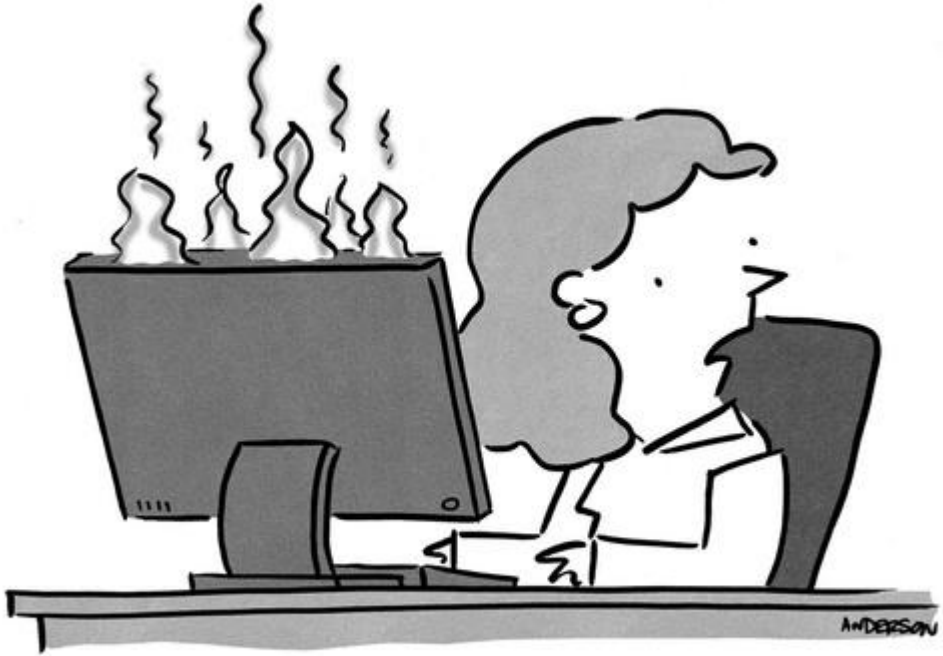
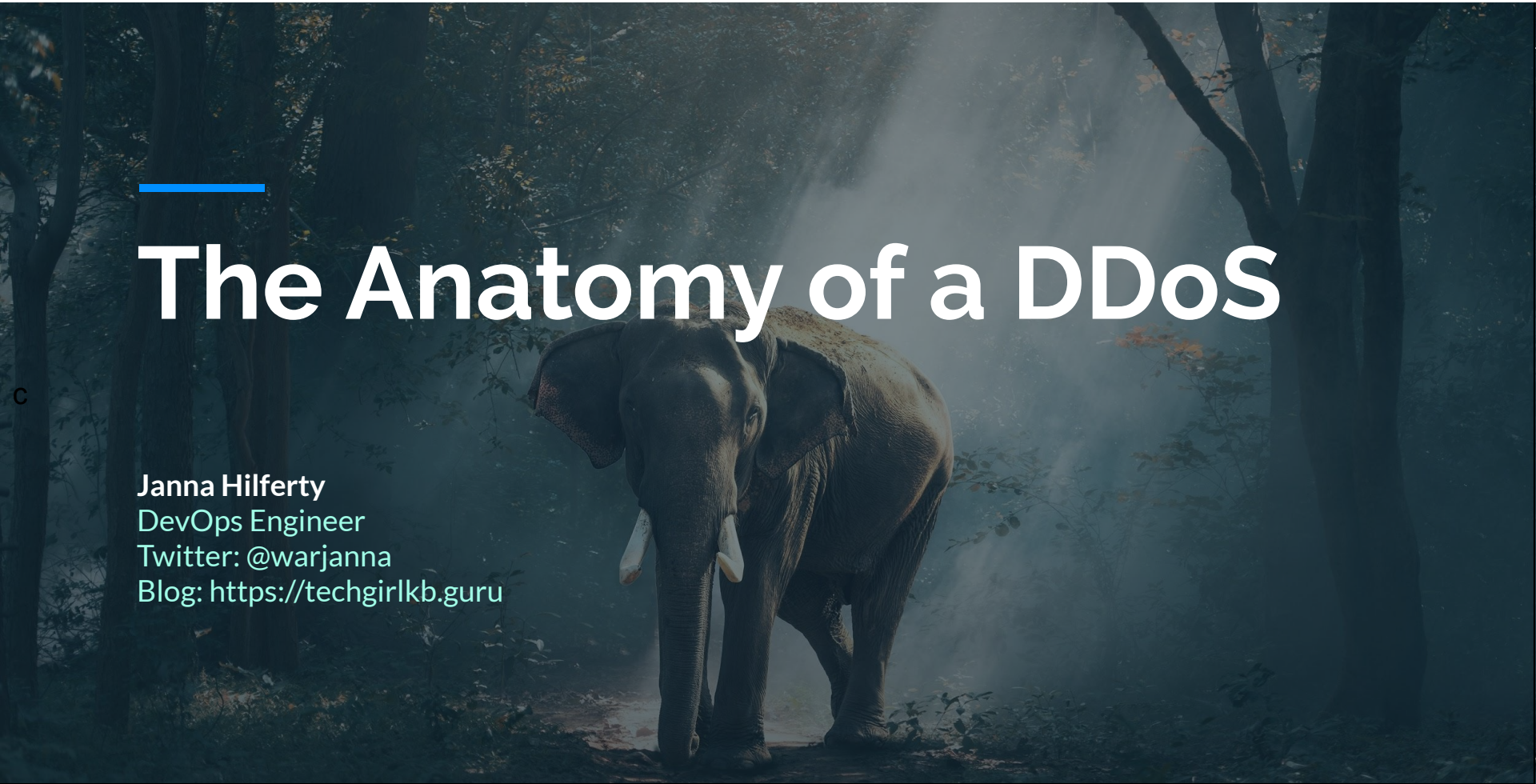


"Hey, honey, can websites catch on fire?"



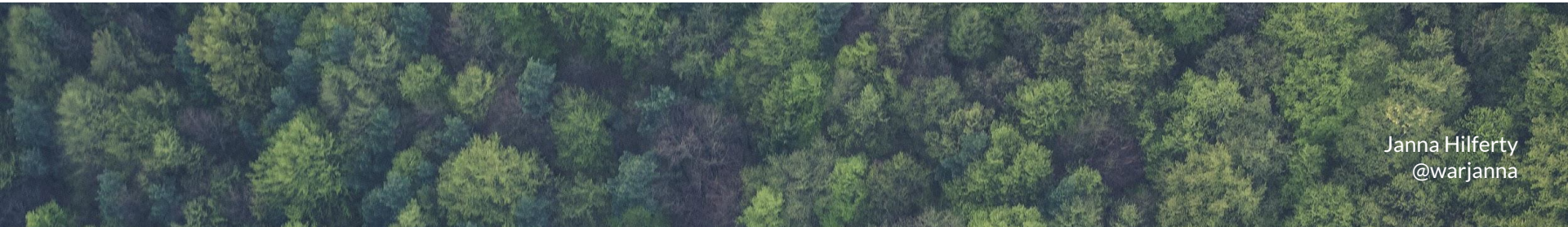
The Anatomy of a DDoS

Janna Hilferty
DevOps Engineer
Twitter: @warjanna
Blog: https://techgirlkb.guru

TOC

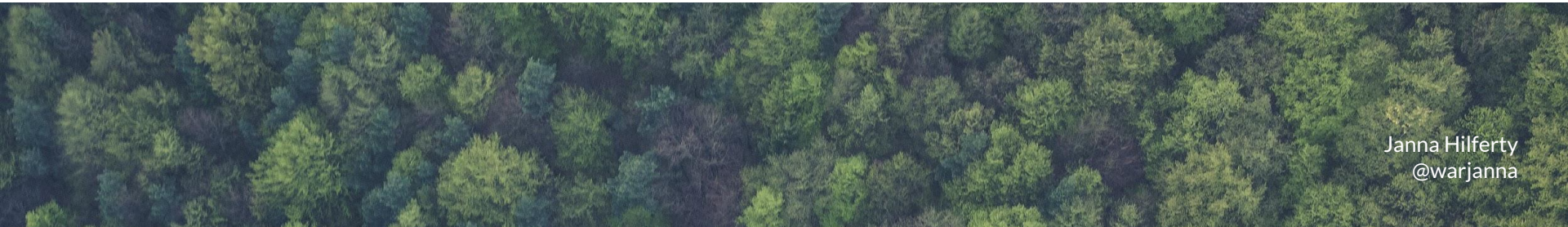
Janna Hilferty
@warjanna

DDoS



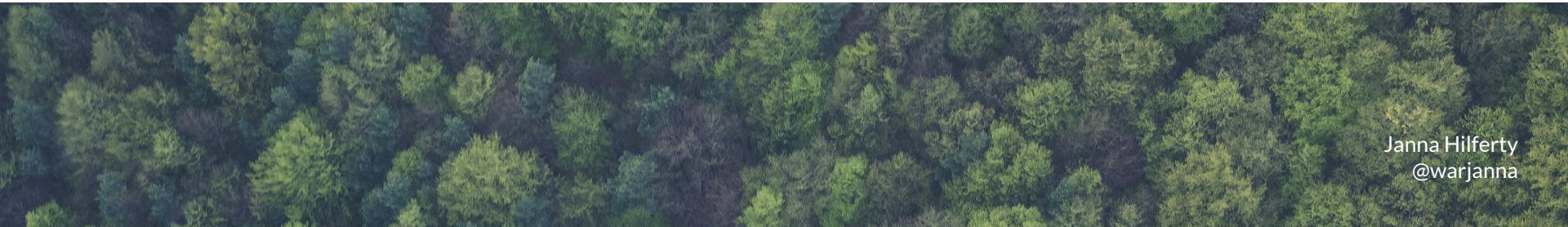
DDoS =

Distributed *Denial of Service*



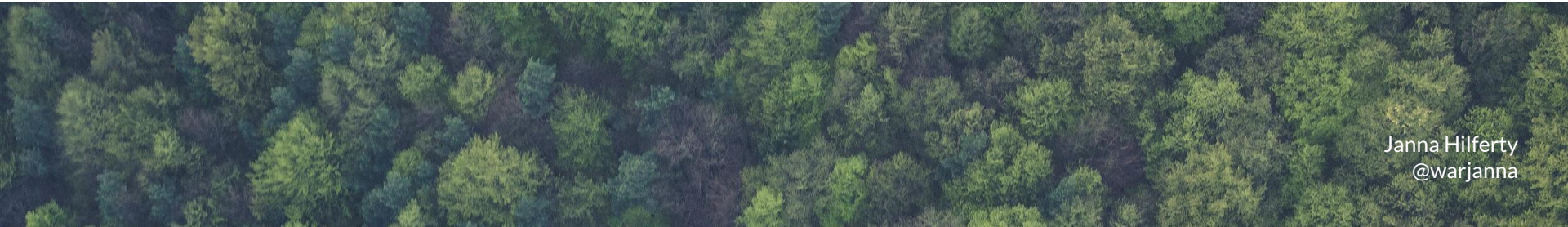
Janna Hilferty
@warjanna

A malicious attempt to **disrupt normal traffic** of a targeted **server**, **service** or **network** …



… by overwhelming the target or its surrounding infrastructure with a **flood of Internet traffic.**

\- Cloudflare



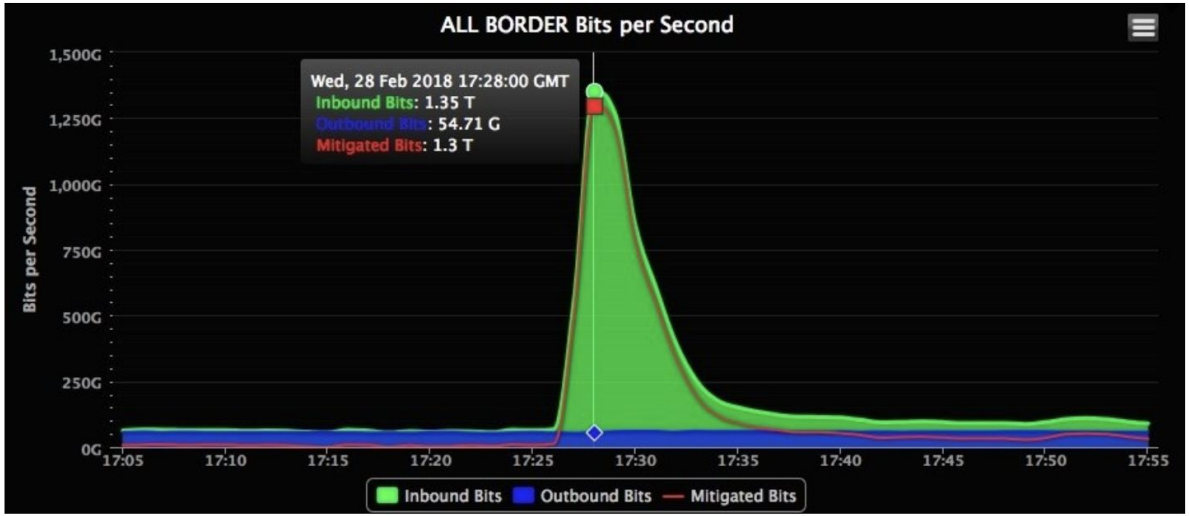
Visualization of a DDoS - [IPViking from Norse Corp]

Janna Hilferty
@warjanna

Modern DDoS Examples

Janna Hilferty
@warjanna

1.3TB/s: Github Memcached Servers (2018)

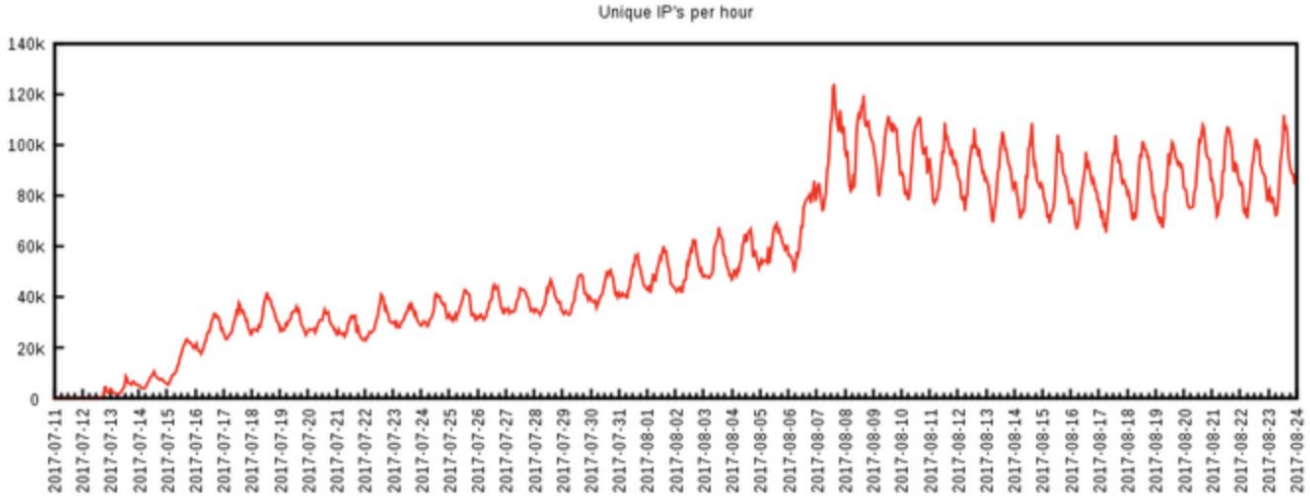


Real-time traffic from the DDoS attack.

AKAMAI

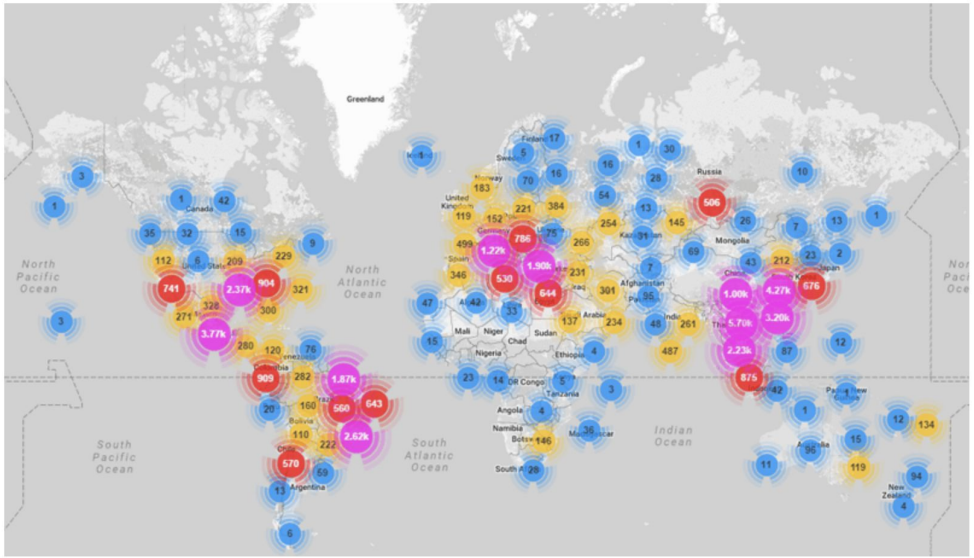
Janna Hilferty
@warjanna

Android-based WireX attacks (2017)



Janna Hilferty
@warjanna

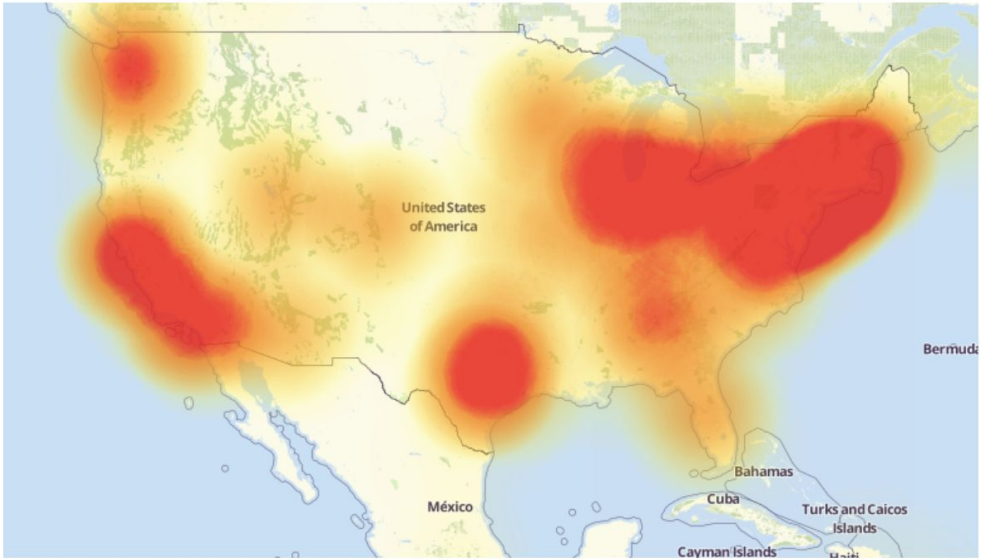
1.1TB/s Mirai botnet attacks (2016)



Mira botnet infections globally. (Image courtesy of Imperva.)

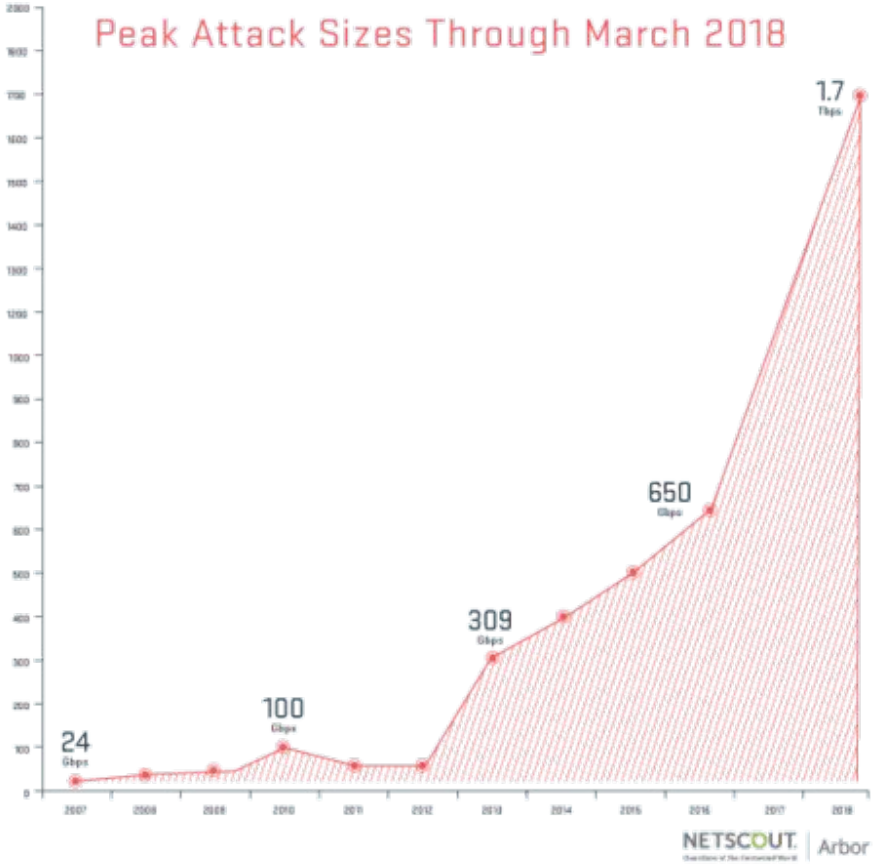
Janna Hilferty
@warjanna

Level 3/DynDNS attacks (2016)



A depiction of the outages caused by the Mirai attacks on Dyn, an Internet infrastructure company. Source: Downdetector.com.

Janna Hilferty
@warjanna

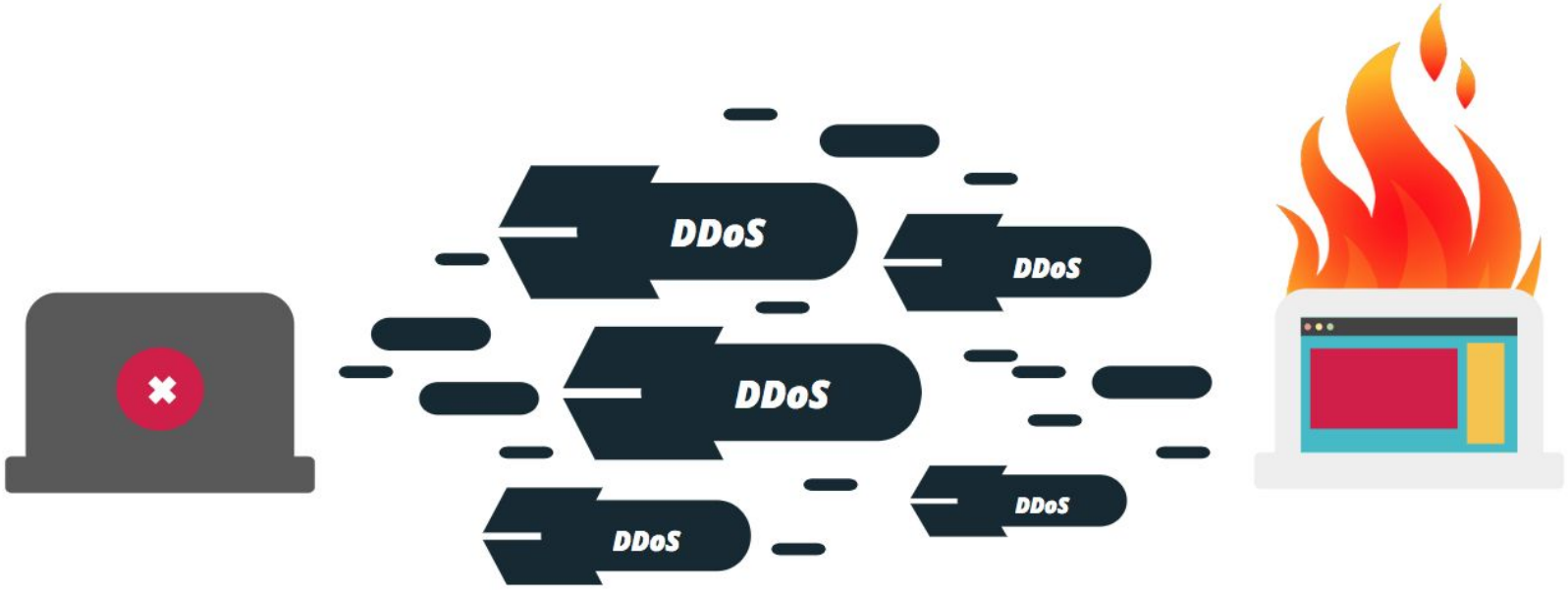


[DDoS attack volume growth]

Janna Hilferty
@warjanna

DDoS attackers may seek a ransom, revenge, secure data, or simply to disarm your business.

Janna Hilferty
@warjanna



Janna Hilferty
@warjanna

Cost of a DDoS

1. On average, the cost of a DDoS attack for enterprises was **$2 million**, and the cost of a DDoS attack for small and medium-sized businesses (SMBs) was **$120,000**.

    - Kaspersky 2017 study

Cost of a DDoS

1. On average, the cost of a DDoS attack for enterprises was **$2 million**, and the cost of a DDoS attack for small and medium-sized businesses (SMBs) was **$120,000**.

   - Kaspersky 2017 study

2. 49% of DDoS attacks last between **6-24 hours**, averaging **$40,000/hr**.

   - Incapsula study

Janna Hilferty
@warjanna

Cost of a DDoS

3

33% of respondents acknowledged **customer data theft**, and 19% of respondents suffered **intellectual property loss**.

- Incapsula study

Cost of a DDoS

3 33% of respondents acknowledged **customer data theft**, and 19% of respondents suffered **intellectual property loss**.

- Incapsula study

4 64% of respondents say **reputation damage** is the main consequence of a denial-of-service attack. This is followed by **diminished productivity for IT staff** (35%) and revenue losses (33%).

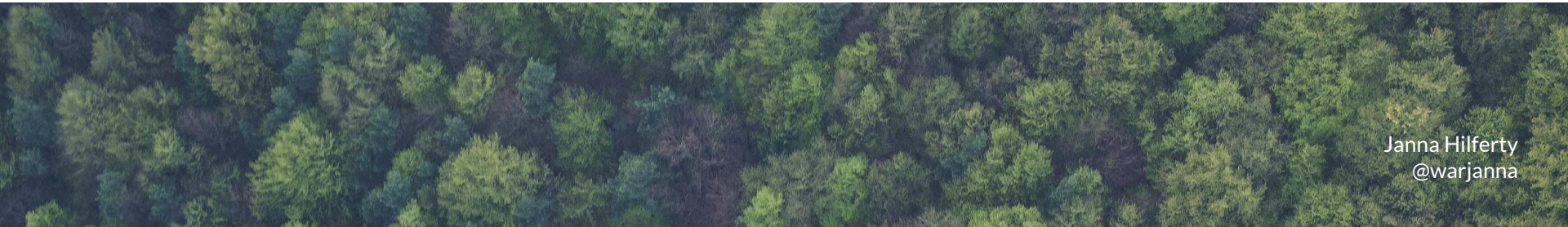
- Ponemon Institute (Akamai study)

Janna Hilferty
@warjanna

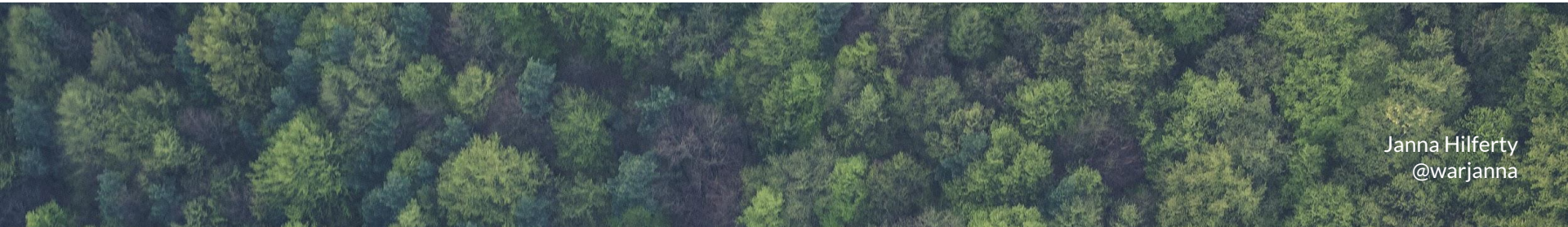
Botnets & Malware

Janna Hilferty
@warjanna

Botnet



Botnet = robot + network



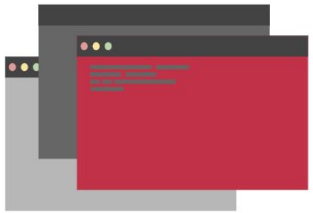
Structure of a botnet

Bot herder

Structure of a botnet

Bot herder

Malware

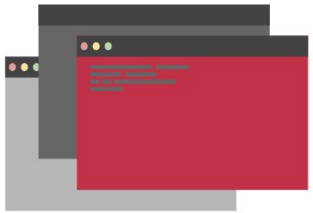


Janna Hilferty
@warjanna

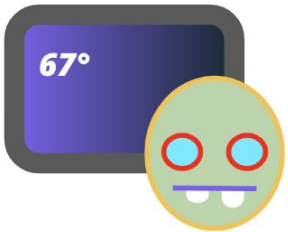
Structure of a botnet

Bot herder

Malware



Zombies



Janna Hilferty
@warjanna

IoT Threat Landscape

Janna Hilferty
@warjanna

Janna Hilferty
@warjanna

Landscape
Internet of Things

The sphere of internet-connected devices is changing faster than regulation and security patches can keep up.

Janna Hilferty
@warjanna

Landscape
Internet of Things

The sphere of internet-connected devices is changing faster than regulation and security patches can keep up.

Implications:

- Security settings
- Factory-default passwords
- Peer-to-peer communications
- Open ports
- ‘Listening’ devices
- Open databases/cloud drives

Janna Hilferty
@warjanna

Landscape
Internet of Things

The sphere of internet-connected devices is changing faster than regulation and security patches can keep up.

Implications:

- Security settings
- Factory-default passwords
- Peer-to-peer communications
- Open ports
- ‘Listening’ devices
- Open databases/cloud drives

SANITY CHECKS

When was the last time you checked your router, thermostat, wireless speakers, or smart doorbell for a security update?

Janna Hilferty
@warjanna

Rule #1: Every internet-connected device is a potential entry-point for malware.

Janna Hilferty
@warjanna

Rule #2: If you can install malware on it, an attacker can harness it to attack you & others.

Janna Hilferty
@warjanna

IoT + Malware = <3

Janna Hilferty
@warjanna

Scanning for open ports

Janna Hilferty
@warjanna

Click-fraud & spam

Janna Hilferty
@warjanna

R u a bot?

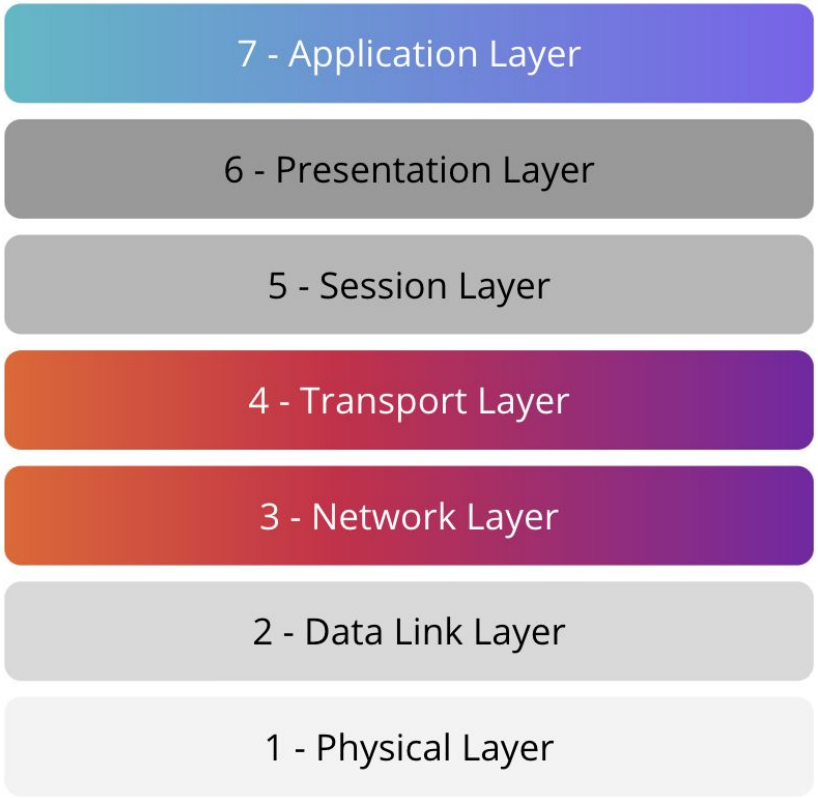
The users of devices with malware are often completely unaware their device is being remotely controlled by the attacker.

Janna Hilferty
@warjanna

Attacks & the OSI Model

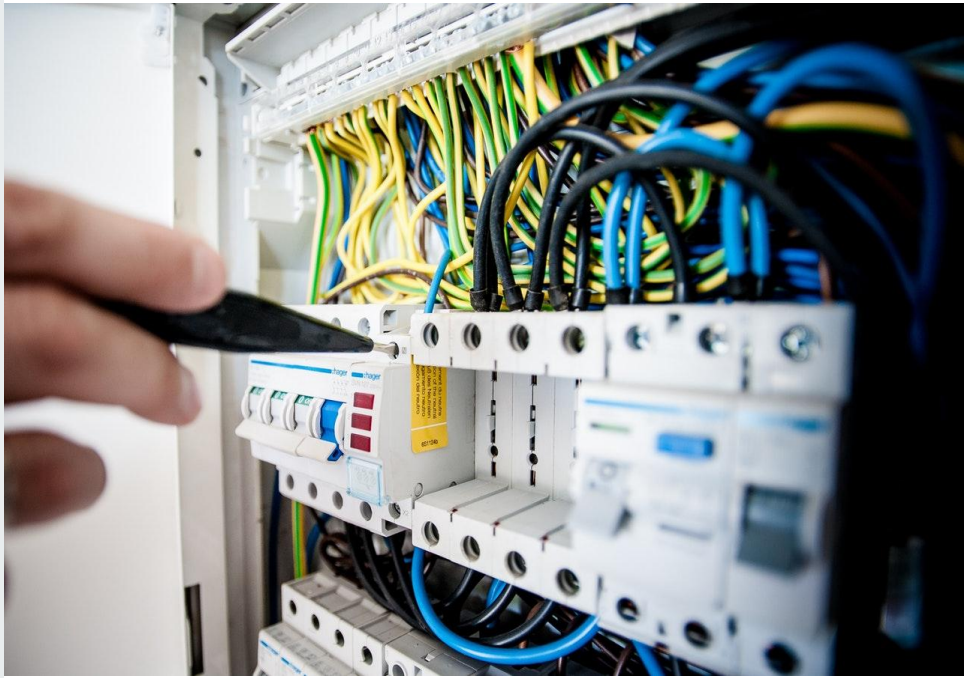
The OSI model

Kind of like all the layers of an internet cake.



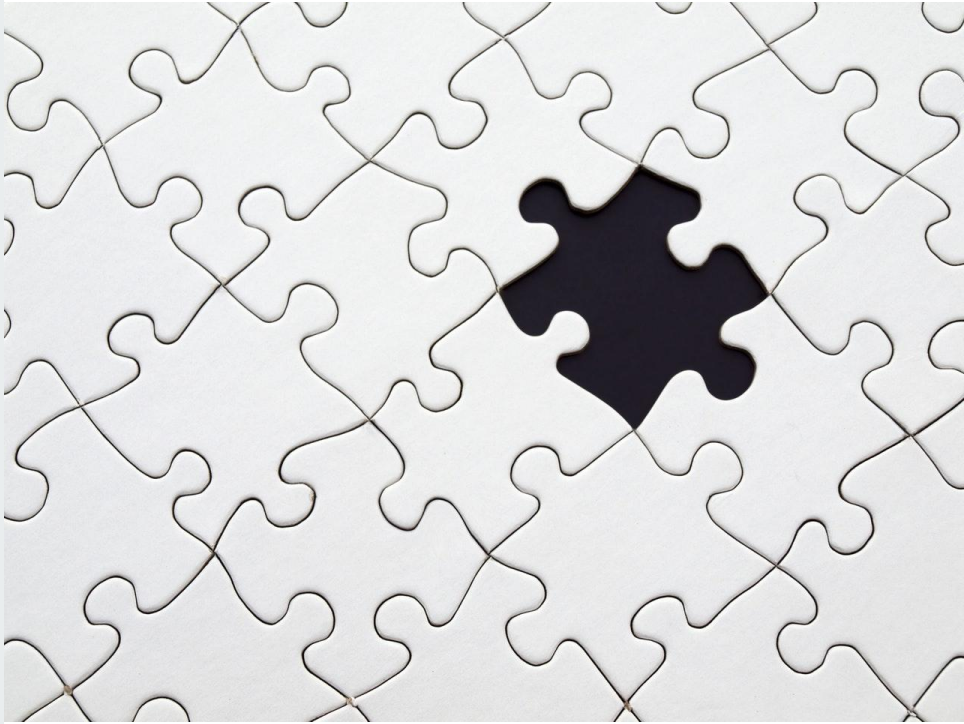
Janna Hilferty
@warjanna

1 - Physical Layer



Janna Hilferty
@warjanna

2 - Data Link Layer



Janna Hilferty
@warjanna

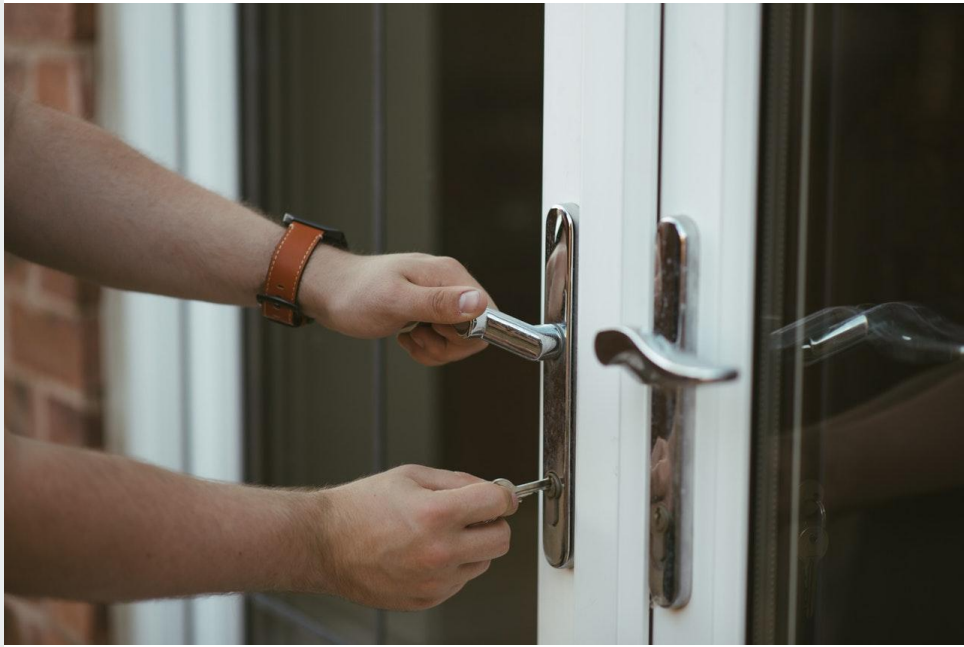
3 - Network Layer

Janna Hilferty
@warjanna

4 - Transport Layer

Janna Hilferty
@warjanna

5 - Session Layer

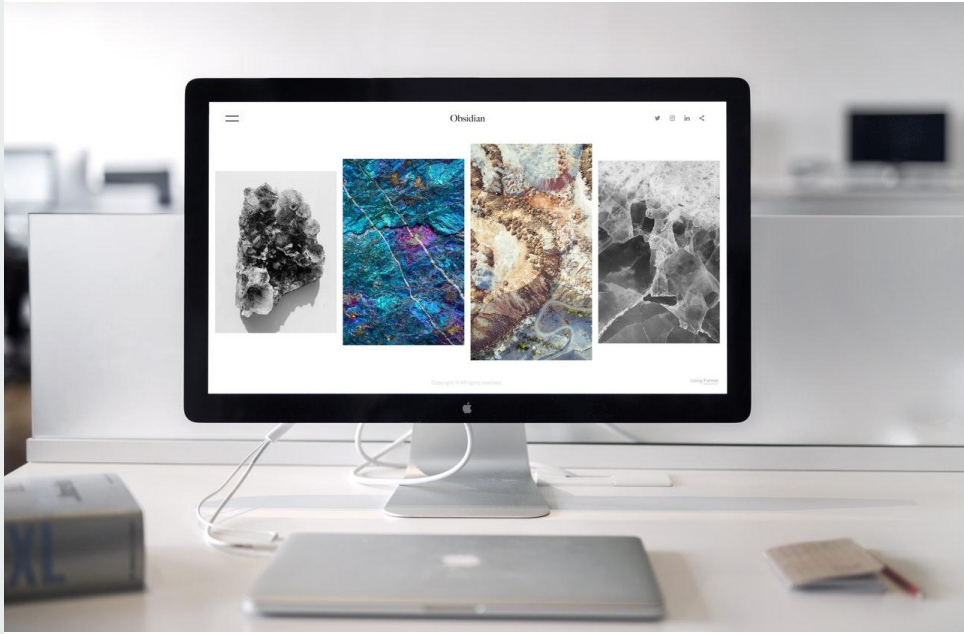


Janna Hilferty
@warjanna

6 - Presentation Layer

Janna Hilferty
@warjanna

7 - Application Layer



Janna Hilferty
@warjanna

DDoS and the OSI model

Most attacks happen on layers 3 (Network), 4 (Transport), and 7 (Application).

Layer 3 attacks: IP Spoofing, ICMP floods, Packet sniffing

Layer 4 attacks: Syn floods

Layer 7 attacks: HTTP floods (botnets), DNS poisoning, DNS amplification

Janna Hilferty
@warjanna

Mitigation Techniques

The best mitigation is to protect against DDoS *before it happens.*

Janna Hilferty
@warjanna

DDoS mitigation: unprotected server

1

Unprotected
origin server

Janna Hilferty
@warjanna

DDoS mitigation: unprotected server

1

Unprotected origin server

2

Attacker identifies origin server IP and sends traffic

Janna Hilferty
@warjanna

DDoS mitigation: unprotected server

1

Unprotected origin server

2

Attacker identifies origin server IP and sends traffic

3

Firewall added, but attackers bypass (origin already known)

Janna Hilferty
@warjanna

DDoS mitigation: unprotected server

1

Unprotected origin server

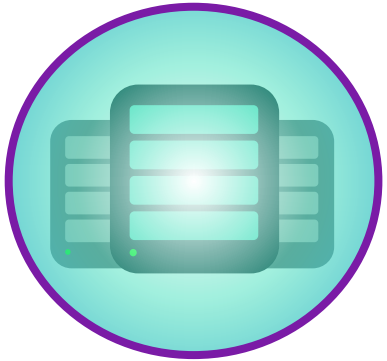
2

Attacker identifies origin server IP and sends traffic

3

Firewall added, but attackers bypass (origin already known)

4



Migration of origin server required

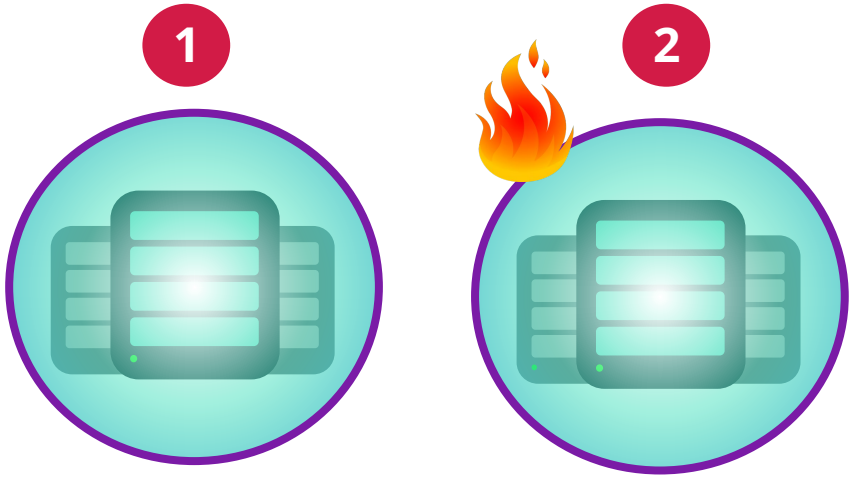
Janna Hilferty
@warjanna

DDoS mitigation: protected server

Protected origin server

Janna Hilferty
@warjanna

DDoS mitigation: protected server



Protected origin server

Attack is deflected at the firewall OR network soaks attack

Janna Hilferty
@warjanna

DDoS mitigation: protected server

Protected origin server

Attack is deflected at the firewall OR network soaks attack

No downtime or migration required - origin server remains online.

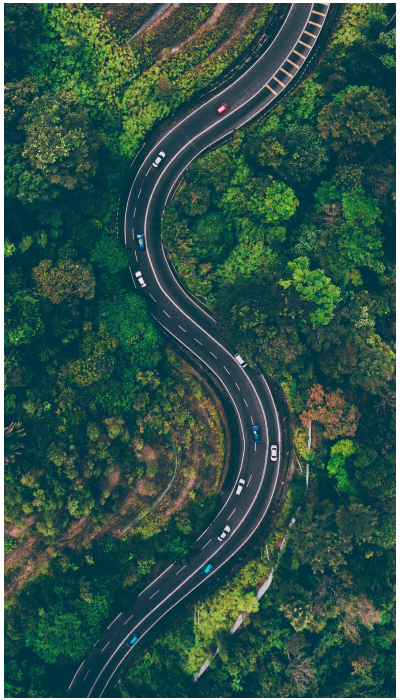
Janna Hilferty
@warjanna

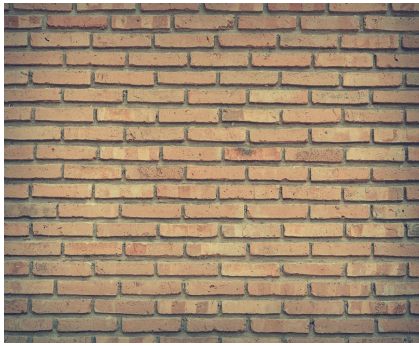
DDoS Protection Services

01 | Managed WAF services

02 | Caching and CDN services

03 | In-server protection





Janna Hilferty
@warjanna


Prevention

What is action is being taken against DDoS attackers?

Janna Hilferty
@warjanna

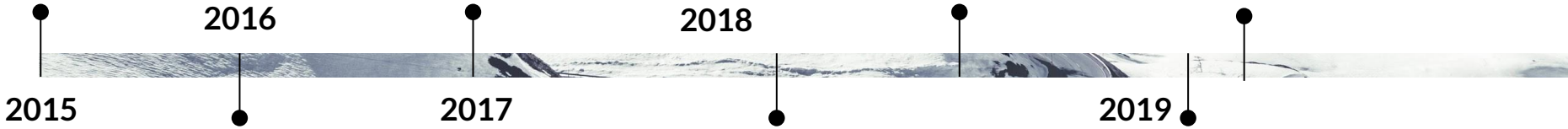
Legislation against DDoS

01 | Computer Fraud & Abuse Act (USA)

02 | Police & Justice Act (UK)

Janna Hilferty
@warjanna

Legal Timeline



2015 — Anonymous petitions White House to label DDoS as “free speech”

2016 — Europol partnership against DD4BC

2017 — FBI asks DDoS victims to come forward

2018 — UK, US, Netherlands partner to take down webstresser.org

2019 — Mirai botnet creators assist FBI to take down new attackers

2019 — FBI takes down 15 DDoS-for-hire websites

2019 — Interpol goes after users of webstresser.org

Janna Hilferty
@warjanna

Q&A

Janna Hilferty
@warjanna


Thank you.
Janna Hilferty
DevOps Engineer
Twitter: @warjanna
Blog: https://techgirlkb.guru