IoT Security Toolkit

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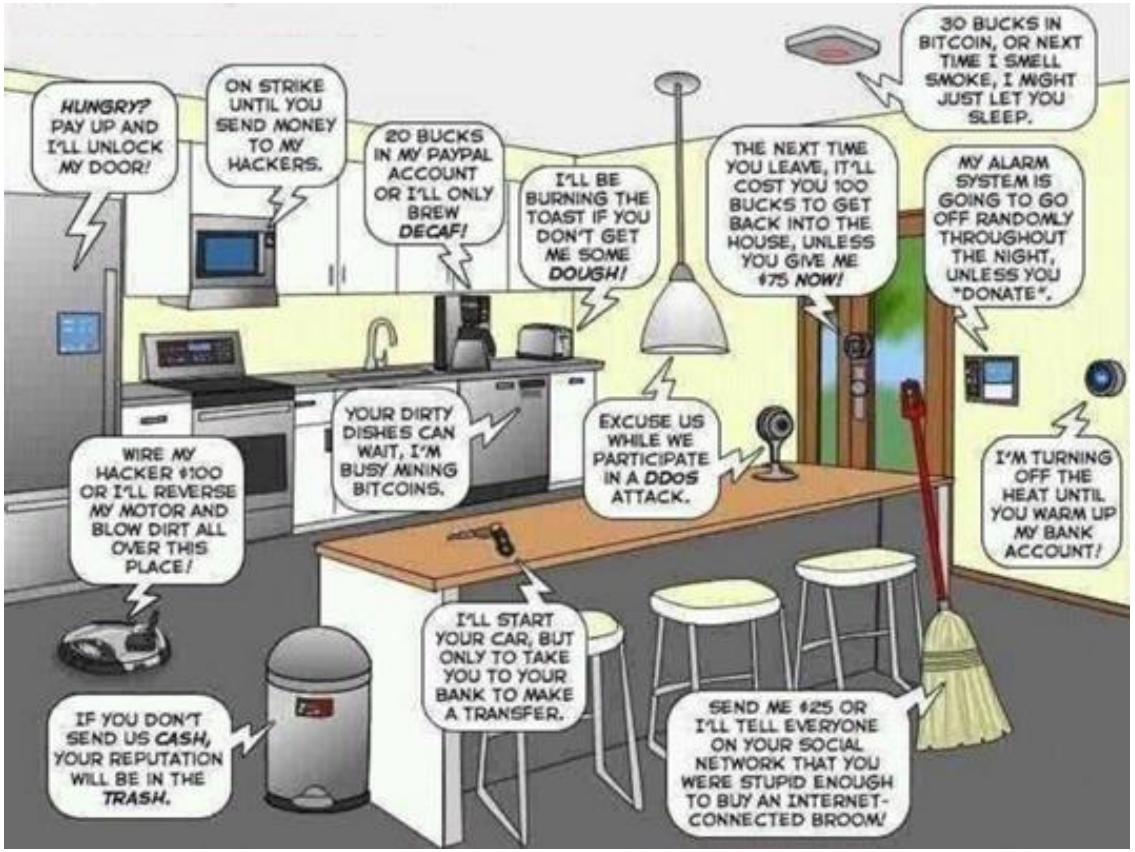
Intro & Disclaimer

- All opinions and suggestions are personal and not endorsed by any vendor
- All vendor names are mentioned only for illustration purposes

Table of Contents

- Introduction
- IoT Architecture Overview
- IoT Security Risks & Attack Vectors
- IoT Security Solutions
- Q&A

Ready?

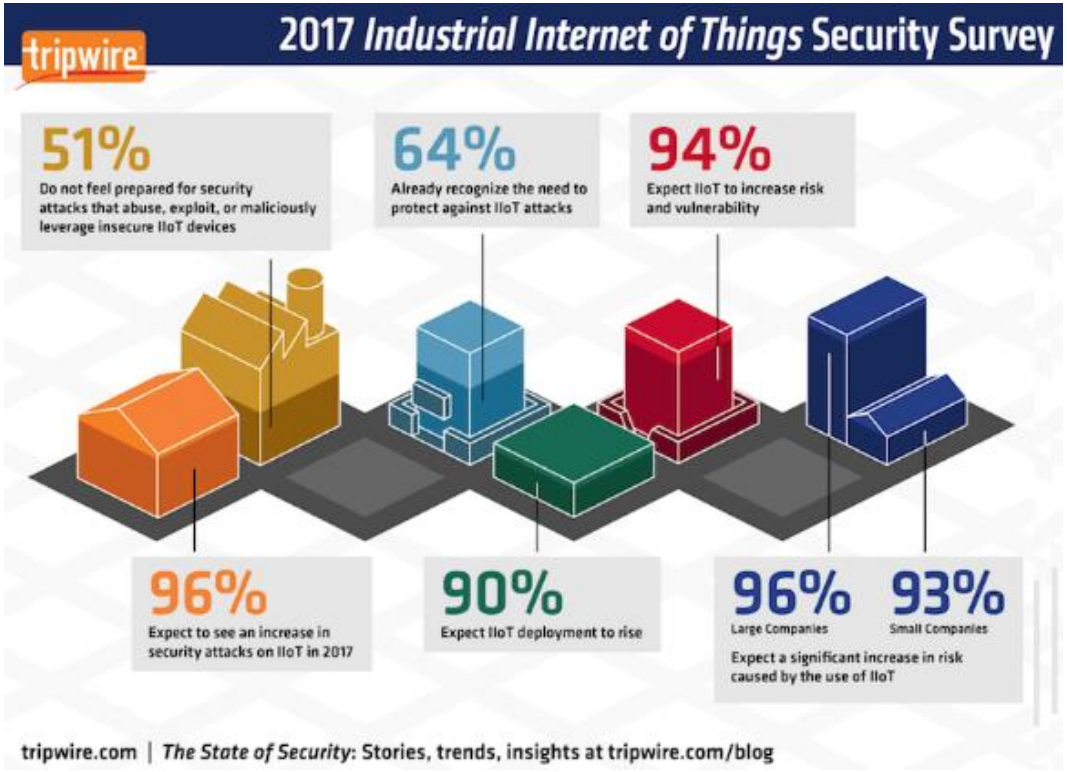

HUNGRY? PAY UP AND I'LL UNLOCK MY DOOR!
ON STRIKE UNTIL YOU SEND MONEY TO MY HACKERS.
20 BUCKS IN MY PAYPAL ACCOUNT OR I'LL ONLY BREW DECAF!
I'LL BE BURNING THE TOAST IF YOU DON'T GET ME SOME DOUGH!
THE NEXT TIME YOU LEAVE, IT'LL COST YOU 100 BUCKS TO GET BACK INTO THE HOUSE, UNLESS YOU GIVE ME $75 NOW!
30 BUCKS IN BITCOIN, OR NEXT TIME I SMELL SMOKE, I MIGHT JUST LET YOU SLEEP.
MY ALARM SYSTEM IS GOING TO GO OFF RANDOMLY THROUGHOUT THE NIGHT, UNLESS YOU "DONATE".
I'M TURNING OFF THE HEAT UNTIL YOU WARM UP MY BANK ACCOUNT!
EXCUSE US WHILE WE PARTICIPATE IN A DDOS ATTACK.
YOUR DIRTY DISHES CAN WAIT, I'M BUSY MINING BITCOINS.
WIRE MY HACKER $100 OR I'LL REVERSE MY MOTOR AND BLOW DIRT ALL OVER THIS PLACE!
I'LL START YOUR CAR, BUT ONLY TO TAKE YOU TO YOUR BANK TO MAKE A TRANSFER.
IF YOU DON'T SEND US CASH, YOUR REPUTATION WILL BE IN THE TRASH.
SEND ME $25 OR I'LL TELL EVERYONE ON YOUR SOCIAL NETWORK THAT YOU WERE STUPID ENOUGH TO BUY AN INTERNET-CONNECTED BROOM!

Safety vs. Security

- Definition of Security…
  - C-I-A of your DATA
  - You can loose your €$£, reputation,…

- Definition of Safety…
  - A-I of your Controls
  - If your pacemaker stops working, you can use your life…

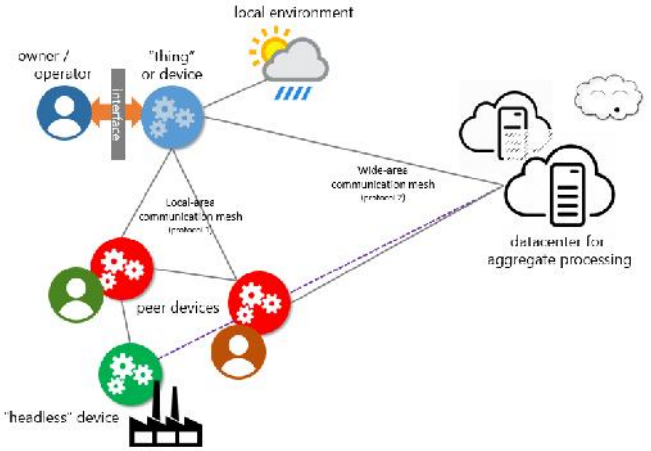
Really Ready?



Psssssst...

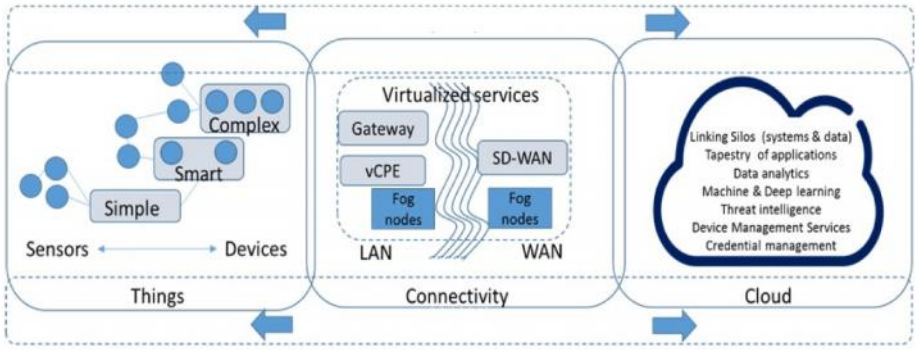
Definition(s) of IoT …

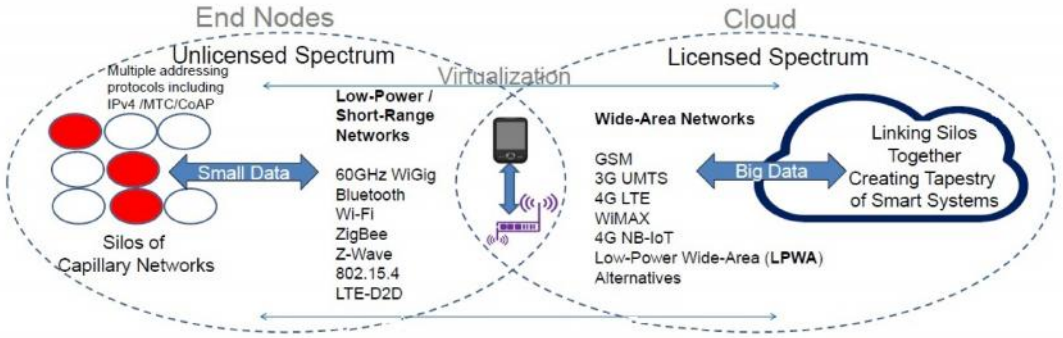
- *New business model*
- *Big Data Analytics*
- *M2M Communication*
- *Machine Learning & Sensors*
- *Predictive Maintenance*
- *Industry v4.0 / IIoT*
- *…or simple to disappear?*



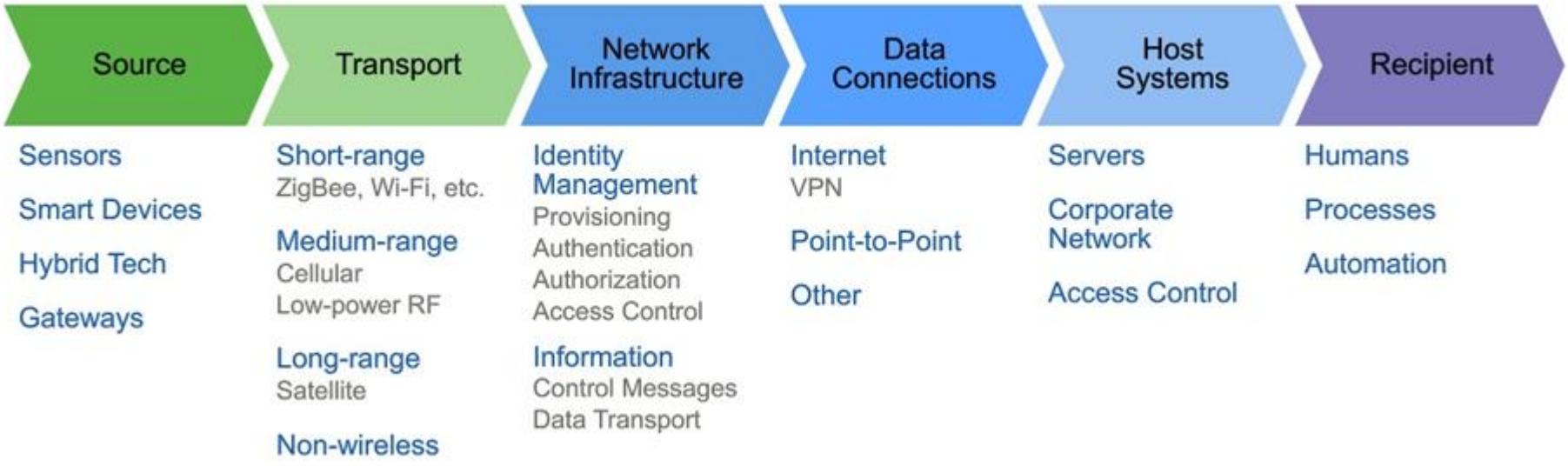
IoT Architecture

- GW based
- GW less
- Fog based
- Hybrid
- …





IoT Risks


Source
Transport
Network Infrastructure
Data Connections
Host Systems
Recipient
Sensors
Smart Devices
Hybrid Tech
Gateways
Short-range
ZigBee, Wi-Fi, etc.
Medium-range
Cellular
Low-power RF
Long-range
Satellite
Non-wireless
Identity Management
Provisioning
Authentication
Authorization
Access Control
Information
Control Messages
Data Transport
Internet
VPN
Point-to-Point
Other
Servers
Corporate Network
Access Control
Humans
Processes
Automation

IoT Attack Vectors

- Default Values
- Insecure Protocols (by default)
- Initialization Phases
- Sensor Saturation/Signal Jamming
- IoT devices are available 24/7 for Botnet
- No users behind IoT device
- Weak CPUs (no AV, no FW, no NAC/IPS…)
- Limited memory
- Stripped down OS
- Manufacturing chain (of insecurity)
- Drop down devices (like Pineapple?)

WiFi Pineapple

wifipineapple.com

Already Known…

- Mirai (scale)
- GRE (attack on CPE CPU)
- Hajime, New Aidra, Bashlight…
- 3rd Party dependencies - service dependencies: DNS, certs, SSO pyramid, micro-services,…
- $19.99 to rent a BotNet?
- ZigBee Worm
- …

IoT security Solutions

- **Legacy but adjusted**
  - AI/Machine Learning
  - Pent testing (DDoS pentesting?)
  - 20/80 rule (20% investment solves 85% of issues?)
- **New approaches**
  - Blockchain
  - Industrial FW, AV, IDS…
  - New Architecture?
- **Standards/Frameworks**
  - IEC 62443
  - IEC 13849-1
  - EN/IEC 62061

IIoT Security Architecture

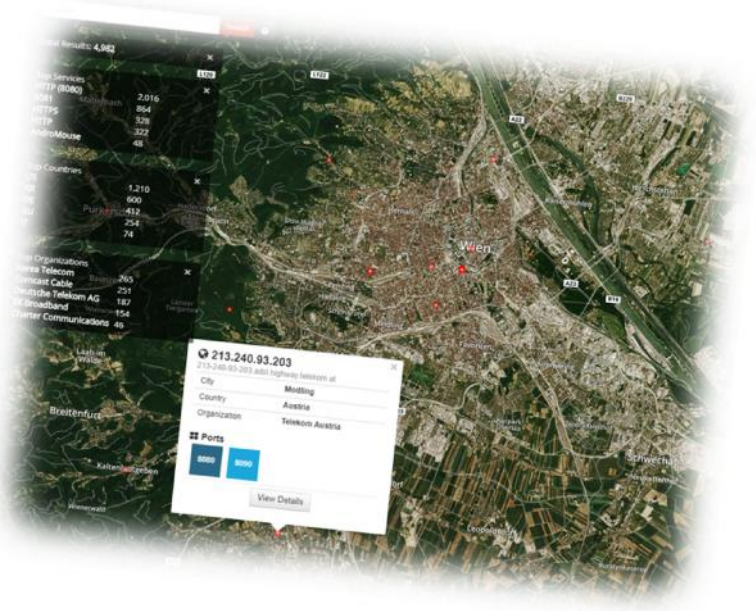
» Zones:

- Internet

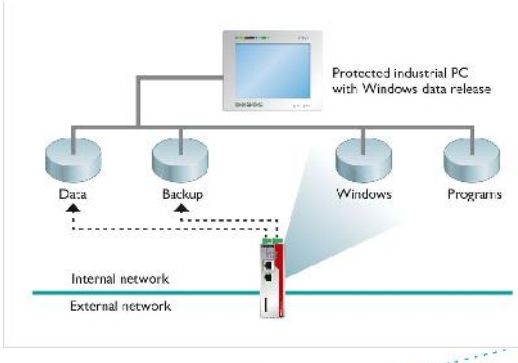
- DMZ + Internal

- Control Network

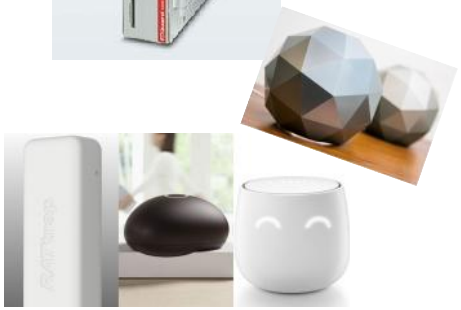
VPN



IoT Firewall



- Industrial IoT…
  - Specific protocols, starting all over?
- “Legacy FW”
  - re-shaping their existing portfolio
- Home IoT:
  - New Players, RatTrap, CUJO, dojo,…



Pentesting/Scanning Tools

- Perytons Eye-O-T Vulnerability Analyzer
- Red Button “DDoS on demand”
- SHODAN.io, GHDB, defpass.com, …
- www.insecam.org/en/bycountry/AT/
- exploit-db.com

Machine Learning / A.I.

- Scaling with an amount of messages…
- "Products TALK back to you…"
- *Always on Protection, Inspection, Control…*
- *Examples: LightCyber/PAN, Darktrace, Cybertrap…*

www.iot-now.com/2017/02/09/58275-iot-based-cyberattacks-ai-can-defend-growing-threat

- ***The cyberattack in India used malware that could learn as it was spreading, and altered its methods to stay in the system for as long as possible. Those were "early indicators" of A.I.***

www.nytimes.com/2017/07/02/technology/hackers-find-ideal-testing-ground-for-attacks-developing-countries.html

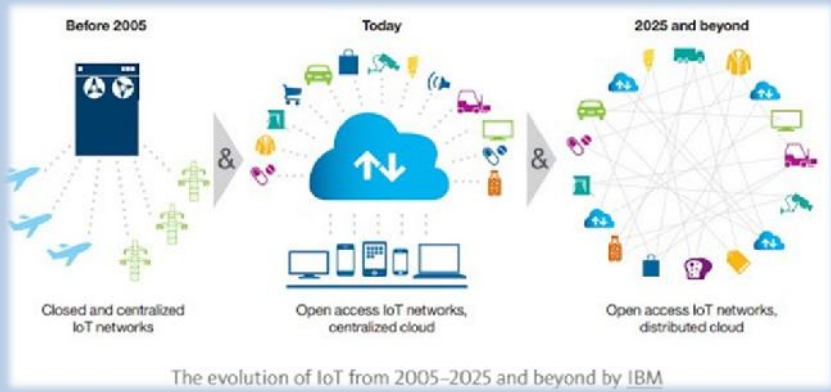
For the cyber security industry, this has made cyberspace increasingly difficult to defend **with existing security methods** having remained relatively stagnant in comparison to this rapid evolution. **Artificial intelligence** is one of the few technologies that is part of this new era of connectivity and therefore may offer *a solution to the underlying problem within the IoT sector*.

Blockchain:

Decentralized IoT networks are the future of IoT
Blockchain is the missing link that will enable **scalability, privacy** and **reliability** of IoT transactions. **Blockchain technology** can serve as a tool to track and coordinate connected devices, enable processes and ultimately support the billions of transactions that will take place within the **Internet of Things**, making use of a **transparent, impenetrable distributed ledger**. Ultimately, **decentralized marketplaces** will enable a global **Economy of Things**, where ***IoT data*** can be traded and exchanged autonomously.

Blockchain*... the few technologies that is part of this new era of connectivity and therefore may offer* ***a solution to the underlying problem within the IoT sector***

The **Watson IoT Platform** has a built-in capability that lets you add selected IoT data to a ***private blockchain***. The protected data is shared among only the business partners involved with the transaction.



The evolution of IoT from 2005–2025 and beyond by IBM

Sources:

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medium.com/@eciotify/key-ways-that-blockchain-can-revolutionize-the-internet-of-things-iot-a00edb50dfb7

Challenges & Conclusions

- Standardization vs. proprietary
- Thing-Bots
- Old Tools vs. New Tools

References

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Questions?

Thank you!

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