Demonstration of IoT Implementation

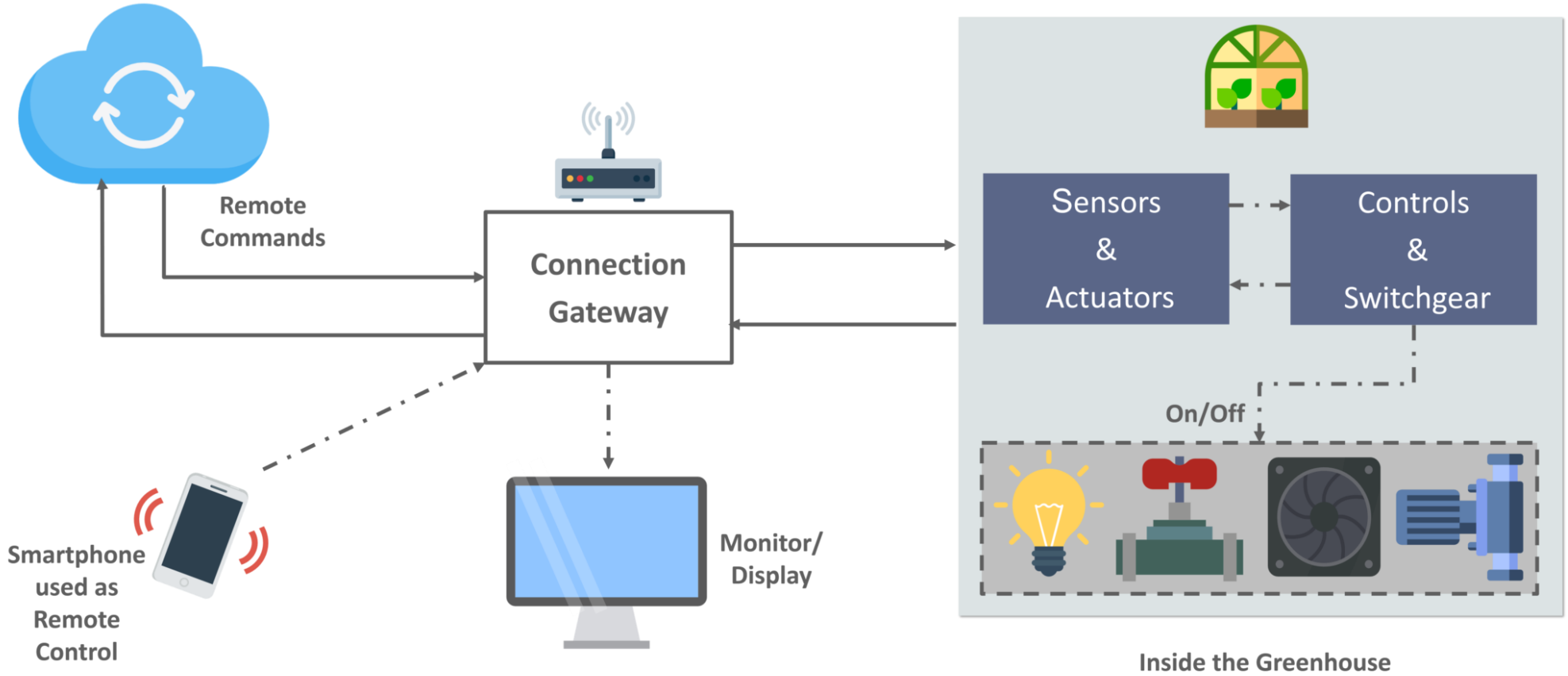
- By Selvin Furtado

Overview

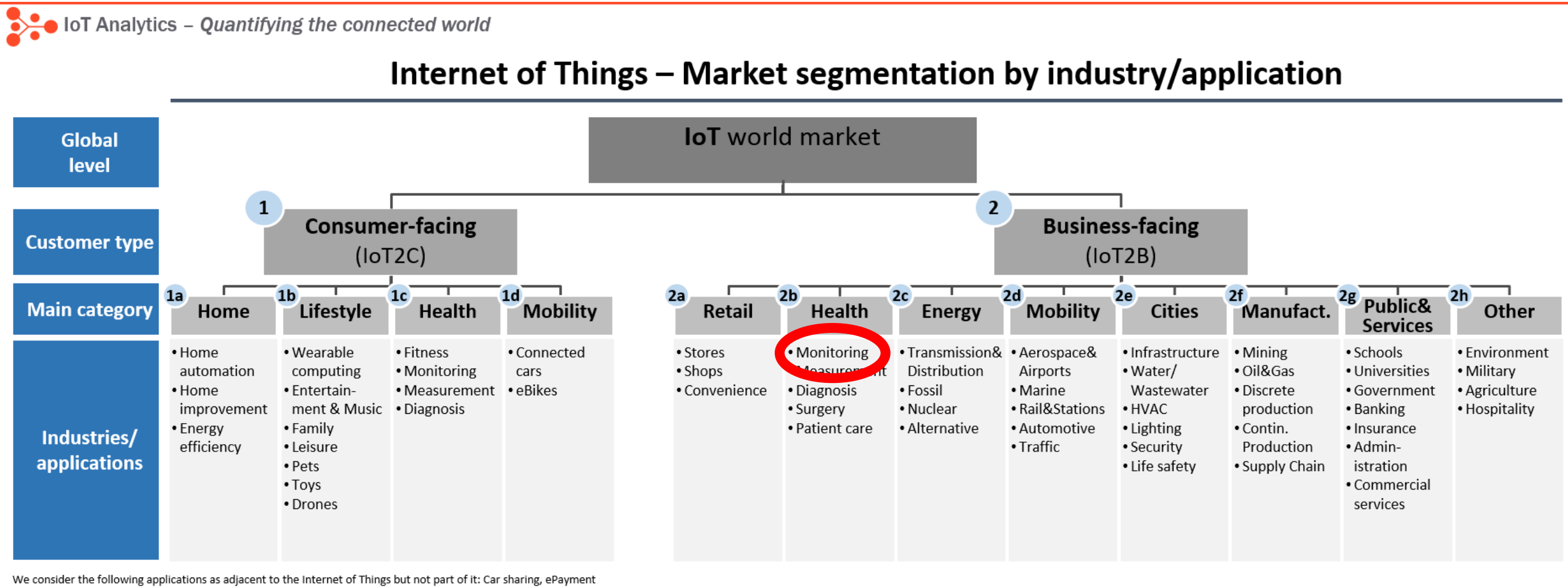
- Understand a typical IoT monitoring system
- Select a specific example.
- Design and Implement selected system.
  - mySQL
  - Php
  - Http
  - Build on Arduino, for ESP32

- If you wish to follow along download and install XAMPP server and POSTMAN.

Typical IoT Example



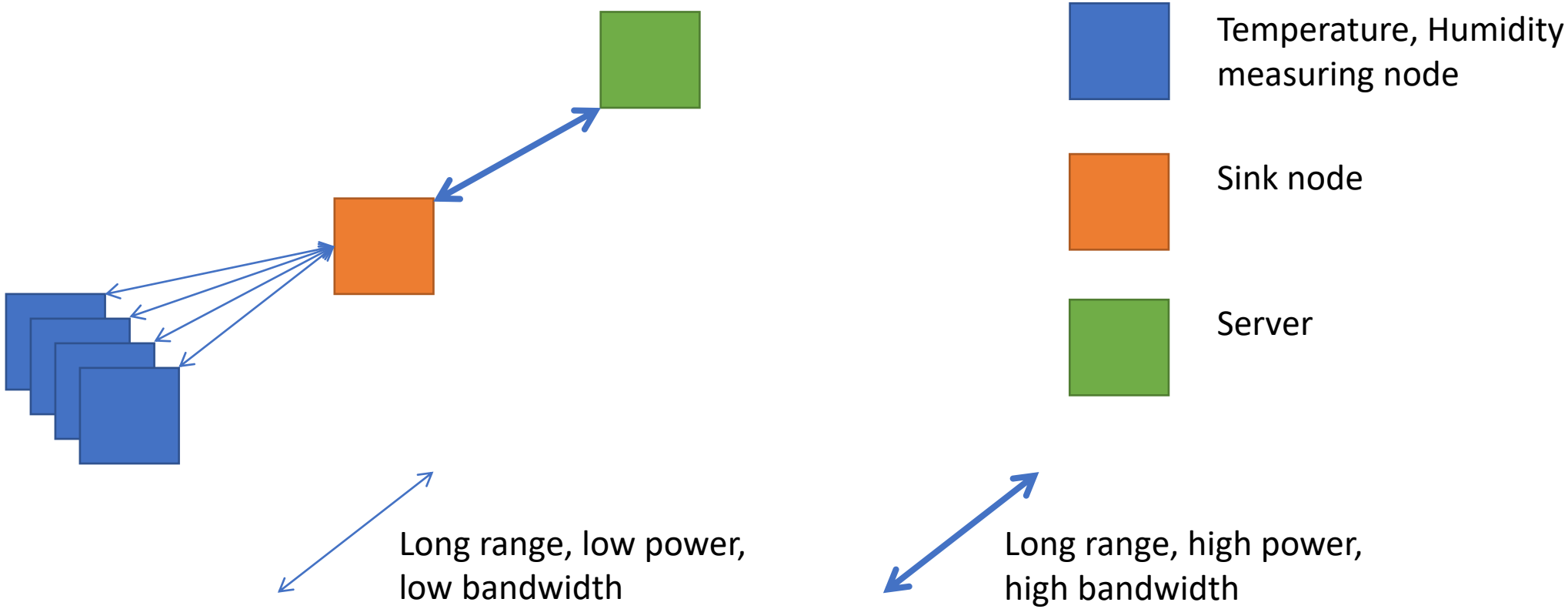
Selecting Example



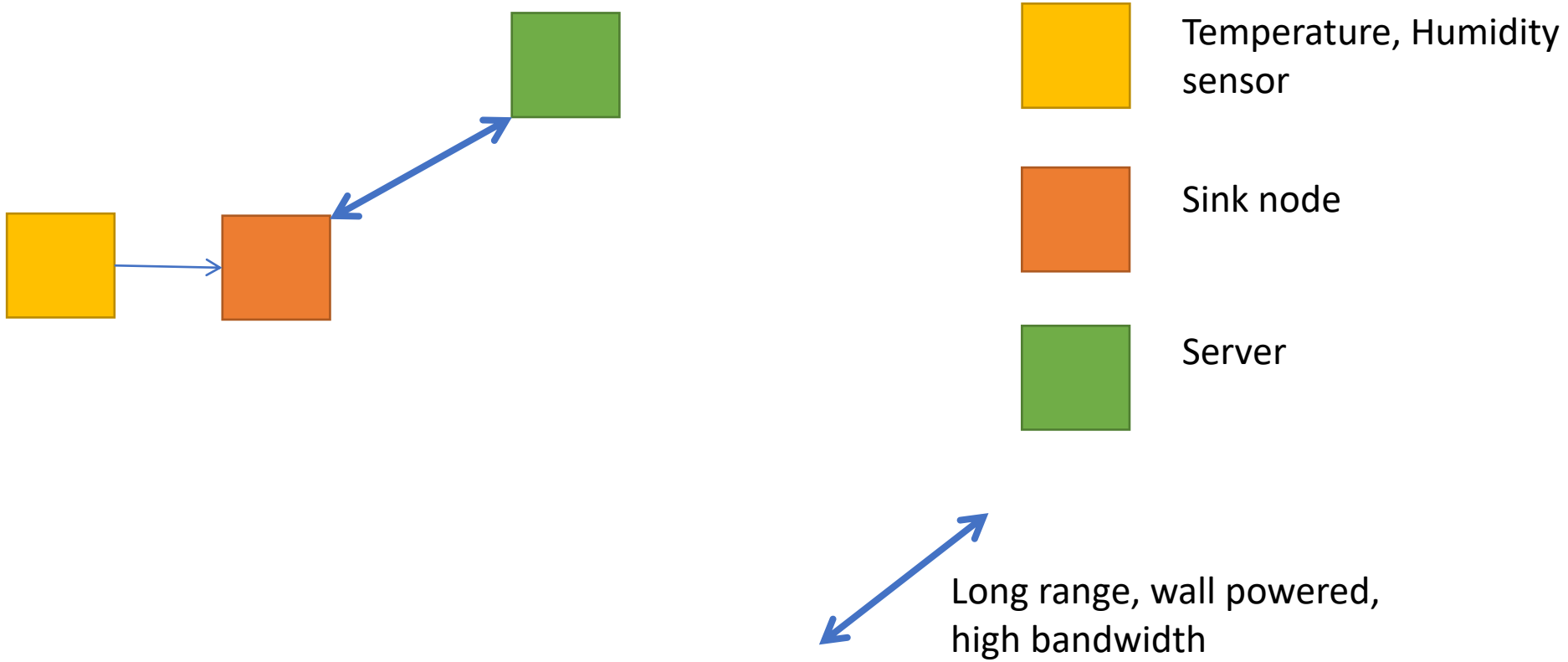
Server Room

- Health
  - Temperature
  - Humidity
  - Closed access

Typical Monitoring Architecture

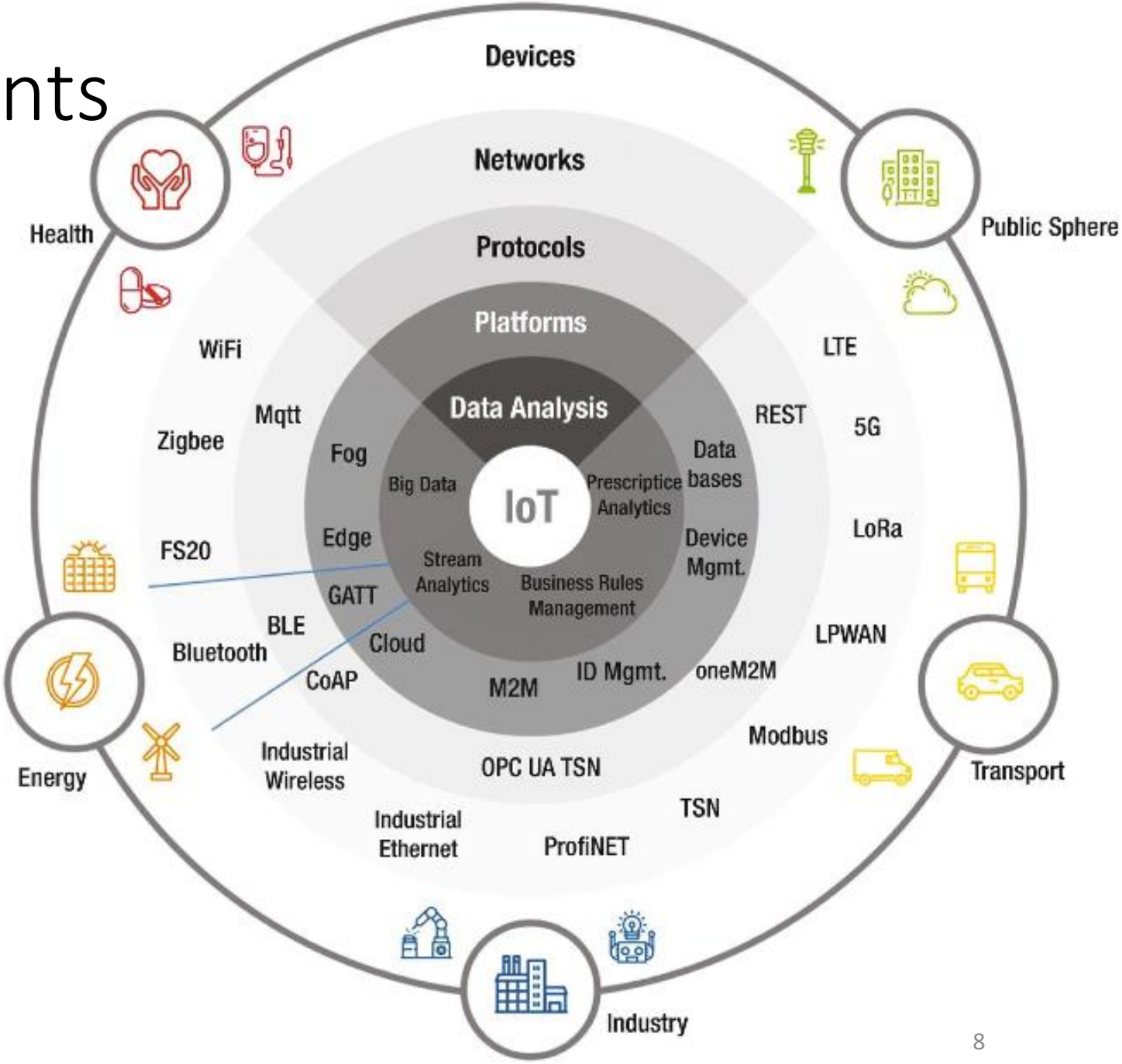


Server Room Monitoring Architecture



Selecting components

- Device = ESP32
- Network = WiFi
- Protocol = REST
- Platform = Apache
- Database = mySQL



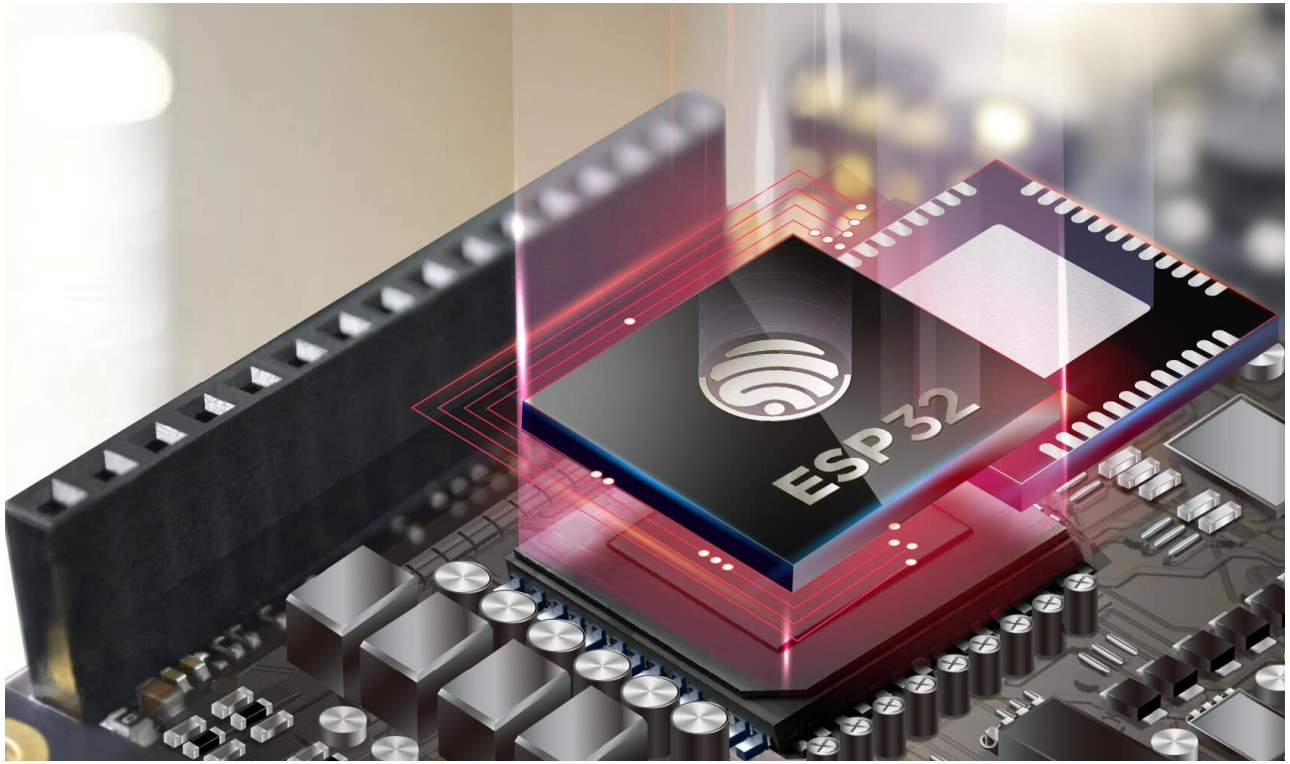
Device = ESP32

Robust Design

Ultra-Low Power Consumption

High Level of Integration

Hybrid Wi-Fi & Bluetooth Chip



Network = WiFi

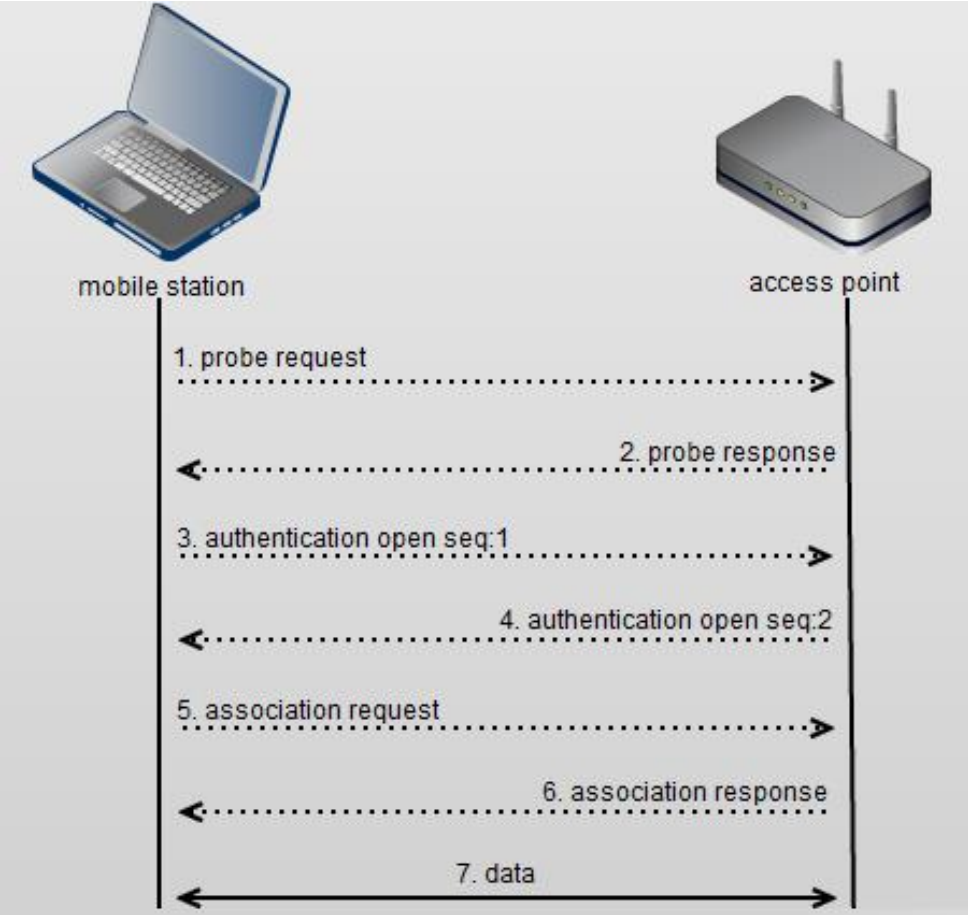
Advantages

- The wireless network does not require any cable or wires, and hence communication is possible even when the user is moving.
- Wireless networks can be easily extended to places where wires and cables are not accessible.
- Installing a wireless network is easier and faster.
- Wireless networks require a one-time investment and, hence, are cheaper.
- Improved and better communication is available if one is using the wireless network.

Disadvantages

- The range of a wireless network is minimal, and it causes problems for many users.
- People who are inexperienced in the computer field may face trouble installing a wireless network.
- The wireless network is very prone to interference, and hence, fog and radiation can cause it to malfunction.
- The cost of installing a wireless network is prohibitive.
- The wireless network has minimal bandwidth.

Network = WiFi




```
#include <WiFi.h>
#include <WiFiMulti.h>
#include <HTTPClient.h>

WiFiMulti wifiMulti;

void setup() {
    wifiMulti.addAP("SSID", "PASSWORD");
}

void loop() {
    // wait for WiFi connection
    if((wifiMulti.run() == WL_CONNECTED)) {

        HTTPClient http;
```

Protocol = REST API

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Protocol = REST API

- **GET**
  - The GET method is used to retrieve data from the server. This is a read-only method, so it has no risk of mutating or corrupting the data.
- **POST**
  - The POST method sends data to the server and creates a new resource.
- **PUT**
  - The PUT method is most often used to update an existing resource.
- **DELETE**
  - The DELETE method is used to delete a resource specified by its URI.

Platform = Apache

- One of the go-to web server.
- Market share of ~33%.
- Cross-platform (works on both Unix and Windows servers).
- Optimal deliverability for static files and compatibility with any programming language (PHP, Python, etc).
- Open-source and free, even for commercial use.

Database = MySQL

- Most popular open source database management system.
- Cross platform database server.
- Support many platform with different languages like C, C++, PHP, PERL, JAVA, Python etc.
- Does not support a very large database size as efficiently.

- But comes bundled with Apache in XAMPP.

Sequence

- MySQL database
- Php pages – landing pages for IoT devices
- Program ESP32