The RIPE Database Requirements Task Force: Draft Document

Date: 23 October 2020

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1. What is the RIPE Database?

Since August 1992, the RIPE Database has served as the authoritative registry of Internet number resources and related information within the RIPE NCC service region (Europe, Middle East, parts of Central Asia). The RIPE Database was built to facilitate coordination between network operators across this region. It also provides information about Internet number resources distributed prior to the current Regional Internet Registry (RIR) system.[1]

RIPE Database information was originally provided on a voluntary basis. This changed when the RIPE NCC began allocating IP addresses and established data collection processes as part of its role as an RIR.

There were several iterations of the RIPE Database as its structure and functionality evolved. New features and objects were added over the years, making the database information richer and more complex. Some data was also migrated out of the RIPE Database in the past, such as information about ccTLD domain names.

In 1995, the Internet Routing Registry (IRR) was created. This is a subset of the RIPE Database that provides routing information. Its purpose is to ensure the stability and consistency of the Internet-wide routing system by sharing information between network operators.

More recently, the RPKI Database was created to offer verifiable proof of holdership of resource registrations by an RIR.

2. The difference between the RIPE Database and the RIPE Registry

The RIPE community has tasked the RIPE NCC to maintain a repository of all allocated Internet number resources in its service region. This information is stored in the RIPE Registry and the RIPE Database.

The RIPE Registry is maintained by the RIPE NCC and contains all data, private and public, about resources and resource holders in its service region. The RIPE Database provides a public view of some RIPE Registry data and also contains data that is separate from the registry (such as abuse contact information). The information disclosed in the RIPE Database aims to facilitate cooperation and coordination between network operators and other stakeholders for a variety of operational tasks, including troubleshooting and preventing outages.

The RIPE Database is maintained by both the RIPE NCC and resource holders. Usage of the database is covered by the RIPE Database Terms and Conditions.

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[1] For more information see "Legacy Internet Resources": https://www.ripe.net/manage-ips-and-asns/legacy-resources

The RIPE NCC is responsible for allocating resources to its members as well as avoiding discrepancies between the RIPE Registry and the RIPE Database.

Resource holders are responsible for updating information regarding their resource usage in the RIPE Database.

3. Why are we reviewing the RIPE Database functionality now?

The RIPE Database provides essential information to members of the RIPE community, which helps them to keep networks and the Internet running in their region. Many stakeholders depend on the accuracy and availability of the data stored in the database to do their job properly, especially regarding cyber security. Some database users, such as ISPs or IXPs, have been part of the RIPE community for years, while others are relatively new, such as Law Enforcement Agencies (LEAs) or regulators. These user groups have different needs and expectations regarding the database which is creating friction within the community. Changing privacy requirements and the question of whether personal data is needed in the RIPE Database are also ongoing discussions inside the RIPE community. Although there was consensus on this topic in the past, this is less obvious today.

While the RIPE Database Working Group and the RIPE NCC are able to solve a lot of the operational issues, a high-level approach was needed to establish a general consensus about the functionality of the RIPE Database. The RIPE Database Requirements Task Force (DBTF) was formed to tackle this challenge and provides here a list of high-level requirements and recommendations that attempt to resolve ongoing and possible future issues regarding the functionality of the RIPE Database and the data it contains.

The task force did its best to anticipate the community's needs by taking a holistic approach for each requirement and steering away from technicalities. Similarly, the implementation of these requirements and recommendations are not addressed in this document. This could be carried out by another task force or the relevant working groups.

4. Requirements

Authoritative and accurate registry of Internet number resources

The need to maintain an accurate public record of Internet number resources holders is common to all Regional Internet Registries (RIRs). This is outlined in RFC 7020:
"A core requirement of the Internet Numbers Registry System is to maintain a registry of allocations to ensure uniqueness and to provide accurate registration information of those allocations in order to meet a variety of operational requirements."

The results of the user survey conducted by this task force in January 2020 confirm that having access to trustworthy and accurate information is one of the most valued aspects of the RIPE Database for users.

The task force analysed three policy documents relating to the registration of Internet number resources (IPv4, IPv6, AS Numbers) to understand the level of information required to register resources in the RIPE Database.

The main takeaways from this analysis:
- All three RIPE policy documents require assignments and allocations to be registered in the RIPE Database.
- The indicated reasons for the registration requirement are ensuring uniqueness of IP addresses and supporting network operations.
- Only the IPv4 policy provides guidance on the level of registration information required.
- Privacy consideration aspects are included in the IPv4 and IPv6 policies. The IPv4 policy provides more details on how End User resources should be registered in the RIPE Database.
- The AS Numbers policy doesn't mention how detailed AS Number registrations should be.

The task force believes that to ensure uniqueness and to provide accurate registration as defined in RFC 7020, the following information should be available in the RIPE Database:

- Full legal name of resource holder
- Full legal address of resource holders who are legal persons
- Contact information for administrative and technical matters

Legal address
The task force recommends that the legal address of resource holders who are legal persons be published in the RIPE Database. This will clarify which organisation holds which Internet number resources and ensure quick action from incident responders such as CSIRTs and LEAs in case of abuse. Please note that the legal address of resource holders is already available in the RIPE Registry. However, the task force is aware that there are legal and technical constraints attached to this recommendation. The main challenge is to find a system that can clearly separate natural and legal persons across our service region, so that the privacy of natural persons in the RIPE Database is respected. The task force asks the RIPE NCC to research these constraints to help the community move forward with this recommendation.

[Text still being developed]

Resource registration requirements
Most registration requirements are based on IPv4 allocations, where documenting the assignment/sub-allocation of the address space helped to justify the next portion of address space that would be requested. As the RIPE NCC ran out of IPv4 addresses in 2019, it would be beneficial to see whether these requirements are still appropriate (and if they will remain so when IPv6 becomes the norm). The task force therefore recommends that the community review the current resources registration requirements and make adjustments to the policies if needed.

Information consistency

The task force identified inconsistencies between the way resources are registered in the RIPE Database. For example, some users provide more information than needed (such as making assignments for individual IP addresses), while others don't make assignments at all. The task force recommends that resources registration requirements be applied consistently to all Internet number resources, regardless of their type or status.

To ensure that the information published in the RIPE Database is correctly updated by resource holders, we recommend that the RIPE NCC continue to use ARCs (Assisted Registry Checks) to verify this data.

A note on transfers

Most IP address transfers (excluding legacy) fall under RIPE policies and follow the same rules as allocations and assignments in terms of how the data is registered in the RIPE Database. Registration accuracy is particularly important in this case, as the RIPE Database has authority over who holds which Internet number resources.

Other operational functions

The RIPE Database is also used for other operational functions that are not directly related to its core purposes.

One of the main secondary usages of the RIPE Database include:
- IPAM for Internet number resources holders

[Text still being developed]

Historical data and personal data

Since 2013, the RIPE Database has stored historical data, as requested by the RIPE community.

This includes:
- Every time an object is updated, the previous version is saved. A standard query will return the most recent version. Old versions are available by using the history query flags.
- If an object is deleted and re-created, a query will return only the most recent version. Deleted objects are not returned in historical query results.
- Objects that are supposed to contain personal data are excluded from historical queries.

Measures are in place to minimise the exposure of personal data, and objects that are meant to contain personal data are filtered out from queries. However, personal data might still be returned in other attributes. The task force recommends that the community look into ways to mitigate this issue and avoid exposing personal data.

This also poses a bigger question of whether historical data is needed in the RIPE Database.

[Text still being developed]

Reverse Domain Name System (rDNS)

DNS reverse mapping is a DNS-based service that maps IP addresses back to domain names. The reverse DNS tree is structured to follow the address 'hierarchy' for both IPv4 (on octet boundaries) and IPv6 (on nibble boundaries). There is no formalised DNS mapping service for AS Numbers.

Since DNS reverse mapping is closely tied to the address space, delegations usually go to the party registered as the holder for that space. Providing DNS reverse mapping management functions (which do not include DNS name service itself) can be seen as a genuine function of both an RIR and an LIR. The RIPE Database is used as a provisioning and documentation tool for reverse DNS for IP addresses under RIPE NCC management. This enables the use of the core address registry for provisioning authorisation purposes (reverse mapping follows inetnum: and inet6num:).

There are operational procedures, including technical checks, that guide the operation of the reverse DNS by the RIPE NCC. These have been developed and maintained under guidance from the DNS and Database Working Groups. Other (non-DNS specific) general rules apply to the objects used for provisioning reverse DNS to the database.

[Text still being developed]

Publishing routing policies by network operators (RIPE IRR)

The RIPE Routing Registry is a subset of the RIPE Database which holds information about routing on the Internet. Since the RIPE Database is authoritative for both IP addresses and AS Numbers which have been allocated or assigned by the RIPE NCC, it provides a natural way to publish authoritative information about how Internet number resources are routed on the Internet.

The task force recommends the following list of requirements for routing information in the RIPE Database:

- The RIPE Database will provide routing information for:
  - Internet number resources delegated by the RIPE NCC.
  - Internet number resources which fall under the terms of the "RIPE NCC Services to Legacy Internet Resource Holders" policy.
  - Other Internet number resources which already have routing information in the RIPE Database.
- Routing information is maintained by the holders of these resources.

- The holders of these resources will be authenticated by the RIPE NCC and only they will be authorised to manage routing information for the resources that they hold.
- Routing information for resources delegated to holders that have not been authenticated by the RIPE NCC should be labelled as non-authoritative. This should apply to both non-RIPE NCC resources and legacy resources with no formal relationship to the RIPE NCC.
- The RIPE community should aim to create policies to delete stale and inaccurate non-authoritative routing information.
- It should not be possible to add new routing information to the RIPE Database for address resources delegated by other Regional Internet Registries.

Routing information classification

Routing information in the RIPE Database falls into two broad categories:
- Routing origin information, which documents associations between address blocks and AS Numbers.
- Information about routing relationships between different AS Numbers.

Routing origin information

Maintaining accurate routing origin information is a requirement of the RIPE Database.

Routing relationship information

RPSL
[Text still being developed]

RPKI Database
[Text still being developed]

Facilitate Internet operations and coordination

Since its inception, the RIPE Database has helped to foster communication between stakeholders, quickly becoming one of the main sources of information to help troubleshoot and develop networks in the RIPE region. The contact information available in the database is historically provided on a best-effort basis by its users.

The task force has identified facilitating communication about usage of resources as one the requirements of the RIPE Database.

The RIPE Database should facilitate communication and cooperation among stakeholders for the following reasons:

- Operational issues such as measuring or troubleshooting networks
- Handling abuse cases, support the handling of cyber incidents, as well as support LEA investigations

Since RIPE 77, there have been concerns around the rising number of PERSON objects in the RIPE Database. It's unclear whether all these objects are needed. For example, this requirement could be maybe fulfilled by using ROLE objects and generic email addresses.

The task force recommends getting community feedback on what level of contact information is required to facilitate communication about usage of resources.

5. Recommendations

Authoritative and Accurate Registry of Internet Number Resources

- The task force recommends that the legal address of resource holders who are legal persons be published in the RIPE Database.
- The task force therefore recommends that the community review the current resources registration requirements and make adjustments to the policies if needed.
- The task force recommends that resources registration requirements be applied consistently to all Internet number resources, regardless of their type or status.
- To ensure that the information published in the RIPE Database is correctly updated by resource holders, the task force recommends that the RIPE NCC continue to use ARCs (Assisted Registry Checks) to verify this data.
- The task force recommends that the community look into ways to mitigate the possible exposure of personal data in historical data queries.

Publishing routing policies by network operators (RIPE IRR)

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- The RIPE Database will provide routing information for:
  - Internet number resources delegated by the RIPE NCC.
  - Internet number resources which fall under the terms of the "RIPE NCC Services to Legacy Internet Resource Holders" policy.
  - Other Internet number resources which already have routing information in the RIPE Database.
- Routing information is maintained by the holders of these resources.
- The holders of these resources will be authenticated by the RIPE NCC and only they will be authorised to manage routing information for the resources that they hold.
- Routing information for resources delegated to holders that have not been authenticated by the RIPE NCC should be labelled as non-authoritative. This should apply to both non-RIPE NCC resources and legacy resources with no formal relationship to the RIPE NCC.
- The RIPE community should aim to create policies to delete stale and inaccurate non-authoritative routing information.
- It should not be possible to add new routing information to the RIPE Database for address resources delegated by other Regional Internet Registries.

Facilitate Internet Operations and Coordination

The task force recommends getting community feedback on what level of contact information is required to facilitate communication about usage of resources.

6. Terminology

Accuracy: In this document, the term "accuracy" refers to "registration accuracy" as defined in [RFC 720](#): "A core requirement of the Internet Numbers Registry System is to maintain a registry of allocations to ensure uniqueness and to provide accurate registration information of those allocations in order to meet a variety of operational requirements. Uniqueness ensures that IP addresses and AS numbers are not allocated to more than one party at the same time.

Assisted Registry Checks: The Assisted Registry Check (ARC) is the name for the RIPE NCC's "audit" and "additional allocation audit" activities. During the ARC review, the RIPE NCC performs a variety of consistency checks to assess the quality of LIRs' registry data.

Internet Number Resources: IPv4 addresses, IPv6 Addresses and Autonomous System Numbers.

Registration: The documentation of Internet number resources within the RIPE NCC Service Region.

Resource Holder: An organisation or individual that has been allocated Internet number resources in the RIPE NCC service region.

RPKI: The Resource Public Key Infrastructure (RPKI) allows Local Internet Registries (LIRs) to request a digital certificate listing the Internet number resources they hold. It offers verifiable proof of holdership of resources's registration by a Regional Internet Registry (RIR).

7. Relevant Policies and Documents

- [The RIPE Registry](#)
- [The RIPE Database Terms and Conditions](#)
- [The Internet Numbers Registry System](#)
- [IPv4 Address Allocation and Assignment Policies for the RIPE NCC Service Region](#) (Section 4.0 and 6.2)
- [IPv6 Address Allocation and Assignment Policies for the RIPE NCC Service Region](#) (Section 3.3, 5.3 and 5.5.)
- [Autonomous System (AS) Number Assignment Policies](#) (Section 6.0)