

# Internet routing ecosystem needs a major upgrade

Internet routing is the basis for all Internet services

Ad Bresser

[Ad.Bresser@gmail.com](mailto:Ad.Bresser@gmail.com)

+31 6 20 39 56 98

# In a Quickscan\* >100 measures to improve the Internet routing security were identified

Issues and solutions are mainly discussed in engineering fora

Fora are for discussions & info exchange, no Internet routing coordination / governance

\*Original: <http://startupinc.nl/wp-content/uploads/2017/10/20171027-Quickscan-on-routing-measures-to-increase-the-security-of-the-Internet.pdf>

LinkedIn: <https://www.linkedin.com/pulse/measures-increase-routing-security-internet-ad-bresser/>

Github: <https://github.com/AdBresser/measures-to-increase-IP-security>

# Internet routing ecosystem needs a major upgrade

There are at least 3 fundamental issues

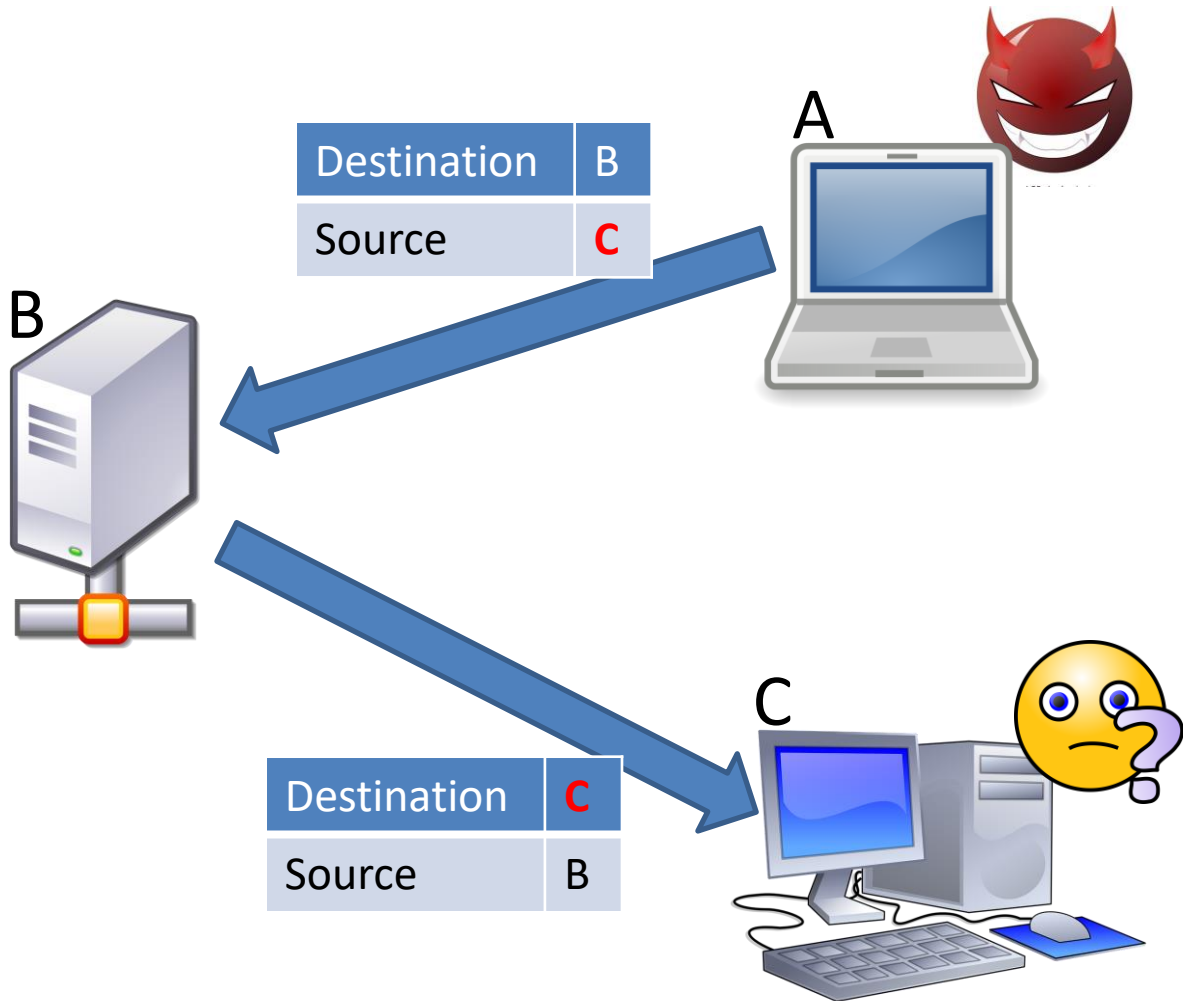
There is a coordination / governance  
challenge

Self regulation before government regulation

We all  
have the  
obligation  
for an ID

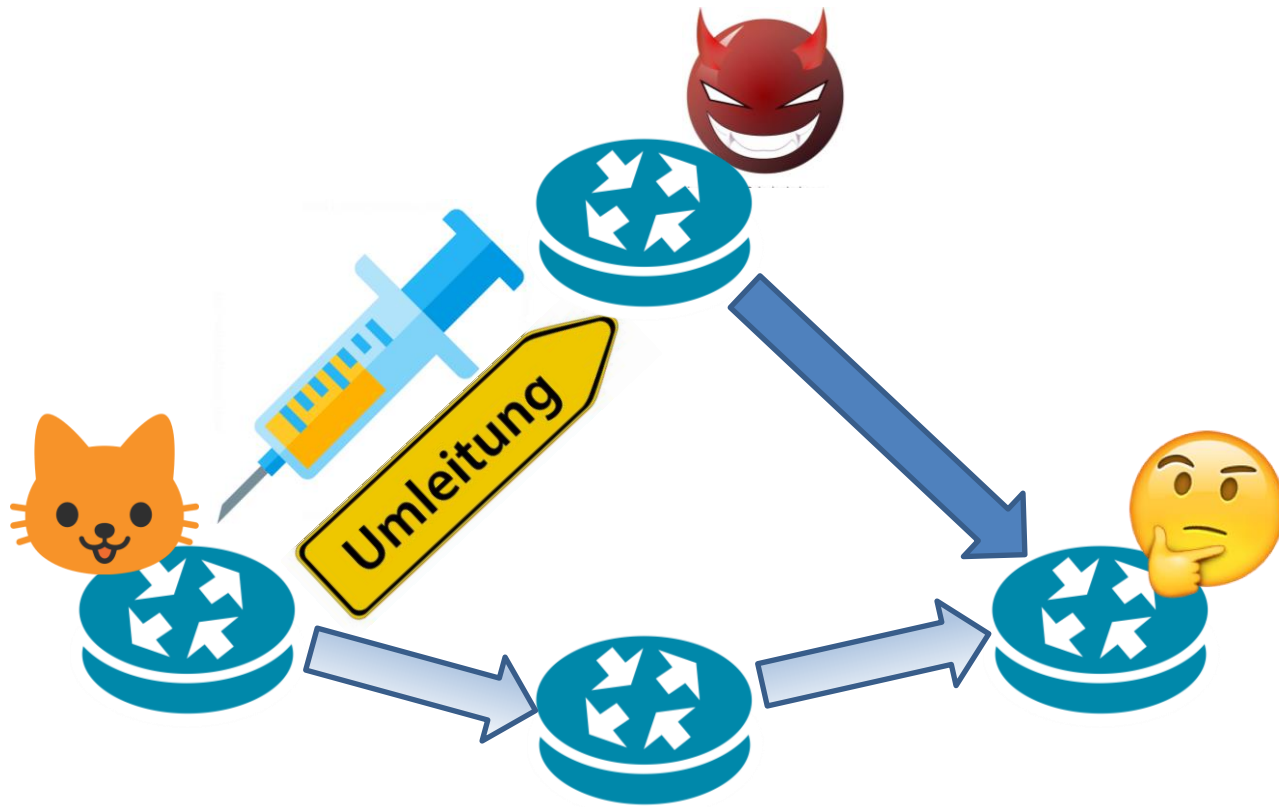


# IP packets don't have an ID obligation: Source address spoofing



- Cybersecurity attacks:
  - DDOS (on B & C)
  - Amplification (on C)
  - Masquerade (on B)
- There are solutions (RFC's).
- Application is not enforced!
- (IPv6 doesn't solve this.)

# Route injection: Traffic monitoring & manipulation

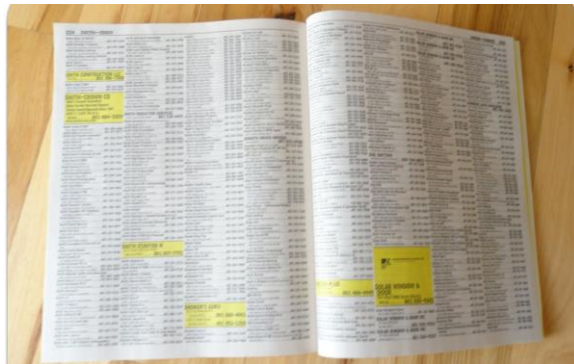


- Cybersecurity attacks:
  - Sniffing / profiling
  - Blackhole / overload
  - Man in the middle
- There are solutions (RFC's).
- Application is not enforced!
  
- 2017: 5304 BGP Hijacks\*

# No reliable contact information



- Documented at registration.
- Information is publisher driven.
- Quality for cybersecurity?
  - 7 \* 24, technical contact



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fundamental issues

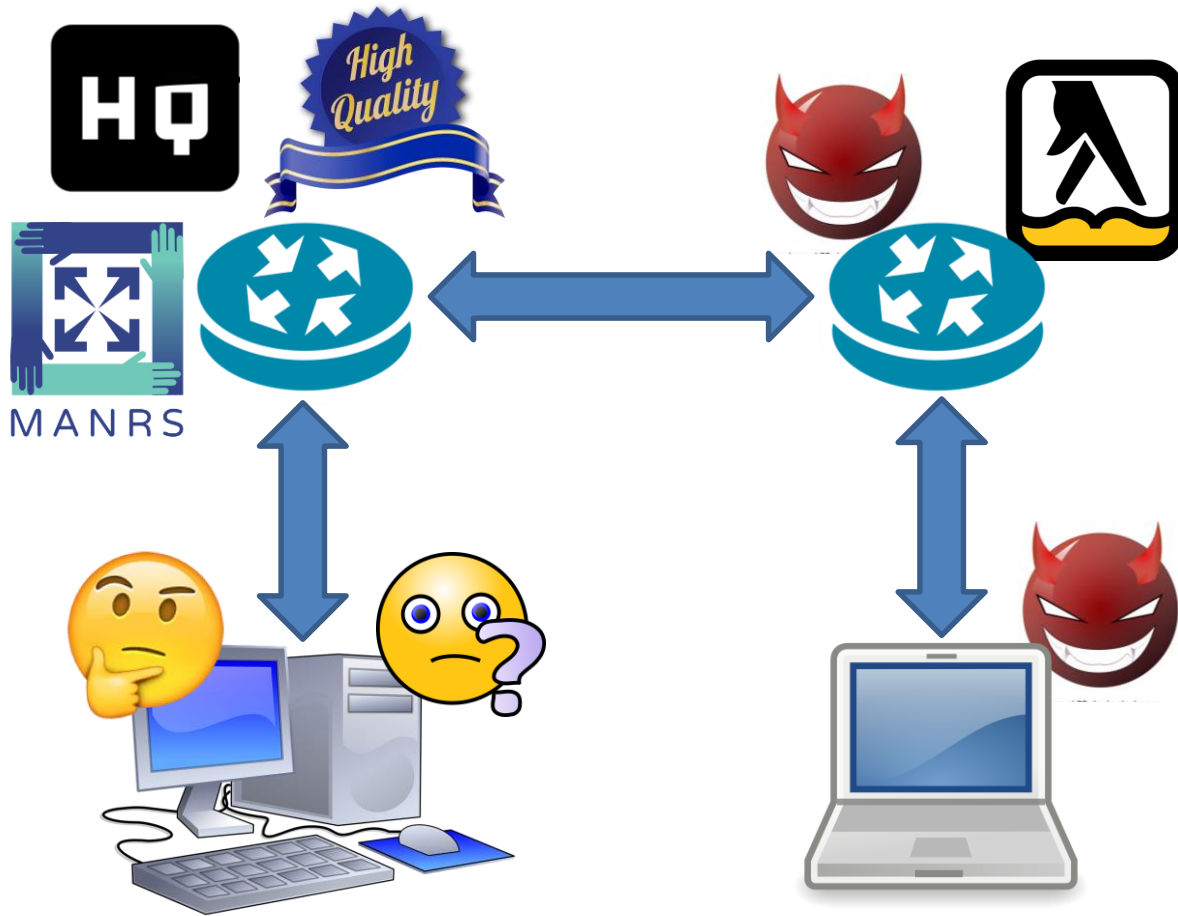
Source address spoofing

Route injection

No reliable contact information

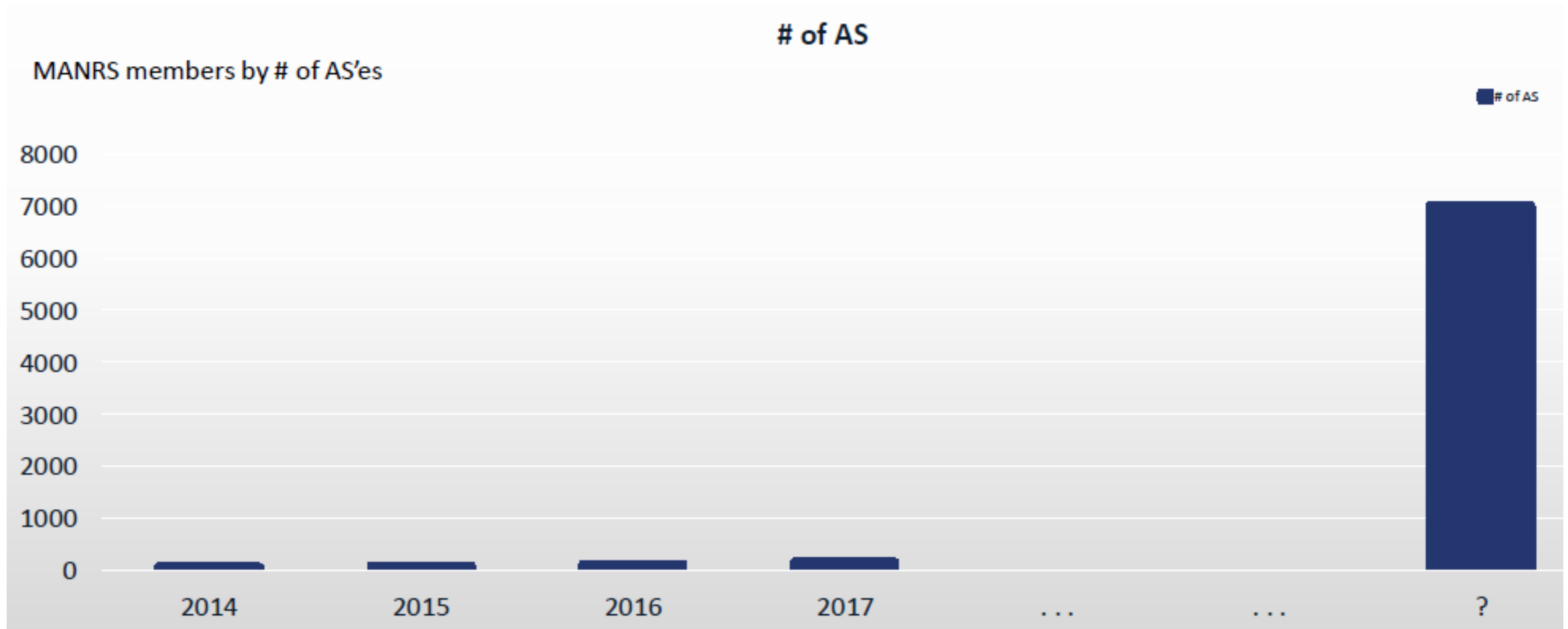


# There are no direct benefits of implementing



- Internet is / was build on trust.
- Different types of IP providers.
- Implementing best practices (by an IP provider) hardly improves security for customers.

# Uptake of self regulation is slow: Limited impact of Routing Manifesto / MANRS



Source: Ben Maddison, at NL-ix Neutral Peering Days 2017, September 2017, The Hague, The Netherlands

# Internet routing is not yet in scope regulators

- ✘ EU NIS (Network and Information Security) Directive:
  - IP only found irt DNS & TLD's
- ENISA (European Agency for Network and Information Security)
  - ✘ No IP in: "Baseline Security Recommendations for IoT in the context of CII"
  - Internet Infrastructure Security and Resilience Reference Group:
    - overview of good practices
- ☐ EU telecom regulation review
- Global Commission on the Stability of Cyberspace (GCSC)
  - Call to Protect the Public Core of the Internet; very high level
- ✘ Global Forum on Cyber Expertise; Internet infrastructure initiative
  - Only IPv6 is mentioned

There is a coordination /  
governance challenge

There are no direct benefits of implementing

Uptake of self regulation is slow

Internet routing is not yet in scope regulators

# With commitment results can be achieved

- There are cases where operator group cooperation, results in a good practice:
  - In content: Notice & take down.
  - (In access: Notice & take off-line, could be handy to mitigate DDOS attacks)
- In aviation (global operation with a multitude of operators), self regulation with Smarter Regulation (IATA) works.

# Build on xx-NOG, RIR & community initiatives

- There are around 75 Network Operators Groups:
  - NANOG (North America) was the first.
  - Albanian Network Operators Group the latest (so far).
- 5 Regional Internet Registries (RIRs), with active network operators participation.
- BGP Large communities initiative:
  - Operational demand for BGP large community standard.
  - An IP operator group accelerated the standardization by cooperation.

# Start with small steps to create traction

- Use MANRS as technical starting point.

Get out of the building:

- Understand why IP operators don't implement & solve.
- Identify and manage issues that are relevant for IP operators.

Dark / Bright future:

- Continuous improvement of the Internet routing system.
- IP Operators driving standardization & implementation.
- License to operate.

# Self regulation before government regulation

With commitment results can be achieved

Build on xx-NOG, RIR & community initiatives

Start with small steps to create traction



Upgrade of Internet routing ecosystem is needed and possible with limited effort.  
But who takes ownership?

Let's talk:

Ad Bresser

[Ad.Bresser@gmail.com](mailto:Ad.Bresser@gmail.com)

+31 6 20 39 56 98