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A. Newton  
ARIN  
K. Ranjbar  
RIPE NCC  
A. Servin  
LACNIC  
B. Ellacott  
APNIC  
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**A Uniform RESTful URL Query Pattern for RIRs**  
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**Abstract**

This document describes uniform patterns for which to construct HTTP URLs that may be used to retrieve information from Regional Internet Registries (RIRs) using "RESTful" web access patterns.

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## **1. Introduction**

The Regional Internet Registries (RIRs) have begun experimenting with RESTful web services for access to Whois data. This document presents uniform patterns which may be used to construct URLs for accessing data from these RESTful web services.

The patterns described in this document purposefully do not encompass all of the methods employed in the Whois and RESTful web services of all of the RIRs. The intent of the patterns described here are to enable lookups of networks by IP address, autonomous system numbers by number, and reverse DNS meta-data reverse DNS domain labels. It is envisioned that each RIR will continue to maintain NICNAME/WHOIS and/or RESTful web services specific to their needs and those of their constituencies, and the information retrieved through the patterns described here may reference such services.

Whois services, in general, are read-only services. Therefore URL [\[RFC3986\]](#) patterns presented here are only applicable to the HTTP [\[RFC2616\]](#) GET and HEAD methods.

This document does not describe the results or entities returned from issuing the described URLs with an HTTP GET. It is envisioned that other documents will describe these entities in various serialization formats, such as XML and JSON.

Additionally, resource management, provisioning and update functions are out of scope for this document. RIRs have various and divergent methods covering these functions, and it is unlikely a uniform approach for these functions will ever be possible.

And while HTTP contains mechanisms for servers to authenticate clients and clients to authenticate servers, from which authorization schemes may be built, both authentication of clients and servers and authorization for access to data are out-of-scope of this document. In general, these matters require "policy" and are not the domain of technical standards bodies.



## **2. Design Intent**

There are a few design criteria this document attempts to support.

First, each query is meant to return either zero or one result. With the maximum upper bound being set to one, the issuance of redirects is simplified to the known document model used by HTTP [[RFC2616](#)]. Should a result contain more than one result, some of which are better served by other servers, the redirection model becomes much more complicated.

Second, response formats are not specified in this document as the intent is to leave room for multiple format types.

Third, HTTP offers a number of transport protocol mechanisms not described further in this document. Operators are able to make use of these mechanisms according to their local policy, including cache control, authorization, compression, and redirection. HTTP also benefits from widespread investment in scalability, reliability, and performance



### **3. Path Specification**

The uniform patterns start with a base URL [[RFC3986](#)] specified by each RIR or any other service provider offering this service. The base URL will be appended with resource type specific path segments. The base URL may contain its own path segments (e.g. `http://example.com/...` or `http://example.com/restful-whois/...` ).

The resource type path segments are:

'ip' IP networks and associated data referenced using either an IPv4 or IPv6 address.

'autnum' Autonomous system registrations and associated data referenced using an AS Plain autonomous system number.

'rdns' Reverse DNS information and associated data referenced using a fully-qualified domain name.

#### **3.1. IP Networks**

Queries for information about IP networks are of the form `/ip/XXX/...` or `/ip/XXX/YY/...` where the path segment following 'ip' is either an IPv4 [[RFC0791](#)] or IPv6 [[RFC5952](#)] address (i.e. XXX) or an IPv4 or IPv6 CIDR [[RFC4632](#)] notation address block (i.e. XXX/YY). Semantically, the simpler form using the address can be thought of as a CIDR block with a length of 32 for IPv4 and a length of 128 for IPv6. A given specific address or CIDR may fall within multiple IP networks in a hierarchy of networks, therefore this query targets the "most-specific" or lowest IP network which completely encompasses it in a hierarchy of IP networks.

Path segments following the IP address or CIDR notation target specific information associated with the targetted IP network in the following way:

'registration' The query is for the network registration data.

'operator' The query is for data about the network operator of the IP network. The network operator is not always considered to be the end user or end site customer of the IP network, a distinction made in some cases. For example, a residential Internet installation may be assigned IP addresses, but the provider from whom they receive Internet access is considered the network operator. Another rule of thumb is that the network operator is the entity contacted to coordinate network issues and has published contact information for this purpose, and operator information can be further decomposed into operator contact





information, which is returned with the 'operator' query when not specifically targetted (see below).

When no path segment follows the IP address, the semantics of the query are that both registration and operator information are to be returned.

The following example URL [[RFC3986](#)] is a query for the IP network registration information.

```
http://example.com/somepath/ip/192.0.2.0/registration
```

The following example URL is a query for the IP network registration information for the most specific IP network starting with 192.0.2.0 and ending with 192.0.2.255.

```
http://example.com/somepath/ip/192.0.2.0/24/registration
```

The following example URL is a query for the network operator information of the most specific network containing 192.0.2.0

```
http://example.com/somepath/ip/192.0.2.0/operator
```

And this is an example URL for both the registration and operator information of the most specific network containing 192.0.2.0

```
http://example.com/somepath/ip/192.0.2.0
```

This is an example of a URL for both the registration and operator information of the most specific network containing 192.0.2.0/24.

```
http://example.com/somepath/ip/192.0.2.0/24
```

The contact information of an operator maybe specifically targetted by following it with a 'contacts' path segment. And the type of contact information may be further targetted by following that path segment with a type. The types are:



- o tech
- o admin
- o abuse

For example:

```
/ip/192.0.2.0/operator/contacts
```

returns all the contact information for the network operator of the most specific network containing IP address 192.0.2.0.

And this path targets only the abuse contacts of that network operator.

```
/ip/192.0.2.0/operator/contacts/abuse
```

### **[3.2.](#) Autonomous Systems**

Queries for information regarding autonomous system number registrations are of the form /autnum/XXX/... where XXX is an autonomous system number [[RFC5396](#)]. In some registries, registration of autonomous system numbers is done on an individual number basis, while other registries may register blocks of autonomous system numbers. The semantics of this query is such that if a number falls within a range of registered blocks, the target of the query is the block registration, and that individual number registrations are considered a block of numbers with a size of 1.

For example, to find information on autonomous system number 65551, the following path would be used:

```
/autnum/65551
```

The autnum path segment may be followed by a 'registration' or 'operator' path segment or no additional path segment, all of which follow the semantics above ([Section 3.1](#)).



### **3.3. Reverse DNS**

Queries for reverse DNS information are of the form  
/rdns/XXXXXXXXX/... where XXXX is a fully-qualified domain name  
[[RFC4343](#)] in either the in-addr.arpa or ip6.arpa zones.

For example, to find information on the zone serving the network  
192.0.2/24, the following path would be used:

```
/rdns/2.0.192.in-addr.arpa
```

The rdns path segment may be followed by a 'registration' or  
'operator' path segment or no additional path segment, all of which  
follow the semantics in [Section 3.1](#).



#### **4. Query Paramaters**

To overcome issues with misbehaving HTTP [[RFC2616](#)] cache infrastructure, clients may use the '\_\_weirds\_\_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 abuse contacts associated with the most specific IP network with the address 192.0.2.0:

```
/ip/192.0.2.0/operator/contacts/abuse?__weirds__cachebust=xyz123
```

For all others, server SHOULD ignore unknown query parameters.





## **5. Normative References**

- [RFC0791] Postel, J., "Internet Protocol", STD 5, [RFC 791](#), September 1981.
- [RFC5952] Kawamura, S. and M. Kawashima, "A Recommendation for IPv6 Address Text Representation", [RFC 5952](#), August 2010.
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- [RFC4343] Eastlake, D., "Domain Name System (DNS) Case Insensitivity Clarification", [RFC 4343](#), January 2006.
- [RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, [RFC 3986](#), January 2005.
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- [RFC5396] Huston, G. and G. Michaelson, "Textual Representation of Autonomous System (AS) Numbers", [RFC 5396](#), December 2008.



## Authors' Addresses

Andrew Lee Newton  
American Registry for Internet Numbers  
3635 Concorde Parkway  
Chantilly, VA 20151  
US

Email: andy@arin.net  
URI: <http://www.arin.net>

Kaveh Ranjbar  
RIPE Network Coordination Centre  
Singel 258  
Amsterdam 1016AB  
NL

Email: kranjbar@ripe.net  
URI: <http://www.ripe.net>

Arturo L. Servin  
Latin American and Caribbean Internet Address Registry  
Rambla Republica de Mexico 6125  
Montevideo 11300  
UY

Email: aservin@lacnic.net  
URI: <http://www.lacnic.net>

Byron J. Ellacott  
Asia Pacific Network Information Center  
6 Cordelia Street  
South Brisbane QLD 4101  
Australia

Email: bje@apnic.net  
URI: <http://www.apnic.net>

