# LACNIC 31

## 8 de Maio de 2019

Automatização de Listas de Prefixos em Peering BGP

Como fazer e sua importância

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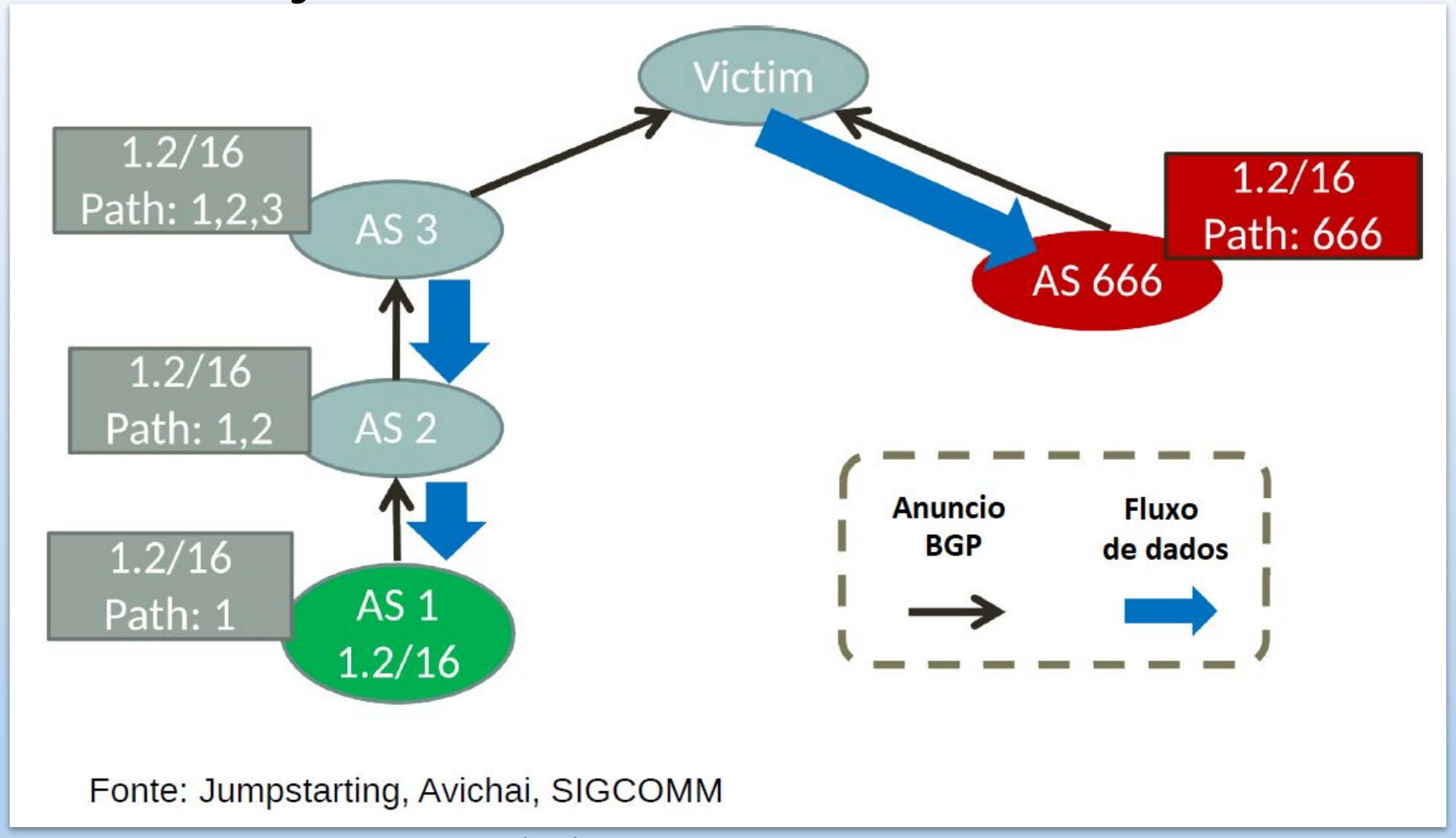
# Douglas Fernando Fischer

- Engenheiro de Controle e Automação
- Atua na área de redes de telecomunicações desde 1999
- Trabalhou como engenheiro de pré-vendas e implantação em integradores de tecnologia
- Consultor na área de redes e servidores no segmento corporativo e provedores de Internet
- BPF – http://brasilpeeringforum.org/
- Tretísta com fins produtivos nas horas vagas

# Intenções dessa Apresentação?

- Linguagem menos rebuscada - Pequenos ISPs Brasileiros.
- Coletânea de outros trabalhos.
- Route-Leak e BGP-Hijack.
- Casos Recentes que impactaram o Brasil.
- “Dedo-Gordo” vs “Má Fé”
- Oque você tem a ver com isso? – Parte 1
- Como proteger-se?
- Proteções que ajudam mas não resolvem.
    - Número máximo de prefixos.
    - AS-Path e Expressões regulares.
    - Listas de prefixos manuais
- IRR e automatização de Filtros.
- Os problemas do IRR e como estão sendo resolvidos.
- Os filtros de Prefixos do IX.BR.
- Oque você tem a ver com isso? – Parte 2

# Route-Leak e BGP-Hijack.




Fonte: Jumpstarting, Avichai, SIGCOMM

Italo Valcy italovalcy@ufba.br – GTS 29 – Foz do Iguaçu – 26/05/2017
https://youtu.be/x8GMBYwinKk?t=9460 –
ftp://ftp.registro.br/pub/gts/gts29/05-Seguranca-BGP.pdf

# Casos Recentes que impactaram o Brasil

https://bgpmon.net/todays-bgp-leak-in-brazil/

## Today's BGP leak in Brazil

*Posted by Andree Toonk – October 21, 2017 – News and Updates – No Comments*

Earlier today several people noticed network reachability problems for networks such as Twitter, Google and others. The root cause turned out to be another BGP mishap.

```
mtr -4rwc10 172.217.16.106
Start: 2017-10-21T13:26:55+0200
HOST: linux-01cz                          Loss%  Drop   Rcv   Snt  Last  Best   Avg  Wrst StDev Gmean Jttr Javg Jmax Jint
  1. AS???    10.235.224.157               0.0%     0    10    10  71.9  37.6  56.7  71.9   9.3  56.0 15.8  9.1 16.2 72.4
  2. AS62292  217.112.143.217              0.0%     0    10    10  58.8  47.0  54.8  65.2   6.2  54.5  1.3  7.1 16.7 53.2
  3. AS???    bix.he.net (193.188.137.175) 0.0%     0    10    10  45.8  45.1  55.9  69.3   7.4  55.4 16.2  7.7 16.2 92.6
  4. AS6939   100ge11-1.core1.vie1.he.net (184.105.213.249) 10.0%  1     9    10  60.0  44.7  54.6  73.4   8.8  54.0  9.7  8.2 20.6 57.5
  5. AS6939   100ge13-1.core1.par2.he.net (184.105.65.5)    0.0%     0    10    10 120.0  62.8  86.8 120.0  21.7  84.4 52.5 23.3 52.5 193.0
  6. AS6939   100ge10-2.core1.ash1.he.net (184.105.213.173) 0.0%     0    10    10 160.6 144.0 152.1 161.4   6.2 152.0 16.6  6.1 16.6 52.6
  7. AS6939   100ge8-2.core1.atl1.he.net (184.105.213.69)  0.0%     0    10    10 157.5 148.1 164.4 185.9  12.5 164.0 11.1 14.1 37.8 100.2
  8. AS6939   100ge4-1.core1.mia1.he.net (184.105.213.26)  0.0%     0    10    10 174.5 160.1 172.2 181.7   7.9 172.1  8.7  8.1 21.5 59.1
  9. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 10. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 11. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 12. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 13. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 14. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 15. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 16. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 17. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 18. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 19. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 20. AS???    ???                          100.0    10     0    10   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
 21. AS52320  200.16.70.209                80.0%     8     2    10 496.2 496.2 498.3 500.3   2.9 498.2  4.1  2.1  4.1  4.1
 22. AS???    45.6.52.32                   88.9%     8     1     9 530.5 530.5 530.5 530.5   0.0 530.5  0.0  0.0  0.0  0.0
 23. AS???    ???                          100.0     4     0     4   0.0   0.0   0.0   0.0   0.0   0.0  0.0  0.0  0.0  0.0
```

**Fusl** 🏳️‍🌈🦊
@OhNoItsFusl

Some Google services seem to have been hijacked for roughly 15 minutes. Seen anything? @atoonk @bgpmon @bgpstream MTR: xor.meo.ws/P0SYOU7j-4FtjI...

♡ 27 9:32 AM - Oct 21, 2017

23 people are talking about this

Between 11:09 and 11:27 UTC traffic for many large CDN was rerouted through Brazil. Below an example for the Internet's most famous prefix 8.8.8.0/24 (Google DNS)
At 2017-10-21 11:09:59 UTC, AS33362, an US based ISP saw the path towards Google's 8.8.8.0/24 like this:

33362 6939 16735 263361 15169

https://radar.qrator.net/blog/bgp-hijacks-malicious-or-mistakes

April 26th, 2018

## BGP hijacks - Malicious or Mistakes?

A few days ago several cybersecurity resources reported details of an entirely malicious traffic redirection that combined DNS, and BGP hijacking. The primary goal of this attack was to steal money from different cryptocurrency wallets and services. Moreover, it was successful, since Amazon did not detect it in time. Today, on April 26, another significant incident happened that seems to be also unnoticed by the majority of players.

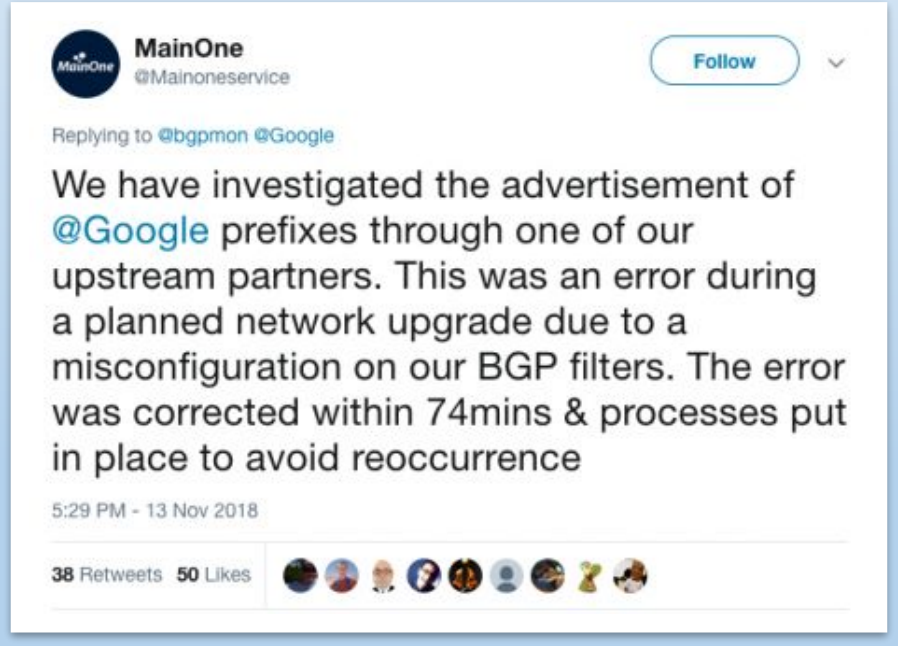
An AS267286, registered almost two years ago, stayed invisible until the event we are going to cover below when it announced 28 prefixes to the outer world. Among those 28 separate announcements **sixteen** were /8 prefixes (6,25% of IPv4 address space). This initial announcement was accepted by ASNs that belong to China Telecom (AS4134, AS4809), which in its turn propagated it to Tier1 carriers and thus helped to spread it all over the world.

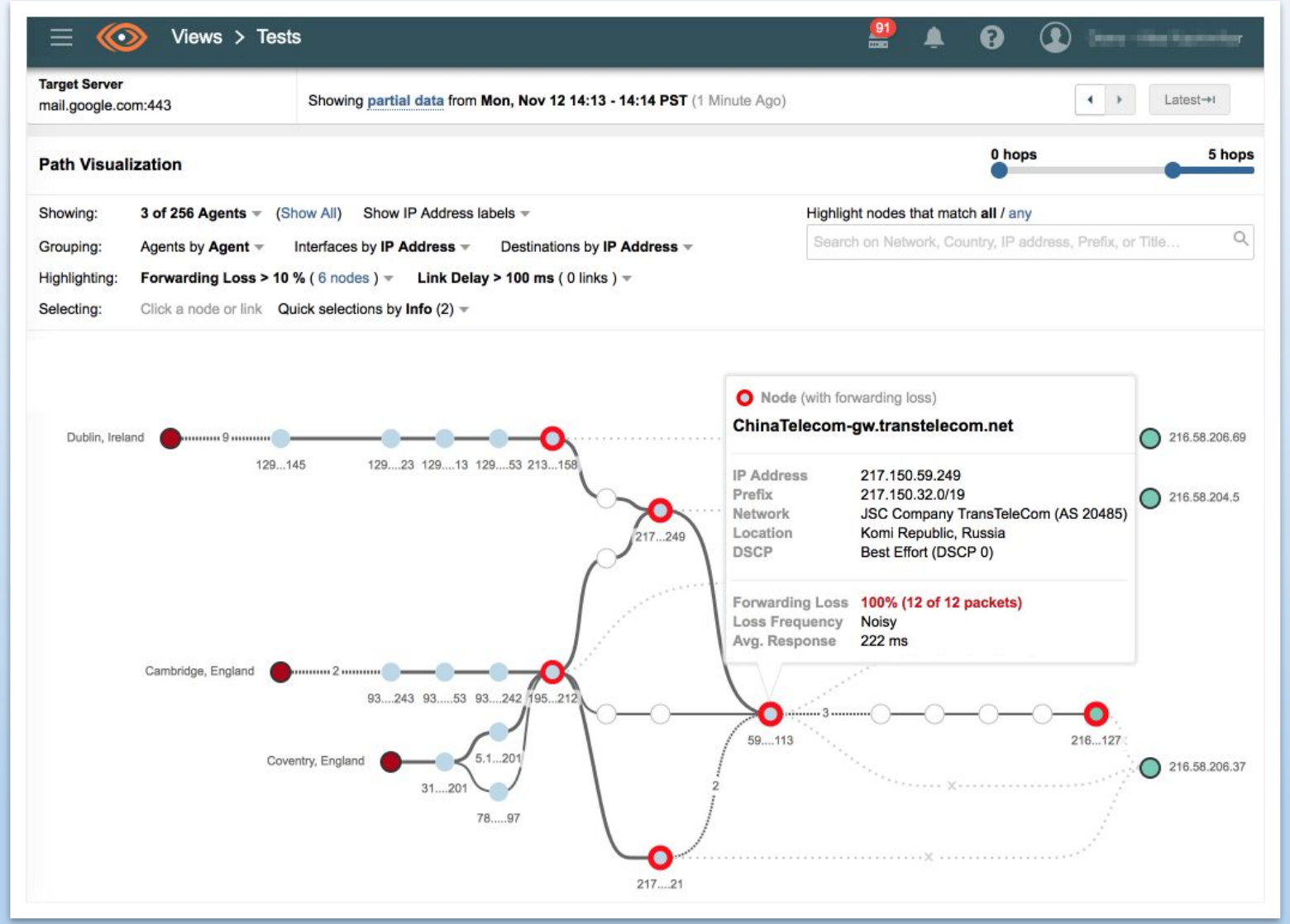
A spread of /8 prefixes on their own does not always affect end-user services or applications. To redirect traffic using /8 prefix, several conditions are necessary:

- The receiving AS has only partial view: it is connected to IX(es) and accepts all routes from that source, but accepts only default routes from upstream providers.
- The /8 is distributed through IX, while legitimate more specific routes are not present there.

With high probability, we can state that those /8 prefixes were distributed at São Paulo IX, the biggest IX in Brazil. Furthermore, several other networks were affected, of the size ranging from /24 and up to /16, belonging to several companies, including Equinix and Incapsula. There were already 5 waves with the same set of prefixes:

# Casos Recentes que impactaram o Brasil


https://blog.thousandeyes.com/internet-vulnerability-takes-down-google/

# Como acompanhar os Hijacks e Route-Leaks?

BGPStream

https://bgpstream.com

| | | | | |
|---|---|---|---|---|
| BGP Leak | *Origin AS:* PPF (AS 327730)<br>*Leaker AS:* Tanzania-e-Government-Agency (AS 327795) | 2018-12-08<br>11:24:26 | | More detail |
| Outage | IT Expert LLC (AS 44812) | 2018-12-08<br>11:13:00 | | More detail |
| Outage | Fars Province University of Medical Science and Health Care Services (AS 59506) | 2018-12-08<br>11:13:00 | | More detail |
| BGP Leak | *Origin AS:* MX Logic, Inc. (AS 14600)<br>*Leaker AS:* McAfee, Inc. (AS 7754) | 2018-12-08<br>11:12:59 | | More detail |
| BGP Leak | *Origin AS:* MCI Communications Services, Inc. d/b/a Verizon Business (AS 15133)<br>*Leaker AS:* MCI Communications Services, Inc. d/b/a Verizon Business (AS 15133) | 2018-12-08<br>08:08:05 | | More detail |
| Possible Hijack | *Expected Origin AS:* Professional Access (AS 17541)<br>*Detected Origin AS:* TATA COMMUNICATIONS (AMERICA) INC (AS 6453) | 2018-12-08<br>04:51:38 | 2018-12-08<br>05:33:42 | More detail |
| Outage | Greybeard Technology LLC (AS 395800) | 2018-12-08<br>03:51:00 | | More detail |
| BGP Leak | *Origin AS:* Headquarters, USAISC (AS 1536)<br>*Leaker AS:* DoD Network Information Center (AS 1733) | 2018-12-08<br>03:44:55 | 2018-12-08<br>03:45:23 | More detail |
| Outage | The Karcher Group Inc. (AS 26306) | 2018-12-08<br>02:48:00 | | More detail |
| BGP Leak | *Origin AS:* Headquarters, USAISC (AS 1536)<br>*Leaker AS:* DoD Network Information Center (AS 27066) | 2018-12-08<br>01:52:49 | 2018-12-08<br>07:24:30 | More detail |
| Outage | Velocityscape Services, LLC (AS 39619) | 2018-12-08<br>01:41:00 | | More detail |
| Possible Hijack | *Expected Origin AS:* RICK-NET, NL (AS 204526)<br>*Detected Origin AS:* JUSTAGUY-AS, GB (AS 210283) | 2018-12-08<br>00:18:17 | 2018-12-08<br>00:21:03 | More detail |

https://bgpstream.com/

https://twitter.com/bgpstream

# “Dedo-Gordo” vs “Má Fé”

- Se existe qualquer possibilidade de ser um equívoco, só deixe para supor má fé em **último caso**!
- Se você trabalha diariamente com BGP em nível médio há 2 anos ou mais, e nunca cometeu um erro de configuração, por favor levante a mão...

- Leak – Dedo-Gordo
  - Erro de configuração
  - Bugs de software
    - Mecanismo de Roteamento
    - Automação de Configurações
- Hijack - Má Fé
  - Concorrência
  - Ataques dirigidos
  - Posseiro de IPs não utilizados

# Oque você tem a ver com isso? – Parte 1

- Você gostaria ser acordado às 03:00am porque alguém, em algum lugar do mundo, foi fazer um rearranjo de rotas, e acabou sequestrando os prefixos do seu ASN e deixando os seu clientes sem conectividade?
- Você gostaria de ser acusado de negligência porque um de seus clientes de Trânsito cometeu algum equívoco de configuração?

- 2 Regras para vida em comunidade

(Vale também para BGP, Spoofing, e muitas outras coisas)

  - Inversão dos papéis
  - Extrapolação

# Como se proteger de Hijacks e Route-Leaks?

A parte boa da resposta é que existem algumas técnicas que pode te ajudar!

- Número máximo de prefixos
- AS-Path
- Prefix-List
  - Criados Manualmente
  - Baseados e IRR
- BGPSEc
- RPKI

A parte triste da resposta é que o que protege os seu prefixos são as ações dos outros ASNs. Ou seja:

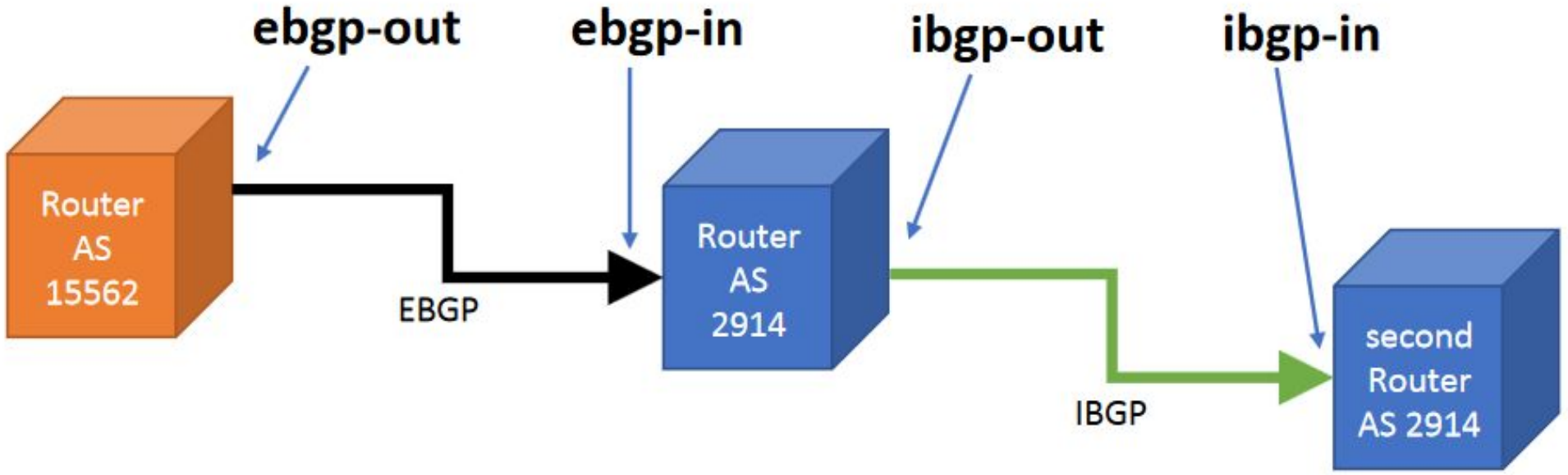
a) Se os outros forem omissos, **<u>você dança</u>**!

b) Se você for omisso, os outros dançam, e **<u>você fica com má reputação</u>**!

# Filtros de BGP – Aonde e em que direção?

- Attachment points
- Directionality

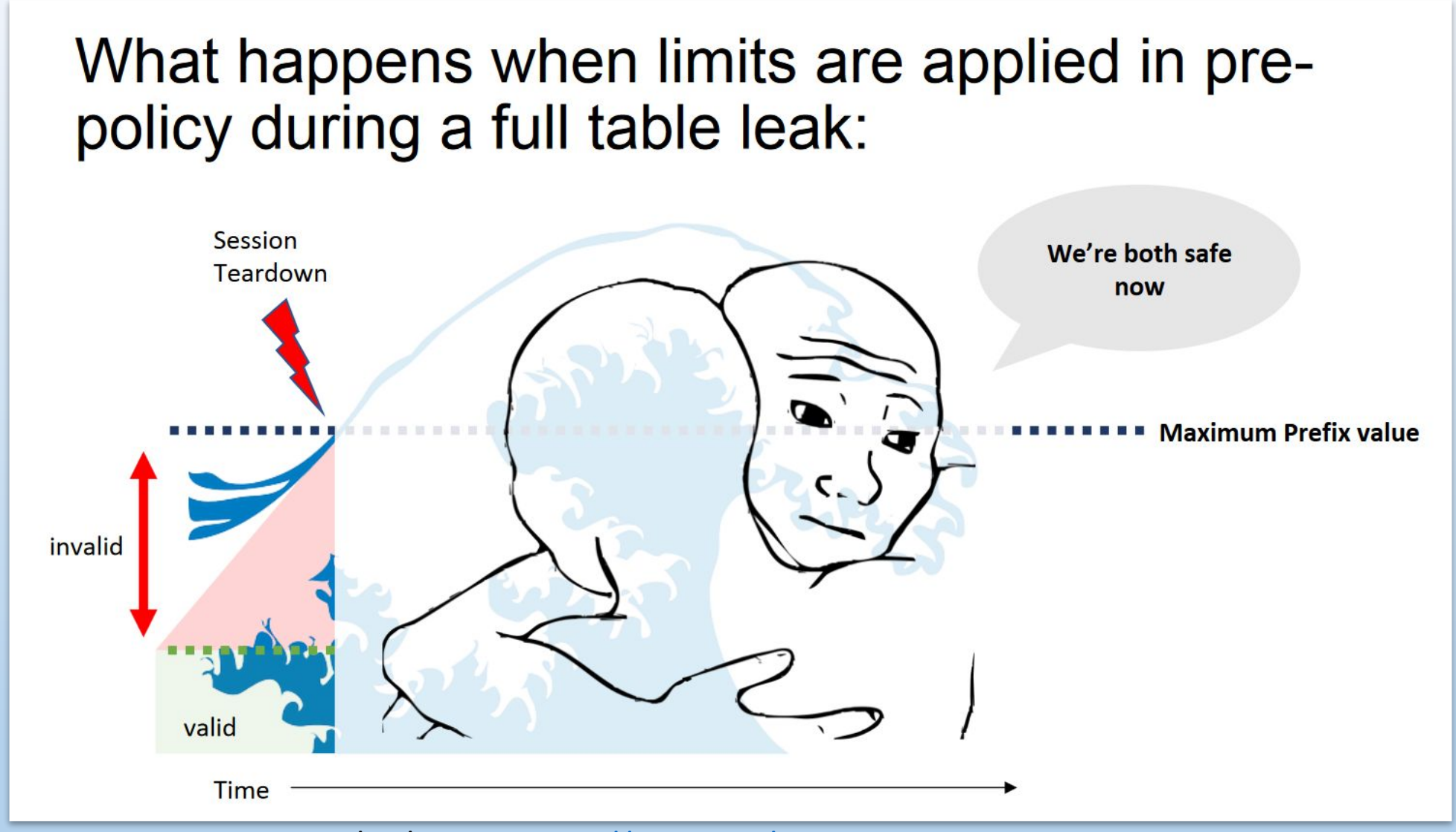
*"One man's ebgp-out is another man's ebgp-in."*
– ancient Dutch proverb




Job Snijders job@ntt.net – LACNIC 30 – Rosário – 26/09/2018 – https://youtu.be/SOA5EONXDKU
https://www.lacnic.net/innovaportal/file/3208/1/lacnic30_snijders_routing_policy_architecture.pdf

# Proteções que ajudam mas não resolvem

Número máximo de prefixos




Job Snijders job@ntt.net – LACNIC 30 – Rosário – 26/09/2018 – https://youtu.be/SOA5EONXDKU
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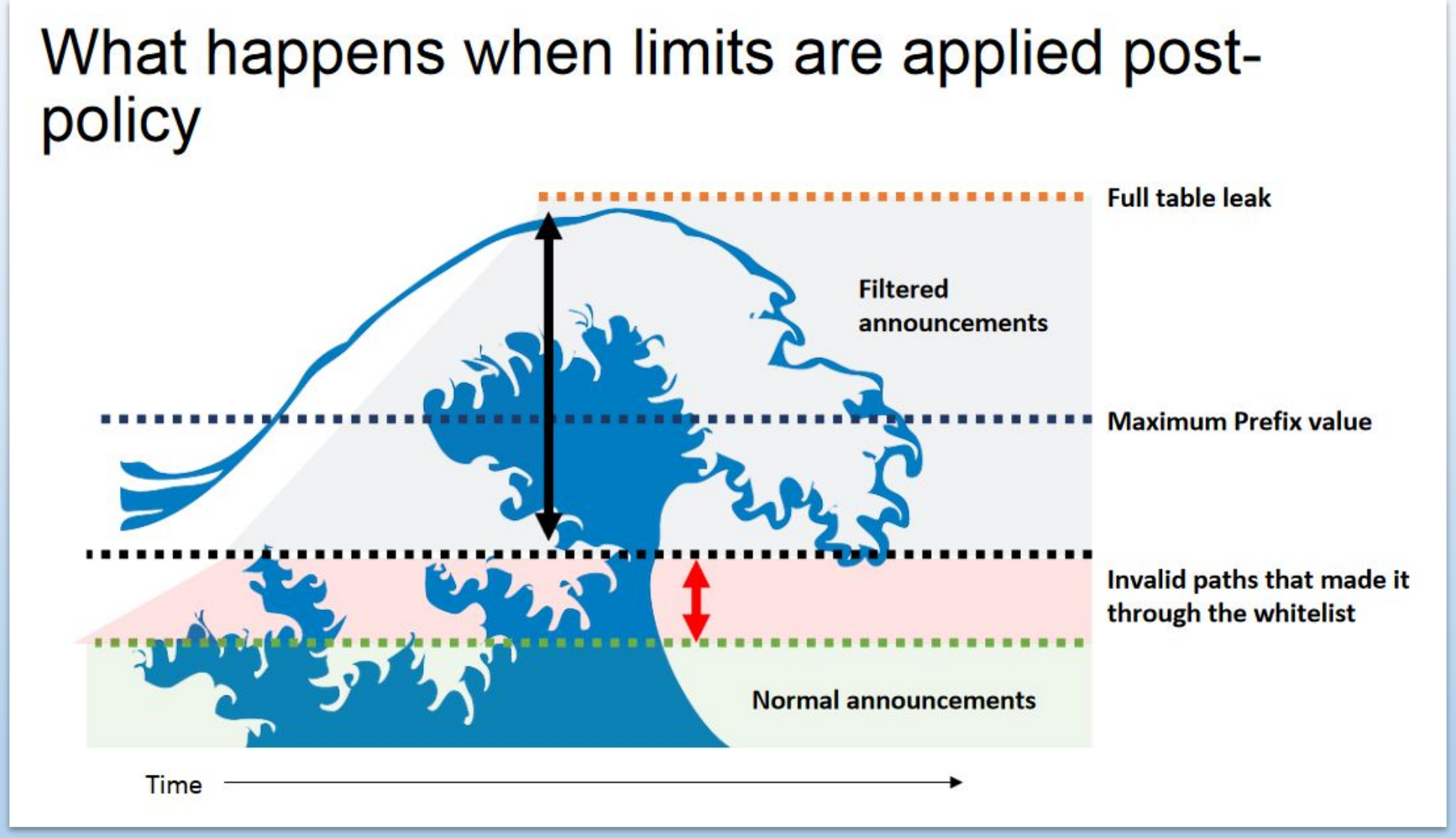
# Proteções que ajudam mas não resolvem

Número máximo de prefixos

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https://www.lacnic.net/innovaportal/file/3208/1/lacnic30_snijders_routing_policy_architecture.pdf

# Proteções que ajudam mas não resolvem

## AS-Path e Expressões Regulares

- Apostila do Rinaldo Vaz sobre BGP – Seção 4.4 – Entendendo o BGP REGEXP
- https://drive.google.com/file/d/1u_44sw8OKx4pe-iJLLO_RuSZzZ_p4g3w/view
- Ajuda a testar coisas como:
  - O ASN de origem do Prefixo
  - Quantidade de Prepends
  - Número máximo de Saltos de ASN no AS-Path
  - Se passou por algum ASN que não se deseja.
  - Se o First-AS é realmente o do ASN do peering
    - Recurso padrão em quase todas Engines BGP
    - Não muito útil em Sessões com Route-Servers de IX
- REGEXP costumam ser monothread.
- Se forem mal escritas ou mal utilizadas espancam a CPU.
- AS-Path é completamente “reescrevível”.
  - Logo, **não podemos confiar**!

# Listas de prefixo

## Filtros de entrada

### Examples

This example shows how to configure a prefix list and apply it to a Border Gateway Protocol (BGP) peer:

```
switch# configure terminal
switch(config)# ip prefix-list allowprefix 10 permit 192.0.2.0 eq 24
switch(config)# ip prefix-list allowprefix 20 permit 209.165.201.0 eq 27
switch(config) router bgp 65536:20
switch(config-router)# neighbor 192.0.2.1/16 remote-as 65536:20
switch(config-router-neighbor)# address-family ipv4 unicast
switch(config-router-neighbor-af)# prefix-list allowprefix in
switch(config-router-neighbor-af)#
```

https://www.cisco.com/c/m/en_us/techdoc/dc/reference/cli/nxos/commands/bgp/ip-prefix-list.html

```
/routing bgp peer
add instance=Internet name=MyPeer in-filter=192.0.2.1 remote-address=192.0.2.1 remote-as=65536

/routing filter
add action=accept chain=allowprefix prefix=192.0.2.0/24
add action=accept chain=allowprefix prefix=209.165.201.0/27
add action=discard chain=allowprefix comment="Explicit Deny"
```

# Listas de prefixo – O Tal “Cone de AS”

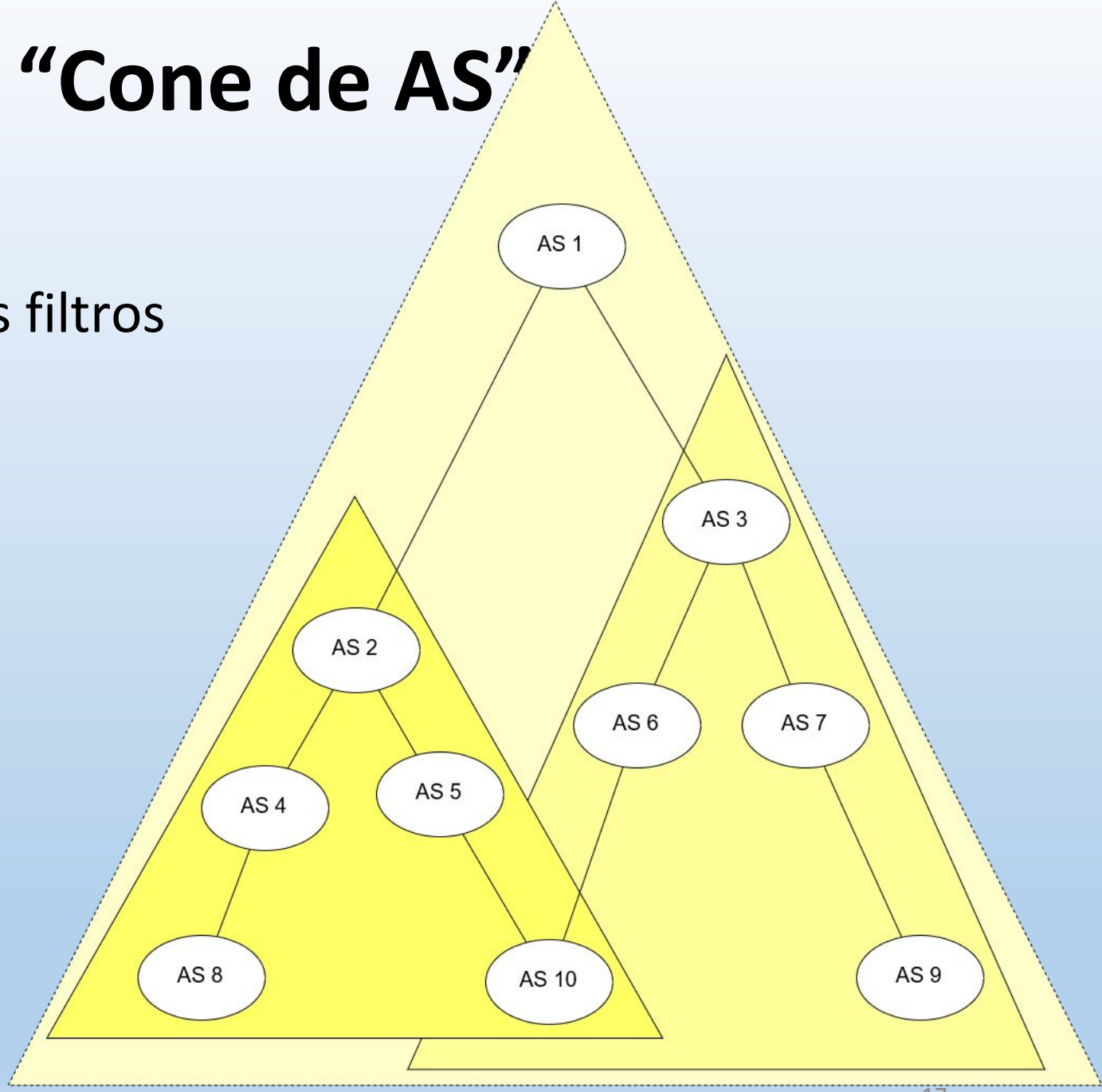
## Filtros de entrada

- Quais prefixos devem estar nos filtros de entrada?

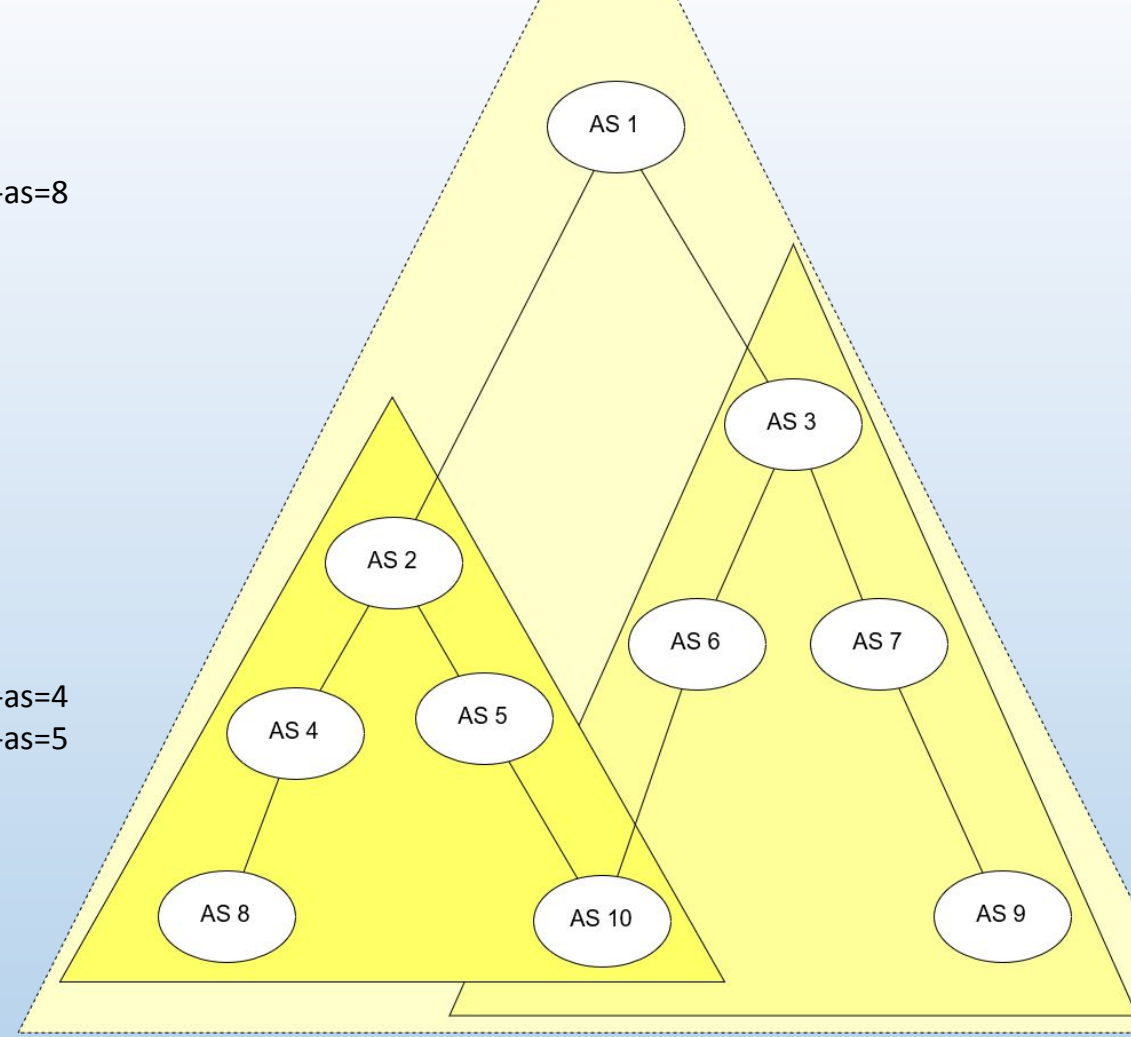
Imaginemos um Exemplo

Digamos que cada um desses ASNs tenha um prefixo que seja 10.0.<ASN>.0/16.

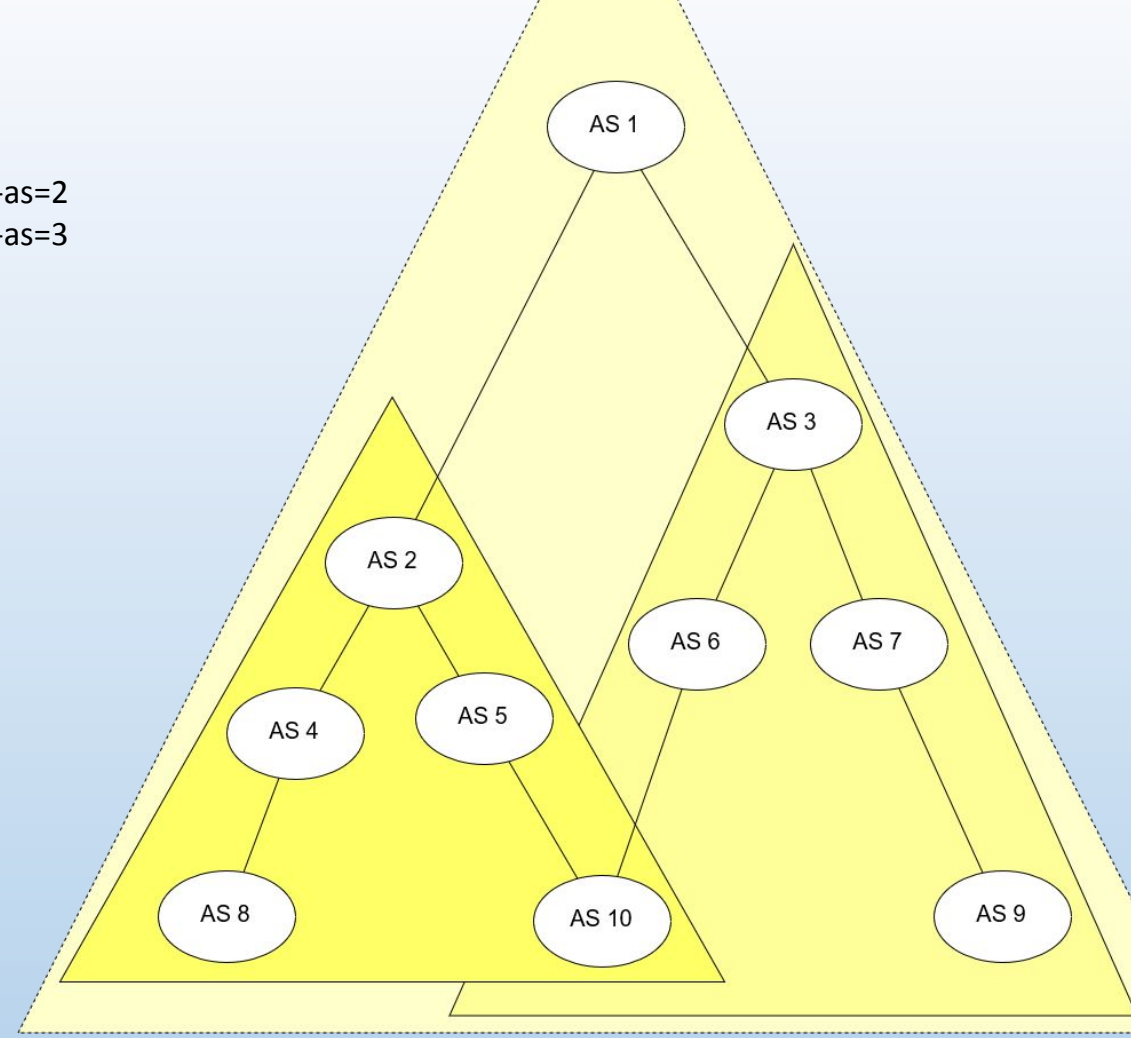
Como ficariam os filtros de entrada nos peers de downstream dos ASNs abaixo?
AS4
AS2
AS1



```
#Configs do ASN 4
#################
/routing bgp peer
add instance=Internet name=AS8-v4 in-filter=PeerFilter-AS8-v4-IN remote-address=?.?.?.? remote-as=8

/routing filter
add action=accept chain=PrefixList-AS8-v4 prefix=10.0.8.0/16 prefix-length=16-24

add action=accept  chain=PeerFilter-AS8-v4-IN match-chain=PrefixList-AS8-v4
add action=discard chain=PeerFilter-AS8-v4-IN comment="Explicit Deny"


#Configs do ASN 2
#################
/routing bgp peer
add instance=Internet name=AS4-v4 in-filter=PeerFilter-AS4-v4-IN remote-address=?.?.?.? remote-as=4
add instance=Internet name=AS5-v4 in-filter=PeerFilter-AS5-v4-IN remote-address=?.?.?.? remote-as=5

/routing filter
add action=accept chain=PrefixList-AS4-v4 prefix=10.0.4.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS5-v4 prefix=10.0.5.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS8-v4 prefix=10.0.8.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS10-v4 prefix=10.0.10.0/16 prefix-length=16-24

add action=accept  chain=PeerFilter-AS4-v4-IN match-chain=PrefixList-AS4-v4
add action=accept  chain=PeerFilter-AS4-v4-IN match-chain=PrefixList-AS8-v4
add action=discard chain=PeerFilter-AS4-v4-IN comment="Explicit Deny"

add action=accept  chain=PeerFilter-AS4-v4-IN match-chain=PrefixList-AS5-v4
add action=accept  chain=PeerFilter-AS4-v4-IN match-chain=PrefixList-AS10-v4
add action=discard chain=PeerFilter-AS4-v4-IN comment="Explicit Deny"
```



```
#Configs do ASN 1
#################
/routing bgp peer
add instance=Internet name=AS2-v4 in-filter=PeerFilter-AS2-v4-IN remote-address=?.?.?.? remote-as=2
add instance=Internet name=AS3-v4 in-filter=PeerFilter-AS3-v4-IN remote-address=?.?.?.? remote-as=3

/routing filter
add action=accept chain=PrefixList-AS2-v4 prefix=10.0.2.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS3-v4 prefix=10.0.3.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS4-v4 prefix=10.0.4.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS5-v4 prefix=10.0.5.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS6-v4 prefix=10.0.6.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS7-v4 prefix=10.0.7.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS8-v4 prefix=10.0.8.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS9-v4 prefix=10.0.9.0/16 prefix-length=16-24
add action=accept chain=PrefixList-AS10-v4 prefix=10.0.10.0/16 prefix-length=16-24

add action=accept  chain=PeerFilter-AS2-v4-IN match-chain=PrefixList-AS2-v4
add action=accept  chain=PeerFilter-AS2-v4-IN match-chain=PrefixList-AS4-v4
add action=accept  chain=PeerFilter-AS2-v4-IN match-chain=PrefixList-AS8-v4
add action=accept  chain=PeerFilter-AS2-v4-IN match-chain=PrefixList-AS5-v4
add action=accept  chain=PeerFilter-AS2-v4-IN match-chain=PrefixList-AS10-v4
add action=discard chain=PeerFilter-AS2-v4-IN comment="Explicit Deny"

add action=accept  chain=PeerFilter-AS3-v4-IN match-chain=PrefixList-AS3-v4
add action=accept  chain=PeerFilter-AS3-v4-IN match-chain=PrefixList-AS6-v4
add action=accept  chain=PeerFilter-AS3-v4-IN match-chain=PrefixList-AS7-v4
add action=accept  chain=PeerFilter-AS3-v4-IN match-chain=PrefixList-AS10-v4
add action=accept  chain=PeerFilter-AS3-v4-IN match-chain=PrefixList-AS9-v4
add action=discard chain=PeerFilter-AS3-v4-IN comment="Explicit Deny"
```



# Proteções que ajudam mas não resolvem

Prefix-Lists mantidas manualmente.

"Ain Douglas... Você está sendo bobo, feio, e chato!
Como assim prefix-list manuais não resolvem?
Não viu ali? Deu um trabalhinho, mas resolveu..."

É Besmo Abiguinho?

# Listas de prefixo – O Tal “Cone de AS”

## Filtros de entrada

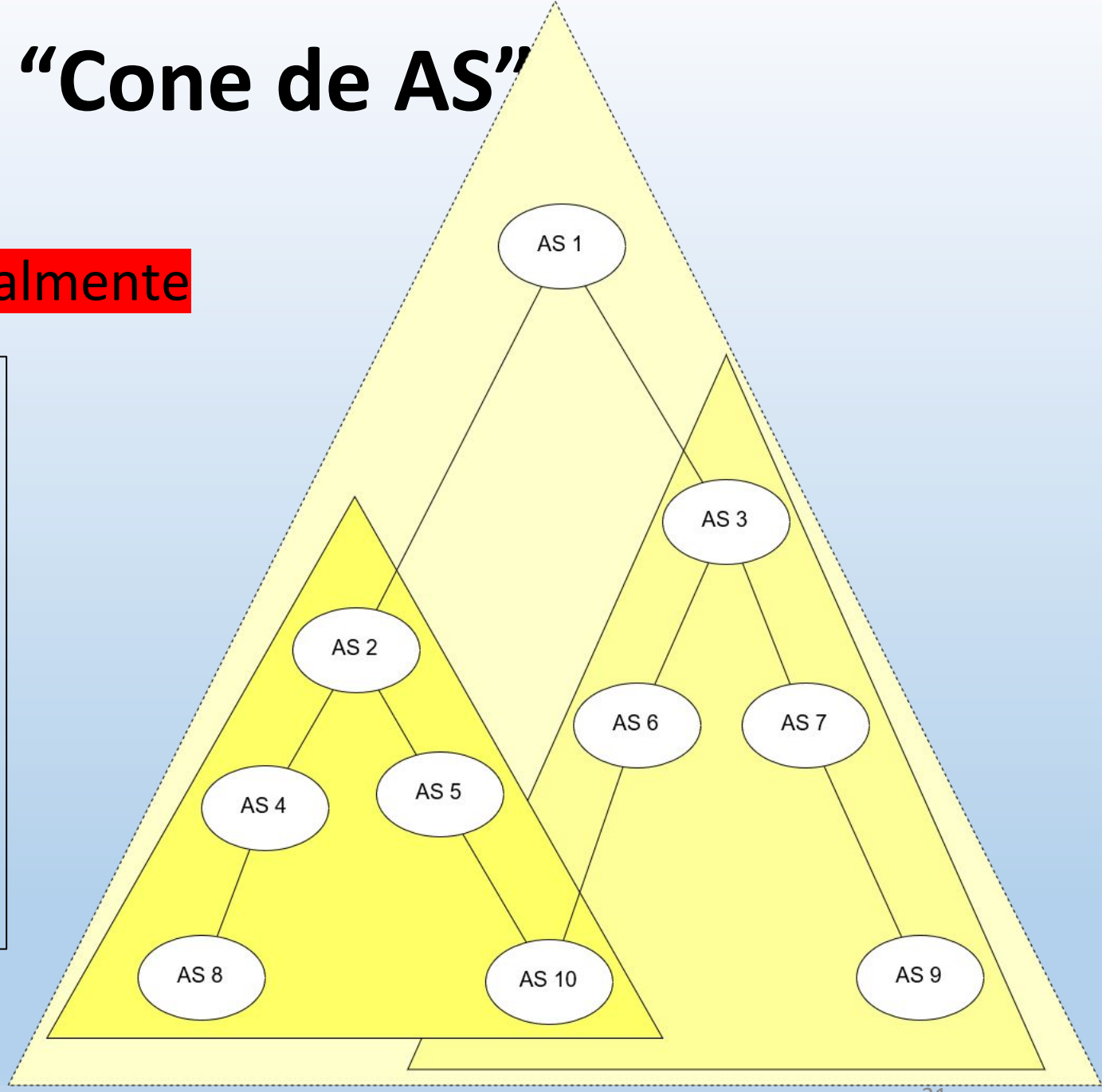
- Mantendo as prefix-lists manualmente

Agora imaginemos um novo Exemplo

Digamos que cada um desses ASNs 15-20 prefixos iniciais.

Digamos que a cada 3 meses haja uma saída ou uma entrada de prefixo de cada um desses prefixos.

Digamos que a cada mês cada um desses ASNs muda alguma dessas relações de Peering ou Trânsito.



# Proteções que ajudam mas não resolvem

Prefix-Lists mantidas manualmente.

> “Poxa, seria legal se tivesse um jeito de cada ASN cadastrar em algum lugar os prefixos que vão anunciar, e também se tivesse um jeito de saber com quem cada um desses ASNs conversa...
>
> Aí quem sabe a gente poderia criar uma forma de automatizar essas tarefas de operação de filtros.”’

# Um tal de IRR

## IRR - O que é?

- é um sistema global de bases de dados que armazenam e compartilham informações sobre políticas de roteamento.
- extende os “whois” tradicionais (registros de numeração).

3

Herbert Faleiros herbert@faleiros.eti.br – GTER 31
São Paulo – 13/05/2011 – ftp://ftp.registro.br/pub/gter/gter31/03-IRR-SCW.pdf

# Um tal de IRR

## What is the Internet Route Registry?

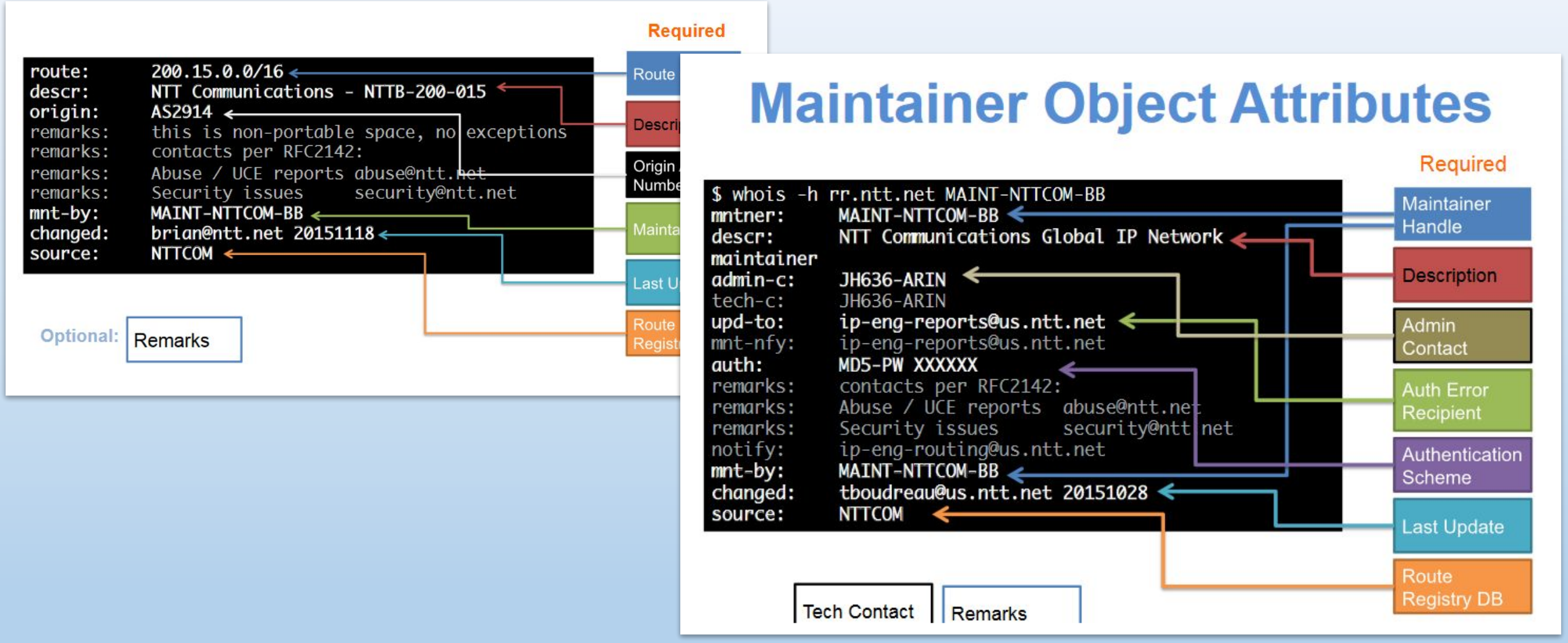
- A distributed database of route and route-related information.
- Objects are defined in the Route Policy Specification Language (RPSL - RFC 2622, RFC 4012)
- The objects in the database are publicly available for service providers and other users to utilize for various purposes

## The Three Essential Route Registry Objects

| | |
|---|---|
| **Maintainer** | Defines the person or group responsible for updating route registry objects |
| **Route** | Defines an route/AS Number relationship |
| **AS-SET** | Defines your customer cone (Customers that peer with you) |

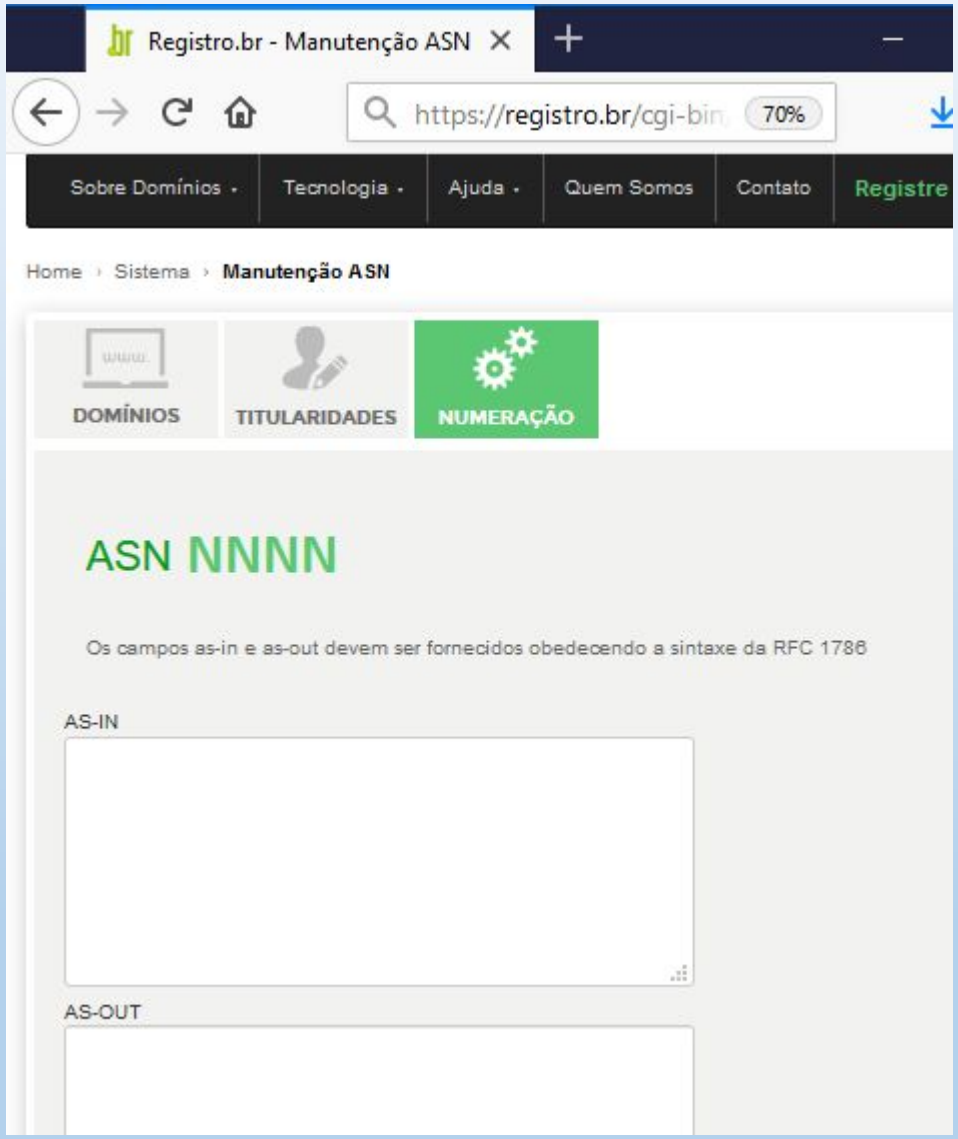
Brian Foust brian@ntt.net – IX Forum 9 – São Paulo – 07/12/2015
http://ix.br/ixforum/9/slides/ixbr9-irr.pdf – https://youtu.be/gvQzOEbWMaY?t=2h56m16s

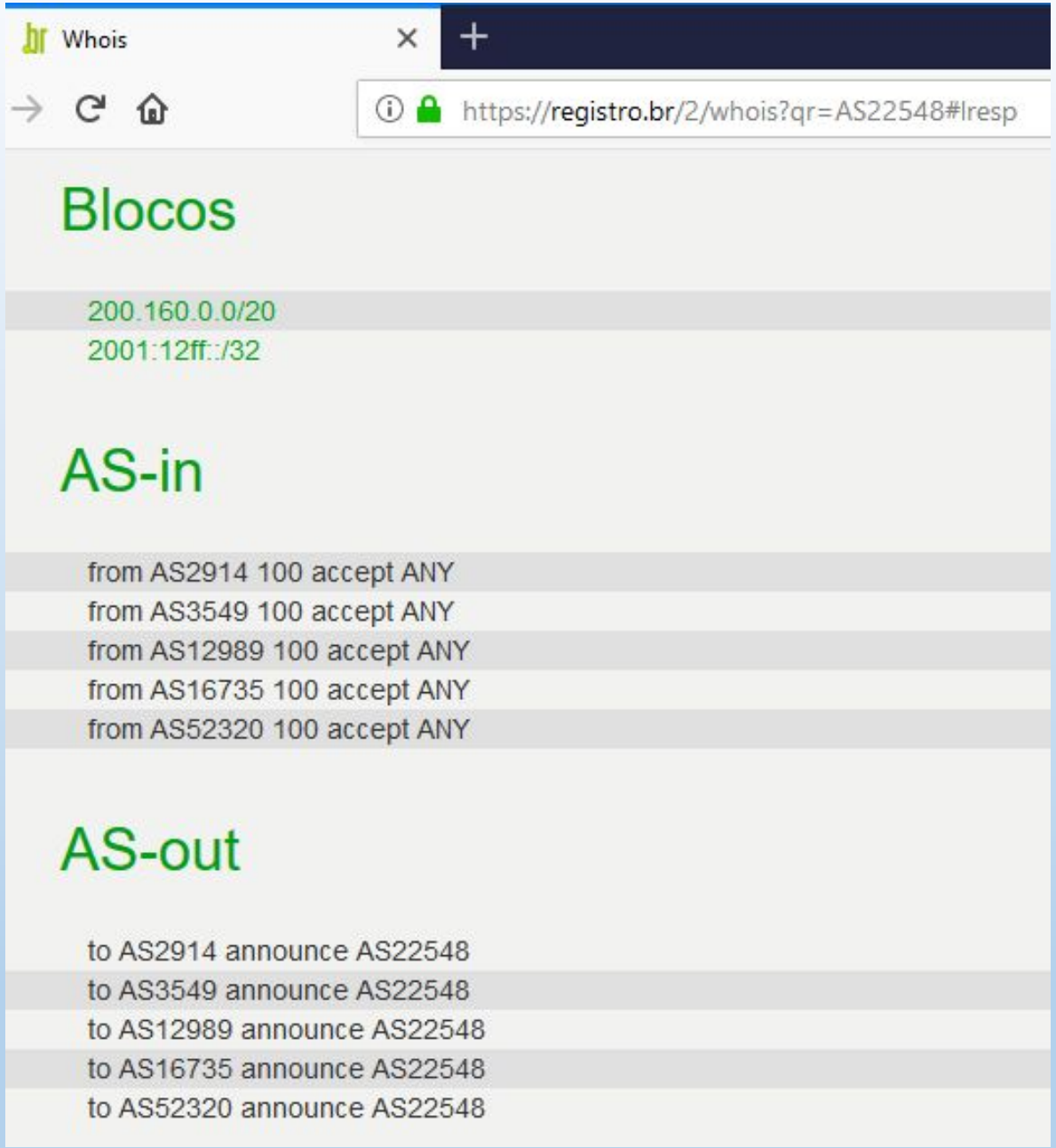
# Um tal de IRR




Brian Foust brian@ntt.net – IX Forum 9 – São Paulo – 07/12/2015
http://ix.br/ixforum/9/slides/ixbr9-irr.pdf – https://youtu.be/gvQzOEbWMaY?t=2h56m16s

# Já viram essas telinhas?



# IRR Explorer

http://irrexplorer.nlnog.net/search/22548

AS Number: 22548

irrexplorer.nlnog.net/search/22548

## AS Number: 22548

### Prefixes

| prefix | bgp | radb | advice |
|---|---|---|---|
| 200.128.0.0/9 | | 7465,14650 | Not seen in BGP, but (legacy?) route-objects exist, consider clean-up |
| 200.160.0.0/20 | 22548 | 22548 | Looks good: BGP origin consistent with AS in route-objects |
| 2001:12ff::/32 | 22548 | 22548 | Looks good: BGP origin consistent with AS in route-objects |

Showing 1 to 3 of 3 entries

Offending prefixes are only found if initial prefix sets is smaller than 1000

### Included in the following macros:

| as_macro | nttcom | radb | level3 | tc | altdb | ripe |
|---|---|---|---|---|---|---|
| AS-CTBC-CUSTOMERS1 | | ✓ | | | | |
| AS-DNS-BR | | ✓ | | | | |
| AS-EMBRATELNET | ✓ | ✓ | | | | |
| AS-GNT-CUSTOMERS | | ✓ | | | | |
| AS-HURRICANE | | ✓ | | | | |
| AS-HURRICANE-DT | | ✓ | | | | |
| AS-HURRICANEV6 | | ✓ | | | | |

# Ferramentas para automatização

## IRR – Ferramentas de Apoio

**IRRToolSet**[29]

- conjunto de ferramentas destinadas à manipulação de políticas de roteamento

**IRR Power Tools**[30]

- monitora e gerencia objetos IRR

**BGPQ3**[31]

- versão simplificada do rtconfig

29

Herbert Faleiros herbert@faleiros.eti.br – GTER 31
São Paulo – 13/05/2011 – ftp://ftp.registro.br/pub/gter/gter31/03-IRR-SCW.pdf

# Ferramentas para automatização – bgpq3

For Cisco we can use aggregation (-A) flag to make this prefix-filter more compact:

```
user@host:~>bgpq3 -Al eltel AS20597
no ip prefix-list eltel
ip prefix-list eltel permit 81.9.0.0/20
ip prefix-list eltel permit 81.9.32.0/20
ip prefix-list eltel permit 81.9.96.0/20
ip prefix-list eltel permit 81.222.128.0/20
ip prefix-list eltel permit 81.222.192.0/18
ip prefix-list eltel permit 85.249.8.0/21
ip prefix-list eltel permit 85.249.224.0/19
ip prefix-list eltel permit 89.112.0.0/18 ge 19 le 19
ip prefix-list eltel permit 89.112.4.0/22
ip prefix-list eltel permit 89.112.64.0/19
ip prefix-list eltel permit 217.170.64.0/19 ge 20 le 20
```

https://github.com/snar/bgpq3

Generating named Juniper prefix-filter for `AS20597` :

```
user@host:~>bgpq3 -Jl eltel AS20597
policy-options {
replace:
 prefix-list eltel {
    81.9.0.0/20;
    81.9.32.0/20;
    81.9.96.0/20;
    81.222.128.0/20;
    81.222.192.0/18;
    85.249.8.0/21;
    85.249.224.0/19;
    89.112.0.0/19;
    89.112.4.0/22;
    89.112.32.0/19;
    89.112.64.0/19;
    217.170.64.0/20;
    217.170.80.0/20;
 }
}
```

# Ferramentas para automatização – bgpq3

# “Mas e o mititiki?”

**Douglas Fischer** <fischerdouglas@gmail.com> seg, 23 de jul 12:13

para Grupo

Resolvi reler com mais atenção a documentação do BGPQ3, e encontrei a parte de User-Defined Format.
https://github.com/snar/bgpq3#user-defined-format
Acredito que deve estar bem fácil de resolver só com esse recur

```
arp@arpoador:~/bgpq3$ bgpq3 -F "add action=accept chain=PrefixL
prefix-length=%l-24 \\n" as3254
add action=accept chain=PrefixList-LuckyNet-V4-Automated prefix
add action=accept chain=PrefixList-LuckyNet-V4-Automated prefix
add action=accept chain=PrefixList-LuckyNet-V4-Automated prefix
add action=accept chain=PrefixList-LuckyNet-V4-Automated prefix
add action=accept chain=PrefixList-LuckyNet-V4-Automated prefix
add action=accept chain=PrefixList-LuckyNet-V4-Automated prefix
add action=accept chain=PrefixList-LuckyNet-V4-Automated prefix
```

Montei um exemplo MUITO SIMPLES de filtragem(apenas prefixos) c
Cenário hipotético onde a Lucky Net (as3254) fosse Downstream d

## MikroTik Support #48

Open **cdavid14** wants to merge 4 commits into `snar:master` from `cdavid14:master`

Conversation 0 | Commits 4 | Checks 0 | Files changed 4

**cdavid14** commented on 13 Dec 2018

Some functions for MikroTik support added.

1

**cdavid14** added some commits on 13 Dec 2018

- Mikrotik Dev(part 1)
- Mikrotik Dev(part 2)
- README Update
- README Update 2

https://eng.registro.br/pipermail/gter/2018-July/074807.html

# Ferramentas para automatização

Colocando essas prefix-list pra dentro do seu router.

- SSH + BASH + Cron
  - Funciona, porém é engessado, difícil de manter e é feio.
- Ansible – https://docs.ansible.com/
  - Trabalhoso de iniciar, depende dos módulos para cada sintaxe.
- Napalm – https://github.com/napalm-automation/napalm
  - Acabei de conhecer, mas aparenta ser algo muito funcional.

- Problemas com o RouterOS
  - Resend involuntário quando se altera os filtros.

# Relembrando do nosso desafio

Agora imaginemos um novo Exemplo

Digamos que cada um desses ASNs 15-20 prefixos iniciais.

Digamos que a cada 3 meses haja uma saída ou uma entrada de prefixo de cada um desses prefixos.

Digamos que a cada mês cada um desses ASNs muda alguma dessas relações de Peering ou Trânsito.

# IRR – Quais são os problemas

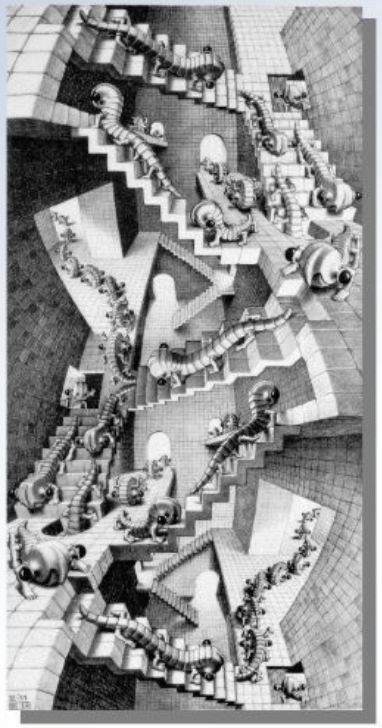
## IRR – what is broken what can be fixed?

- Some IRRdbs do not perform validation
  - Meaning that virtually anyone can create virtually any route/route6 object and sneak those into the prefix-filters
- Eleven relevant IRRs not validating: RIPE, NTTCOM, RADB, ALTDB, ARIN IRR, BBOI, BELL, LEVEL3, RGNET, TC, CANARIE
- Two solutions:
  - Lock the database down (RIPE / RIPE-NONAUTH)
  - Filter on the mirror level

Job Snijders job@ntt.net – LACNIC 30 – Rosário – 26/09/2018
https://www.lacnic.net/innovaportal/file/3135/1/lacnic30_snijders_routing_security_roadmap.pdf

Herbert Faleiros herbert@faleiros.eti.br
GTER 31 – São Paulo – 13/05/2011
ftp://ftp.registro.br/pub/gter/gter31/03-IRR-SCW.pdf

## IRR – e no Brasil?



- cerca de 80% dos prefixos nacionais anunciados tem IRR[28]
- destes, 80% deles são proxies
- apenas 60% são válidos

27

# IRR – Ações para resolver os problemas

## ARIN community also recognized this is an issue

- Consultation at NANOG and through ARIN-Consult mailing list
- https://www.arin.net/vault/resources/routing/2018_roadmap.html
- https://teamarin.net/2018/07/12/the-path-forward/

ALMOST SO

*"Improve, or kill it"*

## RIPE NWI-5 proposal & implementation

- RIPE NCC's IRR previously allowed anyone to register any non-RIPE-managed space if it had not yet been registered. *DANGER*
- The "RPSL" password & maintainer was used for this

SOLVED

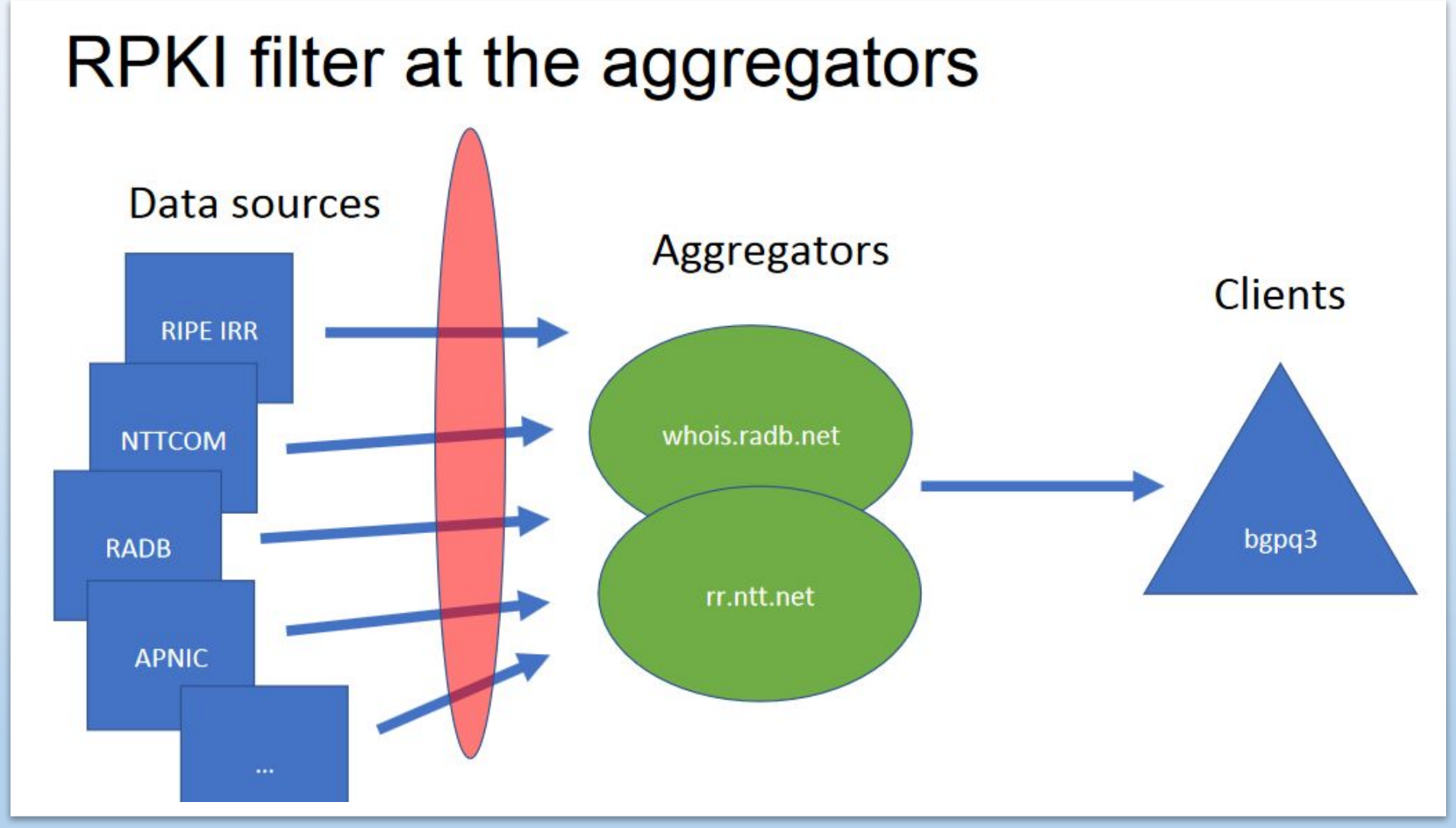
Three steps were taken:

- Cannot register non-RIPE-managed space any more
- All non-RIPE space moved to separate "RIPE-NONAUTH" database
- Route/route6 ASN authorization rules have been improved

More info: https://www.ripe.net/manage-ips-and-asns/db/impact-analysis-for-nwi-5-implementation

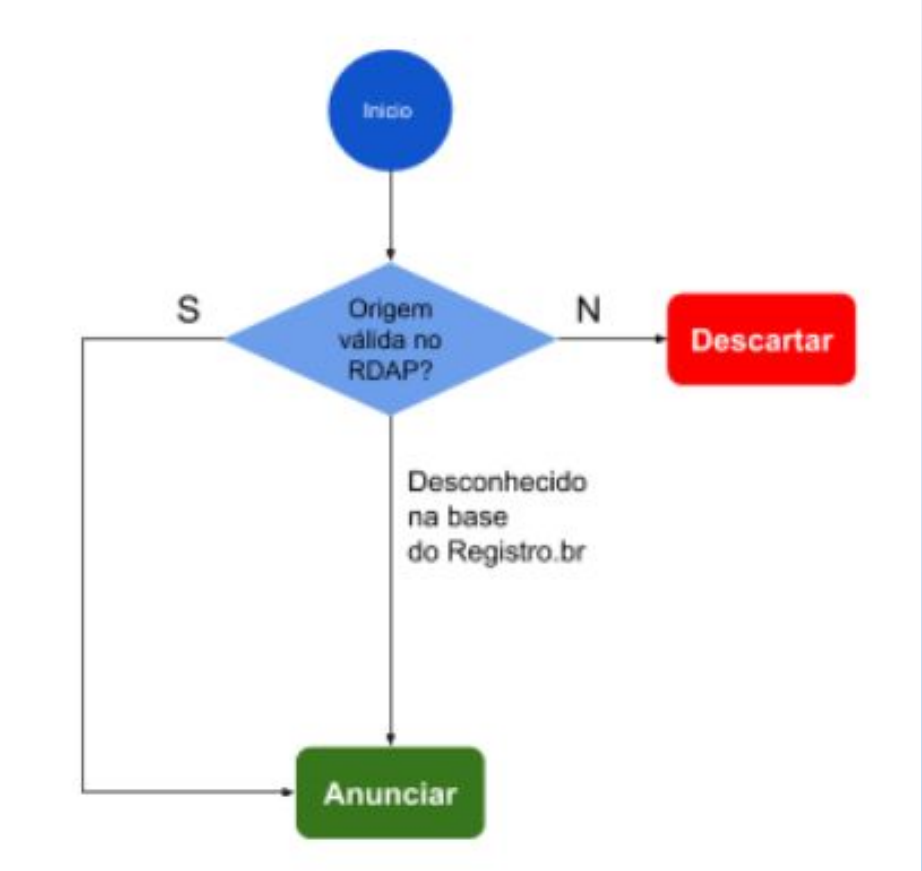
Job Snijders job@ntt.net – LACNIC 30 – Rosário – 26/09/2018
https://www.lacnic.net/innovaportal/file/3135/1/lacnic30_snijders_routing_security_roadmap.pdf

# IRR – Ações para resolver os problemas

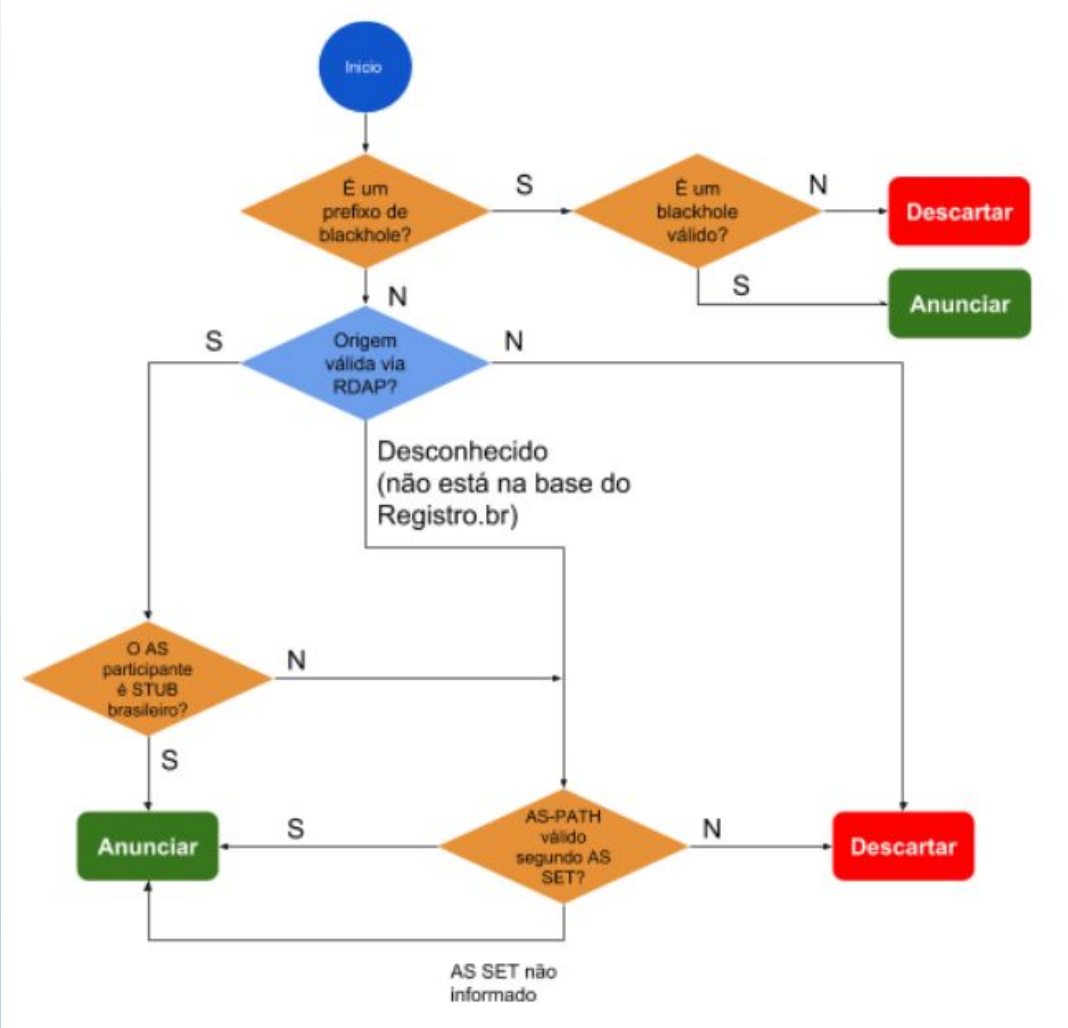



Job Snijders job@ntt.net – LACNIC 30 – Rosário – 26/09/2018
https://www.lacnic.net/innovaportal/file/3135/1/lacnic30_snijders_routing_security_roadmap.pdf

# Filtros no IX.BR http://ix.br/doc/solicitacao-comentarios-acoes-seguranca-ix-br-20180713.pdf

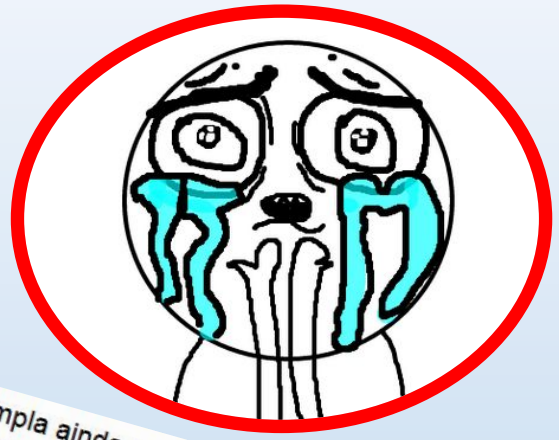



os filtros serão implementados a MÉDIO prazo.

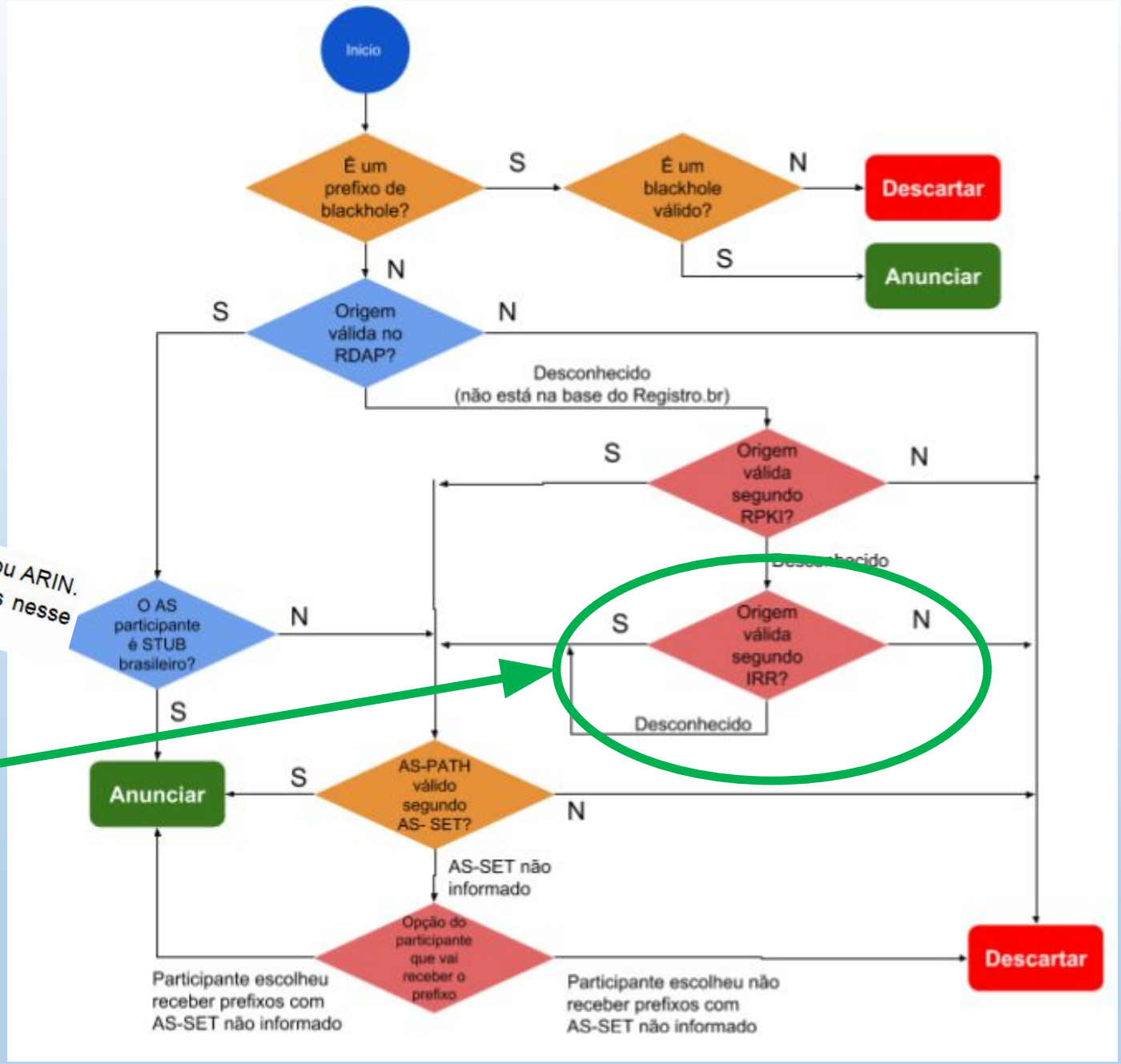



os filtros serão implementados a LONGO prazo.

# Filtros no IX.BR



O diagrama de LONGO prazo não contempla ainda os filtros utilizando RDAP do LACNIC ou ARIN. São necessários estudos adicionais para determinar a exata forma como serão inseridos nesse fluxograma.

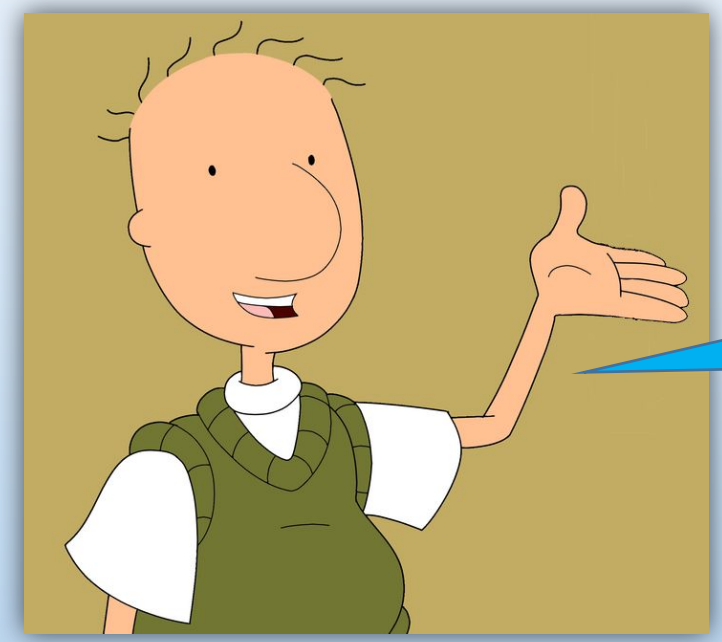


# Oque você tem a ver com isso? – Parte 2

- Se você é cliente de trânsito
  - Faça seu cadastro numa base IRR.
    - RADB
      - Excelente Back-End, excelente Front-End, ótimo atendimento.
      - IRR default para consultas do BGPq3 e do IRRToolset.
      - Não é “di grátis”.
    - TC (bgp.net.br)
      - Excelente Back-End, excelente Back-End, ótimo Back-End.
      - É “di grátis”.
      - Não faz proxyed.
  - Cadastre sua Routing Policy no Site do Registro.

# Oque você tem a ver com isso? – Parte 2

- Se você é fornecedor de trânsito
  - Defina e **publique** uma politica de roteamento
    - Tenha suporte ao básico de Communities
      - Aceite BlackHole, e faça o descarte corretamente.
      - Marque com comunities as origens de onde aprendeu os prefixos que está repassando (Ex.: Trânsito Nacional, trânsito internacional, IX, CDN)
  - Utilize um mecanismo automático de criação de listas de prefixos.
  - Aplique com rigor filtros de eBGP-in, eBGP-out, iBGP-in, iBGP-out.
  - Exija que seu clientes tenham registros de IRR.
    - Ajude-os a fazer se necessário.



# Perguntas?

*“Você tem que ser o que você realmente é.*

*Pois se você não for quem você é, afinal quem é você?”*

Doug Funnie