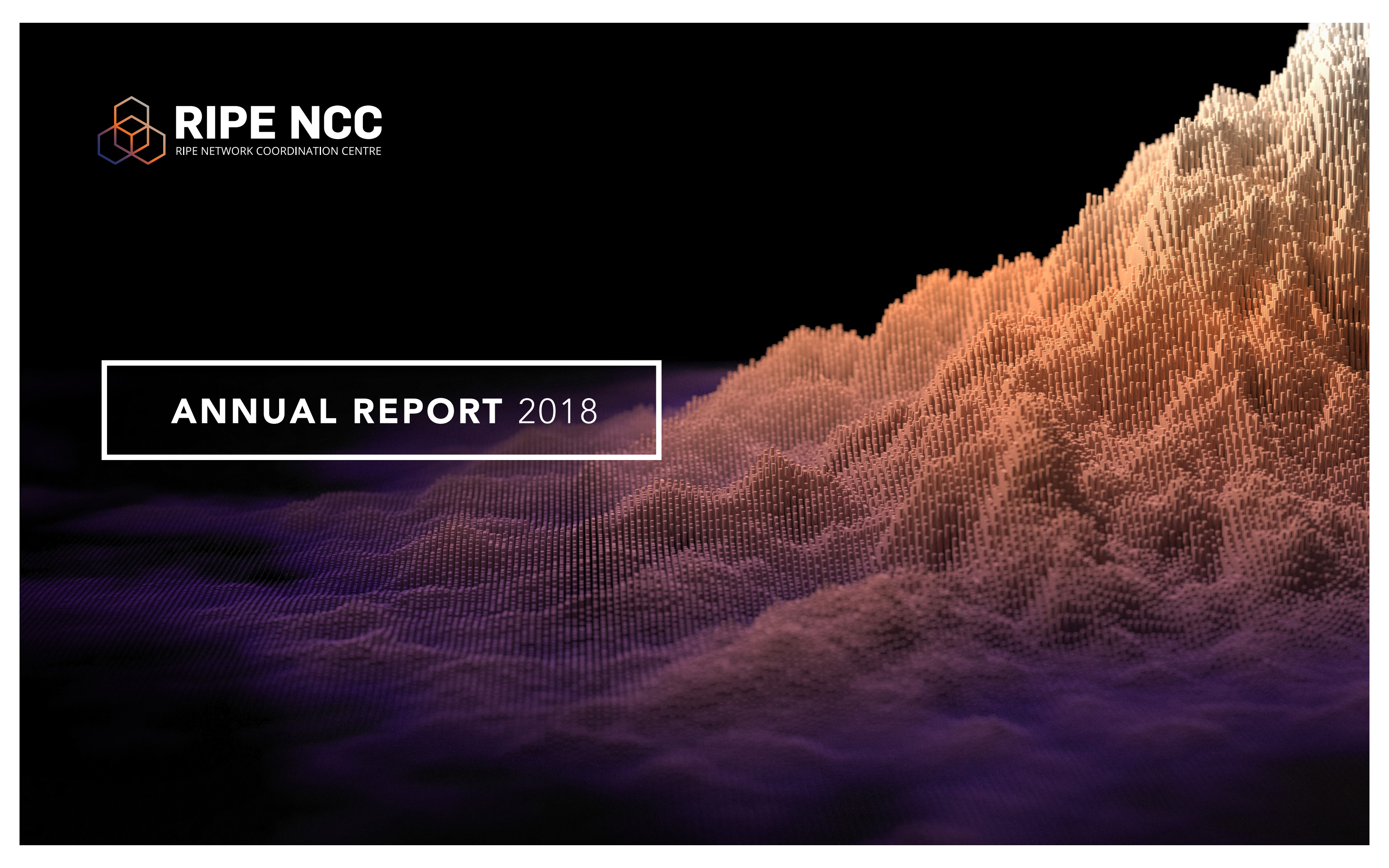




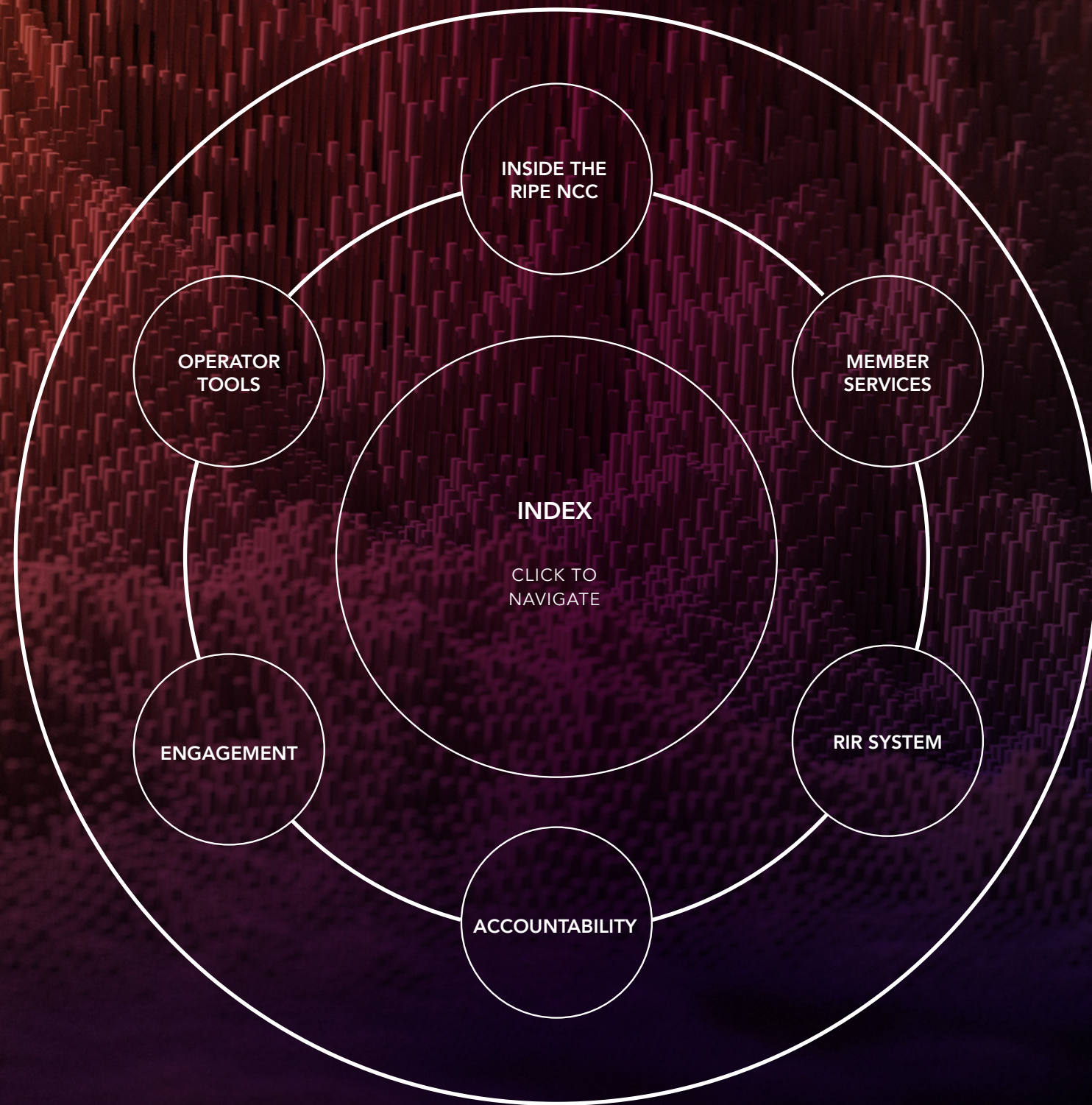
RIPE NCC
RIPE NETWORK COORDINATION CENTRE

ANNUAL REPORT 2018





Together, let's shape the future of the Internet.



INSIDE THE
RIPE NCC

MEMBER
SERVICES

INDEX

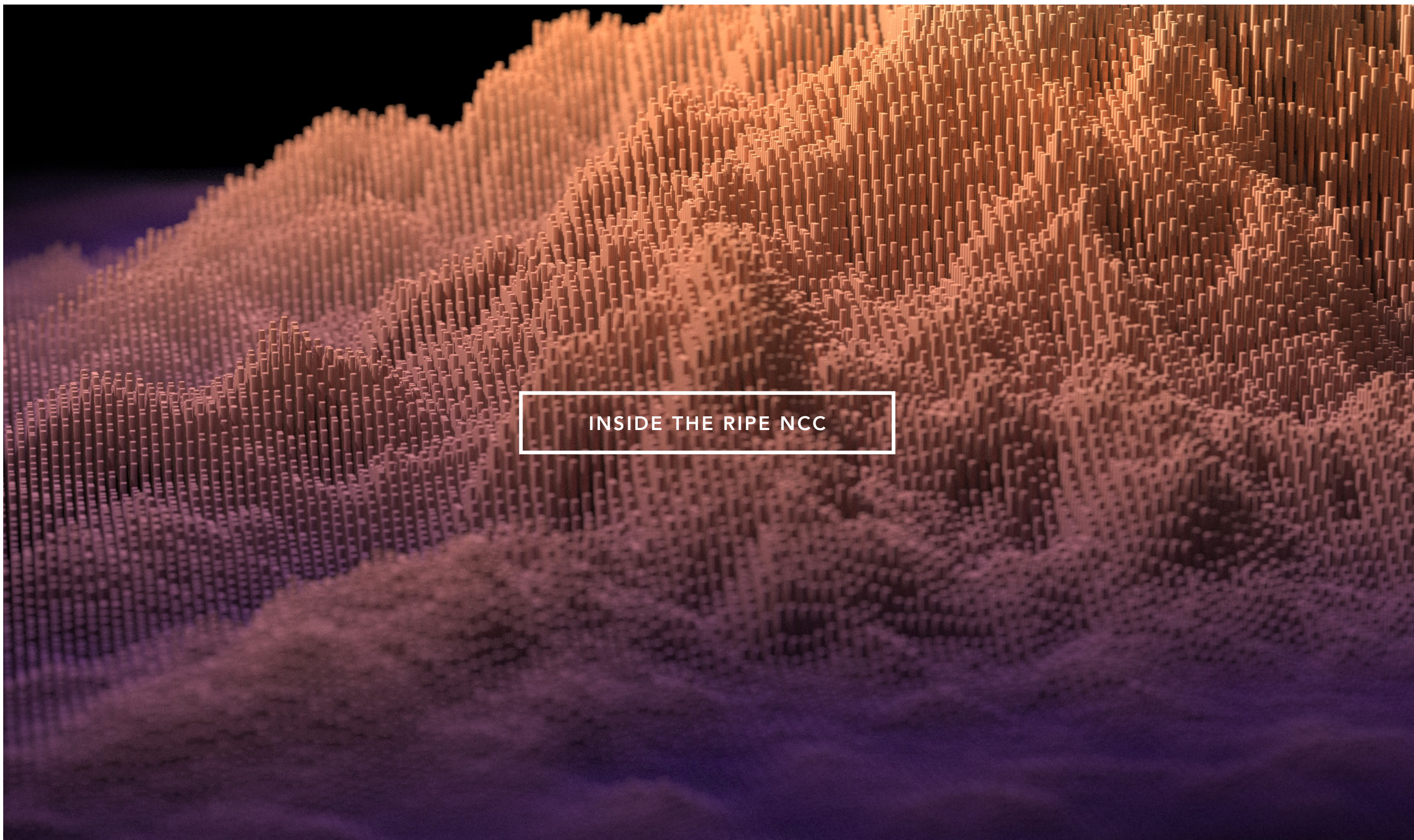
CLICK TO
NAVIGATE

RIR SYSTEM

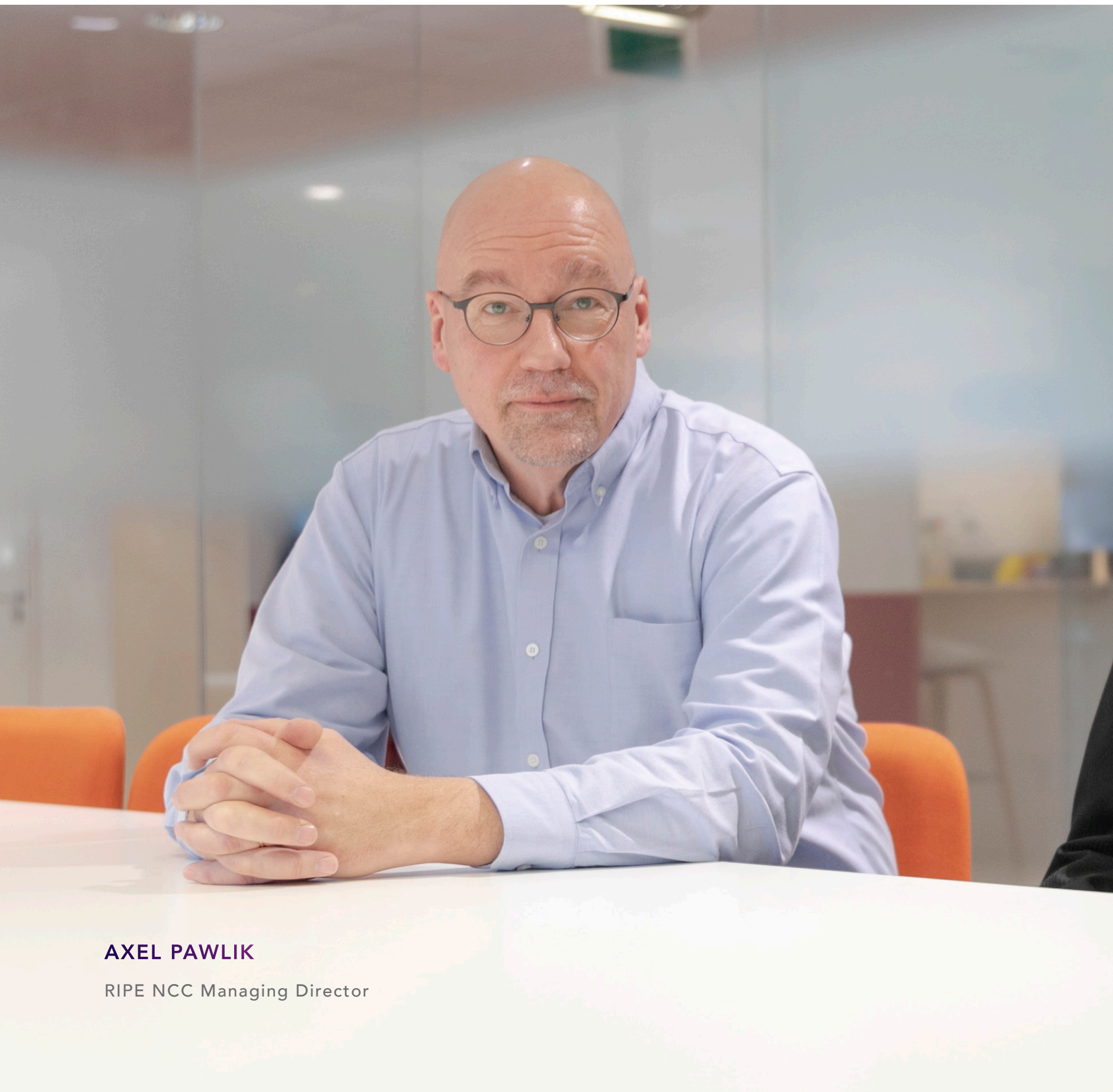
ACCOUNTABILITY

ENGAGEMENT

OPERATOR
TOOLS



INSIDE THE RIPE NCC



AXEL PAWLIK

RIPE NCC Managing Director

WELCOME TO THE RIPE NCC'S ANNUAL REPORT 2018

This document outlines how we performed the activities described in the RIPE NCC Activity Plan and Budget 2018 and is a key part of how we remain accountable to our membership.

In September, we reached the 20,000 Local Internet Registry (LIR) milestone, a reflection of the growth trend we've seen since we reached the /8 of IPv4 space in 2012. In recent years, we've noticed increase diversity amongst our membership in terms of industry and country of origin. We aim to deliver world-class services while connecting people through engagement efforts to maintain the resiliency and stability of the Internet. To do this effectively, we need to better understand who are members are and how we can help them. In addition to IP address allocations, what value can we bring to our members through our service portfolio in this rapidly changing Internet landscape?

We also looked at how we can better empower our staff to deliver better service to our membership. We embarked on a two-year culture change programme to address some of the areas we saw that needed improvement internally. Our incredible staff works hard to deliver world-class services to our members, so happy staff=happy members. We're already seeing our internal work pay off and we are excited to see how the organisation further develops.

In the RIPE NCC Activity Plan and Budget 2018, the key themes of our activities for the year were to improve our service delivery and the RIPE Database/Registry, increase engagement with our stakeholders, strengthen the RIR system and better understand our member base. We've highlighted our achievements over the year here and we've also asked some of our members to give us insight into their relationship with us.

VIEW FROM THE RIPE NCC EXECUTIVE BOARD

As the RIPE NCC membership grows in size and scope, it's important that the RIPE NCC Executive Board evolve as well. After diligently serving the board as Chairman for a decade, Nigel Titley decided to step down in October last year. I was appointed the new Chairman and Nigel will stay on the board until the elections at the RIPE NCC General Meeting May 2019 that will ensure continuity and a smooth handover. On behalf of the board, the RIPE NCC, its membership and the RIPE community, I'd like to thank Nigel for his steadfast leadership over the past decade.

In times of change, it's imperative that the board has open lines of communication with RIPE NCC members. There are several channels through which our members provide us with feedback, both formal and informal, including: the RIPE NCC General Meeting, the members-discuss mailing list, email and face-to-face at RIPE Meetings and regional meetings. We understand that, at times, some of our members expect an immediate response from the board on a given issue. Our growing member base and its huge diversity of opinion means that in order for the board to weigh in, we wait until a wider spectrum of the issue is presented on the list. The importance of the mailing lists as input for the board should not be underestimated. It is one of the key tools that the board uses to understand the needs and opinions of our members. We may take some time before we

respond on an issue, but we are certainly listening to what you have to say.

The board is responsible for ensuring that the RIPE NCC meets its members' needs as well as the needs of its employees. In early 2018, the organisation embarked on a two-year culture change programme aimed at increasing trust, accountability, collaboration and efficiency. To help facilitate these changes, a decision was also made to move the organisation from a top-down hierarchical structure to a flatter and self-organised structure. Fostering an internal culture that values all opinions in an open, transparent and bottom-up way complements how the RIR and I-star communities function externally, so an internal structure to reflect that makes sense. The board supports this transition and is confident that a more agile, transparent structure will allow the RIPE NCC to better meet the evolving needs of our membership.

Evolution, transition and change. These were the prevalent themes of 2018 and beyond for our membership, the RIPE NCC, its staff and the RIPE community. In times of change, it's crucial to listen and engage so that any necessary change can happen in an informed, coordinated and proactive way. This is a priority for the RIPE NCC Executive Board and we will be diligent in delivering on this promise.



CHRISTIAN KAUFMANN

Chairman of the RIPE NCC Executive Board

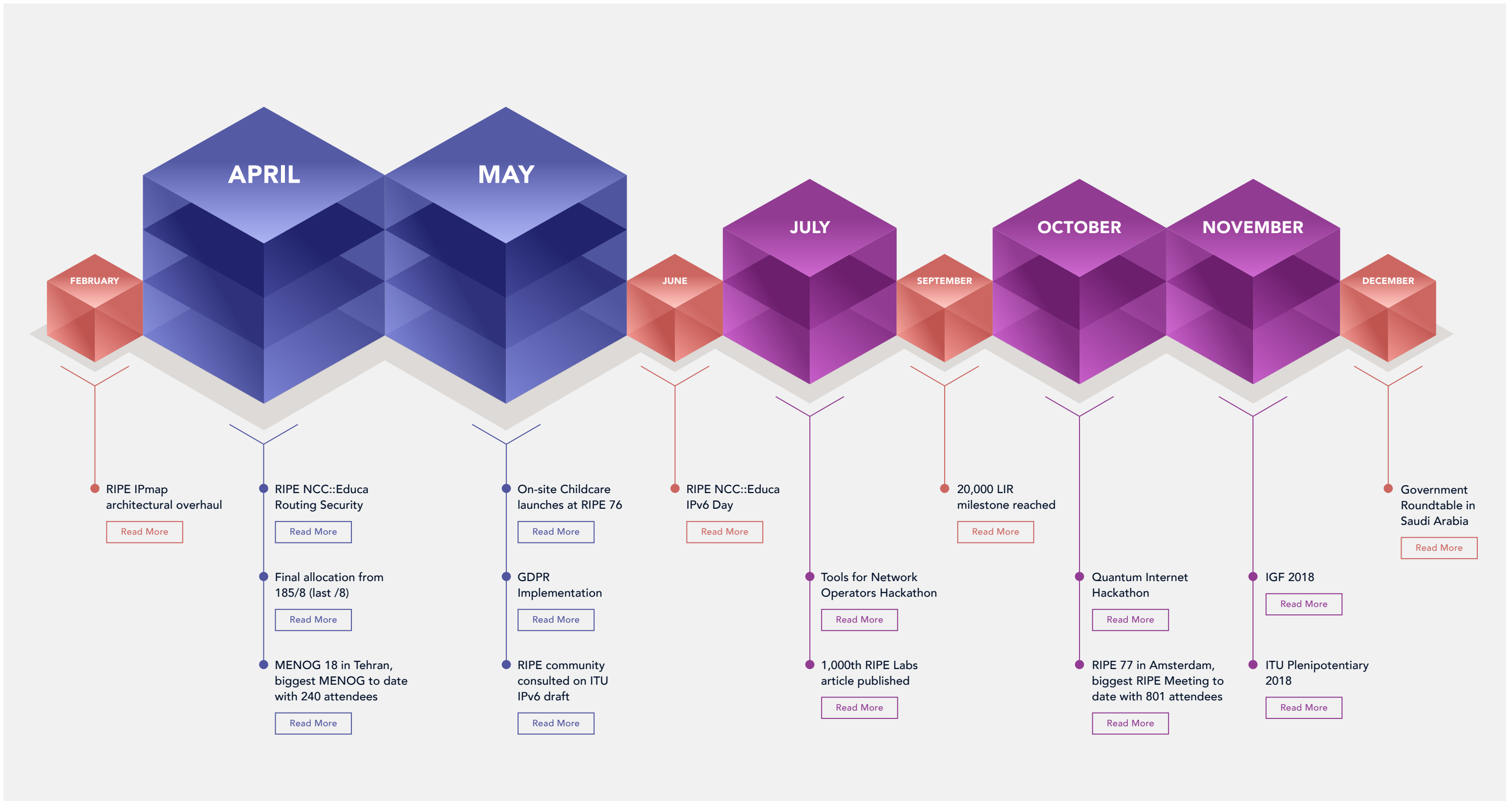
RIPE NCC EXECUTIVE BOARD



REMCO VAN MOOK | FALK VON BORNSTAEDT | MARIA HÄLL | CHRISTIAN KAUFMANN | SALAM YAMOUT | PIOTR STRZYŻEWSKI | NIGEL TITLEY

[Read More](#)

YEAR IN REVIEW HIGHLIGHTS | 2018



OVERVIEW OF RIPE NCC COSTS PER ACTIVITY 2018

These figures are not part of the Financial Report and as such have not been audited by an external third party.

They are indications based on an internal time registration methodology that is executed on a monthly basis.

These figures serve only as indications of the costs relating to these activities.

	Budget Operational Expenses 2018	Actual Operational Expenses 2018	Variation
Registry Maintenance	3,946	4,019	73
RIPE Database	910	703	(207)
Resource Certification (RPKI)	208	243	35
LIR Portal	730	778	48
Regional Internet Registry	5,794	5,743	(51)
Training	1,502	1,694	192
RIPEstat	716	552	(164)
RIPE Atlas and RIS	1,209	1,271	62
Other Services	441	432	(9)
Services	3,868	3,949	81
DNS and K-root Operations	784	534	(250)
Data Analysis and Scientific Support	400	511	111
RIPE Labs	342	234	(108)
Outreach and Engagement	3,848	4,037	189
IPv6 Support	149	75	(74)
RIPE Meetings	1,782	1,641	(141)
RIPE Policy and Community Support	185	111	(74)
ICANN/IANA/IEFT/ISOC/RIRs	1,273	1,131	(142)
Good of the Internet	505	532	27
Coordination Activities	9,268	8,806	(462)
IT and Information Security	2,745	2,570	(175)
Facilities - Rent and Utilities	1,051	985	(66)
Management and HR	2,626	3,200	574
Finance and Administration	1,051	932	(119)
Legal	167	237	70
Organisational Activities: Executive Board, Arbitration Panel and General Meetings	317	229	(88)
Internal	7,957	8,153	196
RIPE NCC	26,887	26,651	(236)

Note: Operational expenses do not include depreciation and bad debts.

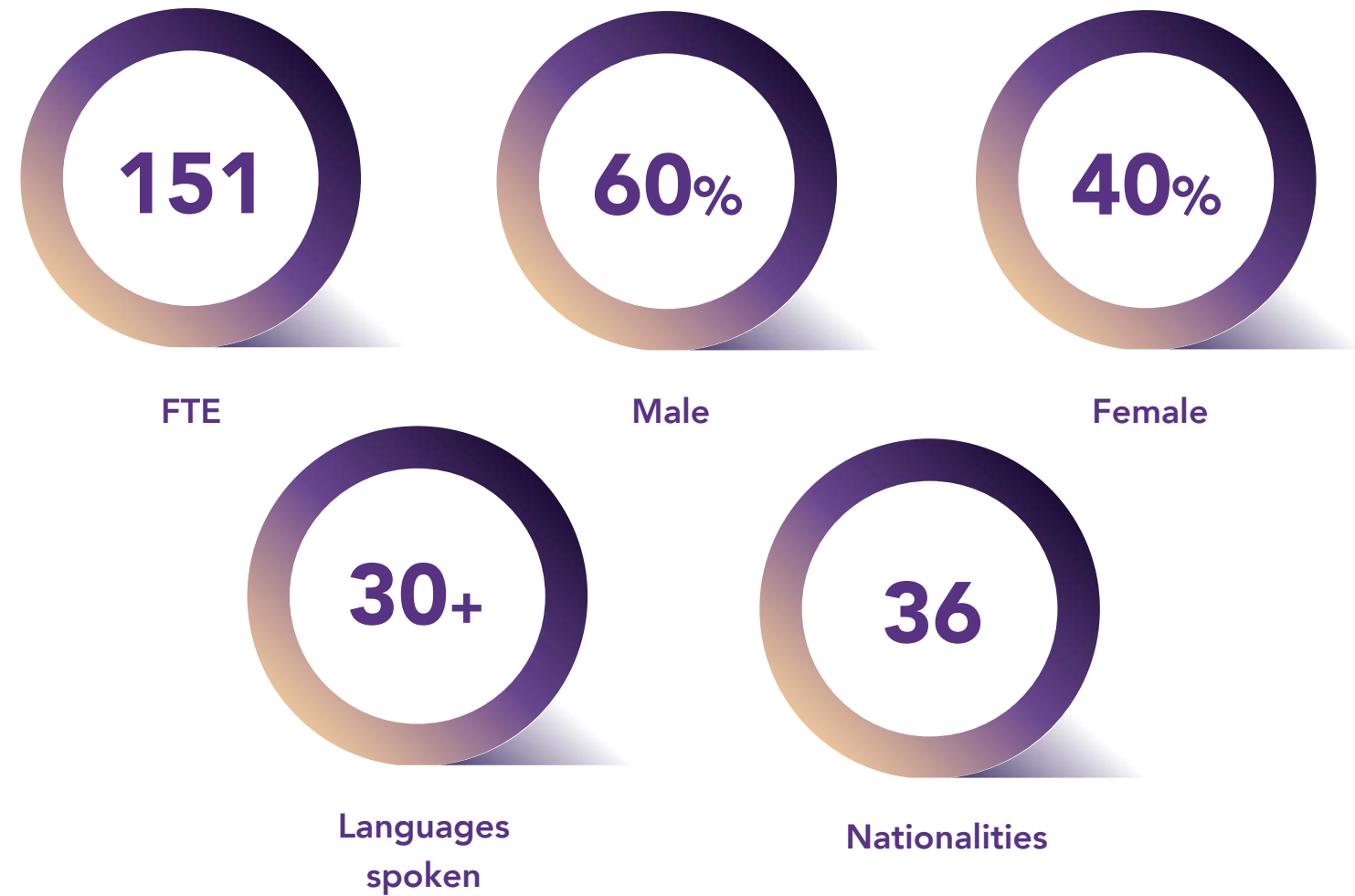
WORKING AT THE RIPE NCC



Between our modern, open office in the east wing of Amsterdam Central Station, our vibrant Dubai office and our remote workers in the Russian Federation, CIS and Eastern Europe, we bring together nearly 170 people from around the globe to shape the future of the Internet.

Our staff are our biggest asset. Our front-line staff (IP Analysts, CS Reps and our receptionists) work directly with our members on a daily basis. Our talented network engineers, developers, architects and analysts build and support the tools that form the backbone of the Internet. Our researchers push us to innovate and explore new ideas. And our communicators, external relations and legal staff members ensure we are connected to our members, improving our services through feedback and providing a consistent, open flow of information. We send staff across our service region to share knowledge, best practices and expert opinions so our members can optimise their network operations.

In 2018, we focused on improving our internal culture to foster a growth mindset rooted in trust, accountability and collaboration. We're already seeing the positive benefits of our programme and look forward to what the future brings!





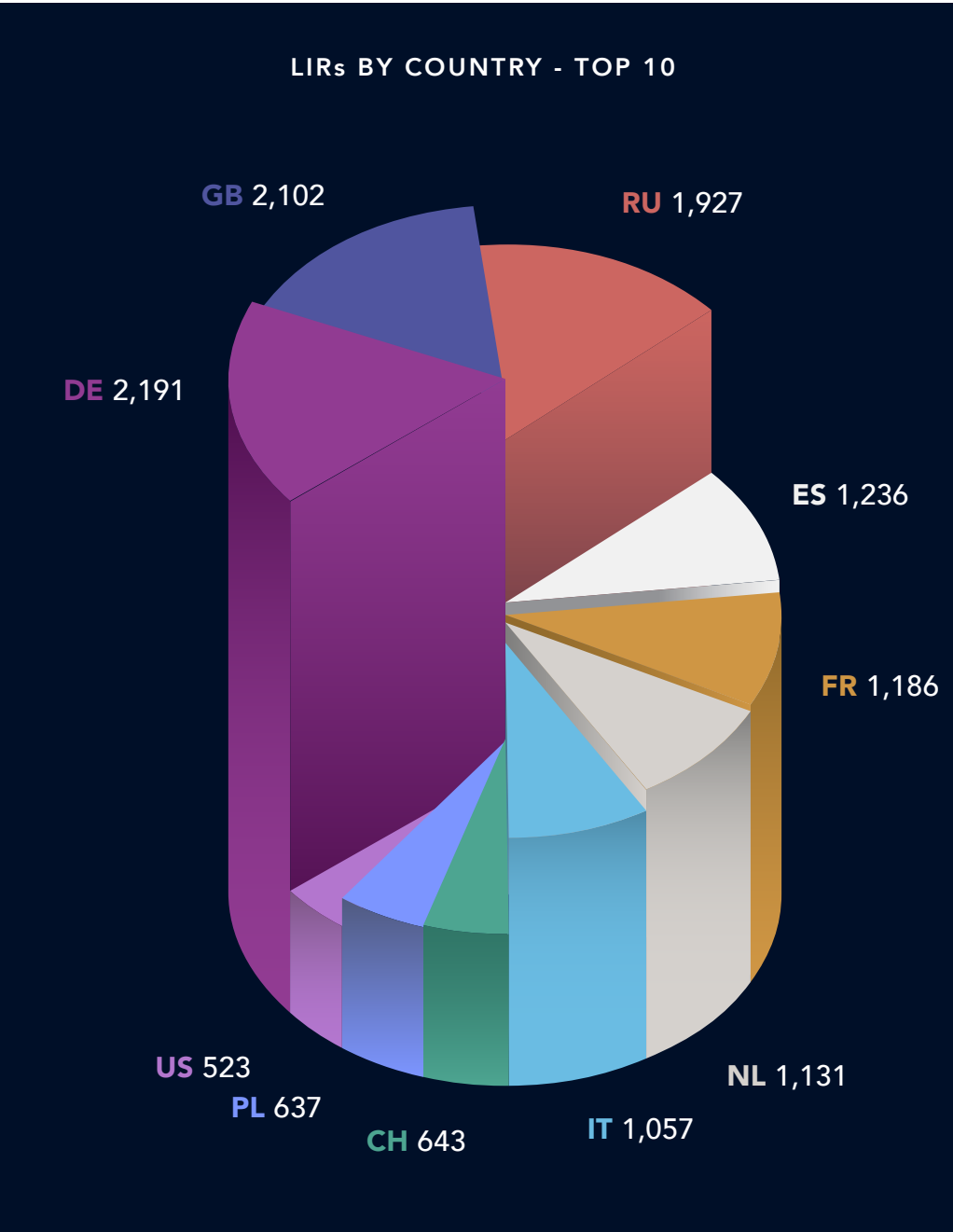
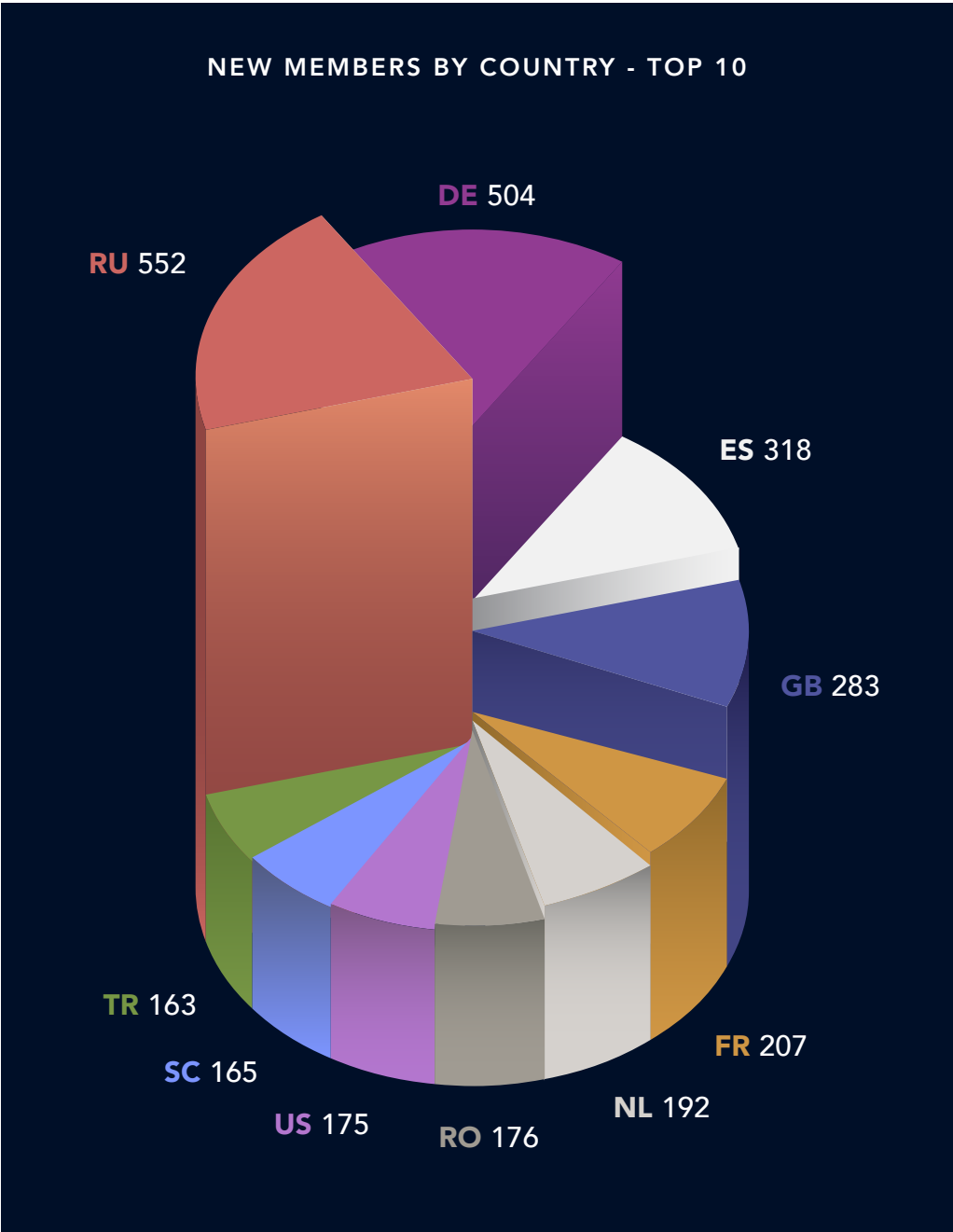
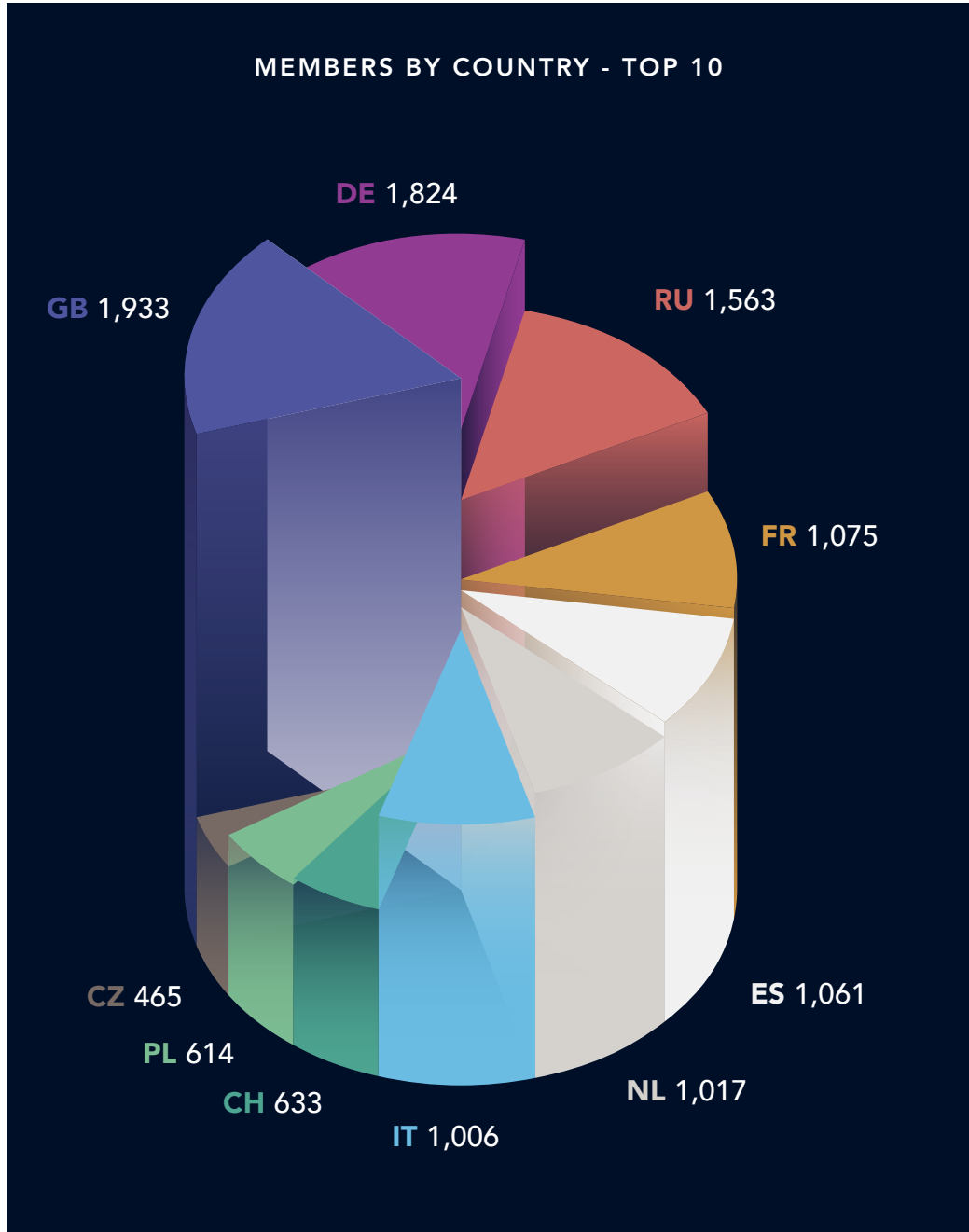
MEMBER SERVICES



OUR DIVERSE MEMBERSHIP - AT A GLANCE

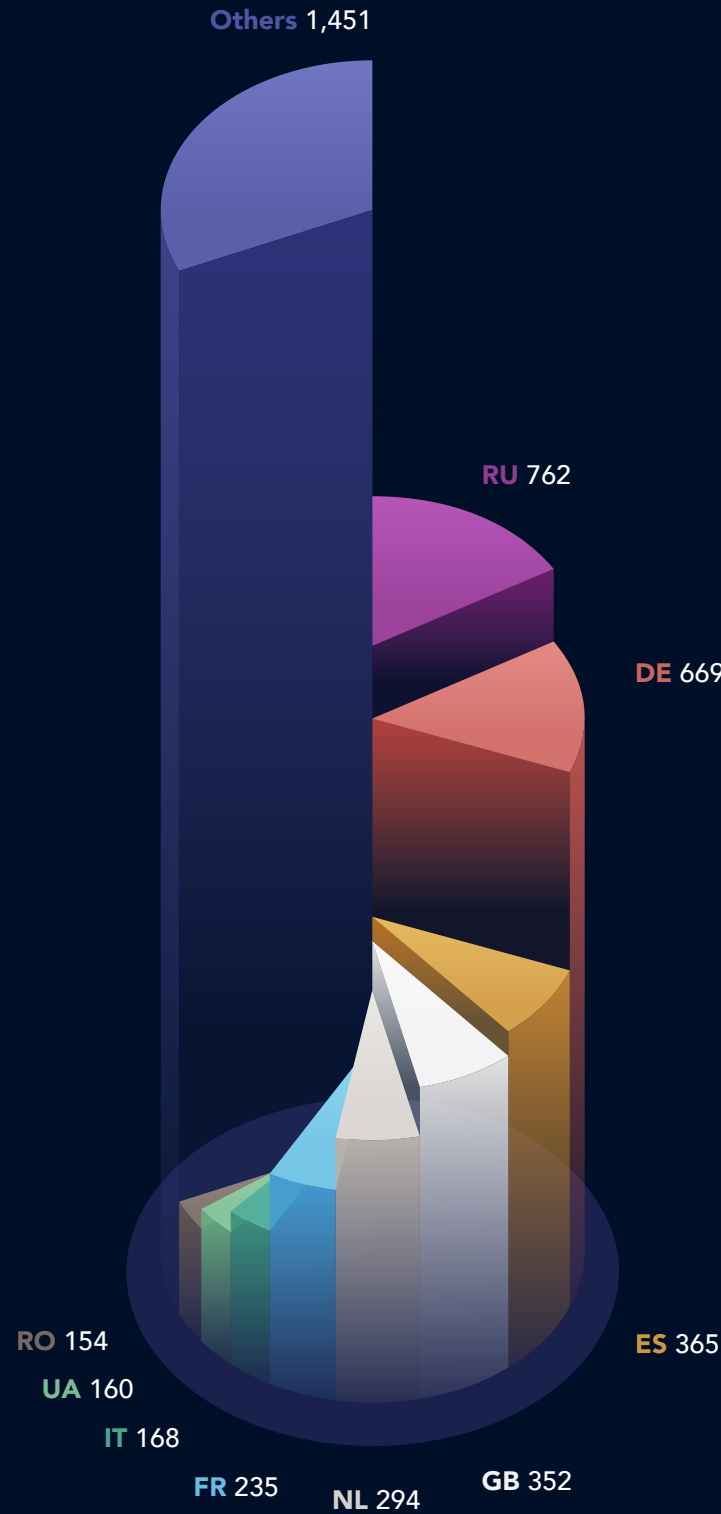
Total number of active LIRs	20,626
Total number of active members	18,052
New LIRs (4,232 active as of year end)	4,401

Member countries	117
Members with an IPv6 allocation	13,460



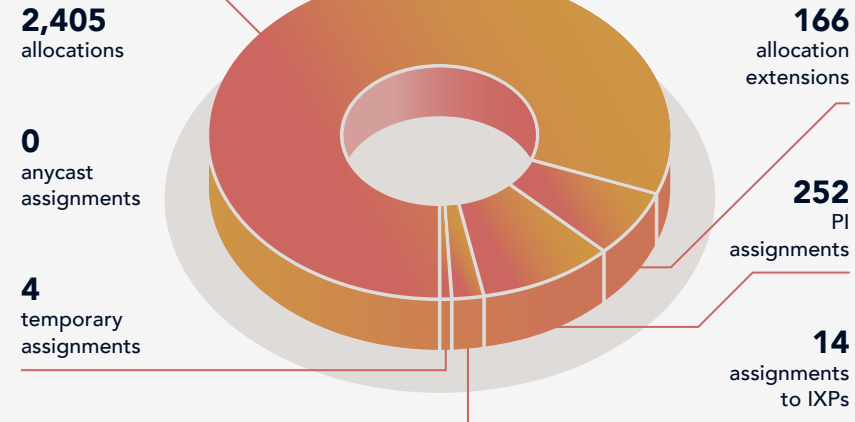


IPv4 /22 ALLOCATIONS BY COUNTRY

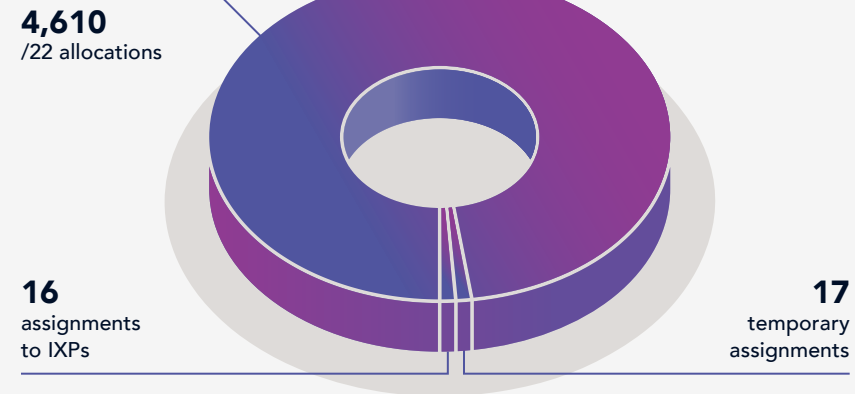


ALLOCATIONS AND ASSIGNMENTS

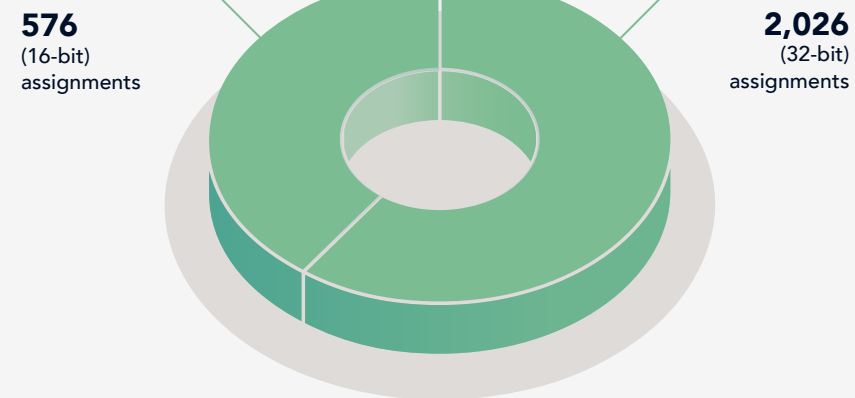
IPv6



IPv4

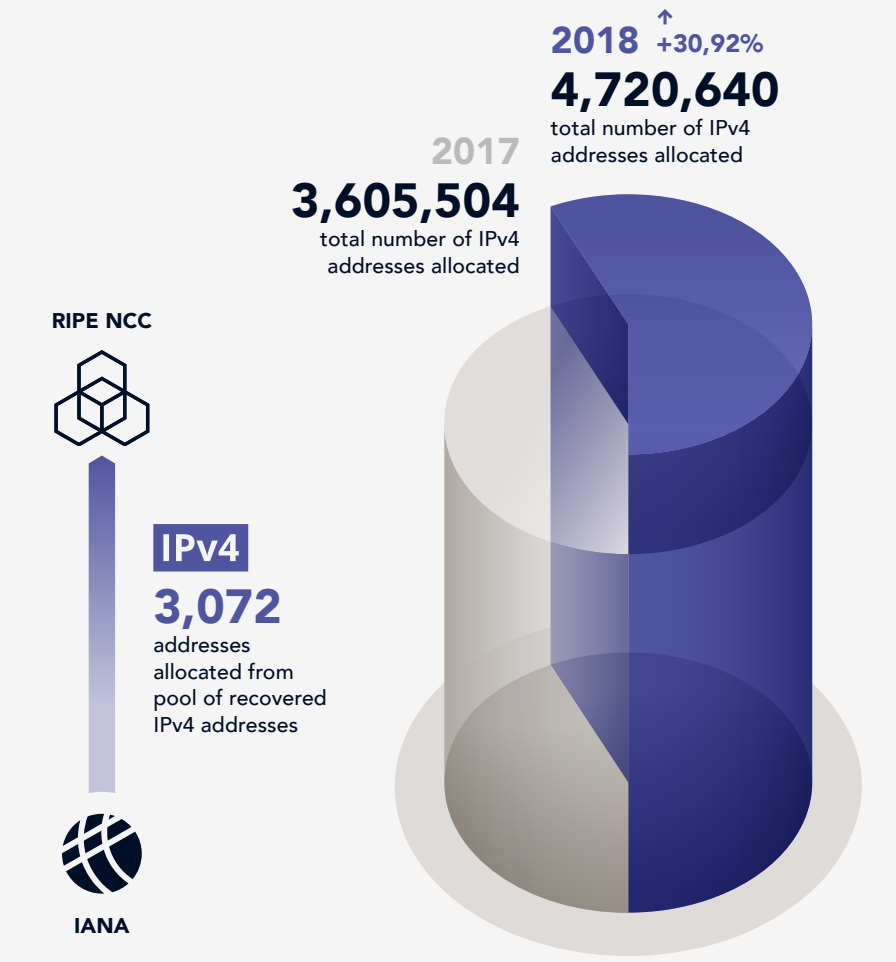
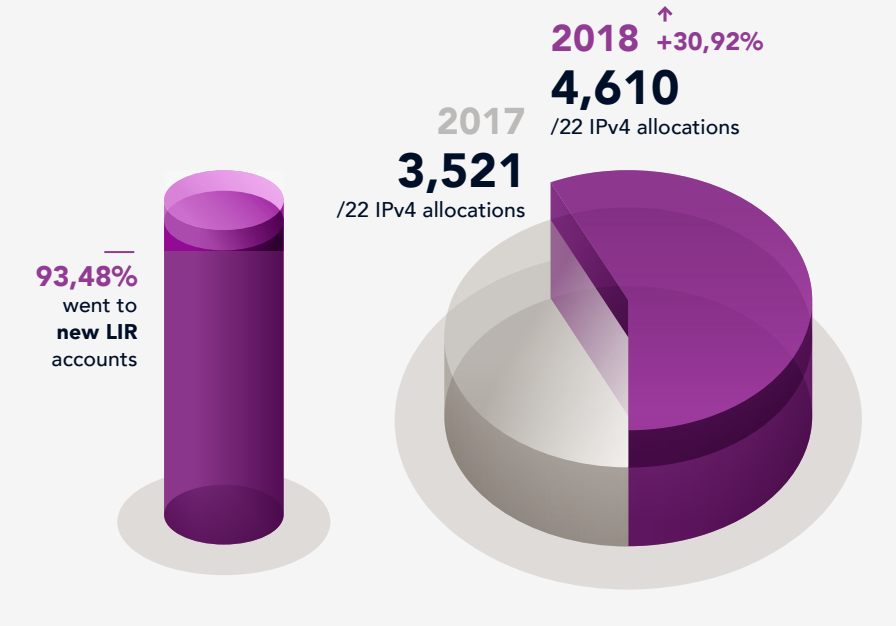


ASNs



767 ASNs were returned to the free pool in 2018.

TOTAL
10,086
allocations and assignments



MEMBER PROFILE: BMI, GERMAN GOVERNMENT



Name: Constanze Bürger

Organisation: Federal Ministry of the Interior, Building and Community, Germany (BMI)

Title: Senior Advisor of Division CI5

How long has BMI been a member of the RIPE NCC?

We have been a happy member since February 2008.

Besides obtaining IP addresses, was there any other motivation in becoming a member?

Our membership strongly supports the Internet way of operation in general. This is also an opportunity to exchange ideas and experience with other LIRs.

What has your experience been in the RIPE community since you first began participating?

The RIPE community is very technical and understands the operations of the Internet in general. The community supported us with workshops and advice. It is clearly visible that, in recent years, the RIPE community has become more sociopolitical.

What changes do you see governments implementing around Internet governance?

The Policy Development Process (PDP) is a great example of bottom-up techniques that help to bring Internet-proven methods to network operators that need to interface between many parties. Since the Internet poses a solid infrastructure for our economics, it is essential to understand the Internet governance process in order to create laws and regulations to support those.

What is the German government's view about IPv6?

IPv6 is a key technology that helps to overhaul grown IPv4-structures that suffered from address shortage for a long time. We also have the possibility of using a uniform protocol in the whole government - that simplifies management and security policies.

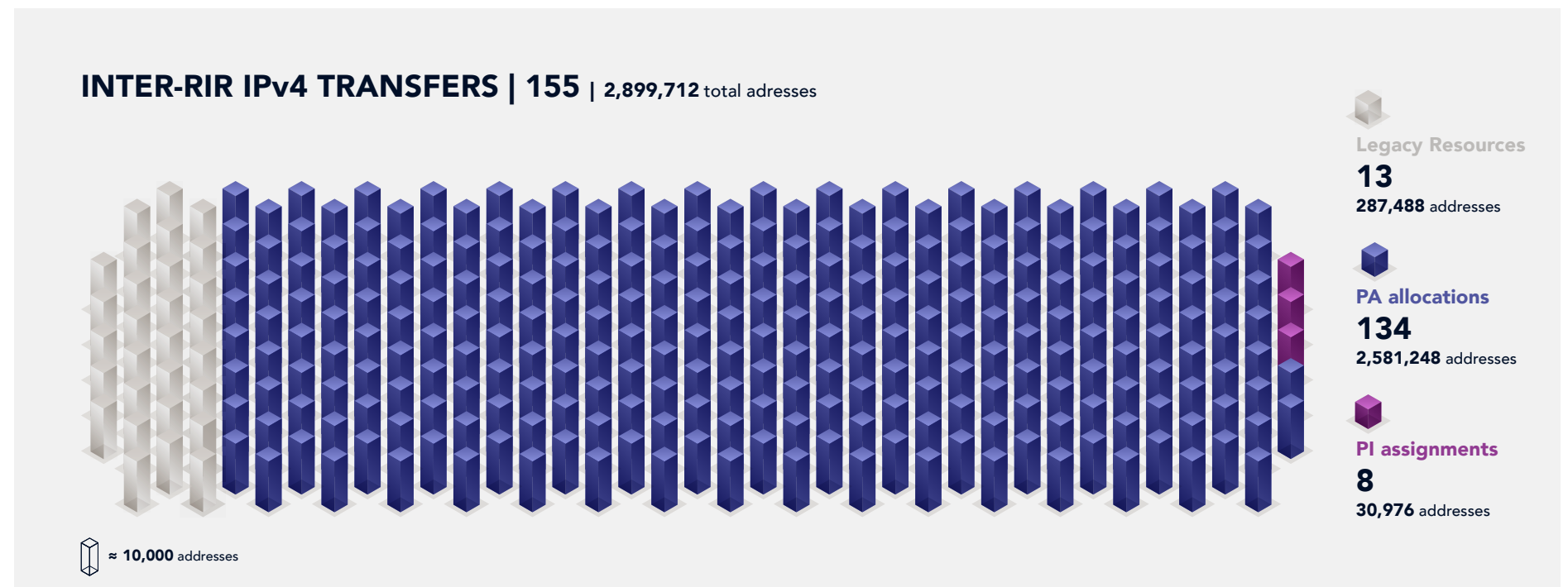
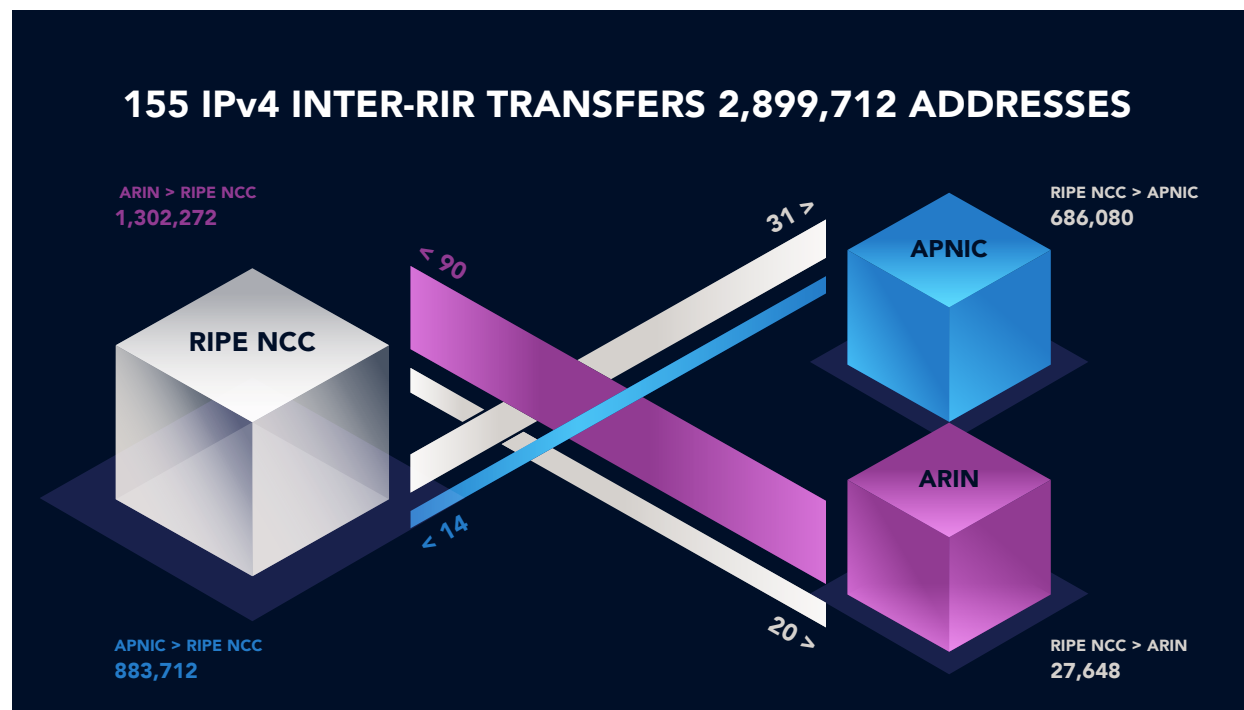
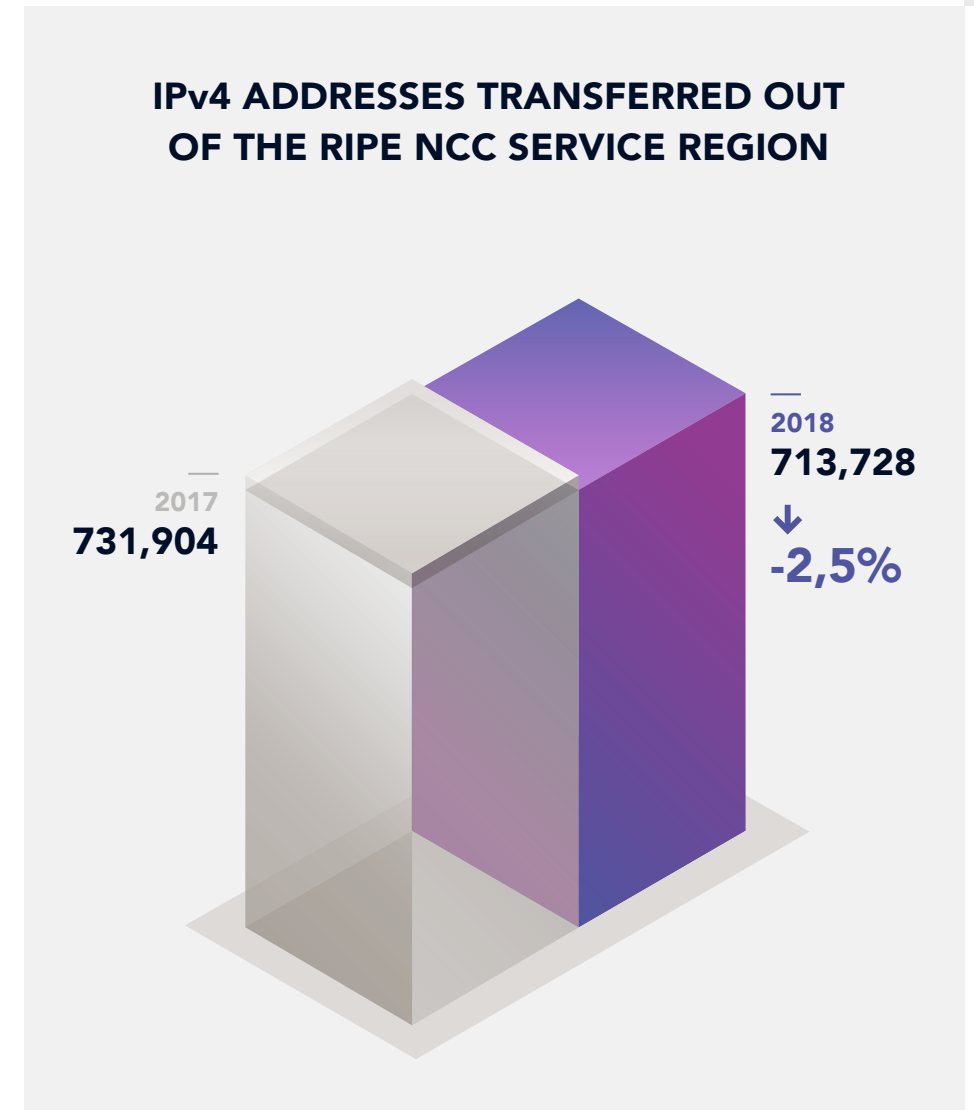
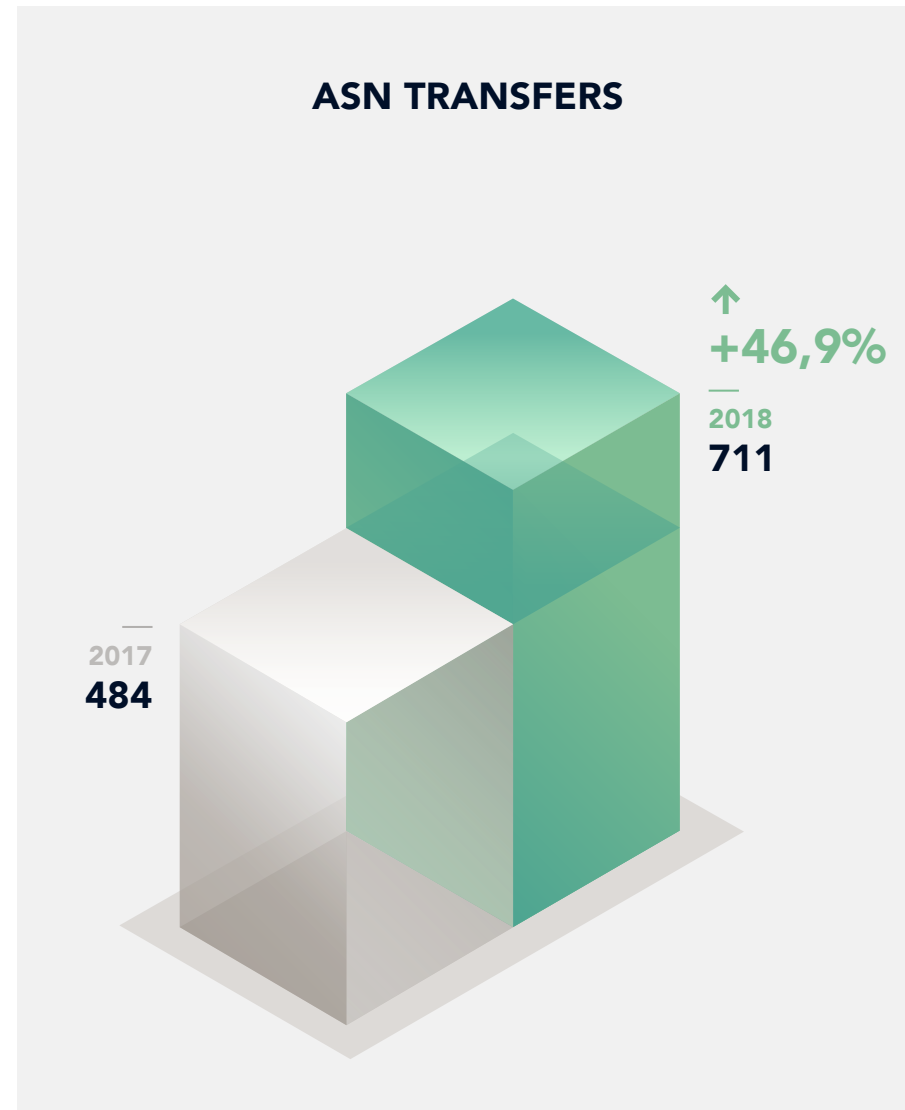
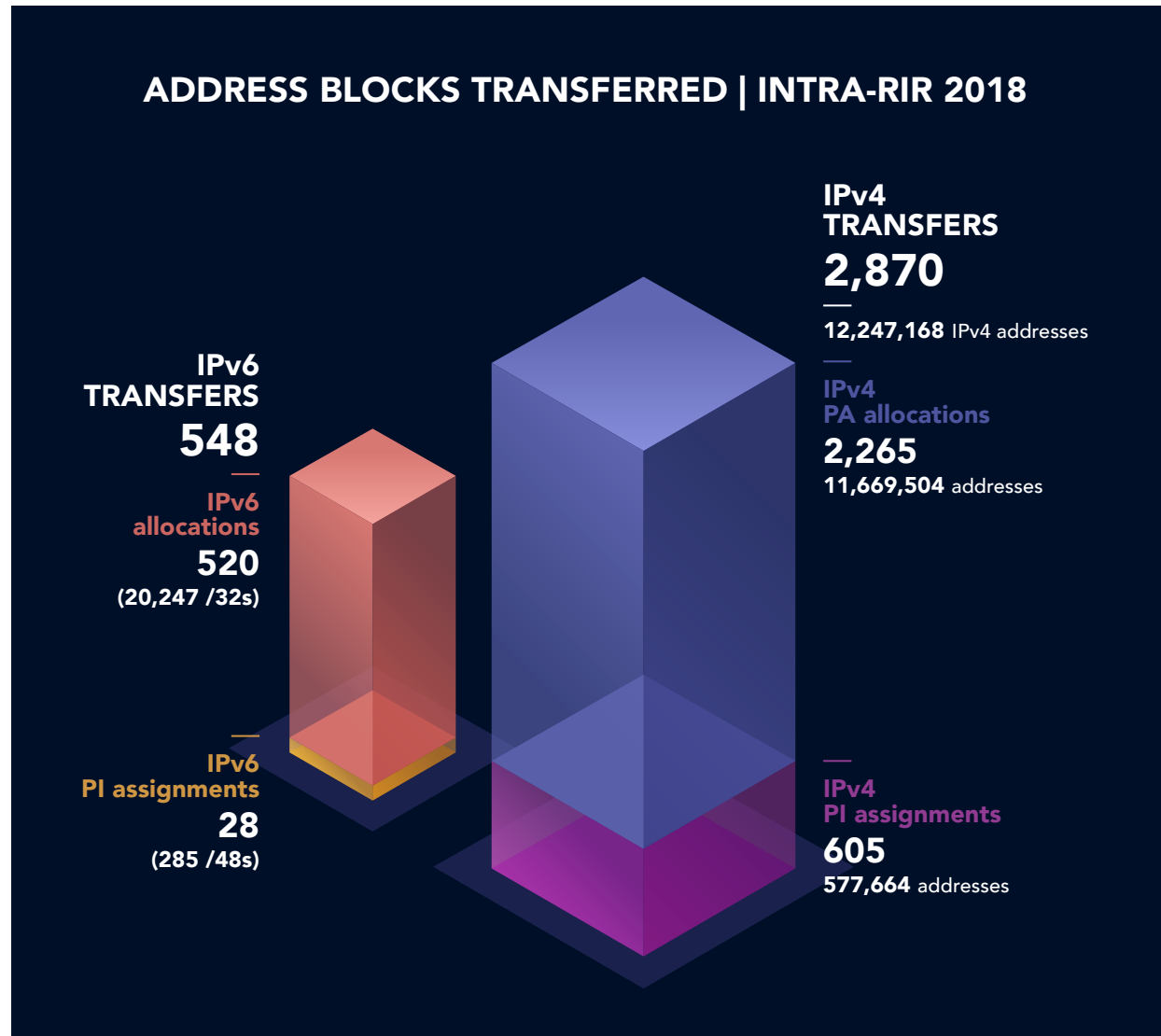
In your experience, what have been the 'added benefits' of being a member of the RIPE NCC?

Being part of the RIPE community allows us to network with other members and to contribute to the development of RIPE Policies. The trainings are of high quality and help to guide our partners to comply with policies and common Internet procedures.

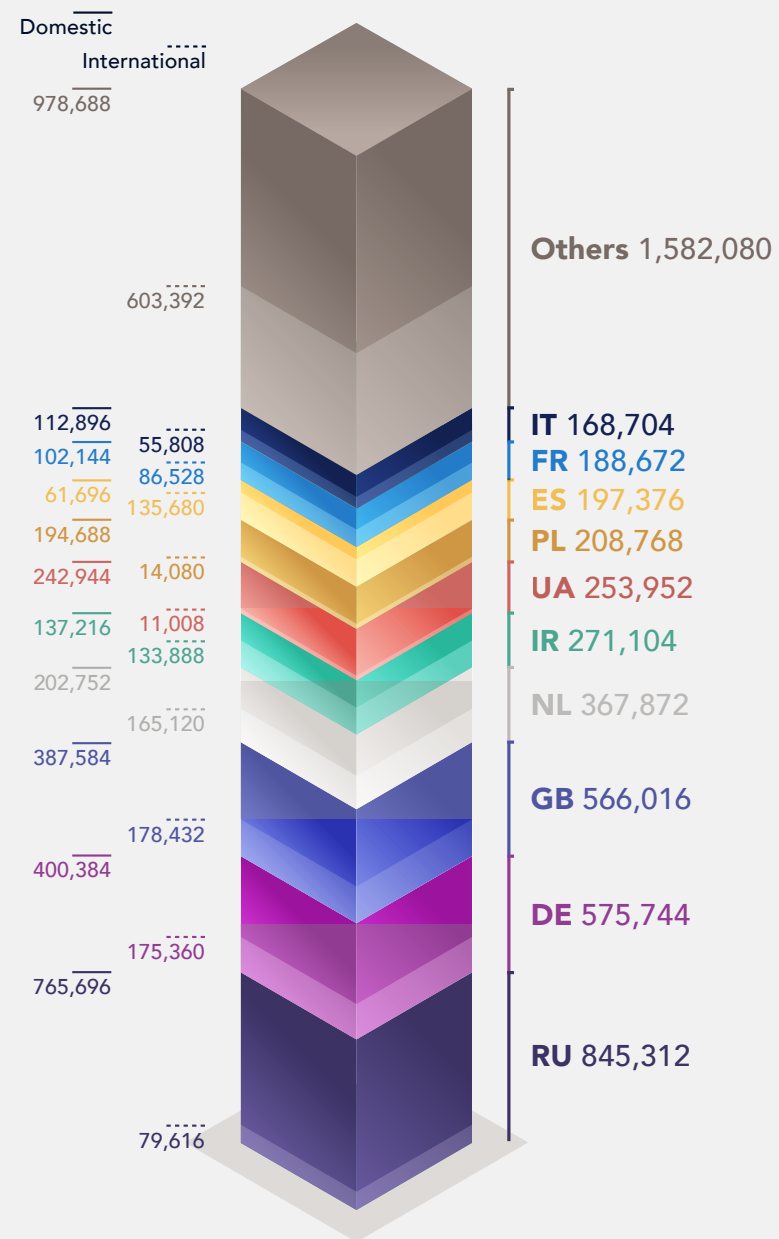
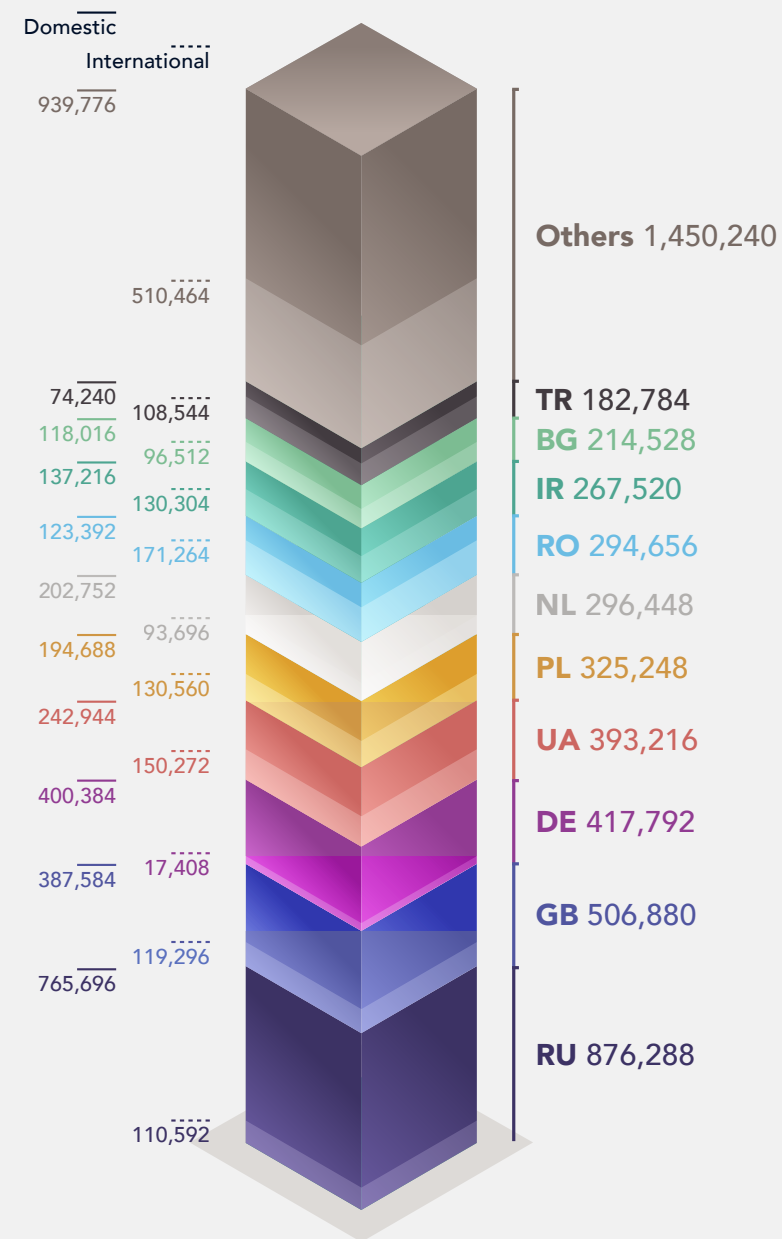


INTERNET NUMBER RESOURCES - TRANSFERS

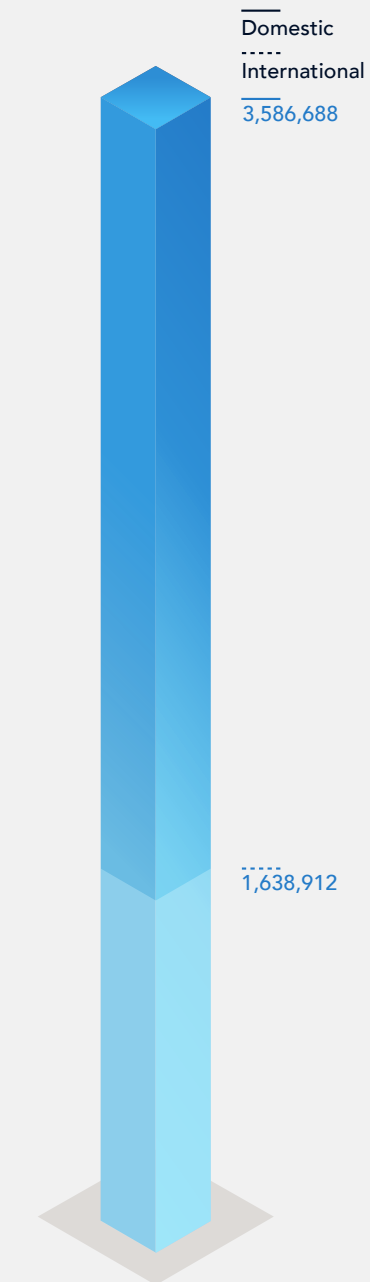
As our membership continues to grow and the pool of available IPv4 addresses continues to decrease, we face a new challenge of providing services to a larger membership while increasing efficiency internally to handle the higher workload that comes with resource transfers. Thanks to these more efficient processes, name changes, transfers, and mergers and acquisitions can be dealt with more quickly, allowing us to focus on the due diligence needed for more complex requests. When members interact with us, they can also leave a rating immediately after a chat or phone conversation, giving us constant feedback on member satisfaction.



INTRA-RIR TRANSFERS BY COUNTRY (TOP 10)

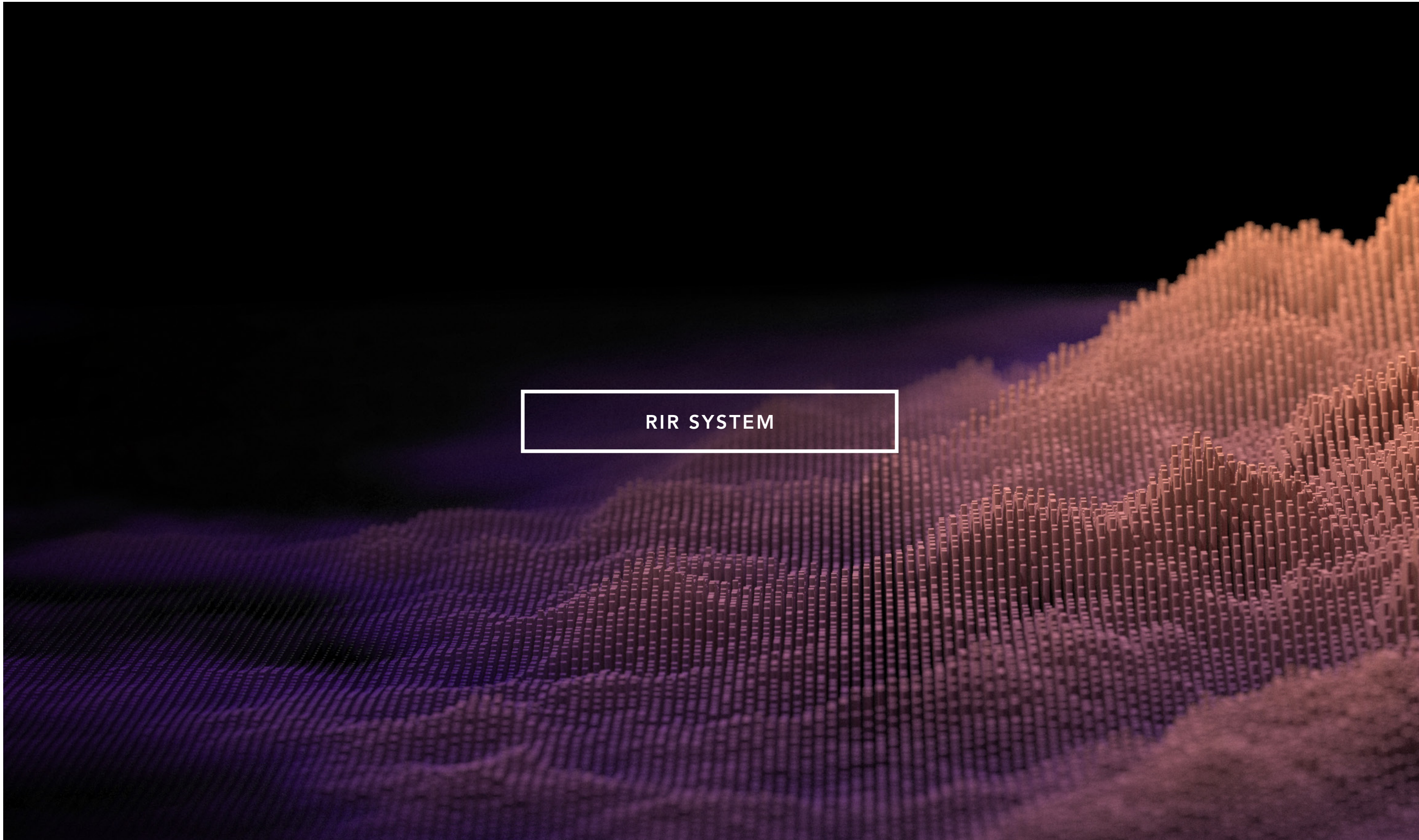


Domestic vs International



Analysing the data for the inbound and outbound flow of IP address transfers between countries requires some manual validation. We checked all the transfers larger than a /16 and removed any that were the result of shuffling of IPs between LIRs belonging to the same parent organisation. Once we removed instances of transfers related to an internal shifting of resources, we could see a more accurate picture of transfer flow between countries, or within a country. The largest movement of IP addresses on a country level was within Russia, which is a similar situation to 2017. In terms of the size of IP address blocks transferred, /22s are the largest contributor, both in the total number of blocks transferred and the total number of addresses.

Note: The intra-RIR transfers by country (above) exclude several large transfers between related entities. These transfers are included in the Address Blocks Transferred (page 16), which accounts for the different totals between the two graphs.



RIR SYSTEM

K-root, DNS, rDNS

We provide core services that support the stability of the Internet, like hosting K-root, one of 13 global root name servers. We run a DNS service from a cluster of servers in Amsterdam, London and Stockholm that serve zones for reverse delegations for RIPE NCC member allocations, country code Top-Level Domain (ccTLD) secondary services and RIPE NCC authoritative zones. We also operate the Routing Information Service (RIS), which tracks changes in the global routing system by collecting and storing Border Gateway Protocol (BGP) routing information using 19 Remote Route Collectors (RRCs) located at major Internet exchanges around the world.

Highlights

- K-root - 66 hosted nodes; 13 added in 2018
- Migration to new DNSSEC signers completed without impact for users

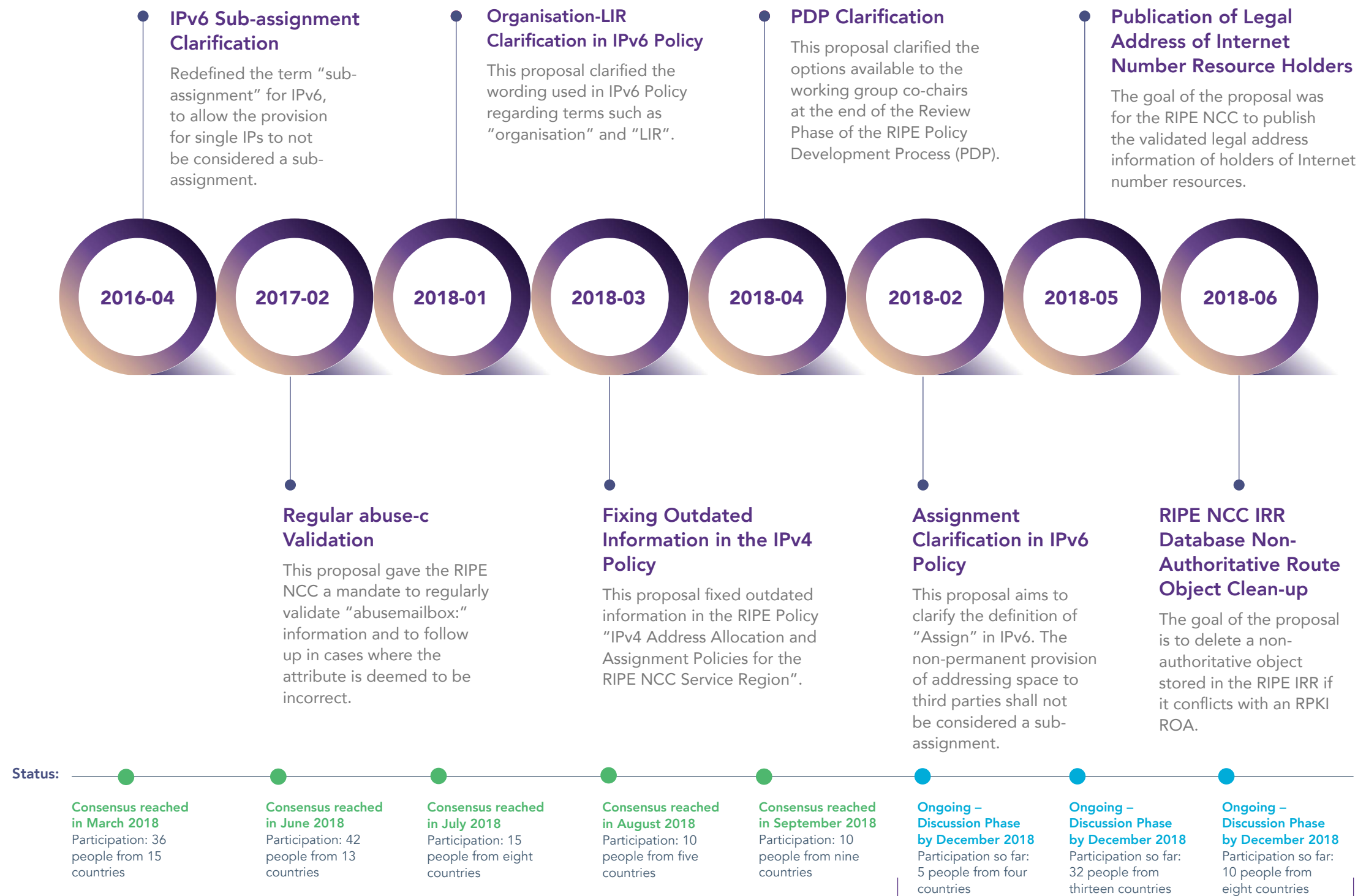
POLICY DEVELOPMENT PROCESS (PDP)

The RIPE community develops and sets policies through a long established, open, bottom-up process of discussion and consensus-based decision making. These discussions take place at RIPE Meetings and on RIPE Working Group mailing lists. Consensus on a policy can only be reached on a mailing list.

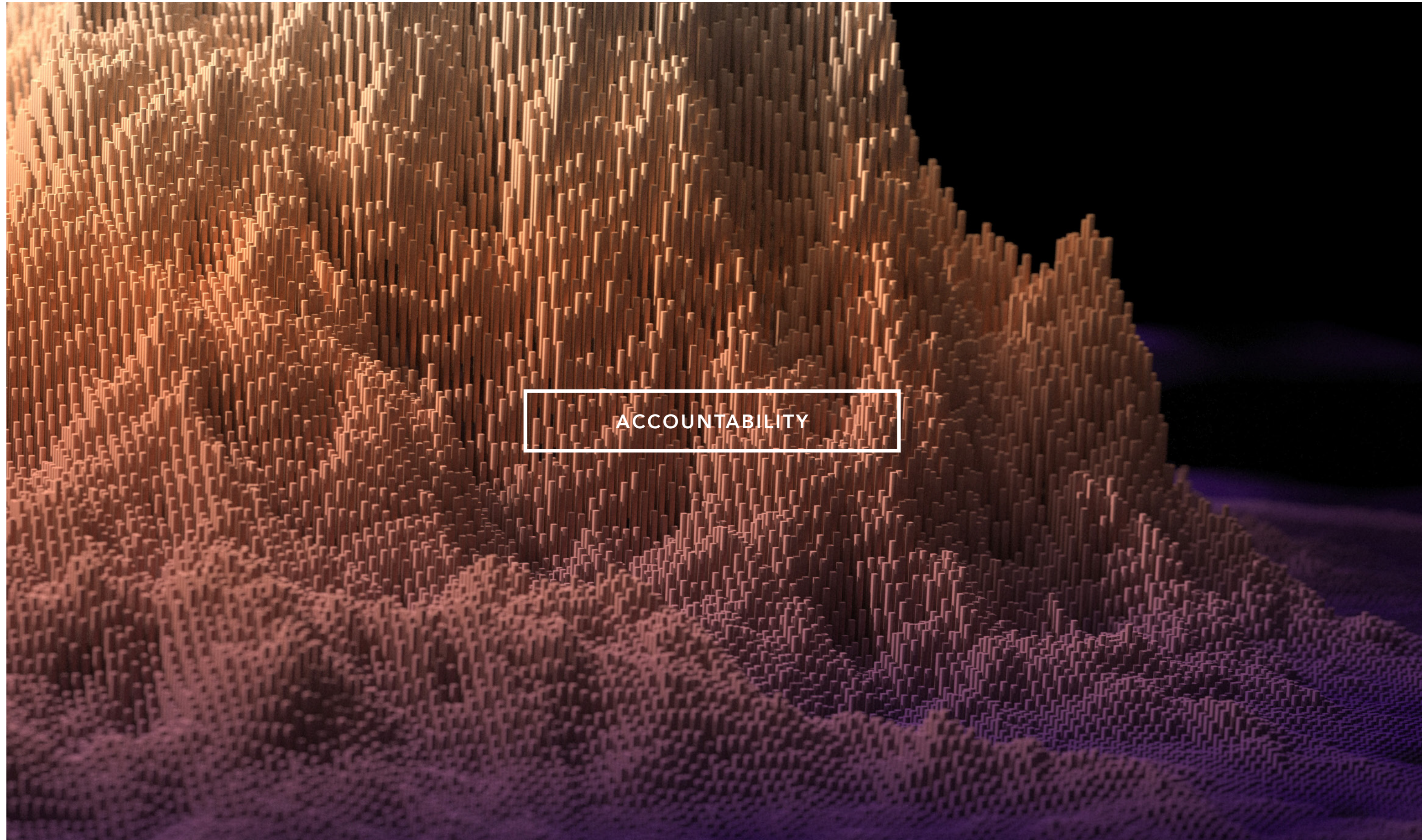
- Seven people from four countries submitted a policy proposal to the PDP
- More than 100 people from 29 countries participated in the PDP in 2018
- Proposal 2018-05 (Publication of Legal Address of Internet Number Resource Holder) was the most popular discussion with more than 90 posts

[Read More](#)

Policies under discussion in 2018



Check the website for the latest status



ACCOUNTABILITY

ABUSE-C VALIDATION

A policy requiring resource holders to list a valid abuse contact email address or 'abuse-c' attribute in the RIPE Database has existed since 2012 to help people report network abuse. However, there was no requirement for the RIPE NCC to proactively check the validity of the listed abuse contact details.

The policy proposal accepted in June 2018 asks the RIPE NCC to validate abuse-c attributes annually to maintain registry accuracy and to follow-up when this data is incorrect. Since then, we have worked to create a process that balances diligence with ease of use. With roughly 70,000 email addresses to validate, automation is a key feature of this process. The goal of the process is to encourage all LIRs to maintain up-to-date and valid abuse contact email addresses. We shared a proposed implementation plan in October 2018, and since then the validation process has been under trial. We expect to roll out the abuse-c validation process during 2019 once the trial process is completed.

NWI-5 Out-Of-Region Objects in the RIPE Database

On 4 September 2018, we changed the way out-of-region **route** objects are managed and represented in the RIPE Database as the result of a long-standing policy discussion within the RIPE Database Working Group.

The RIPE Database no longer supports the creation of out-of-region **route(6)** and **aut-num** objects, and existing out-of-region objects have had their "source:" attribute changed to "RIPE-NONAUTH". This change will help network operators to identify the legitimate holders of IP address space more easily and helps resolve problems related to prefix hijacking.

Total number of out-of-region ROUTE objects in the RIPE Database that needed to be updated (as of 28 June 2018)

68,343

Out-of-region ROUTE objects per region:

AFRINIC	50,005
ARIN	14,033
LACNIC	1,366
APNIC	2,939

Total number of out-of-region ROUTE6 objects in the RIPE Database that needed to be updated (as of 28 June 2018)

1,902

Out-of-region ROUTE6 objects per region:

AFRINIC	513
ARIN	1,060
LACNIC	216
APNIC	113

[Read More](#)

RIPE REGISTRY ACCOUNTABILITY

Ensuring the accuracy of the RIPE Registry is a core function of the RIPE NCC. We work with our members to check that registry records are correct and contact information is current through Assisted Registry Checks (ARCs). Additionally, we investigate reports of abuse and hijacks. In 2018, we launched the RIPE NCC Contact Form, which makes it easier to file various items including abuse complaints and policy violations. Thanks to a strengthening of due diligence activities in 2018, there was a steep increase in the number of investigations carried out by our teams.



Increase in hijack investigations



Assisted Registry Checks (ARCs) completed



Assisted Registry Checks (ARCs) carried out at RIPE Meetings

Abuse Reports

Total number of reports received via the report form in 2018	647
Number of reports regarding spamming or hacking	13
Number of reports relevant to the RIPE NCC	633

Of the 633 reports that were investigated

- 600 reported incorrect data in the RIPE Database. 464 of these required further investigation by the RIPE NCC
- 11 reports concerned policy violations or untruthful information. Eight of these were found not to be policy violations, two could not be followed up due to lack of information and one resulted in a further enquiry
- Five reports were regarding bankruptcy, liquidation or insolvency
- 17 reports did not fall under the scope of normal abuse reports but were investigated nonetheless

Member Feedback on ARCs

“It was very helpful that the agent walked me through what object types were relevant for the data we needed to update and how to create them.”

“I’d just like to pass on thanks to the NCC team for providing this service. For occasional LIR users like myself I think the ARC is a great idea. I’d like to thank the IP Analyst who was helping me. He was extremely helpful, professional and very patient with me on the call.”

“Thank you very much for everything you guys do at RIPE NCC to help us LIRs keep the registry data up-to-date. I think you are doing a great job and offer us all great support. Keep up the good work and I promise you that all your hard work is much appreciated in the community!”

“I know the resources at the RIPE NCC are limited, but try to keep these checks every few years up and running. This is really helpful to discuss this directly with a human being.”



GDPR AND THE RIPE NCC

The General Data Protection Regulation (GDPR) came into effect on 25 May 2018. It aims to strengthen EU citizens' personal data protection rights and imposes heavy fines on businesses (both within and beyond the EU) that infringe these rights.



GDPR AND DATA COMPLIANCE

GDPR and the RIPE Database

The RIPE Database contains registration information about Internet number resources and, in particular, information about the natural or legal persons that hold these resources.

Contact details of the parties responsible for specific Internet number resources are essential for the smooth and uninterrupted operation of Internet and connectivity. The RIPE Database facilitates communication between the people responsible for networks to address technical issues, allowing for quick coordination between operators that do not have a direct relationship. It is the responsibility of the person who inserts the data in the RIPE Database (i.e. the maintainer) to ensure that they have obtained valid consent for the processing to take place.

As part of our review to ensure GDPR compliance, we looked at:

- Whether the processing of personal data published in the RIPE Database is justified by the purpose of the RIPE Database
- The legal basis for processing personal data in the RIPE Database
- RIPE Database queries

We are confident that we are GDPR-compliant when it comes to personal data processing. For RIPE Database queries, we concluded that we need to make some amendments concerning:

- Historical resource holders
- Queries for individuals
- Verification of a contact person when an object is created

[Read More](#)

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](#)

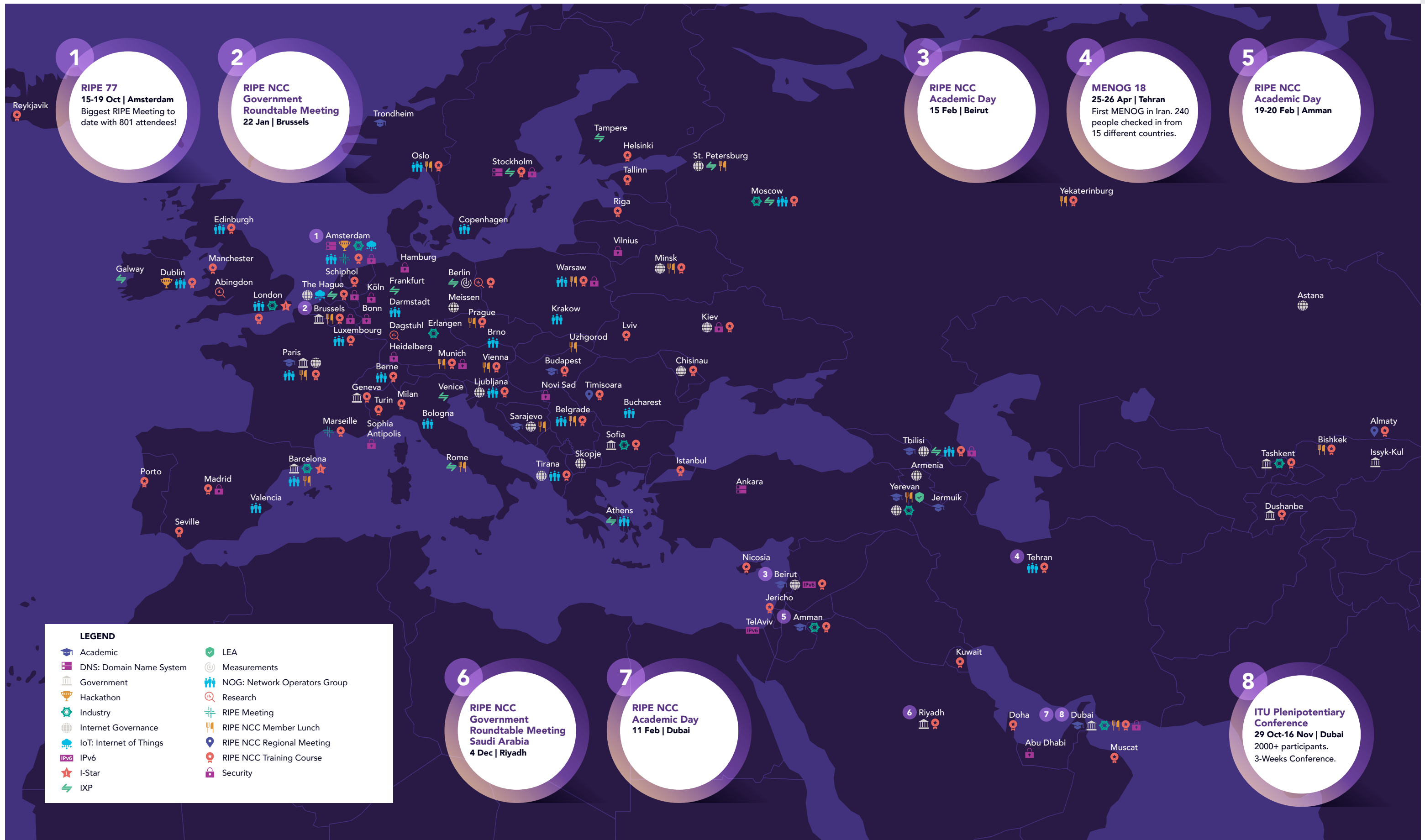
Security-related reports submitted to RIPE NCC CSIRT Team

Total number of submitted reports	71
Relevant security reports	28
Low-impact incidents	27
Medium-impact incidents	1
High-impact incidents	0
Critical-impact incidents	0

The medium-impact incident related to an external data breach. This data breach did not affect our network, systems or services.



ENGAGEMENT



LEGEND

Academic	LEA
DNS: Domain Name System	Measurements
Government	NOG: Network Operators Group
Hackathon	Research
Industry	RIPE Meeting
Internet Governance	RIPE NCC Member Lunch
IoT: Internet of Things	RIPE NCC Regional Meeting
IPv6	RIPE NCC Training Course
I-Star	Security
IXP	

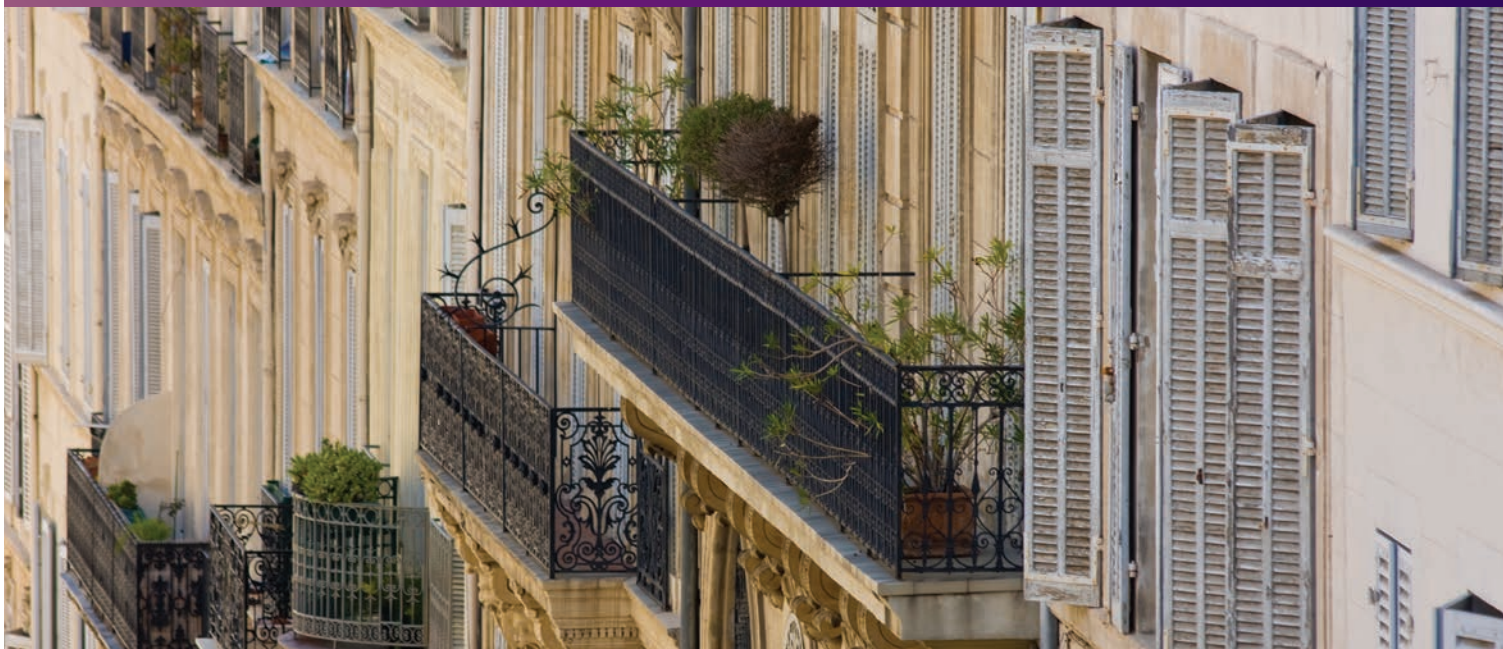
RIPE MEETINGS

RIPE 76

Marseille, France

14 - 18 May 2018

Total attendees: 737
Total first-time attendees: 200
Number of countries: 57



Highlights:

- Launch of on-site childcare
- A battle of wills: weather, strikes, football chaos, missing deliveries and yet one of our most successful meetings ever!
- Rob Blokzijl Award given to Wilfred Wöber

RIPE 77

Amsterdam, the Netherlands

15 - 19 October 2018

Total attendees: 801
Total first-time attendees: 226
Number of countries: 64



Highlights:

- Biggest meeting ever
- RIPE Meeting Mentoring piloted
- Women in Tech (WiT) biggest session to date

FELLOWSHIP, RACI, RCPF

RACI 2018



The RIPE Academic Cooperation Initiative (RACI) connects members of the academic community with the RIPE community by inviting students and researchers to present their Internet-related research at RIPE Meetings, ENOG, MENOG and SEE meetings.

Number of applicants 2018	161
Number of successful candidates	29
Number of countries represented among applicants	58
Number of countries represented among the 29 winners	17

[Read More](#)

RIPE Fellowship 2018



The RIPE Fellowship Programme provides funding for successful candidates in the RIPE NCC service region to participate in a RIPE Meeting.

Number of applicants	150
Number of successful candidates	19
Number of countries represented among applicants	70
Number of countries represented among Fellows	16

[Read More](#)

RIPE NCC Community Projects Fund



The RIPE NCC Community Projects Fund provides EUR 250,000 per year to support projects of value to the operation and resilience of the Internet, with a focus on tools and services benefitting the technical community in our service region.

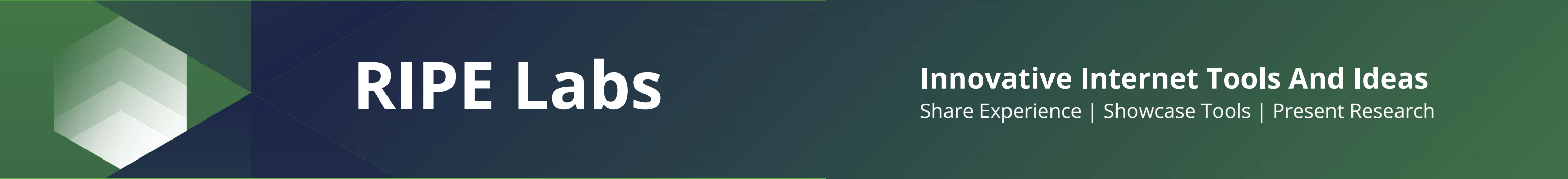
Selected projects:

- Aethra: Intelligent RIPE Atlas Resource Allocation** | Columbia University, UFMG and Lancaster University
- My Data Done Right** | Bits of Freedom
- Internet Health Report** | IIJ Research Lab / WIDE Waseda University
- Open Source RPKI Certificate Authority Software** | NLNetLabs
- A Condensation-Based Approach to Anonymise Network Logs** | Yarmouk University

[Read More](#)



RIPE Labs



RIPE Labs is a collaborative platform that lets network operators, developers and industry experts share best practices, gather feedback on prototypes and discuss innovative Internet-related tools, ideas and analyses that can benefit the RIPE community and RIPE NCC members. In 2018, RIPE Labs celebrated its 1,000th article published.

If you have something you'd like to share with the community, we'd love to hear from you (labs@ripe.net).

Most popular topics:

- IPv6
• DNS
• Security
• Network measurements

Read More

Table with 2 columns: Metric and Value. Rows include Unique visitors (130,550), Visits to the Statistics Dashboard (12,500), and Articles published (150).

Table with 2 columns: Article Title and Views. Rows include 'So Long Last /8 and Thanks For All the Allocations' (11,000 views), 'Out-of-Region ROUTE(6) and AUT-NUM Objects in the RIPE Database' (10,000 views), and 'Blockers to IPv6 Adoption' (3,600 views).

HACKATHONS



RIPE NCC Hackathons provide great opportunities for students, network operators, designers, local community and other enthusiastic coders and hackers to come together and develop new and creative tools, meet others in their field, and exchange knowledge and experience with new peers. Our events are cooperative, rather than competitive, and we produce Free and Open Source Software (FLOSS) to be contributed back to the community.

Although only a small amount of actual coding can be achieved in two short (but intensive) days, the long-term benefits come from the improvements to existing FLOSS tools for all current and future users. New tools get re-worked into follow-up projects because they are readily available, well-documented and promoted by both participants and organisers.

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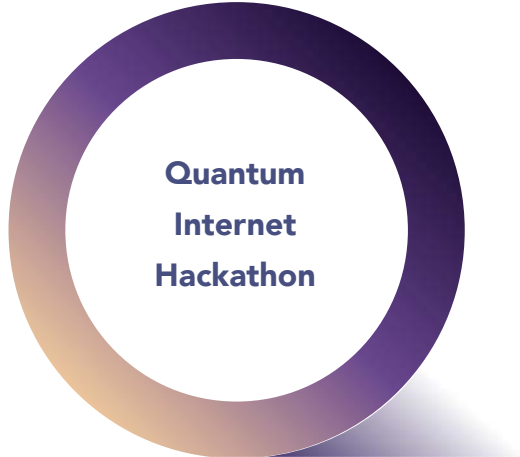
RIPE NCC Hackathons in 2018



**Network
Operator Tools
Hackathon**

Dublin
(23 - 24 June 2018)

Co-organised with INOG (Irish Network Operators Group).



**Quantum
Internet
Hackathon**

Amsterdam
(13 - 14 October 2018)

Co-organised with QuTech and Quantum Internet Alliance.

SUPPORTING NETWORK OPERATOR GROUPS



Network Operator Groups (NOGs) are a key component of the Internet community in the countries and regions that they serve. NOGs provide an excellent opportunity for participants to come together, learn from each other’s experience and establish useful business relationships.

The RIPE NCC provides funding through sponsorship for local NOGs and has sent staff to speak or attend at a wide range of local community events in our service region. We believe that these efforts bring great value for the Internet community, as it helps the community in each country to develop in its own way while at the same time bringing a more regional or global viewpoint that can inform that local community.

NOG Highlights 2018

Number of NOGs sponsored	15
RIPE NCC staff presentations at NOGs	20+
New NOGs 2018:	2
<ul style="list-style-type: none">• LUNOG, Luxembourg• GeoNOG, Georgia	

We also provide a forum for NOGs to collaborate both online (via a mailing list) and in person at RIPE Meetings. This is an opportunity for organisers to collaborate on ideas for developing their NOGs and share their experiences in order to support each other and learn how they might further evolve. All our resources for NOGs, including information on upcoming events and a map of all NOGs we know about globally, are available on our dedicated NOGs page on RIPE Labs.

[Read More](#)

TRAINING AND E-LEARNING



The RIPE NCC delivers training courses and learning opportunities for its members and the RIPE community in person and online, including: face-to-face training courses (for members), webinars, RIPE NCC::Educa (a full-day online learning event) and the RIPE NCC Academy, our online learning platform.

Our trainers involved stakeholders from different sectors to carry out a job-task analysis, so that our new online curriculum is aligned with market needs. Last year, we also brought together experts from around the world for the RIPE NCC::Educa days – two full-day webinars on routing security and IPv6. In another first, we ran a pilot academic project with the American University of Beirut, Lebanon, in which our online learning modules on IPv6 were integrated with the AUB’s undergraduate computer science course.

Highlights

- Foundational work to launch RIPE NCC Professional Certification Programme begins
- Pilot project with American University of Beirut that combined the RIPE NCC’s online learning modules with the university’s curriculum

Statistics / Participants

RIPE NCC::Educa	
Routing Security	173
IPv6	149
Webinars	36
Webinars on nine different topics with 729 participants in total	
RIPE NCC Academy Online Learning Courses	5,865
Three courses (RIPE Database, Introduction to IPv6 and LIR)	enrolled users with 1,215 certificates
Face-to-face training courses	121
Face-to-face trainings given in 46 countries with 2,317 members participating	

MEMBER PROFILE: AMERICAN UNIVERSITY OF BEIRUT



Name: Mohammad Abbas

Organisation: American University of Beirut

Title: IT Infrastructure Director

Country: Lebanon

How long have you been a member of the RIPE NCC?

We have been a member since 1993.

How do you think the students participating in the academic collaboration programme will benefit from this partnership?

AUB and RIPE Academic Collaboration reached a new milestone with the integration of RIPE NCC's "Introduction to IPv6" online course within AUB's undergraduate Computer Science course, "Computer Networks". This integration will be beneficial for the students by focusing on relevant subjects like IPv6, which is a cornerstone for implementing disruptive and innovative technologies such as IoT.

This will also enhance course material availability, reachability and diversity in terms of content and learning methodologies. This integration will result in an enriched learning experience.

What are the additional benefits of the partnership with the RIPE NCC for your students and/or your faculty?

Beside academic collaboration, faculty and students at AUB and other Lebanese universities can benefit from the various capacity building initiatives that the RIPE NCC is conducting in collaboration with AUB to support the development of the Lebanese Internet community through training courses, meetings and conferences.

In addition, researchers in the field of the Internet can benefit from the RIPE Atlas programme that provides effective Internet analytical tools and data for the local and global research community; knowing that AUB is hosting one of the few RIPE Atlas anchors in the region.

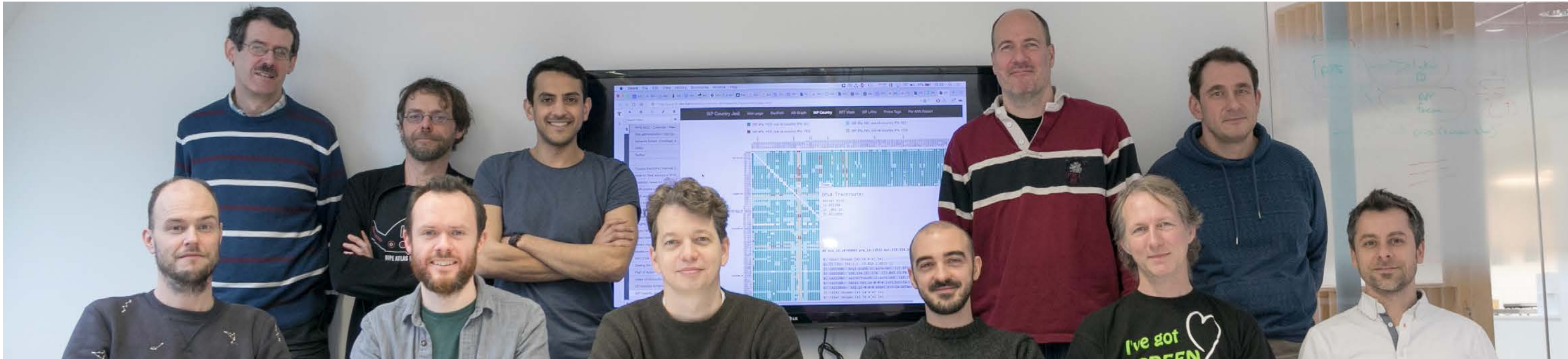
Any other thoughts that you would like to share about your partnership with the RIPE NCC:

The benefits of AUB and RIPE NCC's partnership goes beyond the walls of AUB and RIPE NCC. It aims to support Internet development, in Lebanon and the region as well as helping RIPE NCC in reaching troubled countries like Syria and Iraq by hosting Technical workshops that serve network/security professionals from different sectors in those countries.



OPERATOR TOOLS

INTERNET MEASUREMENT TOOLS



The RIPE NCC's research and development team support and develop a variety of innovative tools for the performance and visualisation of Internet measurements, including RIPE Atlas, RIPEstat, Open IPmap, IXP Country Jedi and TraceMON. R&D has also continued to bring its work to the community, through engagement at a host of conferences and meetings.

RIPE Atlas Virtual Machine Anchors

After a successful pilot project and processing feedback from the community, RIPE Atlas Virtual Machine (VM) anchors were given the green light.

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RIPE Atlas At-a-Glance 2018

RIPE Atlas results collected per second	6,500 Approximately
RIPE Atlas users (12,500 active in 2018)	41,745
Connected RIPE Atlas probes active	10,179
New RIPE Atlas probes shipped	1,091
RIPE Atlas anchors	385
ASNs covered (v4)	3,554 (5.649%)
ASNs covered (v6)	1,461 (8.959%)
RIPE Atlas ambassadors	456
Countries covered	181

MEMBER PROFILE: OMONIA BELGRADE



Name: Goran Slavic

Organisation: Omonia d.o.o. Belgrade (AS39724)

Title: Network Development Engineer

Country: Serbia

How long have you been a member of the RIPE NCC?

AS39724 has been a member for less than two months but the parent company has been a member (OMONIA - AS44306) for around 10 years.

Why did you attend the RIPE NCC Measurement Tools Training Course?

I had some knowledge regarding the RIPE NCC Measurement tools but wanted to systemise the knowledge and complete it in a way that will enable me to use them to full potential.

What was your experience with the course?

It was an excellent course. It filled all my gaps in knowledge and gave me the complete understanding of the tools and abilities of the system and the data that could be obtained using it.

Were you able to use the knowledge gained in your work?

On the day that the RIPE NCC Measurement Tools Training Course ended, I received the call from the central office that they were facing a very strange problem with some services of OMONIA customers (delays and long RTTs). The source of the problem was very difficult to find because it seemed like only customers in some Croatian / Slovenian ISP networks were affected while others were communicating and using services just fine. There was no complete service interruption (that could most likely be detected with a simple traceroute). Just

one one-time traceroute measurement from the RIPE Atlas probes has shown that ISP-s that were affected were not accepting prefixes of Omonia customers over local IXP but were actually getting that traffic over upstream providers that was forcing that traffic to travel over half of Europe before returning to Croatia. With that information both the Omonia and those other ISP-s were able to quickly troubleshoot and fix the problem and continue to provide the services without further problems or difficulties.

Are there any other RIPE NCC tools/services that you use for your operations?

We were sporadically using RIPE Database queries and RIPEstat in the past but considering the benefits that we have seen in the last couple of weeks we have initiated a program for in-house training in RIPE measurement tools usage and are considering several projects for "improved network monitoring and services reliability" using APIs that the RIPE NCC provides for its measurement tools.

RIPESTAT

Millions of users around the world use this web-based interface to find out everything there is to know about IP address space, Autonomous System Numbers (ASNs), and related information for hostnames and countries in one place.

RIPEstat At-a-Glance 2018

18.7 billion Data API requests (up 110% from 2017)

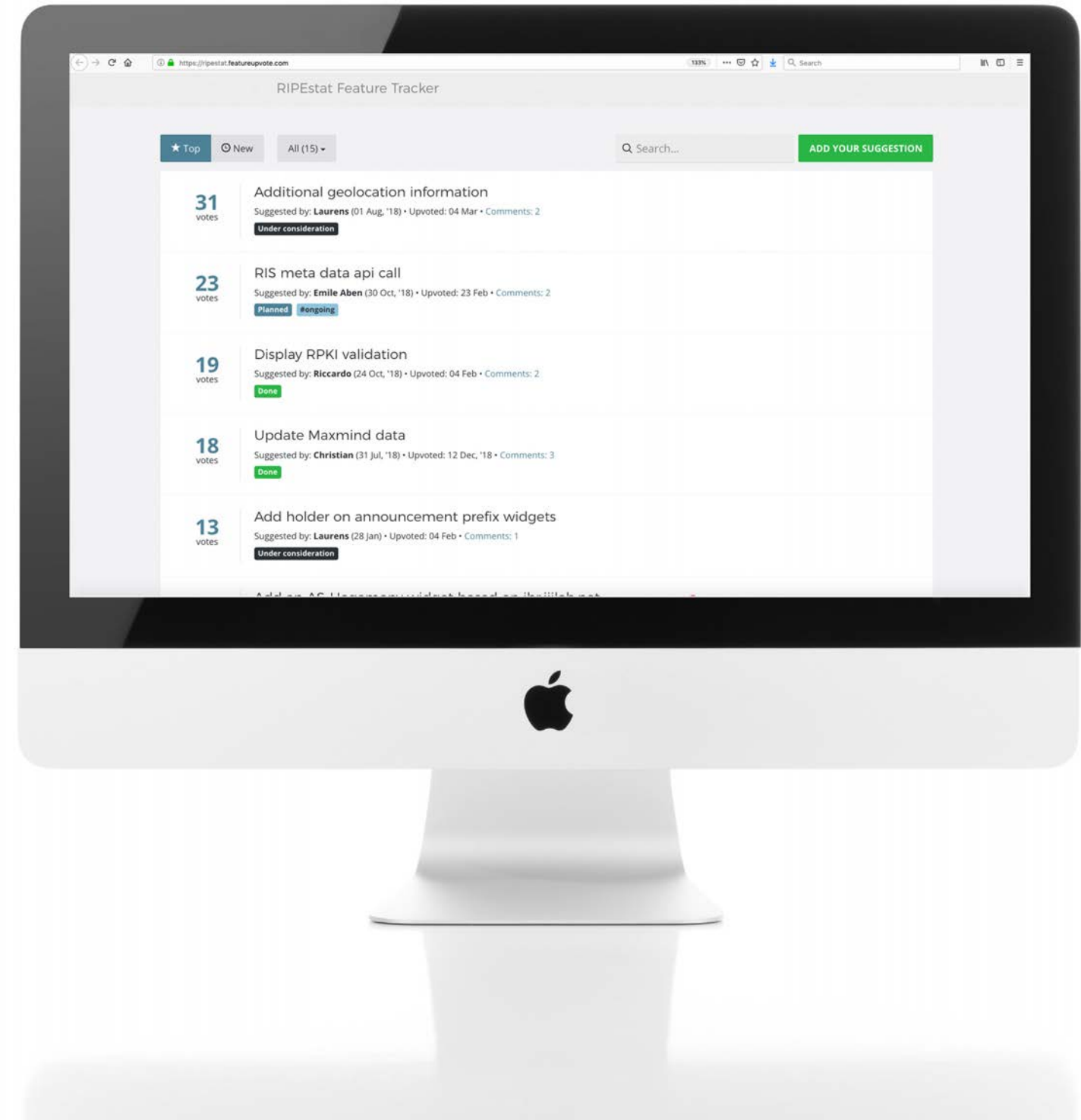
Top five countries using RIPEstat:



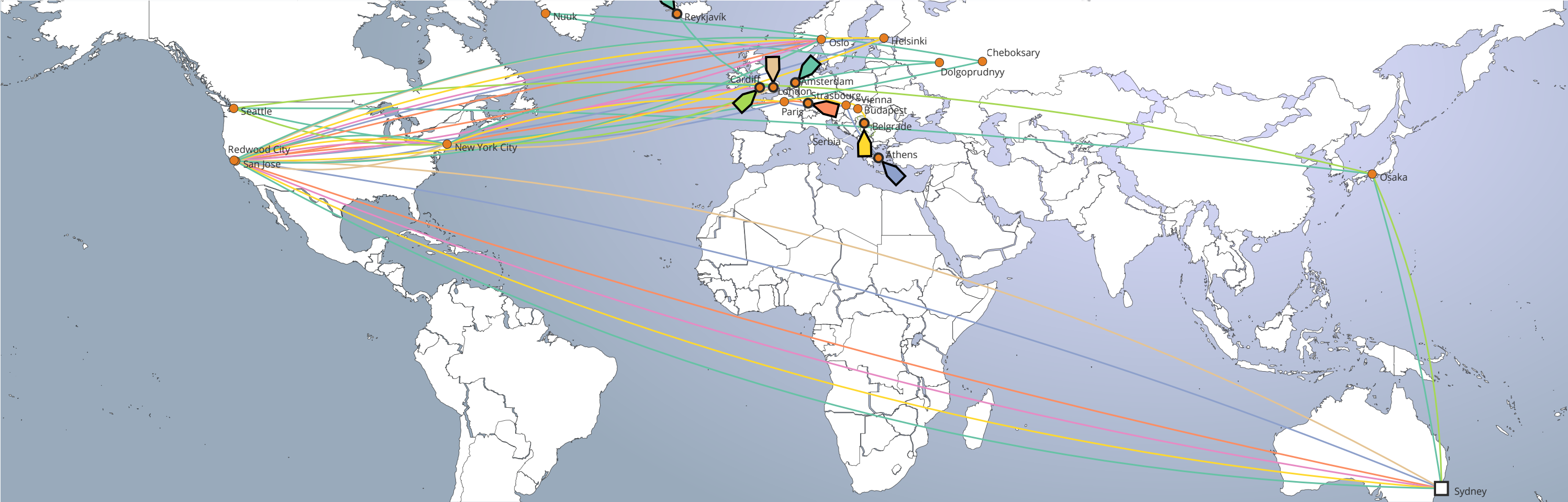
Peak usage - 3.1 million hits per hour (up 25% from 2017)

Unique IPs - 13.4 million

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RIPE IPMAP



RIPE IPmap is a tool to geolocate core Internet infrastructure. Besides relying on user input, RIPE IPmap uses various methods for inferring the geolocation of IP addresses on its own. Its architecture, which can be easily accessed through the API, provides an approach to geolocation capable of drawing on multiple data sources and multiple methods.

[Read More](#)

Highlights 2018

IP geolocation requests	14+ million
IP requests per day	100k
Peak requests	1.3 million
Geolocated (infrastructure) IPs	300k+
Anycast IPs and their servers geolocated	20k+



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.



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