A proactive and collaborative DDoS mitigation strategy for the Dutch critical infrastructure

Cristian Hesselman[1], Jeroen van der Ham[2], Roland van Rijswijk[3], Jair Santanna[2], Aiko Pras[2]

1) SIDN Labs, 2) University of Twente, 3) SURFnet

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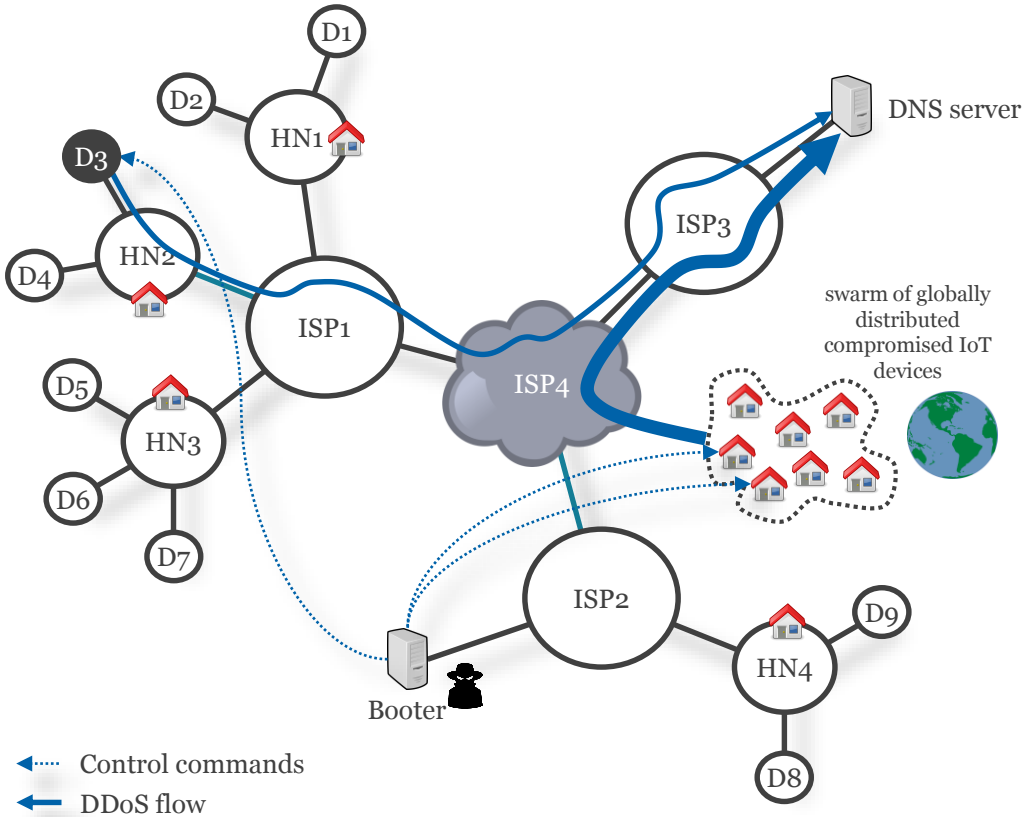
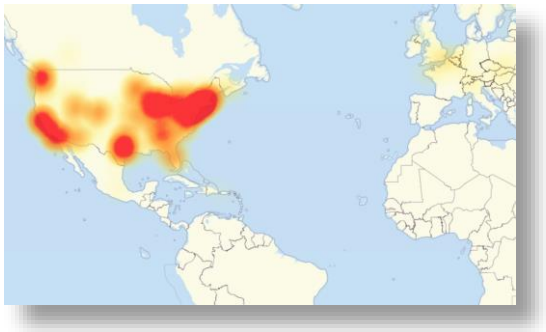
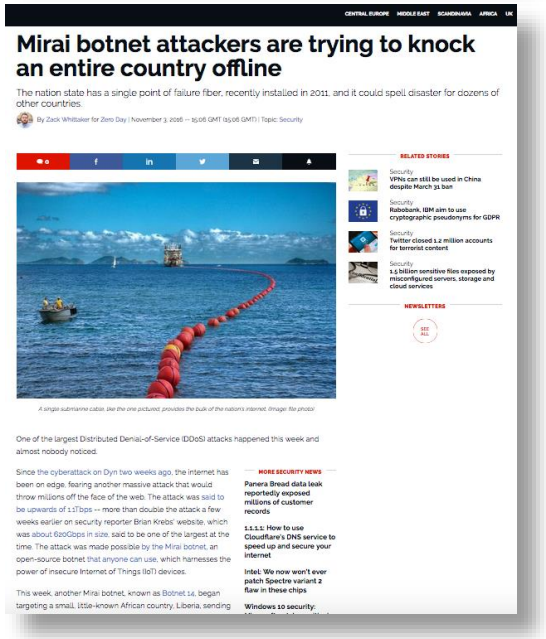
DDoS attacks (on the DNS)







Other targets: OVH (hosting provider), Krebs On Security (website), Deutsche Telecom (ISP)

https://en.wikipedia.org/wiki/2016_Dyn_cyberattack
https://www.zdnet.com/article/mirai-botnet-attack-briefly-knocked-an-entire-country-offline/

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DDoS trends

- Volume at 1+ Tbps, likely going up (Dyn @ 1.2 Tbps, GitHub @ 1.3 Tbps)
- Many widely distributed DDoS sources (Mirai: 600K, bots all over the world)
- IoT bots mutating and spreading quickly (Mirai: 75-minute doubling time)
- Easier to launch through booters/stressers (Mirai)
- Combination of direct and reflection attacks (Mirai)
- DNS increasingly a high-profile target (DNS root 2015, Dyn 2016)

The Netherlands

- DDoS attacks on Dutch critical infrastructure operators (Jan 2018)

- Estimated 40 Gbps attacks resulted in service outages at several operators

- Reactive and individual DDoS mitigation strategy
  - (Commercial) DDoS protection services per critical service provider
  - Person-to-person incident response communications during attacks

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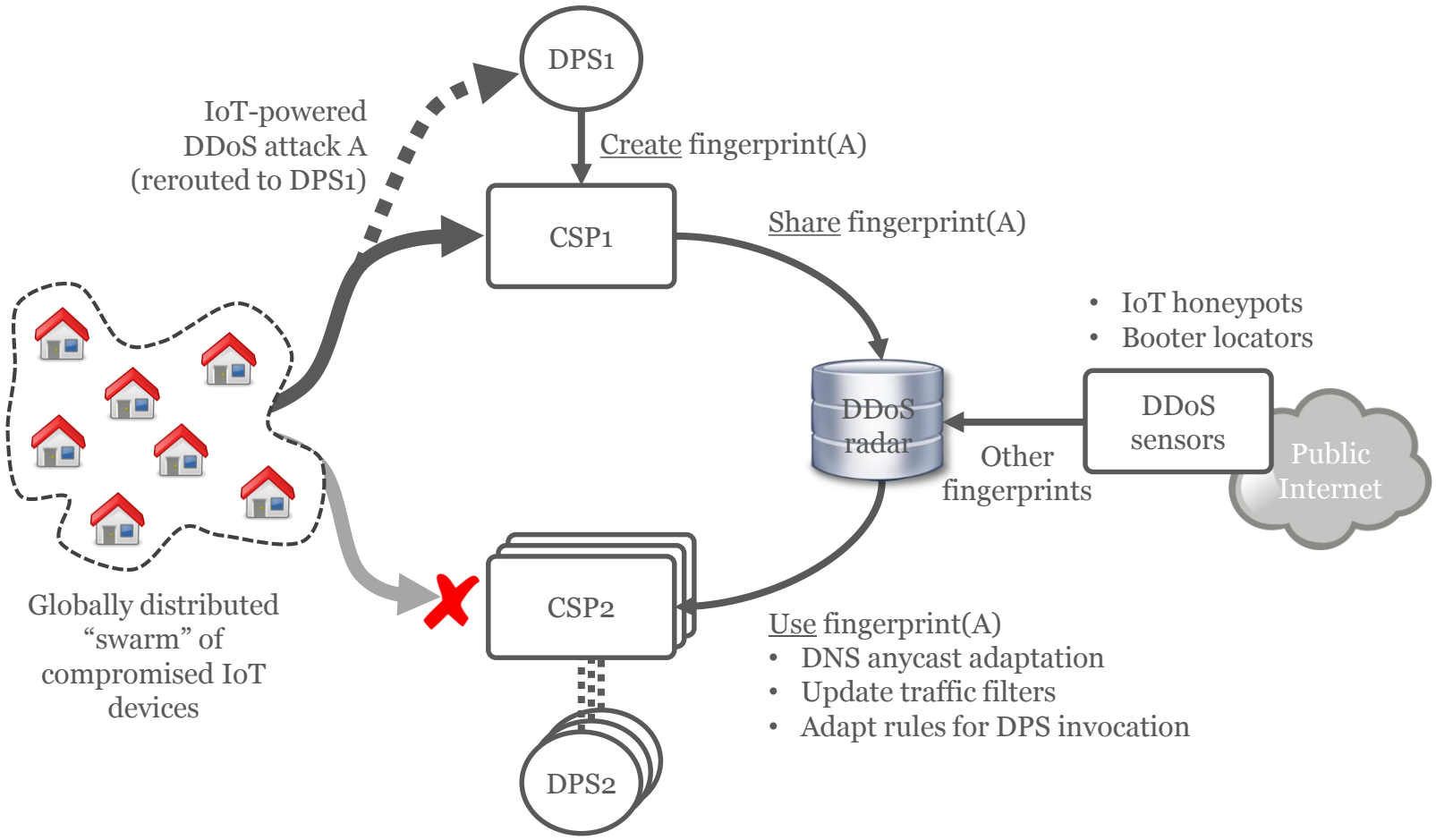
A proactive and collaborative strategy

- Improve information position of Dutch critical service providers by *continually and automatically* sharing *fingerprints* of actual and potential DDoS sources
- Widens view of critical service providers, enabling them to *proactively* prepare for attacks that have not hit them yet
- Information provisioning layer that *extends* existing DDoS protection services that Dutch critical service providers use and *does not replace them*
- Improve *attribution* of perpetrators and booter operators, allowing for better prosecution and increased deterrent effects
- Onboard *all* critical providers in NL (Internet, financial, energy, water, etc.)

DDoS radar (IoT example)



CSP = Critical Service Provider (e.g., a bank, ISP, or a registry)
DPS = DDoS Protection Service (e.g., Nawas or commercial such as Arbor)

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Fingerprint

- Summary of DDoS traffic
  - Domain names used
  - Source IP addresses
  - Protocol
  - Packet length
- Created from traffic capture files like PCAPs
- Victim IP addresses not part of fingerprint
- Challenge: creation at high speed (10s of Gbps)

Status and next steps

- DDoS radar embraced by broad coalition of 25 players from industry (ISPs, xSPs, IXPs, banks, not-for-profit DPS) and gov't (ministries and agencies)

- Dutch Continuity Board (DCB) acts as springboard, supported by Dutch National Cyber Security Center (NCSC-NL)

- Develop DDoS radar based on existing components, such as
  - DDoS-DB of the University of Twente (ddosdb.org)
  - NaWas' DDoS pattern recognition system (ddos-patterns.net)

- Working groups: (1) clearing house, (2) cross-industry information sharing, (3) outreach, (4) ground rules and incident response, and (5) exercises

Longer-term

- Pilot part of an EU cybersecurity research project (under review) + development of a blueprint “business plan” to sustainably run (national) DDoS radars

- Envisioned growth path: (1) Netherlands → Europe → global and (2) extend to “non-critical” service providers

Q&A

Cristian Hesselman
Head of SIDN Labs
+31 6 25 07 87 33
cristian.hesselman@sidn.nl
@hesselma

Blog: https://www.sidnlabs.nl/a/news/a-proactive-and-collaborative-ddos-mitigation-strategy-for-the-dutch-critical-infrastructure?language_id=2