RIPE NCC Activity Plan and Budget 2017

RIPE NCC
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Introduction to the Activity Plan and Budget 2017

The RIPE NCC Activity Plan and Budget 2017 documents the activities that the RIPE NCC proposes to undertake in 2017, along with their associated costs, provided in terms of Full Time Employees (FTEs), Costs (OPEX) and Capital Expenditure (CAPEX). The document also highlights areas of strategic focus for the organisation.

Increasing transparency is a goal the RIPE NCC is constantly striving towards. This document is the clearest way that RIPE NCC members can learn about, comment on and ultimately shape the direction that the RIPE NCC will take in the coming year. As a consequence, the RIPE NCC views the Activity Plan and Budget as an integral part of maintaining the trust of its members, helping to ensure that the RIPE NCC maintains the highest standards of accountability.

To this end, categories of "activity status" are attached to the title of each activity in this document. By marking which activities are new and which are being significantly expanded or scaled back, readers can easily gain an overview of what is being proposed for 2017 compared to the previous year. More details and a definition of each of these categories are provided in this document.

The RIPE NCC also presents its measurable usage figures. To allow members to easily track the development of the RIPE NCC's activities year on year, a measurable usage figure for 30 June is given each year. This allows members to easily compare each year's figures against the previous year.

For 2017, the Activity Plan and Budget has new information boxes that give an easy-to-read overview of activities, providing a description, benefits to the membership, FTEs, costs and whether the activity is ongoing, decreasing or a new activity.

The RIPE NCC publishes this draft version of the document and asks for input from members before publishing a final, definitive version. It is important that RIPE NCC members are aware of how they can provide feedback on the draft version of the Activity Plan and Budget.

In 2016, the RIPE NCC used a number of feedback mechanisms such as mailing lists and the various membership and community meetings held throughout the region to develop the first draft of this document. The RIPE NCC carried out consultations and interviews with members and stakeholders to assess the RIPE NCC's progress ahead of the RIPE NCC Survey 2016. The RIPE NCC also carried out member lunches in a number of cities across its service region to get specific feedback on RIPE NCC activities from the membership. The results of all these feedback mechanisms were presented to the RIPE NCC Executive Board. After the Executive Board's feedback was incorporated, an updated document is

published online and announced to the RIPE NCC membership in September. This gives members time to comment on the draft document before discussions take place at the RIPE NCC Services Working Group and the RIPE NCC General Meeting (GM). During this period, members are encouraged to ask questions and discuss the Draft Activity Plan and Budget via the RIPE NCC Membership Discussion mailing list (members-discuss@ripe.net).

The feedback received at the RIPE NCC General Meeting in October will be incorporated into the final Activity Plan and Budget after the approval of the document by the RIPE NCC Executive Board.

Features in This Activity Plan and Budget

To maintain good transparency for RIPE NCC members, this Activity Plan and Budget includes several features. An activity status is included for each of the activities listed. There are five different activity statuses given through out this document:

- "Ongoing": Any recurring activity that requires around the same amount of resources as in the Activity Plan and Budget 2016 (OPEX) (with less than a 10% deviation from the Activity Plan and Budget 2016)
- "New Activity": Any activity that is making its first appearance in the Activity Plan and Budget
- "Expanding": Any activity where expenses will increase by more than 10% over the Activity Plan and Budget 2016 (OPEX)
- "Decreasing": Any activity where expenses will decrease by more than 10% from the Activity Plan and Budget 2016 (OPEX)
- "Planned Ending": Any activity that will come to a complete end in the course of the coming year

Secondly, where the status of an activity is anything other than "Ongoing", this document will contain information about when and why the decision was made, and who was responsible for making the decision.

Finally, usage statistics have been included wherever possible for each activity. These are intended to show the general scale of a service. There are some cases where activities cannot be quantified or the inclusion of statistics is of little relevance so they are not provided.

Individual activities that cost less than 5 kEUR per annum are considered to have negligible costs and therefore their cost details are not included in the Activity Plan and Budget.

Overview of the Strategic Focus Points in 2017

For 2017, input to the RIPE NCC Executive Board came from a continuous effort from both RIPE NCC Management and the Executive Board to think and rethink the RIPE NCC outlook and developments that impact the RIPE NCC. The Executive Board was also able to draw on the feedback received in RIPE NCC Consultations and the RIPE NCC Survey 2016 to identify the areas that RIPE NCC members brought forward as ones in which the RIPE NCC was well placed to help them.

The strategic focus points for 2017 are:

- Maintaining a strong, secure and accurate registry
- Playing an active role in enhancing RIR stability through good governance and accountability
- Increasing efficiency and cost-saving through automation and streamlining of internal processes
- Increased engagement with members, the RIPE community and governments and regulators

In 2017, the RIPE Registry and the accuracy of the data it contains will remain at the forefront of the RIPE NCC's focus and strategy. The data in this registry is comprised of RIPE Database data and registration information held by the RIPE NCC, and it is critical for the operations of our members and the wider Internet community. All of the RIPE NCC's focus points contribute in their own way to ensuring the accuracy and robustness of the RIPE Registry.

The RIPE NCC membership continues to grow rapidly and there are no signs of this growth slowing down in the near future. It is expected that further resources will be required to accommodate corresponding growth in registry and member administration work. While the number of IPv4 resource transfers has stabilised, this continues to result in a heavy workload and coordination is needed with the other RIRs for inter-RIR transfers. The RIPE NCC will also need to increase its efforts to stay in contact with LIRs through such processes as the Assisted Registry Check (ARC), which has already shown benefits in improving registry data.

The Executive Board has noted that the membership, through various feedback mechanisms, has requested that the RIPE NCC be prudent with expenditure and offer more efficient and simplified processes. The RIPE NCC will work on ways to do this by offering more automation of its processes so that efficiencies are gained for the RIPE NCC and for members who need to interact with the RIPE NCC.

Improvements will continue to be made to the usability of key RIPE NCC services such as the RIPE Database and the LIR Portal, offering increased automation where possible to make it as easy as possible for RIPE NCC members to keep their data (and therefore the RIPE Registry) up to date. Many members have noted that spending time on dealing with the RIPE NCC negatively impacts their ability to carry out their daily work. This is an area the RIPE NCC will focus on to ensure the membership can spend less time on RIPE NCC services and more time on their own business.

In recent years there has been a growing interest in the RIR system from governments and other parties involved in Internet governance discussions. The RIPE NCC will therefore continue its work with the other RIRs to ensure the system remains stable and an example of good governance and accountability.

To help with these efforts, the RIPE NCC will work to better understand the regulation and legislation that members work under in countries across the service region. This work will require that the RIPE NCC formalises its ties with governments and regulators while engaging with the membership and community in those countries to identify where the RIPE NCC can act as a positive influence with local authorities. The RIPE NCC is well

placed to be a neutral, trusted source of technical information that governments can rely on, and to this end the RIPE NCC will work to boost its intelligence in a number of arenas including security

The RIPE NCC is also committed to carrying out effective outreach to its members in all areas of its service region. In 2016, the RIPE NCC organised events and travelled throughout the service region to meet with members, hear directly from them and give them the means to have their voice heard within the wider community. This has already shown great benefits in terms of hearing exactly what our members want to see from us in terms of activities and service improvements that can help them with their operations. This work will be continued in 2017, and the results of the RIPE NCC Survey 2016 will be instrumental in guiding RIPE NCC strategy and ensuring the needs of the membership are met in the coming years.

The RIPE NCC will host a number of Regional Meetings in 2017, support the development of local Network Operator Groups (NOGs) and actively participate in existing NOGs throughout Europe, carry out regionally targeted educational initiatives and represent the membership and technical community at regional Internet events. The RIPE NCC will strengthen its existing and well-established relationships with governments, peers and technical partners in the industry, and will look to form new relationships where there is value for the community.

The RIPE NCC's Member Lunches in cities throughout Europe as well as in the MENOG and ENOG regions have proved to be very effective in helping to engage directly with the membership and finding out its needs and concerns. These meetings have proved very popular as they allow the RIPE NCC to gather feedback and assist members who would otherwise not be able to meet RIPE NCC staff in person. In 2017, the RIPE NCC will use a more formal process to ensure that the feedback received from all areas of contact filters throughout the organisation and results in tangible improvements for members.

The focus in 2017 will continue to be on improving and streamlining processes and services while gaining input from the membership and community to guide these improvements. Overall, the RIPE NCC will deliver a streamlined and cost-efficient service for all members and stakeholders.

Overview of RIPE NCC Costs per Activity 2017

On the following page is an overview of the Full-Time Equivalents (FTEs), Operational Expenses (OPEX) and Capital Expenses (CAPEX) per activity. All amounts are in kEUR. The overview is presented on two levels. It is possible to click on any Level 1 or Level 2 activity for more detailed information.

Notes on Overview of RIPE NCC Activities

Full-Time Equivalents

Full-Time Equivalents (FTEs) indicates the average amount of personnel assigned to each activity as well as supporting staff over the course of the full year.

OPEX (Operational Expenses)

Operational expenses are all direct costs that relate to the activity or project, and a portion of overhead that is related to absence (vacation, illness, education) that has been allocated to the project. The overhead allocation is calculated by dividing the percentage of FTEs involved in the activity by the overall number of FTEs. Operational expenses exclude depreciation and bad debt expenses.

Sponsorship is reported as Income in the Budget and it offsets the costs of RIPE Meetings, Regional Meetings and RIPE Atlas probes.

CAPEX (Capital Expenditure)

Capital Expenses are all items that are taken as an asset. These items include hardware and software, infrastructure, and office furniture.

Overview of RIPE NCC Budgeted Costs for 2017

Level 1	Level 2	FTEs	OPEX kEUR	CAPEX kEUR
1. Regional Internet Registry		**45.6**	**5,204**	**150**
	* 1.1 Registry Maintenance	33.4	3,220	-
	1.2 RIPE Database	7.5	893	-
	1.3 Resource Certification (RPKI)	1.2	573	150
	1.4 LIR Portal	3.5	518	-
2. Services		**29.3**	**3,443**	**455**
	2.1 Training	9.0	1,138	-
	2.2 RIPEstat	5.7	677	178
	2.3 RIPE Atlas and RIS	10.5	1,174	277
	2.4 Other Services	4.1	454	-
3. Coordination Activities		**39.7**	**8,875**	**229**
	3.1 DNS and K-root Operations	4.0	700	150
	3.2 Data Analysis and Scientific Support	3.0	357	12
	3.3 RIPE Labs	1.6	240	-
	* 3.4 External Relations	12.3	2,245	-
	* 3.5 Member Outreach	5.5	1,476	-
	3.6 IPv6 Support	1.6	167	-
	3.7 RIPE Meetings	5.9	1,809	67
	3.8 RIPE Policy and Community Support	1.8	230	-
	3.9 ICANN/IANA/IETF/ISOC/RIRs	3.5	1,098	-
	3.10 Good of the Internet	0.5	553	-
4. Internal		**33.9**	**7,583**	**644**
	4.1 IT and Information Security	12.3	2,475	544
	4.2 Facilities - Rent and Utilities	2.5	1,241	100
	4.3 Management and HR	8.6	2,372	-
	4.4 Finance and Administration	6.9	851	-
	4.5 Legal	0.7	190	-
	4.6 Organisational Activities: Executive Board, Arbitration Panel and General Meetings	2.9	454	-
Total		**148.5**	**25,105**	**1,478**

* RIPE NCC strategic focus point for 2017

RIPE NCC Activities 2017

1) Regional Internet Registry

*** 1.1 Registry Maintenance *** STRATEGIC FOCUS POINT 2017

Registry Maintenance	Status: Ongoing
Description The RIPE NCC is responsible for assigning and allocating Internet number resources (IPv4, IPv6 and AS Numbers) within its service region. A key responsibility is to maintain the accuracy and quality of the RIPE Registry, which contains information about the current holders of these resources. This includes information contained in the RIPE Database as well as other registration information held by the RIPE NCC.	**Measurable Usage** **Internet number resource records the RIPE NCC is responsible for** 2015: 93,000 2016: 101,000 (+8.6%)
Benefits • Improves the overall accuracy of the data in the RIPE Registry • Improves the accuracy of legacy address space registration records • Supports members and the RIPE community with their operations and business needs • Inter-RIR transfers allow members to access unused address space from organisations in other RIR regions	**FTEs:** 33.4
	Costs: 3,220
	CAPEX: -

The exhaustion of the unallocated "free pool" of IPv4 address space means the RIPE NCC has adapted its registry function to maintain its careful stewardship of resource registrations. This means there is a continuing focus on legacy address space, with the goal of bringing registration records up to the same standards of accuracy as address space that was distributed by the RIPE NCC. Additionally, the RIPE NCC works to ensure that the RIPE Registry can accurately deal with a high level of IPv4 transfers and a heightened potential for conflicts over address space, both resulting from the growing scarcity of IPv4. The RIPE NCC will continue to respond to any community-driven initiatives to increase the accuracy of data stored in the registry.

As part of this stewardship role, the RIPE NCC will pay special attention to protecting resource holders against hijacking of their Internet number resources. While this will likely involve more strict verification requirements when evaluating requests, the RIPE NCC will

remain mindful of the balance between ensuring due diligence on the one hand while not being overly bureaucratic or inflexible on the other.

A range of services, such as the Resource Certification (RPKI) system and the Assisted Registry Check (an enhancement of the RIPE NCC's audit activities) will continue to provide an incentive for holders of this space to make sure that their Internet number resources are accurately registered. The focus will be on increasing the value of services that the RIPE NCC can provide to its members to improve their day-to-day operations, while at the same time maintaining the accuracy of registry data.

The RIPE NCC will also continue its work in partnership with the other RIRs to improve data quality and to make this data readily available to the Internet community. The ongoing processing of inter-RIR transfers means that close ties will need to be maintained among the participating RIRs.

1.1.1 Distribution of IPv4/IPv6 Address Space and Autonomous System (AS) Numbers

Status: Ongoing

Measurable usage: Approximately 8,100 allocations and assignments from 1 July 2015 to 30 June 2016.

The RIPE NCC provides fair, impartial and stable distribution of Internet number resources according to policies developed by the RIPE community. In addition to the allocation and assignment of IPv4 and IPv6 address space, the RIPE NCC also assigns AS Numbers and registers these along with the initial associated routing policy. This ensures the uniqueness of AS Numbers and collects data for the Routing Registry. Since 2007, the RIPE NCC has assigned AS Numbers from both the 16-bit and 32-bit pools.

Benefits for RIPE NCC members / RIPE community:

- Provides fair and impartial distribution of Internet number resources guided by policies developed by the RIPE community
- Promotes the efficient use of IP address space and AS Numbers
- Facilitates the optimal aggregation of routing information
- Supports members with the relevant processes and procedures

1.1.2 Management of Internet Number Resources

Status: Ongoing

Measurable usage: The RIPE NCC is administratively authoritative for approximately 101,000 Internet number resource records.

The RIPE NCC manages the complete lifecycle of Internet number resources within its service region, supporting updates of the registration data and deregistering resources that have been returned. In order to facilitate the transfer of IPv4 Provider Aggregatable (PA) address space between members, the RIPE NCC provides the IPv4 Transfer Listing Service. From June 2015 to June 2016, the RIPE NCC transferred approximately 1,998 original IPv4

blocks. The RIPE NCC also processes inter-RIR, IPv6 and AS Number transfers. The RIPE NCC expects that the work involved with transfers will increase significantly in 2017.

The RIPE NCC deregisters Internet number resources that have been allocated or assigned under false pretenses, contravene RIPE Policies or have been hijacked. This activity also applies to LIRs that have been closed for non-payment of their service fee and IP addresses returned by the holders to the RIPE NCC.

Benefits for RIPE NCC members / RIPE community:

- Ensures the uniqueness of IP addresses, aggregation of routing information and conservation of IP address space
- Implements the necessary procedures to enable the processes defined by RIPE Policies
- Enables the accurate registration of network management and contact information
- The inter-RIR transfer policy means that RIPE NCC members can access the resources of organisations in other RIR regions

1.1.3 Assisted Registry Check (ARC)

Status: Expanding

Measurable usage: 2,213 Assisted Registry Checks from 1 July 2015 to 30 June 2016.

Since 1996, the RIPE NCC has conducted audits, at the request of the RIPE community, to ensure the fair and neutral application of policies and to actively check the quality and validity of registry data.

The Assisted Registry Check (ARC) review gives LIRs an opportunity to receive personalised support from the RIPE NCC. This includes help creating database objects to improve contact data, removing inconsistent resource records and providing clarification on RIPE Policies. The aim is to strengthen registry data while supporting the daily technical operations of the membership.

In September 2014, the ARC reviews began on a trial basis with the focus on gaining experience and building the process. There was then a focus on legacy address space issues. Now the ARC reviews are fully developed and running at full speed. For 2017, we estimate that approximately 3,000 ARCs will be carried out with our members, which is in line with membership growth predictions and accounts for the expansion of this activity.

The ARC review covers four broad subject areas:

- Registry consistency
- Resource consistency
- Route/rDNS consistency
- Resource Certification (RPKI) usage/consistency

Benefits for RIPE NCC members / RIPE community:

- Helps RIPE NCC members to maintain accurate registry data
- Provides RIPE NCC members with an overview of how their networks are perceived by an independent entity
- Provides personalised support to members
- Provides an incentive and an easy way for LIRs to keep their RIPE Database objects up to date
- Allows the RIPE NCC to stay in more frequent contact with its members

1.1.4 Maintenance of Contractual Information on End Users and Sponsoring LIRs

Status: Ongoing

Measurable usage: Contracts for approximately 51,000 End User Internet number resource records are overseen by the RIPE NCC.

Subject to the RIPE Policy on contractual requirements for holders of independent resources (ripe-637), the RIPE NCC ensures that changes to contractual arrangements between sponsoring LIRs and End Users are followed up on and the appropriate administrative action taken.

In 2015, the RIPE NCC finalised the process of implementing the RIPE Policy related to establishing an indirect or direct contractual link between the End Users of independent Internet number resources and the RIPE NCC (ripe-637). All independent resources are now covered by a contractual relationship that the RIPE NCC will follow up on.

Benefits for RIPE NCC members / RIPE community:

- Ensures that Internet number resources are registered to the legitimate End Users or legacy resource holders
- Ensures that all resources are covered by a contractual relationship
- Maintains the accuracy of the RIPE Registry

1.1.5 Establishing Contractual Relationships With Legacy Internet Number Resource Holders

Status: Decreasing

Measurable usage: The total number of legacy Internet resources within the RIPE Registry is approximately 4,200 parent IP blocks and 35,000 more specific blocks. There are also 740 legacy AS Numbers. By 30 June 2016, approximately 43% of legacy address space in the RIPE NCC service region was registered either directly or via a sponsoring LIR. In the 12 months prior to 30 June 2016, there were 154 requests to update the RIPE Registry following legacy resource transfers.

Historically, legacy resources have been held without any formal relationship existing between their holders and the RIPE NCC. In order to improve the accuracy and trustworthiness of registry data, the RIPE community created the policy, "RIPE NCC

Services to Legacy Internet Resource Holders" to allow for a formal relationship to be established between legacy resource holders and the RIPE NCC.

In 2014, the RIPE NCC began to implement this policy, which involved offering legacy holders the option of establishing an indirect or a direct contractual link with the RIPE NCC. In 2015, we finished contacting all holders of legacy Internet number resources and many of these will continue to reply to the RIPE NCC over the coming period. With all legacy holders having been contacted, this activity is decreasing, though maintaining these contractual relationships will continue to exist as an ongoing activity.

Benefits for RIPE NCC members / RIPE community:

- Ensures that Internet number resources are registered to the legitimate legacy Internet resource holders
- Safeguards the resources of the legitimate resource holders from hijacking
- Creates a formal relationship between legacy Internet resource holders and the RIPE NCC
- Maintains the accuracy of the RIPE Registry

1.1.6 Internet Number Resource Investigations, and Dispute and Hijacking Handling

Status: Expanding

Measurable usage: The RIPE NCC has investigated 297 potential hijacks since 2012. From 1 July 2015 to 30 June 2016, the RIPE NCC handled 45 investigations. The RIPE NCC received and investigated 430 abuse reports from 1 July 2015 to 30 June 2016.

Since September 2012, the RIPE NCC has seen a significant increase in the number of attempted IP address hijackings taking place within its service region. Due to the increasing scarcity of IPv4 address space, the RIPE NCC expects this to continue for the foreseeable future, with not only legacy and Provider Independent resources being targeted, but also Provider Aggregatable address blocks. As with 2014 and 2015, the past 12 months have seen a number of incidents where hijackers attempted to impersonate resource holders, either to gain control of their resources in the RIPE Database or to sell them to third parties who were unaware that they were not from the legitimate holder.

The hijackers are using sophisticated methods to gain access to the resources, such as test announcements to verify usage, falsified documents, re-registering domains and making copies of websites. Although the rate of new cases during 2016 has shown a relative decline, the complexity of each investigation and the time spent on support activities involving several divisions across the RIPE NCC is increasing. This is particularly the case regarding disputed claims on address space being transferred between RIPE NCC members. Legacy space remains particularly susceptible to hijacking attempts because the RIPE NCC did not issue the resources and therefore has no authoritative documentation on the original distribution and changes in holdership over time.

The RIPE NCC also checks for unauthorised changes to the RIPE Database objects for which it is administratively responsible (mainly independent Internet number resources).

Benefits for RIPE NCC members / RIPE community:

- Safeguarding the resources of legitimate resource holders
- Maintaining the accuracy of the RIPE Registry
- Executing the policies decided on by the RIPE community

1.2 RIPE Database

RIPE Database	Status: Ongoing

Description	**Measurable Usage**	
The RIPE Database contains information about the IP addresses and AS Numbers used by networks within the RIPE NCC service region. For these resources, the database carries information about their current holders along with contact details and related attributes. Resource holders are responsible for maintaining the information in the database, while the role of the RIPE NCC is as data controller.	**RIPE Database queries per minute** 2015: 18,000 2016: 20,000 (+11.11%)	
Benefits • Enables a range of users to find the information they need for network troubleshooting or determining abuse contacts • Ensures the stability of global Internet routing • Makes sure the RIPE Database is robust and secure • Provides greater integration with the LIR Portal	**FTEs:**	7.5
	Costs:	893
	CAPEX:	-

The RIPE Database provides information that is crucial for network troubleshooting and determining abuse contacts. The database has a wide range of users, including network engineers, system administrators and researchers. The service is available for anyone that needs information about networks and Internet number resources.

The RIPE Database also includes the RIPE Routing Registry, which is part of the global Internet Routing Registry (IRR). The IRR ensures the stability and consistency of global Internet routing by sharing information between network operators. The IRR consists of several databases, including the RIPE Routing Registry, in which network operators can publish their routing policies and routing announcements.

The first priority of the RIPE NCC is to ensure that the RIPE Database remains a high-quality service with close to 100% uptime. The RIPE NCC has staff on 24/7 support to ensure that any possible incidents are addressed with the highest priority. However, almost all the effort in this regard is spent pro-actively: by managing hardware, operating systems and software life cycle, carefully testing any new releases in the Release Candidate environment, as well as monitoring the service and planning for resilience and scalability.

The second priority of the RIPE NCC is to take on board and implement the wishes of the RIPE community with regards to the database. This involves working on features and changes requested by the RIPE Database Working Group, supporting RIPE policies emerging from other working groups, and keeping up with technical standards discussed in the IETF and among the RIRs.

Finally, the RIPE NCC uses any remaining time for other improvements and feature implementations. These may be focused on improving the internal processes of the RIPE NCC, but a lot of effort is also spent on improving the usability of the RIPE Database to create efficiencies for those who rely on the database for their operations. Priority setting for these improvements is done on the basis of measurements of time spent on processes, as well as questions and requests we receive from users of the database, and feedback from individual users – for example at RIPE Database trainings and in discussions at various meetings.

1.2.1 Outreach and Support

Status: Ongoing

The RIPE NCC is committed to supporting users of the RIPE Database. Training courses on how to use the RIPE Database are provided to RIPE NCC members. Furthermore, the RIPE NCC responds to user requests through the ripe-dbm@ripe.net ticket queue and through the feedback received from the bug reporting tool on the website. Requests range from users who have lost access to a maintainer object to users with problems setting up reverse DNS, to more general questions about the RIPE Database.

The development of the RIPE Database is done in close collaboration with all stakeholders. New features of the core database services are suggested, discussed and approved by the RIPE Database Working Group before they are implemented. New services that integrate with or extend the database software can also be initiated and defined in other forums such as the IETF or with feedback from training courses and direct customer contact.

In 2017, the RIPE NCC will continue to reach out to database users. The only way to create and provide an excellent service is by knowing the users and by involving them in the entire process.

The RIPE NCC is committed to providing transparency by having the software available as open source. This also enables third-party developers to contribute to the development of the database.

Benefits for RIPE NCC members / RIPE community:

- Provides transparency and awareness of changes to the RIPE Database
- Ensures that the RIPE NCC's priorities for the database match the RIPE community's
- Provides users with training and support on how to use the RIPE Database

1.2.2 New Feature Development

Status: Ongoing

Measurable achievements: 11 releases from 1 July 2015 to 30 June 2016.

Improvements to the RIPE Database are made on a continuous basis. The RIPE NCC works closely with the RIPE community to implement new features and priorities are established in cooperation with the appropriate RIPE Working Groups. The RIPE NCC closely monitors new policies and assesses any impact they might have on the database software and suggests implementation plans.

Possible work items for 2017 that are currently being discussed in working groups include: refinements in tracking abuse contact changes, displaying history for database objects where available, moving IRR objects that belong in the AFRINIC IRR, allowing the "status:" attribute to have multiple values, and improving the way the RIPE Database deals with out-of-region ROUTE(6) and AUT-NUM objects. Of course, other topics may be added to this list if the working groups approve new policies.

The RIPE NCC will also continue to identify where other improvements can be made. The RIPE NCC has implemented a comprehensive system to analyse how the RIPE Database is being used and what kind of problems and errors users run into. This information, combined with user requests, training courses and user feedback, has enabled the RIPE NCC to launch a major effort to make the RIPE Database easier to use in 2016 and this work will continue in 2017. This benefits users and supports the quality of the data in the RIPE Database. It also creates cost-saving efficiencies by reducing the support and training that the RIPE NCC needs to provide.

In 2016, there has been a focus on improving the integration of the RIPE NCC Access single sign-on (SSO) authentication in the web interface, as well as further improvements to the management of authorised persons on maintainer. For 2017, we have identified a number of other areas where more intuitive user interfaces can be provided: contact information management, route object maintenance in relation to BGP, setting up reverse DNS and maintenance of inet(6)num objects. The RIPE NCC's ability to implement these improvements in 2017 will depend largely on developments in the working group, which may take precedence.

Benefits for RIPE NCC members / RIPE community:
- Simplifies use of the database
- Creates new ways to use the database and new interfaces
- Provides an overview of member resources in one location

1.3 Resource Certification (RPKI)

Resource Certification (RPKI) — **Status: Expanding**

Description

RPKI is a community-driven system that allows all resource holders to request a digital certificate listing the Internet number resources they hold. A resource certificate offers proof of holdership of a resource's allocation or assignment by an RIR. It allows the holder of the certificate to make statements with regards to the resources listed on the certificate. The practical application offered today is the ability to use the certificates to help secure Internet routing, particularly BGP origin validation.

Measurable Usage

Resource certificates created

2015: 2,932
2016: 3,736 (+27.4%)

Benefits

- Offers network operators a reliable system for performing BGP Origin Validation based on the RPKI data set
- The option to run a self-hosted open source package for running a local certificate authority
- A robust, open source validation package for using RPKI data, optionally in conjunction with supported router hardware
- A stepping stone towards full BGP security, including path validation, as developed by the sidr working group in the IETF

FTEs:	1.2
Costs:	573
CAPEX:	150

The Resource Certification (RPKI) system uses open standards that were developed by the Secure Inter-Domain Routing sidr) Working Group in the IETF. All Regional Internet Registries (RIRs) are committed to operating a resource certification system, making this a global effort.

RPKI has been fully developed into a mature system and the RIPE NCC does not see the need for significant development on the RPKI back-end next year. In 2017, the Resource Certification service will focus on improvements to the RPKI Validator software package by improving its stability, scalability and robustness. This effort is fueled by the fact that more operators are using the RPKI Validator software in a production environment. The decision to further develop the RPKI Validator was made by the Executive Board after positive feedback from the RIPE community in presentations to the Routing and RIPE NCC Services working groups during RIPE 72.

In 2017, the RIPE NCC is also planning to purchase new RPKI Hardware Signing Modules (HSM), as the current modules are five years old and due for replacement. This work was

initially scheduled for 2018, but has been moved forward to maintain pace with information security developments.

1.4 LIR Portal

LIR Portal	Status: Expanding
Description The LIR Portal is the main member interface with the RIPE NCC, which allows members to manage their Internet number resources and related registration information. It also contains tools such as the IP Analyser and IPv6 Analyser.	**Measurable Usage** **Page views per months (logged in)** 2015: ~140,000 2016: ~150,000 (+7.1%) **Accounts with two-factor authorisation** 2015: 2,276 2016: 3,834 (+68.5%)
Benefits • A single place to manage Internet number resources • Clean user interface, easy to use wizards and tight integration with the RIPE Database • Strong security with two-factor authentication • User-friendly Live Chat service that allows users to easily talk with an expert	**FTEs:** 3.5
	Costs: 518
	CAPEX: -

The focus of the LIR Portal has shifted from requesting resources to managing them. The functionality that the LIR Portal provides through the IPv4 Analyser is geared towards increasing data quality in the registry and the RIPE Database, allowing members to make the most efficient use of the remaining IPv4 address space that LIRs hold. In addition, the IPv6 Analyser is helping users to manage their IPv6 address space or take their first steps in making assignments, by offering a visual insight into the address space and integrating with the RIPE Database. Lastly, seamless Live Chat functionality allows LIRs to quickly talk to an expert in the RIPE NCC if they need help.

As the main member interface with the RIPE NCC, there will also be a focus in 2017 on developing the LIR Portal to ensure members are better able to manage their registration information. In 2017, the focus of LIR Portal developments will be on making request workflows easier, such as name changes, resource transfers, inter-RIR transfers, and

changes resulting from mergers and acquisitions. The first fruits of these efforts have already been delivered in 2016, but streamlining will continue in 2017.

The LIR Portal also contains the IP Analyser and IPv6 Analyser, which are toolsets that offer our members a visual insight into all the allocations, aggregations and assignments they have made. The RIPE NCC intends to expand the functionality of these tools to allow IP address management functions.

In 2017, users will also see the introduction of a new ticketing system that will make it easier for members to communicate with the RIPE NCC and track ongoing ticket statuses, reducing the amount of time they spend on this activity. All of the work carried out in relation to the LIR Portal will be done with the goal of making it easier for members to manage their operations effectively and easily.

2) Services

2.1 Training

Training	Status: Expanding
Description	**Measurable Usage**
The RIPE NCC provides regular face-to-face training courses within its service region on daily operations and specialised areas, such as IPv6 and routing security. The goal of this training is to increase efficiency, raise members' awareness of their role as part of the RIPE community and improve understanding of the RIPE NCC's procedures and tools. In addition to the face-to-face courses, the RIPE NCC provides training courses and learning resources online, including certified training through the RIPE NCC Academy.	**Training courses and workshops** 2015: 104 2016: 90 (-15.5%) **Webinars** 2015: 53 2016: 42 (-26.2%)

Benefits

- Helps members to understand the RIPE NCC's processes and how to request Internet number resources
- Builds knowledge of upcoming technologies, best practices, protocols and RIPE Policies
- Increases awareness of the tools and services provided by the RIPE NCC
- Members and non-members can conveniently access learning materials online
- Members have the opportunity to gain certificates demonstrating their knowledge

FTEs:	9.0
Costs:	1,138
CAPEX:	-

For 2017, the RIPE NCC Executive Board and senior management have requested that Training Services further develop its online learning options, allowing members and the RIPE community to easily follow training courses and share best current practices online while allowing the RIPE NCC to reach members outside regular destinations. This requires the addition of an FTE to cater for improved online services while meeting the commitment to send trainers across the service region to deliver high-quality training.

The focus in 2017 on External Relations (section 3.4) and Member Outreach (section 3.5) also contributes to the increased budget for Training, as the Training Services will provide resources for activities such as IPv6 Roadshows, presentations at industry events and hands-on workshops at meetings.

The RIPE NCC is also coordinating with technical experts and trainers in several regions on a "Train the Trainer" program. This initiative prepares teams of local trainers to spread the technical knowledge required to build and operate IPv6 networks far beyond what might be achieved by the RIPE NCC alone. In 2016, local trainers were trained in both the MENOG and ENOG regions.

2.1.1 Training Courses and Workshops

Status: Expanding

Measurable usage: From 1 July 2015 to 30 June 2016, the following courses were given: LIR Course – 20; Basic IPv6 – 28; Advanced IPv6 – 8; RIPE Database – 20; Routing Security – 6; DNSSEC – 4; RIPE Atlas Tool – 2; BGP – 4; Training for Law Enforcement and Government – 3; Workshops/tutorials alongside RIPE NCC Regional Meetings – 8.

The RIPE NCC offers the following training courses to its members:

- The one-day Local Internet Registry (LIR) Training Course introduces members to the administrative procedures and policies related to obtaining and distributing Internet number resources and operating an LIR
- The IPv6 Training Course is a one-day session for members who are planning to deploy IPv6
- "Advanced IPv6" is a two-day IPv6 course. Topics include IGP, BGP, security and configuration
- In January 2016, the RIPE NCC introduced the BGP Operation and Security Training Course (as a replacement of the Routing Course). This is a two-day course working through advanced topics, offering an in-depth look into BGP.
- The RIPE Database Training Course is a practical introduction for members on usage of the RIPE Database that includes hands-on exercises
- The RIPE NCC provides tutorials and workshops covering best current practices and popular topics such as IPv6, DNSSEC, Routing, Security and others
- The DNSSEC Training Course covers basic DNS theory, public key encryption basics and guides members in securing their domain name servers and zones

Workshops and presentations will also be given at RIPE Meetings and other industry events.

Benefits for RIPE NCC members / RIPE community:

- Helps members to understand the RIPE NCC's processes and how to request Internet number resources
- Assists with the IPv6 deployment process
- Builds knowledge of upcoming technologies, best practices, protocols and RIPE Policies
- Increases awareness of the tools and services provided by the RIPE NCC

2.1.2 E-Learning

The RIPE NCC provides a wide range of training courses and learning resources online, including certified training through the RIPE NCC Academy. In 2017, the RIPE NCC will further develop its online learning options, allowing members and the RIPE community to easily follow training courses and share best current practices online while allowing the RIPE NCC to reach members outside regular destinations.

2.1.2.1 RIPE NCC Academy

Status: Expanding

Measurable usage: RIPE Database Expert Course (launched October 2014): 1,346 participants; Introduction to IPv6 Course (launched June 2015): 1,057 participants

The RIPE NCC has been offering learning resources online for several years. These resources included instructional videos, documentation and live webinars, allowing participants to interact with RIPE NCC trainers remotely.

Following feedback showing that members wanted the RIPE NCC to provide more online learning options, the RIPE NCC Academy was launched at the end of 2014. The RIPE NCC Academy allows the RIPE NCC to offer learning modules and training courses through an interactive portal. Members are able to test and certify their knowledge and interact with the RIPE NCC and each other, sharing best current practices and experiences. In 2017, the RIPE NCC will continue to develop content for the RIPE NCC Academy and, based on membership feedback, will also launch two new online courses: LIR Training Course and a course for law enforcement agencies (LEAs).

Benefits for RIPE NCC members / RIPE community:

- Members and non-members can conveniently access learning materials online
- Members have the opportunity to gain certificates demonstrating their knowledge
- Members and non-members can share best current practices and experiences
- Members can interact with RIPE NCC trainers without having to travel

2.1.2.2 Webinars

Status: Expanding

Measurable usage: 42 webinars were given from 1 July 2015 to 30 June 2016

The RIPE NCC organises weekly one-hour interactive webinars, offering members the opportunity to learn from RIPE NCC trainers, watch live demonstrations and have their questions answered online. The number of participants is limited to 15 so that the trainers have enough time to address individual questions. Topics covered are:

- Introduction to the RIPE Database
- RIPE Database Advanced Topics
- IPv6 in the RIPE Database
- IPv6 Addressing Plan Webinar
- Webinar for New LIRs
- Resource Certification (RPKI)
- Advanced RIPE Atlas Usage

In 2016, the RIPE NCC launched a webinar on RIPE Atlas, which had been frequently requested by members. The RIPE NCC Executive Board has requested development of this activity in 2017 to support more members who are unable to attend face-to-face training courses.

Benefits for RIPE NCC members / RIPE community:

- Enables interaction with RIPE NCC trainers on a variety of topics without having to travel

2.1.3 Hands-on Technical Workshops

Status: Expanding

The RIPE NCC delivers technical workshops and tutorials alongside regional meetings, conferences and on request. Feedback from members has indicated a need for hands-on training courses on various technical subjects in certain parts of the RIPE NCC service region. The RIPE NCC will continue to provide tutorials and workshops covering best current practices and popular topics such as IPv6, DNSSEC, Routing, Security and others. As noted above, the Training Services Department will also support the RIPE NCC's external relations activities by delivering hands-on technical workshops at events across the service region.

Benefits for RIPE NCC members / RIPE community:

- Builds knowledge of upcoming technologies, best practices, protocols and RIPE Policies
- Increases awareness of the tools and services provided by the RIPE NCC

2.2 RIPEstat

RIPEstat	Status: Ongoing
Description	**Measurable Usage**
RIPEstat is a web-based interface that provides information about IP address space, ASNs and related information for hostnames and countries in one place. It presents registration and routing data, DNS data, geographical information, abuse contacts and more from the RIPE NCC's internal data sets as well as from external sources.	**Queries per day** 2015: 4 million 2016: 6 million (+50%)
Benefits • Provides current and historical information about Internet number resources, including those the user is responsible for • Will provide members with routing-specific functions, such as alarms • Additional targeted analysis options provided specifically for members • Provides a single, consolidated interface for accessing all RIPE NCC public data	**FTEs:** 5.7 **Costs:** 677 **CAPEX:** 178

The current datasets powering RIPEstat are being consolidated and new data sources are added, both from the RIPE NCC and relevant external parties. The main goal in 2016 was to provide a tool and an interface that is useful for operators and will help them with their work. There will be a meaningful and useful relation between available datasets and maximising the value of these combined visualisations for end users. The platform will also be the main entry point for RIS data as well as improved visualisations of data from other sources.

The country-based reports have been expanded in 2016. This work will be carried on in 2017 to create an interface that focuses on comparisons and country-specific reports as well as visualisations that serve interested parties beyond the network operations community.

The service itself is considered very stable due to the back-end migration that has taken place and the consolidation of source data storage. During 2017, back-end capacity will be expanded to cater for the expected data growth.

Using feedback from RIPEstat users, the RIPE NCC will continue to evaluate other tools and features that can be incorporated into RIPEstat to make the service more useful to members and the RIPE community.

2.3 RIPE Atlas and RIS

RIPE Atlas and RIS	Status: Expanding
Description RIPE Atlas is a leading Internet active measurement network that collects unique data, providing valuable live and historical information about the reliability of networks and the Internet's reachability and connectivity. The RIPE NCC operates globally distributed measurement networks for the purpose of collecting data on Internet infrastructure, usage and development.	**Measurable Usage** **Measurement results per day** 2015: ~250 million 2016: ~350 million (+40%) **Connected RIPE Atlas probes** 2015: 8,302 2016: 9,232 (+11.2%)
Benefits • Provides timely, hard data on topical issues such as country-wide Internet outages • Offers topical measurements and data analysis for RIPE NCC members • Interfaces with network monitoring tools and adds global-monitoring capabilities to such tools • Provides datasets that can be used to analyse the operation and growth of the Internet • RIS provides data that can be used in tools such as RIPEstat and RIPE Atlas	**FTEs:** 10.5 **Costs:** 1,174 **CAPEX:** 277

RIPE Atlas has proven to be a very useful measurement infrastructure used by operators and scientists to observe the Internet, track changes in networks and diagnose networking issues, among other things. The RIPE NCC has received very positive feedback on the value of RIPE Atlas from different groups, including RIPE NCC members, Internet Service Providers around the globe, press agencies, and researchers and scientists.

RIPE Atlas currently allows users to run their own measurements that test reachability and round-trip times, traceroutes, DNS, NTP measurements and more – from thousands of vantage points around the globe. All measurements are aggregated and provide a big-picture view of the Internet available in several formats, including "traffic maps".

The RIPE NCC started to purchase probes using only external funding from 2014 and this approach will continue in 2017. When the target of 10,000 active probes is met, the RIPE

NCC will review its distribution strategy to target covering as many ASNs as possible. The experience gained by the RIPE NCC and the move to external funding of the service means that further efficiencies can be introduced while maintaining value for users.

In 2016, the RIPE NCC added features and extensions to make it easier for users, especially RIPE NCC members, to extract value from RIPE Atlas. Among many other features, we added DNS zone checks (DomainMON), latency monitoring (LatencyMON), better real-time data streaming of measurement results, credit pooling and sharing between related parties, easier access to public data via enhanced APIs, and more.

In 2017, development will continue with ongoing improvements to Wi-Fi measurements and a selection of previously developed prototype tools (such as OpenIPMap) will be further developed and integrated with RIPE Atlas. We will also work on more visualisations, notably about data plane (traceroute) features as well as making more use of real-time data. The back-end systems processing and storing RIPE Atlas data will be scaled to accommodate the expected volume in measurement data.

The RIPE NCC maintains a public roadmap for RIPE Atlas and will hold continued dialogue with the RIPE community, especially the RIPE MAT Working Group, on future developments and functionality.

Benefits for RIPE NCC members / RIPE community:

- Provides timely, hard data on topical issues such as country-wide Internet outages
- Offers topical measurements and data analysis for RIPE NCC members
- Interfaces with network monitoring tools and adds global-monitoring capabilities to such tools
- Provides datasets that can be used to analyse the operation and growth of the Internet

2.3.1 RIPE Atlas Anchors

Status: Decreasing

Measurable usage: More than 200 RIPE Atlas anchors deployed by 30 June 2016

RIPE Atlas anchors are essentially enhanced probes with far greater measurement capacity than regular RIPE Atlas probes. They basically provide two functions: they perform far more measurements than regular probes and act as stable, cooperating regional targets for measurements originating from probes throughout the RIPE Atlas network. This allows users to examine measurement traffic at both the source and the destination. RIPE Atlas anchors are hosted by interested organisations (mostly data centres and IXPs), who receive additional benefits for their contribution. RIPE Atlas anchors are also used as vantage points for DNS Monitoring.

The RIPE NCC continues to deploy RIPE Atlas anchors in various partnering networks in order to provide a wider distribution of measurement targets. We also have a successful partnership with some of the other RIRs, who are sponsoring the deployment of anchors in regions other than the RIPE NCC service region.

Hosting and the hardware for RIPE Atlas anchors is funded by interested parties, except for strategic locations where the RIPE NCC has direct interest in monitoring network connectivity, such as where we host essential equipment like resiliency servers or global K-root nodes. This activity is expected to continue in 2017.

2.3.2 Routing Information Services (RIS)

Status: Expanding

The RIPE NCC operates globally distributed measurement networks for the purpose of collecting data on Internet infrastructure, usage and development.

The RIPE NCC works with a range of stakeholders to unify, optimise and develop new interfaces for this data, while, of course, performing life-cycle maintenance on the collector hardware. Data collectors and back-end systems have been replaced by a new hardware and software platform that is easier to deploy and maintain. This new architecture enables us to provide near real-time route updates to the RIPE NCC back-end infrastructure. The RIS data is and will be accessible via RIPEstat as outlined in the sections above, and it is also available in the form of MRT dump files for those parties that prefer to create their own visualisations or reporting based on the RIS data.

In 2017, the emphasis for RIS will be on improving the scalability of the back-end infrastructure and making the near-real time data more widely available. The RIS collector network will be expanded modestly with a maximum of five nodes in areas not currently covered following feedback received from the Routing Working Group at RIPE 71.

Benefits for RIPE NCC members / RIPE community:

- Provides datasets that can be used to analyse the operation and growth of the Internet
- Provides data that can be used in tools such as RIPEstat and RIPE Atlas

2.4 Other Services

Other Services	Status: Expanding
Description The RIPE NCC manages the complete lifecycle of RIPE NCC memberships and of those wishing to take advantage of RIPE NCC services (e.g. legacy resource holders). This includes queries from potential members, applications, administrative and contractual changes, billing enquiries and account closures. The RIPE NCC also runs the RIPE Database Proxy Service, the Near Real Time Mirroring (NRTM) service and the LISP EID Registry for the benefit of the RIPE community.	**Measurable Usage** **RIPE NCC members** 2015: 12,000 2016: 13,700 (+14.2%)
Benefits • New members are guided through the application process • Support is given when administrative or financial questions arise • Members are kept aware of services, tools and features • Members can receive personal support via Live Chat and in other languages where possible	**FTEs:** 4.1 **Costs:** 454 **CAPEX:** -

2.4.1 Membership Lifecycle Management

Status: Expanding

Measurable usage: 13,700 members; 2,851 membership applications, 2,469 accounts activated; 33,366 member enquiries

The RIPE NCC manages the complete lifecycle of RIPE NCC memberships and of those wishing to take advantage of RIPE NCC services (e.g. legacy resource holders). Support and advice is given throughout the contractual relationship, including queries from potential members, applications, administrative and contractual changes, billing enquiries and account closures.

In 2017, the RIPE NCC expects to see a further substantial increase in the number of members (around 14%), leading to a greater number of applications and requests for support. The growing IPv4 transfer market is expected to continue resulting in high numbers of requests to update the registry as members get their administration in order. Furthermore,

the RIPE NCC has increased due diligence on membership applications and registry update requests in order to secure the quality of registry data. In 2017, the increases in these three areas are expected to result in the need for additional FTEs.

New systems and processes will be introduced (for example, a new ticketing system) that will lead to an improved customer experience in addition to gaining efficiencies and saving time for both members and the RIPE NCC. Customer feedback will be sought, tracked and shared internally in order to remain aware of external perceptions and ahead of customer expectations.

Benefits for RIPE NCC members / RIPE community:

- New customers are guided through the application process
- Support is given when administrative or financial questions arise
- Members are kept aware of services, tools and features
- Members can receive personal support via Live Chat and in other languages where possible

2.4.2 RIPE Database Proxy Service

Status: Ongoing

Measurable usage: 8 contracts have been signed; 6 actual users of the service

The RIPE Database Proxy Service is for third parties who send queries to the RIPE Database on behalf of their clients. It ensures that the daily access limits for users of the RIPE Database are correctly applied. For example, if a third party provides their clients with a web-based gateway to the RIPE Database, the proxy service ensures that daily limits are calculated based on the clients' queries and avoids the possibility of the third party's server being denied access to the RIPE Database because of too many queries from its clients.

At the 87th Executive Board Meeting, held on 26 March 2013, the RIPE NCC Executive Board decided that the RIPE Database Proxy Service should be continued free of charge, for both members and non-members, under a formal contract with the users of the service.

Benefits for RIPE NCC members / RIPE community

- Provides third parties with a mechanism for ensuring that their clients' RIPE Database queries are not added to their daily access limit
- Helps to ensure the accessibility of query gateways to the RIPE Database that third parties provide to their clients

2.4.3 Near Real Time Mirroring (NRTM)

Status: Ongoing

Measurable usage: 25 users of the NRTM service

The Near Real Time Mirroring (NRTM) service provides RIPE NCC members with a local copy of the RIPE Database. This local copy is kept up to date with modifications from the RIPE Database in near real time. The NRTM feeds do not contain any personal or private data.

Benefits for RIPE NCC members / RIPE community

* Provides members with a local copy of the RIPE Database
* Enables members to use RIPE Database data (e.g. routing data) in near real time to manage their networks without the need to continuously query the RIPE Database for changes

2.4.4 LISP EID Registry

Status: Expanding

At the IETF, an Internet Draft for the allocation of LISP EID address prefixes was submitted. LISP EID (Locator/Identifier Separation Protocol Endpoint ID) is a "map-and-encapsulate" protocol.

The basic idea behind the separation is that the Internet architecture combines two functions: routing locators (where a client is attached to the network) and identifiers (who the client is) in one number space, the IP address.

The IETF LISP Working Group has requested a trial period of three years for this protocol extension. During these three years, interested parties can request IPv6 address space from a specific designated experimental block. The LISP EID Registry was implemented in November 2016, and the RIPE NCC is now responsible for the management and registration of this temporary experimental address space.

3) Coordination Activities

3.1 DNS and K-root Operations

DNS and K-root Operations	Status: Expanding

Description

The RIPE NCC provides DNS coordination and support activities as well as reverse DNS services for the IPv4 and IPv6 address space that it manages. For reverse DNS (rDNS) associated with the address space managed by other RIRs, the RIPE NCC provides secondary DNS services to support the reliability of reverse lookups.

Measurable Usage

K-root instances
2015: 20
2016: 42 (+110%)

Benefits

- Provides reverse DNS services for RIPE NCC members with registered IP addresses
- Ensures the stability and diversity of the DNS root name server system
- Guarantees the neutral, impartial and professional provision of key high-level DNS services
- Provides a secondary service for ccTLD operators

FTEs:	4.0
Costs:	700
CAPEX:	150

The scalability of the DNS infrastructure for primary, secondary and reverse DNS services is improved based on the requirements specific to each of these services.

Primary and secondary DNS services by the RIPE NCC have traditionally been served from three locations to provide resilience and geographical coverage. These locations are Amsterdam, London and Stockholm. In 2016, the RIPE NCC decided to look for a third party to provide secondary DNS services for www.ripe.net and some other RIPE NCC domains. An external service provider was selected after following an open Request for Proposal (RfP) procedure.

Service of these main RIPE NCC domains is, in addition to the three existing locations, now also provided worldwide from several tens of additional locations, as provided by the partnering service provider. This has lead to an increase in the budget for DNS services for 2017.

K-root and other DNS service nodes will continue to be well maintained and supported. As a consequence, necessary lifecycle upgrades and replacements are planned for 2017.

Security-related aspects, as well as global measurement and reporting on the RIPE NCC's DNS services (for example by providing RSSAC002 data to the public) are becoming increasingly important and will continue to be areas of focus in 2017.

This activity is expanding due to various reasons as also explained in the more detailed sections below.

3.1.1. Reverse DNS and Reverse DNS Support

Status: Expanding

Measurable usage: three reverse provisioning instances; approximately 5 billion reverse root queries daily

The RIPE NCC delegates reverse DNS zones for the address ranges that it manages. To support this service, it provides reliable, authoritative name servers.

As part of its DNSSEC deployment efforts, the RIPE NCC signs all its zones and provides tools for users to secure delegations received from the RIPE NCC. In addition, the RIPE NCC shares experience by publishing operational white papers, documentation and software toolkits. This service is noted as expanding to take into account the possibility that the RIPE NCC's DNS services might be supported by a partnering service provider in 2017 (as noted above), which would involve extra costs for the RIPE NCC.

Benefits for RIPE NCC members / RIPE community:

- Supports the proper address-to-name mapping for addresses allocated to the RIPE NCC
- Provides reliable and secure reverse DNS services
- Supports the operation and maintenance of DNSSEC

3.1.2 Secondary DNS Service

Status: Ongoing

Measurable usage: 67 TLDs hosted as secondary for ccTLD operators

The RIPE NCC offers a free secondary name service to the other RIRs, along with 61 country code top-level domain (ccTLD) operators who are in the start-up phase of their operations. The RIPE NCC no longer provides this service to well-established ccTLDs.

The community has provided guidelines on the eligibility of ccTLDs to receive this service, as documented in ripe-663. During 2016, the RIPE NCC started to apply the given criteria to new requests for service and to re-evaluate the eligibility of ccTLDs currently receiving the secondary service. As a consequence, some of these ccTLDs have already stopped using the service and it is expected that during 2017 the number of ccTLDs receiving this service will decrease further.

Benefits for RIPE NCC members / RIPE community:

- Supports the stability of the global DNS by offering a professional service to the other RIRs and to developing ccTLD operators that require it

3.1.3 DNS Service in the e.164.arpa Domain (ENUM)

Status: Ongoing

Measurable usage: 52 delegations in the ENUM (e164.arpa) zone

The Internet Architecture Board (IAB) has an agreement with the RIPE NCC under which the RIPE NCC provides technical operation of the e164.arpa domain. This domain implements support in the DNS for the ENUM protocol, which allows the mapping of telephone numbers to domain names in order to help facilitate services such as Voice over IP (VoIP).

Benefits for RIPE NCC members / RIPE community:

- Supports the operations of one of the systems required for the deployment of the ENUM protocol, promoting increased integration between the Internet and services provided through the traditional telephony infrastructure
- Supports security of the e.164.arpa domain by deploying and maintaining DNSSEC and allowing secure delegations from ENUM operators

3.1.4 K-root Operations

Status: Expanding

Measurable usage: 42 K-root instances at 30 June 2016; approximately 5 billion queries daily

The RIPE NCC operates the K-root service through a set of globally distributed anycast clusters. Root name servers are a crucial part of the Internet DNS infrastructure. The RIPE NCC has operated the K-root server since 1997, when the first server was installed at the London Internet Exchange (LINX). The RIPE NCC has since deployed five global nodes of the K-root name server. Since 2003, the RIPE NCC has been using anycast to provide the K-root name service.

In 2016, the RIPE NCC has been implementing the expansion plan for K-root that was proposed to the community in 2015. According to this plan, we were able to substantially expand and improve the global coverage and reachability of K-root, supported and sponsored by various organisations who opted to have a K-root hosted node in their own network. The cost of the hosted nodes is borne by the host themselves rather than coming from membership funds.

By 30 June 2016 we had a total of 42 K-root nodes spread over a wide range of locations. During 2017, the expansion plan will remain in effect and we expect to see the addition of around a further 10 K-root hosted nodes.

Starting in 2015, the RIPE NCC also began revising the agreements it has with some of the external parties that house K-root global nodes. These agreements had not been reviewed in years and needed to be updated. In some cases, this has led to increased costs to formalise these support arrangements with the local hosts, and has meant that new collocation facility costs have been incurred. As this work is ongoing, it has resulted in an increased operational cost for K-root in 2017.

In recent years, there has been a gradual increase in peak load, both on K-root and other DNS services. This is partly due to an increase in genuine queries, as can be seen in the increased query load over the years, but this is also due to the load caused by various forms of attacks on the DNS infrastructure. The RIPE NCC aims to always be able to respond correctly and in a timely manner to received DNS queries, the RIPE NCC continuously monitors and analyses the performance of the existing K-root anycast nodes to determine if any service improvements or capacity increase in K-root global nodes is required.

Based on our current analyses, we are further adapting the architecture of the K-root global nodes to make them more future-proof. In 2017, we will increase capacity on all K-root global nodes to maintain headroom against growing query and attack volumes. This expansion will result in an increase in the DNS and K-root operational and hardware costs for 2017.

The RIPE NCC is also working closely with other RIRs to identify locations where it can benefit from a local K-root node and find possible hosts for the service.

Benefits for RIPE NCC members / RIPE community:

- Provides a resilient, efficient, secure and high-quality service
- Can help with the isolation of an "external" Denial of Service (DoS) attack and localises the impact of a "local" DoS attack
- Efficiently maintains the network of K-root anycast instances by monitoring network and instance problems, performing trend analysis and determining if, and where, other anycast nodes should be deployed.

3.2 Data Analysis and Scientific Support

Data Analysis and Scientific Support	Status: Ongoing
Description The RIPE NCC has a long-standing tradition of providing the operator community with data analysis about the state of the Internet and providing new and innovative tools that help the community understand various aspects of routing, DNS, reachability and other topics.	**Measurable Usage** N/A
Benefits • Regular reporting and analysis of various RIPE NCC-related statistics such as Internet number resource usage • Accurate and methodological analysis of Internet events, with a particular emphasis on using data collected by the RIPE NCC's measurement systems • Publication of interesting findings about the working of the Internet, relevant to network operators • Prototypes of new and innovative tools that have the potential to become future RIPE NCC services	**FTEs:** 3.0 **Costs:** 357 **CAPEX:** 12

In 2017, the RIPE NCC will allocate more time to these scientific publications and analyses. It will also continue to develop prototype tools that, if they show enough operational value to the RIPE NCC membership and the community at large, can be evolved into future RIPE NCC services. The RIPE NCC will also aim to work with well-known publishing outfits to keep the technical community up to date with developments and changes in the global Internet infrastructure, such as the effects of natural disasters. In this way, the RIPE NCC can provide intelligence in a variety of arenas to act as an early-warning system for members and the community. By improving its intelligence-gathering mechanisms, this will also allow the RIPE NCC to gain better understanding of the global Internet and adapt quickly and changes and new conditions.

The RIPE NCC also has a history of engaging in collaborative research and analysis, the results of which have benefitted the Internet technical and research communities with innovative findings.

In 2017, we will take a more structured approach to developing our collaborative research program with external parties. A dedicated budget will help attract interns and researchers

from around the world to spend several weeks at the RIPE NCC, where they will work closely with staff researchers. Applications will be open, and the research results of these collaborations will be made publicly available.

3.3 RIPE Labs

RIPE Labs   **Status: Ongoing**

Description

RIPE Labs is a platform for network operators, developers and industry experts to expose, test and discuss innovative Internet-related tools, ideas, analysis and statistics that can benefit members and the RIPE community. These ideas are being developed both within the RIPE NCC and the community at large.

Measurable Usage

Articles published

2015: 80
2016: 97 (+21.3%)

Benefits

- Informs the community about new ideas and prototypes the RIPE NCC is working on
- Provides a platform for community members to present and discuss their research and use cases
- Provides a channel for the community to provide feedback to the RIPE NCC
- Provides a statistics dashboard showing a large range of operational statistics

FTEs:	1.6
Costs:	240
CAPEX:	-

The Statistics Dashboard has been one of the most popular pages on RIPE Labs, together with articles on topics related to IPv6, routing and security. In 2017, the RIPE NCC will continue to reach out to the wider community and to attract content from external sources such as researchers, network operators and experts.

*** 3.4 External Relations *** STRATEGIC FOCUS POINT 2017

External Relations		Status: Expanding
Description The RIPE NCC carries out external relations activities and outreach to governments, law enforcement and other communities to ensure that the interests and concerns of the RIPE NCC membership and RIPE community are heard in Internet governance discussions at the national, regional and global level.	**Measurable Usage** N/A	
Benefits • Contributes to the strength and legitimacy of bottom-up, community-driven policy-making, as practiced in the RIPE community • Promotes openness and transparency in the development of public policy relating to the Internet, as well as raising any specific concerns for the RIPE NCC membership or the RIPE community • Ensures the RIPE NCC can inform its membership and community of relevant public policy issues or discussions	**FTEs:** 12.3	
	Costs: 2,245	
	CAPEX: -	

As the Internet regulatory and governance landscape continues to evolve, the RIPE NCC will grow its capacity to engage strategically with all Internet stakeholders, including governments, industry partners, law enforcement agencies (LEAs), inter-governmental organisations and the academic community. By strengthening multistakeholder engagement with the RIPE community and its Policy Development Process, the RIPE NCC promotes the interests of the RIPE community and solidifies the place of community-driven policy development in the Internet space. The RIPE NCC is recognised as a leader and innovator in this area among its industry partners, and we will maintain that position.

In 2017, the RIPE NCC will strengthen ties among itself, governments and the technical community through its technical expertise and long-standing reputation as a source of expertise on Internet-related matters. The RIPE NCC's liaison strategies with governments and the public sector will include:

- RIPE NCC Roundtable Meetings for Governments and Regulators
- Engagement with LEA representatives via direct capacity-building efforts with specific agencies and targeted participation in relevant forums and events

- Direct engagement with government agencies on issues relevant to the RIPE NCC, its membership and the RIPE community, including discussions towards formal coordination agreements with specific governmental entities
- Participation in international discussions of Internet-related public policy development in forums including:
  - The Internet Governance Forum (IGF)
  - Regional and national Internet governance events
  - The International Telecommunication Union (ITU) and its regional coordination groups (CEPT Com-ITU in Europe, RCC in the CIS region, and the Arab Group in the Middle East)
  - The Organisation for Economic Cooperation and Development (OECD)
  - The United Nations World Summit on the Information Society (WSIS)
- Cooperative educational and capacity building initiatives with public sector organisations and industry partners (such as the IPv6 Roadshow initiative in the Middle East and CIS regions).

Key events in this space will include the ITU's World Telecommunication Development Conference (WTDC-17) and the ongoing preparations for the next ITU Plenipotentiary, which will be held in 2018. However, in 2017 the RIPE NCC will focus less on major events and more on targeted government engagements, focused at the national level (or formal regional entities such as the European Union). We expect to employ additional resources to assist in providing the necessary intelligence on regulatory and legislative developments across the service region. This will help the RIPE NCC to effectively carry out its operations, while allowing us to better inform the RIPE community on relevant issues.

The RIPE NCC's stakeholder engagements will focus thematically on IPv6 deployment, the Internet of Things (IoT), relevant network security issues and accountability in the Internet registry system. These are areas that the RIPE NCC Executive Board and Senior Management have identified as significant for the organisation and of particular interest to RIPE NCC stakeholders.

The RIPE NCC will continue to focus on engaging the RIPE NCC membership across the service region, employing the resources of staff based in Amsterdam, Dubai, Moscow and Brussels to inform and listen to our members. This will be done via sub-regional events (such as the RIPE NCC Levant Regional Meeting in 2016), one-day Member Meetings, Member Lunches and events targeting members from specific sectors (such as banking and finance).

3.5 Member Outreach

Member Outreach	Status: Expanding

Description	Measurable Usage
The RIPE NCC takes a tailored approach to its outreach efforts, engaging in different ways in the 76 countries of the service region depending on the local community's needs and level of development.	N/A

Benefits		
• Embraces external groups as part of the open RIPE community, strengthening the legitimacy of the RIPE bottom-up policy development process • Ensures that all RIPE NCC stakeholders feel engaged and represented in the operation of the organisation • Positions the RIPE NCC to facilitate expert technical input into policy and decision-making processes outside the RIPE forum that may impact on, or be affected by, IP addressing issues. • Enables effective coordination of the Internet technical community's input into multi-stakeholder Internet governance discussions	FTEs:	5.5
	Costs:	1,476
	CAPEX:	-

The RIPE NCC supports the open, multi-stakeholder model of Internet governance by engaging with a broad range of stakeholder groups on behalf of the membership and for the good of the Internet community. Among the stakeholder groups that the RIPE NCC has developed relationships with are:

- RIPE NCC membership
- Internet technical community (including Network Operator Groups (NOGs) and Internet Exchange Point (IXP) communities)
- Industry partners (RIRs, ICANN, the Internet Society etc.)
- Internet industry and professional groups
- Academia and the research community
- Public sector (governments and regulators)
- Law Enforcement Authorities (LEAs)

In 2016, RIPE NCC Regional Meetings took place in Moscow, Beirut, Tirana, Istanbul and Yerevan. In Western Europe, Member Lunches were organised in Tel Aviv, Vilnius, Riga, Helsinki, Luxembourg, Frankfurt, Milan and Zagreb. The RIPE NCC also attended and

presented at NOG, IXP and security events throughout the region, sending staff to engage with attendees and develop collaboration initiatives for the benefit of specific communities as well as the entire membership and RIPE community. Outreach also takes place beyond the RIPE NCC service region, with staff attending events organised by the other RIRs as well as industry partners such as ICANN and the IETF.

2017 will see further development of current initiatives to build these relationships, including:

- Funding for RIPE community members to participate in the Internet Governance Forum and regional Internet governance events
- Contributions to technical community conferences and events to highlight RIPE NCC services (particularly statistics and analysis) and issues of concern (including IPv6 adoption and Internet governance discussions)
- Using RIPE NCC data to identify countries and industry sectors that would most benefit from engagement with the RIPE NCC
- Enhancing ties with local governments to represent the RIPE NCC membership in those countries

The RIPE NCC is also committed to building on its outreach efforts to the core membership by supporting Network Operator Groups (NOGs), Internet Exchange Points (IXs) and other forums in the service region through sponsorship and active participation.

Regional organisation and participation are crucial to successful community-driven, bottom-up policy development models, providing all stakeholders with the means to contribute and have their voice heard. The RIPE NCC has been very active in supporting the development of regional forums within its service region, including:

- Network Operator Groups, including the Middle East Network Operators Group (MENOG), the Eurasia Network Operators Group (ENOG) and support for national NOGs
- RIPE NCC Regional Meetings, including sessions attached to MENOG and ENOG, the South East European Regional Meeting (which will hold its sixth meeting in 2017), and events in central Asia and the Middle East.
- Regional Internet governance forum events (including EuroDIG, the Arab IGF and national IGF events)
- Regionally targeted educational initiatives (the RIPE NCC/MENOG/CIS IPv6 Roadshow)

Over the past several years, the RIPE NCC has been steadily increasing its outreach activities with a particular focus on the Russian and Middle East regions. Since 2012, this increase has been accompanied and facilitated by the addition of staff in Dubai and Russia. The External Relations Team has two staff in Amsterdam, four staff members in Dubai and two staff in Russia. These staff members, particularly in Dubai and Moscow, will strengthen the RIPE NCC's reach and influence with the technical community, public sector and business stakeholders in those regions.

In addition, our presence in Dubai and Russia will create more opportunities for Amsterdam-based staff to engage with members and stakeholders across the service region.

The RIPE NCC carried out the RIPE NCC Survey 2016 from May to June this year. The survey received 4,344 responses, and this work is a crucial input to the strategic planning and service improvements that the RIPE NCC will make in the coming three years. The 2016 survey was developed with input from RIPE NCC members and community stakeholders, and it was conducted by a third party organisation to ensure anonymity for participants as well as fair and independent analysis of the results. The results of the survey will be published in late 2016, as will a response from the RIPE NCC Executive Board and the RIPE NCC's proposed action plan to address the points raised in the survey. In 2017, the RIPE NCC will focus on addressing the points raised in the survey by our members and community.

The RIPE Academic Cooperation Initiative (RACI) will continue as a significant activity, providing opportunities for greater academic community involvement in RIPE community events, including RIPE Meetings, MENOG, ENOG and SEE events. The program has proven to be popular and useful for both the RIPE community and for Internet researchers, and contributes to the long-term development of RIPE by bringing interesting and relevant research into the community's conversations.

Finally, the RIPE NCC will continue to build on work with industry partners, including ICANN and the Internet Society, on various initiatives to build regional engagement with the Internet technical community.

3.6 IPv6 Support

IPv6 Support		Status: Expanding
Description The RIPE NCC focuses a great deal of its outreach efforts on IPv6 awareness-raising efforts across the full range of RIPE NCC stakeholder groups.		**Measurable Usage** N/A
Benefits • Builds awareness among all Internet stakeholders of the need to deploy IPv6 • Ensures that the interests of the RIPE NCC membership and the technical community are represented in all relevant forums • Promotes capacity building, particularly in developing areas, and facilitates knowledge sharing with global experts	**FTEs:**	1.6
	Costs:	167
	CAPEX:	-

This includes work to inform and educate governments, regulators and LEAs about IPv6 deployment, engagement with national forums and task forces, and meetings with LEAs around the world. The RIPE NCC will also continue to work closely with the OECD on IPv6-related activities conducted under the remit of that organisation.

While there will remain a strong focus on the technical and operational aspects of deploying IPv6, the RIPE NCC management has decided that efforts will continue to be made to raise awareness of IPv6 among decision-makers. This will be supported by the IPv6 Program Manager, who will dedicate efforts to IPv6 awareness-raising activities.

3.6.1 Training and Education

3.6.1.1 RIPE NCC/MENOG IPv6 Roadshows

Status: Ongoing

The IPv6 Roadshow events are a joint initiative from the Middle East Network Operators Group (MENOG) and the RIPE NCC. They consist of three-day events that provide hands-on training for network engineers involved in the operations of private and public sector networks.

In 2017, there will be around seven IPv6 Roadshow events scheduled throughout the Middle East region. The RIPE NCC continues to work with local partners, including governments, to develop the Train-the-Trainer Program to broaden the pool of Arabic-speaking trainers and increase the amount of capacity building resources in the region. The goal is to create a broad pool of Arabic-speaking trainers who can assist in delivering roadshows and also carry out their own IPv6 events with RIPE NCC support.

Benefits for RIPE NCC members / RIPE community:

- Provides education and capacity building in a context that recognises the Middle East region's specific needs
- Builds relationships with public sector bodies and actors in the Middle East
- Enables local trainers to acquire the knowledge and skills to educate their communities

3.6.1.2 IPv6 Roadshows in the ENOG region

Status: Expanding

The ENOG IPv6 Roadshows will be further rolled out in 2017. In 2016, we trained 12 Russian-speaking trainers from six different countries through the Train-the-Trainer program. In 2017, we will work on further developing their skills and have them co-train on ENOG IPv6 Roadshow events.

Benefits for RIPE NCC members / RIPE community:

- Provides education and capacity building in a context that recognises the specific needs of stakeholders in Russia, Ukraine and surrounding countries
- Builds relationships with public sector bodies and actors in the region
- Enables local trainers to acquire the knowledge and skills to educate their communities

3.6.2 Online IPv6 Resources, Measurements and Analysis

Status: Expanding

The RIPE NCC supports IPv6 adoption by providing resources, measurements and analysis to its membership and the wider RIPE community. This activity includes maintenance of the IPv6ActNow section of the website, the provision of IPv6-related statistics and the IPv6

RIPEness rating system, which measures and ranks the IPv6 preparedness of individual RIPE NCC members based on a number of specific indicators.

Recognising the advances being made in the deployment of IPv6 in several markets in the RIPE NCC service region, the RIPE NCC will continue working on including case studies and background information about successful IPv6 deployments on the IPv6ActNow section of the website and RIPE Labs. In collaboration with local and regional communities, the RIPE NCC will encourage and facilitate community members to share their operational experience with IPv6.

Monitoring and measuring the level of IPv6 deployment among members and Internet end users in general remains an important focal point. These measurements will provide an important basis to monitor progress as well as help the community to measure the quality of IPv6-based communications. With significant advances in the deployment of IPv6 in several networks and markets, RIPE NCC management has decided to put additional focus on providing statistics that can help the public sector to evaluate and identify successful programmes to incentivise IPv6 deployment.

In 2017, we will work on integrating per-LIR measurements in the LIR Portal so that RIPE NCC members can check on their own IPv6 RIPEness status.

Benefits for RIPE NCC members / RIPE community

- Provides comprehensive, impartial information to assist in deploying IPv6
- Provides analysis on the rate of IPv6 deployment
- Encourages RIPE NCC members to become IPv6-ready and rewards them for doing so
- Provides a unique indicator of IPv6 readiness across the RIPE NCC service region (and at more specific levels, including by country, sector, LIR size)

3.7 RIPE Meetings

RIPE Meetings   **Status: Expanding**

Description

The RIPE NCC organises two five-day RIPE Meetings each year at various locations throughout its service region, trying to vary these geographically. RIPE Meetings bring together Internet Service Providers (ISPs), network operators and other interested parties from all over the world. The RIPE NCC provides all administrative, logistical and technical support.

Measurable Usage

Attendees per meeting
2015: 650+
2016: 650+

Benefits

- Supports the open, bottom-up, industry self-regulatory structure
- Stimulates participation of the RIPE community in the IP policy-making process and the technical coordination of IP networking
- Facilitates networking opportunities with key players in the Internet industry
- Contributes to the stable operation of the RIPE NCC by allowing for guidance and advice from the RIPE Working Groups

FTEs:	5.9
Costs:	1,809
CAPEX:	67

The RIPE NCC sends staff to RIPE Meetings who are available for face-to-face consultation about: Internet resource requests, the RIPE Database, billing queries, training services, RIPE NCC tools and measurement services, RIPE Labs, and any other services that are made available to members or the wider community.

The RIPE NCC expects that both RIPE Meetings in 2017 will receive attendance in excess of 600 people. For those that are unable to physically attend RIPE Meetings, state of the art webcasting services and live transcription will be made publicly available.

In 2017, increased attendance is expected due to a steady rise in membership (resulting in more free tickets to new LIRs). A new RIPE Meeting Fellowship will provide financial support in the form of subsidised travel and accommodation to allow worthy recipients to attend RIPE Meetings. Improvements will also be made to the set-up for the IPv6 network and enhancements will be made to the presentation infrastructure. The RIPE NCC will also work in 2017 to increase the ability for attendees to identify networking opportunities and arrange to meet with contacts at RIPE Meetings. We will also provide an improved payment

system for attendees. The costs of RIPE Meetings are offset by sponsorship received from third parties.

3.8 RIPE Policy and Community Support

RIPE Policy and Community Support	Status: Ongoing
Description The RIPE NCC provides support to any and all stakeholders who wish to participate in formulating RIPE Policy or who wish to be part of the RIPE community. It supports the RIPE Policy Development Process (PDP) and offers assistance to the RIPE Working Groups and Working Group Chairs as required so that they are able to develop policy in a consensus-based, bottom-up manner.	**Measurable Usage** **Proposals completing the PDP** 2015: 12 2016: 5 (-58%)

Benefits		
Benefits • Encourages participation in the RIPE Policy Development Process (PDP) • Helps to anticipate problems related to the PDP or policy proposals by analysing their potential impact for the community • Provides transparency and consistency of the procedures • Translates RIPE Policy into RIPE NCC procedures • Documents and maintains a clear overview of new and changed procedures	**FTEs:**	1.8
	Costs:	230
	CAPEX:	-

The RIPE NCC provides information and statistics to various working group mailing lists and creates impact analyses that highlight the expected outcome of RIPE Policy proposals to facilitate community discussion. The RIPE NCC also implements procedures as part of the RIPE Policy Development Process (PDP).

In recent years, important stakeholders within the Internet community, both technical and non-technical, have shown greater interest in the RIR system. The RIPE NCC plays an active role in promoting the bottom-up policy development process to support:

- The engagement of community members with the PDP
- The engagement of all stakeholders in the Internet community that look to RIPE as a model of effective policy-making
- Understanding of the RIPE NCC's role in the coordination of Internet policy

- The existing collaborations with other important Internet institutions such as ICANN, the ASO AC and the NRO

The RIPE NCC maintains a number of high-volume external mailing lists. Traffic is closely monitored and efforts are made to support subscribers with problems and to control spam so the mailing lists can be easily and efficiently moderated without losing any End User functionality.

Starting in 2014, the RIPE NCC has placed greater emphasis on growing community engagement with the PDP by facilitating accessibility, communication and greater information dissemination within the RIPE community. This has included sending monthly PDP updates to the ENOG and MENOG communities in Russian and Arabic.

In 2016, the RIPE Forum was rolled out, which is a web-based interface to RIPE community mailing lists. The RIPE Forum is completely optional, the existing mailing list setup will continue to be supported. In 2017, the RIPE NCC will continue to encourage further engagement with the PDP through promotion of the RIPE Forum and greater outreach activities to increase awareness and make it easier for people to participate in the PDP.

3.9 ICANN/IANA/IETF/ISOC/RIRs

ICANN/IANA/IETF/ISOC/RIRs	Status: Ongoing
Description	**Measurable Usage**
The RIPE NCC is strongly committed to maintaining close relationships with its industry partners, including the four other Regional Internet Registries (RIRs), ICANN, the Internet Engineering Task Force (IETF) and the Internet Society (ISOC).	N/A
Benefits • Ensures the RIPE NCC is widely recognised as accountable and legitimate in its role as a Regional Internet Registry • Promotes the open, bottom-up, industry self-regulatory structure common to the RIR communities and other Internet technical coordination bodies • Facilitates coordinated implementation of global policies developed by the Policy Development Processes (PDPs) of the five RIRs, and contributes to the global legitimacy of bottom-up, community-driven policy-making processes • Facilitates the general technical and outreach coordination necessary to support the stable operation and governance of the Internet	**FTEs:** 3.5 **Costs:** 1,098 **CAPEX:** -

While the IANA stewardship transition is expected to conclude in 2016, there remains a focus from all Internet stakeholders on the accountability and legitimacy of those organisations with an administrative role in the global governance of the Internet. This includes the RIRs, as part of the global Internet registry system, and the RIPE NCC will continue to work closely with all participants in this discussion in venues including the ICANN Cross-Community Working Group on Enhancing ICANN Accountability (CCWG-Accountability) and the ICANN Governmental Advisory Committee (GAC) Public Safety Working Group (PSWG).

The RIPE NCC has also confirmed its strong support for the IETF and its role in the development and implementation of technical standards and coordination among those who support the global operation of the Internet. In 2016, the RIPE NCC committed to annual contributions to support the long-term sustainability of the IETF for the coming 10 years.

The RIPE NCC will continue to coordinate with technical community organisations, particularly the so-called "I-star" organisations, to ensure strong, coordinated communication on issues where there is a common Internet technical community position.

With technical community partners, we will look build on our cooperative engagement efforts, particularly those directed towards local and regional communities and non-technical stakeholders.

3.10 Good of the Internet

Good of the Internet		Status: New Activity
Description In July 2016, the RIPE NCC Executive Board approved the addition of the addition of a Good of the Internet activity to the RIPE NCC Activity Plan and Budget with a budget of EUR 500,000. This activity is intended to provide a means for the RIPE NCC and its members to support worthwhile causes that contribute to the overall development and stability of the Internet.	**Measurable Usage** N/A	
Benefits • Contributes to the good of the Internet in the RIPE NCC service region • Supports worthwhile initiatives that help with the development and stability of the Internet • Recognises people who have contributed to the advancement of the Internet locally, regionally or globally • Gives financial support to industry partners who are instrumental to the global Internet infrastructure	**FTEs:**	0.5
	Costs:	553
	CAPEX:	-

3.1.1 RIPE NCC Community Projects Fund

The RIPE Community Projects Fund will support specific projects of value to the operation and resilience of the Internet, with a focus on tools and services that benefit the technical community in our service region. Applications will be evaluated by a committee of RIPE community and Executive Board members, along with one RIPE NCC staff observer.

3.1.2 Rob Blokzijl Foundation

The RIPE NCC Executive Board has approved the establishment of the Rob Blokzijl Foundation, in honour of the RIPE Chair Emeritus who passed away in 2015. The foundation will recognise people from our service region who have made a lasting contribution to the development of the Internet. This award will be given every two years

and the recipients will be individuals who have made substantial technical or operational contributions.

A nomination committee will be chosen by the RIPE community to select the award recipients. The foundation will be completely independent from the RIPE NCC, though we will initially support the foundation as required.

3.1.3 SEED Alliance

In 2017, the RIPE NCC will apply to join the SEED Alliance, which is an organisation consisting of several RIRs and partner organisations who wish to collect and distribute funds for projects aimed at developing the Internet to support positive transformations in marginalised areas or communities.

3.1.4 Supporting IETF Sustainability

The RIPE NCC also agreed to contribute EUR 100,000 annually to the sustainability of the IETF following presentations at RIPE 71 and RIPE 72 from the IETF and subsequent discussion on the matter on the RIPE NCC Members Discuss Mailing List. The RIPE NCC and its members confirmed their strong support for the IETF and that organisation's role in the development and implementation of technical standards and coordination among those who support the global operation of the Internet.

4) Internal

4.1 IT and Information Security

IT and Information Security		Status: Expanding	
Description The IT activity at the RIPE NCC provides substantial support for all the internal and external services and activities provided by a Regional Internet Registry.		**Measurable Usage** N/A	
Benefits • Provides of 24/7 support for services • Ensures efficient IT support for staff to facilitate delivery of RIPE NCC services • Enables members and the RIPE community to flag technical emergencies outside of the RIPE NCC's regular office hours		FTEs:	12.3
		Costs:	2,475
		CAPEX:	544

This activity includes the operation of the internal infrastructure and system administration and engineering support for all related infrastructure (such as co-location facilities, network, archiving and storage and email delivery), user support for staff, and IT support and enhancement for all external services provided by the RIPE NCC. 24/7 IT support is provided for all of the RIPE NCC's critical services.

The IT infrastructure at the RIPE NCC currently includes four co-locations, in addition to one external "warm node" in Stockholm, Sweden to operate all RIPE NCC services. This warm node operates completely independent from the RIPE NCC infrastructure in the Netherlands. By the end of 2016, the number of co-locations will be reduced from four to two (larger) co-locations, as well as the set-up at the Amsterdam office, including laptop, wireless network and telephony. The RIPE NCC also maintains the technical operations of the Number Resource Organisation (NRO) and the Address Supporting Organisation (ASO).

IT also includes the technical set-up for the twice-yearly RIPE Meetings at locations throughout the service region, as well as support during RIPE NCC Regional Meetings.

In 2017, key areas will be maintaining a high availability network, server and virtual server environment and a focus on efficiency and simplicity to facilitate service improvements.

The RIPE NCC monitors its critical services 24/7. This monitoring includes RIPE NCC websites, the RIPE Database, K-Root, DNS and reverse DNS, the LIR Portal and Resource Certification (RPKI). A technical emergency hotline is in place to ensure issues relating to RIPE NCC's critical services can be dealt with appropriately.

4.1.1 Information Security

Status: Expanding

In 2017, the RIPE NCC will update its network security capabilities to keep up with the current threat landscape and increasing capacity of the network infrastructure.

The RIPE NCC aims to develop the capabilities of its corporate Computer Security Incident Response Team (CSIRT). The scope of the CSIRT will include proactive testing of the network and applications, to ensure a high level of security for all of the RIPE NCC's public and member services. There are also costs associated with lifecycle replacement for security software and the replacement of the network intrusion detection infrastructure. We have also added an FTE to the security team at the RIPE NCC to be better support the increasing amount of security activities we are involved with.

The RIPE NCC will continue outreach efforts with the security community like TF-CSIRT (of which the RIPE NCC is a member) and M3AAWG. Further engagement and involvement with the security community will help us to get a better understanding of how the RIPE NCC can help in this area.

Benefits for RIPE NCC members / RIPE community:

- Ensures the availability, confidentiality and integrity of the RIPE NCC's services and data
- Minimises the impact of security incidents on the RIPE NCC's services and subsequently minimises the possible impact on our members
- Co-ordination provision between parts of the security community and RIPE NCC members and the RIPE Community

4.2 Facilities – Rent and Utilities

Facilities – Rent and Utilities		Status: Decreasing
Description Facilities include all of the rent, utilities, security, repair and maintenance costs for the RIPE NCC's building and equipment.	**Measurable Usage** N/A	
Benefits • Creates a secure, healthy and productive environment for employees • Provides up-to-date and well-maintained working facilities	**FTEs:**	2.5
	Costs:	1,241
	CAPEX:	100

The RIPE NCC is continuously improving its facilities in order to provide a work environment that maximises the productivity of its employees. The RIPE NCC has reviewed its current location and has found a new office location in Amsterdam that will improve internal communication and employee productivity. The move to the new office is expected to conclude in 2016.

4.3 Management and HR

Management and HR	Status: Ongoing

Description	Measurable Usage
The Management and HR activity at the RIPE NCC encompasses the Senior Management functions, including the Managing Director and the Chief Scientist. The Senior Management Team works closely with the RIPE NCC Executive Board to develop the strategy and vision of the organisation. HR is responsible for the recruitment and effective integration of well-qualified employees from throughout the RIPE NCC's service region.	N/A

Benefits		
• Maximises the efficiency of the RIPE NCC's internal structure • Provides strategy and vision for the RIPE NCC • Maintains a well-trained workforce	FTEs:	8.6
	Costs:	2,372
	CAPEX:	-

The Senior Management Team guides staff and actively steers the RIPE NCC in order to provide excellent services and coordination activities for the RIPE NCC membership and the wider Internet community. The team is supported by the Management Assistants at the RIPE NCC.

The RIPE NCC continuously reviews its organisational structure to ensure it remains as efficient as possible. Management support is also provided to facilitate decision making through engagement with relevant third parties. A priority is placed on maintaining an effective, healthy, and skilled RIPE NCC staff.

In 2017, the RIPE NCC will work to achieve more administrative efficiency gains, partly through increased automation of internal processes.

4.4 Finance and Administration

Finance and Administration	Status: Expanding
Description	**Measurable Usage**
The RIPE NCC maintains high-quality administrative processes and is constantly looking to increase efficiency. The RIPE NCC's accounting, administration and reporting adheres to the General Dutch Accounting Standards and aims to provide a true and fair view of the RIPE NCC's financial situation, even though by law it is not required to do so. Furthermore, following from this enhanced reporting, the RIPE NCC continues to improve its control processes to have good cost control and to be able to provide useful management information.	N/A

Benefits		
• Increases efficiency in payment and administration for members and the RIPE NCC • Ensures a professionally managed organisation with efficient administrative processes and cost-effective processes • Meets the financial needs of organisations in different parts of the RIPE NCC service region • Meets the audit standards set by the Dutch fiscal system	**FTEs:**	6.9
	Costs:	851
	CAPEX:	-

In 2017, the RIPE NCC will continue to provide a transparent billing process by sending LIRs at the beginning of the year an annual Account Statement that provides an overview of the fees to be paid for 2017. Focus will also be given to simplifying internal processes wherever possible to increase efficiency.

Directed by the Executive Board, in 2017 the RIPE NCC will continue with the execution of the Treasury Statute to achieve a minimised-risk treasury management.

4.5 Legal

Legal	Status: Expanding

Description	**Measurable Usage**
The RIPE NCC's Legal activity encompasses its work to help legislators and law enforcement agencies understand the RIR system and how they can participate. The RIPE NCC also updates its internal activities according to new national and international legislation and maintains an extensive legal governance framework, which consists of a range of corporate governance documents that sets out the standards and procedures for our internal and external operations and ensures the RIPE NCC's accountability.	N/A

Benefits		
• Ensures that the RIPE NCC is run within an up-to-date legal framework and with a full set of corporate governance documents • Improves legislators and LEAs' understanding of the Internet governance model and the role of RIRs to gain their support for the current model • Ensures that legislators receive the technical community's perspective	**FTEs:**	0.7
	Costs:	190
	CAPEX:	-

In 2017, the RIPE NCC will continue to follow legislative developments and coordinate externally for the support of the self-governance model. Additionally, the RIPE NCC will keep enhancing its accountability by reviewing its governance model and the procedures in place. A goal for 2017 is to gain better understanding of regulation and legislation throughout the service region and engage more effectively on the national level to achieve that. Finally, the scarcity of IPv4 addresses increases the complexity of legal requests the RIPE NCC receives because there is an increasing number of mergers and transfers as well as an increasing number of disputes and abuse complaints.

4.6 Organisational Activities: Executive Board, Arbitration Panel and General Meetings

Organisational Activities: Executive Board, Arbitration Panel and General Meetings		Status: Expanding
Description The RIPE NCC supports twice-yearly RIPE NCC General Meetings (GMs). At these GMs, members vote annually on the RIPE NCC Financial Report and on the Charging Scheme for the following year. Members can also exercise their rights to vote in Executive Board elections and on resolutions, such as amendments to the RIPE NCC Articles of Association. The RIPE NCC also supports a neutral and objective arbitration panel that exists to resolve any disputes relating to its services and evaluate any resource requests made by the RIPE NCC for its own infrastructure or services.	**Measurable Usage** N/A	
Benefits • Allows RIPE NCC members' interests to be represented by the Executive Board • Gives members the opportunity to give feedback directly to the Executive Board on the RIPE NCC's Activity Plan and Budget • Allows members to approve the RIPE NCC Charging Scheme and Financial Report • Gives a level of transparency on the management and the strategies of the RIPE NCC that gives members and other interested parties sufficient information to give feedback on any of activity/decision/change	**FTEs:**	2.9
	Costs:	454
	CAPEX:	-

In order to help ensure an informed membership at the GM, the RIPE NCC prepares various sets of documentation including a draft Activity Plan and Budget, a Charging Scheme and an Annual Report, which includes the RIPE NCC Financial Report. The RIPE NCC provides remote participation facilities and electronic voting capabilities for those members who are unable to attend the GM in person but who wish to follow proceedings and vote in elections and on resolutions. Members attending the GM in person can also choose to vote electronically.

As set out in the Articles of Association, the arbiters on the RIPE NCC Arbitration Panel are appointed by the RIPE NCC's Executive Board and approved by the RIPE NCC membership.

The RIPE NCC also facilitates multiple meetings for its Executive Board in the course of each year. These meetings deal with strategic and financial issues pertinent to the organisation as well as the RIPE NCC's relationship with industry partners. At these meetings, the RIPE NCC Executive Board incorporates feedback from the membership and

the RIPE NCC Management into their discussion and final decision on the RIPE NCC's Activity Plan and Budget for the following year. The Executive Board also plays a crucial role in the RIPE NCC's outreach and member liaison activities. After every Executive Board meeting, the minutes of the meeting are published for the membership along with key outcomes.

The Executive Board and the RIPE NCC Management are actively looking to engage with the membership regarding its activities and strive for the utmost transparency with regards to the management, services and strategies of the RIPE NCC.

This activity is expanding due to greater legal and clerical support for the Arbitration Panel being required, extra costs resulting from increased GM attendance, and an increase in the Executive Board's workload in view of increased governance and enhanced accountability.

5) *Unforeseen Activities*

There may be activities that are entirely unforeseen at the time of writing the RIPE NCC Activity Plan and Budget 2017 or have started recently and are not at the stage where they can be estimated to have a material financial impact. A quick, well-focused reaction to the changing environment and new requirements of the RIPE NCC members and other stakeholders is always a goal of the RIPE NCC. In line with good corporate governance, any unforeseen activities that that arise are developed in close consultation with the RIPE NCC Executive Board, and when there is any material financial impact the Executive Board must approve the resulting action to be taken.

Appendix 1: Membership Services

- Distribution and Management of Internet Number Resources
- Assisted Registry Check (ARC)
- Resource Certification (RPKI)
- IPv4 Transfer Listing Service
- Resource Transfers
- Reputation Service
- LIR Portal
- IP Analyser and IPv6 Analyser
- Training Courses: LIR; IPv6; Routing Registry and Resource Certification (RPKI); RIPE Database
- Near Real Time Mirroring (NRTM)

Appendix 2: Summary of Activity Statuses (Excluding "Ongoing")

New Activity

- 3.10 Community Projects Fund

Expanding

  - o 1.1.3 Assisted Registry Check (ARC)
  - o 1.1.6 Internet Number Resource Investigations, and Dispute and Hijacking Handling
- 1.3 Resource Certification (RPKI)
- 1.4 LIR Portal
- 2.1 Training
  - o 2.1.1 Training Courses and Workshops
    - ▪ 2.1.2.1 RIPE NCC Academy
    - ▪ 2.1.2.2 Webinars
  - o 2.1.3 Hands-on Technical Workshops
- 2.3 RIPE Atlas and RIS
  - o 2.3.2 Routing Information Services (RIS)
  - o 2.4.1 Membership Lifecycle Management
- 2.4.4 LISP EID Registry
- 3.1 DNS and K-root Operations
  - o 3.1.1. Reverse DNS and Reverse DNS Support
  - o 3.1.4 K-root Operations
- 3.4 External Relations
- 3.5 Member Outreach
- 3.6 IPv6 Support
    - ▪ 3.6.1.2 IPv6 Roadshows in the ENOG region
  - o 3.6.2 Online IPv6 Resources, Measurements and Analysis
- 3.7 RIPE Meetings
- 4.1 IT and Information Security
  - o 4.1.1 Information Security
- 4.4 Finance and Administration
- 4.5 Legal
- 4.6 Organisational Activities

Decreasing

  - o 1.1.5 Establishing Contractual Relationships With Legacy Internet Number Resource Holders
- 1.4 LIR Portal
- 2.3.1 RIPE Atlas Anchors
- 4.2 Facilities – Rent and Utilities

Closed

- New Office Location

Appendix 3: Budget Figures 2017

RIPE NCC Budgeted Statement of Income & Expenditure 2017 in kEUR

Income	Budget 2017	LE 2016*	Budget 2016	Difference B17/16	B17/B16
Fees Existing Members	20,860	17,880	18,340	2,980	2,520
Independent Resource Fees	1,082	1,063	1,125	19	(43)
Service Fees New Member	2,149	2,224	1,719	(75)	430
Re-opening Fees	200	170	200	30	-
Members Fees	*24,291*	*21,337*	*21,384*	*2,954*	*2,907*
New Member Sign-up Fees	5,000	5,400	4,000	(400)	1,000
RIPE Meetings	275	259	275	16	-
Sponsorship Income	340	420	340	(80)	-
Other Income	50	20	50	30	-
Total Income	**29,956**	**27,436**	**26,049**	**2,520**	**3,907**

Expenditure					
Salary Wage Components	10,059	9,020	9,135	1,039	924
Secondary Benefits	2,485	2,523	2,164	(38)	321
Miscellaneous Personnel	2,251	1,945	2,006	306	245
Subtotal Personnel	*14,795*	*13,488*	*13,305*	*1,307*	*1,490*
Housing	922	1,037	1,206	(115)	(284)
Office Costs	2,152	2,174	2,174	(22)	(22)
External & Public Relations	725	710	788	15	(63)
Contributions	1,070	590	569	480	501
IT Infrastructure	1,673	1,508	1,422	165	251
Travel	1,336	1,552	1,230	(216)	106
Consultancy	2,212	1,735	1,421	477	791
Bank Charges	220	210	200	10	20
Bad Debts	200	170	200	30	-
Depreciation	1,141	533	1,500	608	(359)
Total Expenses	**26,446**	**23,707**	**24,015**	**2,739**	**2,431**

Financial Result	350	295	435	55	(85)

Surplus before Redistribution	3,860	4,024	2,469	(164)	1,391

Capital Expenditure	1,478	2,436	2,436	(1,108)	(1,108)

Number of FTEs	149	139	141	10	8

* LE 2016 based on the estimated figures per 30 September 2016.

* Note on the Budget 2017 figures:

All figures are drawn up in compliance with the general accounting standards in the Netherlands (Dutch GAAP).

Notes on Budgeted Income and Expenditure Table
Income
- The membership fee for 2017 is fixed at EUR 1,400, the same fee as in 2016
- Net membership growth is expected to be 2,000, consisting of 2,500 new members and 500 membership closures
- The number of independent resources charged for is estimated at 21,640
- Re-opening fees are the fees that are paid when a member is closed due to non-payment and then re-opens the LIR account. It is estimated that in 2017, 100 LIRs will reopen on closure of their LIR account.
- Sponsorship is reported as Income and it offsets the costs of RIPE Meetings, Regional Meetings and RIPE Atlas probes
- Other Income is comprised of miscellaneous income and exchange rate differences

Expenses
- Personnel costs are split into direct salary items, secondary benefits such as health and pension premiums, and miscellaneous personnel costs such as employer's taxes, education and recruitment
- Office costs are all regular office costs such as phone, postage and insurance but also include location hire and catering during meetings
- Contributions include support for industry partners such as ICANN, IETF and ISOC to support industry self-regulation but also to support technical development
- Travel costs include all travel costs for staff to RIPE Meetings and other meetings and includes all Executive Board member travel
- Consultancy includes legal and accounting consultants
- Financial Result includes all interest received from investments as well as revaluations of investments and exchange rate differences of these investments

Development of the RIPE NCC Reserves

The table below shows the RIPE NCC's capital development. The RIPE NCC Capital consists of the Clearing House and any addition to the Clearing House, either from capital gains or from an accumulation of the surplus. Each year the RIPE NCC General Meeting will decide whether excess contribution paid for a given year should be redistributed to members. In 2016 members approved the redistribution and, as a result, the income for 2016 is reduced by the total amount to be redistributed.

Development of RIPE NCC Reserves <u>with</u> a redistribution in 2017 (in kEUR)

Year	Surplus	Addition to the Capital	Capital at 31 December	Expenses Per Year	% of Expenses
2012	2,358	-	21,403	18,441	116%
2013	1,732	-	21,912	19,330	113%
2014	3,414	-	25,326	21,224	119%
2015	(262)	-	25,064	21,978	114%
LE 2016	(150)	-	24,914	23,707	105%
B 2017*	(100)	-	24,814	26,446	94%

Development of RIPE NCC Reserves <u>without</u> a redistribution in 2017 (in kEUR)

Year	Surplus	Addition to the Capital	Capital at 31 December	Expenses Per Year	% of Expenses
2012	2,358	-	21,403	18,441	116%
2013	1,732	-	21,912	19,330	113%
2014	3,414	-	25,326	21,224	119%
2015	(262)	-	25,064	21,978	114%
LE 2016	(150)	-	24,914	23,707	105%
B 2017*	3,860	2,905	27,819	26,446	105%

Appendix 4: Changes to the Draft Activity Plan and Budget 2017 (23 November 2016)

Amendments to the Activity Plan

- Minor editorial changes have been made to the text.
- The Resource Certification activity has been updated to include the purchase of new Hardware Signing Modules (HSM).
- The LISP EID Registry has changed to "expanding" and the text has been updated to reflect that this has now been implemented.
- Text has been added on RIPE Meeting Fellowships that will be available in 2017.
- "Community Projects Fund" has been renamed "Good of the Internet" and has been split into four component activities.

Amendments to the Budget Figure 2017

There is a total additional budget of 61 kEUR for the following Operational Expenditures:

- 20 kEUR for RIPE Meeting Fellowships.
- 55 kEUR budget for in-region travel to attend, host and facilitate meetings in the RIPE NCC service region.
- 55 kEUR for HR consultancy.
- Reduction of 69 kEUR as a result of decreases in personnel, housing, office costs, marketing and contributions.

There is additional budget for the following Capital Expenditures:

- 150 kEUR under Resource Certification for the purchase of new Hardware Signing Modules.