RIPE

Specifying an 'Internet Router' in the Routing Registry

Tony Bates

Document ID: ripe-122

ABSTRACT

This paper describes a simple specification for defining an Internet router within a routing registry.

1. Introduction

It has become apparent as routing registries evolve that there is a need to register details of an Internet router (1) within the routing registry. By adding this kind of detailed information it adds functionality to information based on routing policies [1] facilitating the ability to build operational tools [2],[3] such as configuration generators and diagnostic tools within increased local information. It also provides a direct method to find a contact for an important component of the Internet infrastructure. This can be extremely useful when resolving operational problems.

The features described in this document will be usable in the RIPE database at a time specified in [17]. Please refer to this document for more details.

2. Acknowledgments

This specification is based on a similar specification by Merit Inc. for a 'route' object (2). All credit should go to them. This paper acts purely to clarify the original ideas set out in the Merit paper.

---

(1) Here an Internet router means any IP [4] node capable of running an IP routing protocol. Be that RIP, BGP or any other of the current IP based routing protocols found in the Internet today. This definition is intentionally looser than what might be found in the "Router requirements" Internet draft [5].

(2) This specification does not use 'router' as the object name to avoid possible clashes with the 'route' object which already exists within the routing registry.

3. Router Representation

The representation must be capable of representing both ‘‘interior’’ and ‘‘border’’ routers within ones own autonomous system. This said, it should be noted that the original intention of this object is to document ones border routers but does preclude interior routers. Each object is uniquely identified by its object name. Here is a simple example of a router object:

```
inet-rtr: Amsterdam.ripe.net
localas:  AS3333
ifaddr:   192.87.45.190 255.255.255.0
ifaddr:   192.87.4.28 255.255.255.0
ifaddr:   193.0.0.222 255.255.255.224
ifaddr:   193.0.0.158 255.255.255.224
peer:     192.87.45.6 AS3333 BGP4
peer:     193.0.0.219 AS2122 BGP
peer:     193.0.0.221 AS1104 BGP
peer:     192.87.4.18 AS1103 BGP4
peer:     192.87.4.24 AS1103 BGP4
peer:     192.87.4.20 AS286 BGP4
admin-c:  Daniel Karrenberg
tech-c:   Tony Bates
tech-c:   Marten Terpstra
notify:   ops@ripe.net
remarks:  The router for the RIPE NCC
changed:  tony@ripe.net 940720
source:   RIPE
```

This object provides several key pieces of information. The exact syntax for each attribute is discussed in the next section. However, some general remarks about this example are worthy of note. From this you can see immediately that this router "Amsterdam.ripe.net" is in the autonomous system 3333 and has four configured interfaces. You also see that it has several exterior peers and one interior peer (192.87.45.6). Details of the actual routing protocol are given. This can be extremely useful. For example a BGP3 (denoted above by BGP) router is not CIDR [6] capable whereas a BGP4 capable router is. A tool could use this information when examining routing policy to see if a peer can make use of aggregation. Finally, we also see who we can contact when problems occur with this router.

4. 'inet-rtr' Syntax Definition

Here is a summary of the tags associated with inet-rtr object itself and their status. The first column specifies the attribute, the second column whether this attribute is mandatory in the inet-rtr object, and the third column whether this specific attribute can occur only once per object [single], or one or more [multiple]. When specifying multiple lines per attribute, the attribute name must be repeated.

```
inet-rtr:      [mandatory]          [single]
localas:       [mandatory]          [single]
ifaddr:        [mandatory]          [multiple]
peer:          [optional]           [multiple]
tech-c:        [mandatory]          [multiple]
admin-c:       [mandatory]          [multiple]
remarks:       [optional]           [multiple]
notify:        [optional]           [multiple]
mnt-by:        [optional]           [multiple]
changed:       [mandatory]          [multiple]
source:        [mandatory]          [single]
```

Each attribute has the following syntax:

inet-rtr:

The fully qualified domain name of the router.

Format:

Fully qualified domain name without trailing "." (dot). This must be registered in the DNS. For routers with more than one DNS you should pick the one that seems most suitable. It should be noted that it is commonly general practice for a router to have single uniquely defined domain name.

Example:

```
inet-rtr: Amsterdam.ripe.net
```

Status: mandatory, only one line allowed

localas:

The autonomous system in which this router belongs.

Format:

```
AS<positive integer between 1 and 65535>
```

Example:

```
localas: AS3333
```

Status: mandatory, only one line allowed

ifaddr:

An interface address within the router.

Format:

<Interface Address> <Interface Subnet Mask>

<Interface Address> must be a "dotted-quad" represented host address.

<Interface Mask> must be the "dotted-quad" subnet mask of the interface address.

It should be noted that at least ONE ifaddr must be configured for the inet-rtr object to be valid. This facilitates the registering of route servers which may only have one interface address and are purely routing engines.

Examples:

```
ifaddr: 192.87.45.190 255.255.255.0
ifaddr: 192.87.4.99 255.255.255.0
```

Status: mandatory, multiple lines allowed

peer:

Details of any router peerings. These can be both interior or exterior.

Format:

<Peer address> <Peer AS> <Routing Protocol> [Local AS]

<Peer address> is the interface address of the remote peer. This is same format as that used in the ‘‘ifaddr’’ attribute above.

<Peer AS> is the autonomous system number of the peer. Its format is `AS<positive integer between 1 and 65535>`. It should be noted that even interior peers should have their <Peer AS> detailed.

<Routing Protocol> represents the routing protocol running between the router and the peer. This can be any one of a list of reserved routing protocol keywords as given in appendix A:

[Local AS] is an optional piece of information which allows this peering to be configured as having the router in a DIFFERENT autonomous system. This is useful only when a router is configured to ‘fake’ that it is another AS. The format of [Local AS] is "localas AS<positive integer between 1 and 65535>". The string ‘localas’ must be present for this optional information to be valid. This is only useful with protocols that allow this feature.

Example:

```
peer:     193.0.0.219 AS2122 BGP
peer:     193.0.0.221 AS1104 BGP
peer:     192.87.4.18 AS1103 BGP4
peer:     192.87.4.24 AS1103 BGP4
peer:     192.87.4.20 AS286 BGP4
peer:     192.87.4.6 AS2122 BGP4 localas AS2121
```

Status: optional, multiple lines allowed

admin-c:

Full name or uniquely assigned NIC-handle of an administrative contact person.

Format:

`<firstname> <initials> <lastname>` or `<nic-handle>`

Examples:

```
admin-c: Joe T Bloggs
admin-c: JTB1
```

Status: mandatory, multiple lines allowed

tech-c:

Full name or uniquely assigned NIC-handle of a technical contact person for this macro. This is someone to be contacted for technical problems such as misconfiguration.

Format:

`<firstname> <initials> <lastname>` or `<nic-handle>`

Examples:

```
tech-c: John E Doe
tech-c: JED31
```

Status: mandatory, multiple lines allowed

notify:

The notify attribute contains an email address to which notifications of changes to this object should be send. See [11] for more details.

Format:

`<email-address>`

The `<email-address>` should be in RFC822 domain syntax wherever possible. see

Example:

```
notify: Marten.Terpstra@ripe.net
```

Status: optional, multiple lines allowed

mnt-by:

The mnt-by attribute contains a registered maintainer name. See also [11].

Format:

`<registered maintainer name>`

Example:

```
mnt-by: RIPE-DBM
```

Status: optional, multiple lines allowed

remarks:

Remarks/comments, to be used only for clarification.

Format:

`free text`

Example:

```
remarks: This is a router
```

Status: optional, multiple lines allowed

changed:

Who changed this object last, and when was this change made.

Format:

```
<email-address> YYMMDD
```

`<email-address>` should be the address of the person who made the last change. `YYMMDD` denotes the date this change was made.

Example:

```
changed: johndoe@terabit-labs.nn 900401
```

Status: mandatory, multiple lines allowed

source:

Source of the information.

This is used to separate information from different sources kept by the same database software. For RIPE database entries the value is fixed to `RIPE`.

Format:

```
RIPE
```

Status: mandatory, only one line allowed

5. References

[1] Bates, T., Gerich, E., Joncheray, L., Joanigot, J-M, Karrenberg, D., Terpstra, M, Yu, J., "Representation of IP Routing Policies in the RIPE Database", RIPE-181, Oct, 194.

[2] PRIDE Tools Release 1.
See **ftp.ripe.net:pride/tools/pride-tools-1.tar.Z**.

[3] Merit Inc. RRDB Tools.
See **rrdb.merit.edu:pub/meritrr/***

[4] J. Postel, "Internet Protocol", RFC 791, January 1981.

[5] Kastenholz, F., draft-ietf-rreq-iprouters-require-01.txt, April, 1994, INTERNET DRAFT

[6] V. Fuller, T. Li, J. Yu, K. Varadhan, "Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy", RFC1519, Sep., 1993.

[7] Mills, D., "Exterior Gateway Protocol formal specification", RFC904, April 1984.

[8] K. Lougheed, Y. Rekhter, "A Border Gateway Protocol 3 (BGP-3)", RFC1267, October 1991.

[9] Y. Rekhter, T. Li, "A Border Gateway Protocol 4 (BGP-4)", RFC1654, January, 1994.

[10] C. Kunzinger, "ISO/IEC 10747 - Protocol for the Exchange of Inter-Domain Routing Information among Intermediate Systems to Support Forwarding of ISO 8473 PDUs", <draft-kunzinger-idrp-ISO10747-00.txt>, INTERNET DRAFT, April 1994.

[11] Karrenberg, D., Terpstra, M. "Authorisation and Notification of Changes in the RIPE Database", RIPE-120, Oct, 1994.

[12] Hedrick, C., "Routing Information Protocol", RFC1058, June, 1988.

[13] Malkin, G., "RIP Version 2 Protocol Analysis", RFC1387, June, 1993.

[14] Mills, D., "DCN local-network protocols", RFC891, December, 1983.

[15] Moy, J., "OSPF Version 2", RFC1583, March, 1994.

[16] Callon, R., "Use of OSI IS-IS for Routing in TCP/IP and Dual Environments", RFC1195, December, 1990.

[17] Bates, T., Karrenberg, D., Terpstra, T., "RIPE Database Transition Plan", RIPE-123, Oct, 1994.

6. Appendix A - List of Routing Protocol Keywords

This is a list of currently supported routing protocols supported in the "inter-rtr" object. This list will be updated regularly in the form of addenda to this document. Where a specification document exists it is referenced.

EGP
: The routers are using the exterior gateway protocol, EGP [7].

BGP
: The routers are using the exterior gateway protocol, BGP, conforming to [8]. This can mean either BGP version 2 or BGP version 3.

BGP4
: The routers are using the exterior gateway protocol, BGP, conforming to BGP version 4 [9].

IDRP
: The routers are using the exterior gateway protocol, IDRP, conforming to [10].

RIP
: The routers are using the interior routing protocol, RIP [12]

RIP2
: The routers are using the interior routing protocol, RIP2 [13]

HELLO
: The routers are using the HELLO [14] protocol.

IGRP
: The routers are using IGRP protocol from Cisco Systems Inc.

EIGRP
: The routers are using EIGRP rotocol from Cisco Systems Inc.

OSPF
: The routers are using the interior routing protocol, OSPF2 [15].

ISIS
: The routers are using the IS-IS routing protocol [16].

OTHER
: This peering is using a protocol not in one of the categories above.