Collective responsibility for security and resilience of the global routing system

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Let us look at the problem first

- **BGP is based on trust**
  - **No validation of the legitimacy of updates**
  - **Tools outside BGP exist, but not widely deployed**
  - **BGPSEC is under development in the IETF**

Let us look at the problem first

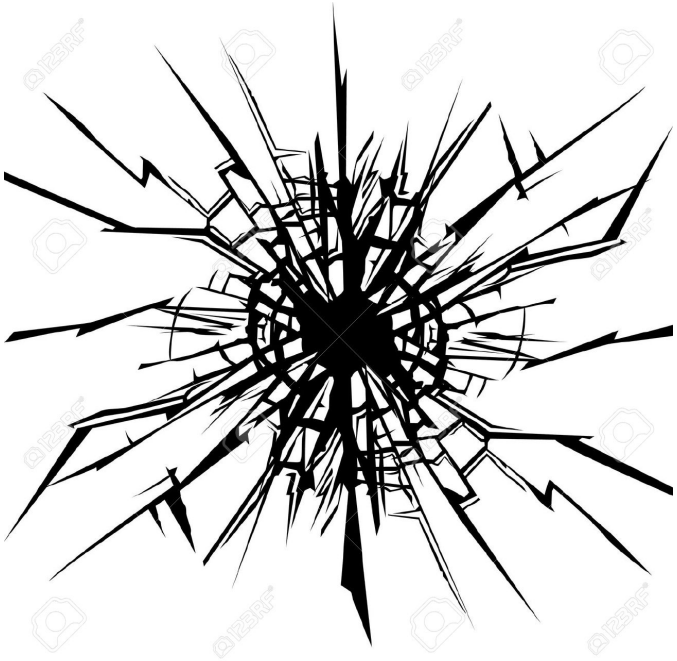
- **Prefix hijack**
  - **Announcing a prefix that does not belong to a network**
  - **Can involve “ASN hijacking”**
- **“Route leak”**
  - **Violation of a “valley-free” principle**
  - **E.g. a customer becoming a transit provider**

But also

- Source IP address spoofing
  - Forging the source IP address of packets
- Collaboration
  - How do you reach someone on the other side of the Net to help you out?
  - How do you mitigate a DDoS?

Impact

- **Prefix hijack**
  - **Denial of service, impersonating a network or a service, traffic intercept**
- **“Route leak”**
  - **Traffic intercept, but may result in denial of service**
- **IP spoofing**
  - **The root cause of reflection DDoS attacks**



How do we address these problems?

- **Tools**
  - **Prefix and AS-PATH filtering, RPKI, IRR, …**
  - **Ingress and egress anti-spoofing filtering, uRPF, …**
  - **Coordination and DDoS mitigation**
- **Challenges**
  - **Your safety is in someone else's hands**
  - **Too many problems to solve, too many cases**

The Mutually Agreed Norms for Routing Security (MANRS)

- **Aka Routing Resilience Manfesto:**
  - https://www.routingmanifesto.org/manrs/
- **Defines a minimum package: 4 Actions**
  - **Too many problems to solve, too many cases**
- **Collective focus and commitment**
  - **Your safety is in someone else's hands**

Good MANRS

1. Prevent propagation of incorrect routing information
2. Prevent traffic with spoofed source IP address
3. Facilitate global operational communication and coordination between the network operators
4. Facilitate validation of routing information on a global scale.

Actions (1)

Prevent propagation of incorrect routing information

Network operator defines a clear routing policy and implements a system that ensures ***correctness*** *of their* ***own announcements*** *and* ***announcements from their customers*** *to adjacent networks with prefix and AS-path granularity.*

Network operator is ***able to communicate*** *to their adjacent networks which announcements are correct.*

Network operator applies due diligence when checking the correctness of their customer's announcements, specifically that the ***customer legitimately holds the ASN and the address space it announces****.*

Actions (2)

Prevent traffic with spoofed source IP address

Network operator implements a system that ***enables source address validation*** *for at least* ***single-homed stub customer networks, their own end-users and infrastructure****. Network operator implements anti-spoofing filtering to prevent packets with an incorrect source IP address from entering and leaving the network.*

Actions (3)

Facilitate global operational communication and coordination between the network operators

Network operators should maintain ***globally accessible up-to-date contact information.***

Actions (4)

Facilitate validation of routing information on a global scale.

*Network operator has **publicly documented routing policy**, ASNs and prefixes that are intended to be advertised to external parties.*

MANRS is not (only) a document – it is a commitment

1) The company **supports the Principles and implements at least one of the Actions** for the majority of its infrastructure. Implemented Actions are marked with a check-box. The Action "Facilitate global operational communication" cannot be the only one and requires that another Action is also implemented.
2) The company becomes a Participant of MANRS, helping to **maintain and improve** the document, for example, by suggesting new Actions and maintaining an up-to-date list of references to BCOPs and other documents with more detailed implementation guidance.

Public launch of the initiative - 6 November 2014

A growing list of participants

	Country	ASNs	Filtering	Anti-spoofing	Coordination	Global Validation
KPN	NL	1136, 5615, 8737	✓	✓	✓	✓
Seeweb	IT	12637	✓	✓	✓	✓
Gigas	ES, US	57286, 27640	✓	✓	✓	✓
NTT	US	2914	✓	✓	✓	✓
BIT BV	NL	12859	✓	✓	✓	✓
Algar Telecom	BR	16735, 53006, 27664	✓		✓	✓
OpenCarrier eG	DE	41692		✓	✓	✓
SpaceNet	DE	5539	✓	✓	✓	✓
CERNET	CN	4538	✓		✓	✓
SpeedPartner GmbH	DE	34225	✓	✓	✓	✓
Comcast	US	7015, 7016, 7725, 7922, 11025, 13367,	✓	✓	✓	✓

Next Steps

- Expanding the group of participants
  - Looking for industry leaders in the region
- Expanding the scope of the MANRS
  - Raising the bar – defining new Actions
- Developing better guidance
  - Tailored to MANRS
  - In collaboration with existing efforts, like BCOP

Are you interested in participating?

Filtering 

Anti-Spoofing 

Coordination 

Global scale 

https://www.routingmanifesto.org/

https://www.manrs.org/

Internet Society