

RIPE NCC Activity Plan and Budget 2016

RIPE NCC

Document ID: ripe-662

Date: December 2016

Introduction to the Activity Plan and Budget 2016

The RIPE NCC Activity Plan and Budget 2016 documents the activities that the RIPE NCC proposes to undertake in 2016, 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 2016 compared to the previous year. More details and a definition of each of these categories are provided in this document.

Beginning this year, the RIPE NCC is also formalising its measurable usage figures. Previously, figures were given in September for the Draft Activity Plan and Budget, and these figures were updated at the end of the year when the document was finalised. To allow members to more easily track the development of the RIPE NCC’s activities year on year, one measurable usage figure for 30 June will be given each year. This will allow members to easily compare each year’s figures against the previous year’s figures.

The RIPE NCC publishes a draft version of this 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 2015, 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 since it carried out the RIPE NCC Survey in 2013. 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 was published online and announced to the RIPE NCC membership in October, six weeks before the RIPE NCC General Meeting. 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 Draft Activity Plan and Budget was further discussed by the membership at the GM in November 2015. The feedback received there was 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 throughout this document:

- “Ongoing”: Any recurring activity that requires around the same amount of resources as in the Activity Plan and Budget 2015 (OPEX) (with less than a 10% deviation on the Activity Plan and Budget 2015)
- “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 2015 (OPEX)
- “Decreasing”: Any activity where expenses will decrease by more than 10% from the Activity Plan and Budget 2015 (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.

Note: 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 2016

This document highlights the RIPE NCC's strategic focus points for the coming year. They are, broadly:

- Maintaining a strong registry
- Playing an active role in enhancing RIR accountability ahead of the IANA transition
- Safeguarding the continued stability of the RIR system
- Conducting effective outreach in all parts of the service region
- Providing enhanced statistics and analysis

In 2016, 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. Indeed, all 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 shows no sign of slowing down. It is expected that further resources will be required to accommodate corresponding growth in registry-related work. An increased workload is also expected due to growth in the number of IPv4 resource transfers and the implementation of 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 impact analysis that the RIPE NCC performs for policy proposals has already shown its value in facilitating informed policy discussions, and the RIPE NCC will look to further develop this in the coming year. We will also look at providing improved analysis of the current situation relating to matters such as IPv4 address transfers to better inform community decision-making and understanding.

2016 will be an important year for Internet governance as the stewardship of the IANA functions transitions away from the US National Telecommunications and Information Agency (NTIA). The RIPE NCC will continue to elicit the views of the RIPE community during the transition process. An important aspect to the process is ensuring that the RIRs are accountable and have transparent processes based on input from the community. To this end, the RIPE NCC will work with the other RIRs to ensure the RIR system remains stable and that the RIPE NCC in particular can help to ensure a smooth transition by proving itself as an example of good governance and accountability.

The RIPE NCC is also committed to carrying out effective outreach to its members in all areas of its service region. In 2015, the RIPE NCC organised events and traveled throughout the service region to meet with members and to 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 improvement that can help them with their operations. This work will be stepped up in 2016, particularly with the launch of

the RIPE NCC Survey 2016. The 2013 survey was instrumental in guiding RIPE NCC strategy over the past three years and we hope to get another comprehensive response from members in 2016.

The RIPE NCC will host a number of Regional Meetings in 2016, 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 governance events. We will look to strengthen our existing and well-established relationships in the industry, and will look to form new relationships where we see value for our community. The establishment of a regional office in Dubai and the addition of staff in Russia have greatly increased the RIPE NCC's ability to conduct this type of outreach throughout the service region. In 2015, the RIPE NCC also held Member Lunches in cities throughout Western Europe as well as in the MENOG and ENOG regions. These meetings have proved very popular as they allow us to gather feedback and assist members who would otherwise not be able to meet our staff in person. In 2016, we will ensure that the feedback we receive from all these areas of contact filters throughout the organisation and results in tangible improvements for our members.

Following the consolidation in 2014 of our technical services, such as Test Traffic Measurements and DNSMON into the RIPE Atlas anchor infrastructure, we will focus in 2016 on providing even more useful statistics and analysis that can help with our members' operations and help to inform policymakers in the community. To do this, we will continue to work on streamlining our statistics and analysis generation. Usability for a wide range of audiences will be a key point of focus in 2016, as will provision of unique and valuable reporting methods for all audiences. RIPE Atlas is now a full service that is gaining momentum all the time, with the network approaching 10,000 active probes and 150 RIPE Atlas anchors, and it will form the basis of the RIPE NCC's enhanced statistics and analysis service in 2016.

The focus in 2016 will continue to improve our processes and the services we currently offer while gaining input from the membership and community as we make those improvements. Overall, we will deliver a streamlined and efficient service for all our members and stakeholders. No new RIPE NCC-initiated services are planned for 2016, although we will expand the range of training courses and online training options available to members.

Overview of RIPE NCC Costs per Activity 2016

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. All items under EUR 500 are expensed, as is required by the Dutch tax code.

Overview of RIPE NCC Budgeted Costs for 2016

Level 1	Level 2	FTEs	OPEX kEUR	CAPEX kEUR
<u>1. Regional Internet Registry</u>		44.8	4,586	0
	* <u>1.1 Registry Maintenance</u>	33.5	3,096	0
	<u>1.2 RIPE Database</u>	7.6	908	0
	<u>1.3 Resource Certification (RPKI)</u>	1.1	157	0
	<u>1.4 LIR Portal</u>	2.6	425	0
<u>2. Services</u>		27.9	3,046	378
	<u>2.1 Training</u>	8.2	1,019	0
	<u>2.2 RIPEstat</u>	6.5	699	307
	<u>2.3 RIPE Atlas and RIS</u>	9.3	943	71
	<u>2.4 Other Services</u>	3.9	385	0
<u>3. Coordination Activities</u>		35.0	7,338	84
	<u>3.1 DNS and K-root Operations</u>	3.2	504	60
	* <u>3.2 Data Analysis and Scientific Support</u>	2.7	339	4
	<u>3.3 RIPE Labs</u>	1.7	266	0
	* <u>3.4 External Relations</u>	11.4	1,830	0
	* <u>3.5 Member Outreach</u>	4.2	1,286	0
	<u>3.6 IPv6 Support</u>	1.4	153	0
	<u>3.7 RIPE Meetings</u>	4.9	1,599	20
	<u>3.8 RIPE Policy and Community Support</u>	1.8	220	0
	* <u>3.9 ICANN/IANA/IETF/ISOC/RIRs</u>	3.7	1,141	0
<u>4. Internal</u>		33.3	7,345	1,974
	<u>4.1 IT and Information Security</u>	11.1	2,138	360
	<u>4.2 Facilities - Rent and Utilities</u>	4.1	1,730	1,596
	<u>4.3 Management and HR</u>	7.4	2,253	18
	<u>4.4 Finance and Administration</u>	7.6	756	0
	<u>4.5 Legal</u>	1.0	145	0
	<u>4.6 Organisational Activities: Executive Board, Arbitration Panel and General Meetings</u>	2.1	323	0
Total		141.0	22,315	2,436

* RIPE NCC strategic focus point for 2016

RIPE NCC Activities 2016

1) Regional Internet Registry

***** 1.1 Registry Maintenance *** STRATEGIC FOCUS POINT 2016**

Status: Ongoing

Measurable usage: The RIPE NCC is administratively authoritative for approximately 93,000 Internet number resource records

Since 1992, the RIPE NCC has been responsible for assigning and allocating Internet number resources (IPv4, IPv6 and AS Numbers) within its service region. One of the organisation's key responsibilities is to maintain the accuracy and quality of the RIPE Registry, which contains information about the current holders of these resources. This includes information that is contained in the RIPE Database as well as other registration information held by the RIPE NCC. Maintaining the RIPE Registry remains a strategic focus for 2016.

The exhaustion of the unallocated "free pool" of IPv4 address space means the RIPE NCC 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 will work to ensure that the RIPE Registry can accurately deal with an increase in 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 implementation of the inter-RIR transfer policy will mean that close ties will need to be maintained among the participating RIRs.

Benefits for RIPE NCC members / RIPE community:

- 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 will allow members to access unused address space from organisations in other RIR regions

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

Status: Ongoing

Measurable usage: Approximately 7,430 allocations and assignments from 1 July 2014 to 30 June 2015

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: Decreasing

Measurable usage: The RIPE NCC is administratively authoritative for approximately 93,000 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 2014 to June 2015, the RIPE NCC processed approximately 1,000 transfer requests, consisting of approximately 2,250 original blocks. From September 2015, the RIPE NCC also processes inter-RIR, IPv6 and AS Number transfers. The RIPE NCC therefore expects that the work involved with transfers will increase significantly in 2016.

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.

This activity is marked as decreasing due to a reclassification of some tasks, which are now considered part of the Assisted Registry Check (ARC) below.

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: 864 Assisted Registry Checks from beginning in September 2014 to 30 June 2015

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, remove inconsistent resource records and provide clarification on RIPE Policies. The aim is to strengthen registry data while providing support for 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 2016, we estimate that 3,000-4,000 assisted registry checks 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
- Increases the overall accuracy of the RIPE Database
- 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 49,000 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 a 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. Furthermore, there are 740 legacy AS Numbers. Up to 30 June 2015, approximately 25% of legacy address space in the RIPE NCC service region is registered either directly or via a sponsoring LIR.

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 hijackings
- 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: Decreasing

Measurable usage: The RIPE NCC has investigated 252 potential hijacks since 2012. From 1 July 2014 to 30 June 2015 the RIPE NCC handled 85 investigations. The RIPE NCC received and investigated 572 abuse reports from 1 July 2014 2014 to 30 June 2015.

Since September 2012, the RIPE NCC has seen a significant increase in the number of attempted IP address hijackings taking place in its service region. Due to the increasing scarcity of IPv4 address space, the RIPE NCC expects that the number of hijacking cases will continue to grow exponentially. Over the course of 2014 and 2015, there were 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 the legitimate holder.

The hijackers mostly targeted apparently unannounced (legacy) resources. Due to the fact that hijackers use 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, these investigations are time-consuming and labour intensive, involving several divisions within the RIPE NCC. Especially where it involves legacy space, the investigations are complex as the RIPE NCC has not issued the resources and has therefore no authoritative documentation of the original distribution and changes in holdership over time. Legacy resources are particularly susceptible to hijacking attempts.

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

While it is expected that the number of these cases will continue to increase, this activity is considered to be decreasing in terms of the resources allocated to it. This is due to the RIPE NCC becoming more efficient at investigating potential hijackings and related issues, using the experience gained from previous cases.

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

Registry Maintenance Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Registry Maintenance	33.5	3,096	-

1.2 RIPE Database

Status: Ongoing

Measurable usage: Approximately 18,000 RIPE Database queries per minute at 30 June 2015.

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.

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. 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 that we get from individual users – for example at RIPE Database trainings and in discussions at various meetings.

Benefits for RIPE NCC members / RIPE community

- Enables a range of users, including network engineers, system administrators, researchers and End 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

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. Requests sent there range from users that have lost access to a maintainer object to users who have 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 from feedback from training courses and direct customer contact.

In 2016, 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. New features of the core database services are suggested,

discussed and approved by the RIPE Database Working Group before they are implemented. In addition to this, the RIPE NCC is also actively engaged with the technical community through the IETF and various industry meetings. The RIPE NCC is in contact with end users of the Database through training courses and support requests.

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 relating to the ongoings related to the RIPE Database
- Ensures up-to-date and modern services
- Ensures that the RIPE NCC's priorities for the database match the RIPE community's
- Ensures that users receive training on how to use the RIPE Database
- Ensures that users are supported when they have issues with using the RIPE Database

1.2.2 New Feature Development

Status: Ongoing

Measurable achievements: Five releases from 1 July 2015 to 30 June 2015

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 2016 that are currently being discussed in working groups include: UTF8 support, abuse clean-up, IRR homing project, changing requirements for route object authorisation, showing deleted objects and transfer policies. 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. Based on user requests, training courses and user feedback, the RIPE NCC began a major effort in 2015 to make the RIPE Database easier to use. This benefits the users and the quality of the data in the RIPE Database. In addition, it creates efficiencies by reducing the support and training that the RIPE NCC needs to provide.

In 2015, there has been a focus on improving the integration of the RIPE NCC Access single sign-on (SSO) authentication in the web interface. We plan to further improve the management of authorised persons on maintainer objects in the remainder of this year. For 2016, 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 2016 will depend largely on developments in the working group, which may take precedence.

Benefits for RIPE NCC members / RIPE community:

- Provides support to RIPE Database users in their daily operations
- Simplifies use of the database
- Creates new ways to use the database and new interfaces
- Provides an overview of member resources in one location

RIPE Database Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
RIPE Database	7.6	908	-

1.3 Resource Certification (RPKI)

Status: Decreasing

Measurable usage: 2,932 resource certificates created by 30 June 2015

In 2011, the RIPE NCC launched a community-driven system that allows all resource holders to request a digital certificate listing the Internet number resources they hold. This Resource Certification (RPKI) system uses open standards that were developed in 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.

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 – formally known as attestations – with regards to the resources listed on the certificate.

These statements could be about anything related to the resources, but the practical application offered today is the ability to use the certificates to help secure Internet routing, particularly BGP origin validation.

By 2015, the RPKI system had been fully developed into a mature system and the RIPE NCC does not see the need for significant RPKI development next year, which accounts for the decrease in this activity. In 2016, the Resource Certification service will focus on stability, scalability and robustness. In addition, the goal is to integrate the functionality that the Internet Routing Registry (IRR) offers into the RPKI workflow.

Lastly, the RPKI Validator software package will be expanded to make sure other types of resource data can be included in the decision making process that operators need for their BGP workflow.

Benefits for RIPE NCC members / RIPE community

- Offers network operators a reliable system for performing BGP Origin Validation based on the RPKI data set
- An easy to use hosted interface to create statements with regards to BGP origination.
- 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

Resource Certification (RPKI) Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Resource Certification (RPKI)	1.1	157	-

1.4 LIR Portal

Status: Expanding

Measurable usage: ~140,000 (logged in) page views per month; 2,276 accounts with two-factor authorisation at 30 June 2015

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.

Feedback from RIPE Meetings and other direct member feedback has consistently indicated a desire to see further LIR Portal development. This was also clear from the RIPE NCC Consultations Report 2015. Based on this, RIPE NCC Management has decided to focus more resources on LIR Portal development as an activity in 2016.

In 2016, the focus of LIR Portal developments will be on helping LIRs with their address management by offering a single, integrated workflow for managing resources, fixing problems, updating the RIPE Database and setting up routing and

DNS configuration. There will be a further focus on unlocking resource data through an API, to allow for more integration with the IP address management workflows that operators have.

As the main member interface with the RIPE NCC, there will also be a focus in 2016 on developing the LIR Portal to ensure members are better able to manage their registration information. The development of the portal will also need to take into account resource transfers, inter-RIR transfers, and changes resulting from mergers and acquisitions. 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.

Next year, the RIPE NCC will also work to further improve contact management in the LIR Portal following the consolidation of user categories in 2015. This work will make it easier for members to interact with the RIPE NCC and allow users to more easily administer their accounts.

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.

Benefits for RIPE NCC members / RIPE community

- 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

LIR Portal Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
LIR Portal	2.6	425	-

2) Services

2.1 Training

Status: Ongoing

Measurable usage: From 1 July 2014 to June 2015, Training Services delivered the following: 104 training courses and workshops, 53 webinars, three training courses for law enforcement officials and other stakeholders, and seven tutorials/workshops alongside RIPE and RIPE NCC Regional Meetings

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. This also leads to a reduced workload for the RIPE NCC's internal departments.

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. In 2016, 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.

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.

2.1.1 Training Courses and Workshops

Status: Ongoing

Measurable usage: From 1 July 2014 to 30 June 2015, the following courses were given: LIR Course – 30; Basic IPv6 – 27; Advanced IPv6 – 6; RIPE Database – 20; Routing Security – 12; DNSSEC – 4; RIPE Atlas Tool – 1; BGP – 1; Training for Law Enforcement and Government – 3; Workshops/tutorials alongside RIPE NCC Regional Meetings - 7

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
- The Routing Security Training Course is a one-day introductory course for members, covering usage of the Internet Routing Registry (IRR), Routing Policy Specification Language (RPSL) and Resource Certification (RPKI)
- 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 the participants in securing their domain name servers and zones

In 2016, the RIPE NCC also plans to rewrite the Routing Security Training Course to include more BGP content and will expand this from a one-day course to two days.

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
- Increases awareness of the importance of a high-quality registry
- Builds awareness about IPv4 exhaustion and the need for IPv6 deployment
- Assists with the IPv6 deployment process
- Teaches members how to make Internet routing more secure and reliable using the Routing Registry and the Resource Certification (RPKI) system
- Increases awareness of the function, scope and importance of the RIPE Database
- Builds knowledge of upcoming technologies, best practices, protocols and RIPE Policies
- Increases awareness of the tools and services provided by the RIPE NCC
- Allows members to understand the basic concepts of DNS Security

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 2016, 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): 783 participants; Introduction to IPv6 Course (launched June 2015): 445 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 worked on the implementation of a virtual learning environment, the RIPE NCC Academy, which was launched at the end of 2014. The RIPE NCC Academy allows the RIPE NCC to offer more 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 2016, the RIPE NCC will continue to develop content for the RIPE NCC Academy and, based on membership feedback and the results of the consultation groups carried out earlier this year, the RIPE NCC will also launch two new courses: RIPE Atlas Tools and the LIR Training Course.

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 with each other
- Members can interact with RIPE NCC trainers without having to travel

2.1.2.2 Webinars

Status: Expanding

Measurable usage: 53 webinars were given from 1 July 2014 to 30 June 2015

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)

In 2016, the RIPE NCC will also have webinars on RIPE Atlas and tools such as RIPEstat, which have been frequently requested by members.

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: Ongoing

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.

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

Training Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Training	8.2	1,019	-

2.2 RIPEstat

Status: Ongoing

Measurable usage: 4 million queries per day at 30 June 2015

In 2014, the RIPE NCC focused on migrating backends from legacy and prototype systems to its consolidated data provisioning system, RIPEstat, which provides the data collected by many of the RIPE NCC's measurements systems, including RIPE Atlas and the Routing Information System (RIS). This migration greatly improved the consistency, stability and performance of RIPEstat and will radically bring down the maintenance and expansion costs of the system for the coming years.

With this migration completed, in 2015 the focus was on integrating different data sources within the RIPE NCC as well as data from third parties. RIPEstat will allow different target groups to access the information they need in the most useful format with the main focus on RIPE NCC members and small and medium-sized service providers, who form the majority of the membership and can get the most value from an open and public tool like RIPEstat.

The current datasets will be consolidated and new data sources will be added, both from the RIPE NCC and relevant external parties, with RIPE Atlas providing much of the data for RIPEstat. The main goal in 2016 will be to provide a tool and an interface that is useful for operators and will help them with their own 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 entry point for RIS data as well as improved visualisations of public RIPE Atlas data and data from other sources.

More resources and effort will be expended in 2016 to create an interface that focuses on comparisons and country-specific reports. The service itself is considered very stable due to the backend migration that has taken place and the consolidation of source data storage.

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.

Benefits for RIPE NCC members / RIPE community:

- 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

RIPEstat Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
RIPEstat	6.5	699	307

2.3 RIPE Atlas and RIS

Status: Decreasing

Measurable usage: Approximately 250 million measurement results per day and approximately 1 million measurements performed up to 30 June 2015; approximately 10,000 active probes forecast for 2016

At RIPE 61 in 2010, the RIPE NCC announced that it intended to start the RIPE Atlas measurement network and the RIPE NCC Executive Board later gave the project its approval. In the period since, the RIPE NCC has managed to build 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. In 2015, RIPE Atlas graduated to a production service at the RIPE NCC.

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.

The RIPE NCC has already introduced features such as RIPE Atlas status checks, which integrate the power of the RIPE Atlas global network into end users’ existing monitoring tools and infrastructure. This is an extremely valuable tool for service providers and the RIPE NCC will continue building tools and services aimed at providing direct value for our members and service providers in general. This will

help to improve the general stability and resiliency of the Internet by empowering service providers with unique tools to monitor global network behaviour and act proactively in case of issues.

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”.

In 2015, the RIPE NCC continued to expand the RIPE Atlas infrastructure to accommodate the growing number of probes. The RIPE NCC started to purchase probes using only external funding from 2014 and that trend will continue in 2016. 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 will continue working on features and extensions to make it easier for users, especially RIPE NCC members, to extract value from RIPE Atlas. Specifically, we will work to provide more automated features and streamlined interfaces to understand actual network behaviour, such as DNS zone checks, measurement visualisations and “single-click” measurements.

Development will also continue, with ongoing improvements and additional features such as Wi-Fi measurements and virtual machine probes being considered for development pending approval from the community. In addition, a selection of previously developed prototype tools (such as OpenIPMap) will be further developed and integrated with RIPE Atlas.

It is envisioned that overall development of RIPE Atlas will be less resource-intensive in 2016 due to the stability of the service. Funding through sponsorship from external parties is also expected to increase and there are plans to boost efforts to attract funding.

The RIPE NCC will maintain 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
- Reinforces the credibility and standing of the RIPE NCC by providing a neutral, transparent data collection infrastructure
- Provides datasets that can be used to analyse the operation and growth of the Internet

- Collects measurement data on the state of the Internet, using active data collection methods

2.3.1 RIPE Atlas Anchors

Status: Ongoing

Measurable usage: Approximately 125 RIPE Atlas Anchors deployed by 30 June 2015

RIPE Atlas anchors are essentially enhanced probes with far greater measurement capacity than regular RIPE Atlas probes. They have replaced the old Test Traffic Measurement (TTM) machines and 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), which receive additional benefits for their contribution. RIPE Atlas anchors are also used as vantage points for DNS Monitoring – the old DNSMON service was integrated into RIPE Atlas in 2014.

In 2015, the RIPE NCC continued to deploy RIPE Atlas anchors in various partnering networks in order to provide a wider distribution of measurement targets. 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 the network connectivity, such as where we host essential equipment like resiliency servers or global K-root nodes. This activity is expected to continue in 2016.

2.3.2 Routing Information Services (RIS)

Status: Ongoing

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

During 2015, the RIPE NCC worked with a range of stakeholders to unify, optimise and develop new interfaces for this data, while also performing life-cycle maintenance on the collector hardware. Data collectors and back-end systems have been replaced by a new hardware platform that is easier to deploy and maintain and which is capable of providing near real-time route updates to the RIPE NCC back-end infrastructure. The collected data is and will be accessible via RIPEstat as outlined in the sections above.

In 2016, in line with explicit requests from the RIPE community, the emphasis will be on further expansion of the RIS data collection infrastructure and improving the scalability of the back-end infrastructure. The RIS collector network will be expanded with a maximum of five nodes in areas not currently covered following feedback received in the Routing Working Group at the RIPE 71 Meeting.

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

RIPE Atlas and RIS Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
RIPE Atlas and RIS	9.3	943	71

2.4 Other Services

2.4.1 Membership Lifecycle Management

Status: Expanding

Measurable usage: 12,000 members; 2,398 membership applications, 2,032 accounts activated; 33,359 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 closure.

In 2016, the RIPE NCC expects to see a further substantial increase in the number of members (around 12%), leading to a greater number of applications and opportunities for support. Furthermore, 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. In 2016, the increases in both these 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 efficiency. 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:

- Potential members receive advice regarding membership
- 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 that provide value for money

- 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: Ongoing

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. Management and registration of the allocation of temporary experimental address space for LISP EID will be carried out by the RIPE NCC.

Other Services Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Other Services	3.9	385	-

3) Coordination Activities

3.1 DNS and K-root Operations

Status: Expanding

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. 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.

In 2014, the RIPE NCC finished expanding its primary and secondary DNS services by adding a third cluster node in Stockholm, in addition to those currently located in Amsterdam and London, to improve resilience and geographical coverage.

K-root and other DNS service nodes will continue to be well maintained and, as a consequence, lifecycle upgrades and replacements are planned for 2016.

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 2016.

This activity is expanding due to the cost of formalising hosting arrangements for K-root global nodes. This is explained further in the K-root Operations section (3.1.4) below.

Benefits for RIPE NCC members / RIPE community:

- 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

3.1.1. Reverse DNS and Reverse DNS Support

Status: Ongoing

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 and checks all zones under its responsibility to ensure that they are properly set up and functioning correctly.

As part of its DNSSEC deployment efforts, the RIPE NCC publishes signed 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.

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: 76 TLDs hosted as secondary

The RIPE NCC offers a free secondary name service to the other RIRs, along with 76 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.

In 2014, the RIPE NCC approached the RIPE community for input on documenting the requirements and policies for providing such services. The community has provided feedback and the guidelines have been published. In 2016, the RIPE NCC will follow those guidelines as the process for running this service.

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: 20 K-root instances at 30 June 2015; approximately 2 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 also been deploying anycast instances of the K-root server with local reachability.

In 2015, the RIPE NCC proposed a plan for expansion of K-root to the community and membership. The expansion gave interested parties an opportunity to host a K-

root node in their own network. By the end of 2015, the RIPE NCC added 15 additional so-called K-root hosted nodes to its operations as part of this expansion plan. At the same time, the majority of the so-called K-root local instances were migrated to the new K-root hosted node model. Currently, 7 local instances have been migrated to hosted nodes and there are still 5 local nodes active.

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 2016.

In 2016, it is expected that another 15 K-root hosted nodes will be added and the remaining local instances will be migrated to hosted nodes. The cost of the hosted nodes is borne by the host themselves rather than coming from membership funds.

The RIPE NCC collects and analyses data to evaluate the performance of the existing K-root anycast nodes and to determine if additional anycast nodes should be deployed. During 2014 and 2015, there has been a gradual increase in peak load, both on K-root and other DNS services. This is mostly due to the load caused by various forms of attacks on the DNS infrastructure. Because it is a strong goal of the RIPE NCC to be always able to service its DNS query load, a modest increase in the capacity of the existing K-root global nodes and the authoritative DNS service clusters is planned.

In 2014 and early 2015, the RIPE NCC designed a new architecture for the K-root platform, which greatly reduces deployment costs of new nodes. This resulted in the aforementioned expansion of K-root without incurring significantly higher operational costs. During 2015, the RIPE NCC revised all existing nodes, performed the necessary lifecycle replacements, and renewed and unified its hosting requirements and contracts with current hosts. The RIPE NCC is also working closely with other RIRs in order 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.

DNS and K-root Operations Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
DNS and K-root Operations	3.2	504	60

***** 3.2 Data Analysis and Scientific Support *** STRATEGIC FOCUS POINT 2016**

Status: Ongoing

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.

In 2016, 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.

Benefits for RIPE NCC members / RIPE community:

- 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

Data Analysis and Scientific Support Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Data Analysis and Scientific Support	2.7	339	4

3.3 RIPE Labs

Status: Ongoing

Measurable usage: 80 articles published in 2015; approximately 100,000 unique visitors

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.

The Statistics Dashboard has been one of the most popular pages on RIPE Labs, together with articles on topics related to IPv6 and security. In 2016, the RIPE NCC will continue to reach out to the wider community and to attract content from external sources such as researchers and operators and experts (e.g. security experts).

Benefits for RIPE NCC members / RIPE community:

- 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

RIPE Labs Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
RIPE Labs	1.7	266	-

***** 3.4 External Relations *** STRATEGIC FOCUS POINT 2016**

Status: Expanding

In recent years, the RIPE NCC has developed its capacity to engage strategically with governments, law enforcement agencies (LEAs) and inter-governmental organisations on behalf of its membership and community. With the completed expansion of the External Relations Department and staff in Amsterdam, Dubai and Moscow, we are now working to use those resources to the greatest benefit for all RIPE NCC stakeholders. The RIPE NCC is recognised as a leader and innovator in this area among its industry partners, and we will continue to maintain that position.

The RIPE NCC's liaison strategies in this area include:

- RIPE NCC Roundtable Meetings for Governments and Regulators in various regions
- Engagement with LEA representatives through our own dedicated events, direct capacity-building efforts with specific agencies and participation in events including the annual Global e-Crime Congress; the RIPE NCC will engage the services of a consultant with experience or working in the LEA arena to boost our efforts in dealing with LEA stakeholders
- Direct engagement with government agencies on issues relevant to the RIPE NCC, its membership and the RIPE community across our entire service region, as well as regional institutions such as the European Union and the Gulf Cooperation Council (GCC)
- Participation in international discussions of Internet-related public policy development in forums including the Internet Governance Forum (IGF), regional IGF events (EuroDIG and various national events), the International Telecommunication Union (ITU) and its regional coordination groups (the Conference of European Postal and Telecommunications Administrations Committee on ITU (CEPT Com-ITU), the Regional Commonwealth in the Field of Communications (RCC) and the Arab Group), the Organisation for Economic Cooperation and Development (OECD) and the United Nations World Summit on the Information Society (WSIS)
- Cooperative educational and capacity building initiatives with public sector organisations and industry partners. The IPv6 Roadshow initiative (see section 3.6.1) is one example of this

The transition of stewardship of the IANA functions will continue to feature prominently as an issue in 2016, with the current expectation that a global solution will be in place midway through the year. Effective communication of and around these events to all RIPE NCC stakeholders will be vital. Other priorities will be shaped somewhat by the outcome of the United Nations WSIS High Level Meeting in December 2015, which may see movement towards a further global summit on Internet governance. As leaders in the technical community's OECD engagement, we will also be working to provide useful input to the 2016 OECD Ministerial Meeting, which will be one of the year's most high-profile Internet governance events.

In 2016, the RIPE NCC will continue to focus on establishing the necessary links between our public sector engagement and informing our Executive Board, core community and membership. The External Relations Department will spearhead efforts to create and evolve strategies to achieve this, both via face-to-face engagement (Member Meetings, Member Lunches) and using email, social media and RIPE Labs.

In 2016, the RIPE NCC will increase its support for the RIPE Academic Cooperation Initiative (RACI), which aims to strengthen links between the RIPE community and the academic community. The program has proven to be popular and useful for both the RIPE community and for the Internet researchers themselves. In 2016, RACI will be established in the ENOG, MENOG and SEE communities. There will also be expansion of RACI to include hackathons to encourage use of RIPE NCC data for research as well as awards for excellent research using tools such as RIPE Atlas. The development of RACI should contribute to the long-term development of RIPE and ensure the exposure of interesting and useful research to the community.

Benefits for RIPE NCC members / RIPE community:

- Ensures 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
- Contributes to the global legitimacy of bottom-up, community-driven policy-making processes, as practiced by the RIPE community
- Promotes openness and transparency in the development of public policy relating to the Internet as well as raising any specific concerns of the RIPE NCC membership or the RIPE community
- Ensures the RIPE NCC can inform its membership and community of relevant public policy issues or discussion

External Relations Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
External Relations	11.4	1,830	-

*** 3.5 Member Outreach *** STRATEGIC FOCUS POINT 2016

Status: Ongoing

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 Operators Groups 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)
- The Free and Open Source Software (FOSS)

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. In 2015, RIPE NCC Regional Meetings took place in Belgrade, Dubai, Kazan, Yerevan, Tehran and Odessa. In Western Europe, Member Lunches were organised in Madrid, Barcelona, Paris and Lisbon. 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.

2016 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)

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 throughout the service region
- RIPE NCC Regional Meetings, including sessions attached to MENOG and ENOG, the South East European Regional Meeting (which will hold its fifth meeting in 2016), 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, and in line with the feedback received in the RIPE NCC Survey 2013 and consultations held in early 2015, 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 provide more opportunities for Amsterdam-based staff to engage with members and stakeholders across the service region.

The RIPE NCC will also carry out the RIPE NCC Survey 2016 from May to June. The 2013 survey received 3,600 responses, and this work was crucial to developing the strategic planning and service improvements that the RIPE NCC has made in the

previous three years. The 2016 survey will be developed with input from RIPE NCC members and community stakeholders, and it will be 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 Autumn, 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.

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.

Benefits for RIPE NCC members / RIPE community:

- Embraces external groups and stakeholders as part of the open RIPE community, strengthening the authority and legitimacy of the RIPE bottom-up policy development process
- Ensures that all RIPE NCC stakeholders feel engaged and represented in the operation and guidance 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

Member Outreach Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Member Outreach	4.2	1,286	-

3.6 IPv6 Support

Status: Ongoing

The RIPE NCC will continue to focus a great deal of its outreach efforts on IPv6 awareness-raising efforts across the full range of RIPE NCC stakeholder groups. 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.

Benefits for RIPE NCC members / RIPE community:

- 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
- Highlights the work being done by the RIPE NCC and RIPE community in data-gathering and analysis
- Promotes capacity building, particularly in developing areas, and facilitates knowledge sharing with global experts
- Highlights the advantages of the community-driven, bottom-up system for managing and distributing Internet number resources

3.6.1 Training and Education

i) 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 2016, there will be around six 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

ii) IPv6 Roadshows in the ENOG region

Status: Ongoing

Building on the success of the RIPE NCC/MENOG IPv6 Roadshows and learning from the experience of their launch, these events will be further rolled out in 2016. Recognising the needs of operators in this region, the IPv6 Roadshow events will be delivered by Russian-speaking trainers. To enable this, the RIPE NCC is working together with regional communities such as ENOG to recruit potential trainers to participate in a Train-the-Trainer Program facilitated by the RIPE NCC. In 2016, these activities will continue and the RIPE NCC will be working on extending the

pool of trainers and continue the efforts in providing them with updated training materials as well as additional resources that can help to increase the understanding or awareness of IPv6 deployment.

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: Ongoing

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.

Benefits for RIPE NCC members / RIPE community

- Provides comprehensive, impartial information to assist in deploying IPv6
- Provides analysis on the rate of IPv6 deployment
- Establishes the RIPE NCC and the RIPE community as authoritative sources of data and analysis
- 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)

IPv6 Support Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
IPv6 Support	1.4	153	-

3.7 RIPE Meetings

Status: Expanding

Measurable usage: 650+ attendees per meeting; 1,000+ remote participants

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.

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, RIPE NCC 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 2016 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 2016, this activity is seen as expanding due to increased attendance, a steady rise in membership (resulting in more free tickets to new LIRs), and hosting of the meetings in two relatively expensive locations. Improvements will also be made to the set-up for the IPv6 network and enhancements will be made to the presentation infrastructure.

However, the costs of RIPE Meetings are offset by sponsorship received from third parties.

Benefits for RIPE NCC members / RIPE community:

- 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

RIPE Meetings Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
RIPE Meetings	4.9	1,599	20

3.8 RIPE Policy and Community Support

Status: Ongoing

Measurable usage: Eleven policy proposals entered the Policy Development Process (PDP) from 1 July 2014 to 30 June 2015. In the same period, 12 proposals completed the PDP.

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. 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 an increased interest in the RIR system. The RIPE NCC plays an active role in promoting the bottom-up policy development process:

- The engagement of the community members to participate in policy discussion
- The engagement of all the stakeholders in the Internet community that look at RIPE as a model of effective policy-making
- The education and awareness building of the community members over the PDP and the multiple channels of communications available to participate in the self-regulation system – the process and procedures for the above engagement and awareness building
- Representation of RIPE NCC roles 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.

In 2014, the RIPE NCC started expanding its focus on increasing the level of participation in the PDP by facilitating accessibility, communication and information dissemination within the RIPE community. The initial strategic steps involved the

adoption of new media, such as a Policy Development Office Twitter account, and sending monthly policy updates about ongoing proposals to the ENOG and MENOOG communities in Russian and Arabic. This multilingual service was highly appreciated by the local communities.

In 2015, the RIPE NCC started to roll out, and will continue to develop in 2016, a pilot communication platform that will allow for better integration between different communication methods, such as forums and the existing mailing lists (which will remain the leading communication method), allowing for easier reading, searching and sharing. The focus will be on expanding participation in the RIPE PDP and reaching out to new audiences. The RIPE NCC will also investigate means of encouraging further engagement with the PDP via social media.

Benefits for RIPE NCC Members / RIPE Community:

- Promotes the RIPE Policy Development Process (PDP)
- Strengthens the RIPE community and encourages involvement
- Educates the RIPE community about the PDP and promotes its use
- 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
- Facilitates the exchange of information among the RIPE community and the RIPE NCC membership
- Encourages participation of individuals who have little or no experience of the RIPE community

RIPE Policy and Community Support Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
RIPE Policy and Community Support	1.8	220	-

***** 3.9 ICANN/IANA/IETF/ISOC/RIRs *** STRATEGIC FOCUS POINT 2016**

Status: Expanding

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). The IANA stewardship transition, which we hope to see concluded successfully in 2016, has highlighted the importance of these relationships, and the need for effective coordination and information sharing on the policy and communications side (as well as in technical areas).

The RIPE NCC supports ICANN, particularly in relation to the role in it has played as operator of the IANA functions and now as convener of the multi-stakeholder process to develop a transition plan. The RIPE NCC works with the IETF and the Internet Society to ensure implementation of agreed technical standards and coordination among those who support the global operation of the Internet.

The RIPE NCC plans to build on the organisation's leadership among technical community organisations through new and expanded cooperative engagement efforts, building on activities like the RIPE NCC Roundtable Meetings, cooperative efforts to engage local and regional communities, and coordination efforts between the so-called “I-star” organisations.

This activity is expanding due to the additional efforts around the IANA transition and improving ICANN accountability. A weaker Euro relative to the US Dollar has also driven up costs, as many expenses associated with this work are in US Dollars.

Benefits for RIPE NCC members / RIPE community:

- Promotes the open, bottom-up, industry self-regulatory structure common to the RIR communities and other Internet technical coordination bodies
- Ensures recognition of the Internet numbers community as a mature, inclusive policy-making community with autonomy over issues relating to the management of Internet number resources
- 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

ICANN/IANA/IETF/ISOC/RIRs Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
ICANN/IANA/IETF/ISOC/RIRs	3.7	1,141	-

4) Internal

4.1 IT and Information Security

Status: Ongoing

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. This activity includes the operation of the internal network and system administration and engineering support for all related infrastructure (such as co-location facilities, archiving and storage and email delivery), front-line 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 the RIPE NCC's critical services.

The IT infrastructure at the RIPE NCC includes three co-locations as well as the set-up at the Amsterdam office, including data storage, desktop and laptop infrastructure, telephony and building access systems. 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.

A key aspect for the IT service is the capacity planning with the continuous growth of data the RIPE NCC holds. The RIPE NCC has three co-location facilities and has one external "warm node" in Stockholm, Sweden to operate all RIPE NCC services. In 2015, the external "warm node" was expanded to be able to operate completely independent from the RIPE NCC infrastructure in the Netherlands.

In 2016, key areas will be automation improvements to the RIPE NCC's network infrastructure, a high availability virtual server environment and a focus on efficiency 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.

Benefits for RIPE NCC members / RIPE community

- Supports the efficient deployment and enhancement of services
- 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
- Ensures the details of technical emergencies are forwarded to the RIPE NCC's 24/7 teams in a timely manner

4.1.1 Information Security

Status: Expanding

In 2016, 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 antivirus software and the purchase of a new anti-DDos product. These efforts, along with extensive (external) audits of key RIPE NCC services, account for the expansion of this activity in 2016.

The RIPE NCC will continue outreach efforts with the security community like TF-CSIRT (of which the RIPE NCC is now 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

IT and Information Security Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
IT and Information Security	11.1	2,138	360

4.2 Facilities – Rent and Utilities

Status: Ongoing

Facilities include all of the rent, utilities, security, repair and maintenance costs for the RIPE NCC’s building and equipment.

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 that will improve internal communication and employee productivity. In 2016, the RIPE NCC will conclude this project and will start relocating to the new office space.

Benefits for RIPE NCC members / RIPE community:

- Creates a secure, healthy environment for employees
- Provides up-to-date and well-maintained working facilities

Facilities - Rent and Utilities Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Facilities - Rent and Utilities*	4.1	1,730	1.596

*** Note: The figures for Facilities – Rent and Utilities include the costs for 4.2.1 Office Relocation, which are also provided separately below for transparency**

4.2.1 Office Relocation

Status: New activity

The RIPE NCC will move to a new office location in Amsterdam by mid-2016, due to increasing costs of the current location and also due to the inefficiencies and logistical problems that the existing building offers.

This project will require initial investments to fit out the new office space. However, after this initial year, the annual rental costs will go down. This will result in considerable savings over the long term. The RIPE NCC will follow extensive and diligent processes in tendering the contracts related to the new office space.

Benefits for RIPE NCC members / RIPE Community:

- Create an efficient work environment
- Encourage interaction and cooperation between different departments
- Improve flexibility to accommodate changes in function or occupancy
- Provide a comfortable, state-of-the-art and inspiring work environment that fosters health and productivity
- Lower recurring rental costs and maintenance fees

New Office Space Costs for 2016:

Activity	FTEs	Costs*	Capital Expenditure
New Office Space	2.6	732	1,596

** The costs are excluding depreciation costs.*

4.3 Management and HR

Status: Ongoing

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. The team also 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 Senior Management Team is supported by the Management Assistants at the RIPE NCC.

HR is responsible for the recruitment of well-qualified employees from throughout the RIPE NCC’s service region and ensuring their effective integration into the RIPE NCC staff. HR is also responsible for staff training, salary administration and workplace health and safety.

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 2016, the RIPE NCC’s HR activities will focus on automating its staff review process and dealing with legislative changes that will impact secondary benefits such as pensions. The RIPE NCC is also reviewing its Business Continuity Plan and improving its procedures for a more efficient recovery in the event of a disaster that affects its ability to operate – which requires regular scenario testing.

Benefits for RIPE NCC members / RIPE community:

- Ensures the continuation of critical RIPE NCC services in the event of a disaster
- Maximises the efficiency of the RIPE NCC’s internal structure
- Provides strategy and vision for the RIPE NCC
- Maintains a well-trained workforce

Management and HR Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Management and HR	7.4	2,253	18

4.4 Finance and Administration

Status: Ongoing

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.

Directed by the Executive Board, the RIPE NCC will execute an efficient treasury management in 2016 based on risk minimisation. Following from the updated tax ruling and new Clearing House procedure, in 2016 the RIPE NCC will implement this new tax regime and new procedure for the first time.

Internally, the RIPE NCC will continue to enhance its financial and performance indicator reporting tools and improve the management of documents and administrative processes.

Benefits for RIPE NCC members / RIPE community

- 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

Finance and Administration Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Finance and Administration	7.6	756	-

4.5 Legal

Status: Ongoing

The RIPE NCC follows national and international legal developments and updates its internal activities accordingly. One of the key external developments that will continue to require extensive legal review and input is the IANA stewardship transition in coordination with the other RIRs and participants of the RIR community. The RIPE NCC also 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 RIPE NCC's accountability.

The RIPE NCC focuses efforts on helping legislators and Law Enforcement Agencies (LEAs) to understand how the self-governing mechanism of the RIPE community and the RIR system functions, and how they can participate. The RIPE NCC also provides legislators with technical knowledge to support the development of appropriate public policy.

2016 will see an increased need for legal support on RIPE policies and on RIPE policy proposals. In addition to this, the scarcity of IPv4 addresses increases the complexity of requests the RIPE NCC receives because there is an increasing number of mergers and transfers but also an increasing number of disputes and abuse complaints. The RIPE NCC will continue to support and enhance its governance model and the appeals procedures in place.

Benefits for RIPE NCC members / RIPE community:

- 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

Legal Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Legal	1.0	145	-

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

Status: Ongoing

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. At GMs, 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. 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 RIPE NCC 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. The arbiters 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.

The Executive Board proposal to increase the maximum number of board members was approved by the RIPE NCC membership at the General Meeting in Autumn 2013. The number of board members increased to six in 2014 and to seven in 2015.

Benefits for RIPE NCC members / RIPE community:

- Allows RIPE NCC members' interests to be represented by 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
- Members can elect representatives to the Executive Board
- Provides opportunities to follow GM proceedings and cast votes from anywhere in the world
- 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

Organisational Activities: Executive Board, Arbitration Panel and General Meetings) Costs for 2016:

Activity	FTEs	Costs	Capital Expenditure
Organisational Activities: Executive Board, Arbitration Panel and General Meetings	2.1	323	

5) Unforeseen Activities

There may be activities that are entirely unforeseen at the time of writing the RIPE NCC Activity Plan and Budget 2016 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

- 4.2.1 Office Relocation

Expanding

- 1.1.3 Assisted Registry Check (ARC)
- 1.4 LIR Portal
- 2.1.2.1 RIPE NCC Academy
- 2.1.2.2 Webinars
- 2.4.1 Membership Lifecycle Management
- 3.1 DNS and K-root Operations
- 3.1.4 K-root Operations
- 3.4 External Relations
- 3.7 RIPE Meetings
- 3.9 ICANN/IANA/IETF/ISOC/RIRs
- 4.1.1 Information Security

Decreasing

- 1.1.2 Management of Internet Number Resources
- 1.1.5 Establishing Contractual Relationships With Legacy Internet Number Resource Holders
- 1.1.6 Internet Number Resource Investigations, and Dispute and Hijacking Handling
- 1.3 Resource Certification (RPKI)
- 2.3 RIPE Atlas and RIS

Appendix 3: Budget Figures 2016

RIPE NCC Budgeted Statement of Income & Expenditure 2016

In kEUR	Budget 2016				Difference		
	Exc. Reloc	Relocation	Total 2016	LE 2015*	Budget 2015	16/15	16/B15
Income							
Fees Existing members	18,340		18,340	17,650	17,840	690	500
Independent Resource Fees	1,125		1,125	1,020	1,050	105	75
Service Fees New Member	1,719		1,719	2,300	1,229	(581)	490
Re-opening Fees	200		200	240	200	(40)	-
<i>Members Fees</i>	<i>21,384</i>		<i>21,384</i>	<i>21,210</i>	<i>20,319</i>	<i>174</i>	<i>1,065</i>
New Member Sign-up Fees	4,000		4,000	4,350	2,500	(350)	1,500
RIPE Meetings	275		275	260	300	15	(25)
Sponsorship Income	340		340	250	100	90	240
Other Income	50		50	40	50	10	-
Total Income	26,049		26,049	26,110	23,269	(61)	2,780
Expenditure							
Salary Wage Components	8,998	137	9,135	8,650	8,723	485	412
Secondary Benefits	2,132	32	2,164	2,200	1,914	(36)	250
Miscellaneous Personnel	1,976	30	2,006	1,900	2,196	106	(190)
<i>Subtotal Personnel</i>	<i>13,106</i>	<i>199</i>	<i>13,305</i>	<i>12,750</i>	<i>12,833</i>	<i>555</i>	<i>472</i>
Housing	860	346	1,206	810	888	396	318
Office Costs	2,044	130	2,174	1,800	1,872	374	302
External & Public Relations	788		788	700	817	88	(29)
Contributions	569		569	550	447	19	122
IT Infrastructure	1,415	7	1,422	1,300	1,229	122	193
Travel	1,230		1,230	1,250	1,210	(20)	20
Consultancy	1,371	50	1,421	1,400	1,443	21	(22)
Bank Charges	200		200	200	168	-	32
Bad Debts	200		200	200	200	-	-
Depreciation	1,133	367	1,500	1,050	1,000	450	500
Total Expenses	22,916	1,099	24,015	22,010	22,107	2,005	1,908
Financial Result			435	100	350	335	85
Surplus / Deficit			2,469	4,200	1,512	(1,731)	957
Capital Expenditure	840	1,596	2,436	1,325	1,900	1,111	536
Number of FTEs			141	133	136	8	5

* LE 2015 based on the estimated figures per 30 September 2015.

*** Note on the Budget 2015 figures:**

For comparison purposes, a reclassification of the Budget figures for 2015 was made following compliance with the general accounting standards in the Netherlands (Dutch GAAP).

Notes on Budgeted Income and Expenditure Table

Income

- The membership fee for 2016 is fixed at EUR 1,400, a 13% decrease on the 2015 fee
- Net membership growth is expected to be 1,500, consisting of 2,000 new members and 500 membership closures
- The number of independent resources charged for is estimated at 22,500
- 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 2016, 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 and ISOC to support industry self-regulation but also to support technical development such as DNSSEC
- 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. At the RIPE NCC General Meeting in November 2015, the General Meeting approved the resolution to have the excess contribution paid for 2015 to be redistributed to members. As a result, the surplus for 2015 is not added to the Clearing House. Only the capital gains from the Clearing House reserve are added to the Capital.

Year	Surplus	Addition to the Capital	Capital at 31 December	Expenses Per Year	% of Expenses
2011	923	-	19,046	18,162	105%
2012	2,358	-	21,403	18,441	116%
2013	1,732	-	21,912	19,330	113%
2014	3,414	-	25,326	21,224	119%
LE 2015	4,200	312	25,638	22,010	116%
B 2016*	2,469	1,994	27,582	24,015	115%

*Note: In the Budget 2016, the surplus is added to the Capital for comparison purposes. If in 2016 the surplus is redistributed to the membership, the % Capital of Expenses is estimated to be 108%.

Appendix 4: Changes to the Draft Activity Plan and Budget 2016 (21 October 2015)

Amendments to the Activity Plan

- Minor editorial changes have been made to the text.
- The draft version referred to “regional offices in Moscow and Dubai”, which does not accurately describe the RIPE NCC presence in these locations. The office in Dubai is a registered regional office of the RIPE NCC, while the office space in Moscow will be simply a formal workspace for the two Russia-based employees.
- There is additional text on the RIS expansion following a request from the RIPE community.
- There is additional text on improvements to the RIPE Meeting IPv6 and presentation infrastructure set-up.

Amendments to the Budget Figure 2016

- There is additional budget for the following Capital Expenditures:
 - 10 kEUR for RIS: expansion of route collectors
 - 20 kEUR for RIPE Meetings: set-up improvements for IPv6 network and enhancements of presentation infrastructure.
 - Relocation Project: 100 kEUR for cabling set-up and installation of fibres and 100 kEUR for audio/visual and security infrastructure.
- The depreciation costs increase and the “Development of the RIPE NCC Reserves” section in Appendix 3 are updated to take into account changes to the Budget 2016.