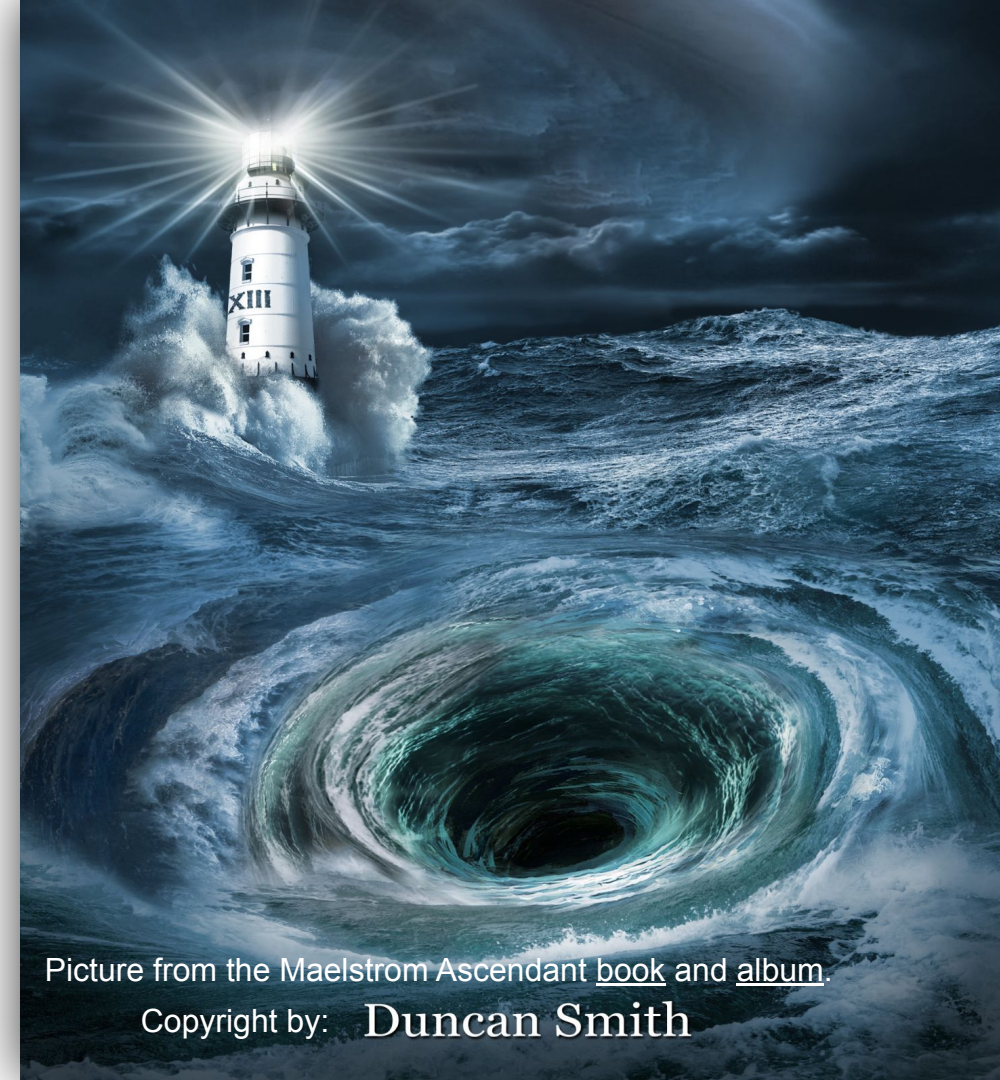
Measuring Route Origin Validation

Setting up a useful RPKI Beacon

Willem Toorop
20 March 2022
IEPG at IETF113 Vienna



Picture from the Maelstrom Ascendant book and album.
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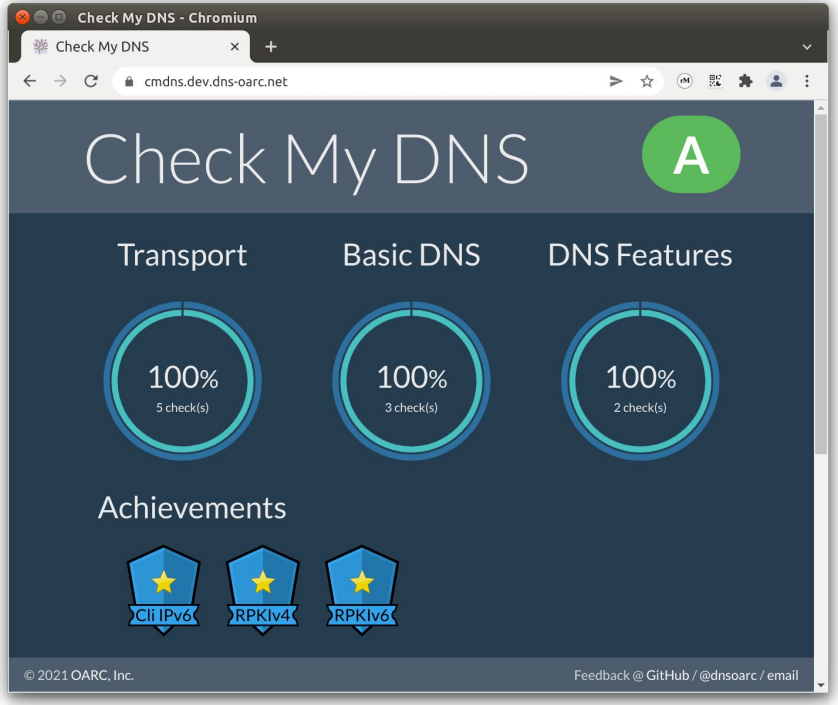
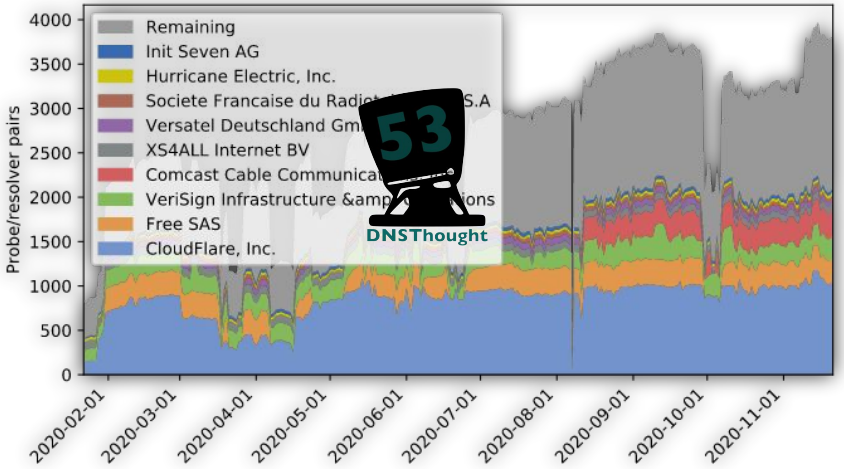
Why this presentation

- I had to setup an RPKI Beacon, but I'm not an RPKI expert
- I need your opinion – does what I did make sense
- I need your brains – how to best measure ROV?
- I want the beacon to be usable (available) for you too!
- We could also use some additional IPv4 resources 😁

Genesis

- I do DNS measurements (with RIPE Atlas mostly)
- Job Snijders offered to use his RPKI Beacon during IMC2019 in Amsterdam 🙏💖
- Started measuring the uptake Of Route Origin Validation since Januari 2020
- Job's beacon EOL in Oct. 2020





The Current State of DNS Resolvers and RPKI Protection

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ABSTRACT

The goal of this research was to gain insight into the Resource Public Key Infrastructure (RPKI) protection state of DNS resolvers. RIPE Atlas Probes were used to send DNS queries to an authoritative DNS server. This server contained Resource Records in both an RPKI valid and invalid prefix. The RIPE Atlas probes were instructed to send their queries

security, it is not broadly adopted [7, 8]. For this reason, this paper will focus on RPKI.

Due to the distributed nature of BGP and RPKI, the majority of network operators should sign their network prefixes and implement RPKI filtering to minimize prefix hijacks and route leaks [9]. A study conducted in 2019 claims that between 9.98% and 11.28% of the BGP announcements are verifiable using RPKI [10].

Re-evaluate setup - before

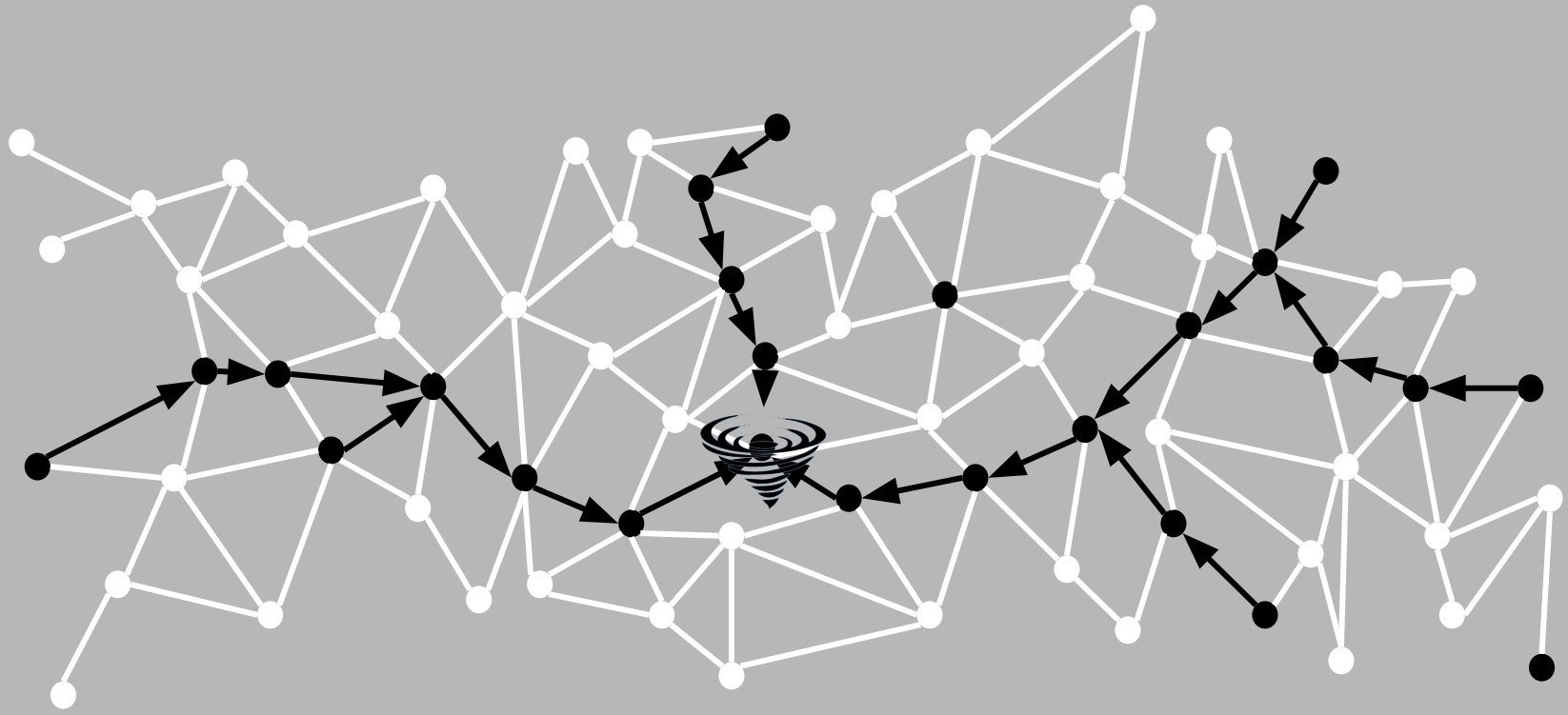
- Invalid IPv4 /24 & IPv6 /48 + /24 & /48 valids for reference

  ✔ If endpoint validates → invalid = unreachable

  ✗ If any hop in between validates → invalid = unreachable

  ✗ Validating hop may be in return path

Re-evaluate setup - before



Re-evaluate setup - before

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  ✔ If endpoint validates → invalid = unreachable

  ✗ If any hop in between validates → invalid = unreachable

  ✗ Validating hop may be in return path

  ✗ Is this a realistic route hijack?

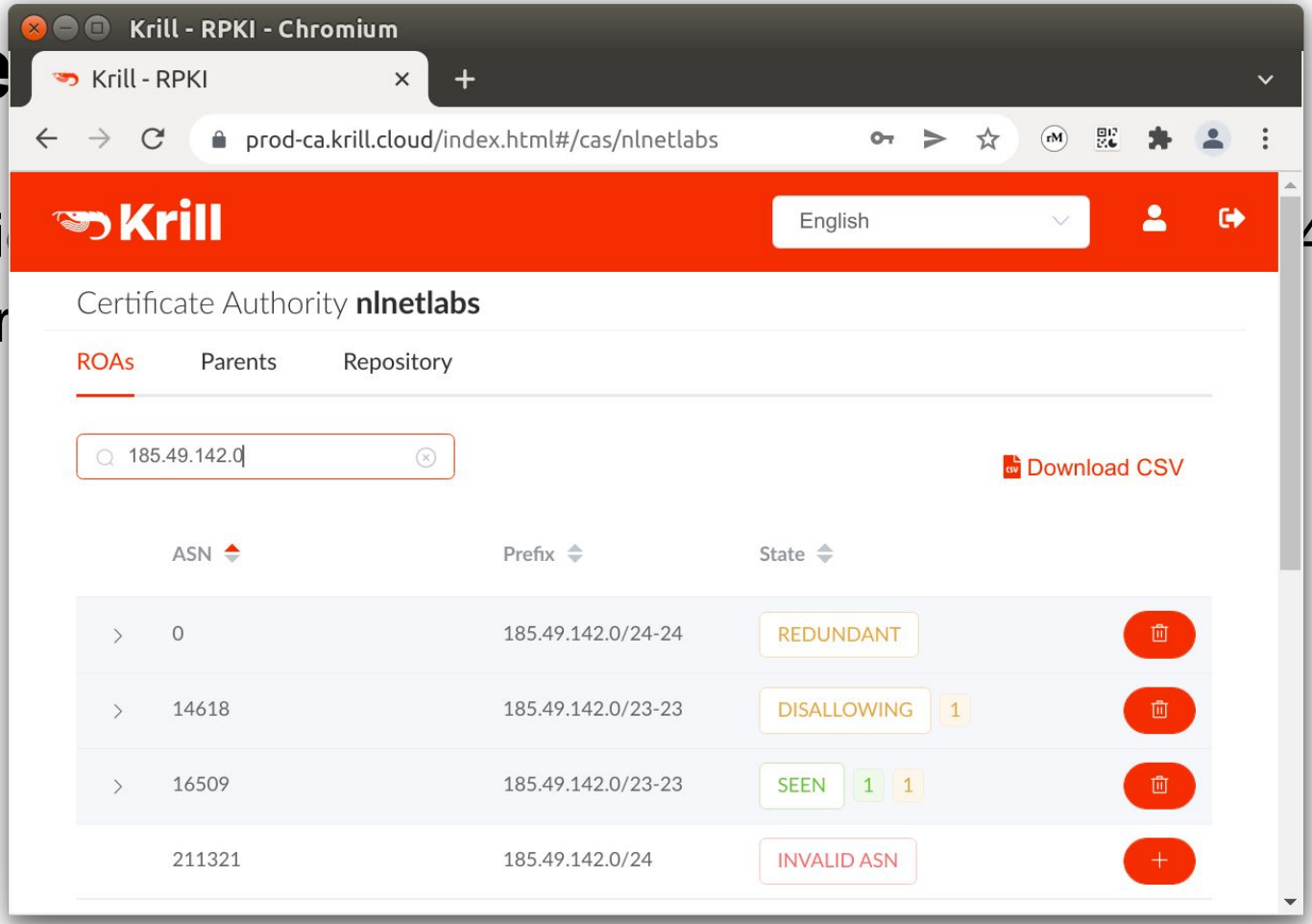
  ✗ Unreachable detection based on timeout

Re-evaluate setup - new setup

- Valid /23 (IPv4) and /47 (IPv6) and Invalid /24 and /48 more specific announcements from elsewhere
  - ✔ More realistic route hijack?
  - ✔ Don’t have to wait for timeouts!

Re-e

- Vali 48
mor



Re-evaluate setup - new setup

- Valid /23 (IPv4) and /47 (IPv6) and Invalid /24 and /48 more specific announcements from elsewhere

  ✔ More realistic route hijack?

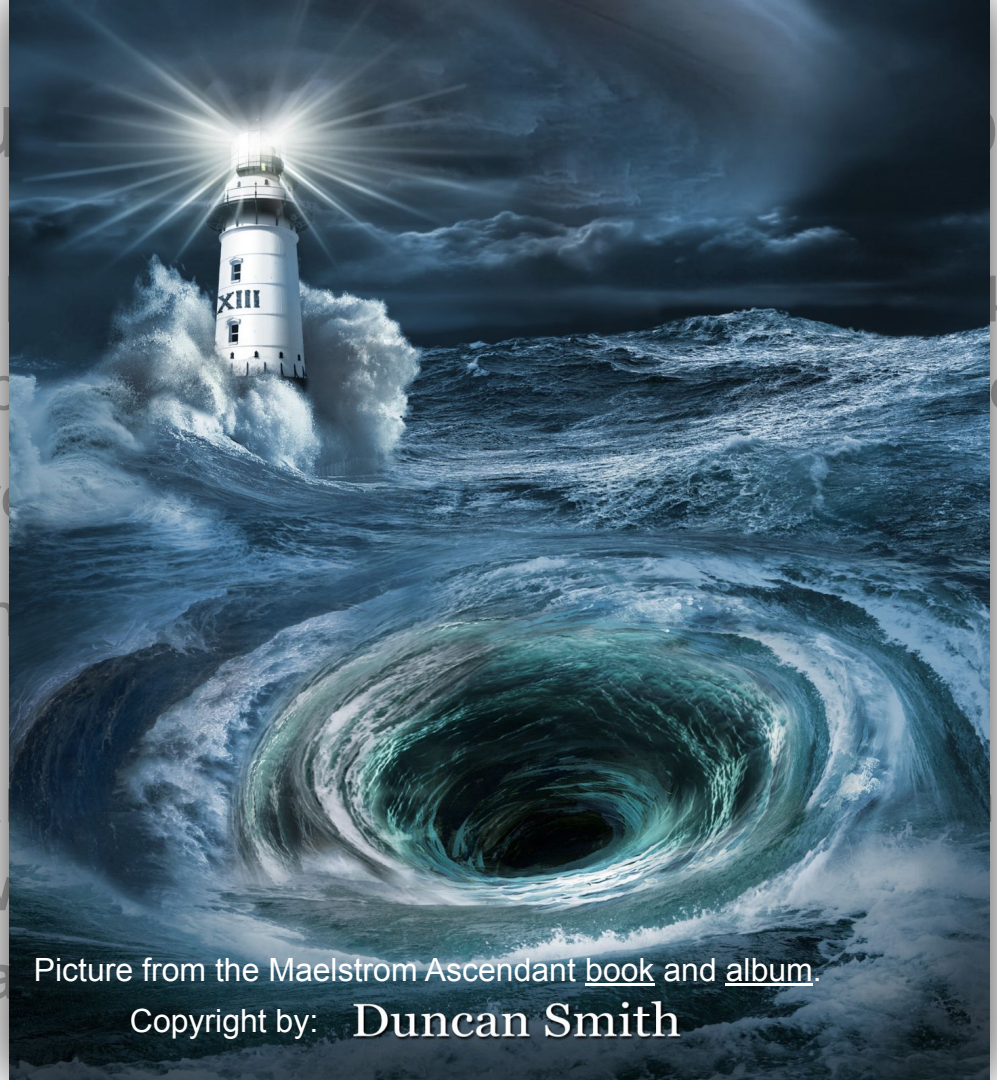
  ✔ Don’t have to wait for timeouts!

  ✗ Still can’t determine which hop is validating

  ✗ **Even when your network is validating, you can still reach the invalid!**

Re-evalu

- Valid /23 (and /48 more spec
  - ✔ More r
  - ✔ Don't h
  - ✗ Still ca g
  - ✗ **Even w you ca**



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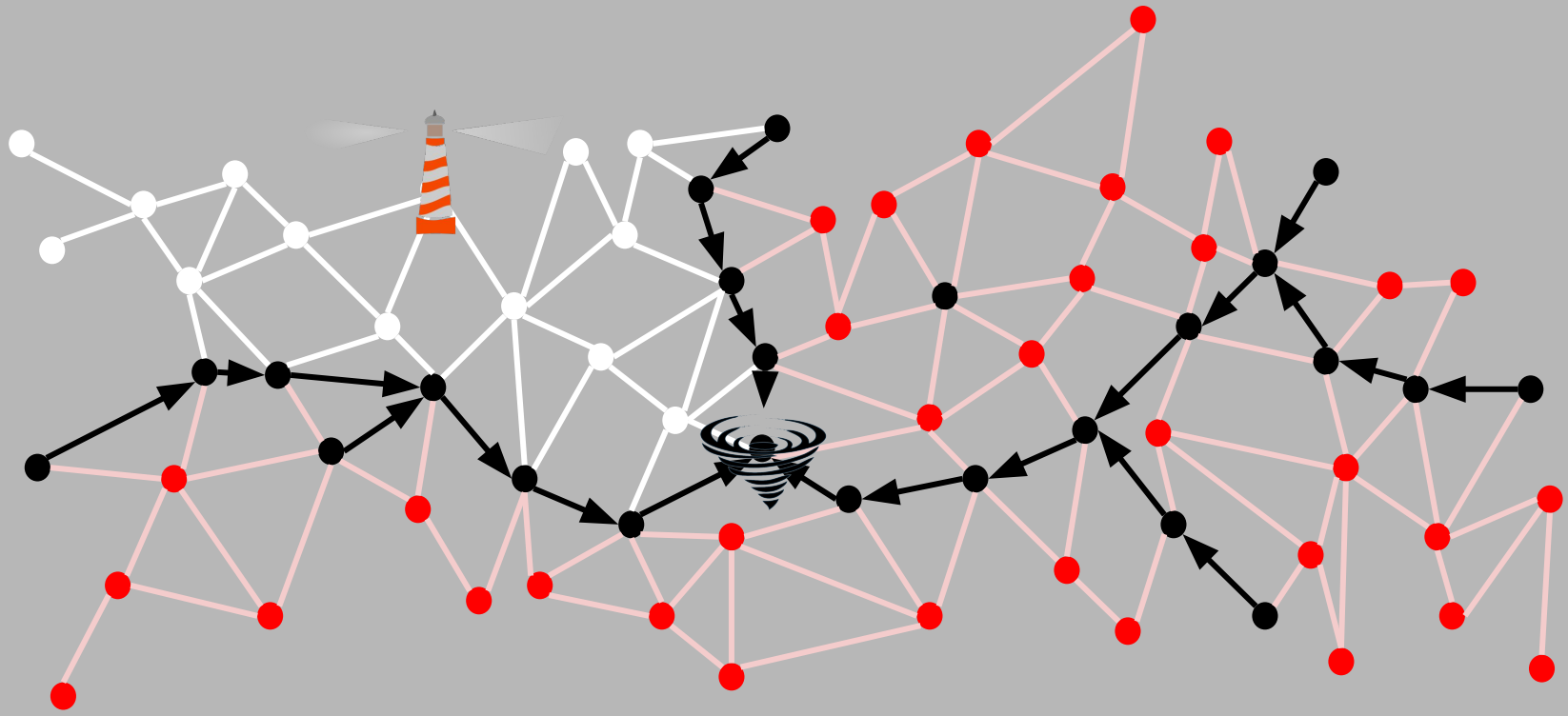
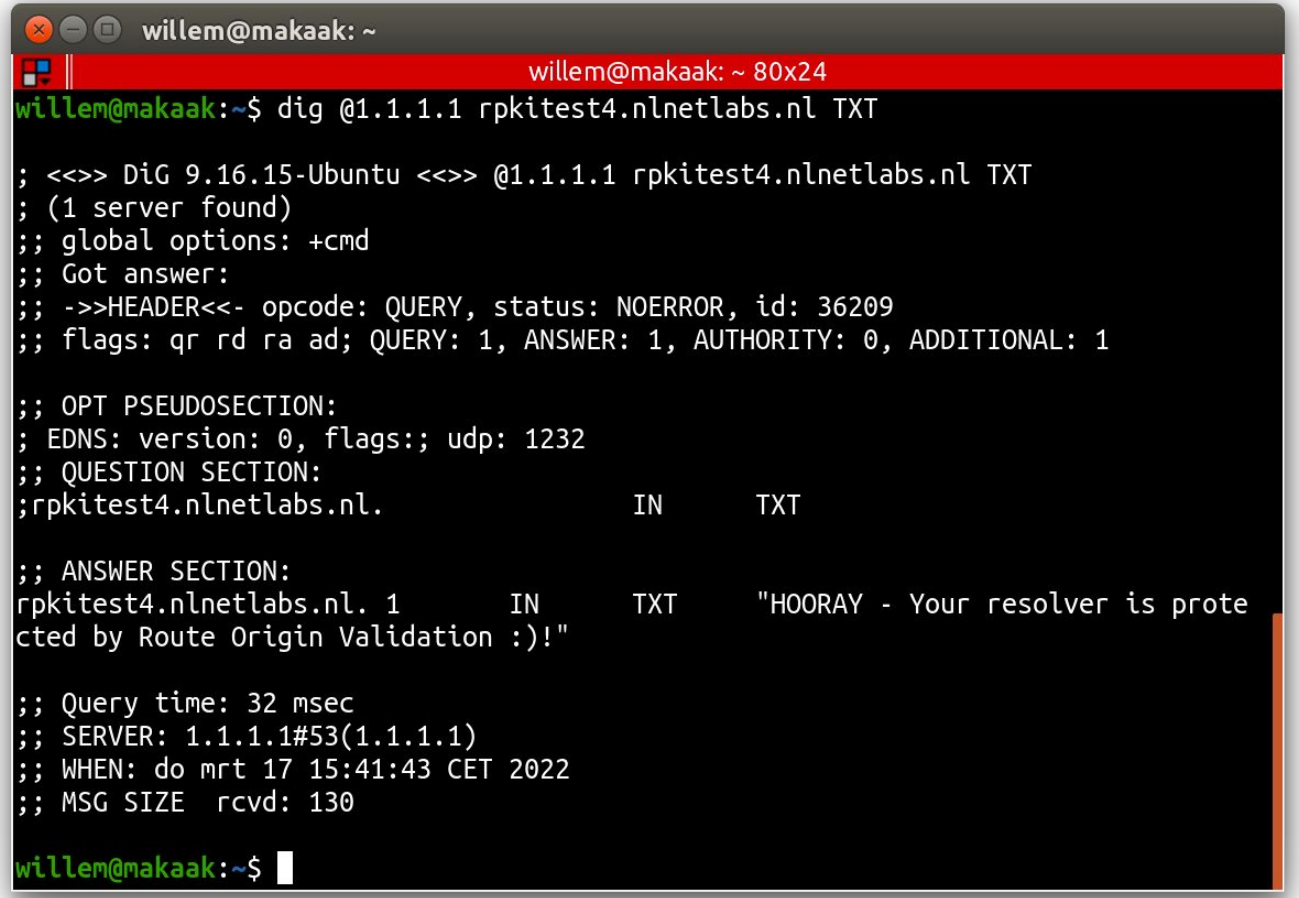
Re-evaluate setup - new setup



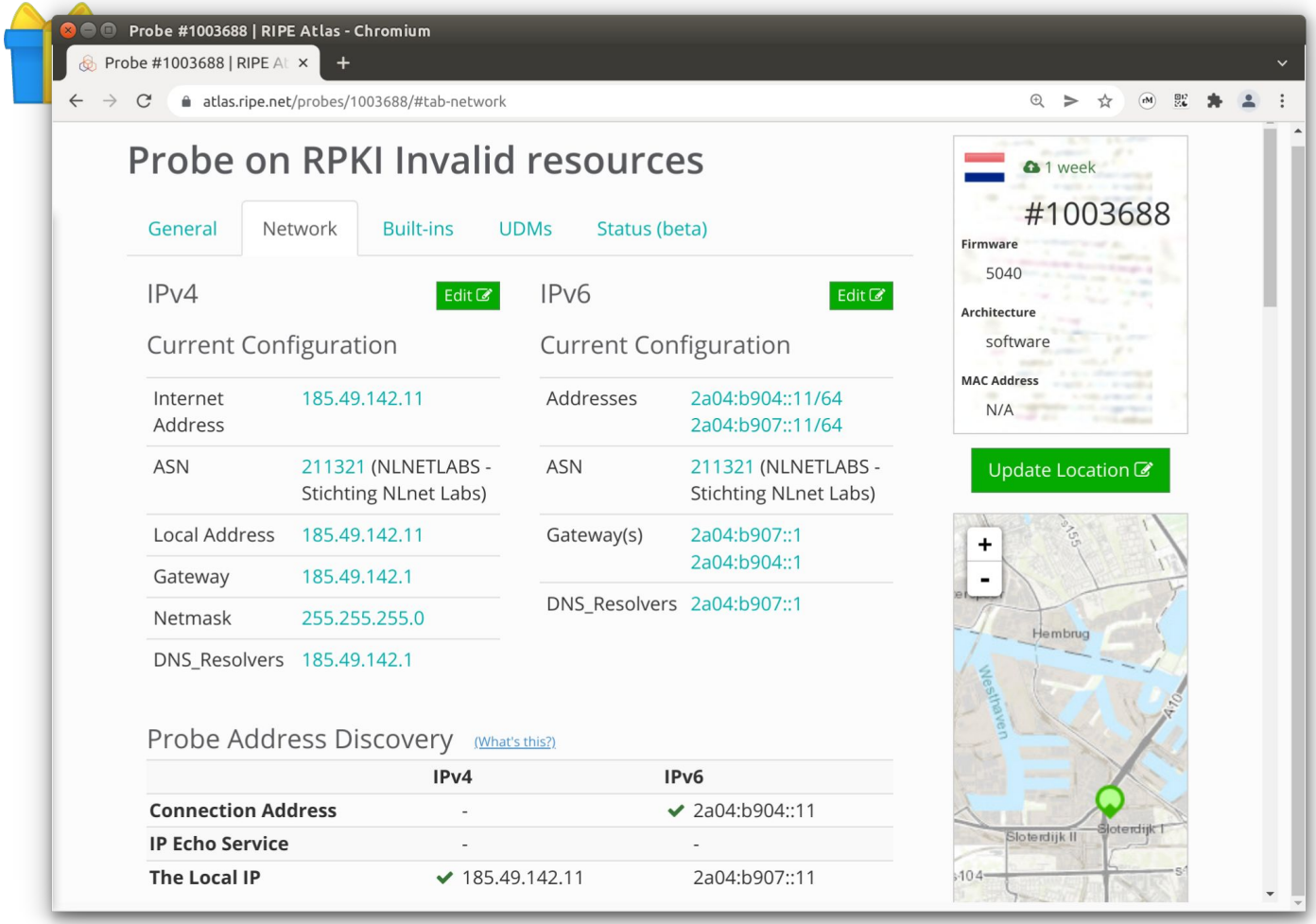
Apps

- CMDNS:
  Moved 👍
- Resolver test:
  Very fast! 👍
- RPKI NCC
  Web test:
  Ont it's way 👍



For you!

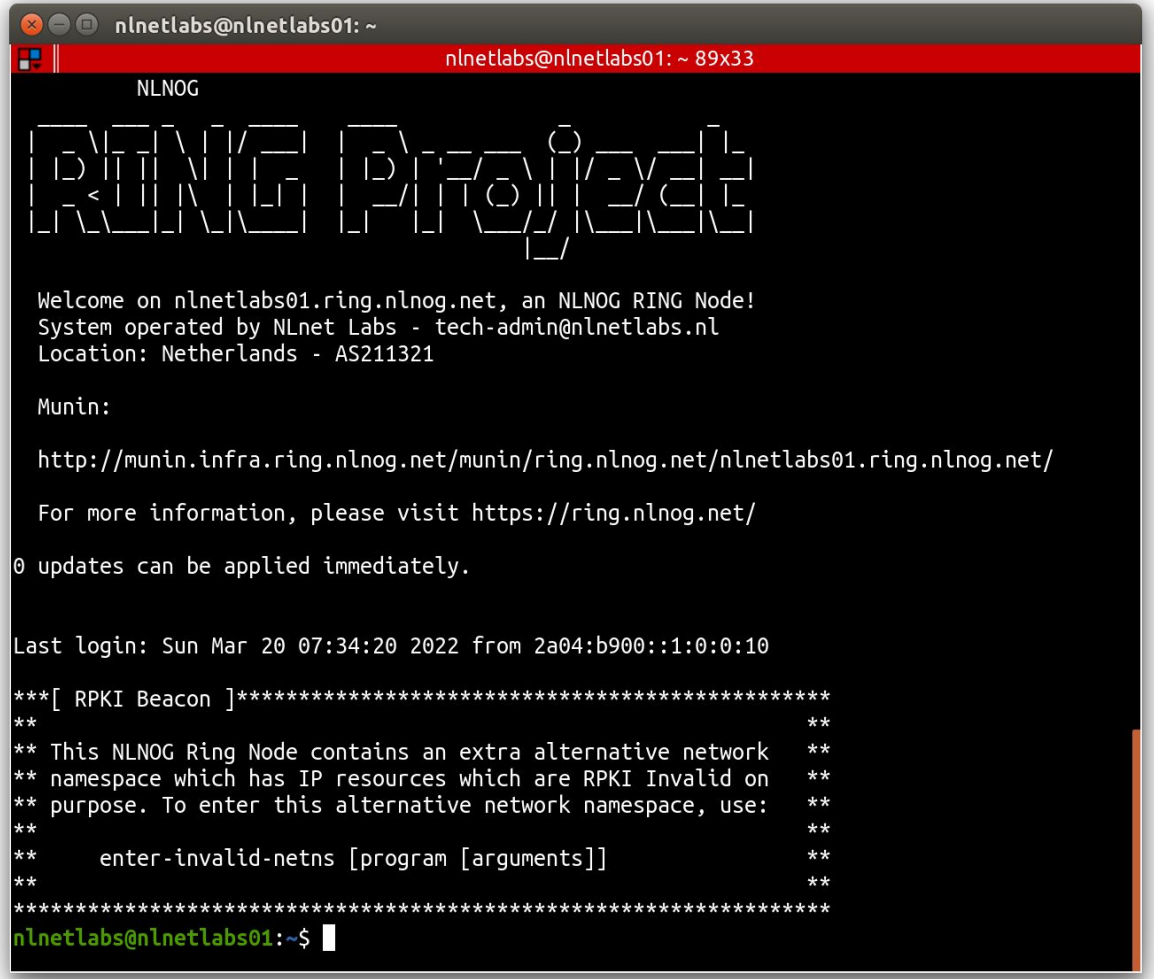
@ RIPE Atlas



For you!

@ RIPE Atlas

@ NLNOG Ring



For you!

@ RIPE Atlas

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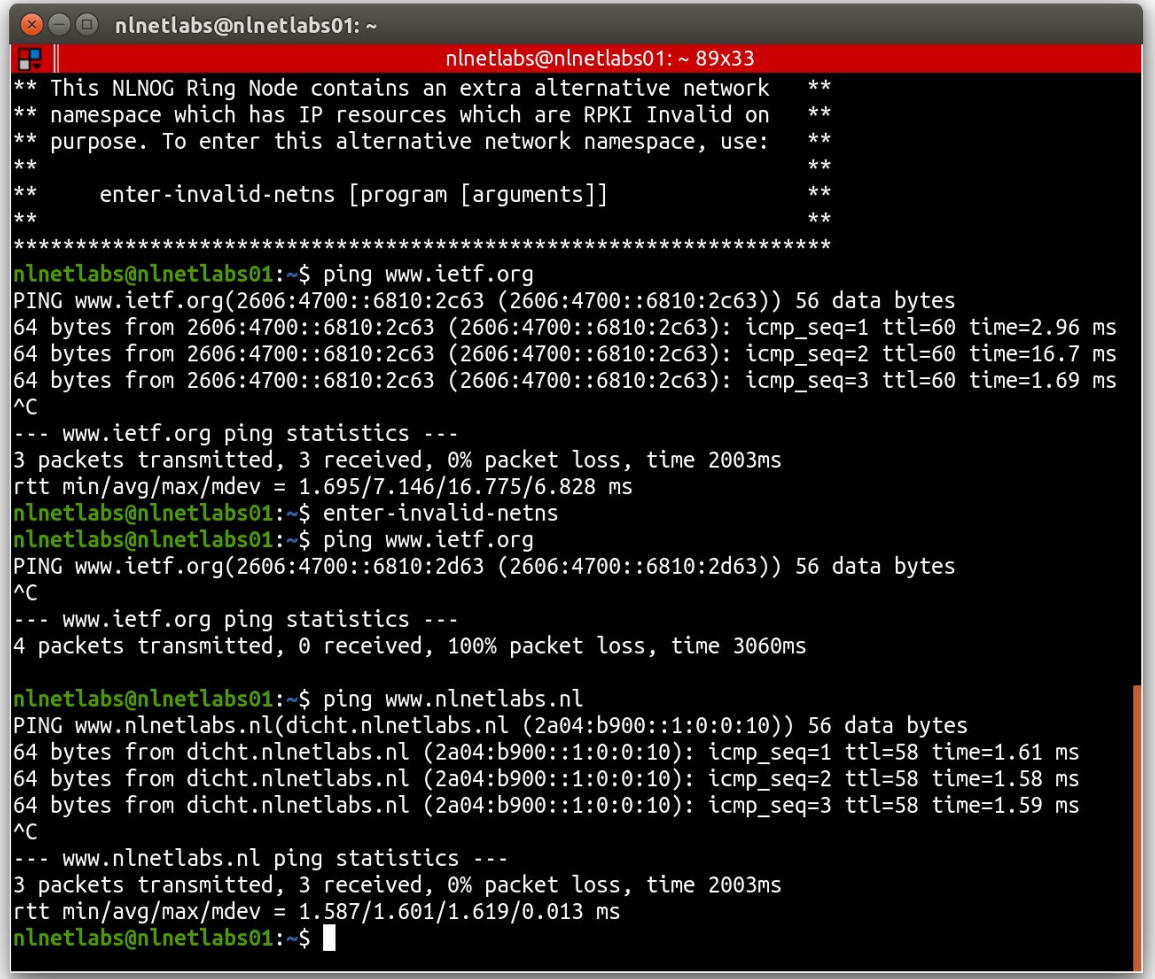


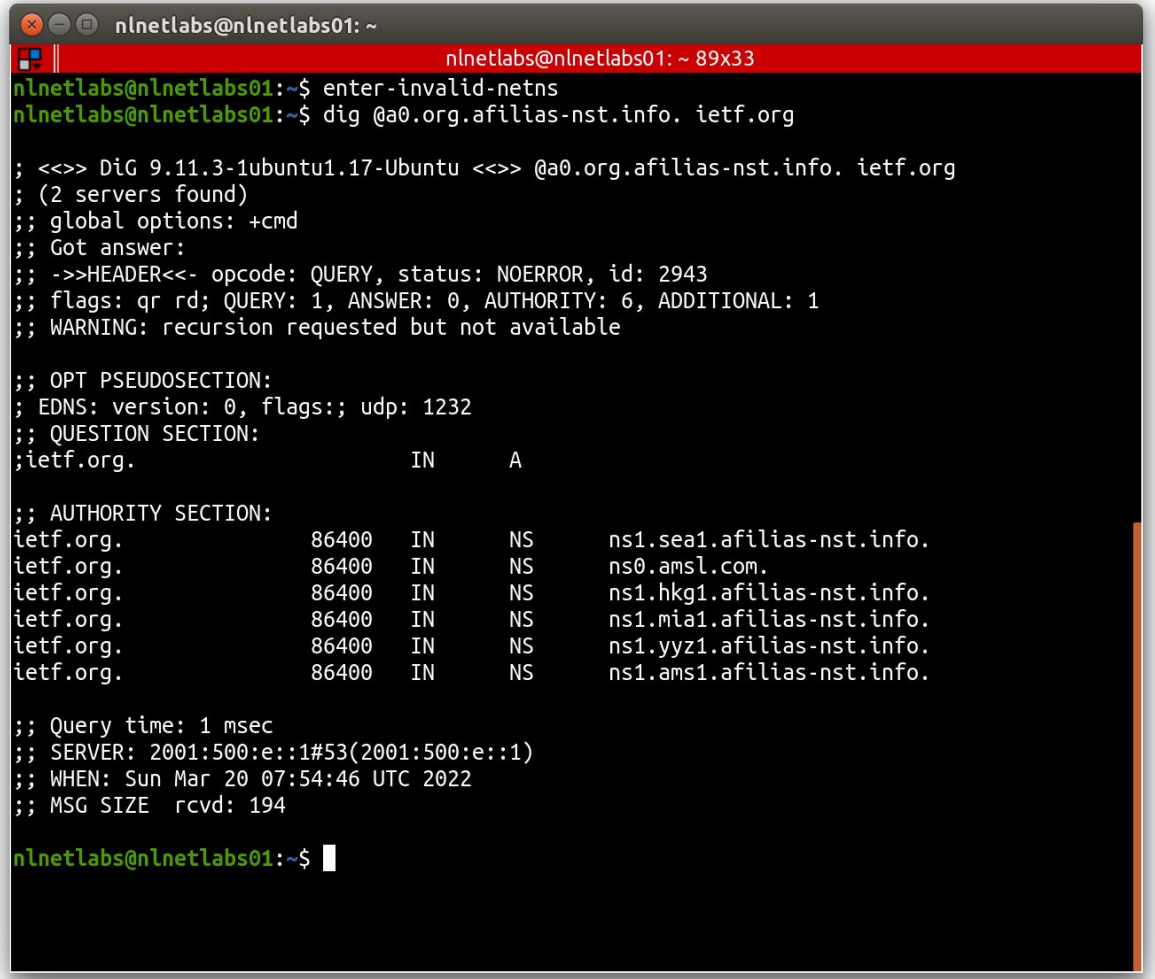
For you!

@ RIPE Atlas

@ NLNOG Ring

Measure services
Should they?

@ Anything else?



Why - questions & feedback

- I need your opinion – **does what I did make sense?**
- I need your brains – **how to best measure ROV?**
- I want the beacon to be usable (available) for you too!
  – what tool do you want/need?
- We could also use some additional IPv4 resources 😁
  – Collaborate?