Internet Routing Registries
The Internet Routing Registry (IRR)

- It is a distributed database that contains routing information
- It can be used to help debug, configure, and engineer Internet routing.
- The IRR provides information that helps to validate the contents of BGP announcement or mapping an origin AS number to a list of prefixes
- Overview of the IRR [http://www.irr.net/docs/overview.html](http://www.irr.net/docs/overview.html)
Routing Policy Specification Language (RPSL)

- RPSL is a language used to register routing policies and configurations in the IRR.
- RPSL is based on database "objects". Each database object contains some routing policy information and some necessary administrative data.
- Using RPSL in Practice http://www.irr.net/docs/rfc2650.txt
IRR Objects: Maintainer Object

It is used to provide authorization information for registrations. It lists the contact information and describes security mechanisms to update other objects.

```
mntner: MAINT-AS15169
descr: Google Inc.
admin-c: AS15169 Network Operations
tech-c: AS15169 Network Operations
upd-to: noc@google.com
mnt-nfy: noc@google.com
auth: ************
remarks: For network issues, mail: nst@google.com
remarks: For peering questions, mail: peering@google.com
notify: noc@google.com
notify: nst@google.com
mnt-by: MAINT-AS15169
changed: noc@google.com 20110527 21:45:03Z
source: RADB
```
## IRR Objects: Autonomous System Object

<table>
<thead>
<tr>
<th>aut-num:</th>
<th>AS15169</th>
</tr>
</thead>
<tbody>
<tr>
<td>as-name:</td>
<td>Google</td>
</tr>
<tr>
<td>descr:</td>
<td>Google, Inc</td>
</tr>
<tr>
<td>import:</td>
<td>from AS-ANY accept ANY AND NOT {0.0.0.0/0}</td>
</tr>
<tr>
<td>export:</td>
<td>to AS-ANY announce AS-GOOGLE AND NOT {0.0.0.0/0}</td>
</tr>
<tr>
<td>admin-c:</td>
<td>Google Network Engineering</td>
</tr>
<tr>
<td>tech-c:</td>
<td>Google Network Engineering</td>
</tr>
<tr>
<td>notify:</td>
<td><a href="mailto:noc@google.com">noc@google.com</a></td>
</tr>
<tr>
<td>mnt-by:</td>
<td>MAINT-AS15169</td>
</tr>
<tr>
<td>changed:</td>
<td><a href="mailto:joew@google.com">joew@google.com</a> 20040114</td>
</tr>
<tr>
<td>changed:</td>
<td><a href="mailto:arin-contact@google.com">arin-contact@google.com</a> 20070430 #21:54:13(UTC)</td>
</tr>
<tr>
<td>source:</td>
<td>RADDB</td>
</tr>
</tbody>
</table>

It defines the import and export policies of an AS objects.
IRR Objects: AS-SET Object

- These are used to group autonomous system objects into a set.
- AS-SET objects start with "AS-". AS-SET objects are
- Useful to specify groups with specific policies such as peers, customers, or providers.
IRR Objects: Route objects

- It defines prefixes originated from an AS
- It is grouped together with other routes of the same origin AS.

<table>
<thead>
<tr>
<th>route</th>
<th>descr</th>
<th>origin</th>
<th>notify</th>
<th>mnt-by</th>
<th>changed</th>
<th>source</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.224.0.0/14</td>
<td>Google</td>
<td>AS15169</td>
<td>radb-contact@...</td>
<td>MAINT-AS15169</td>
<td>radb-contact@... 20190109</td>
<td>RADB</td>
</tr>
<tr>
<td>35.224.128.0/19</td>
<td>Google</td>
<td>AS15169</td>
<td>noc@...</td>
<td>MAINT-AS15169</td>
<td>noc@... 20180316 #16:46:22</td>
<td>RADB</td>
</tr>
</tbody>
</table>
Queries

To query the information in the IRR you can use the “whois” command or you can use online engines:

For example you can:

```
whois -h whois.radb.net 35.228.224.0/19
```

To query all the routes originated by Google you can use the “-i” flag:

```
-i origin AS15169 [Online query]
```
Verification

RIPE Stats

https://stat.ripe.net/widget/as-routing-consistency