SAKARYA ÜNİVERSİTESİ
Bilgisayar ve Bilişim Bilimleri Fakültesi
Bilgisayar Mühendisliği Bölümü

BSM 451

Internet of Things (IoT) and Applications

THE INTERNET OF THINGS TECHNOLOGIES USED IN APPLICATIONS

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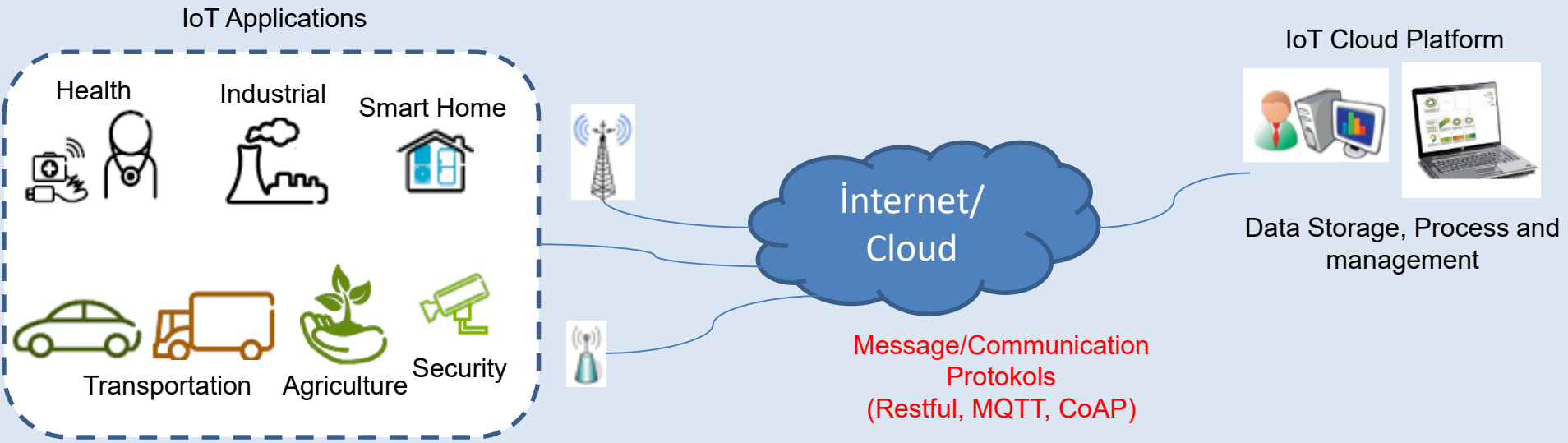
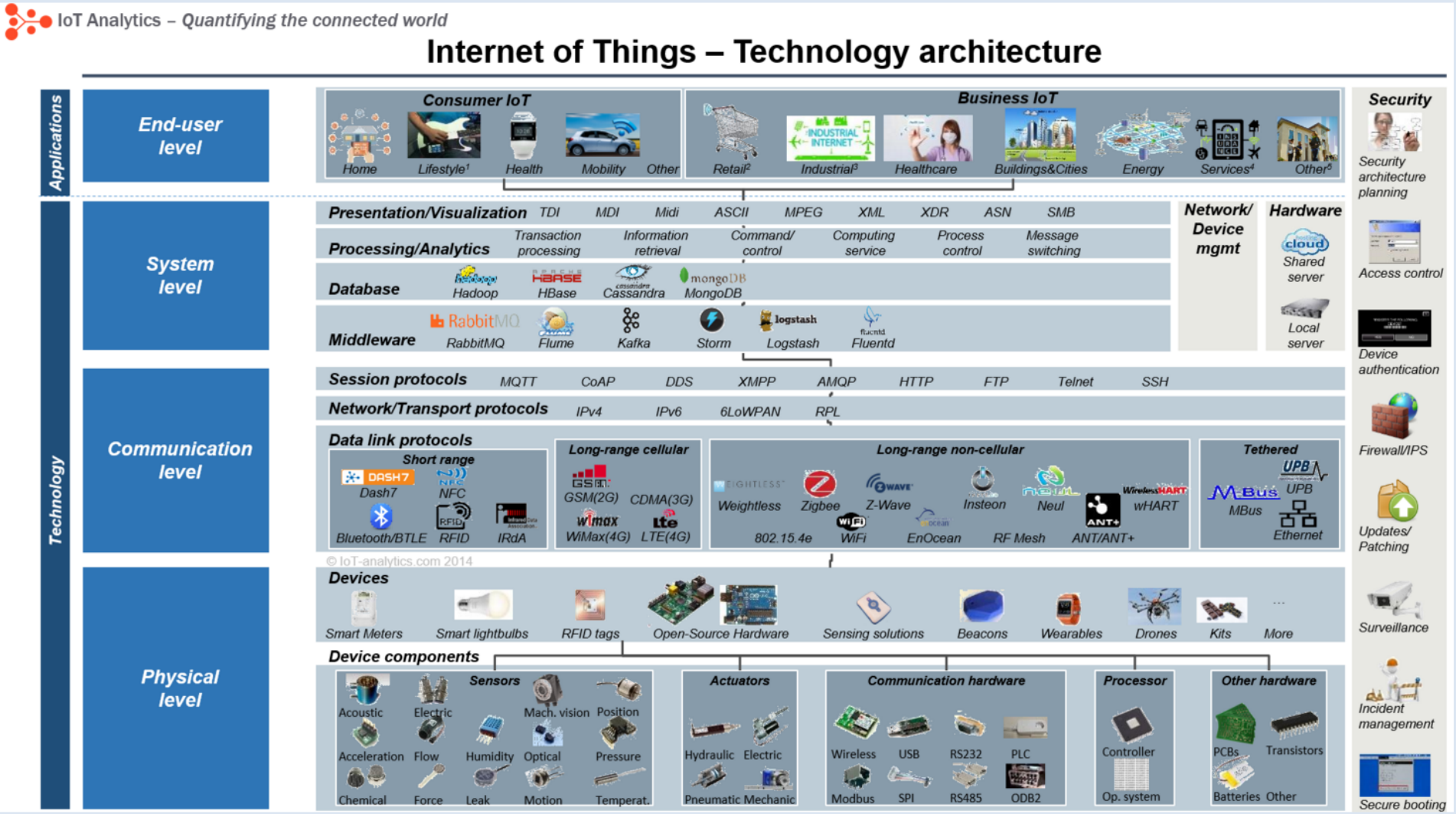
Technologies Used in IoT Applications



IoT Technologies

- RFID
- NFC
- Bluetooth Low Energy
- GSM
- GPS

IoT Protocol Architecture



IoT Network and Components

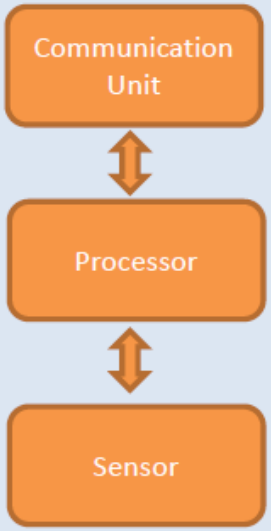
- Network components of IoT

Information Technology, IT + Operational Technology, OT + Smart Objects

- OT: Transferring right info to the right person in the right time.

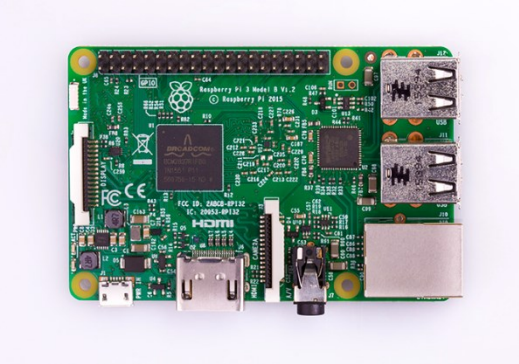
- IoT Smart Things

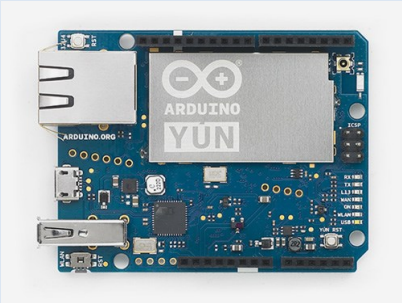
- Physical devices that can process data, make smart decisions, communicate with each other and internet

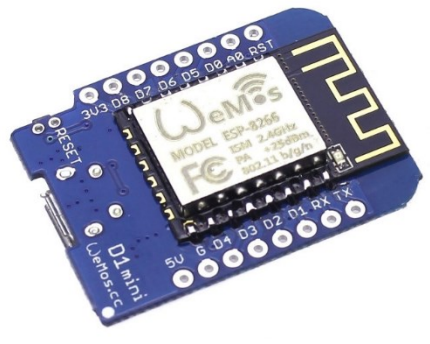


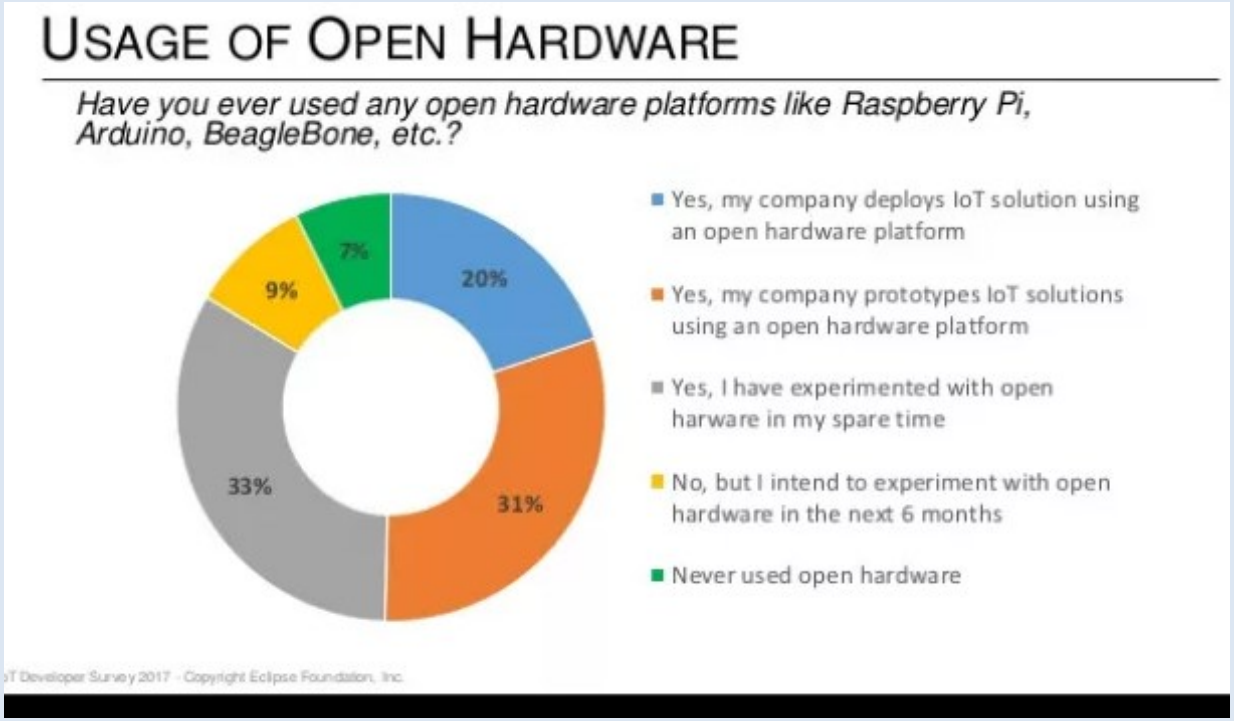
IoT Hardware Examples

- IoT open source Hardwares

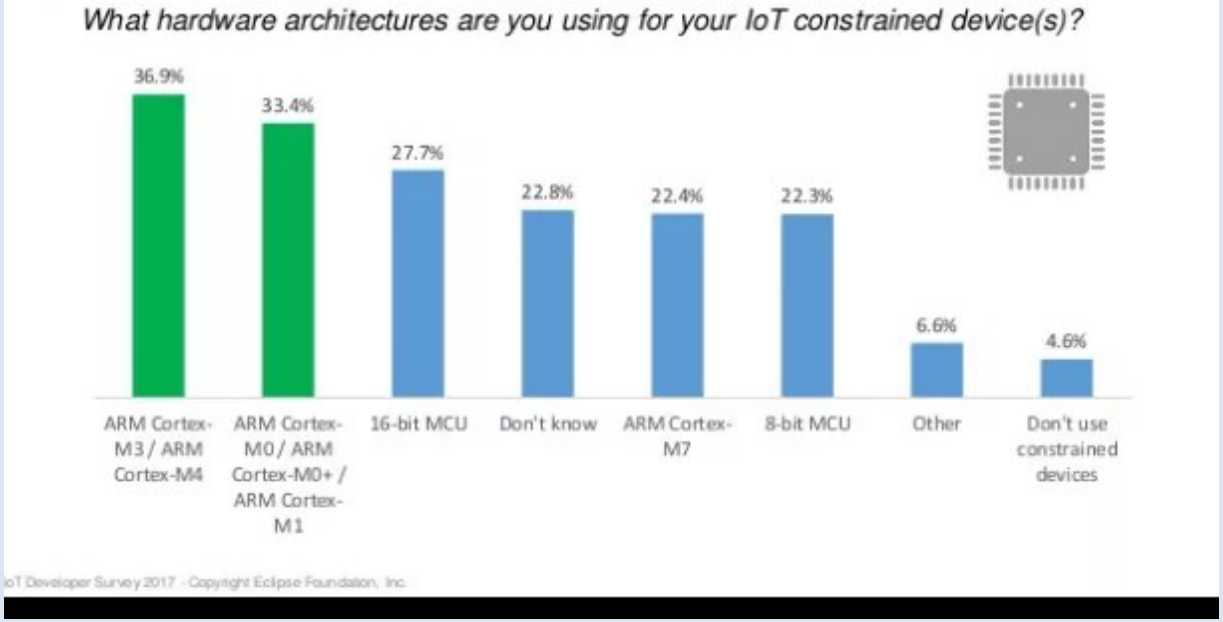


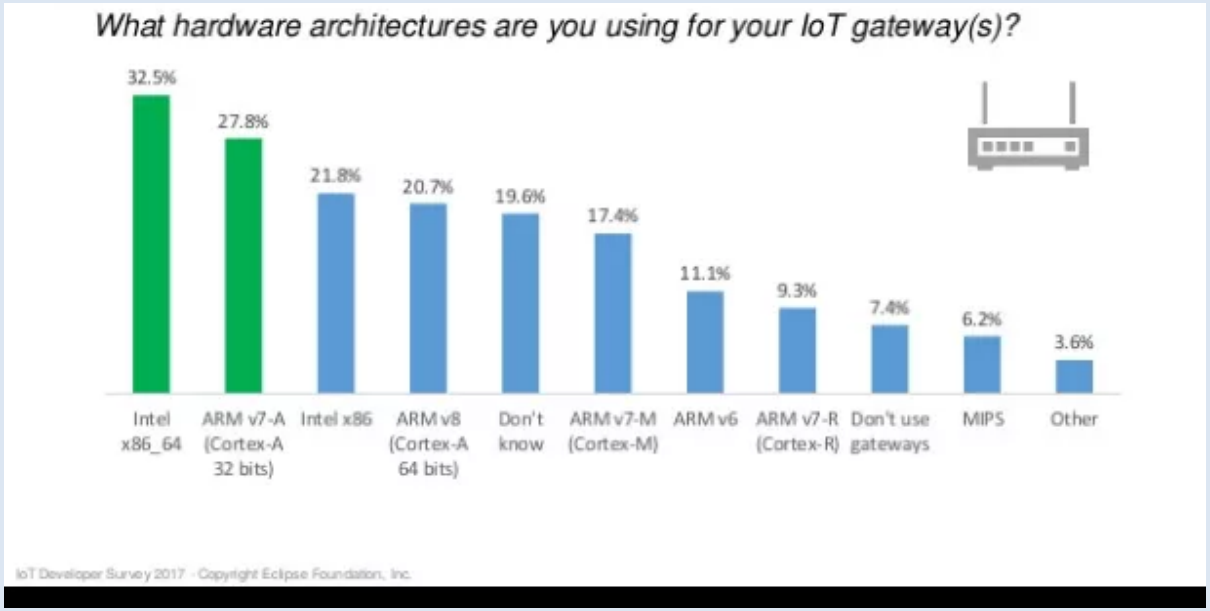




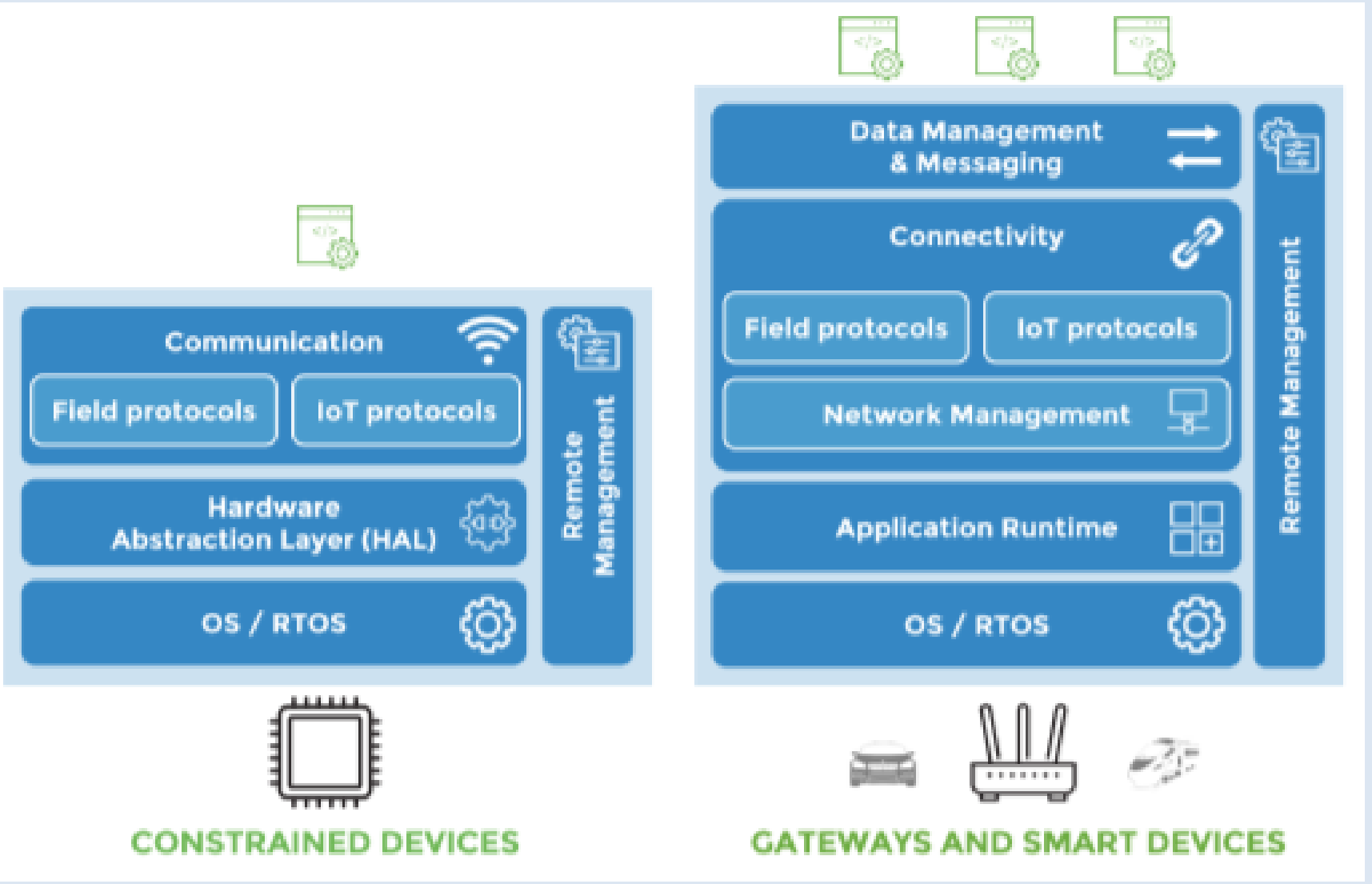


IoT Hardware Architecture

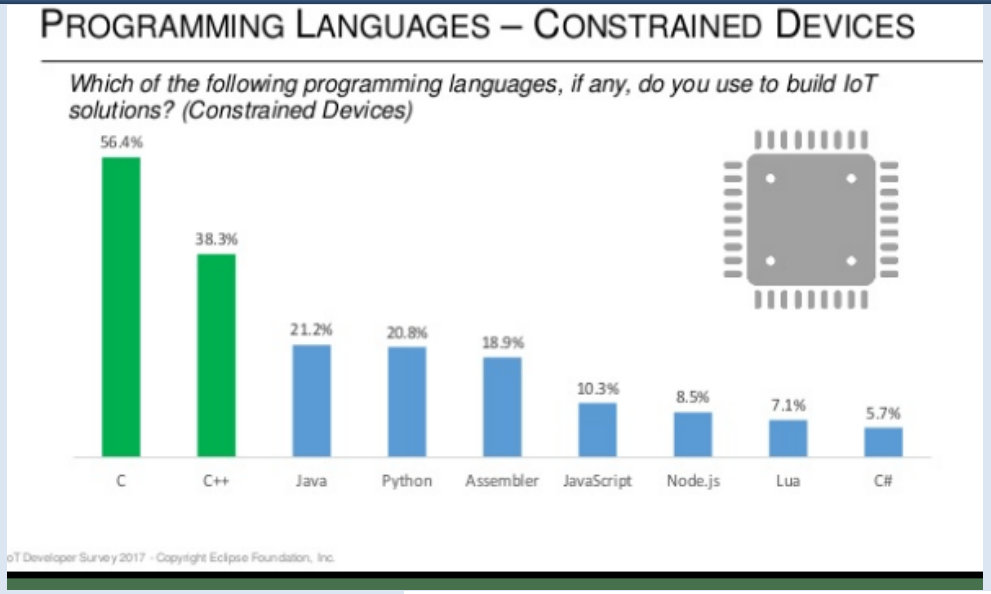


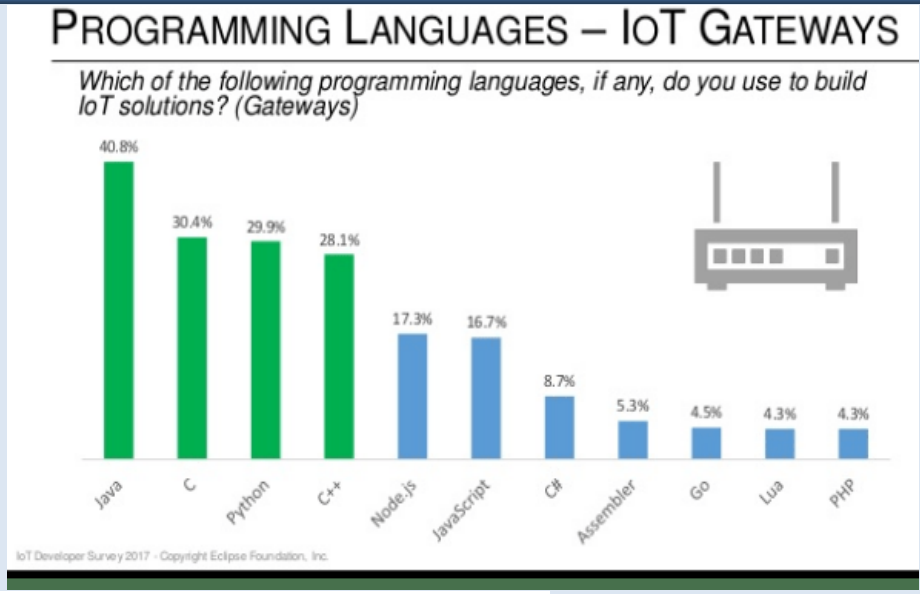


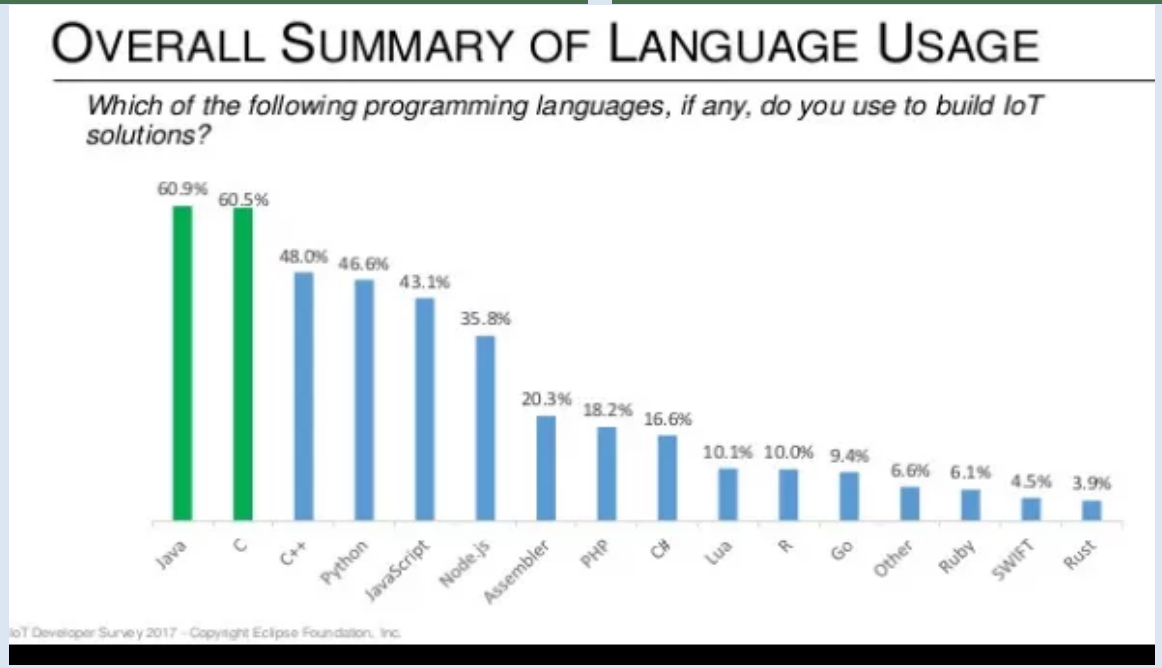
IoT Embedded Software Models



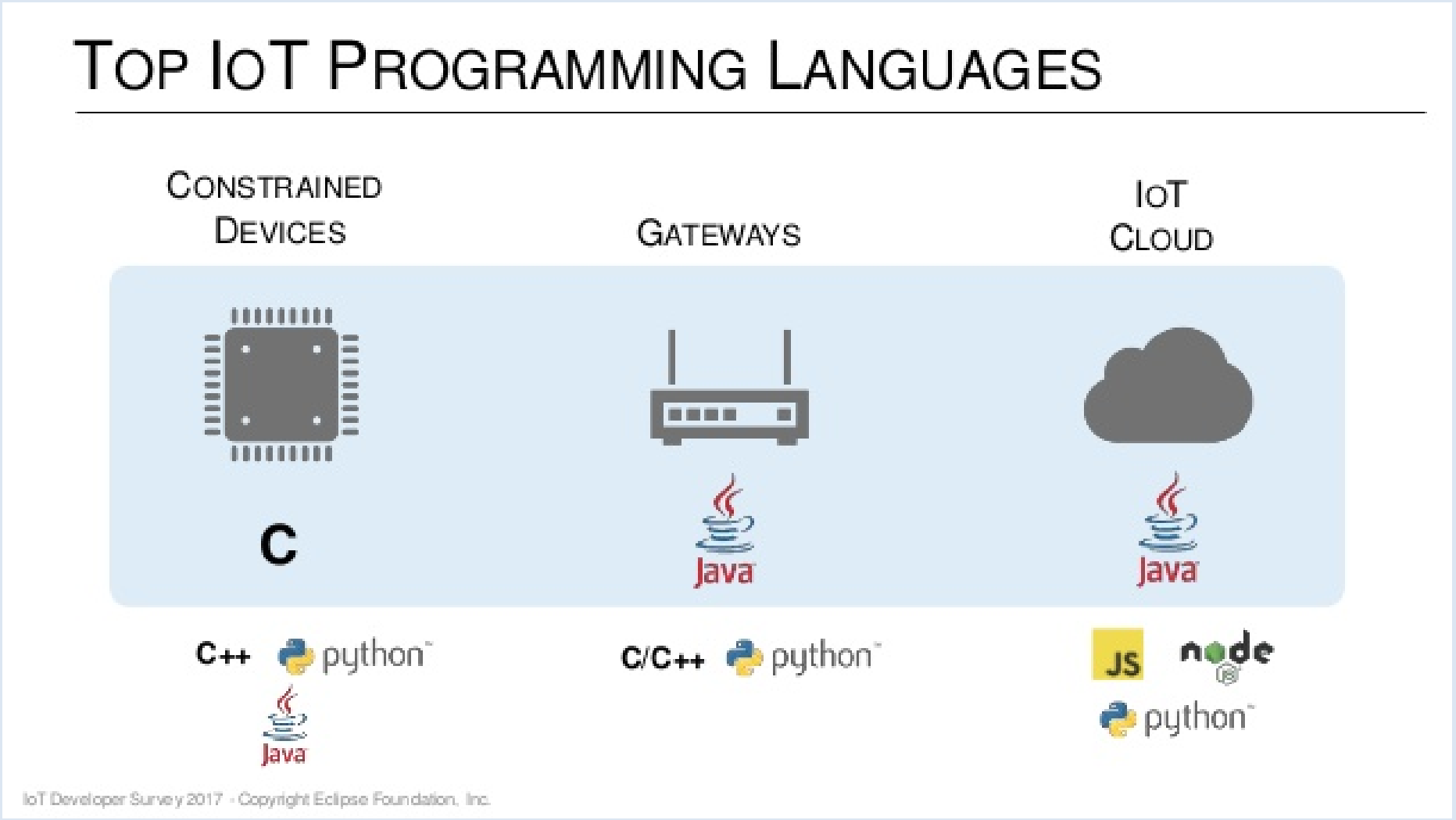
IoT Programming Languages



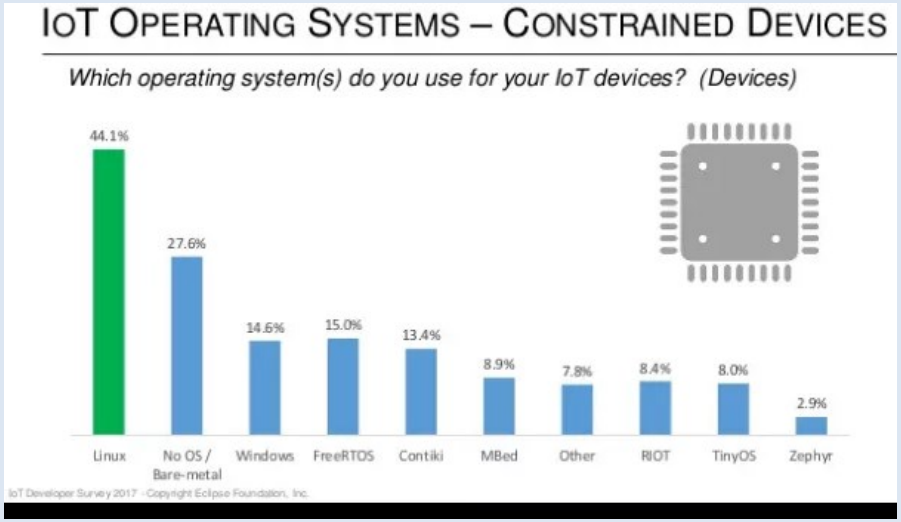


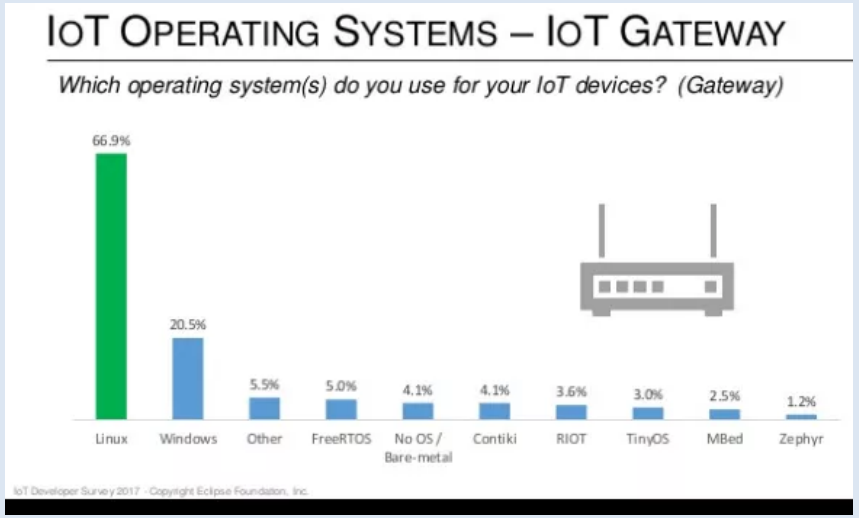


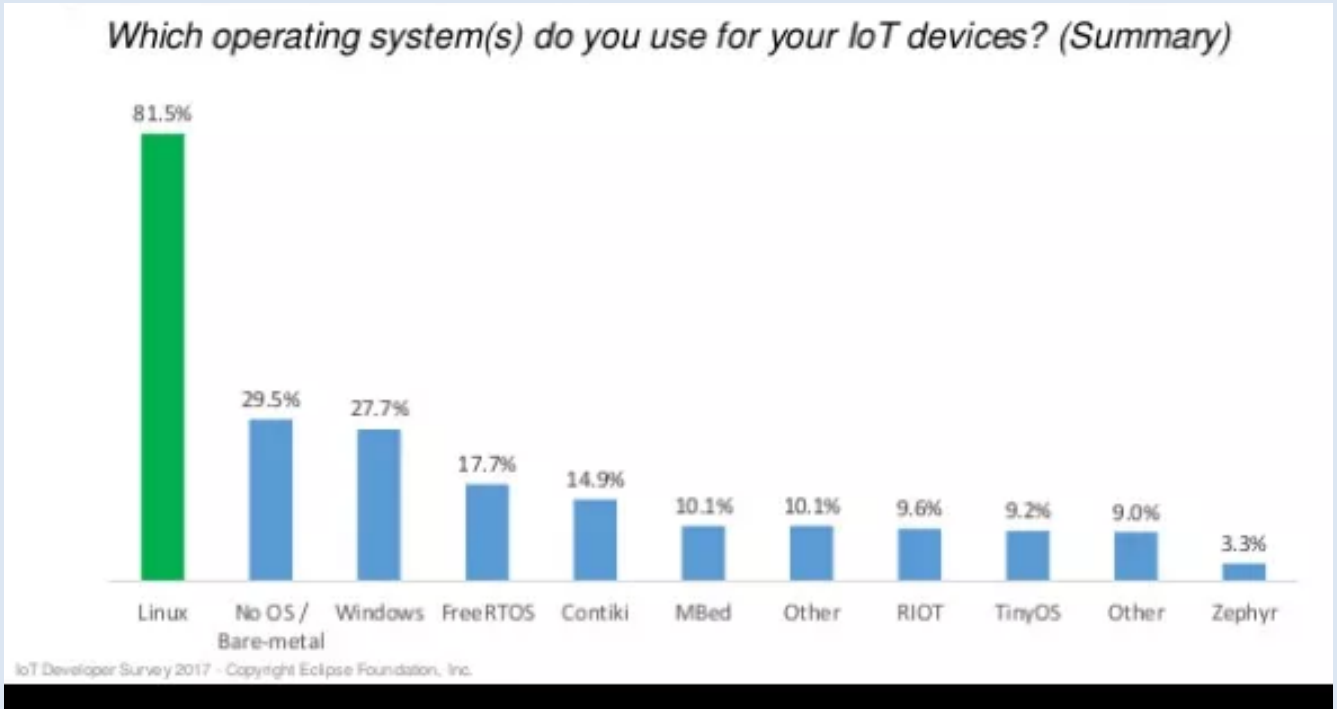
IoT Programming Languages



Operating Systems Used in IoT Hardware



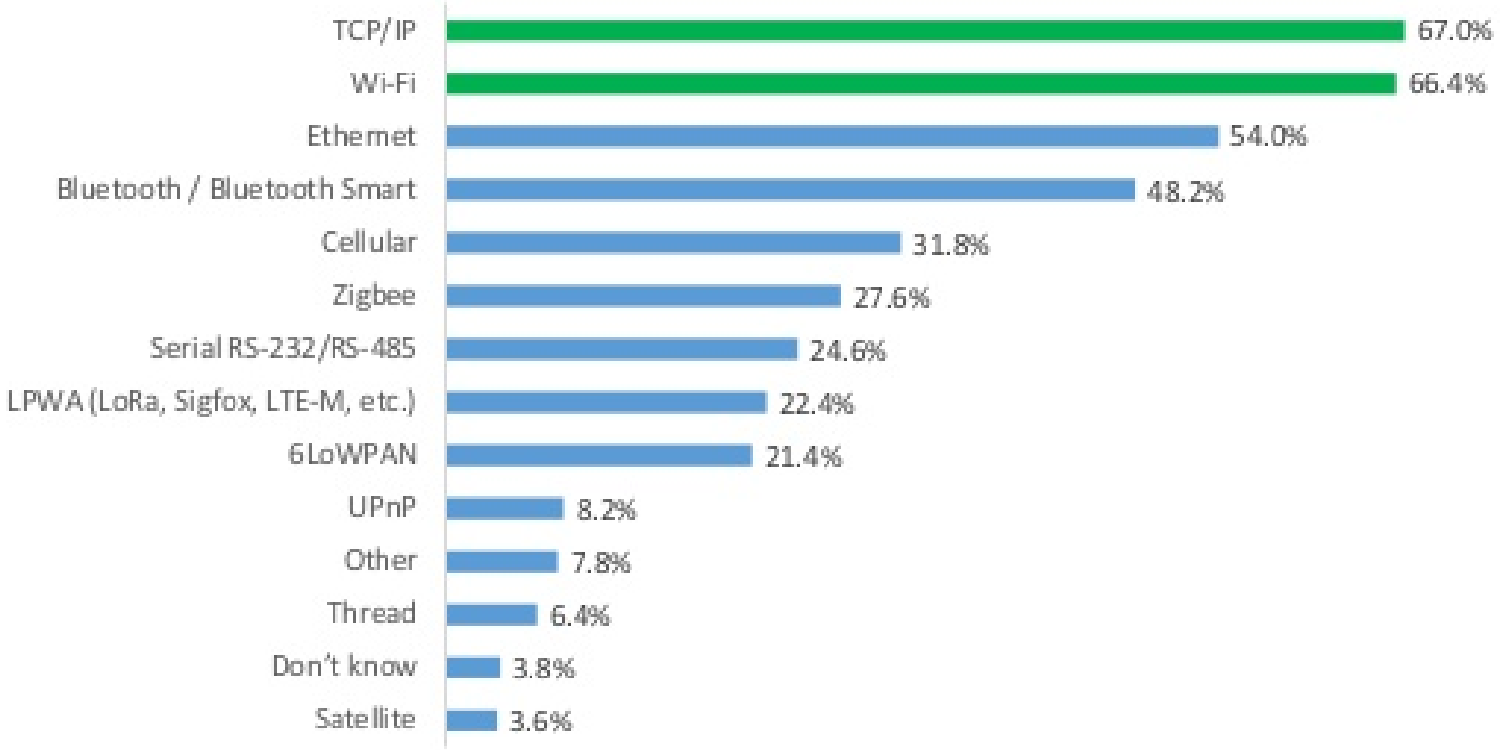




IoT Connection Protocols

CONNECTIVITY PROTOCOLS

What connectivity protocol(s) do you use for your IoT solution?



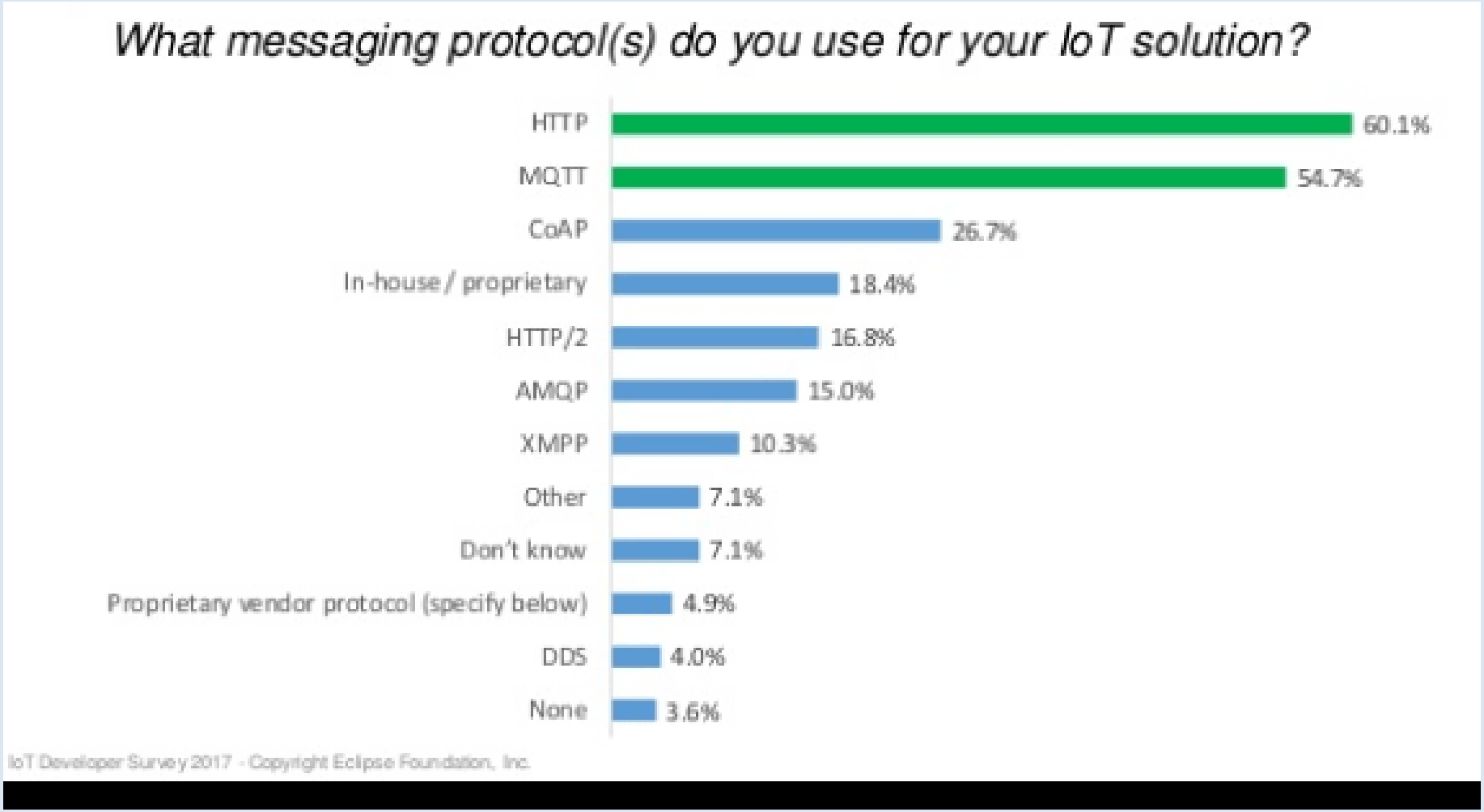
IoT Messaging / Communication Protocols Overview

- Web Services is a communication method that provides communication between two remote devices by sending and receiving XML with HTTP protocol.

- Web Services are discussed in the application / communication protocols on IoT.

- In the selection of Application / Communication Protocol, it should be considered that IoT devices with limited equipment can use their resources such as cpu, memory, battery effectively. For this reason, IoT applications need communication with lightweight protocols.

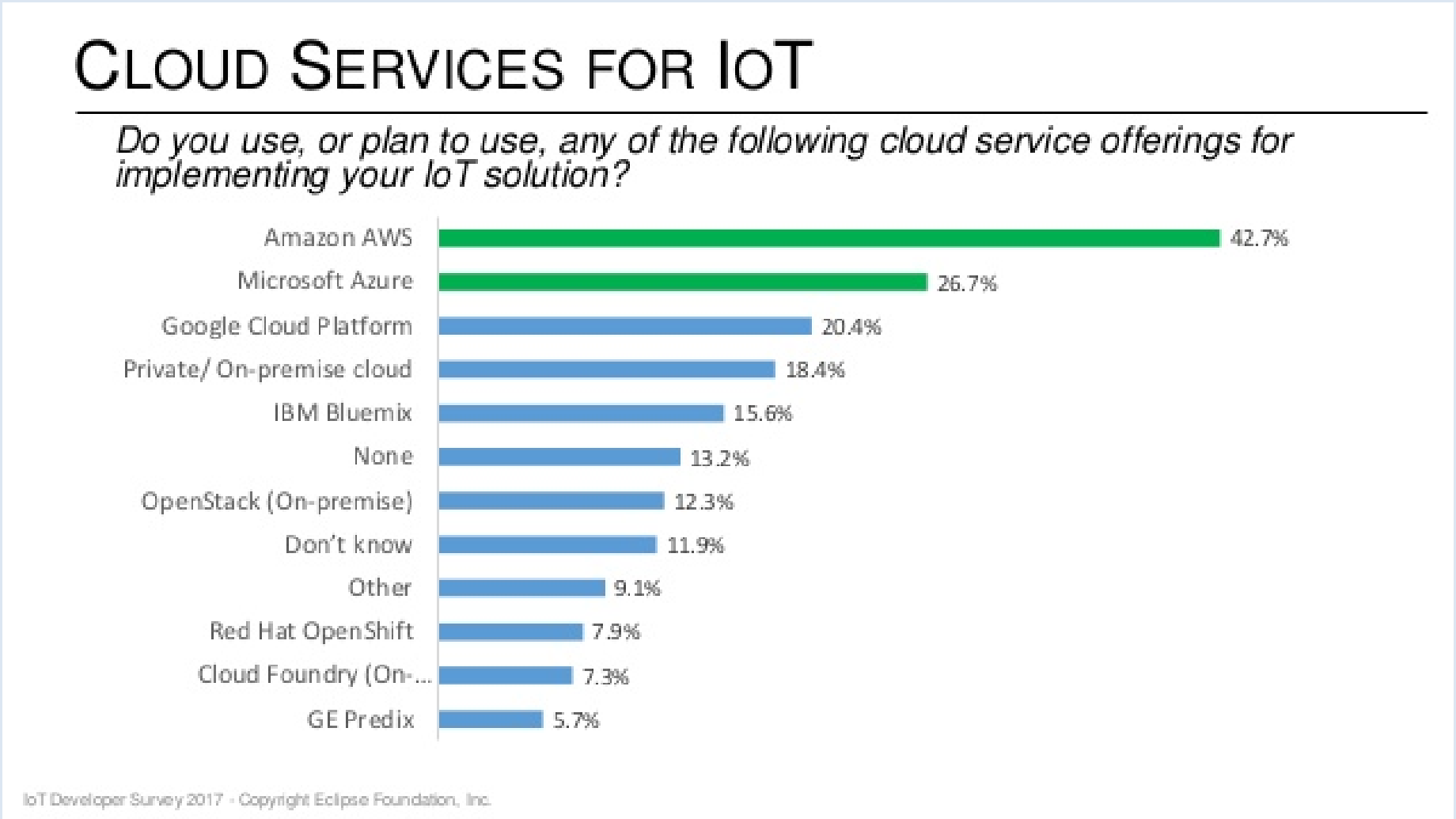
IoT Messaging Protocols



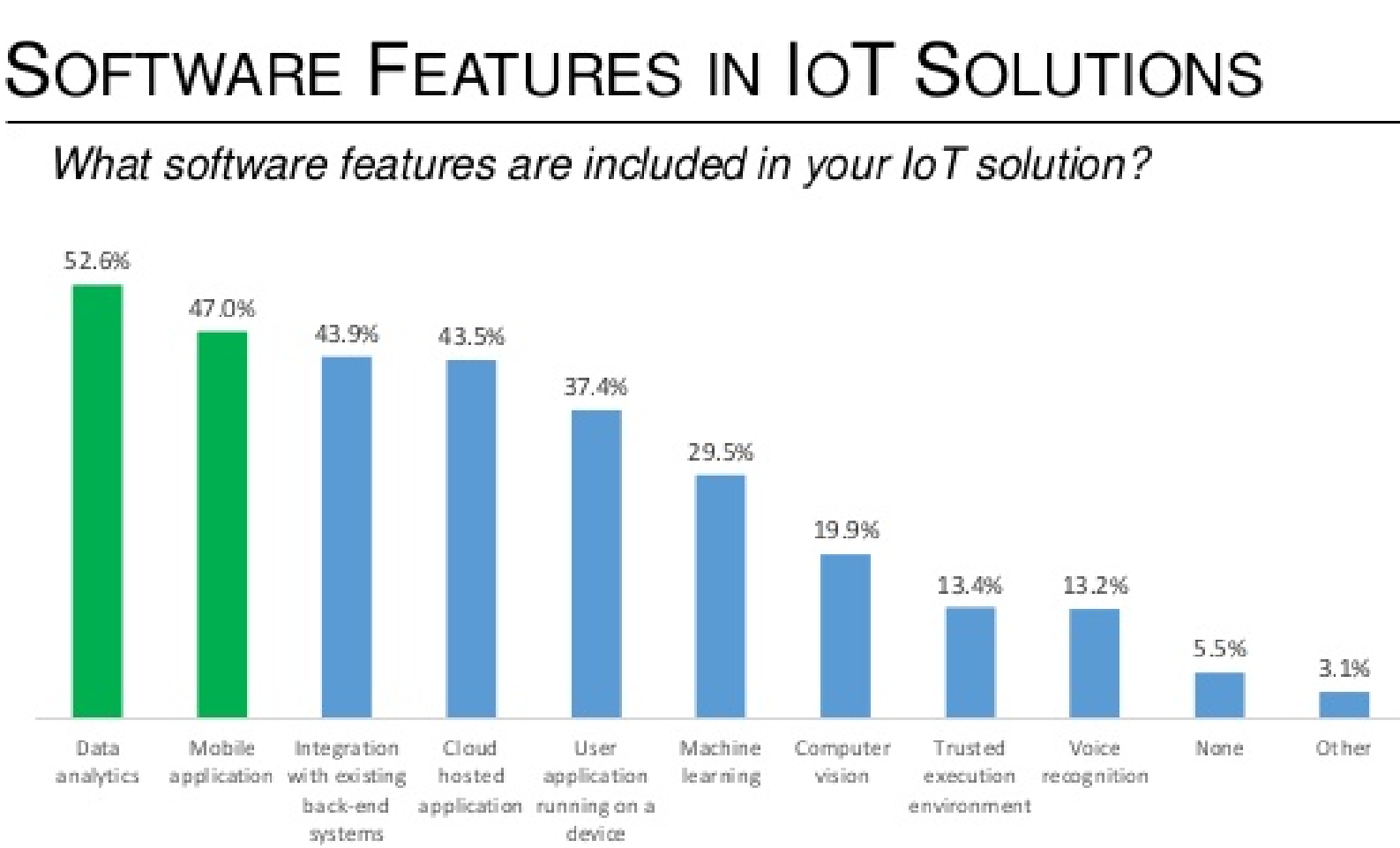
IoT Cloud Platforms

- Due to the nature of IoT applications, there is a need for environments where the data produced / obtained by the objects will be stored and visualized / analyzed on the internet.
  - adafruit,
  - ThingSpeak,
  - Firebase,
  - TeMBoo,
  - IBM Watson IoT,
  - Microsoft Azure IoT,
  - Amazon Web Services (AWS) IoT,
  - ThingWorx IoT Platform,
  - Carriots,

The Cloud Services for IoT Applications



Software Features in IoT Applications



Resources

- **Lecture Notes -Presentations**
- Eclipse Foundation IOT Developer Survey 2017