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History of records in the Registration Data Access Protocol
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Abstract

The Registration Data Access Protocol (RDAP) provides current registration information. This document describes an RDAP query and response extension that allows retrieving historical registration records.

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1. Introduction

The Registration Data Access Protocol (RDAP) offers simple search and responses as defined in [RFC7482] and [RFC7483] respectively. Both the search and response documents implicitly describe current registration information. This document provides an extension to RDAP allowing the discovery of historical registration information.

1.1. Terminology

The keywords MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL, when they appear in this document, are to be interpreted as described in [RFC2119].

2. JSON Responses

The JSON responses described in [RFC7483] are extended with one additional object class, the History object class, described below.

2.1. The History Object Class

The history object class is a container in which individual registration records are listed, together comprising a history of

registration. The registration records are represented in the form given in [RFC7483], without change.

The history object class can contain the following members:

- o `objectClassName` -- the string "history"
- o `records` -- an array of record objects, defined in the next subsection

In addition, any of the common data structures defined in section 4 of [RFC7483] may be included in accordance with the constraints of that section, with the following additional considerations.

- o Any "rdapConformance" structure in the topmost object of a response including a History object **MUST** include the string "history_0" to indicate to clients that the response conforms to this specification.
- o An events structure **MAY** be included, but none of the values defined in section 10.2.3 of [RFC7483] are suitable for a History object class. Future values in the "RDAP JSON Values" registry may be suitable, however.

2.2. The Record Data Structure

The record data structure describes one historical registration record. It is an object containing the date range during which this record was current, and the record's content. The content of a historical record is a JSON response element as defined in [RFC7483]. In this way, history is defined for all RDAP object classes, and may be extended to apply to non-standard or new RDAP object classes without requiring a revision to the history specification.

The date range of the historical registration record consists of an element indicating the first moment at which the contained record was current, in the "applicableFrom" element, and an element indicating the first moment at which the contained record was no longer current, in the "applicableUntil" element. The date range is half-open, including the "applicableFrom" date but excluding the "applicableUntil" date. If the "applicableUntil" date is not included in the response, this indicates that the associated content was current at the time the response was generated.

An example of the record data structure:

```
{
  "applicableFrom": "2008-09-04T06:51:49Z",
  "applicableUntil": "2008-09-04T07:27:55Z",
  "content": {
    "objectClassName": "ip network",
    ...
  }
}
```

3. RDAP Historical Path Segment Specification

Path segments for querying registration data are defined in [RFC7482] for five resource types (ip, autnum, domain, nameserver, and entity). In addition to these segments, this document defines one additional path segment, 'history', for querying the historical data of any of the five resource types, where supported by the server.

The history access specified in this document does not support searches.

3.1. IP Network History Path Segment Specification

Syntax: "history/ip/<IP address>" or "history/ip/<CIDR prefix>/<CIDR length>"

Queries for the history of IP networks follow the same form as for the current registration of IP networks. However, while the current registration query will select the "most-specific" or smallest IP network that completely encompasses the query network, an historical query selects all networks intersecting the query range.

A server MAY choose to limit the number of networks selected by a query, by limiting the size of sub-networks, or the total number, or some other means.

3.2. Autonomous System History Path Segment Specification

Syntax: "history/autnum/<autonomous system number>"

Queries for the history of an autonomous system number follow the same form as for the current registration of autonomous system numbers.

3.3. Domain History Path Segment Specification

Syntax: "history/domain/<domain name>"

Queries for the history of a domain registration. As with [RFC7482] the domain is fully qualified, and SHOULD NOT be represented as a mixture of A-labels and U-labels.

3.4. Nameserver History Path Segment Specification

Syntax: "history/nameserver/<nameserver name>"

Queries for the history of a nameserver. As with [RFC7482] the name is a fully qualified host name represented in either A-label or U-label format.

3.5. Entity History Path Segment Specification

Syntax: "history/entity/<handle>"

Queries for the history of an entity. The syntax of the handle is specific to the registration provider.

4. Query Processing

The processing of queries proceeds as in [RFC7482] and [RFC7480]. Associated records, as documented in section 4.2 of [RFC7482], contribute to the history of a registration record, and so any change to the record or any of its associated records SHOULD be included in the response to a history query.

A server MAY choose to limit the responses given to a history query. For example, the date range of returned records may be restricted, or the number of distinct records may be limited. A server MAY choose to abridge history, such as eliding a short-lived record state. If a server limits responses in this way, it SHOULD indicate to the user that it has done so, either through the "help" path segment documented in [RFC7482], or in a "notice" element as documented in section 4.3 of [RFC7483] using an appropriate notice type such as "result set truncated due to unexplainable reasons".

5. Internationalization Considerations

Character encoding considerations are described in section 6.1 of [RFC7482].

6. IANA Considerations

The IANA is requested to add this document to the IANA RDAP Extensions Registry.

TO BE REMOVED: This registration should take place at
<<https://www.iana.org/assignments/rdap-extensions/rdap-extensions.xhtml>>

Extension identifier: history_0

Registry operator: Asia Pacific Network Information Center

Published specification: TBD

Person & email address to contact for further information: Byron
Ellacott <<mailto:bje@apnic.net>>

Intended usage: This extension allows an RDAP operator to provide
historical registration data.

7. Security Considerations

Historical records may contain information which was inadvertently entered into a record, and subsequently amended. It may contain information which was removed by request of the information holder. Additional privacy constraints may apply to data held for a long period. Operators of a history-capable RDAP service SHOULD ensure they have understood the privacy implications of this facility.

A query for historical records may consume more computing resources than a query for current records. Implementations SHOULD take care to offer operators the appropriate means to manage the operational cost of a historical service, limiting query rates or response sizes or both, where appropriate.

8. Acknowledgements

Substantial feedback on the initial draft was provided by Andrew Newton of ARIN.

9. References

9.1. Normative References

[RFC7480] Newton, A., Ellacott, B., and N. Kong, "HTTP Usage in the Registration Data Access Protocol (RDAP)", RFC 7480, DOI 10.17487/RFC7480, March 2015, <<http://www.rfc-editor.org/info/rfc7480>>.

- [RFC7482] Newton, A. and S. Hollenbeck, "Registration Data Access Protocol (RDAP) Query Format", RFC 7482, DOI 10.17487/RFC7482, March 2015, <<http://www.rfc-editor.org/info/rfc7482>>.
- [RFC7483] Newton, A. and S. Hollenbeck, "JSON Responses for the Registration Data Access Protocol (RDAP)", RFC 7483, DOI 10.17487/RFC7483, March 2015, <<http://www.rfc-editor.org/info/rfc7483>>.

9.2. Informative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.

Appendix A. An example History response

```
{
  "rdapConformance": [
    "history_0",
    "rdap_level_0"
  ],
  "notices": [
    {
      "title": "Example Only",
      "description": [
        "This is an example object only."
      ]
    }
  ],
  "objectClassName": "history",
  "records": [
    {
      "applicableFrom": "2009-01-20T07:00:00Z",
      "applicableUntil": "2017-01-20T07:00:00Z",
      "content": {
        "objectClassName": "entity",
        "handle": "POTUS",
        "vcardArray": [
          "vcard",
          [
            [ "version", {}, "text", "4.0" ],
            [ "fn", {}, "text", "Barack Obama" ]
          ]
        ]
      }
    },
    {
      "applicableFrom": "2017-01-20T07:00:00Z",
      "content": {
        "objectClassName": "entity",
        "handle": "POTUS",
        "vcardArray": [
          "vcard",
          [
            [ "version", {}, "text", "4.0" ],
            [ "fn", {}, "text", "Donald Trump" ]
          ]
        ]
      }
    }
  ]
}
```

In this example, the "POTUS" entity has two historical records. The applicability range of the first record is left-closed, indicating that the "POTUS" entity had the first record's contents at noon EST on the 20th of January, 2009, and right-open, indicating that the "POTUS" entity no longer had the first record's contents at noon EST on the 20th of January, 2017. The absence of a gap between the "applicableUntil" date of the first record and the "applicableFrom" date of the second record indicates that the record was updated, while a gap may indicate that the record was removed, then a similar record with the same key was subsequently added. The second record has no "applicableUntil" element, which indicates that, as of the time that this RDAP History response was prepared, the second record was still in effect.

This example also suggests that this response elides a number of previous versions of this record. A registry's local policy will determine what historical registration information is available, and may vary based on the identity of the entity retrieving the information.

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