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Domain Name Registration Data Access Protocol Query Format
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Abstract

This document describes a RESTful query format proposal for the Domain Name Registration Data Access Protocol.

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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This Internet-Draft will expire on October 29, 2012.

Table of Contents

1. Introduction

This document describes a specification for querying domain name registration data using a RESTful web service and uniform query patterns. The service is implemented using the Hypertext Transfer Protocol (HTTP) [RFC2616] and conforms to the architectural constraints of Representational State Transfer (REST) [REST].

The protocol described in this specification is intended to address deficiencies with the WHOIS protocol [RFC3912] that have been identified over time, including:

Lack of standardized command structures,

lack of standardized output and error structures,

lack of support for internationalization and localization, and

lack of support for user identification, authentication, and access control.

2. 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 RFC 2119 [RFC2119].

The terms "registry", "registrar", and "registrant" are to be interpreted as described in RFC 3707 [RFC3707].

2.1. Acronyms and Abbreviations

DNRD: Domain Name Registration Data

HTTP: Hypertext Transfer Protocol, specified in RFC 2616 [RFC2616]

HTTP/TLS: HTTP over TLS, specified in RFC 2818 [RFC2818]

IDN: Internationalized Domain Name, specified in RFC 5890 [RFC5890]

JSON: JavaScript Object Notation, based on a subset of the JavaScript Programming Language standard [ECMA]

REST: Representational State Transfer [REST]

RWS: RESTful Web Service

TLS: Transport Layer Security, specified in RFC 5246 [RFC5246]

URI: Uniform Resource Identifier, specified in RFC 3986 [RFC3986]

URL: Uniform Resource Locator, specified in RFC 3986 [RFC3986]

XML: Extensible Markup Language, specified in W3C Recommendation REC-xml-20081126 [W3C.REC-xml-20081126]

3. Design Considerations

Representational State Transfer (REST) is a style of software architecture for distributed systems. The style describes six constraints: client-server, stateless, cacheable, layered system, code on demand (optional), and uniform interface. Systems that comply with these constraints are designed to have the properties of performance, scalability, simplicity, modifiability, visibility, portability, and reliability. The principles of REST have been used to design other protocols such as the ATOM publishing protocol [RFC5023].

A RESTful web service is a web service implemented using HTTP and the principles of REST. It is a collection of resources, with three defined aspects:

- The "verbs" of the service are those strictly defined by the HTTP methods GET, PUT, POST, and DELETE,
- the "verbs" are used to act upon resources, and
- resources are addressable using URLs.

3.1. Why RESTful?

A RESTful approach to querying domain registration data offers several advantages when compared to the WHOIS protocol, including:

Standardized output and error structures: outputs can be structured using encoding technologies like JSON and XML, which when paired with a well-defined specification will allow for automated processing.

Support for internationalization: RWS structured data formats include complete support for both internationalized registration data and Internationalized Domain Names (IDNs) with U-labels.

Authentication and access control: HTTP, the transport for RWS, supports multiple native user identification and authentication schemes, and by using these capabilities RWS makes it possible to implement registration data access control mechanisms.

Addressable service: RWS requires the use of a URI/URL standard structure for each object/resource. This provides a way to unambiguously refer to objects.

Increased usability: The inherent capabilities of the HTTP protocol (such as redirects) can be used to provide additional functionality, such as automatic referrals to more specific data sources without requiring specialized parsing by the client.

Authenticity of origin: RWS provided over HTTP/TLS provides confidence in the origin of the information.

Leverage existing infrastructure and expertise: RWS is HTTP-based and is supported using popular, commonly deployed web server infrastructures.

4. Protocol Specification

This section describes the DNRD-AP URL structure and methods used to create the uniform patterns needed to submit queries over HTTP. Each query is sent to the server in the form of an HTTP "GET" or HTTP "HEAD" request. A "GET" request will return both response headers and a response body. A "HEAD" request will return only response headers. A "HEAD" request can be used to verify URL syntax or resource availability without actually retrieving the requested resource.

General specifications for using HTTP in a system to provide a RESTful DNRD query service are described in X (the design team HTTP draft).

4.1. Base URL Specification

The uniform patterns start with a base URL [RFC3986] specified by the service provider offering this service. Resource-type specific path segments are then appended to the end of the base URL. The base URL may contain its own path segments (e.g. http://example.com/... or http://example.com/dnrd-ap/...).

The resource type path segments are:

'domain': Used to identify a domain name query.

'host': Used to identify a host name query.

'contact': Used to identify a contact query.

4.2. Domain Path Segment Specification

Syntax: domain/<domain name>

The <domain name> parameter represents a domain name as specified in RFC 4343 [RFC4343]. Internationalized domain names represented in both A-label and U-label formats [RFC5890] are also valid domain names.

The following example URL is a query for domain name registration information:

http://example.com/dnrd-ap/domain/example.com/

HTTP GET Request Format:

```
GET /dnrd-ap/domain/example.com HTTP/1.1
Host: example.com
```

HTTP HEAD Request Format:

```
HEAD /dnrd-ap/domain/example.com HTTP/1.1
Host: example.com
```

4.3. Host Path Segment Specification

Syntax: host/<host name>

The <host name> parameter represents a host name as specified in RFC 952 [RFC0952] and RFC 1123 [RFC1123]. Internationalized host names represented in A-label format [RFC5890] are also valid host names.

The following example URL is a query for host name registration information:

http://example.com/dnrd-ap/host/ns1.example.com/

HTTP GET Request Format:

```
GET /dnrd-ap/host/ns1.example.com HTTP/1.1
Host: example.com
```

HTTP HEAD Request Format:

```
HEAD /dnrd-ap/host/ns1.example.com HTTP/1.1
Host: example.com
```

4.4. Contact Path Segment Specification

Syntax: contact/<contact id>

The <contact id> parameter represents a contact identifier as specified in RFC 5730 [RFC5730] and RFC 5733 [RFC5733].

The following example URL is a query for contact registration information:

http://example.com/dnrd-ap/contact/CID-4005/

HTTP GET Request Format:

```
GET /dnrd-ap/contact/CID-4005 HTTP/1.1
Host: example.com
```

HTTP HEAD Request Format:

```
HEAD /dnrd-ap/contact/CID-4005 HTTP/1.1
Host: example.com
```

4.5. Response Preference Specification

DNRD-AP servers return responses encoded using one of multiple algorithms. The client MAY signal the preferred format using an HTTP "Accept:" header. The client can also signal the preferred format by adding a DOS-file-style extension to the resource. For example, "/domain/example.com.xml/". If the client specifies no preferred format the server MUST encode the response using a default format. If the client signals multiple formats with the HTTP "Accept:" header, or one format with the HTTP "Accept:" header and another with the extension style, the response will be encoded as described in Section X of (the draft DNRD-AP response document).

The following media type values can be specified with the "Accept:" header:

application/xml (for an XML-encoded response)

application/json (for a JSON-encoded response)

text/html (for an HTML-encoded response)

text/plain (for a plain text response)

HTTP GET Request Format for an XML-encoded Response:

```
GET /dnrd-ap/domain/example.com HTTP/1.1
Host: example.com
Accept: application/xml
```

HTTP HEAD Request Format for an XML-encoded Response:

```
HEAD /dnrd-ap/domain/example.com HTTP/1.1
Host: example.com
Accept: application/xml
```

Alternate HTTP GET Request Format for an XML-encoded Response:

```
GET /dnrd-ap/domain/example.com.xml HTTP/1.1
Host: example.com
```

Alternate HTTP HEAD Request Format for an XML-encoded Response:

```
HEAD /dnrd-ap/domain/example.com.xml HTTP/1.1
Host: example.com
```

HTTP GET Request Format for an XML- or JSON-encoded Response:

```
GET /dnrd-ap/domain/example.com HTTP/1.1
Host: example.com
Accept: application/xml,application/json
```

HTTP HEAD Request Format for an XML- or JSON-encoded Response:

```
HEAD /dnrd-ap/domain/example.com HTTP/1.1
Host: example.com
Accept: application/xml,application/json
```

5. Query Parameters

To overcome issues with misbehaving HTTP cache infrastructure, clients may use the '__dnrd__cachebust' query parameter with a random value of their choosing. Servers MUST ignore this query parameter.

The following is an example use of this parameter to retrieve the domain registration data for the example.com domain:

http://example.com/dnrd-ap/domain/example.com?__dnrd_cachebust=xyz123

Clients SHOULD NOT send any other query parameters.

6. Client Identification

Access to resources can be restricted to clients that possess identification credentials negotiated using an out-of-band mechanism. For example, a service provider can provide clients with user names and passwords as part of a service agreement to gain access to restricted resources. If available, clients MAY provide user name and password identification information to a server using the HTTP "basic" authentication scheme described in RFC 2617 [RFC2617]. Considerations for making authorization and access control decisions based on client-provided identification information are described in Section X of (the draft DNRD-AP response document).

Client user names and passwords MUST be protected using a facility that provides privacy and integrity services to protect against unintended disclosure and modification while in transit. At a minimum, support for HTTP/TLS as described in RFC 2818 [RFC2818] MUST be provided. Service providers can optionally specify and deploy additional security services.

7. Internationalization Considerations

7.1. Label Considerations

There is value in supporting the ability to submit either a U-label (Unicode form of an IDN label) or an A-label (ASCII form of an IDN label) as a query argument to a DNRD service. Users may most often prefer a U-label since this is more visually recognizable and familiar than A-label strings, but users of programmatic interfaces may wish to submit and display A-labels or may not be able to input U-labels with their keyboard configuration.

Internationalized domain and host names can contain character variants and variant labels as described in RFC 4290 [RFC4290]. Clients that support queries for internationalized domain and host names MUST accept service provider responses that describe variants as specified in (the draft DNRD-AP response document).

7.2. Label Encoding

Internationalized labels can be encoded in any of three different ways:

U-label only: A U-label is entered as part of a path segment. For example, /domain/"U+82F1""U+96C4".example.

A-label only: A U-label is first converted to its corresponding A-label before being submitted to the server. In the example above, the U-label would be converted to "xn--dj1az91b", and the path segment would be /domain/xn--dj1az91b.example.

IRI -> URI conversion: An IRI (which contains the U-label) is converted to a URI using the algorithm described in RFC 3987 [RFC3987] before being submitted to the server. In the example above, the label would be converted to "%E8%8B%B1%E9%9B%84" and the path segment becomes /domain/%E8%8B%B1%E9%9B%84.example.

8. IANA Considerations

This document does not specify any IANA actions.

9. Security Considerations

All of the security considerations described for HTTP in RFC 2616 [RFC2616] and its successors are applicable. There are no additional considerations introduced by this specification.

10. Acknowledgements

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