    Registration Data Access Protocol (RDAP) Reverse search capabilities
              draft-ietf-regext-rdap-reverse-search-04

Abstract

   The Registration Data Access Protocol (RDAP) does not include query
   capabilities to find the list of domains related to a set of entities
   matching a given search pattern. Even if such capabilities, commonly
   referred as reverse search, respond to some needs not yet readily
   fulfilled by the current Whois protocol, they have raised concerns
   from two perspectives: server processing impact and data privacy.
   Anyway, the impact of the reverse queries on RDAP servers processing
   is the same as the standard searches and it can be reduced by
   implementing policies to deal with large result sets, while data
   privacy risks can be prevented by RDAP access control functionality.
   In the RDAP context, an entity can be associated to any defined
   object class. Therefore, a reverse search can be applied to other
   use cases than the classic domain-entity scenario. This document
   describes an RDAP search query extension that allows clients to
   request a reverse search based on the relationship between an object
   and the associated entities.

Status of This Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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   material or to cite them other than as "work in progress."

   This Internet-Draft will expire on November 19, 2020.

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1. **Introduction**

   Reverse Whois is a service provided by many web applications that
   allow users to find domain names owned by an individual or a company
   starting from the owner's details, such as name and email. Even if
   it has been considered useful for some legal purposes (e.g.
   uncovering trademark infringements, detecting cybercrime cases), its
   availability as a standardized Whois capability has been objected for
   two main reasons, which now don't seem to conflict with an RDAP
   implementation.

   The first objection has been caused by the potential risks of privacy
   violation. However, TLDs community is considering a new generation
   of Registration Directory Services
   ([ICANN-RDS1],[ICANN-RDS2],[ICANN-RA]), which provide access to

sensitive data under some permissible purposes and according to
adequate policies to enforce the requestor accreditation,
authentication, authorization, and terms and conditions of data use.
It is well known that such security policies are not implemented in
Whois ([RFC3912]), while they are in RDAP ([RFC7481]). Therefore,
RDAP permits a reverse search implementation complying with privacy
protection principles.

Another objection to the implementation of a reverse search
capability has been connected with its impact on server processing.
Since RDAP supports search queries, the impact of both standard and
reverse searches is equivalent and can be mitigated by servers
adopting ad hoc strategies. Furthermore, the reverse search is
almost always performed by specifying an entity role (e.g.
registrant, technical contact) and this can contribute to restricting
the result set.

Reverse searches, such as finding the list of domain names associated
with contacts or nameservers may be useful to registrars as well.
Usually, registries adopt out-of-band solutions to provide results to
registrars asking for reverse searches on their domains. Possible
reasons for such requests are:

o the loss of synchronization between the registrar database and the
   registry database;

o the need for such data to perform massive EPP ([RFC5730]) updates
   (e.g. changing the contacts of a set of domains, etc.).

Currently, RDAP does not provide any way for a client to search for
the collection of domains associated with an entity ([RFC7482]). A
query (lookup or search) on domains can return the array of entities
related to a domain with different roles (registrant, registrar,
administrative, technical, reseller, etc.), but the reverse operation
is not allowed. Only reverse searches to find the collection of
domains related to a nameserver (ldhName or ip) can be requested.
Since an entity can be in relationship with any RDAP object
([RFC7483]), the availability of a reverse search can be common to
all resource type path segments defined for search.

The protocol described in this specification aims to extend the RDAP
query capabilities to enable the reverse search based on the
relationship between any object and the associated entities. The
extension is implemented by adding new path segments (i.e. search
paths) and using a RESTful web service ([REST]). The service is
implemented using the Hypertext Transfer Protocol (HTTP) ([RFC7230])
and the conventions described in RFC 7480 ([RFC7480]).

1.1. Conventions Used in This Document

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
   document are to be interpreted as described in [RFC2119].

2. RDAP Path Segment Specification

   The new search paths are OPTIONAL extensions of those defined in RFC
   7482 ([RFC7482]). A generic reverse search path is described by the
   syntax:

   {resource-type}/reverse/{role}?{property}=<search pattern>

   The path segments are defined as in the following:

   o resource-type: it MUST be one of resource type path segments
      defined in Section 3.2 of RFC 7482 ([RFC7482]): "domains",
      "nameservers" or "entities";

   o role: it MUST be one of the roles described in Section 10.2.4 of
      RFC 7483 ([RFC7483]). For role independent reverse searches, the
      value "entity" MUST be used;

   o property: it identifies the entity property to be used in matching
      the search pattern. A pre-defined list of properties includes:
      fn, handle, email, city, country, cc. The mapping between such
      properties and the RDAP fields is shown in Table 1. Servers MAY
      implement additional properties to those defined in this document.

   Partial string matching is allowed as defined in section 4.1 of RFC
   7482 ([RFC7482]).

```
+------------------+-------------------+--------+--------+--------+
| Reverse search   | RDAP property     | RFC    | RFC    | RFC    |
| property         |                   | 7483   | 6350   | 8605   |
+------------------+-------------------+--------+--------+--------+
| handle           | handle            | 5.1.   |        |        |
| fn               | vcard fn          |        | 6.2.1  |        |
| email            | vcard email       |        | 6.4.2  |        |
| city             | locality in vcard |        | 6.3.1  |        |
|                  | adr               |        |        |        |
| country          | country name in   |        | 6.3.1  |        |
|                  | vcard adr         |        |        |        |
| cc               | country code in   |        |        | 3.1    |
|                  | vcard adr         |        |        |        |
+------------------+-------------------+--------+--------+--------+
```

        Table 1: Mapping between the reverse search properties and the RDAP
                                  fields

      https://example.com/rdap/domains/reverse/technical?handle=CID-40*

      https://example.com/rdap/domains/reverse/registrant?fn=Bobby*

      https://example.com/rdap/domains/reverse/registrant?cc=US

      https://example.com/rdap/entites/reverse/registrar?handle=RegistrarX

               Figure 1: Examples of reverse search queries

   The "country" property can be used as an alternative to "cc" when
   RDAP servers don't include the vCard "cc" parameter ([RFC8605]) in
   their response.

3. Implementation Considerations

   The implementation of the proposed extension is technically feasible.
   Both handle and fn are used as standard path segments to search for
   entities ([RFC7482]). With regards to the other reverse search
   properties, namely email, city and country code, the impact of their
   usage on server processing is evaluated to be the same as other
   existing query capabilities (e.g. wildcard prefixed search pattern)
   so the risks to degrade the performance or to generate huge result
   sets can be mitigated by adopting the same policies (e.g. restricting
   the search functionality, limiting the rate of search requests
   according to the user profile, truncating and paging the results,
   returning partial responses).

4. Implementation Status

   NOTE: Please remove this section and the reference to RFC 7942 prior
   to publication as an RFC.

   This section records the status of known implementations of the
   protocol defined by this specification at the time of posting of this
   Internet-Draft, and is based on a proposal described in RFC 7942
   ([RFC7942]). The description of implementations in this section is
   intended to assist the IETF in its decision processes in progressing
   drafts to RFCs. Please note that the listing of any individual
   implementation here does not imply endorsement by the IETF.
   Furthermore, no effort has been spent to verify the information
   presented here that was supplied by IETF contributors. This is not
   intended as, and must not be construed to be, a catalog of available
   implementations or their features. Readers are advised to note that
   other implementations may exist.

   According to RFC 7942, "this will allow reviewers and working groups
   to assign due consideration to documents that have the benefit of
   running code, which may serve as evidence of valuable experimentation
   and feedback that have made the implemented protocols more mature.
   It is up to the individual working groups to use this information as
   they see fit".

4.1. IIT-CNR/Registro.it

      Responsible Organization: Institute of Informatics and Telematics
      of National Research Council (IIT-CNR)/Registro.it
      Location: https://rdap.pubtest.nic.it/
      Description: This implementation includes support for RDAP queries
      using data from the public test environment of .it ccTLD.
      Level of Maturity: This is a "proof of concept" research
      implementation.
      Coverage: This implementation includes all of the features
      described in this specification.
      Contact Information: Mario Loffredo, mario.loffredo@iit.cnr.it

5. Privacy Considerations

   The use of the capability described in this document MUST be
   compliant with the rules about privacy protection each RDAP provider
   is subject to. Sensitive registration data MUST be protected and
   accessible for permissible purposes only. Therefore, RDAP servers
   MUST provide reverse search only to those requestors who are
   authorized according to a lawful basis. Some potential users of this
   capability include registrars searching for their own domains and
   operators in the exercise of an official authority or performing a

specific task in the public interest that is set out in a law.
Another scenario consists of permitting reverse searches, which take
into account only those entities that have previously given the
explicit consent for publishing and processing their personal data.

6. Security Considerations

Security services required to provide controlled access to the
operations specified in this document are described in RFC 7481
([RFC7481]).

The specification of the entity role within the reverse search path
allows the RDAP servers to implement different authorization policies
on a per-role basis.

7. IANA Considerations

This document has no actions for IANA.

8. Acknowledgements

The authors would like to acknowledge Tom Harrison, Scott Hollenbeck,
Francisco Arias, Gustavo Lozano and Eduardo Alvarez for their
contribution to this document.

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Appendix A. Change Log

00: Initial working group version ported from draft-loffredo-regext-
     rdap-reverse-search-04
01: Updated "Privacy Considerations" section.
02: Revised the text.
03: Refactored the query model.
04: Keepalive refresh.

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