Cyber Security for an IoT World

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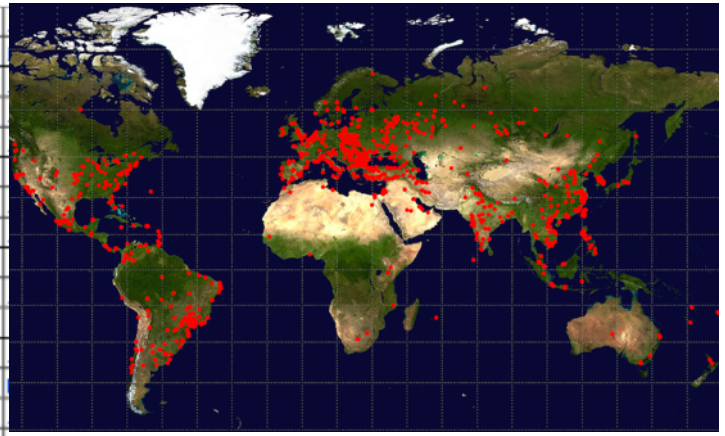
IoT Growth - 1.5 Million Devices Per hour!!

Mirai Botnet (IoT) Oct 2016

- Compromised IoT Devices
  - Baby monitors, webcams
  - Home routers
  - DVRs, printers
- Massive DDoS Botnet (600Gb-1Tb)
  - **DynDNS** attack (Liberia, Deutsche Telek
  - DDoS as a service, DDoS for ransom
  - Source code released!!
- **Challenges (why does it exist??)**
  - **Default Passwords, open ports, unma**
  - **Vulnerabilities (slow to patch)**
  - **Low focus on security (time to market**
  - **Low resources (CPU/RAM/Storage/etc**
  - **Agentless (no AV/client)**

ACTi IP Camera
ANKO Products DVR
Axis IP Camera, et. al
Dahua Camera
Dahua DVR
Dahua DVR
Dahua IP Camera
Dahua IP Camera
Dahua IP Camera
Dreambox TV receiver
EV ZLX Two-way Speaker?
Guangzhou Juan Optical
H.264 - Chinese DVR
HiSilicon IP Camera
HiSilicon IP Camera
HiSilicon IP Camera
HiSilicon IP Camera
IPX-DDK Network Camera
IQinVision Cameras, et. al
Mobotix Network Camera
Packet8 VOIP Phone, et. al
Panasonic Printer
RealTek Routers
Samsung IP Camera
Shenzhen Anran Security Camera
SMC Routers
Toshiba Network Camera
Ubiquiti AirOS Router
VideoIQ
Vivotek IP Camera
Xerox printers, et. al
ZTE Router



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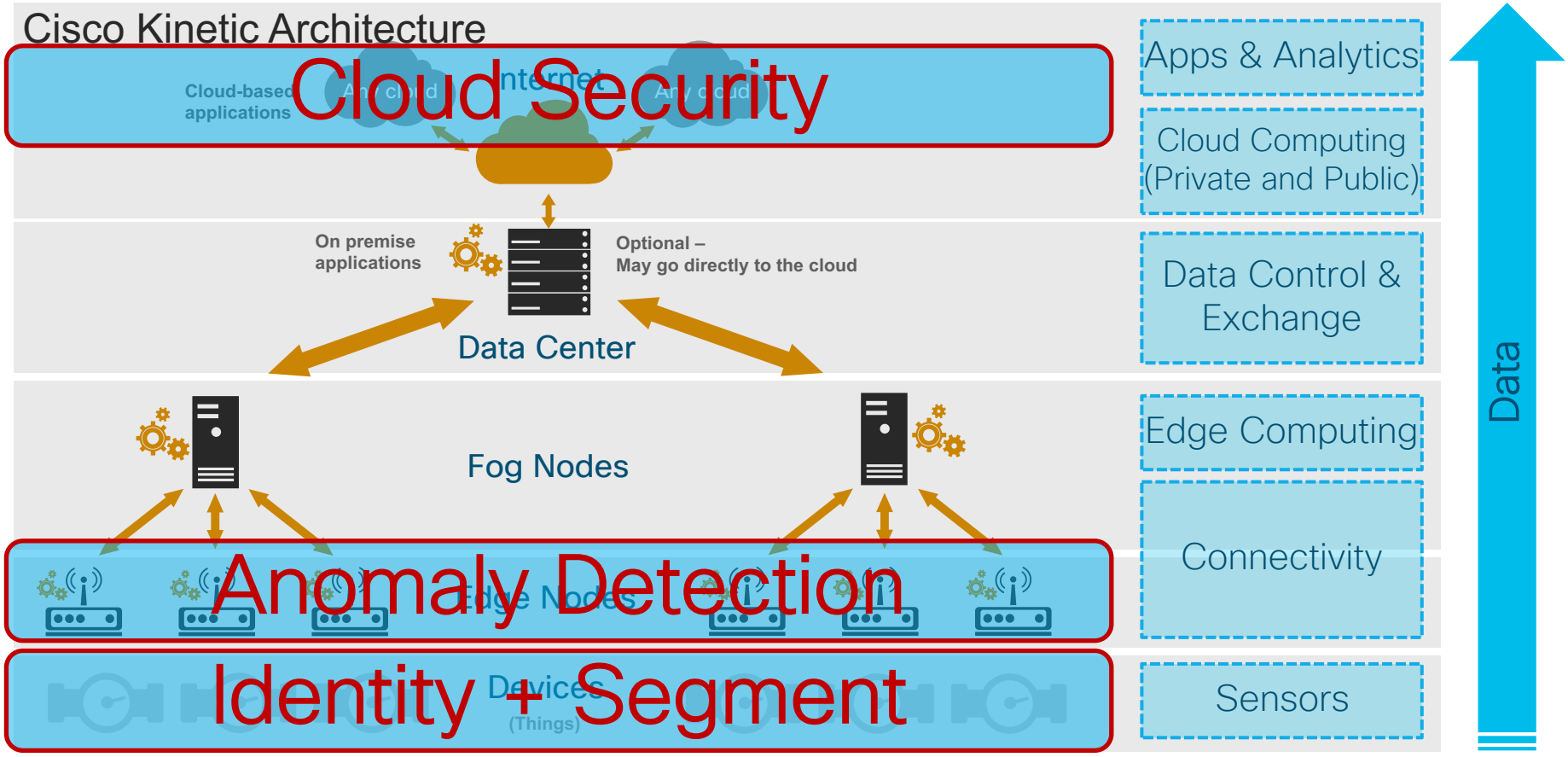
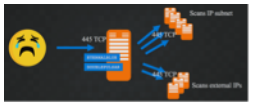
IoT Security Challenge – Identity + Anomaly + ML/AI/CloudIntel

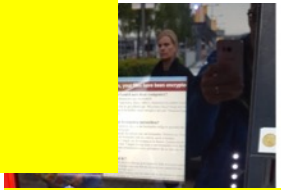




WannaCry (Worm – OT/IoT Impact)

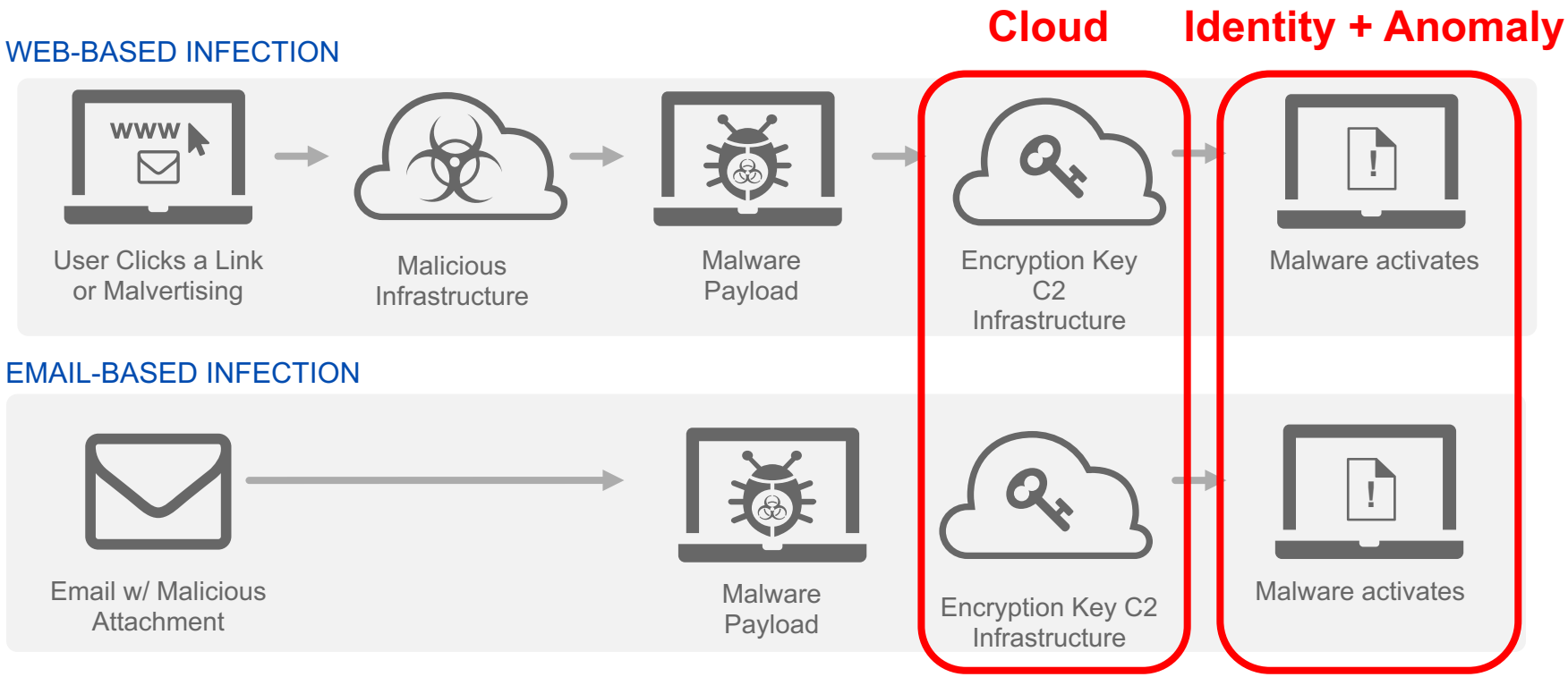
- Began on 12/5/17- spread as a worm – 230,000 infections across 150 countries
- OT Impact - Britain NHS (computers, MRI scanners, blood-storage refrigerators and theatre equipment), Telefonica, Deutsche Bahn, Nissan (UK), Renault, ATMs, Parking Meters
- Exploits windows (MS17-010) using tools leaked by Shadow Brokers – 1 month head start!!
  - Not very sophisticated!!
  - Followed by more targeted and much more destructive NotPetya

"…WannaCry was first thought to have infected around 55 road safety cameras, forcing Victoria Police to initially suspend 8000 tickets issued for speeding and red light infringements…" Ref: itnews.com.au



"…was caused by a contractor mistakenly **connecting infected hardware** to cameras…" Ref: theguardian.com

How Malware Works–Most Variants Require All 5 Steps



Cloud Security

DNS = Domain Name System

www.google.com = 172.217.26.68 (IP Address)

CNC = C2 = Command and Control

Monetise Malware (RAT, Banking Trojan, Ransomware, etc)

66.96.146.129 (IP Address)

www.evil.com = 66.96.146.129

Fast Flux IP

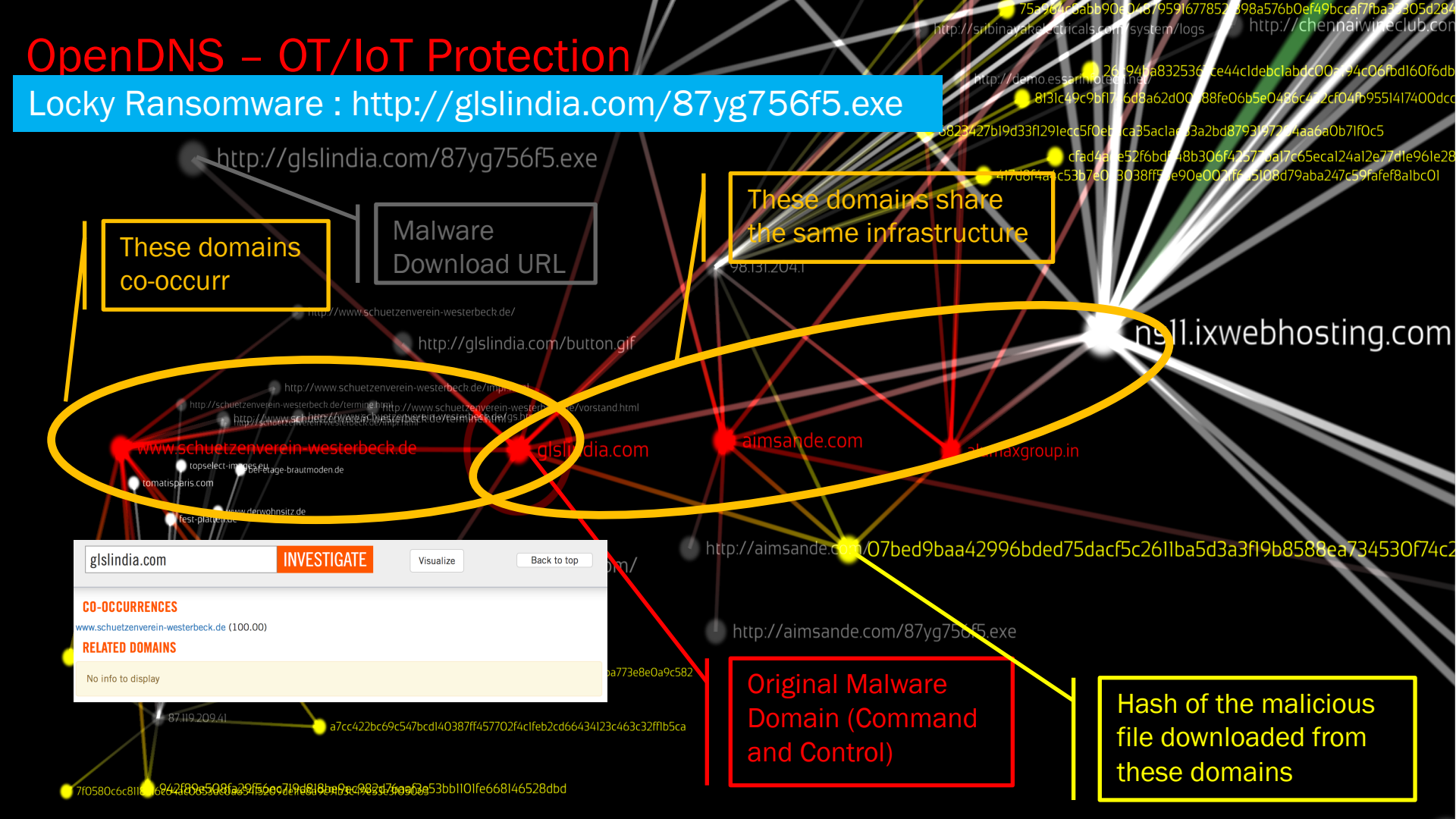
= 77.1.3.24 (2 hours later)

yfrscsddkkdl.com (Initial)
qgmcgoqeasgommee.org (2 hours later)
iyyxtyxdeypk.com (2 hours later)
diiqngijkpop.ru (2 hours later)

DGA – Domain Generation Algorithm

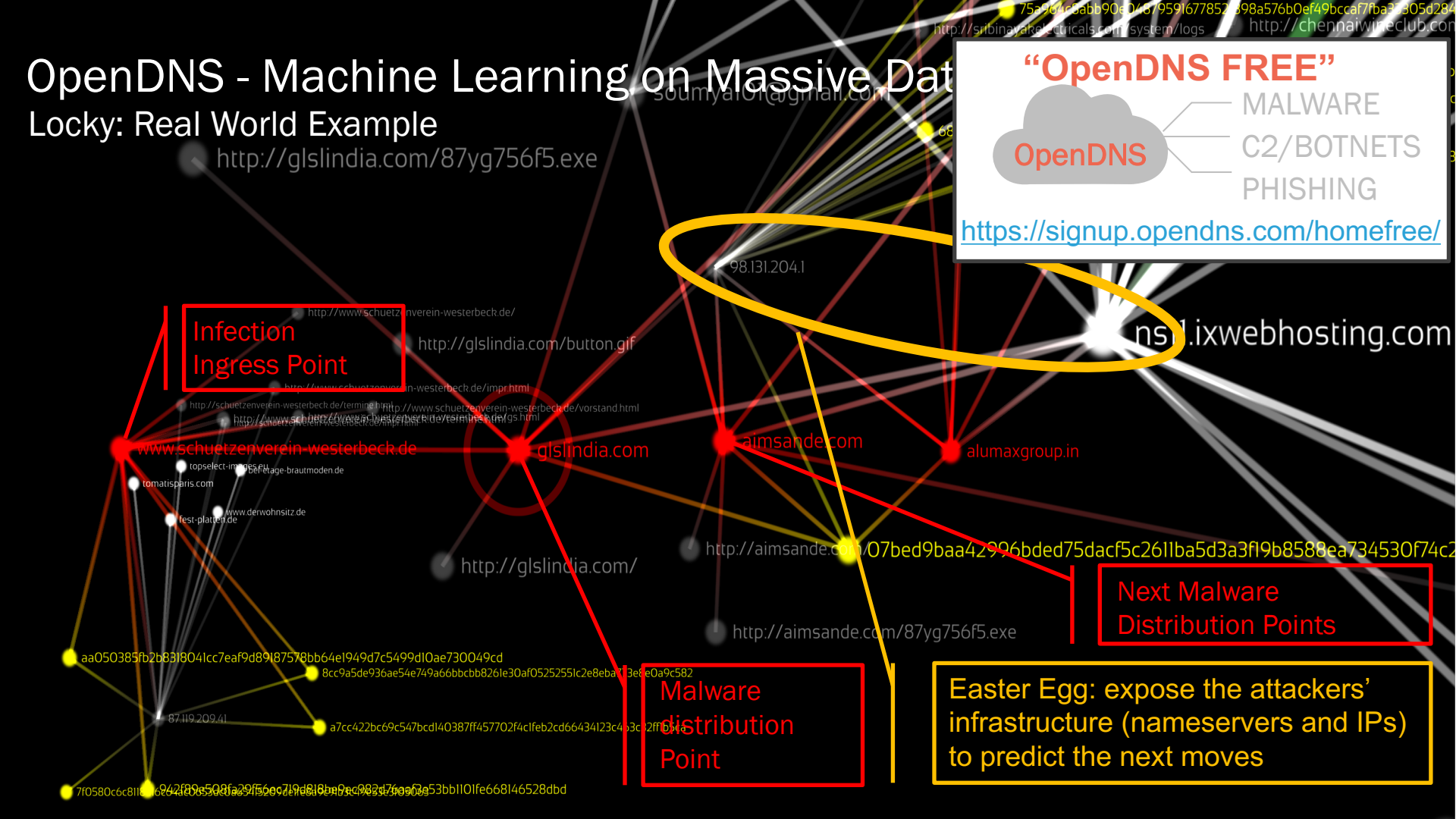
OpenDNS – OT/IoT Protection

Locky Ransomware : http://glslindia.com/87yg756f5.exe



OpenDNS - Machine Learning on Massive Dat

Locky: Real World Example



Stealthwatch – OT/IoT Protection
(Record all Conversations)

Anomaly Detection

Who

What

Who

Duration	Search Subject	Port	Traffic Summary	Port	Peer
Start: 05/29 - 12:19:18 PM End: 05/29 - 12:20:58 PM Duration: 1m 40s	10.10.18.102 RFC 1918 employee1 00:50:56:b4:3f:af	4866/TCP	11.49KB | 285 packets → HTTP ← 1.62MB | 1.15K packets	80/TCP	216.191.247.145 Canada crl.entrust.net

When

Where

How

Geo-IP mapping

Applied situational awareness

Flow Sensor

Endpoint Visibility

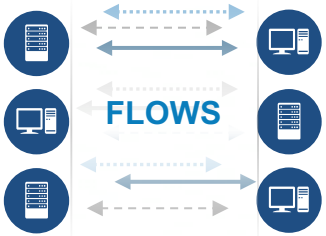
Threat Intelligenc

Flow Detailed Summary: 10.201.3.149

Search Subject Details	Totals	Peer Details
Packets: 321	Packets: 862	Packets: 541
Packet Rate: 64.2pps	Packet Rate: 172.4pps	Packet Rate: 108.2pps
Bytes: 16.57KB	Bytes: 689.34KB	Bytes: 672.77KB
Byte Rate: 3.39Kbps	Byte Rate: 141.18Kbps	Byte Rate: 137.78Kbps
Percent Transfer: 2.4%	Search Subject/Peer Ratio: 0.02	Percent Transfer: 97.6%
Host Groups: Atlanta, Sales and Marketing, Desktops	TCP Connections: 1	Host Groups: Russian Federation, Gumblar
Payload: GET http://allstadiums.ru /parfumin/config.bin	RTT: 166ms	Payload: 200 OK
Process Name: taskhost.exe	SRT: 797ms	

Anomaly Detection

COLLECT AND ANALYZE FLOWS



SECURITY EVENTS (94 +)

Addr_Scan/tcp
Addr_Scan/udp
Bad_Flag_ACK**
Beaconing Host
Bot Command Control Server
Bot Infected Host - Attempted
Bot Infected Host - Successful
Flow_Denied
.
.
ICMP Flood
.
.
Max Flows Initiated
Max Flows Served
.
Suspect Long Flow
Suspect UDP Activity
SYN Flood

ALARM CATEGORY

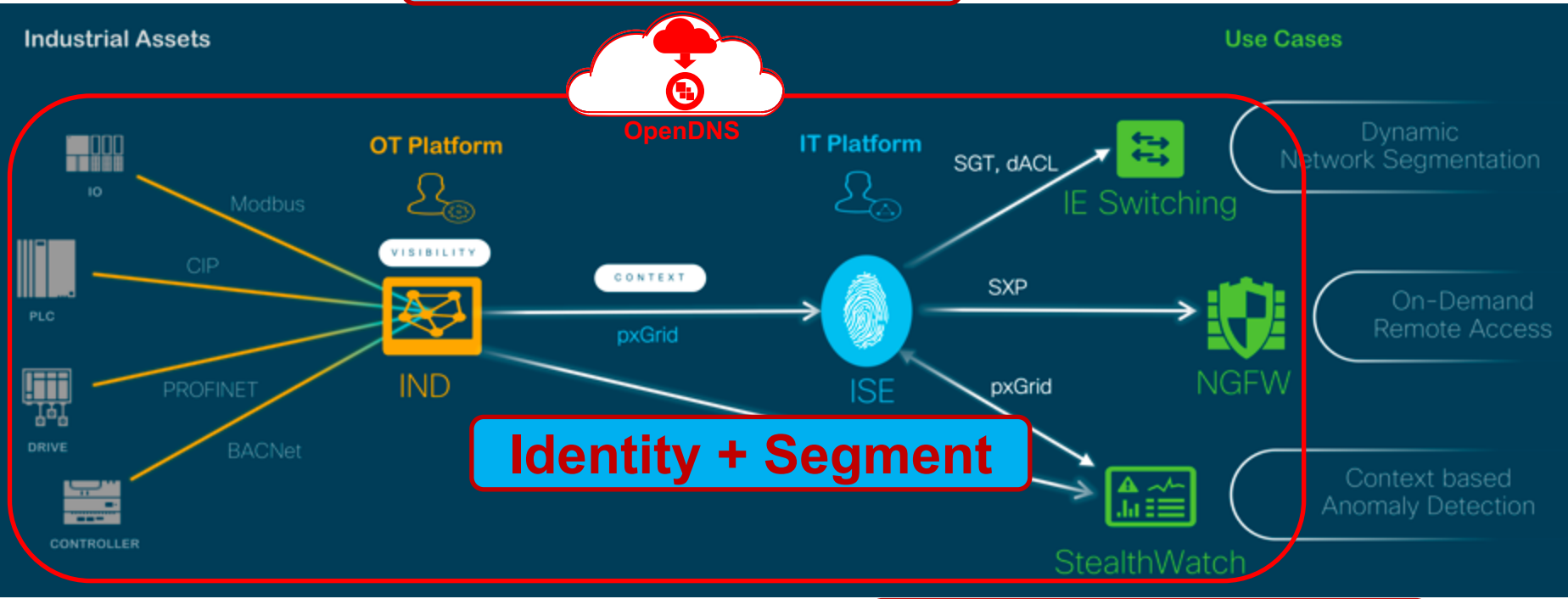
- Concern
- Recon
- C&C
- Exploitation
- Data hoarding
- Exfiltration
- DDoS target

RESPONSE

- Alarm table
- Host snapshot
- Email
- Syslog / SIEM
- Mitigation

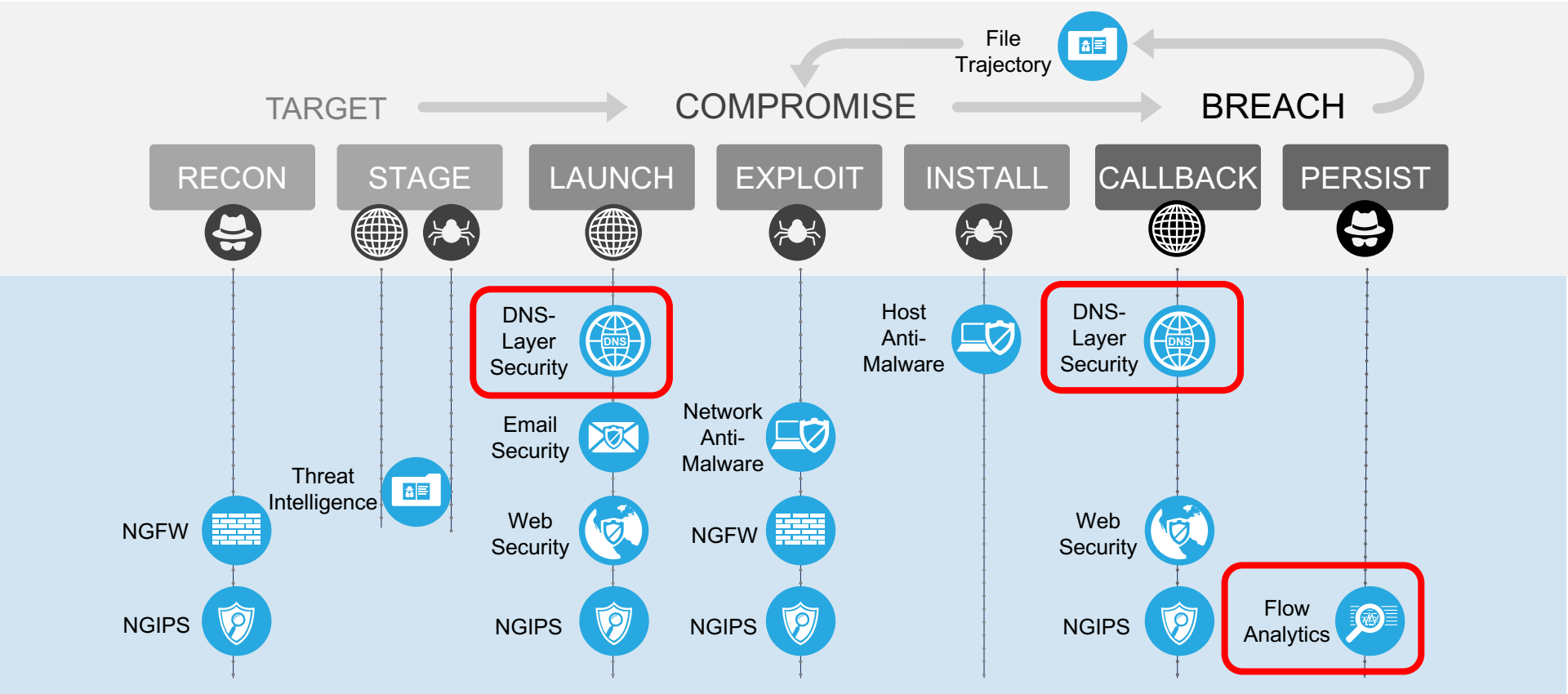
OT/IoT/IT Integration

Cloud Security



Anomaly Detection

End-to-End “Kill Chain” Defense Infrastructure



Anatomy of a Cyber Attack

Ransomware - Anatomy of an Attack

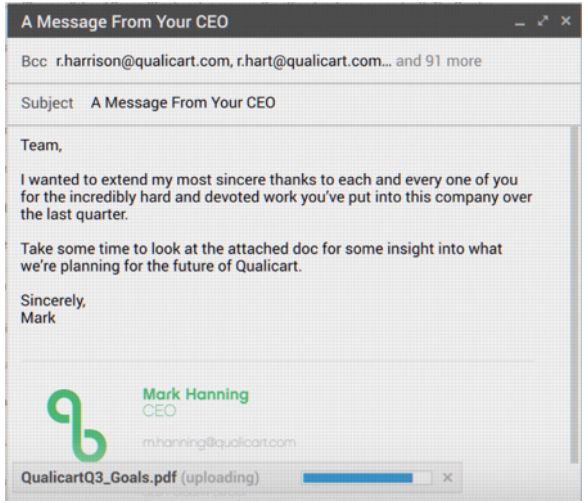
https://www.youtube.com/watch?v=4gR562GW7TI

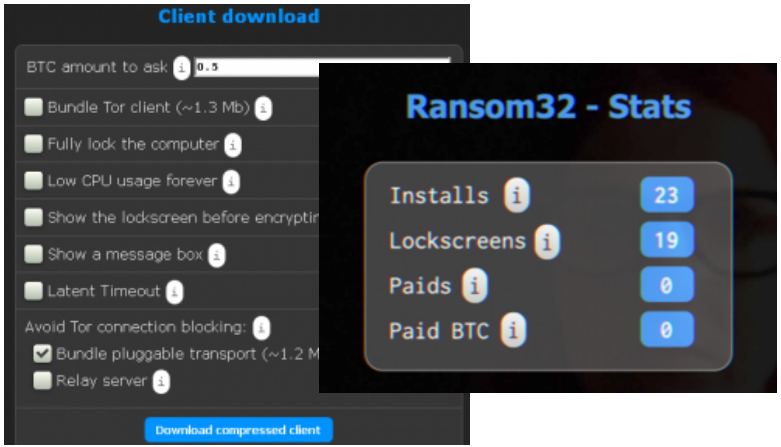
Anatomy of an IoT Attack

https://www.youtube.com/watch?v=GvLnb4YQHh0

What did you notice??

- Attackers are not necessarily nerds in hoodies sitting in the dark
  - Commercial enterprises – well resourced – run as 9-5 companies
  - Free wifi, public space
- (Spear) Phishing attack (email attack)
  - Social engineering
  - Qaullcart.com vs Qualicart.com
  - Email signature
- Ransomware (smokescreen)
  - Ransomware as a service (Ransom32)
  - Pyramid affiliate schemes
  - Very popular – crypto currencies + anonymous web
- Real target - gamed stock, customer information





How can you help protect your organisation?

1. You are a target – be vigilant at all times (Social Engineering)
2. Don’t open up unknown attachments!! (Emails!! + Personal)
3. Understand what qualifies as sensitive data within your organisation (assets)
4. Backup data (work and personal)
5. Understand how to identify and avoid threats (skeptical mindset + phone)
6. Understand your organisation’s acceptable use policies
7. Understand your organisation’s security policies
8. If you’re ever in doubt – ask for help!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