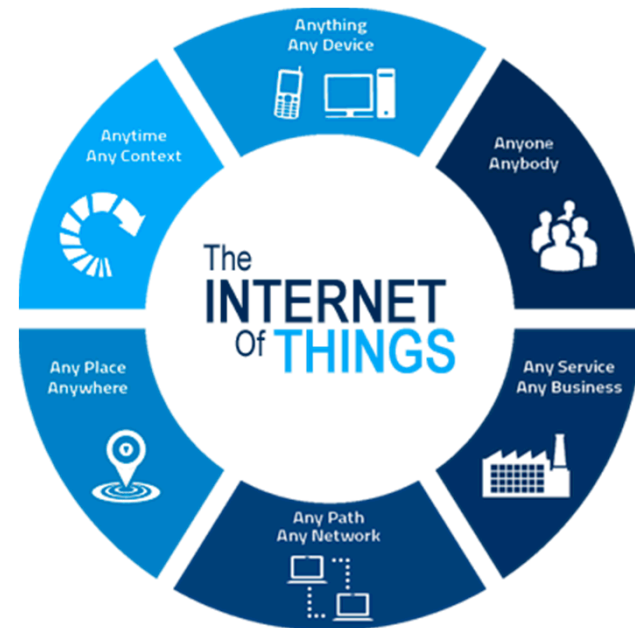


IoT Security: The Internet of Other People's Things

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So what is IoT?

At it's core, IoT devices are:

- Embedded systems
- With network connectivity
- And a physical component

None of these things are new!

The applications and ecosystems of these devices
bring about new challenges

So what is IoT?

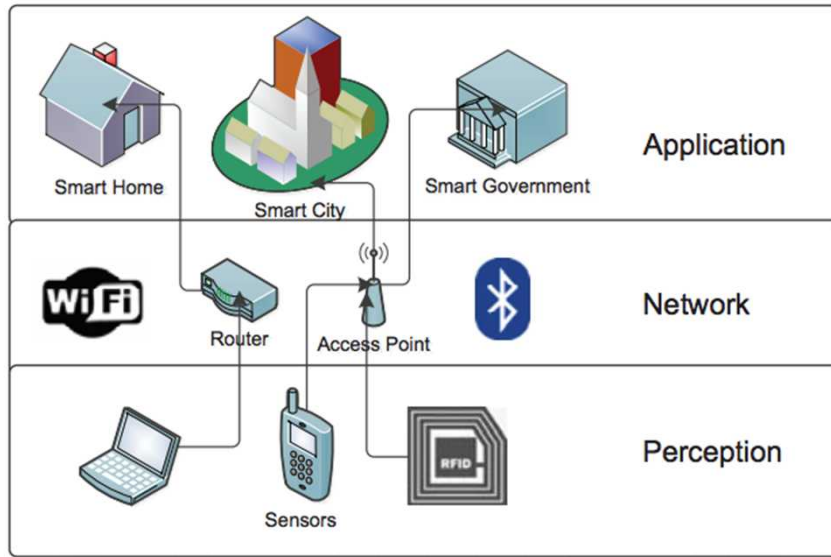
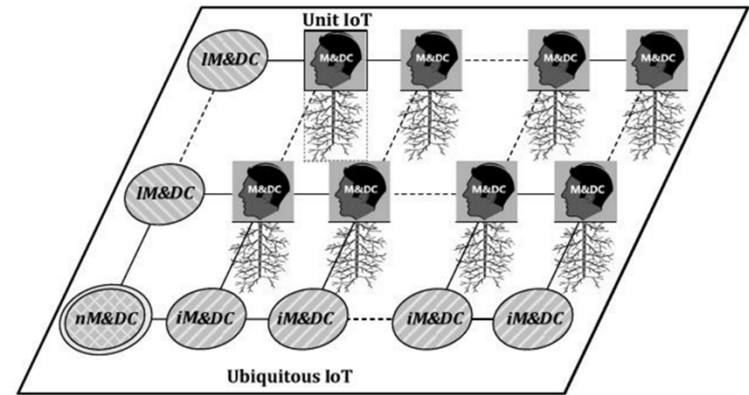
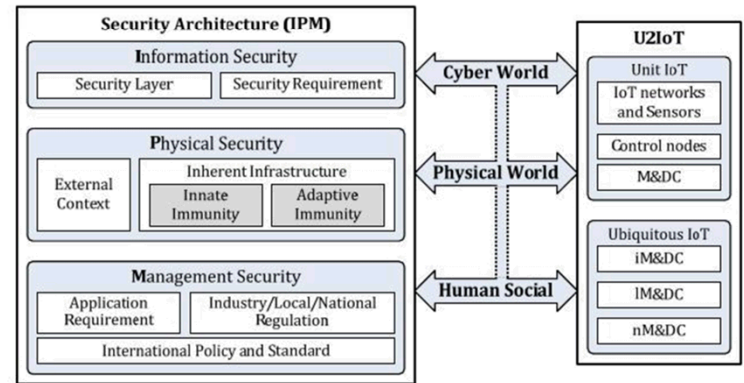


Figure 1. Three-layer IoT architecture.



(a)



(b)

Figure 1. U2IoT model and its security architecture (IPM). (a) The U2IoT (Unit IoT and Ubiquitous IoT) model; (b) The proposed security architecture (IPM) based on U2IoT.

Today's IoT devices



PHILIPS



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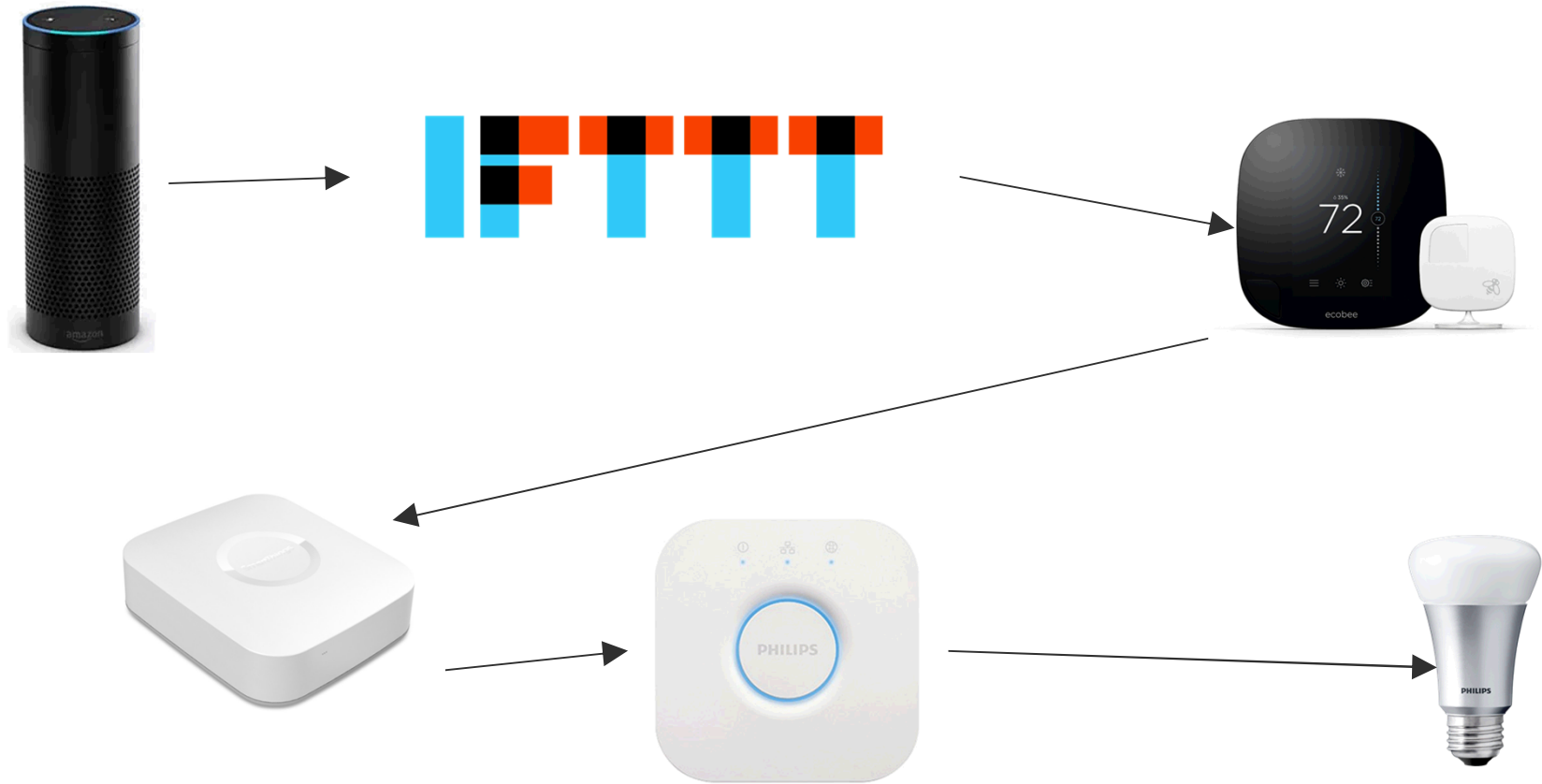
SmartThings™



I N S T E N[®]



The things must interact!



Risk

- Encryption Vulnerabilities
- Complexity of Intertwining network technology
- Account and data management
- Cross platform capabilities & vulnerabilities
- Correlating human behaviors with cyber systems (Spying on someone)
- Human safety concerns with bridging the cyber and physical world



Project Goals

- Define the “real” security model of IoT, as actually implemented by today’s IoT devices. Show how this clashes with previous work, and common security best-practice.
- Document the primary types of device and service interactions (Bootstrapping, Control, Sharing) in the modern IoT ecosystem.
- Propose a better solution for each that mitigates security concerns without sacrificing usability.
- Explore compromise scenarios
- Back the above with any vulnerabilities discovered during this work

Approach?

- **Reverse Engineering:**
 - Android APK (Android Application)
 - Firmware
- **Pentesting**
 - Network
 - Web Service
 - Android APK
 - Bluetooth
 - Low frequency radio waves protocol(Zigbee, Z-Wave, etc)
- **Locate Encryption Vulnerabilities**
- **Accessing Data Leakage**
- **Documentation**
 - Vulnerabilities, protocols, and security architectures

Findings

- **Evaluated a number of consumer products**
 - Locks
 - Camera
 - Hubs
 - Sensors
 - Switches
- **Diverse Array of Security Models**
- **General Problems:**
 - Encryption Issue
 - Data Management
 - Authentication/Environment Assumption

Questions, Comments, Concerns?!