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Using RPSL to Confirm Peering Relationships

Author: Douglas Fernando Fischer – fischerdouglas@gmail.com
Douglas Fernando Fischer

• Control and automation engineer
• Been working with telecommunications since 1999 as pre-sales engineer and deployment in technology integrators
• Consultant in the area of networks and servers in the corporate segment and Internet providers
• EAI Telecomunicações - Brazil
• BPF – http://brasilpeeringforum.org/
• Troublemaker for a better Brazilian internet in the vacant hours
Meet Brasil Peering Forum - BPF

• The Brazil Peering Forum is a NOG (Network Operators Group).
• It has several professionals who work to make a better Brazilian Internet.
• Engaged with the community of Network and Telecommunications operators in Brazil.
• Plays instructive roles and participates in major industry events.
• It contributes to the technical and operational growth of ISPs and Internet companies.
A participação é aberta para a comunidade Internet e gratuita e acontece através dos grupos de trabalho e listas de discussão. Convidamos todos a se inscreverem e participar das discussões na LI discutidos os assuntos de interesse geral, realizados anúncios para a comunidade, aviso de publicação de novos materiais, etc. O intuito principal da lista é promover a troca de informações, aprend
participantes. Para se inscrever acesse a página sobre Participação (Listas de Discussão / Task-Forces).

Conheça os detalhes do trabalho desenvolvido pelo BPF nos links abaixo

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❖ Subscribe and keep active on the Mailing Lists. It's free!
❖ Promote the BPF work in companies and industry events!
❖ Contribute to an article of your own, which can be:
  ➢ A very objective tutorial; a how-to.
  ➢ A longer, better worked and didactic tutorial.
  ➢ A broader and deeper dissertation of a technology or method, process, framework, good practice, etc.
  ➢ Just prioritize the QUALITY of your contribution!

http://wiki.brasilpeeringforum.org/
Landmarks

• A BIG portion of IRR information isn't trustable.
  • This portion is getting bigger and bigger.
  • "You have stolen my origin validation with your empty route-objects."
• Almost all information in RPKI are trustable.
  • With Web Interfaces and APIs "dumb-proof", it can be zero.
• Possibility of using RPKI as the source of Route and Route6 objects for IRR.
  • Please note that I said "THE source" and not "one of the sources".
Objective of this presentation

• Propose a methodology that, using the already available tools and protocols, and already existent and trustable source of information, to create a "unlikely fraudulent" source to be a confirmation of Internet peering relationships.

• Based on that confirmed peering, create automated IRR AS-Sets to be used in Route-Filtering.

Maybe one step further of Path Validation
LACNIC's IRR - Injecting ROAs in IRR

"Possibility of using RPKI as the source of Route and Route6 objects for IRR."

On may 2019, in a presentation of new filtering policies of AS15169, Carlos Martinez Mentioned that LACNIC was cooking an IRR that was based on ROAs

- [https://youtu.be/OT9at07N7qM?t=1830](https://youtu.be/OT9at07N7qM?t=1830)

A Read-Only IRR?
What About AS-Sets?
**LACNIC's IRR - Injecting ROAs in IRR**

**Remark:**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
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<tbody>
<tr>
<td>11:30</td>
<td>Herramientas para la visualización de información de enrutamiento - Cómo conocer y de Gerardo Pias</td>
</tr>
<tr>
<td>12:00</td>
<td>Route leaks y RPKI: ejemplos de la vida real - Louis Poinsignon</td>
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<tr>
<td>12:15</td>
<td><strong>IRR de LACNIC: decisiones de diseño</strong> - Guillermo Cicileo</td>
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<tr>
<td>12:30</td>
<td>Evolución de Internet de 2009 a 2019: crecimiento y reducción en simultáneo - Craig Labovitz</td>
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<tr>
<td>14:00</td>
<td>Uso de BGP y uRPF para mantener la seguridad de Internet - John Brown</td>
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<tr>
<td>14:45</td>
<td>MANRS: Operadores de Red de Universidades de la Comunidad LAC - Carmen Denis, Juan Antonio Herrera</td>
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<tr>
<td>15:15</td>
<td>Observatorio MANRS - Christian Oflaherty</td>
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<tr>
<td>15:30</td>
<td><strong>Uso de RPSL para confirmar las relaciones de peering</strong> - Douglas Fischer</td>
</tr>
<tr>
<td>15:45</td>
<td>Optimización automática de peering con SDN, desafíos y soluciones - Reda Laichi</td>
</tr>
</tbody>
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LACNIC's IRR - Injecting ROAs in IRR

LACNIC's IRR

LACNIC ROAs
LACNIC's IRR - Injecting ROAs in IRR
What are the possibilities?

• Automatically Generated Route-Sets for each ASN that is referenced as Authorized(RPKI) / Origin(IRR) in LACNIC

Examples:
• RS-BYLACNIC-AS123
  • 198.51.100.0/24
• RS-BYLACNIC-AS456
  • 203.0.113.0/24
  • 192.0.2.0/24
Relationship Confirmations depend on manifestations of both sides

Did you know that now I'm dating Lara Croft?

Do you believe him?
Routing Policies on RIR/NIR - AS-IN / AS-OUT

"...using the already available tools and protocols..."

- RFC1786
Routing Policies on RIR/NIR - AS-IN / AS-OUT

"...and already existent and **trustable** source of information..."

**RFC1786** - What are the trustable sources for this information?

- All those who are responsible for the ASN delegation. RIRs, NIRs, LIRs.

- Anywhere else then the Internet Registry that did the ASN Delegation. Including all the IRRs.

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Routing Policies on RIR/NIR - AS-IN / AS-OUT

as-in: from Banner 100 accept ANY
as-out: to Banner announce Romanoff

as-in: from America 100 accept ANY
as-out: to America announce Romanoff

as-in: from Rogers 100 accept ANY
as-out: to Rogers announce Carter

as-in: from Romanoff 100 accept ANY
as-out: to Romanoff announce Banner

as-in: from Romanoff 100 accept ANY
as-out: to America announce Romanoff

as-in: from Carter 100 accept ANY
as-out: to Carter announce Rogers

as-in: from Rogers 100 accept ANY
as-out: to Carter announce Rogers

as-in: from Rogers 100 accept ANY
as-out: to Rogers announce Jabba

as-in: from Romanoff 100 accept ANY
as-out: to Rogers announce Jabba

as-in: from Romanoff 100 accept ANY
as-out: to Romanoff announce Rogers

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Routing Policies on RIR/NIR - AS-IN / AS-OUT

• AS-SET of type "They are PEER"
  • The very first step is to check the reciprocity only looking to "from" and "to" fields of routing policies.
  • It will give us a both-side CONFIRMED peering relationship
    • (of some unspecified type)

Examples:

• AS-BYLACNIC-AS123-PEERS
  • Contains AS456

• AS-BYLACNIC-AS456-PEERS
  • Contains AS123

AS123
as-in: from AS456 100 accept <something>
as-out: to AS123 announce <something>

AS456
as-in: from AS123 100 accept <something>
as-out: to AS456 announce <something>
Routing Policies on RIR/NIR - AS-IN / AS-OUT

• AS-SET of type "They are PEER"

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AS456
as-in: from AS123 accept <something>
as-out: to AS456 announce <something>

So far, all proposed is possible, for sure!

And all this being based only on RPKI and IP routing policies. Both being under the control of the Internet Registry.
Routing Policies on RIR/NIR - AS-IN / AS-OUT

And what about AS-SETs of type "This is one a Downstream of this other one"?

Can we create them Automatically?

From now on, we will have to dare a little.
Routing Policies on RIR/NIR - AS-IN / AS-OUT

• AS-SET of type "One is a Downstream of the other"
  • The next step is to look also to the fields "accept" and "announce", beyond "from" and "to".
  • Based on what one announces, and what the other one accepts, it will CONFIRM to us that one is downstream of the other.
  • In this case, an Stub ASN.

Example:
• AS-BYLACNIC-AS456-DOWNSTREAMS
  • Contains AS123

AS123
as-in: from AS456 100 accept any
as-out: to AS123 announce AS123

AS456
as-in: from AS123 100 accept AS123
as-out: to AS456 announce any
Routing Policies on RIR/NIR - AS-IN / AS-OUT

• Incrementing a bit the dept of the analysis…
• Here we have a transit ASN inside of an AS-SET of another transit ASN.
• In this example, AS456 is doing a reference to an AS-SET created from himself.
• The extra requirement in this case would be that the Automatically Generate AS-SET of the Type "Downstreams" should contain the ASN it self.

<table>
<thead>
<tr>
<th>AS456</th>
<th>as-in: from AS999 100 accept any</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>as-out: to AS999 announce AS-BYLACNIC-AS456-DOWNSTREAMS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AS999</th>
<th>as-in: from AS456 100 accept AS-BYLACNIC-AS456-DOWNSTREAMS</th>
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<tr>
<td></td>
<td>as-out: to AS456 announce any</td>
</tr>
</tbody>
</table>

Example:
• AS-BYLACNIC-AS456-DOWNSTREAMS
  • Contains AS456-DOWNSTREAMS
Conclusion

The Jedis from the beginning of the Internet had already thought of all this!

We just came to believe their solution was too complicated, and we set it aside ...

And now we're inventing much more complicated mechanisms to replace something that "seemed" complicated.

What do you think about this idea?

“You have to be what you really are.
If you're not who you are, who are you anyway?”
Doug Funnie