLOCATIONS AND ASSIGNMENTS

ASNs
2,760

IPv4
6,373

IPv6
3,271

4 temporary 32-bit assignments
7 temporary 16-bit assignments
691 16-bit assignments
2,058 32-bit assignments

20 temporary assignments
32 assignments to IXPs
124 /24 allocations
6,197 /22 allocations

4 temporary assignments
29 assignments to IXPs
126 allocation extensions
272 PI assignments
2,840 allocations

2018
4,610
/22 IPv4 allocations

2019
6,197
/22 IPv4 allocations

5,885
(94,97%)
went to new LIR accounts

2018
4,720,640
IPv4 addresses allocated

2019
6,377,472
IPv4 addresses allocated

RIPE NCC

IPv4
512
addresses allocated from the IANA recovered IPv4 pool
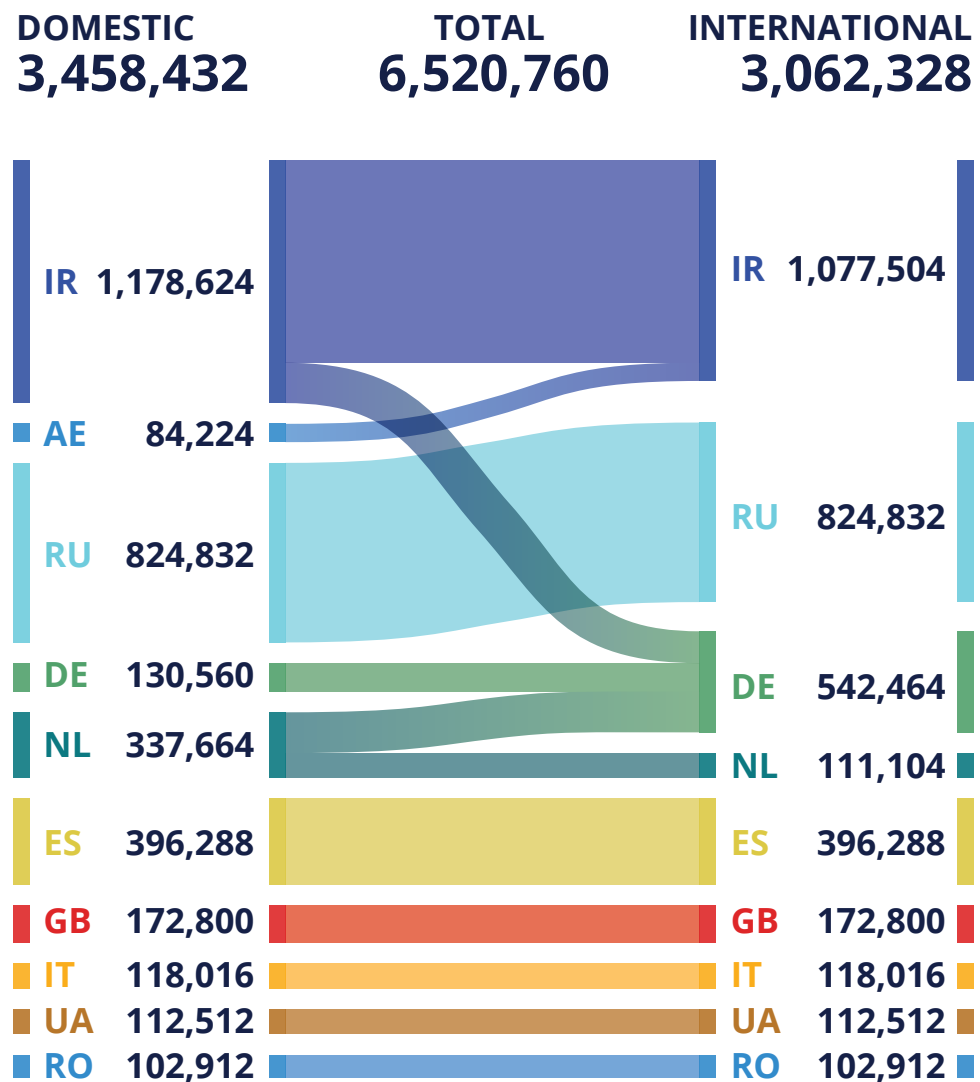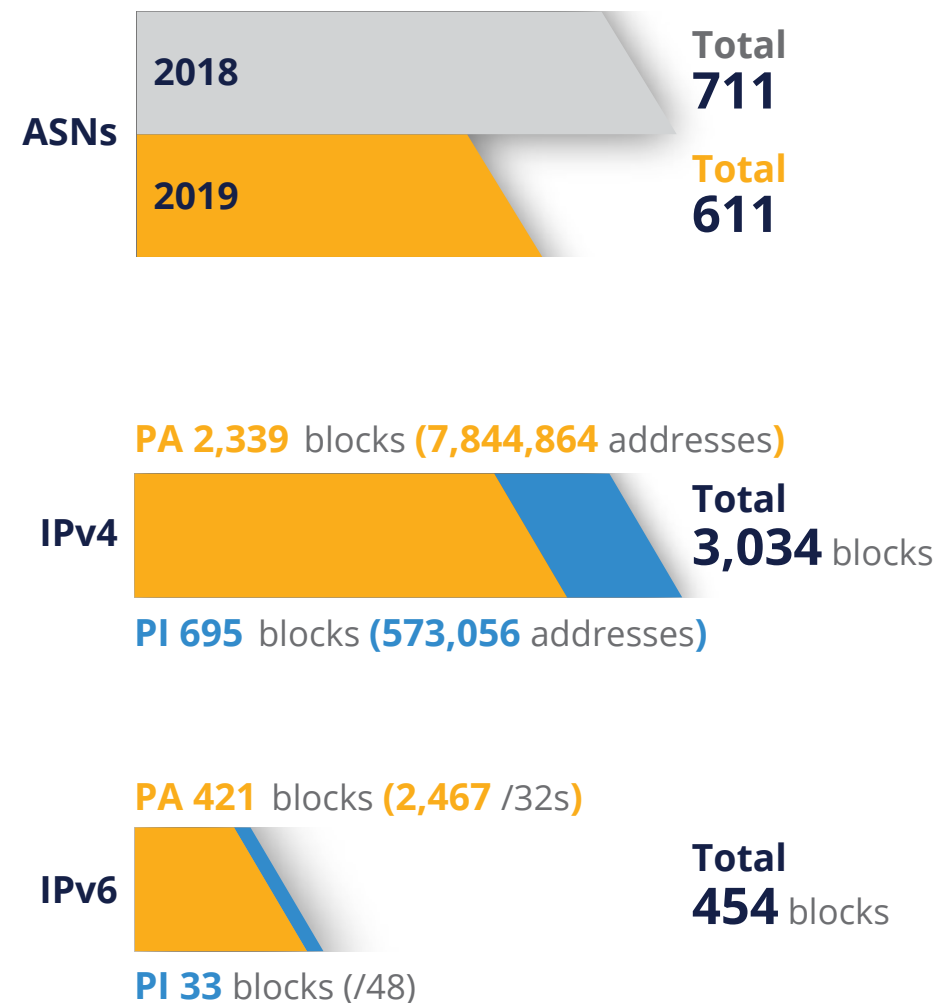
IANA

TRANSFERS OVERVIEW

Here is an overview of IPv4 address transfers between the RIPE NCC and other RIRs, and within the RIPE NCC service region.

To correctly visualise the inbound and outbound flow of IPv4 address transfers between countries (intra-RIR transfers), we manually corrected the data set. We looked at big policy transfers, larger than a /18, and excluded those that resulted from internal shifting of resources to get a more accurate representation.
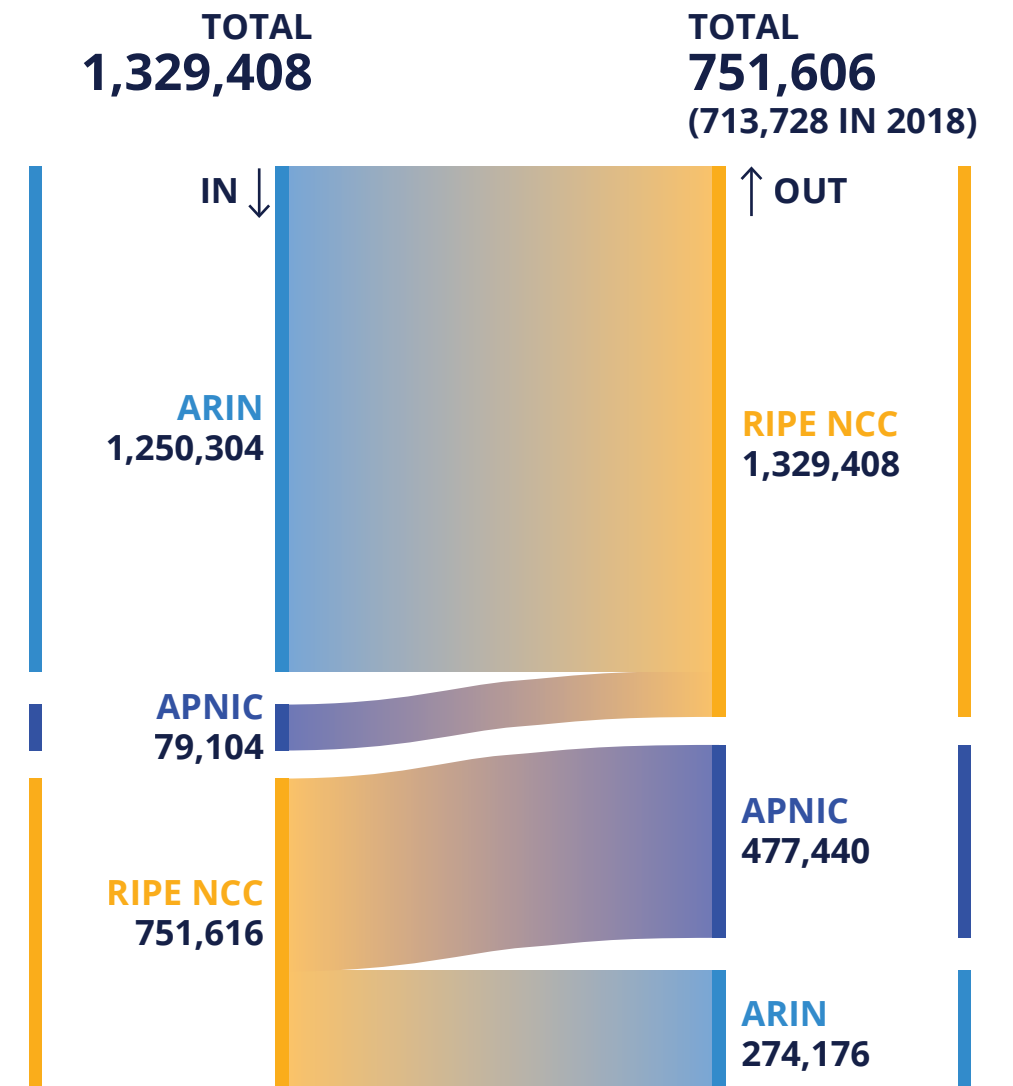
INTRA-RIR TRANSFERS BY COUNTRY - TOP 10 (IPv4)

DOMESTIC	TOTAL	INTERNATIONAL
3,458,432	6,520,760	3,062,328

IR	1,178,624	IR 1,077,504
AE	84,224	RU 824,832
RU	824,832	DE 542,464
DE	130,560	NL 111,104
NL	337,664	ES 396,288
ES	396,288	GB 172,800
GB	172,800	IT 118,016
IT	118,016	UA 112,512
UA	112,512	RO 102,912
RO	102,912	

TRANSFERS WITHIN THE RIPE NCC'S SERVICE REGION

ASNs
- 2018 — Total **711**
- 2019 — Total **611**

IPv4
- PA 2,339 blocks (7,844,864 addresses)
- PI 695 blocks (573,056 addresses)
- Total **3,034** blocks

IPv6
- PA 421 blocks (2,467 /32s)
- PI 33 blocks (/48)
- Total **454** blocks

INTER-RIR TRANSFERS (IPv4)

TOTAL	TOTAL
1,329,408	751,606 (713,728 IN 2018)

IN ↓   ↑ OUT

ARIN 1,250,304 → RIPE NCC 1,329,408

APNIC 79,104

RIPE NCC 751,616 → APNIC 477,440

ARIN 274,176

IPv4: THE ROAD TO RUNOUT

2009

15 DECEMBER • "Run out Fairly" accepted by the RIPE community - aimed at gradually reducing the allocation and assignment periods in step with the expected 'life time' of the IPv4 unallocated pool.

READ MORE

2011

19 JANUARY • "Allocations from the last /8" accepted by the RIPE community - described how the RIPE NCC should distribute IPv4 space from the last /8 block. Each LIR could get only one /22 allocation.

READ MORE

3 FEBRUARY • IANA exhausts its free pool of IPv4 addresses. Each RIR receives one final /8 block. RIPE NCC receives 185/8.

READ MORE

2012

14 SEPTEMBER • RIPE NCC starts allocating /22s from the last /8.

READ MORE

17 OCTOBER • First IPv4 transfer within the RIPE NCC service region takes place.

READ MORE

2014

20 MAY • LACNIC reaches the last /9 of IPv4 space, triggering "Global Policy for Post Exhaustion IPv4 Allocation Mechanisms". IANA starts allocating recovered IPv4 address space to each of the five RIRs.

READ MORE

2018

17 APRIL • RIPE NCC allocates the last /22 from 185/8 and starts allocating recovered address space.

READ MORE

2019

1 MARCH • RIPE NCC receives a /23 from IANA's recovered pool - the last IPv4 addresses received from them.

READ MORE

2 OCTOBER • RIPE NCC can no longer make contiguous /22 allocations, starts allocating "/22 equivalents" that are combinations of /23s or /24s.

READ MORE

25 NOVEMBER • RIPE NCC runs out of IPv4 addresses. The IPv4 Waiting List is activated.

READ MORE

RIPE DATABASE UPDATES

Here are some of the updates we made to the RIPE Database in 2019.

Automatically deletes non-authoritative route objects in the RIPE Database, if they conflict with RPKI ROAs.

We introduced 'Sponsored Resources' to the 'My Resources' overview in the RIPE Database to make your resource data as accurate and easy to manage as possible.

IMPLEMENTED
NWI-8 "USER SYNCHRONISATION TO DEFAULT MNTNER"

IMPLEMENTED
2018-06 "NON-AUTHORITATIVE ROUTE OBJECT CLEAN-UP"

IMPROVED
REGISTRATION DATA ACCESS PROTOCOL (RDAP)

ADDED
SPONSORED RESOURCES TO MY RESOURCES

GDPR-RELATED IMPROVEMENTS

This new feature synchronises users in the LIR Portal with the RIPE Database maintainer. You no longer need to manually update the same information in two places and it lowers the risk of someone gaining unauthorised access.

We enhanced our RDAP implementation (which modernises the Whois query protocol) by improving consistency with other RIRs and RFCs.

You no longer automatically get personal data when making historical queries in the RIPE Database. Another improvement is the default creation of a new role-maintainer pair rather than a person-maintainer pair for improved privacy.

ARCs AND ABUSE-C VALIDATION

ASSISTED REGISTRY CHECKS (ARCs)

An Assisted Registry Check is how we help members ensure their data is accurate and up to date. We provide personalised support over a call, or in person at events to help members correct any inconsistencies. Our goal is to constantly strengthen the quality of data in the registry. During an ARC, among other things, we check an LIR's legal name, address and contacts, IPv4 and IPv6 resources registered, and whether their BGP announcements are consistent with the Routing Registry.

READ MORE

ABUSE-C: VALIDATION

We started implementing the Abuse Contact (abuse-c) management policy in 2019. This policy asks the RIPE NCC to validate the email addresses listed as 'abuse-c' or 'abuse-mailbox' in the RIPE Database.

This was a challenging task as there were over 70,000 email addresses to validate. We created a process that was partially automated, with manual checks built-in where required.

READ MORE

MEMBER FEEDBACK ON ARCs

"We appreciate that RIPE NCC took time to discuss with us about ARC topics, especially in our language. We think that it's great that RIPE NCC is promoting IPv6 even if we are not ready yet."
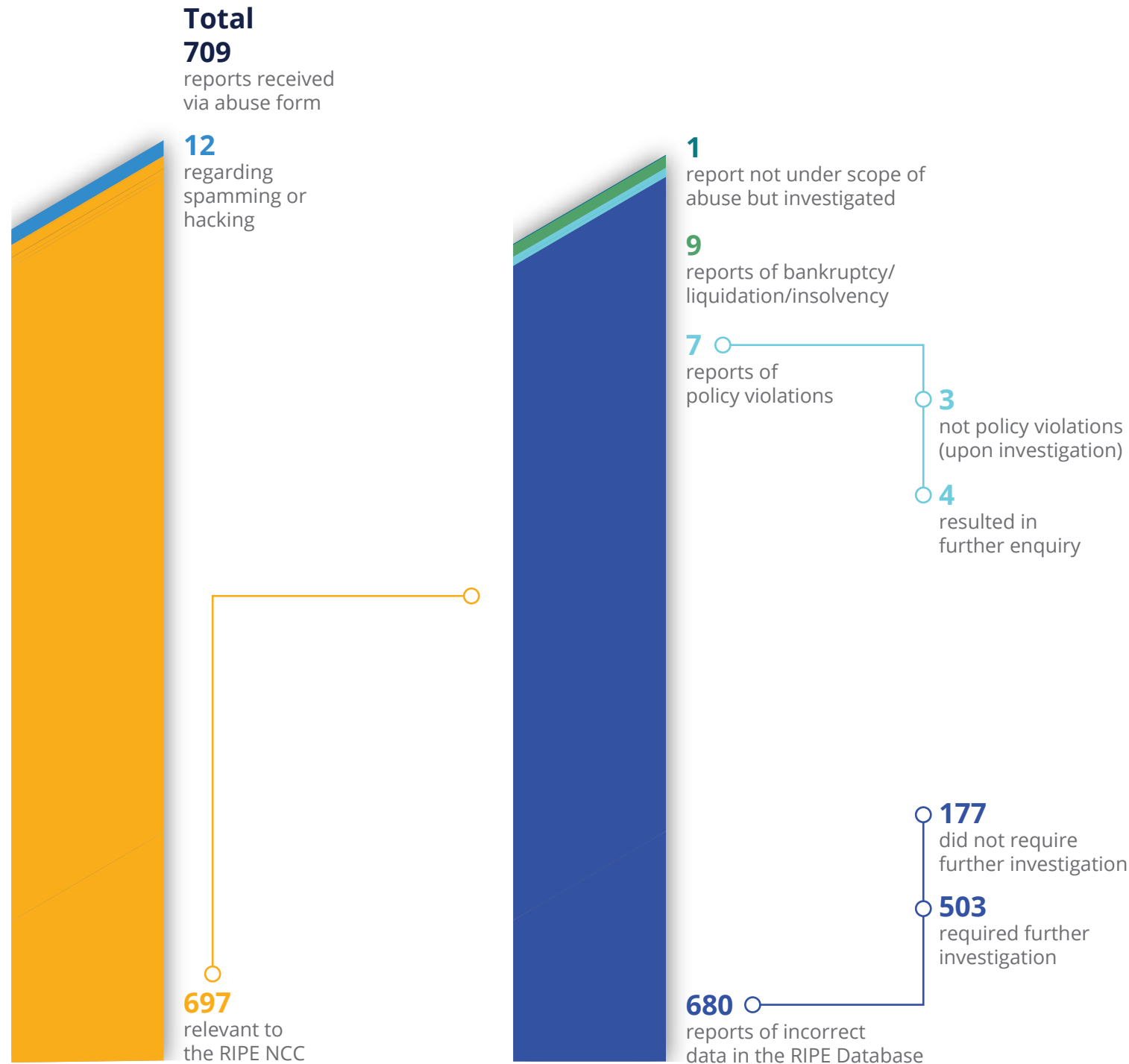
"I think that this kind of assistance is very useful especially for those that are not familiar with the LIR's duties and responsibilities."

"I was very surprised with the quality of the communication, information and support provided by the RIPE NCC during the ARC. Keep up the excellent work!"

In 2019 **3,258** ARCs completed **23** at RIPE 78 **42** at RIPE 79

77,979 validated email addresses **73,023** validated using automated process

4,956 email addresses required manual intervention

38,307 abuse-c ROLE objects created and/or updated the listed 'abuse-mailbox:' attribute
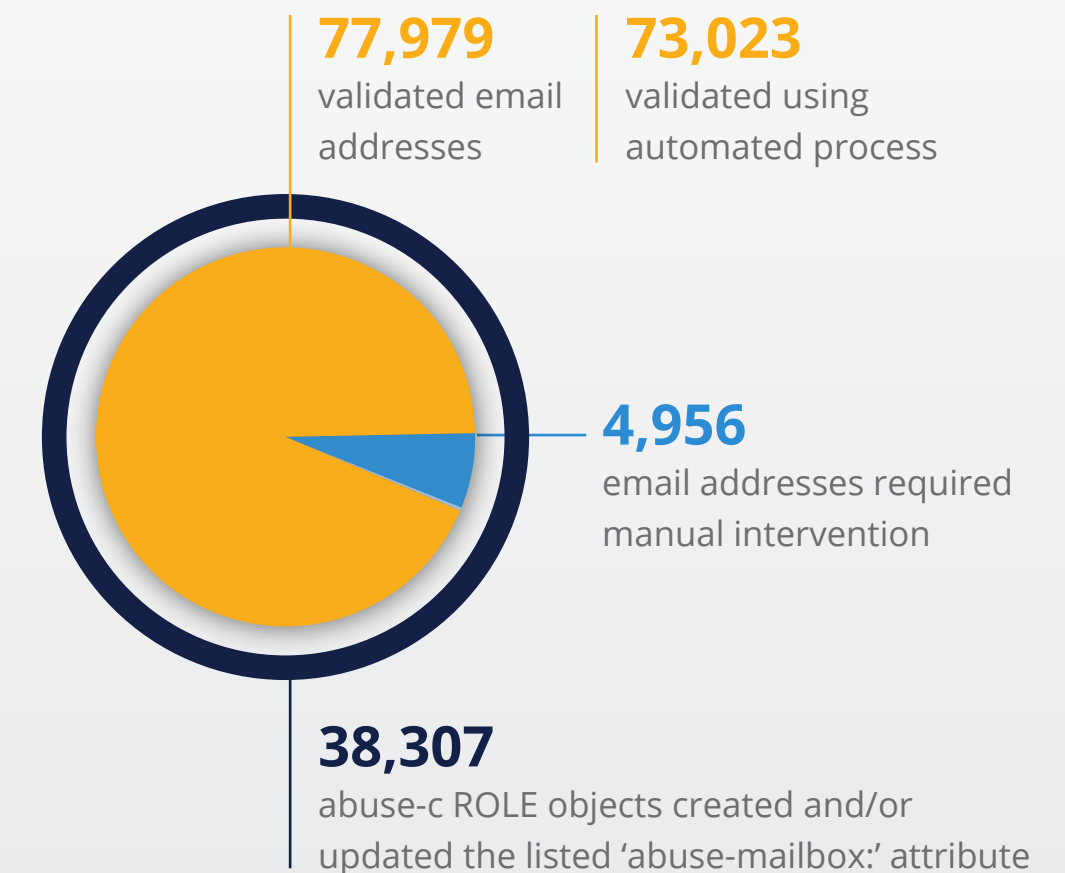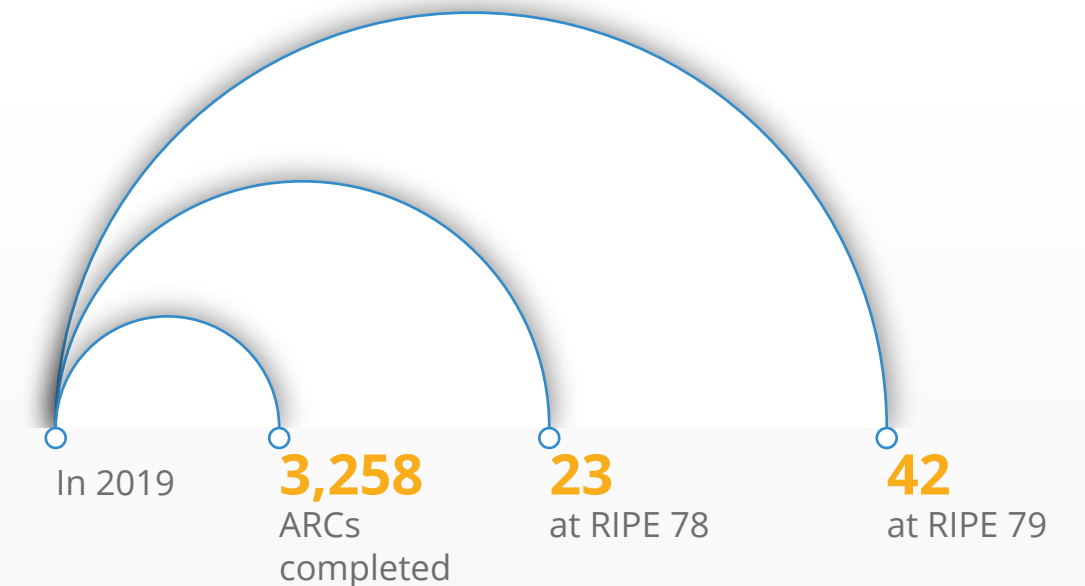
REPORTS AND INVESTIGATIONS

REPORTS RECEIVED VIA THE ABUSE FORM

Total
709
reports received via abuse form

12
regarding spamming or hacking

697
relevant to the RIPE NCC

1
report not under scope of abuse but investigated

9
reports of bankruptcy/liquidation/insolvency

7
reports of policy violations

3
not policy violations (upon investigation)

4
resulted in further enquiry

680
reports of incorrect data in the RIPE Database

177
did not require further investigation

503
required further investigation

HIJACK INVESTIGATIONS

225
Hijack Investigations

SECURITY REPORTS
We encourage the reporting of vulnerabilities in line with our Responsible Disclosure Policy. **READ MORE**

120
Security-related reports received

68
Reports were relevant

SECURITY INCIDENTS
Security incidents are detected on the basis of audits performed, alerts from our network intrusion detection system and external reports.

9
Low-impact security incidents

7
Medium-impact security incidents

0
High or Critical impact incidents

GDPR
In 2019, we received ten requests from individuals under the EU General Data Protection Regulation (GDPR). Of these, in four cases, we complied with the request, in five cases, no personal data was found, and in one case, the individual did not respond to our authentication request.

TRANSPARENCY REPORT
The RIPE NCC receives information requests from Law Enforcement Agencies (LEAs) and tries to facilitate the provision of any required publicly available information. We do not provide confidential or private information to LEAs without a court order or other legally enforceable order or request under Dutch law. **READ MORE**

COORDINATION

Our coordination activities include providing secretarial support to the RIPE community for policy development processes, working together with other RIRs for better Internet governance, and managing K-root, one of the 13 DNS root zones.
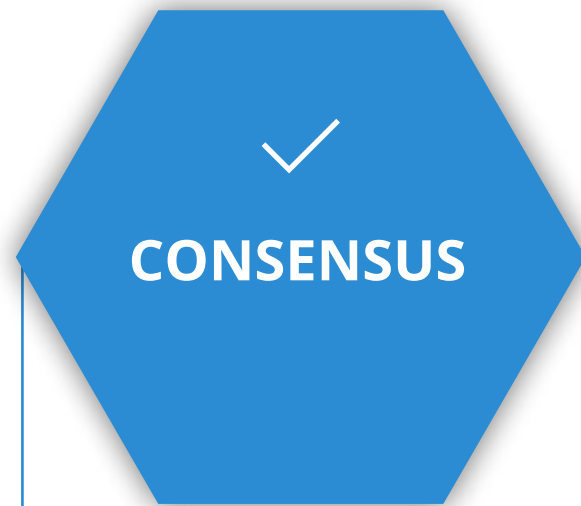
POLICY DEVELOPMENT

Policies implemented by the RIPE NCC emerge from an open, transparent, community-led development process.

Here is an overview of the policies discussed in 2019. The data shown reflects the status of that policy and participation as of 31 December 2019.

IN A NUTSHELL

In 2019 **10** people submitted a policy from **6** countries

140+ people participated in discussions from **36** countries

CONSENSUS ✓

2019-01 - Clarification of Definition for "ASSIGNED PA"
👤 **18** 🏳 **12** ✓ *May 2019*

2019-02 - IPv4 Waiting List Implementation
👤 **33** 🏳 **20** ✓ *July 2019*

2019-05 - Revised IPv4 assignment policy for IXPs
👤 **32** 🏳 **15** ✓ *October 2019*

2018-06 - RIPE NCC IRR Database Non-Authoritative Route Object Clean-up
👤 **19** 🏳 **11** ✓ *November 2019*

WITHDRAWN ✗

2018-05 - Publication of Legal Address of Internet Number Resource Holders
👤 **32** 🏳 **13** ✗ *January 2019*

2018-02 - Assignment Clarification in IPv6 Policy
👤 **5** 🏳 **4** ✗ *March 2019*

2019-03 - Resource Hijacking is a RIPE Policy Violation
👤 **62** 🏳 **21** ✗ *October 2019*

ONGOING ↻

2019-04 - Validation of "abuse-mailbox"
👤 **28** 🏳 **14** ↻ *Discussion Phase by December 2019*

2019-07 - Default assignment size for IXPs
👤 **11** 🏳 **9** ↻ *Discussion Phase by December 2019*

2019-08 - RPKI ROAs for Unallocated and Unassigned RIPE NCC Address Space
👤 **27** 🏳 **18** ↻ *Discussion Phase by December 2019*

2019-06 - Multiple Editorial Changes in IPv6 Policy
👤 **6** 🏳 **6** ↻ *Review Phase by December 2019*

DNS AND K-ROOT

The RIPE NCC runs two independent and equally important DNS services. The first is K-root, one of the 13 Internet root name servers. The K-root service is provided by a set of distributed nodes using IPv4 and IPv6 anycast.

The second is a DNS service for RIPE NCC zones and reverse DNS. A cluster of servers in Amsterdam, London, Stockholm and Vienna, serve zones for reverse delegations for RIPE NCC member allocations, country code Top-Level Domain (ccTLD) secondary services and RIPE NCC authoritative zones.

In an ongoing effort to increase coverage of K-root for better geographical coverage and DDoS resilience, we added six new hosted nodes in 2019. Also in 2019, having carried out an analysis of our existing infrastructure, we established that K-root has sufficient capacity to continue operating in a stable fashion even in the event of future DDoS attacks. Plans have been put in place to ensure we have the same level of assurance with regards capacity for our equally important authoritative and reverse DNS services.
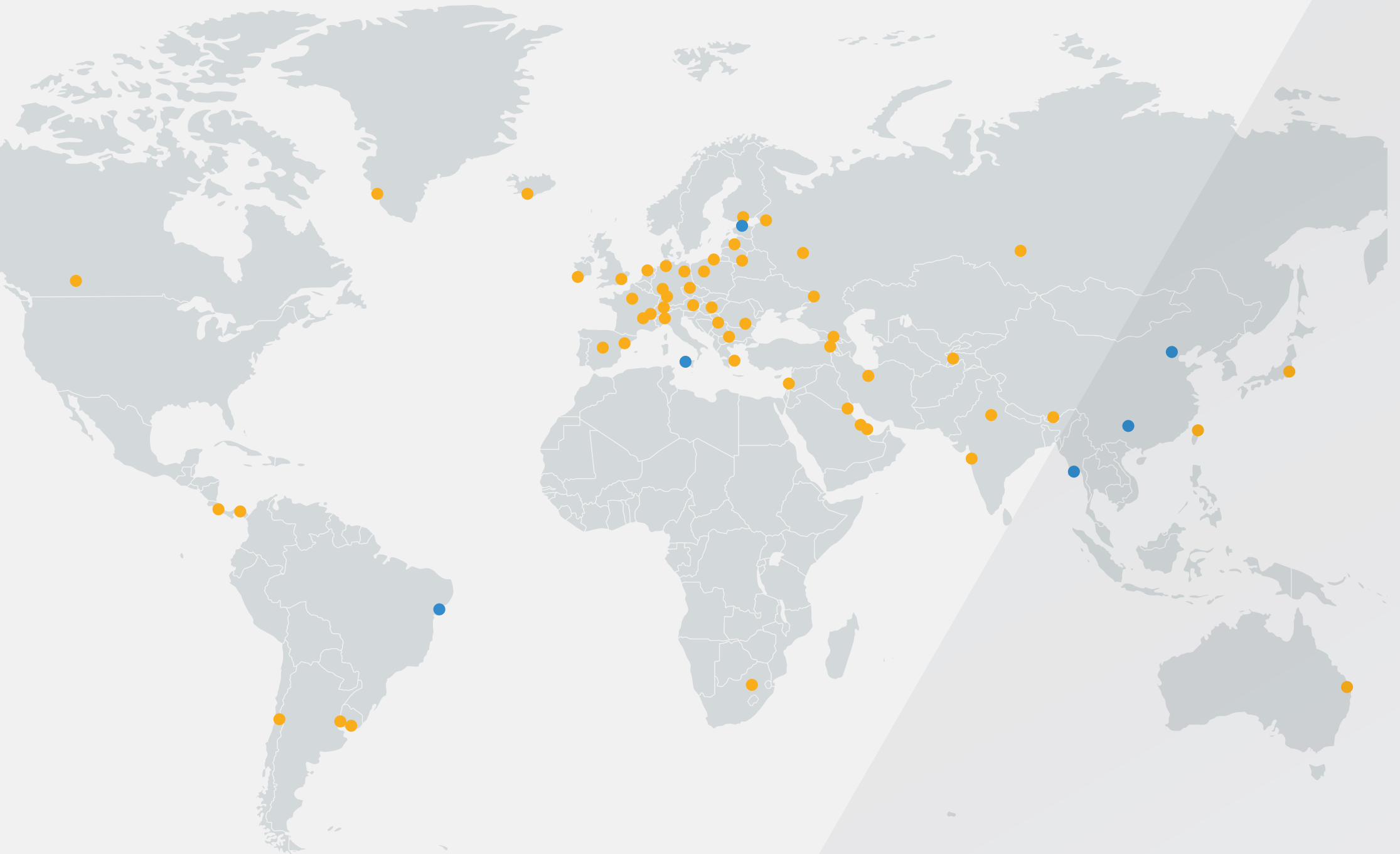
LEGEND

🟠 Existing K-root nodes   🔵 K-root nodes added in 2019

ENGAGEMENT

We support our members and stakeholders by offering services, organising events and creating opportunities for them to engage not only with our staff but with each other. The largest RIPE Meetings to date took place in 2019, and we held a series of events across our service region, including Regional Meetings, Hackathons, and Member Lunches. As always, training courses continue to be among our most sought-after services.
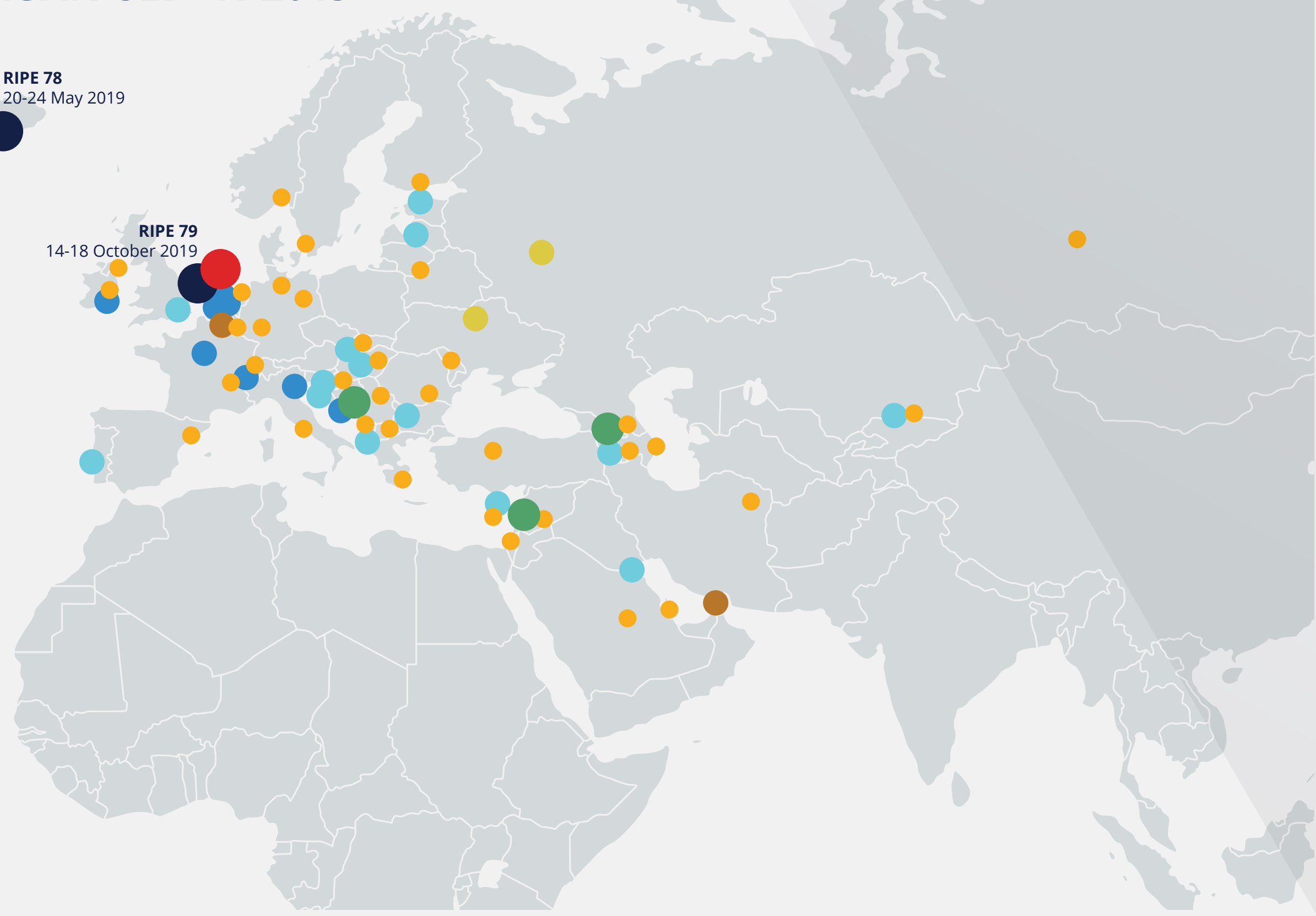
EVENTS WE ORGANISED IN 2019

RIPE 78
20-24 May 2019

RIPE 79
14-18 October 2019

LEGEND
- Hackathon
- Member Lunch
- Regional Meeting
- RIPE Meeting
- RIPE NCC Day
- RIPE NCC General Meeting
- Roundtable Meeting
- Training Course

OUTREACH AND ROUNDTABLE MEETINGS

Our Roundtable Meetings offer government officials and regulators the opportunity to discuss governance issues relevant to the RIPE community, and to get a deeper understanding of complex technical topics.

Over the past year, we have continued to contribute to regional and national Internet governance by holding our 23rd and 24th Roundtable meetings, in Brussels and in Dubai, respectively. Representatives attending these events discussed a variety of issues including the IPv4 transfer market, developments in routing security and other issues in Internet governance.

For the first time ever, we were invited to present in Turkmenistan. As part of our outreach efforts, we also support various Internet Governance Forums (IGFs).

In 2019, we sponsored **11** events consisting of **IGFs** **youth IGFs** **regional events** such as SEEDIG
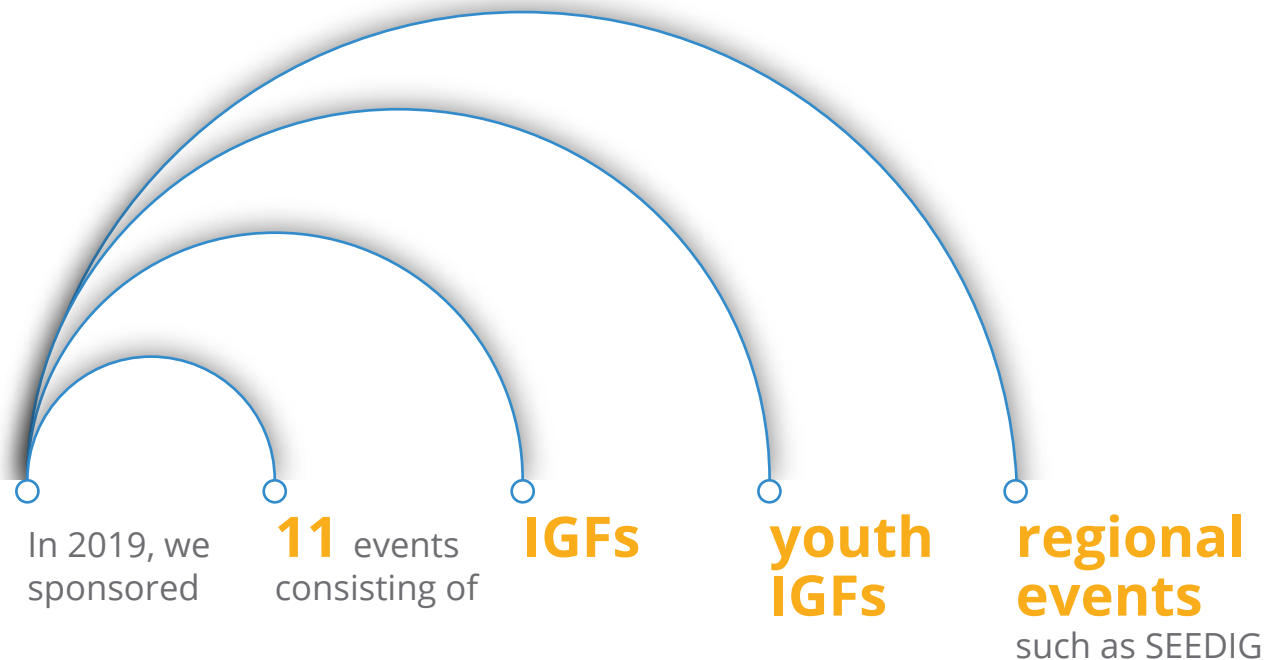
TRAINING SERVICES IN 2019

Training is one of the most popular member services offered by the RIPE NCC. We provide face-to-face training courses, webinars, workshops and maintain the RIPE NCC Academy, our online learning platform.

One of the highlights of 2019 was successfully holding a remote training course on IPv6 Security for our members in Yemen delivered from our headquarters in Amsterdam. We also worked on updating the BGP Operations and Security course to include new content on RPKI, and added a lab, in which the participants can configure both the Validators and the BGP router. We paused the Train the Trainer programme in order to re-evaluate its structure.

Webinars are also popular! We introduced a new webinar on RPKI in 2019. We also held one-off webinars on the Policy Development Process and IPv4 Transfer Market, as well as for RIPE Meeting Newcomers.

READ MORE
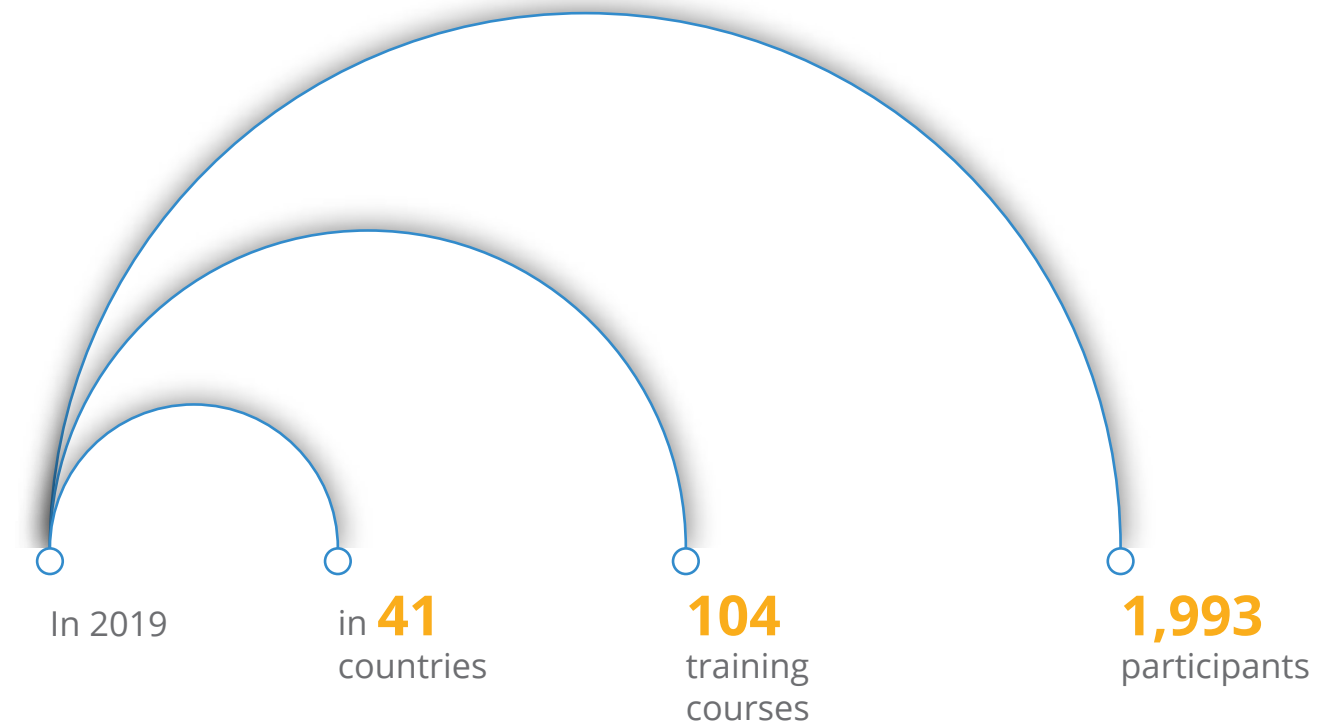
Training courses offered in 2019:

- LIR Training Course
- RIPE Database Training Course
- Basic IPv6 Training Course
- BGP Operation and Security Training Course
- Advanced IPv6 Training Course
- IPv6 Security Training Course
- Measurements and Tools Training Course

In 2019, we held webinars on:

- Webinar for New LIRs
- Introduction to the RIPE Database
- RIPE Database Advanced Topics
- IPv6 in the RIPE Database
- IPv6 Addressing Plan
- Internet Routing Registry
- RIPE Atlas
- RPKI

TRAINING COURSES

In 2019   in **41** countries   **104** training courses   **1,993** participants

WEBINARS

In 2019   **35** webinars   **870** participants joined

CERTIFIED PROFESSIONALS AND E-LEARNING

The RIPE NCC Academy is our e-learning platform which is free and open to all. We offered three courses in 2019 - the RIPE Database, Introduction to IPv6 and New Local Internet Registry courses.

In 2019, we focused on updating the RIPE Database course to align the learning material with the RIPE Database Associate exam, so that you can use the online RIPE Database course to prepare for the RIPE NCC Certified Professionals exam. We also worked on making the modules shorter and added greater interactivity. The revamped RIPE NCC Academy will be live in 2020.

- **Claim your badge** - This digital credential contains verifiable metadata about the exam, the skills it certifies and the validity.
- **Share your achievement** - The badge can be shared on social networks, added to digital CVs or websites.

READ MORE

READ MORE

RIPE NCC CERTIFIED PROFESSIONALS
We successfully piloted the very first exam - RIPE Database Associate - for the RIPE NCC Certified Professionals in the second half of 2019. Candidates could also certify at RIPE 79 in Rotterdam, and instantly claim their new digital badge!

INTRODUCING RIPE NCC CERTIFIED PROFESSIONALS
- **Take the exam online** - Candidates can certify their skills through an online proctored exam. This exam can be taken from anywhere using a secure browser. Candidates are shown their results immediately, and those who pass can get a verifiable digital badge.

7,529
Registered learners

1,700
Academy certificates issued

2019
199 candidates tested

153
became Certified Professionals

average score
75 out of **100**
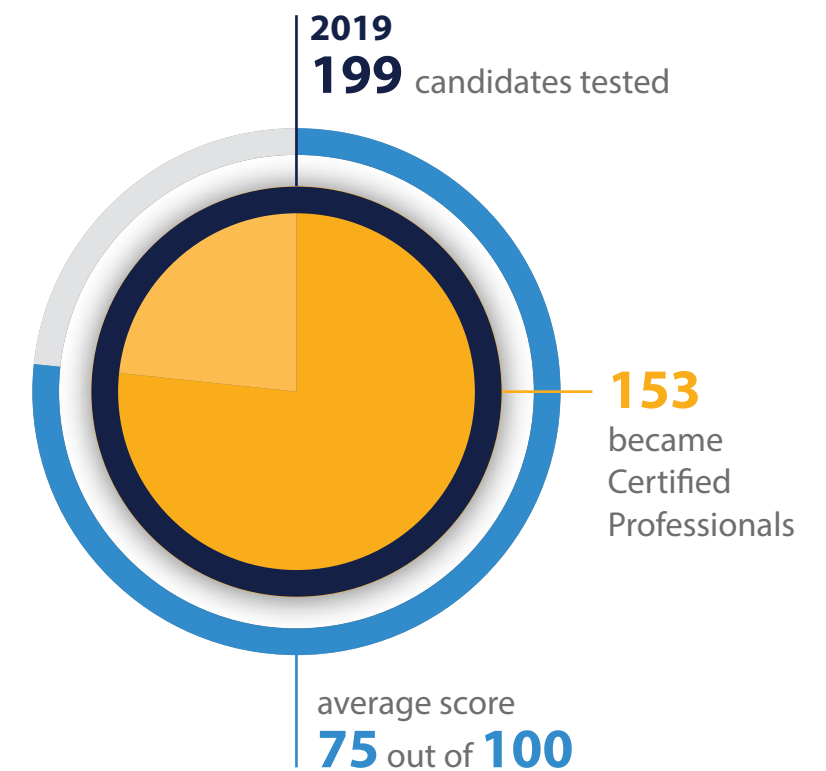
RIPE 78

REYKJAVIK, ICELAND 20-24 MAY 2019

742
Attendees

199
First-time attendees

60
Countries

Highlights

- **We celebrated 30 years of the RIPE community**

- **The RIPE Big Picture BoF looked at where we are heading as a community**

- **IPv4 runout was one of the big issues**

- **The RIPE Chair selection process was discussed**

The first RIPE Meeting was on 22 May 1989, which meant that the community celebrated thirty years of its existence during RIPE 78. This was an opportunity to reminisce, and also for some introspection. The RIPE Big Picture BoF raised a few questions including whether time should be made for community discussions in the RIPE Meeting plenary, leading to the RIPE Community Plenary session at RIPE 79.

Another big topic of discussion was the RIPE Database, what purpose it serves, and whether the information it contains is relevant or necessary. This created support for the formation of a designated task force. The RIPE Database Task Force was subsequently formed at RIPE 79.

READ MORE

READ MORE

RIPE 79

ROTTERDAM, THE NETHERLANDS 14-18 OCTOBER 2019

736
Attendees

187
First-time attendees

59
Countries

Highlights

- Axel Pawlik announced that he was stepping down as Managing Director

- The last RIPE Meeting before IPv4 runout

- The RIPE Community Plenary

- The RIPE Database Requirements Task Force formalised

- The Code of Conduct was discussed at the RIPE Community Plenary

Axel Pawlik announced that he would step down as Managing Director of the RIPE NCC, 20 years to the day after he took over. The RIPE NCC had 1,600 members in 1999 when Axel joined, and during his tenure, the organisation has grown to over 19,000 members. This massive increase corresponds with the growth of the Internet into a tool that has become essential to billions of people around the world. Axel's assured leadership meant that the RIPE NCC was more than able to meet the challenges involved in that growth.

Axel spearheaded the efforts to grow technical communities throughout our service region, and he was instrumental in the establishment of the ENOG, MENOG and SEE communities. He is personally proud of the RIPE NCC's efforts to accommodate the voices of everyone interested in the development of the Internet. Axel will remain very much an integral part of the RIPE community in the years ahead.

READ MORE

READ MORE

SUPPORTING THE COMMUNITY

RACI

The RIPE Academic Cooperation Initiative helps members of the academic community connect with and present to the RIPE community at RIPE Meetings and RIPE NCC Regional Meetings.

RIPE FELLOWSHIP

Through the RIPE Fellowship, we aim to increase diversity in the RIPE community by supporting those from underrepresented regions, minority backgrounds or those in need of funding to attend a RIPE Meeting. Fellowships are open to those living or working in the RIPE NCC service region, and studying or working in the fields of Internet technology and related topics of interest to the RIPE community.

MENTORING

The RIPE Meeting Mentorship programme brings together experienced community volunteers to mentor newcomers at RIPE Meetings. Volunteering as a mentor is a simple way to support new faces in navigating RIPE Meetings, and helping them participate more effectively in the RIPE community.

In 2019, we received	In 2019, we received	Mentoring in 2019
153 applications from **56** countries	**120** applications from **44** countries	RIPE 78 had **20** pairs of mentors and mentees
Out of which, we funded	Out of which, we awarded	RIPE 79 had **24** pairs of mentors and mentees
22 candidates from **15** countries	**44** fellowships covering **15** countries	

READ MORE

READ MORE

READ MORE

THE COMMUNITY PROJECTS FUND

The RIPE NCC Community Projects Fund provides €250,000 in funding annually for projects that work towards the 'Good of the Internet'. Here are the projects the Selection Committee chose to fund in 2019:

- **Antikraak:**
  Protecting non-routed and transferred address space against spear-hijacking.

- **ARTEMIS:**
  Verification and monitoring of BGP prefix hijacking incidents using RIPE Atlas probes in the ARTEMIS open source detection tool.

- **ASNR:**
  ASN Ranking system - A path to detect fake ASNs.

- **Cryptofuzz:**
  Leveraging fuzzing to find security bugs in cryptography libraries.

- **Improving the Tor network's IPv6 support**

- **IRRexplorer v2:**
  Allowing network operators to explore IRR, BGP and RPKI data, and the consistency between these sources.

- **RPKI Ecosystem Health Monitoring:**
  Examining the quality of, and discrepancies between RPKI repositories.

READ MORE

In 2019 **45** applications received from **23** countries **7** projects funded
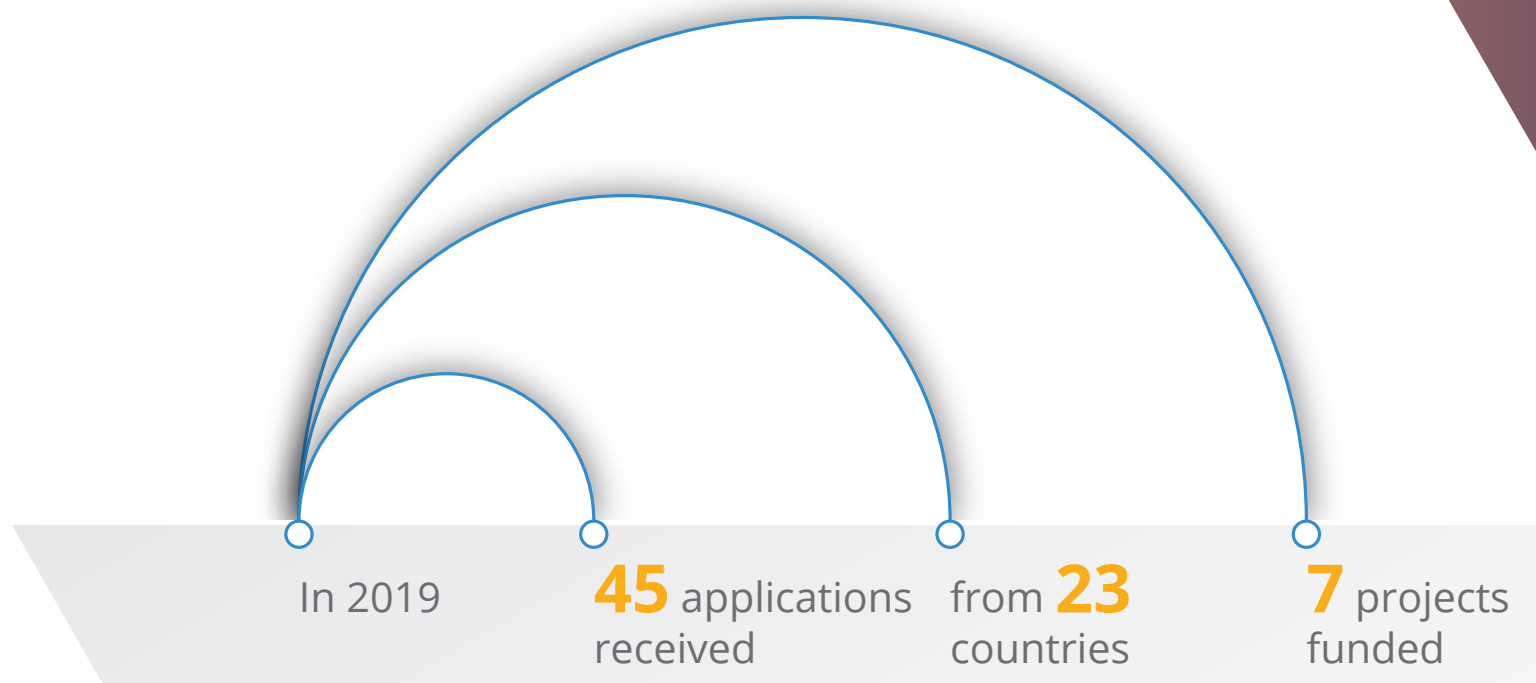
NETWORK OPERATOR GROUPS (NOGs)

Network Operator Groups (NOGs) bring together operators locally to share experiences and best practices, and to learn from one another. NOGs help operators address their concerns, and create opportunities for networking at a local level. We believe that NOGs can play a substantial role in supporting Internet communities in the regions that they serve.

We sponsor NOG meetings on an ongoing basis, and RIPE NCC staff often present at NOGs to share the latest news and updates. In 2019, we also brought several NOG organisers in the RIPE region together, for them to share their experiences through a special NOG 'Birds of a Feather' (BoF) session at RIPE 79.

READ MORE

13
NOG meetings sponsored

15
Presentations given by RIPE NCC staff

RIPE LABS

RIPE Labs is an open platform for network operators, researchers, developers and others to share case studies, best practices, deployment experiences, prototypes, research and more. We also use RIPE Labs to share ideas and ask for feedback from the community, as well as trial prototypes for our tools.

At RIPE 79, we celebrated 10 years of RIPE Labs!

READ MORE

IN 2019
161,353
unique visitors read

95
articles

51 were authored by RIPE NCC staff
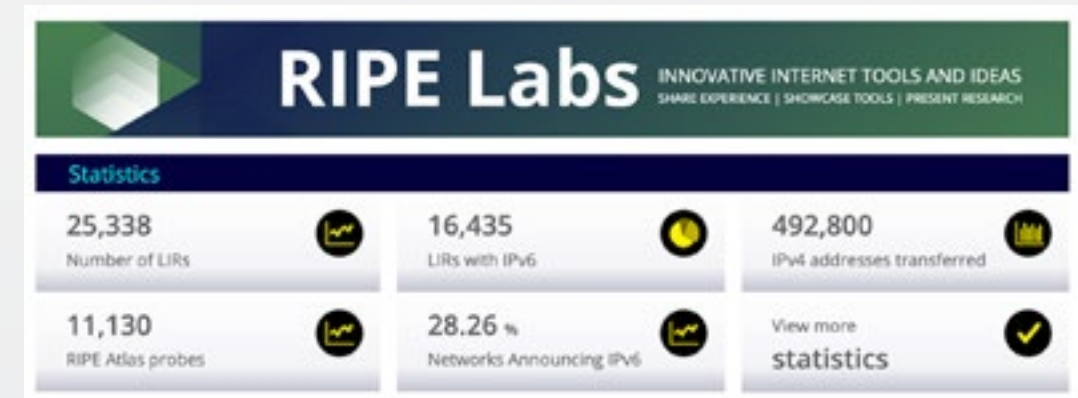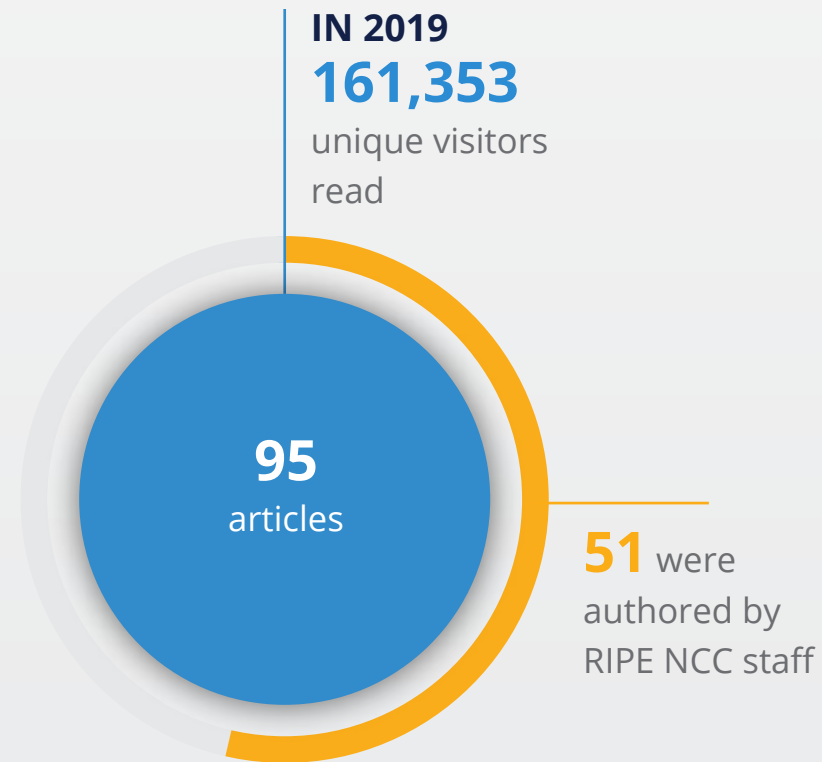
13,700 visitors checked out the Statistics dashboard

Three most-read RIPE Labs articles in 2019

'Build Your Own Anycast Network in Nine Steps' by Samir Jafferali	'Visibility of IPv4 and IPv6 Prefix Lengths in 2019' by Stephen Strowes	'768k Day - Will It Happen? Did it Happen?' by Emile Aben
6,500 views	**4,500 views**	**2,600 views**
READ MORE	READ MORE	READ MORE

HACKATHONS

In a hackathon, network operators, students, researchers, coders, developers, designers and general enthusiasts work together over one or two days, in multidisciplinary teams to take on a challenge.

Our goal is to foster an environment in which creativity, collaboration and an exchange of ideas and expertise can take place. Our hackathons are cooperative rather than competitive, and we produce Free and Open Source Software (FLOSS) that can contribute to the community.

In March 2019

42
participants

joined us for the
RPKI Deployathon in
AMSTERDAM

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In October 2019

30
participants

attended the
IoT Hackathon in
ROTTERDAM

READ MORE

In November 2019

100+
participants

hacked simultaneously for
the **Pan-European Quantum Internet Hackathon** in

DELFT, DUBLIN, GENEVA, PARIS, PADUA AND SARAJEVO

READ MORE

OPERATOR TOOLS

Our tools and services help everyday users, network operators, researchers, governments and regulators to understand the state of the Internet.

We collect massive amounts of useful data from a variety of sources including RIPE Atlas, our active Internet measurements platform, RIPEstat, the Routing Information Service (RIS) and more. All of our data is publicly available, and can be quickly accessed and visualised using the tools we provide or via dedicated APIs.

RPKI

RPKI was in the limelight for 2019! We launched a new version of our Validator (version 3.1) that increased stability and performance.

We offered our Validator 3.1 in a Debian package and a Docker container to cater to popular demand. At RIPE 78, we also became the first RIR to use RPKI to drop invalid BGP announcements on the meeting network. One of the highlights of the year was reaching the milestone of more than 10,000 generated Certificate Authorities, the first step towards creating Route Origin Authorisations (ROAs), in November 2019.

READ MORE

2019
8,650
+59%

2018
5,431

RPKI Certificates

Highlights

- We held an RPKI Deployathon in Amsterdam in March 2019.

- The policy proposal 2018-06 "RIPE NCC IRR Database Non-Authoritative Route Object Clean-up" reached consensus.

- The RPKI webinar was revived and a dedicated RPKI section has been added to the BGP training course.

2019
13,415
+73.5%

2018
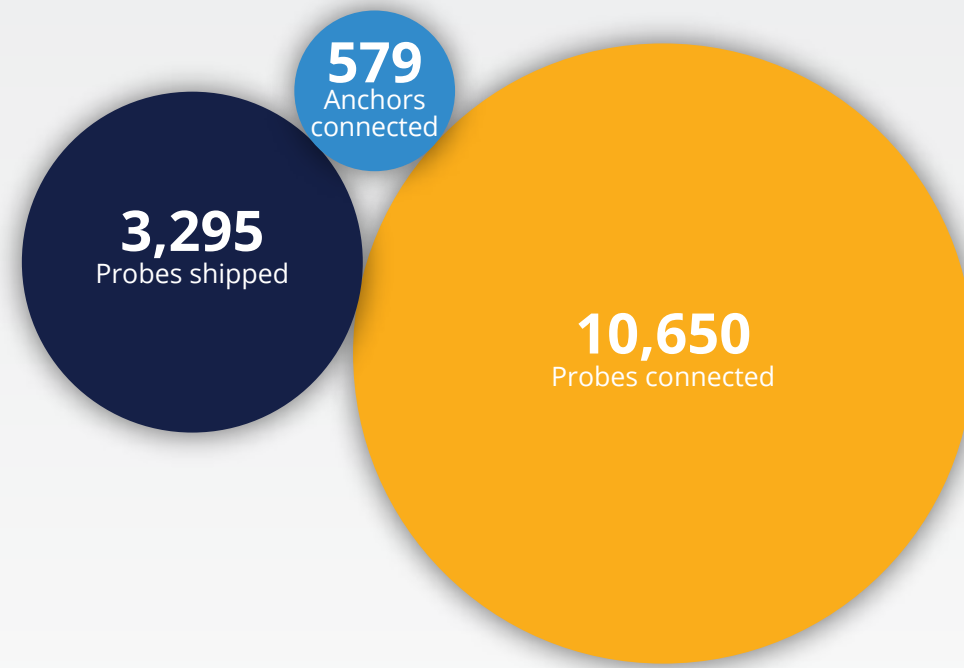**7,729**

ROAs

I SIGNED MY ROAs
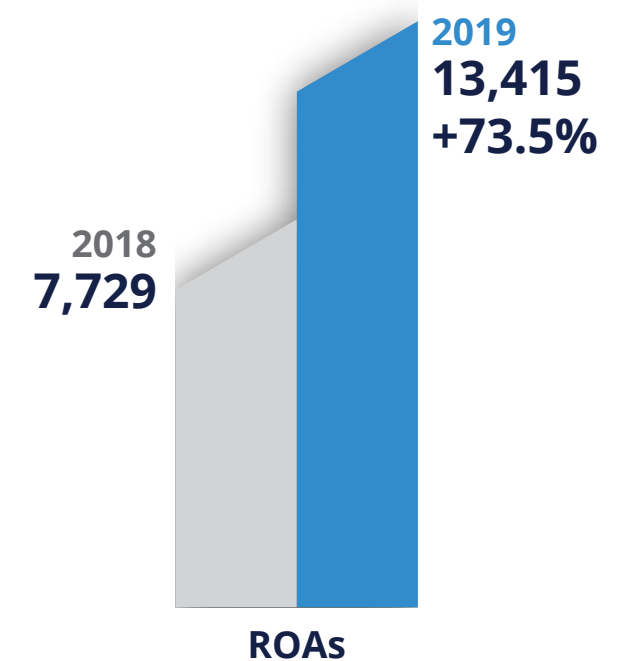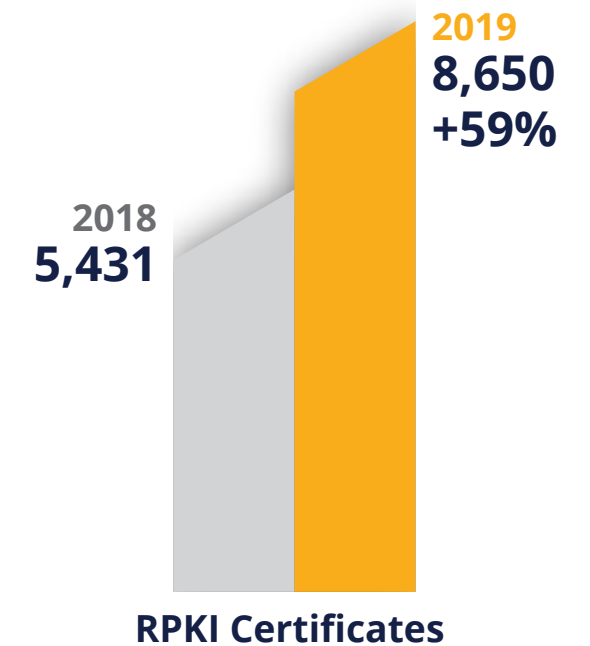
RIPE ATLAS

With an average of approximately 600 million active measurement results collected every day from over 10,000 probes last year, RIPE Atlas, our global Internet measurements network, continues to provide users with an unparalleled understanding of the state of the Internet in real time.
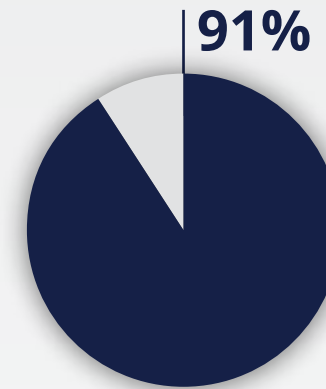
Our version 4 RIPE Atlas probes, selected for improved performance over previous models, are now in circulation. We also continued to support and invest in non-hardware solutions. While the deployment of virtual anchors has further extended the reach of RIPE Atlas, reinforcing the stability of the network, the end of 2019 also saw us moving into the final stages of testing for RIPE Atlas software probes.

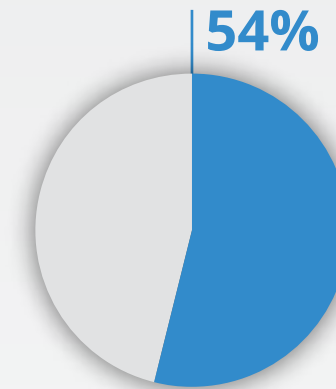**READ MORE**

RIPE ATLAS PROBES AND ANCHORS 2019

579 Anchors connected

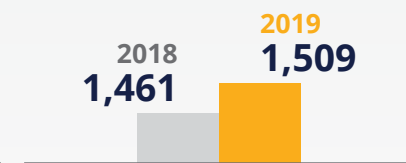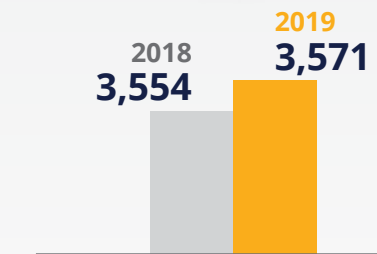**3,295** Probes shipped

10,650 Probes connected

Countries covered
91%

ASNs COVERED

ASNs covered (v4)
54%

ASNs covered (v6)
82%

2018 **3,554**   2019 **3,571**

2018 **1,461**   2019 **1,509**

RIPE ATLAS PROBES

Anchors connected: 2018 **385**, 2019 **579**

Probes connected: 2018 **10,179**, 2019 **10,650**

Probes shipped: 2018 **1,091**, 2019 **3,295**

Results collected per second: 2018 **6,500**, 2019 **9,300**

RIPE ATLAS USERS

Active users: 2018 **12,500**, 2019 **14,500**

Total users: 2018 **41,715**, 2019 **47,995**
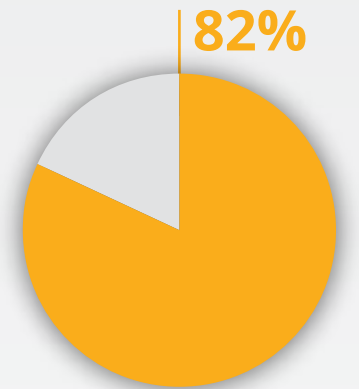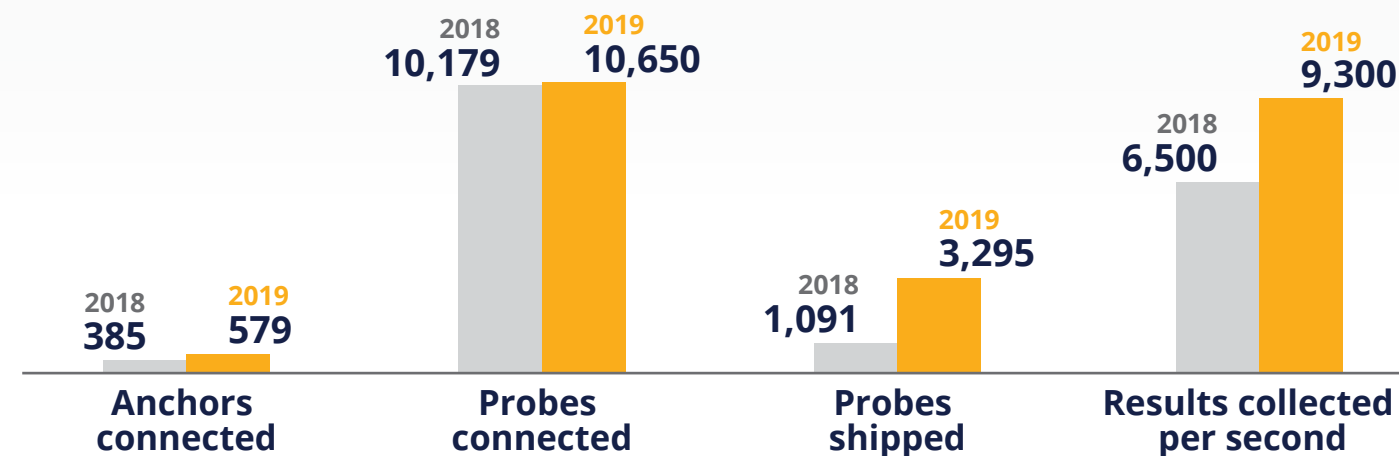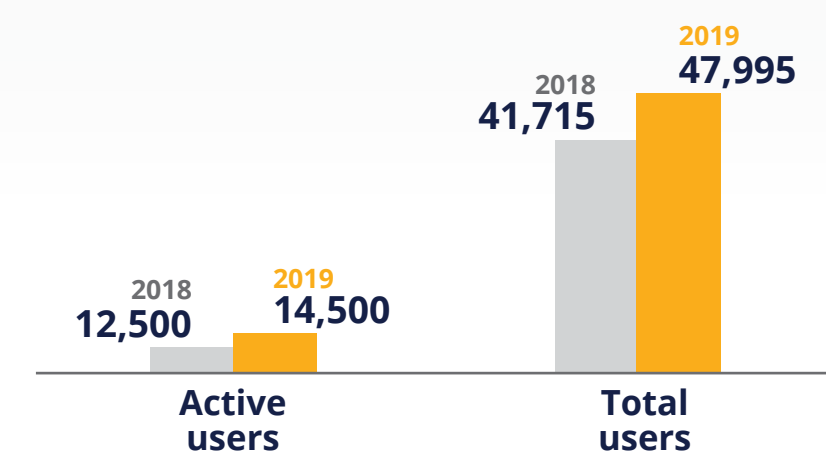
RIPEstat

RIPEstat provides millions of users with essential information on IP address space and Autonomous System Numbers (ASNs) along with related statistics on specific hostnames and countries.

Our new prototype user interface, available to all RIPEstat users, is set to replace the existing frontend and provide a faster, more modern, mobile-friendly experience.

supported the development of the APNIC NetOX prototype and LACNIC's Inforedes platform, both of which leverage the power of RIPEstat to assist operators in other regions.

RIPEstat helps strengthen inter-RIR cooperation. In 2019, our RIPEstat team
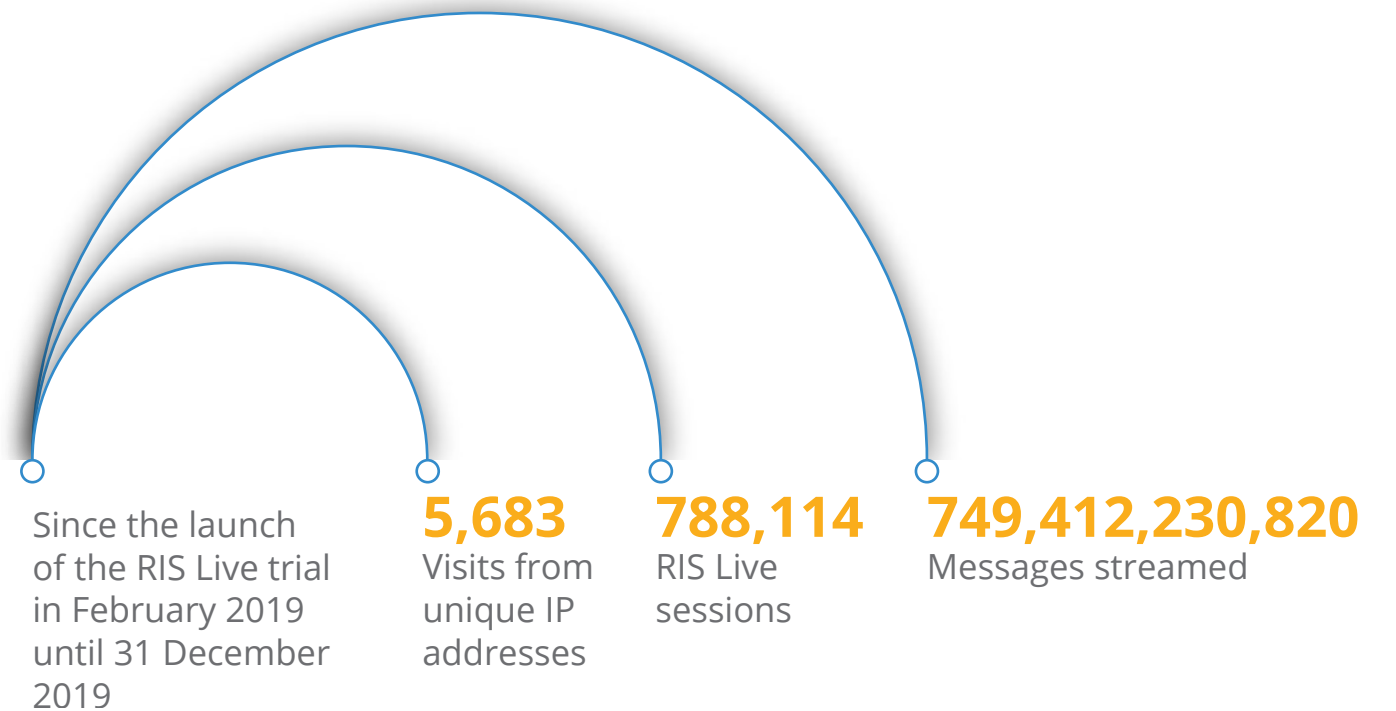
READ MORE
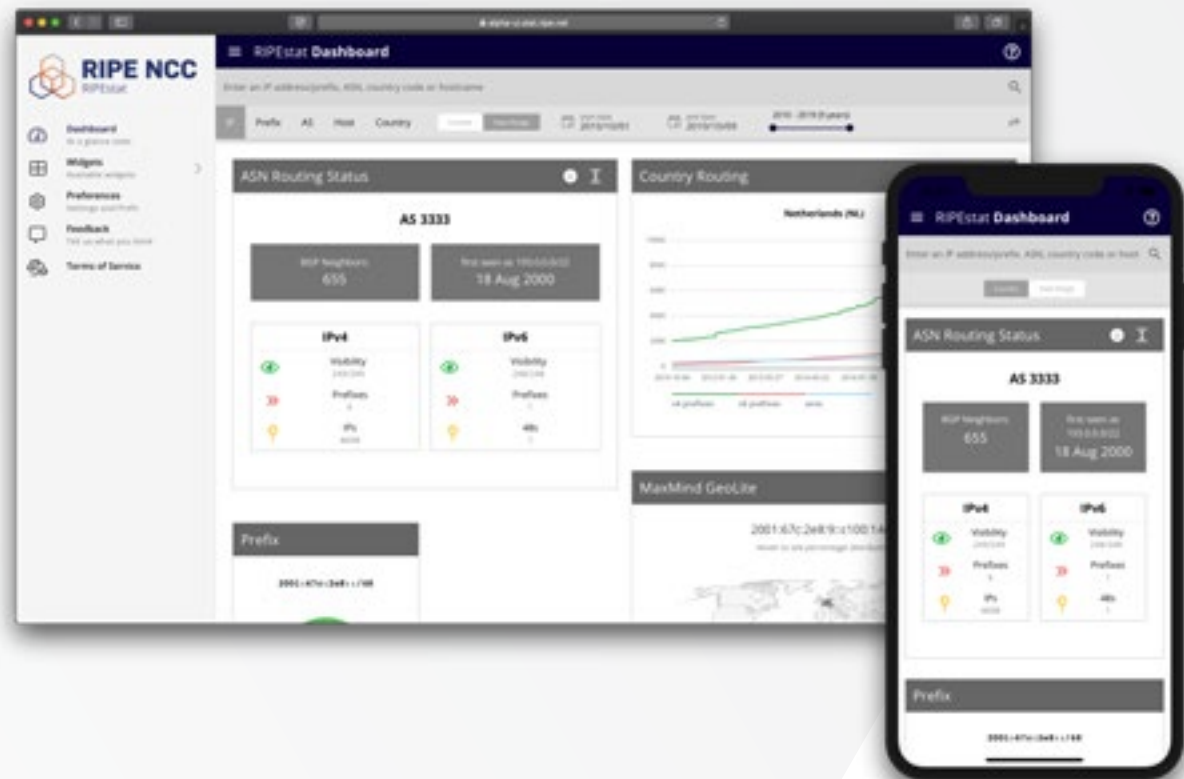
RIS LIVE

RIS Live lets users stream BGP data in real time, allowing them to monitor and detect routing events anywhere in the world as those events occur. With several filters available, users can choose to see whatever BGP messages are of interest to them.

READ MORE

Since the launch of the RIS Live trial in February 2019 until 31 December 2019

5,683
Visits from unique IP addresses

788,114
RIS Live sessions

749,412,230,820
Messages streamed

INSIDE THE RIPE NCC

Our Mission

• As an authority on unique Internet number resources, we enable our members to operate and develop the Internet

• As a neutral source of information and knowledge, we actively contribute to a stable and innovative Internet

• We are a trusted steward of the open, inclusive, collaborative Internet model, connecting people, communities and stakeholders

AT THE HEART OF THE RIPE NCC

Our staff are at the core of our operations. We work to serve our 19,000 plus members with a team of 156 FTEs out of our headquarters in Amsterdam, with small teams in Dubai and Moscow.

We believe that a diverse staff can understand and serve the needs of our highly diverse membership. This is why we bring together professionals from over 40 nationalities to work at the RIPE NCC. And within our offices, you will hear more than 30 languages being spoken!

2019 was a challenging year for us. As the long-anticipated IPv4 runout drew closer, the number of membership applications started to rise steeply. Our staff pulled together from all across the organisation to ensure that, as runout took place, it was handled as smoothly as possible, with members knowing exactly what to expect.

In 2019, we also started a transition to a self-organised structure, to create more flexibility and empower staff to achieve their goals. This new structure aims to develop purpose-driven teams, and greater transparency with regards to roles and accountabilities.

READ MORE

156
FTEs

59%
Male

41%
Female

40
Nationalities

30+
Languages spoken

OVERVIEW OF COSTS PER ACTIVITY IN 2019

These figures are not part of the Financial Report and as such have not been audited by an external third party. These figures serve only as indications of the costs relating to these activities.

Over the course of 2019 and 2020, the RIPE NCC is undergoing an internal transition to a self-organised structure. This will impact how the cost per activity overview is calculated in 2020.

READ MORE

	Budget Operational Expenses 2019	Actual Operational Expenses 2019	Variation
Registry Maintenance	4,666	4,898	232
RIPE Database	960	616	(344)
Resource Certification (RPKI)	162	405	243
LIR Portal	680	574	(106)
Regional Internet Registry	**6,468**	**6,493**	**25**
Training	2,246	1,829	(417)
RIPEStat	976	745	(231)
RIPE Atlas and RIS	1,022	1,446	424
Other Services	369	716	347
Services	**4,613**	**4,736**	**123**
DNS & K-Root Services	1,307	666	(641)
Data Analysis and Scientific Support	572	454	(118)
RIPE Labs	319	251	(68)
Outreach and Engagement	4,396	4,142	(254)
IPv6 Support	117	12	(105)
RIPE Meetings	2,069	1,661	(408)
RIPE Policy and Community support	183	150	(33)
ICANN/IANA/IETF/ISOC/RIRs	1,066	1,337	271
The Good of the Internet Initiatives	463	433	(30)
Coordination Activities	**10,492**	**9,106**	**1,386**
IT and Information Security	3,325	2,884	(441)
Facilities (Rent and Utilitites)	1,193	1,086	(107)
Management and HR	3,416	4,052	636
Finance and Administration	1,498	1,579	81
Legal Activities	296	243	(53)
Organisational Activities	299	314	15
Internal	**10,027**	**10,158**	**131**
RIPE NCC	**31,600**	**30,493**	**(1,107)**

RIPE NCC
RIPE NETWORK COORDINATION CENTRE

TOGETHER, LET'S
SHAPE THE FUTURE
OF THE INTERNET

WWW.RIPE.NET