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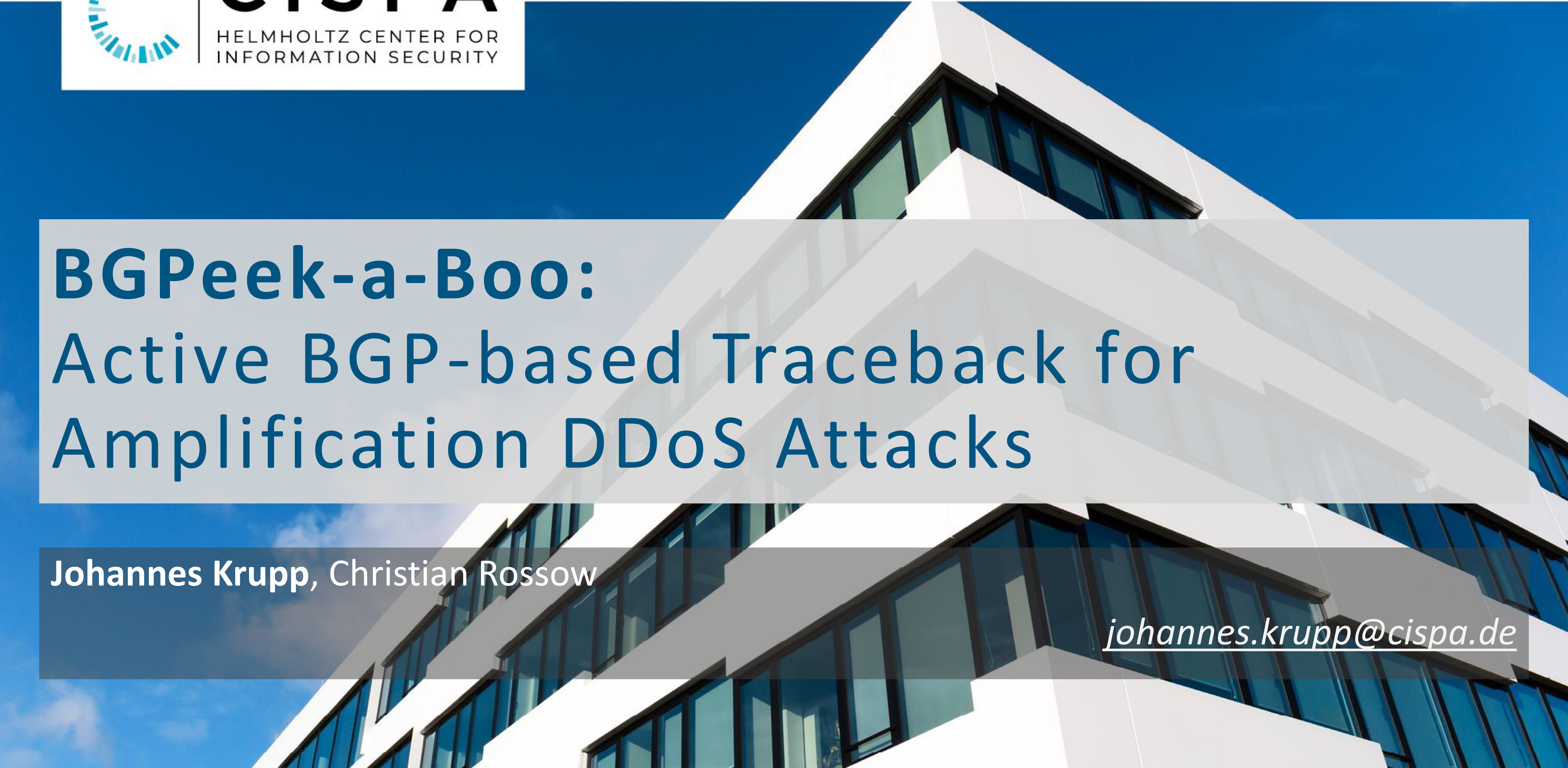
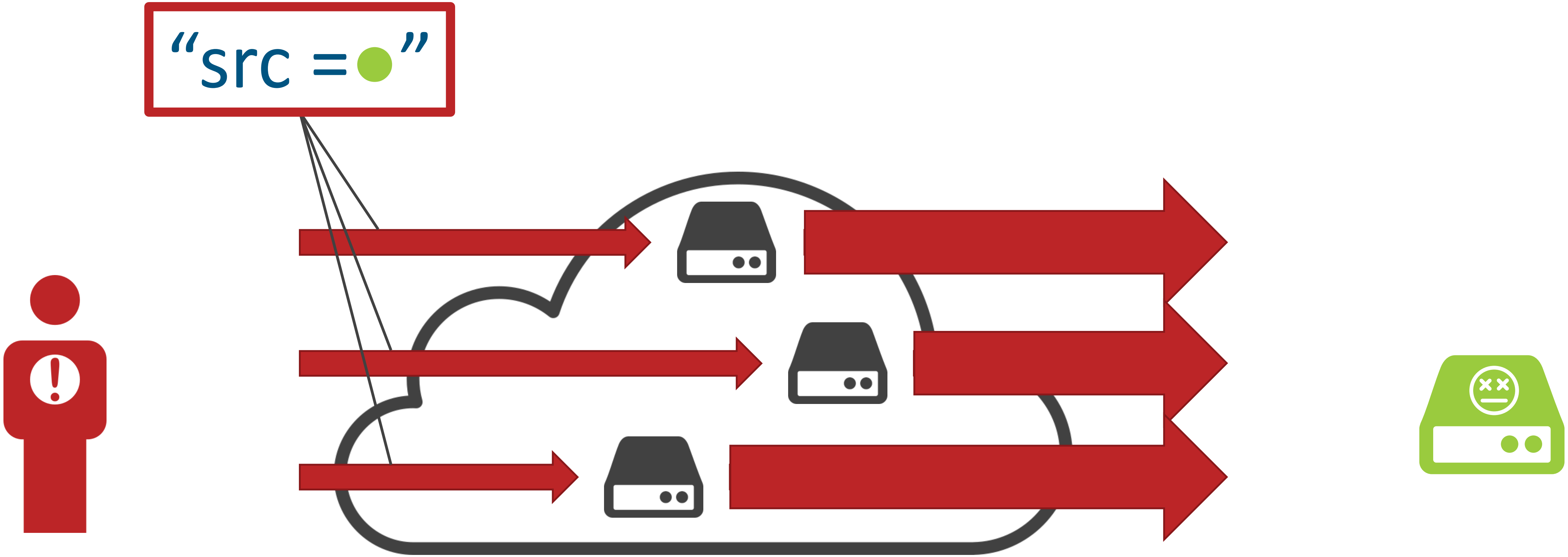


BGPeek-a-Boo: Active BGP-based Traceback for Amplification DDoS Attacks

Johannes Krupp, Christian Rossow

johannes.krupp@cispa.de

Reflective DDoS



“src = ●”

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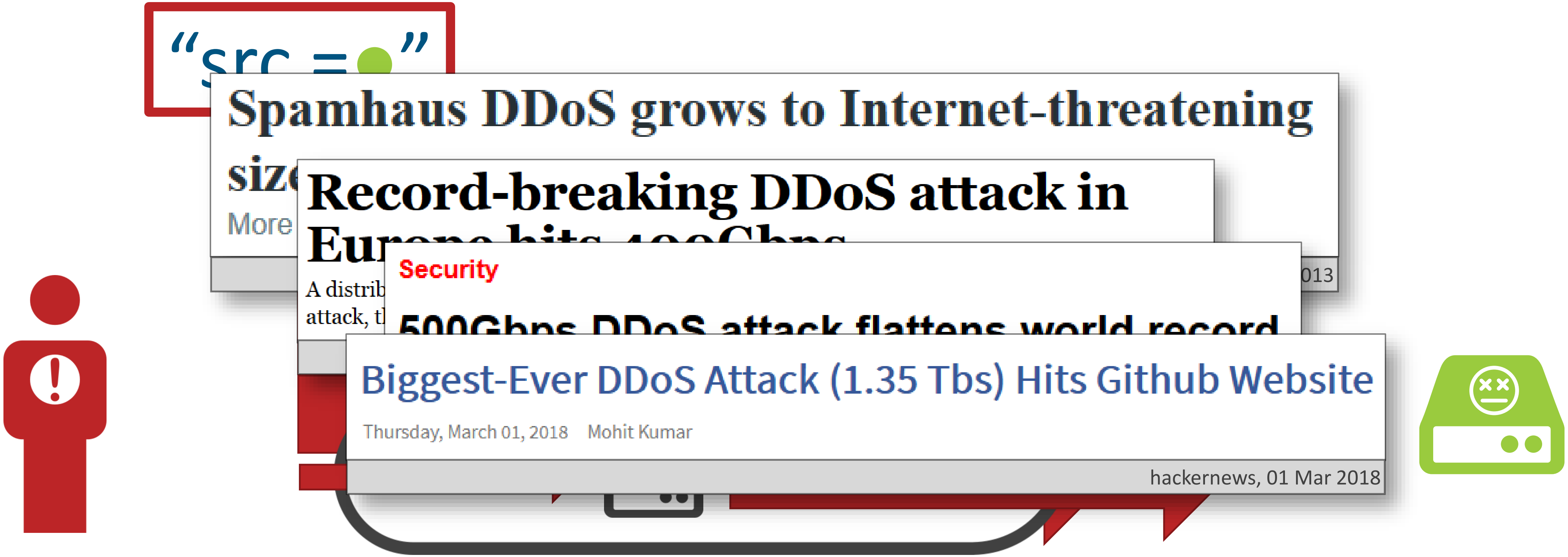

Spamhaus DDoS grows to Internet-threatening siz

More

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Record-breaking DDoS attack in Europe hits 400Gbps

A distrib

attack, t

Security

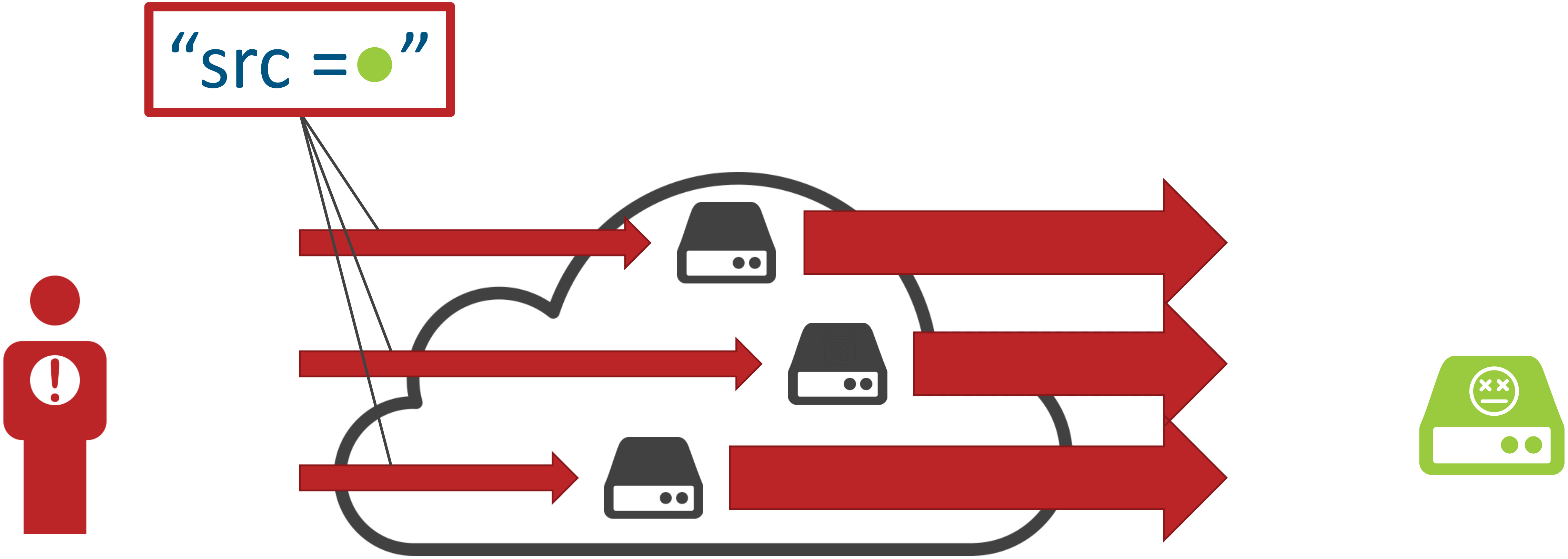
500Gbps DDoS attack flattens world record

Biggest-Ever DDoS Attack (1.35 Tbs) Hits Github Website

Thursday, March 01, 2018 Mohit Kumar

hackernews, 01 Mar 2018

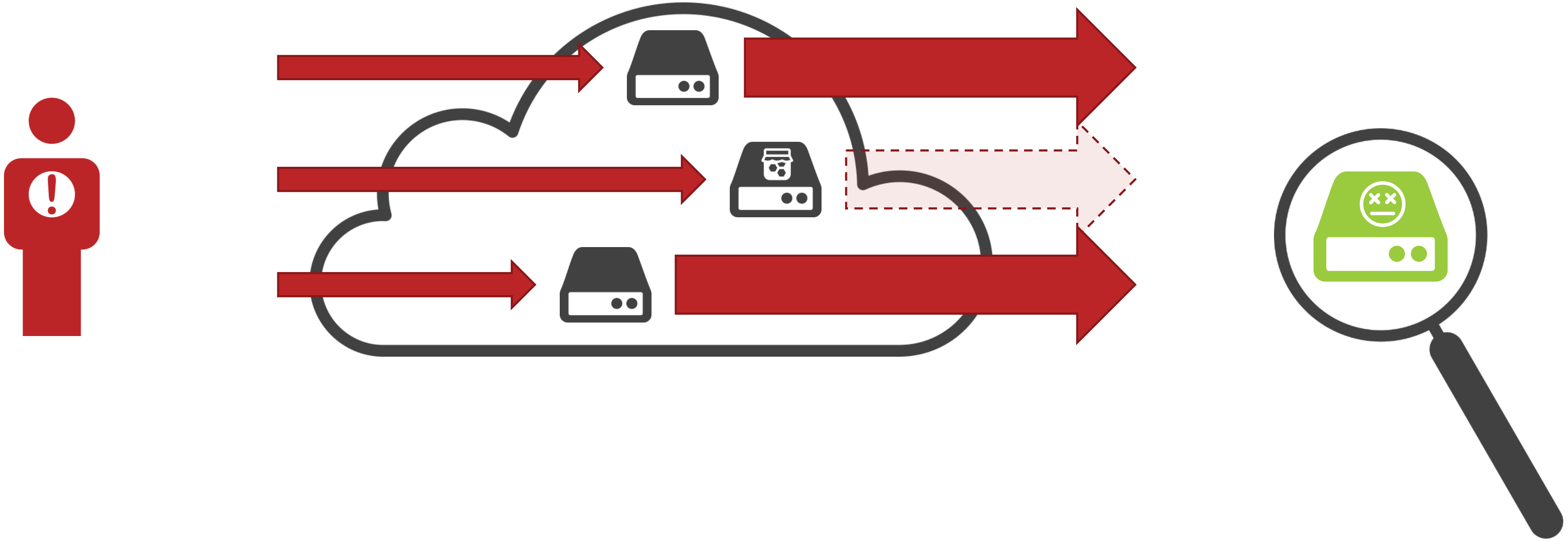
Reflective DDoS - Honeypot



where do attacks come from?

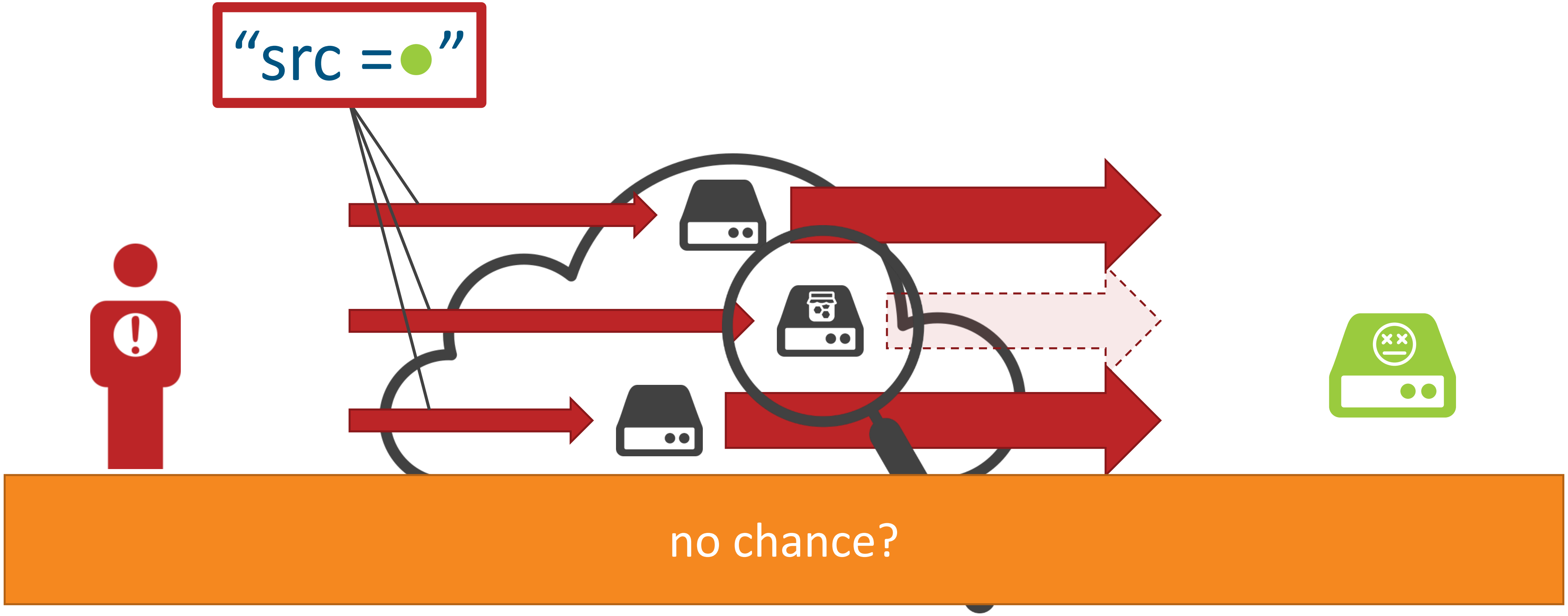
Victim’s Perspective

- Traffic from amplifiers only
- No direct contact with attacker



Amplifier’s Perspective

- Traffic from attacker
- …but with spoofed source only



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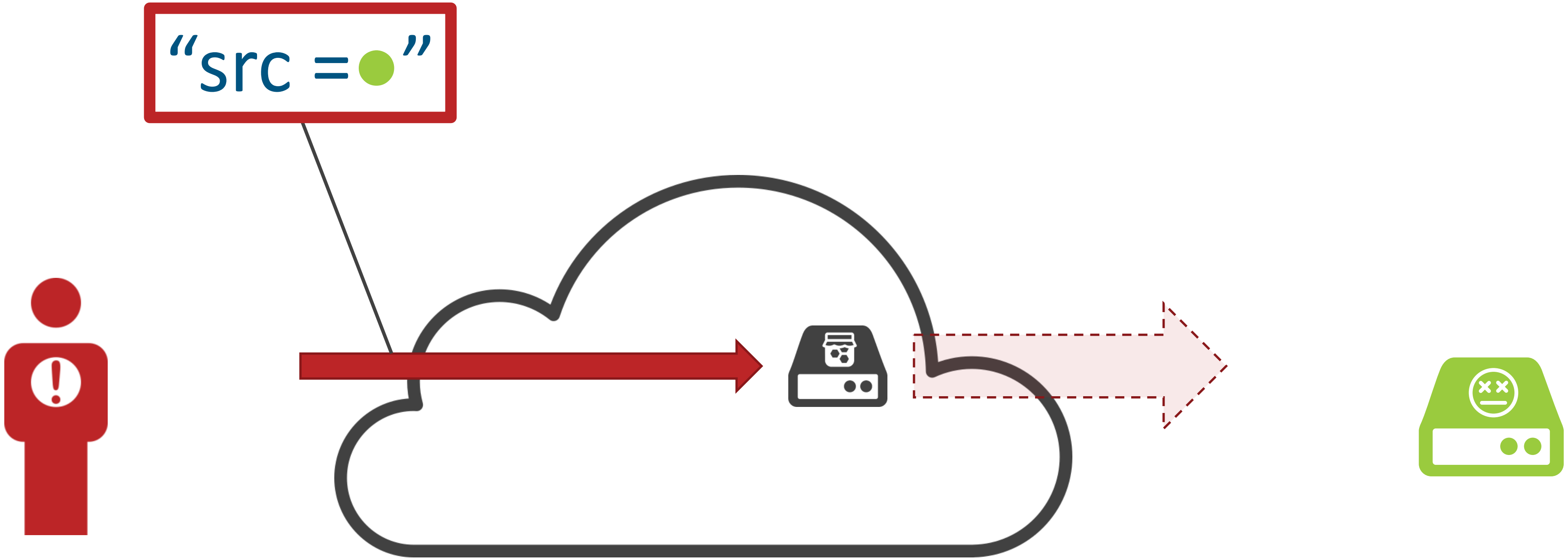
no chance?

Amplifier’s Perspective (network view)

- Traffic from attacker
- …but with spoofed source only
- **but still originating from attacker**



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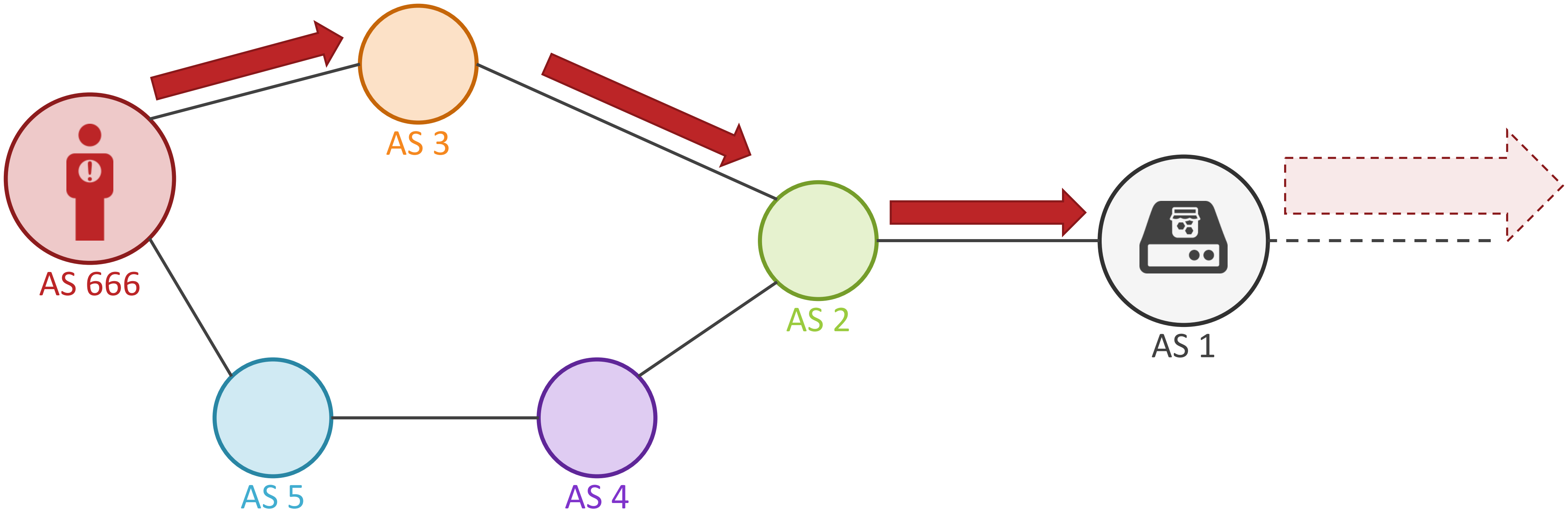
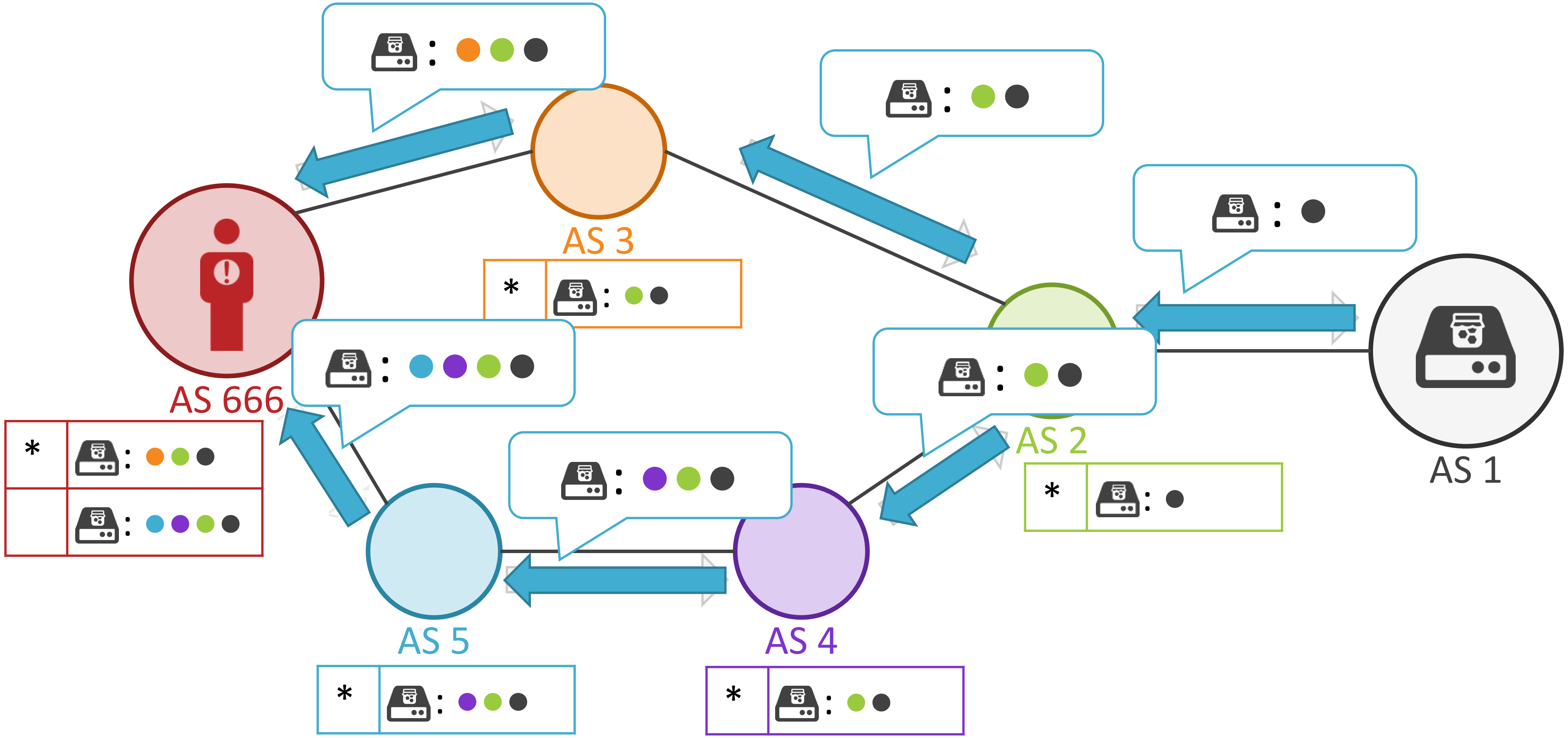


BGP Path Propagation

- How does the attacker system know where to forward traffic to?
  => through BGP



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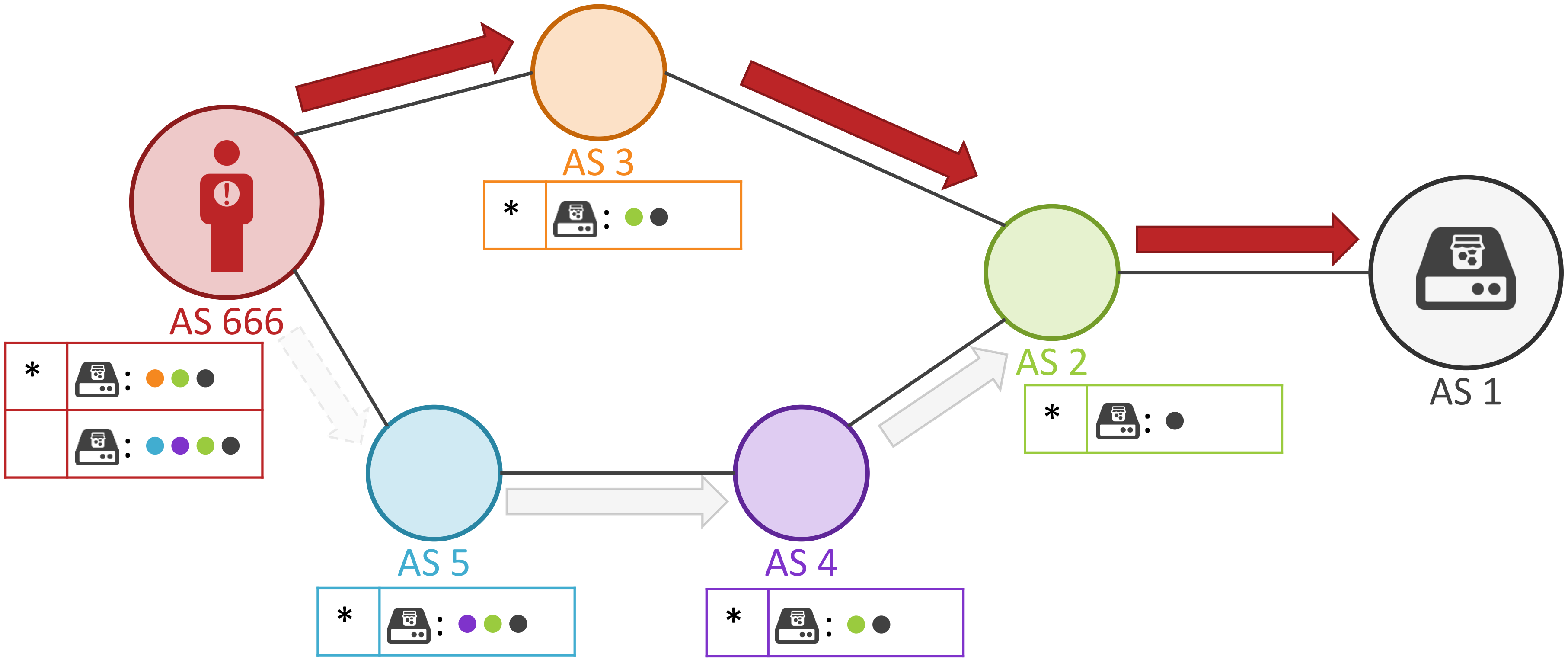

BGP Path Propagation under Poisoning

- How does the attacker system know where to forward traffic to?
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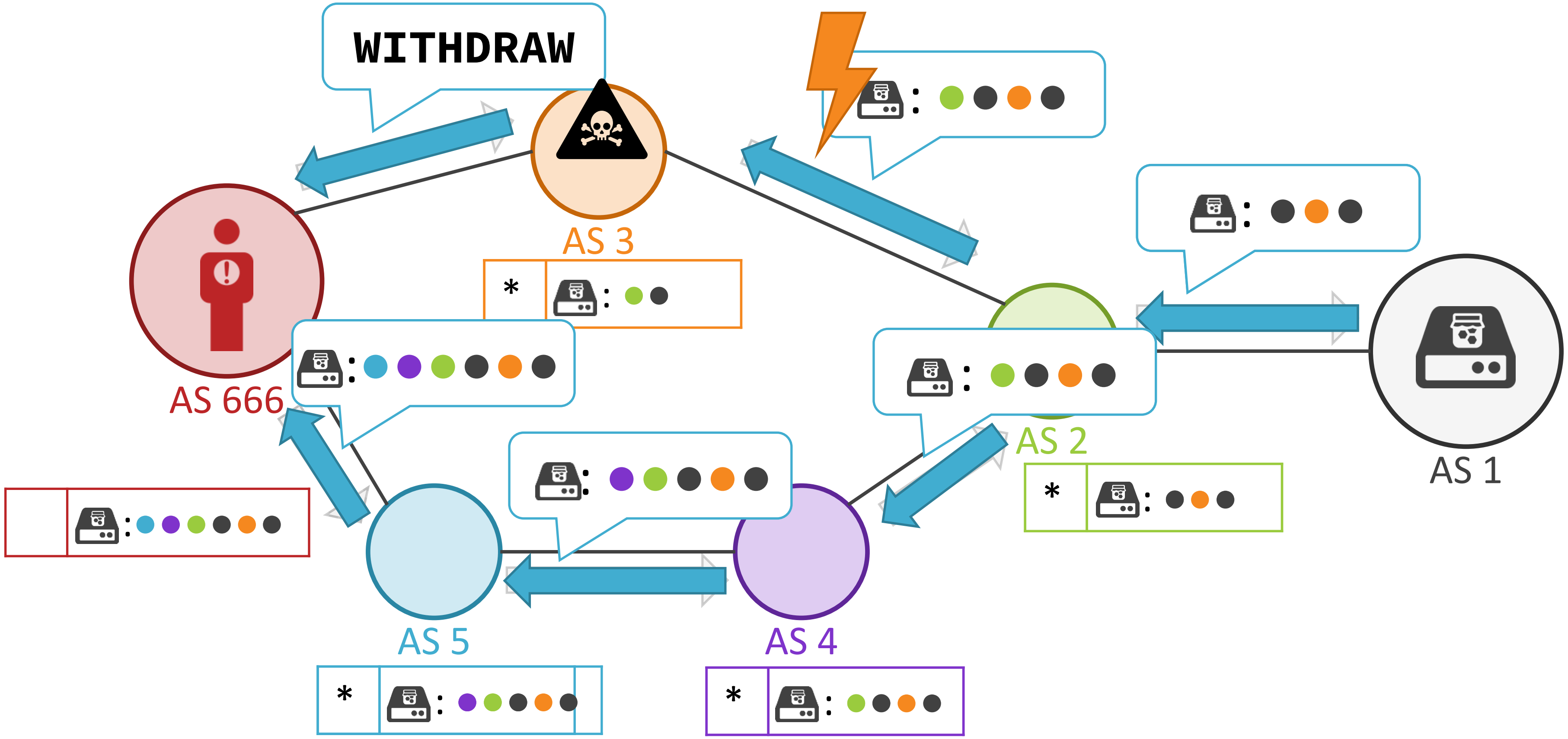
- Can we influence the attacker?
  => Yes, through BGP Poisoning



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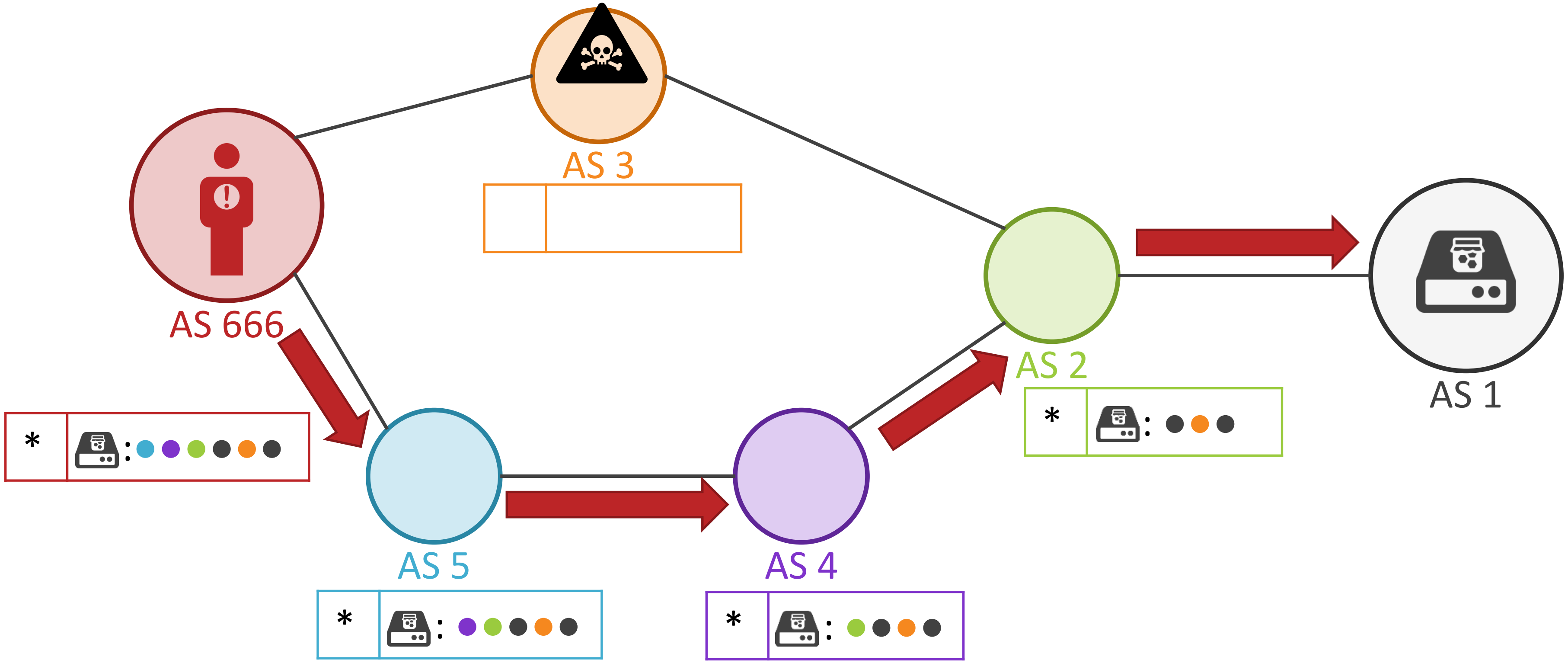
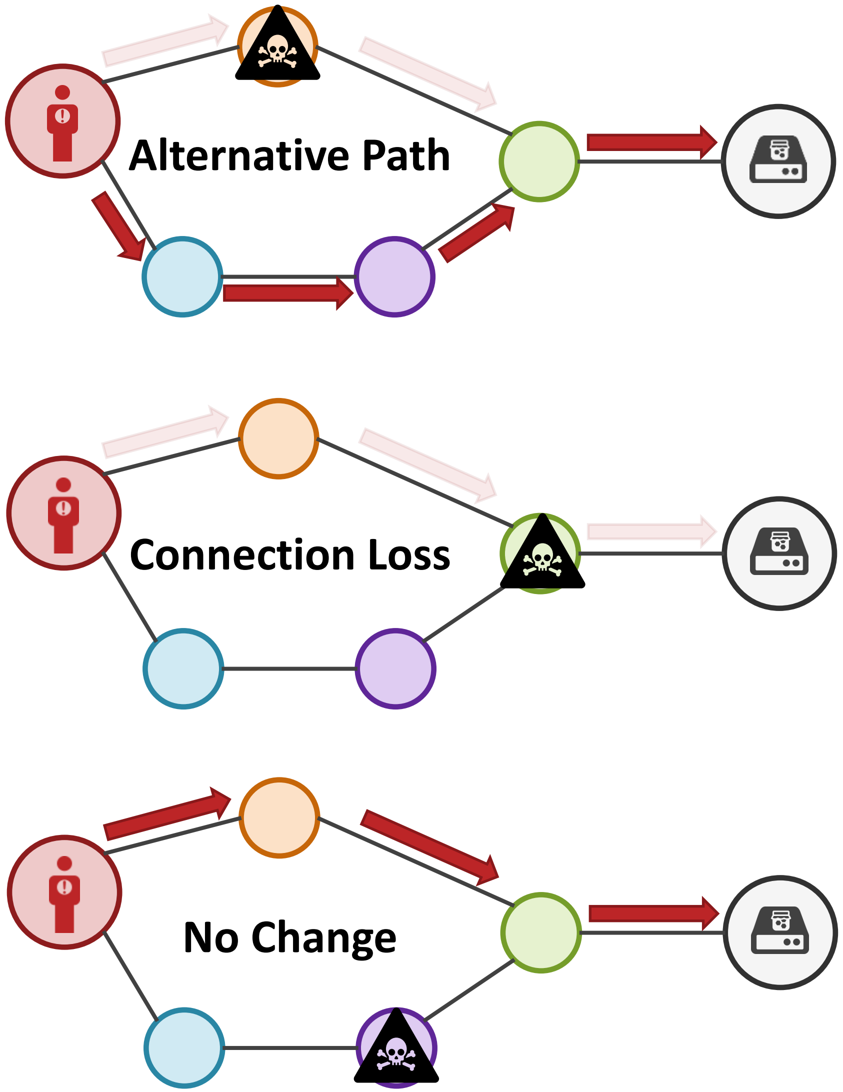


BGP Poisoning for Attack Traceback



Observable Effect?

Yes (if TTL change)

Yes (traffic stops)

No

only if poisoned AS was on original path

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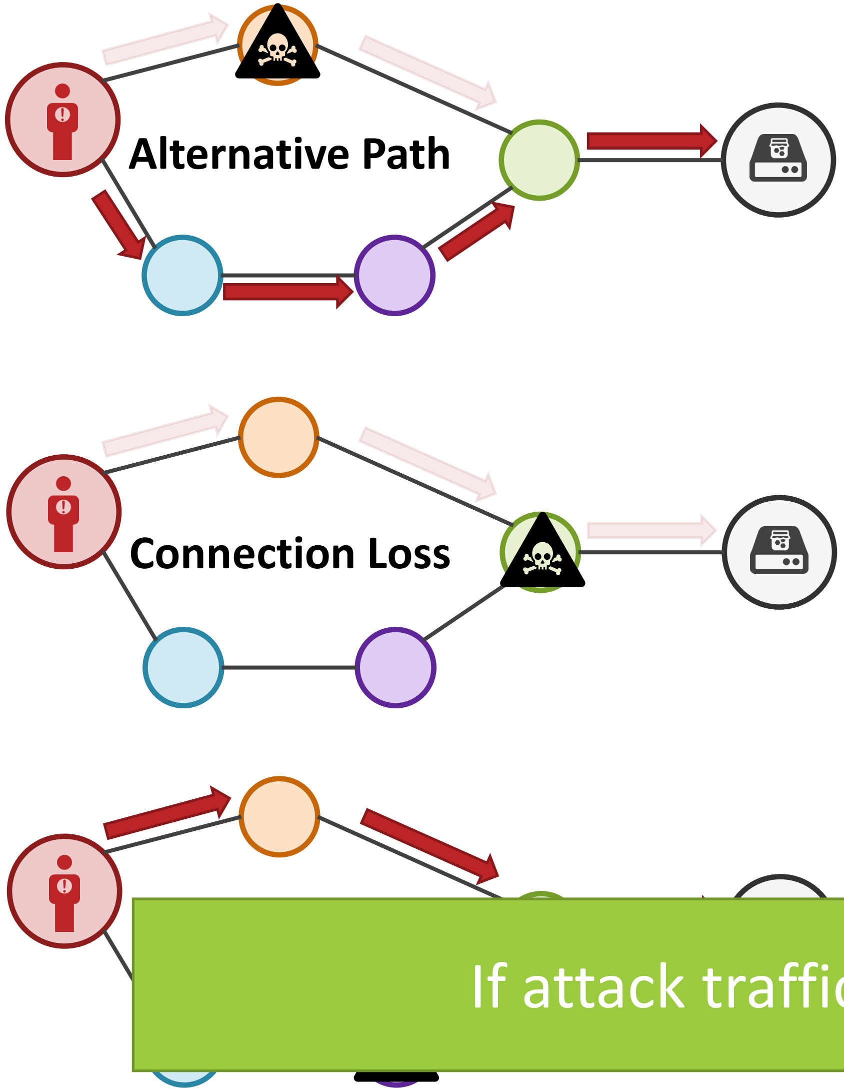

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If attack traffic changes => poisoned AS was on path

Naive Traceback

```
for every AS A:
  poison A
  if has_effect():
    candidates.add(A)
```

- ~ 70,000 active Ases
- max rate: 6/h

11,667 hours
= 486 days
= 1.3 years

Naive Traceback

```
for every block of ASes P:
  poison P
  if has_effect():
    split P in two parts
    & recurse
```

- shortcut: stop if a stub-AS shows an effect (no customers => must be traffic origin)

- ~ 70,000 active Ases
- max rate: 6/h
- poison 128 ASes in parallel
  - logarithmic split&recurse overhead

91.1 hours
= 3.8 days

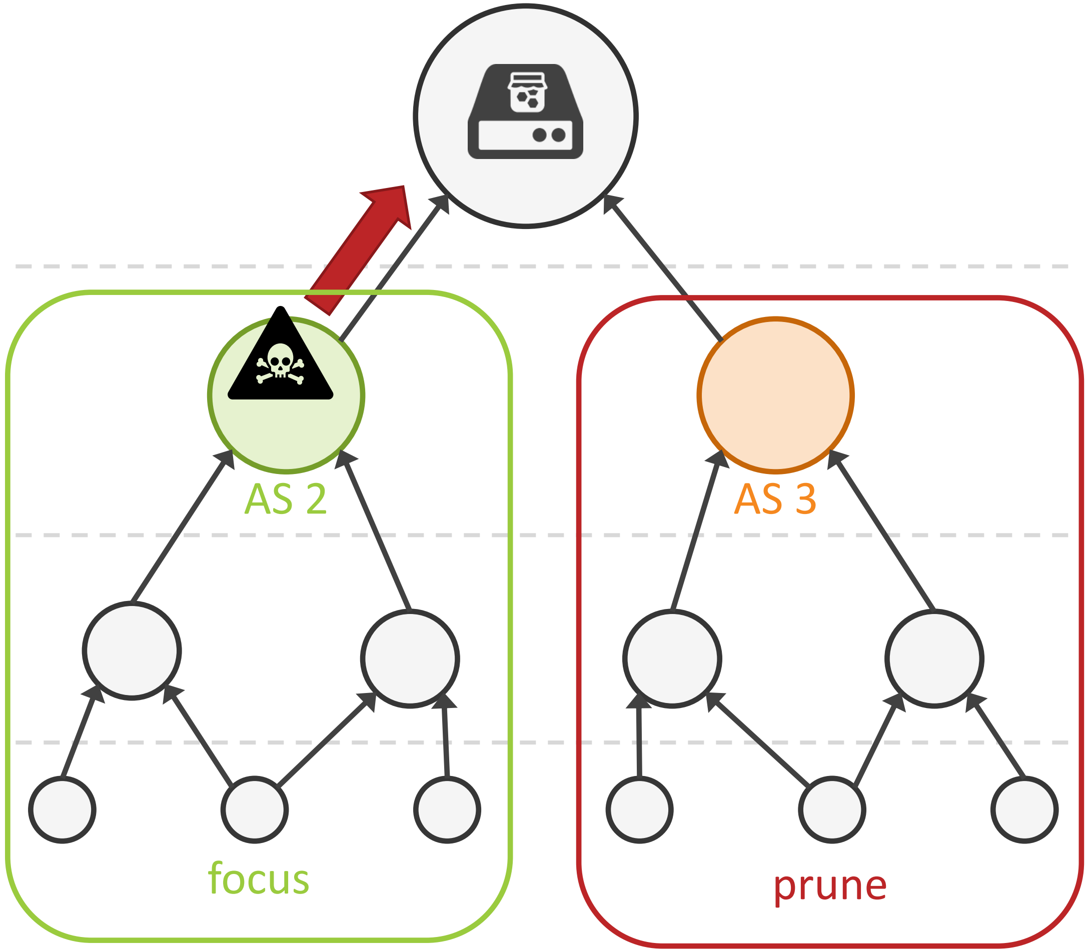
Feasible

Can we do even better?

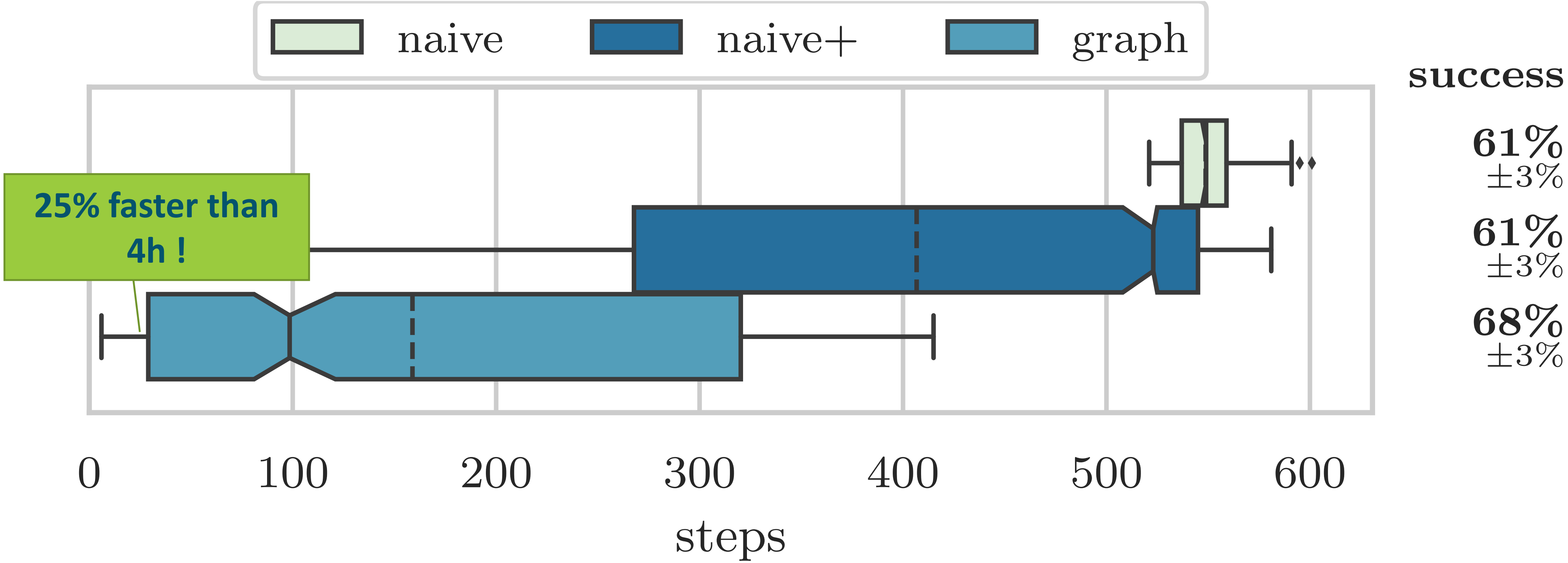
Graph-based Traceback

- create rooted directed graph over ASes
  - root: 🖴
  - edge AS1 → AS2:
AS1 can have AS2 as next-hop
- use graph to
  - search in layers
  - prune search
- **requires accurate AS relationship data**

large parts pruned
= dramatic speed-up

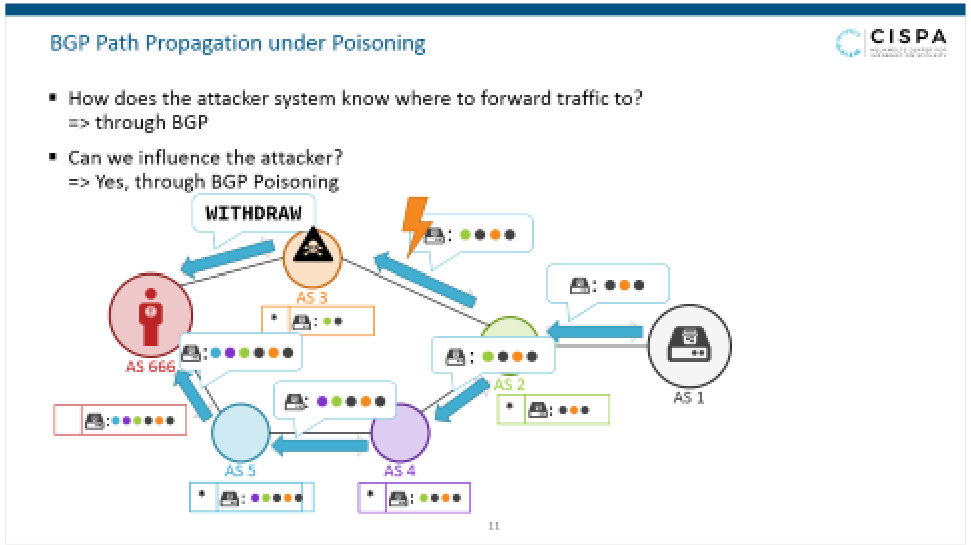


Evaluation – Results



25% faster than 4h !

Conclusion



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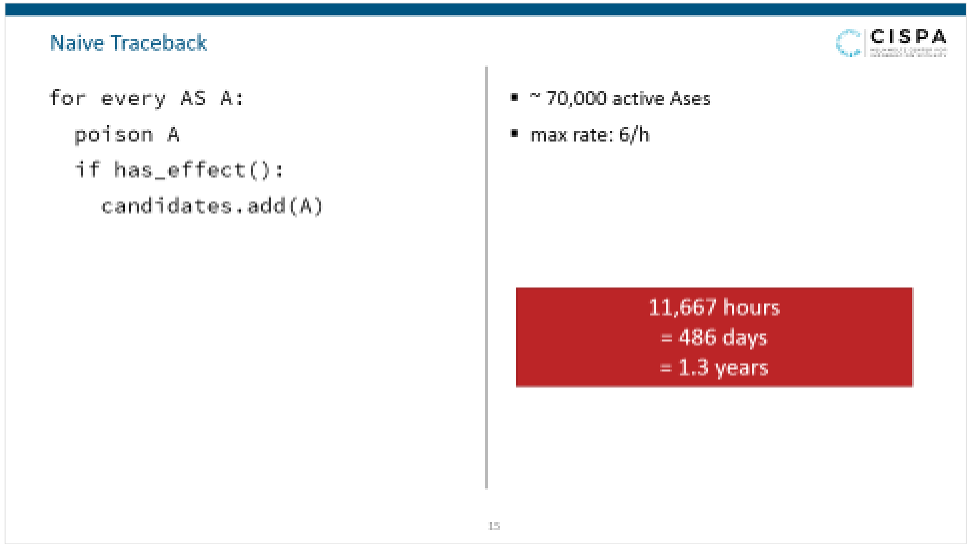

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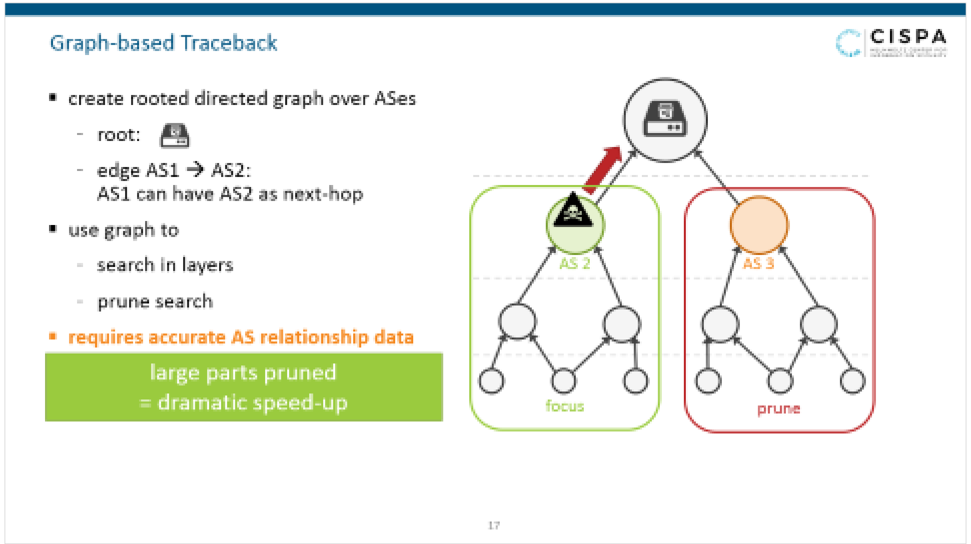

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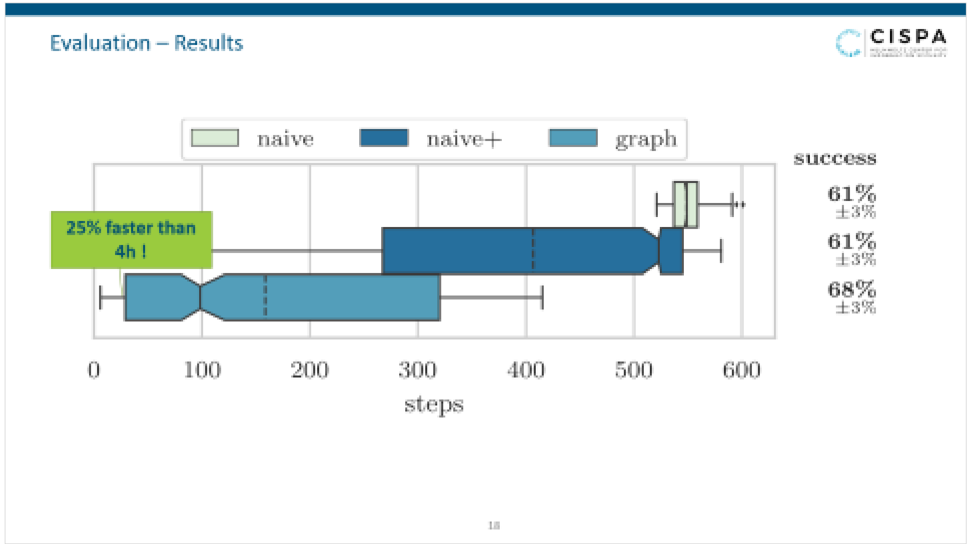

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