IoT & DNS Webinar

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Security and Stability Advisory Committee (SSAC)

Who We Are

- 39 Members
- Appointed by the ICANN Board

What We Do

Role: Advise the ICANN community and Board on matters relating to the security and integrity of the Internet’s naming and address allocation systems.

What is Our Expertise

- Addressing and Routing
- Domain Name System (DNS)
- DNS Security Extensions (DNSSEC)
- Domain Registry/Registrar Operations
- DNS Abuse & Cybercrime
- Internationalization (Domain Names and Data)
- Internet Service/Access Provider
- ICANN Policy and Operations

How We Advise

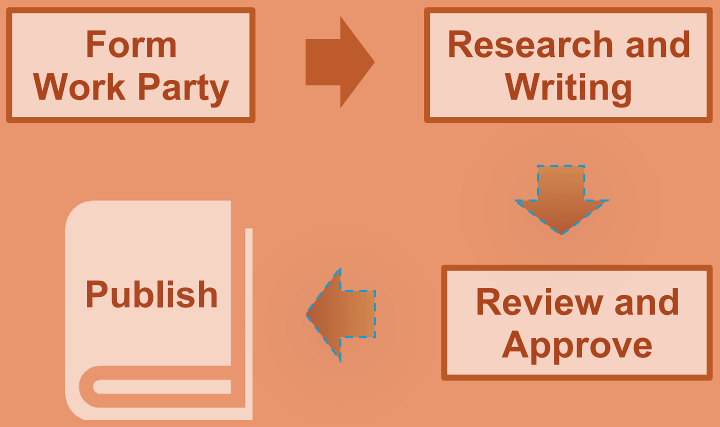
113 Publications since 2002

Security and Stability Advisory Committee (SSAC)

ICANN's Mission & Commitments

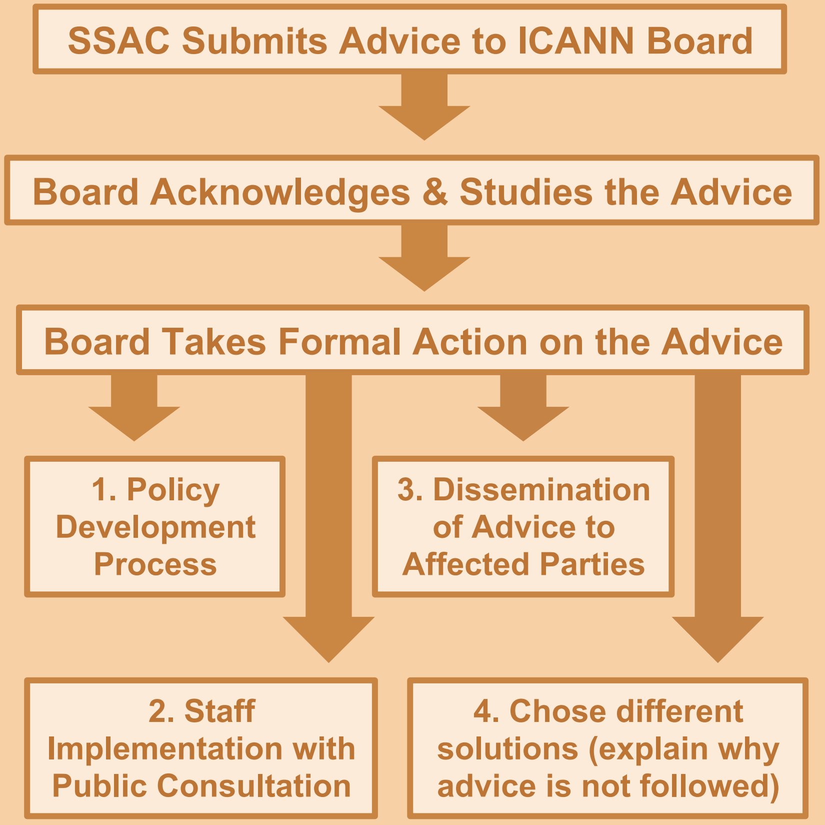
- To ensure the stable and secure operation of the Internet's unique identifier systems.
- Preserving and enhancing the operational stability, reliability, security and global interoperability, resilience, and openness of the DNS and the Internet.

SSAC Publication Process



Consideration of SSAC Advice

(to the ICANN Board)


SSAC Submits Advice to ICANN Board
Board Acknowledges & Studies the Advice
Board Takes Formal Action on the Advice
1. Policy Development Process
3. Dissemination of Advice to Affected Parties
2. Staff Implementation with Public Consultation
4. Chose different solutions (explain why advice is not followed)

This novella based on SAC105: The DNS and the Internet of Things: Opportunities, Risks, and Challenges

Paper have been adopted by IEEE as manuscript.

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SAC105: The DNS and the Internet of Things

- SAC105: The DNS and the Internet of Things: Opportunities, Risks, and Challenges, published June 3rd, 2019
- A different kind of SSAC report:
  - **No recommendations** to the ICANN Board
  - A tutorial-style discussion intended to trigger and **facilitate dialogue** in the broader ICANN community
  - More **forward looking** than operational in nature
  - Partly within SSAC and ICANN's remit, but also goes beyond it
- Many aspects of our discussion are not new, except as they consider new challenges from IoT

The Internet of Things (IoT)

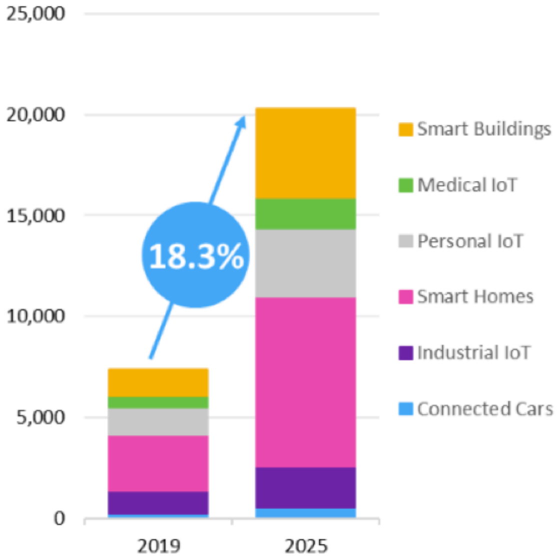
- Internet application that extends “network connectivity and computing capability to objects, devices, sensors, and items **not ordinarily considered to be computers**” (ISOC, 2015)
- IoT describes the network of physical objects “things”—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet (Wikipedia)
- Examples: smart homes, smart cities, self-organizing dynamic networks of drones and robots, etc.
- Differences with “traditional” applications
  - IoT continually senses, interprets, and acts upon physical world
  - Often without user awareness or involvement (passive interaction)
  - Pervasive 20-30 billion devices operating “in the background” of people’s daily lives (most of’em for machines)
  - Widely heterogeneous devices (hardware, operating systems, network connection)
  - Longer lifetimes (perhaps decades) and unattended operation

Numbers are important

M2M market: these devices are connected, billions more – not connected to public networks

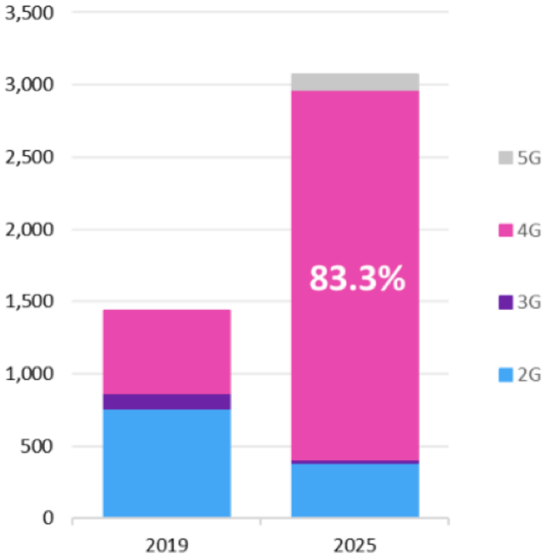
IoT devices, by major application, global market

Installed device base in millions

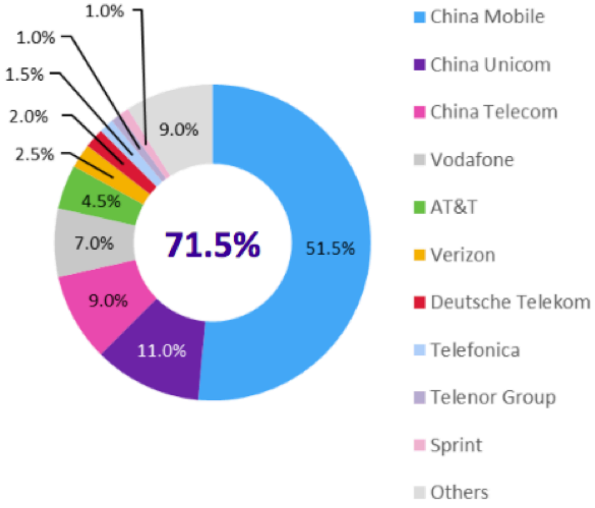


Cellular IoT connections, by "G", global market

Cumulative connections in millions



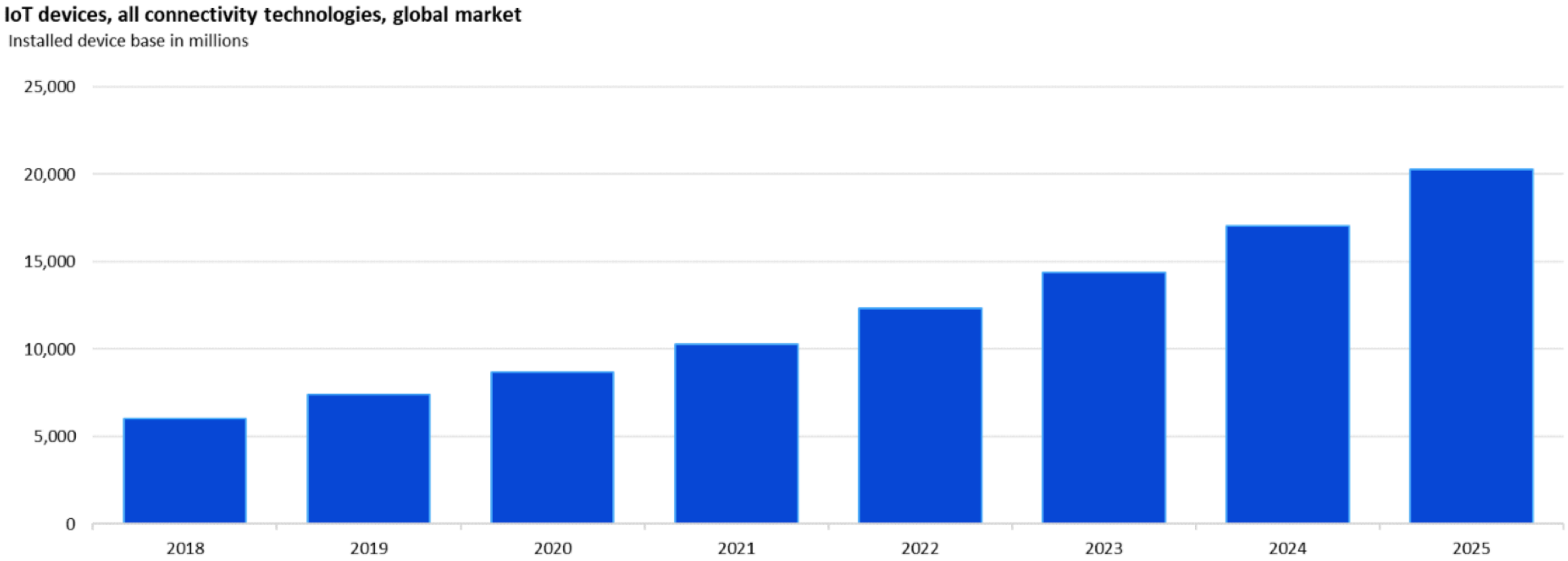
Global operator cellular IoT connection market shares, 2019



Source (c) 2020 Omdia

Growth is important too…

M2M device market: nice looking trend



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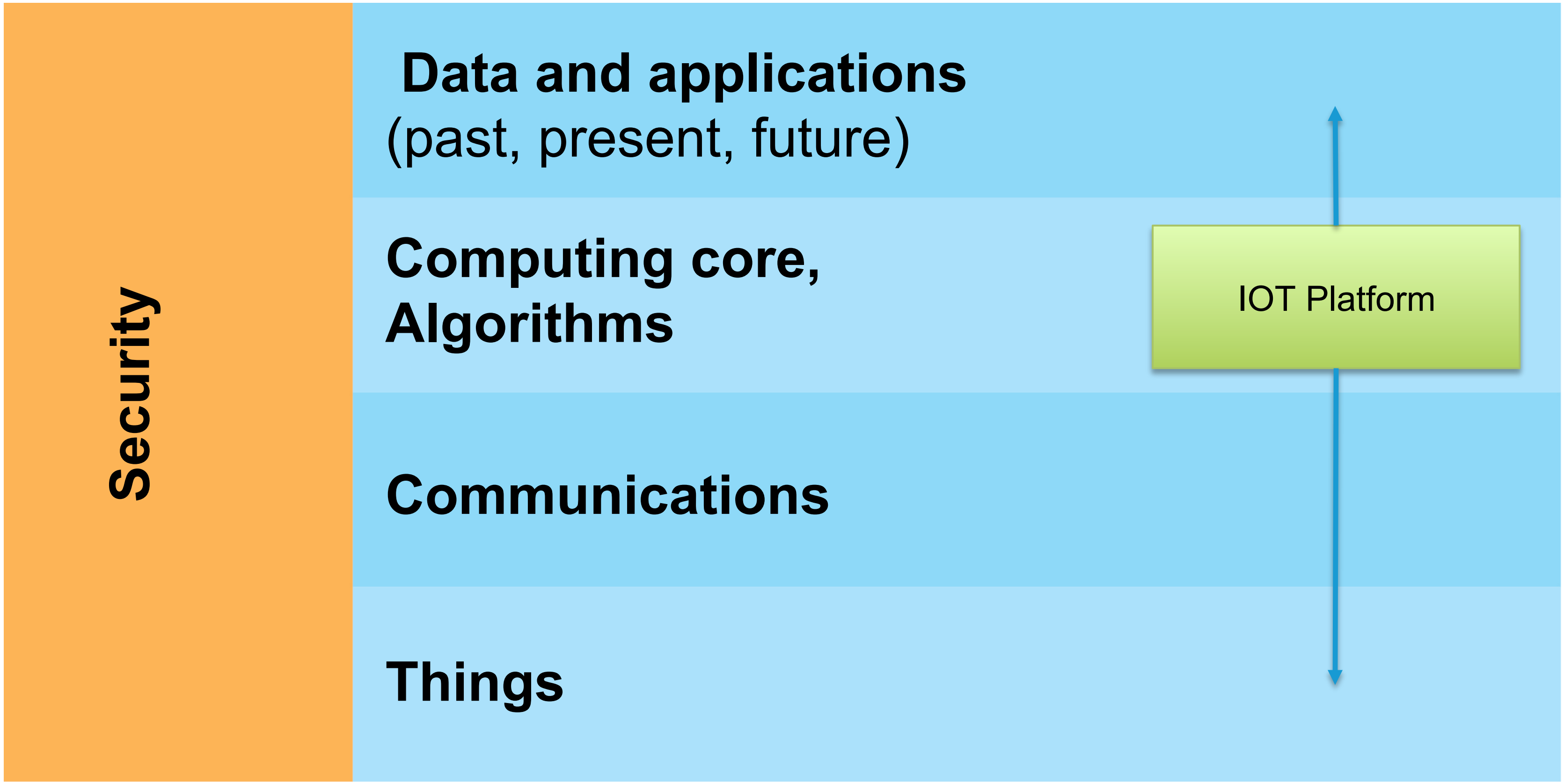
IoT Architecture



Security

Data and applications
(past, present, future)

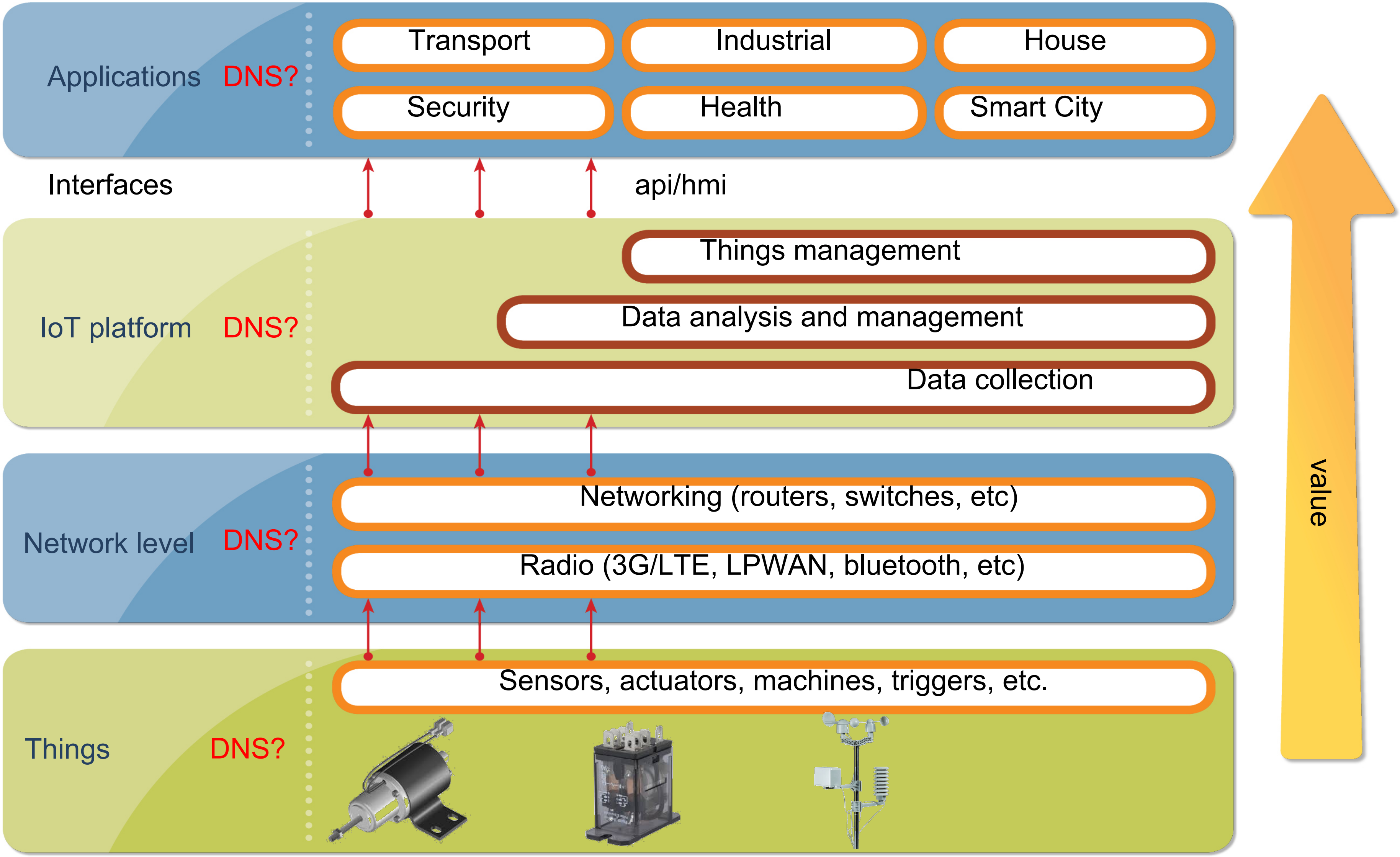
Computing core, Algorithms

Communications

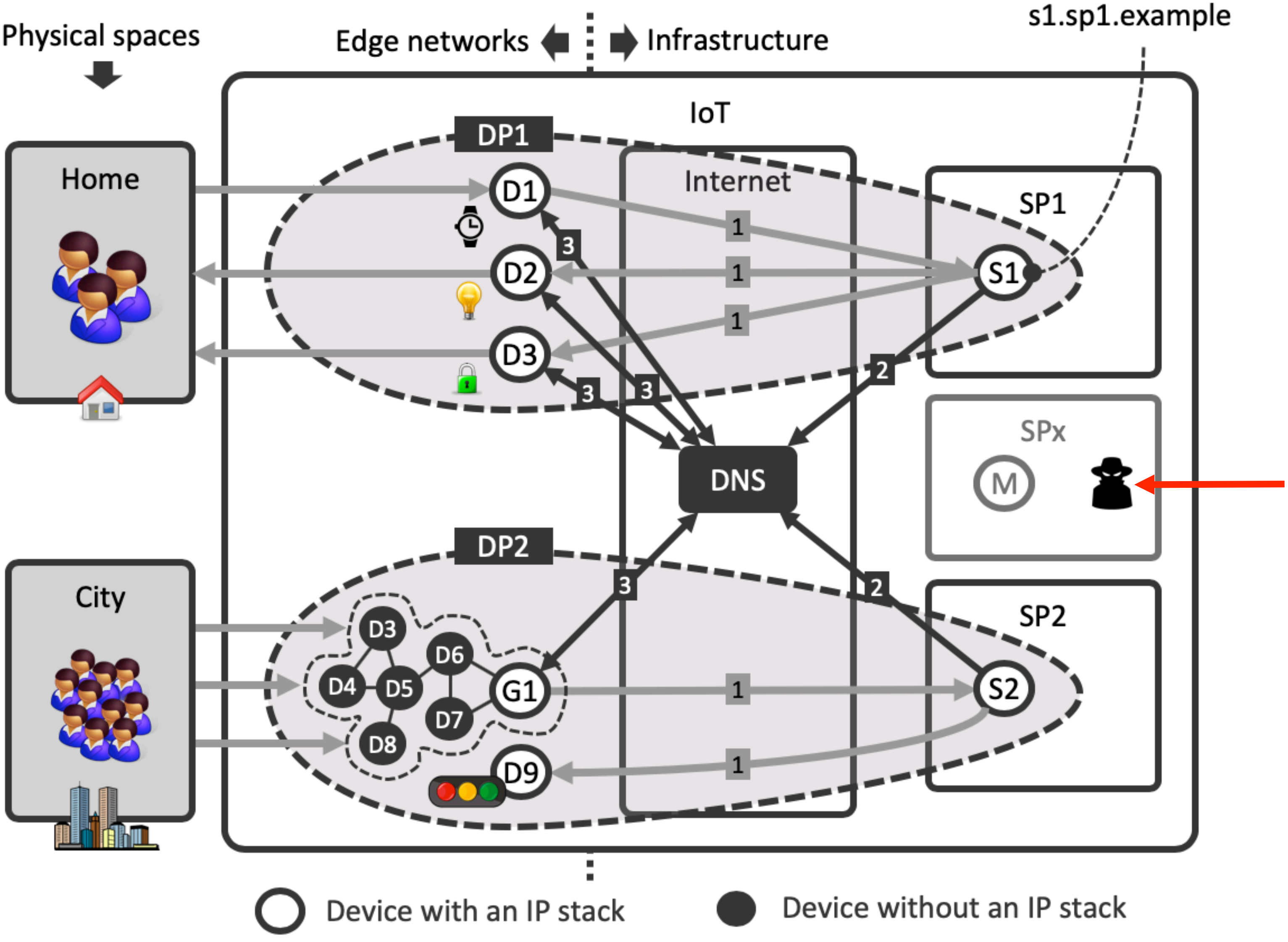
Things

IOT Platform

IoT vertical layout, colorful



Role of the DNS for the IoT



Bad Actors

IoT and the DNS

- Remote services (cloud services) assist devices in performing their task (e.g., combining and analysing data from multiple sensors)
- Devices calling DNS to perform their firmware updates and locate remote service
- IoT Applications use DNS to locate service platforms
- **Opportunity:** DNS helps fulfilling IoT's more stringent security, stability, and transparency requirements stemming from seamless interaction with physical world
- **Risk:** IoT stresses the DNS, accidentally (e.g., large number of devices coming online simultaneously after a power outage) or on purpose (IoT-powered DDoS attack)
- **Challenge:** DNS and IoT industries can seize opportunities and address risks

What does it means for end user?

- Botnet superstar is Mirai, responsible for DDoS attacks involving 400,000 to 600,000 devices. Hajime botnet in sleeping mode has ± 400K infected IoT devices. Important: these zombie devices utilize direct connection to the internet

- Unintentional DDoS attacks example: a software update for a popular IP-enabled IoT device that causes the device to use the random lookup to check for network availability (say hello to Chromium)

- However, the most dangerous object for end users is this:

No brand remote control power switch sending data / executing your commands through some unknown cloud service

Simple recommendations

- Evaluate the convenience of IoT adoption at your home (do you really need cloud based kettle?). This might be fun thing to do, but in two weeks you'll forget about it
- Be accurate in selecting an IoT service provider. Do not rely critical home appliances on some unknown stuff
- Be suspicious with open IP stack devices
- Your M2M device security most likely is appropriately managed by your mobile operator. However, if you experience paranoia, remember - all your data is collected, used, processed and sold

Thank you