

Internet Engineering Task Force
Internet-Draft
Intended status: Informational
Expires: November 18, 2012

C. Martinez, Ed.
A. Servin, Ed.
D. Gomez
G. Rada
LACNIC
May 17, 2012

LACNIC's Redirection Service for Number Resource RESTful WHOIS Queries
draft-lacnic-weirds-restwhois-redirects-00

Abstract

The traditional WHOIS protocol has several important shortcomings, and over the past few years several approaches to a better WHOIS have been discussed and proposed.

Among these shortcomings, different registries operate different WHOIS services. For users this implies that several WHOIS queries to different registries may be necessary in order to obtain data for a given resource.

This document describes a proof-of-concept redirection service for RESTful WHOIS queries as implemented by LACNIC. This service allows users to query a single WHOIS service and be redirected to the authoritative registry.

The main goal of this document is to encourage discussion on the topics of Joint WHOIS services and query redirection in a RESTful WHOIS world.

The solution implemented by LACNIC proposed here applies to numbering resources (IPv4, IPv6 and autonomous system numbers).

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on November 18, 2012.

Copyright Notice

Copyright (c) 2012 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1.	Introduction	4
1.1.	Requirements Language	4
2.	Proposed Approach	4
2.1.	The REST approach to web services	4
2.2.	Query redirection for RESTful WHOIS queries	5
2.3.	A global Joint WHOIS through HTTP redirection	5
2.4.	Loops in redirection	9
3.	LACNIC RESTful WHOIS redirector implementation	12
3.1.	Accessing the redirector	12
3.1.1.	Redirection URI	12
4.	Security Considerations	13
5.	References	13
5.1.	Normative References	13
5.2.	Informative References	13
	Authors' Addresses	14

1. Introduction

A user interested in obtaining registration information for a given number resource normally uses the WHOIS service provided by the RIRs (AfrinIC, APNIC, ARIN, LACNIC and RIPE-NCC).

In order avoid having to query several databases until obtaining an answer some approaches have been discussed and implemented in the past, most notably the Joint WHOIS [[lacnic-joint-whois](#)] initiative. However, among other shortcomings, Joint WHOIS is implemented using proxies and server-side referrals.

The RESTful approach to WHOIS services ([draft-newton-weirds-arin-whoisrws](#) [[I-D.newton-weirds-arin-whoisrws](#)], [draft-newton-rir-query](#) [[I-D.newton-et-al-weirds-rir-query](#)], [[draft-lacnic-restful-whois](#)]) makes it comparatively easy to implement client-side redirects based on normal HTTP 1.1 semantics and behavior.

The goal of this I-D is to document LACNIC's current implementation of a RESTful WHOIS redirection service and to encourage discussion on the topic of redirects in this problem domain.

1.1. Requirements Language

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](#)].

2. Proposed Approach

2.1. The REST approach to web services

While a full introduction to REST and RESTful [<http://www.rest.org>](http://www.rest.org) interfaces is out of the scope of this document it is important to note that these interfaces employ the verbs defined in HTTP (GET, POST, HEAD, DELETE) and HTTP response codes to signal the semantics and outcomes of an operation.

As WHOIS is a read-only service only the GET verb is implemented.

HTTP status codes provide signaling for errors and other conditions, including the concept of "client-side redirection" as outlined below.

2.2. Query redirection for RESTful WHOIS queries

Each RESTful WHOIS server should answer directly only those queries for which it is authoritative. In this case, being authoritative equals "having direct access to a given registry database".

For all other queries, a RESTful WHOIS server could provide a 301 MOVED PERMANENTLY Redirect answer pointing to an URL hosted on a different RESTful WHOIS server.

Currently the format of the RESTful WHOIS URIs is different across implementations ([\[I-D.newton-weirds-arin-whoisrws\]](#), RIPE RESTful Interface [\[1\]](#), [\[draft-lacnic-restful-whois\]](#)), so the redirecting server implemented by LACNIC currently maps the original query URI to the URI format expected by the receiving server.

As all requests are to be performed employing HTTP GETs, a user agent can transparently follow the HTTP 30x redirection hints ([\[RFC2616\]](#)) until obtaining a non-error answer (HTTP 20x)) or an unrecoverable error condition (HTTP 40x or 50x).

If the work of WEIRDS progresses far enough so that an uniform URI format is agreed upon, the need for server-side URI mappings may become unnecessary.

LACNIC's current implementation splits the authoritative RESTful WHOIS service from the redirection service. The redirection service provides a "switching point" for the whole resource tree. No Inter-RIR coordination, database replication nor RIR-side proxies are needed.

2.3. A global Joint WHOIS trough HTTP redirection

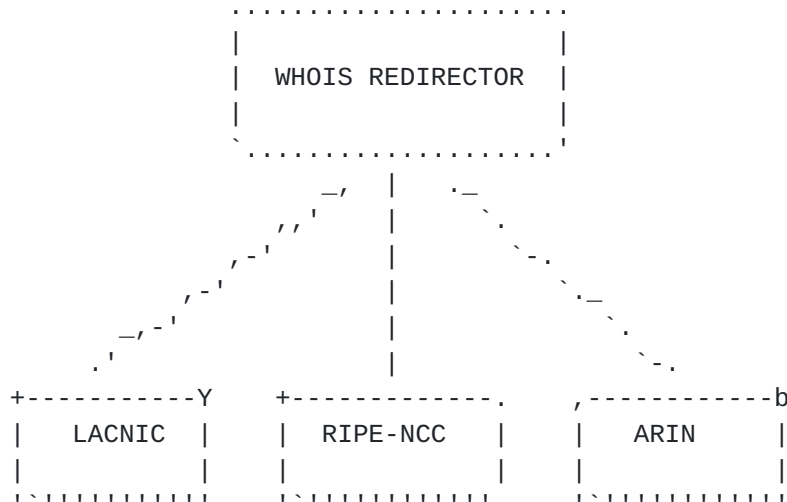
A single redirection-only RESTful WHOIS server could provide a single root to which all RIR RESTful WHOIS servers could point queries for which they are not authoritative.

In LACNIC's implementation the redirect server's database was initialized from IANA's registries for IPv4, IPv6 and AS numbers.

Implementation was very simple even when adding the server-side URI mapping requirement outlined above. LACNIC's staff was able to implement a proof of concept redirect-only server in about two days of effort including importing IANA's IPv4 registry into a database and implementing URI mapping for LACNIC, ARIN and RIPE's RESTful WHOIS services.

Figure 1 shows the general scheme of a single WHOIS redirector

serving three different RIRs standalone WHOIS while providing a seamless query interface to clients.



RESTful Joint WHOIS Tree.

Figure 1

Figure 2 shows how HTTP 301 redirection hints guide a client looking for registration data for the IPv4 address 23.1.1.1 (administered by ARIN) from LACNIC's WHOIS, the redirector and finally ARIN's WHOIS.


```
wget --output-document=-
http://restwhois.labs.lacnic.net/restfulwhois/ip/23.1.1.1

--2012-01-10 15:37:46--
http://restwhois.labs.lacnic.net/restfulwhois/ip/23.1.1.1

Resolving restwhois.labs.lacnic.net (restwhois.labs.lacnic.net)...
200.7.84.21

Connecting to restwhois.labs.lacnic.net
(restwhois.labs.lacnic.net)|200.7.84.21|:80... connected.
HTTP request sent, awaiting response... 307 Temporary Redirect

Location: http://www.labs.lacnic.net/restwhois/rwhois\_redir/ip/23.1.1.1
[following]
--2012-01-10 15:37:46--
http://www.labs.lacnic.net/restwhois/rwhois\_redir/ip/23.1.1.1

Resolving www.labs.lacnic.net (www.labs.lacnic.net)...
2001:13c7:7001:4000::10, 200.7.84.10
Connecting to www.labs.lacnic.net
(www.labs.lacnic.net)|2001:13c7:7001:4000::10|:80... connected.
HTTP request sent, awaiting response... 301 MOVED PERMANENTLY

Location: http://www.labs.lacnic.net/restwhois/rwhois\_redir/ip/23.1.1.1/
[following]
--2012-01-10 15:37:46--
http://www.labs.lacnic.net/restwhois/rwhois\_redir/ip/23.1.1.1/

Connecting to www.labs.lacnic.net
(www.labs.lacnic.net)|2001:13c7:7001:4000::10|:80... connected.
HTTP request sent, awaiting response... 301 MOVED PERMANENTLY

Location: http://whois.arin.net/rest/ip/23.1.1.1 [following]

--2012-01-10 15:37:46-- http://whois.arin.net/rest/ip/23.1.1.1

Resolving whois.arin.net (whois.arin.net)... 2001:500:31::47,
2001:500:13::46, 2001:500:13::47, ...
Connecting to whois.arin.net (whois.arin.net)|2001:500:31::47|:80...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 1038 (1.0K) [application/xml]
Saving to: `STDOUT'

--- output suppressed for brevity ---

Detailed 'wget' output for a RESTful WHOIS query for 23.1.1.1
```


Figure 3

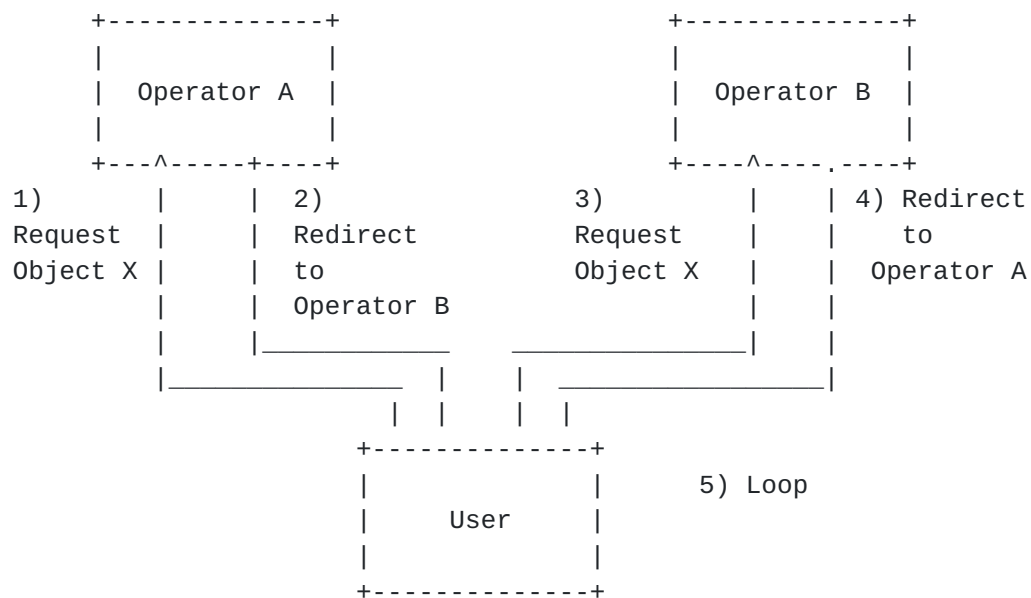
2.4. Loops in redirection

When redirection is used there is always the risk that bogus user-agents and applications or malicious user can create loops that in turn may become Denial of Service attacks.

To minimize the risk of loops created by bogus applications and user-agents operators MAY use the mechanism shown in [Section 3.1](#). However, this mechanism could be forged and bypassed by malicious users possibly creating a Denial of Service attack against the operator. To avoid completely the risk of DoS operators should use other methods such as rate-limit and authentication that are outside the scope of this document.

One of the challenges by using redirection is loop avoidance. Even though recommendation from REFERENCE** indicates that user-agents should have a mechanism to break loops, due to sometimes not carefully coded user-agents and other applications or due to malicious users' activities loops that could end up in a Denial of Service for the RESTful WHOIS operator.

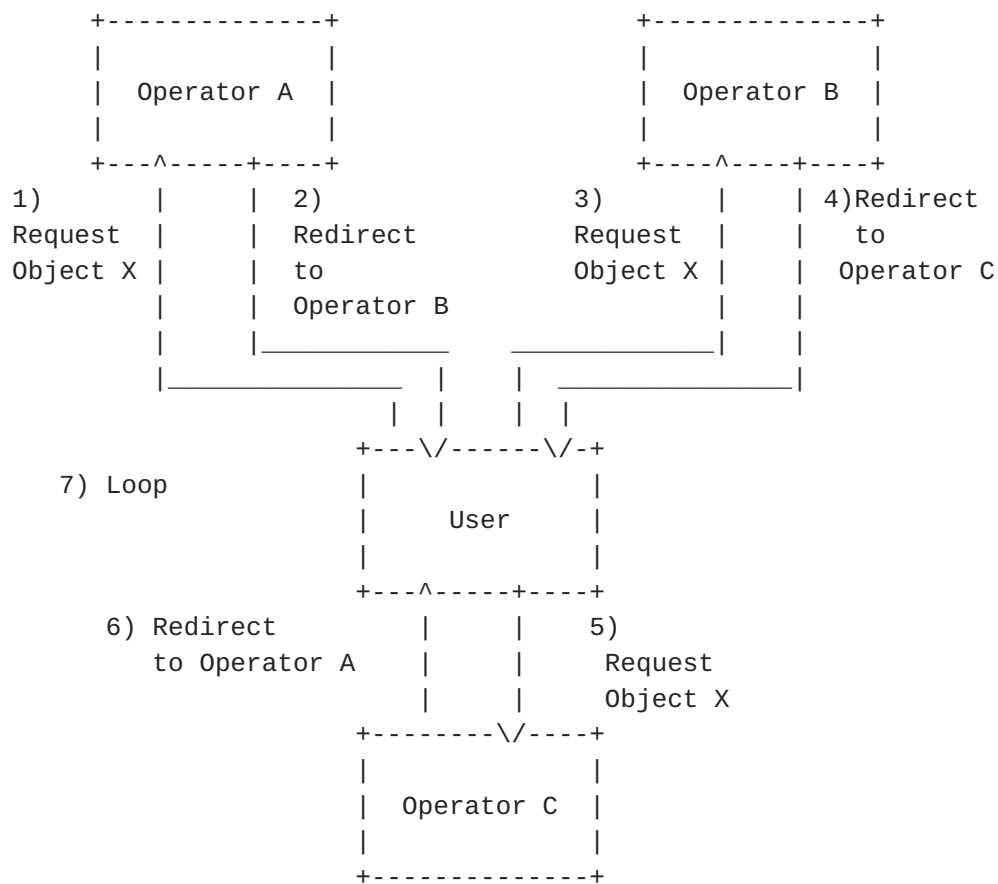
A simple scenario that creates a loop is shown in Figure 4. An user request (1) an object from Operator 1; Operator 1 do not have the object but it has a pointer that Operator 2 has it, so it redirects (2) the user to Operator 2; user request Object X to Operator 2 (3); Operator 2 does not have the object either object but it has a pointer that Operator 1 has it, so it redirects (4) the user to Operator 1; it creates a loop (5).



A simple loop

Figure 4

The loop described could be avoided by simple forbidding to redirect a response when the query has been originated by a redirect. However this solution only allows one redirection. A less restrictive approach forbidding redirection to only when the destination is the same than the originator for the redirection does not work either as shown in Figure 5.



A more complex loop.

Figure 5

In the scenario depicted in Figure 5 the user request object X from Operator A which redirects him/her to Operator B which in turn redirects the user to Operator C. Operator C then redirects the user back to Operator A again creating a loop.

To avoid loops created by not well-programmed user-agents or applications when redirecting operators MAY append or modify a special URI indicating that a redirection and how many times it has been done. The format of the URI is described in the next section.

In the scenario depicted in Figure 5 the user request object X from Operator A which redirects him/her to Operator B which in turn redirects the user to Operator C. Operator C then redirects the user back to Operator A again creating a loop.

To avoid loops created by not well-programmed user-agents or applications when redirecting operators MAY append or modify a special URI indicating that a redirection and how many times it has

been done. The format of the URI is described in the next section.

3. LACNIC RESTful WHOIS redirector implementation

LACNIC's staff was able to implement a proof-of-concept WHOIS redirect without committing to a large development effort (around 12 man-hours were consumed).

The redirector was implemented in the Python programming language and employing the Django web framework library for handling HTTP requests and responses.

The choice of technology was dictated more by the developers' familiarity with it. No claim regarding performance or suitability for a production service is made.

3.1. Accessing the redirector

Currently there are two ways for accessing the redirector:

- o By querying LACNIC's RESTful WHOIS for a non-LACNIC resource:

```
wget --output-document=-  
http://restwhois.labs.lacnic.net/restfulwhois/ip/23.1.1.1
```

- o Directly at:

```
http://www.labs.lacnic.net/restwhois/rwhois\_redir
```

The redirector currently supports queries for IPv4 address blocks only, employing the REST URIs defined in [!REF:[draft-lacnic-restfulwhois](#)].

The current implementation will provide a redirection to an empty answer in case the resources are not found in its registry.

LACNIC's current plans currently include extending the redirector so queries for IPv6 blocks as well as autonomous system numbers are supported.

3.1.1. Redirection URI

When a RESTful WHOIS operator redirects an user to retrieve an object from another operator, the operator making the redirection operator MAY append or modify a special URI.

When using an URI to indicate redirection, the URI MUST have the

following structure:

/redirect/[step]

Where [step] is a consecutive counter that **MUST** be increased by every operator when the URI is encountered in a query object.

When an operator is redirecting a query for the first time it **MAY** append the redirection URI to the original URL. If the redirection URI is used, it **MUST** use the format previously described and it **MUST** set "step" equal to 1. For example, the URL "http://whois.lacnic.net/restfulwhois/ip/200.7.84.0/24" would be replaced by

"http://whois.example.com/restfulwhois/ip/200.7.84.0/24/redirect/1"

If an operator receives a request with the redirect URI it first **SHOULD** check if "step" is shorter than the defined threshold. If it does the operator **SHOULD** strip it and process the query. If the query requires further redirection the operator **MAY** use the redirection URI and it **MUST** increase "step" in one.

Operators that support the redirect URI **MUST** never process redirects that contain a step value greater than their locally set threshold.

4. Security Considerations

This document makes no explicit security considerations other than those stated above.

5. References

5.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

[min_ref] authSurName, authInitials., "Minimal Reference", 2006.

5.2. Informative References

[I-D.newton-et-al-weirds-rir-query]
Newton, A., Ranjbar, K., and A. Servin, "A Uniform RESTful URL Query Pattern for RIRs",
[draft-newton-et-al-weirds-rir-query-00](#) (work in progress),
September 2011.

[I-D.newton-weirds-arin-whoisrws]

Newton, A., "ARIN's RESTful Web Service for Whois Data",
[draft-newton-weirds-arin-whoisrws-00](#) (work in progress),
June 2011.

[RFC2616] Fielding, R., Gettys, J., Mogul, J., Frystyk, H.,
Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext
Transfer Protocol -- HTTP/1.1", [RFC 2616](#), June 1999.

[[draft-lacnic-restful-whois](#)]

LACNIC, "LACNIC's RESTful WHOIS Interface for Registry
Data", 2011, <<http://www.labs.lacnic.net/site/sites/default/files/draft-lacnic-weirds-restwhois-03.pdf>>.

[lacnic-joint-whois]

LACNIC, "Joint WHOIS", 2005, <<ftp://anonymous@ftp.registro.br/pub/gter/gter20/02-jwhois-lacnic.pdf>>.

URIs

[1] <<https://labs.ripe.net/ripe-database/database-api/api-documentation>>

Authors' Addresses

Carlos M. Martinez (editor)
LACNIC
Rambla Mexico 6125
Montevideo, 11400
Uruguay

Phone: +598-2604-2222
Email: carlos@lacnic.net

Arturo L. Servin (editor)
LACNIC
Rambla Mexico 6125
Montevideo, 11400
Uruguay

Phone: +598-2604-2222
Email: aservin@lacnic.net

Dario Gomez
LACNIC
Rambla Mexico 6125
Montevideo, 11400
Uruguay

Phone: +598-2604-2222
Email: dario@lacnic.net

Gerardo Rada
LACNIC
Rambla Mexico 6125
Montevideo, 11400
Uruguay

Phone: +598-2604-2222
Email: gerardo@lacnic.net

