

IoT App Development



How IoT Works?

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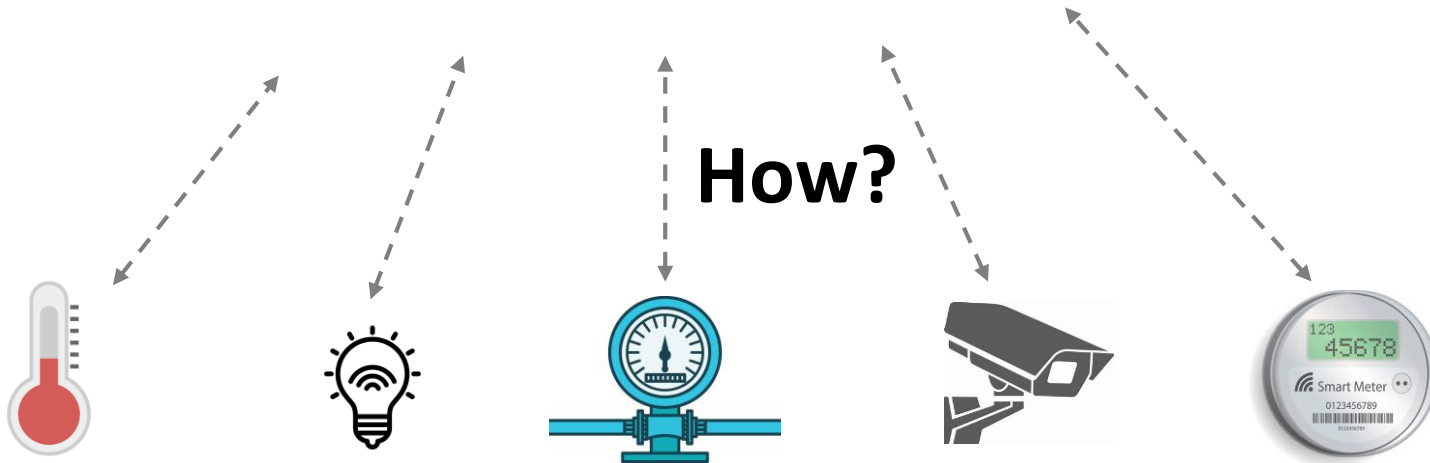
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Sensors in IoT Application

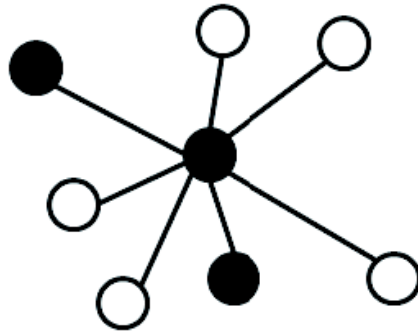
What next?

How?

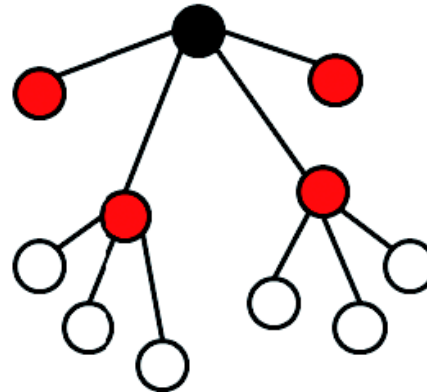


Smart Sensors in the bottom layer

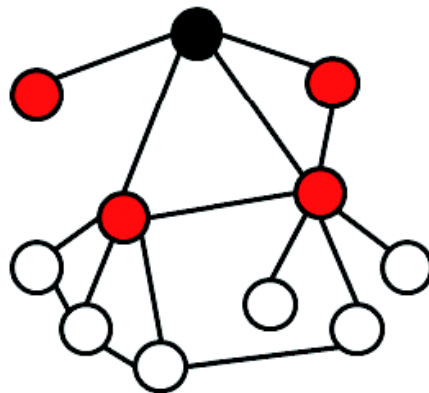
Topology – How the Sensors Connected



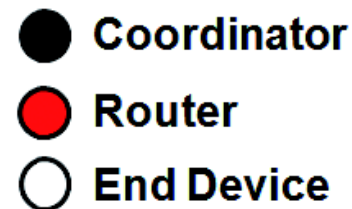
Star



Tree



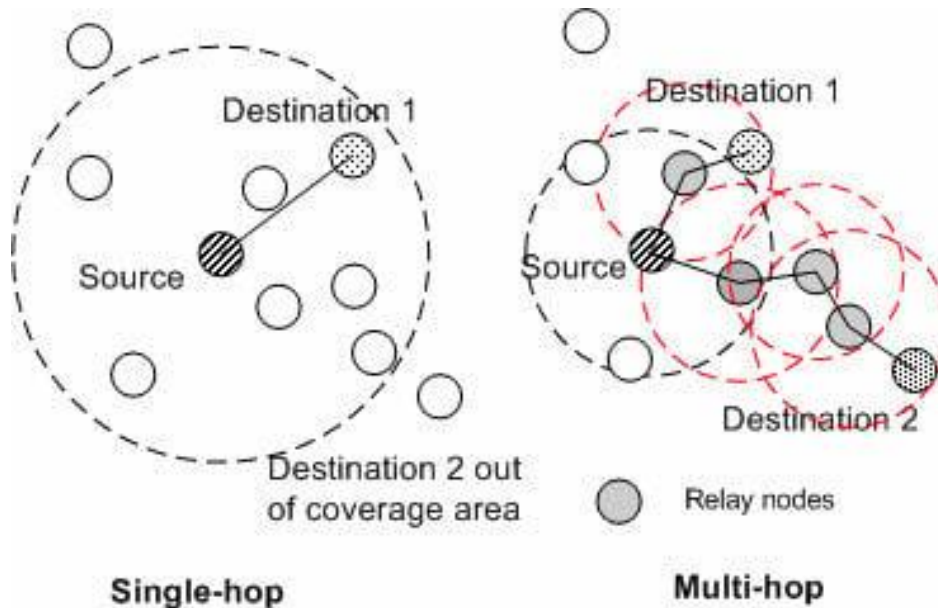
Mesh



Single-hop and Multi-hop

In **single-hop** communication, data is transmitted directly from a source node to a destination node without any intermediate nodes.

Multi-hop communication involves the use of intermediate nodes (or relays) to transmit data from the source to the destination.



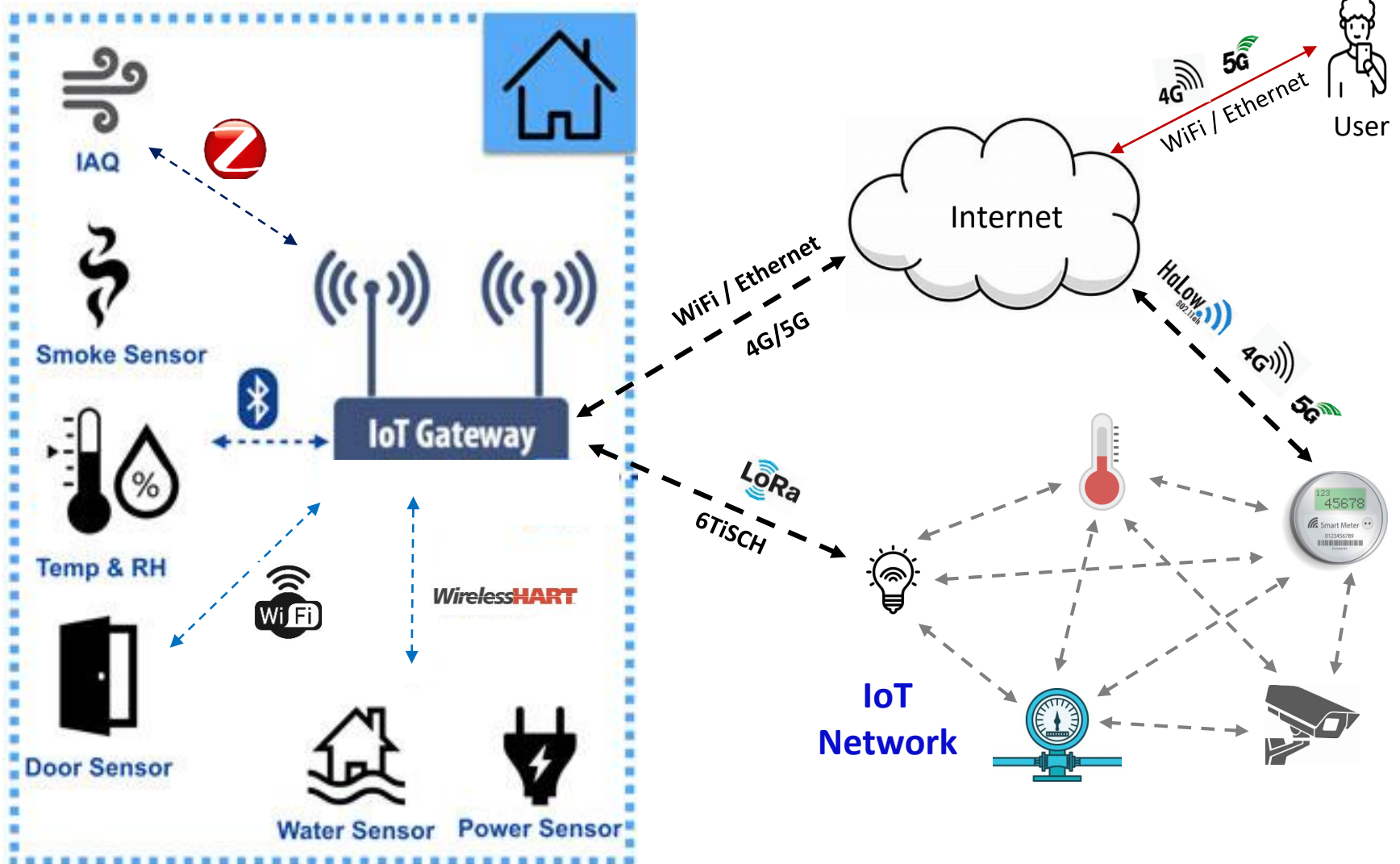
Advantages of single-hop:

- ✓ Simplicity
- ✓ Low Latency
- ✓ Lower Energy Consumption

Disadvantages of single-hop

- ✓ Limited Range
- ✓ Scalability Challenges

IoT Application and Connectivity



Traditional Data Flow in IoT



Image Source: <http://events17.linuxfoundation.org/sites/events/files/slides/Intelligence%20at%20the%20Edge.pdf>

Traditional Data Flow in IoT

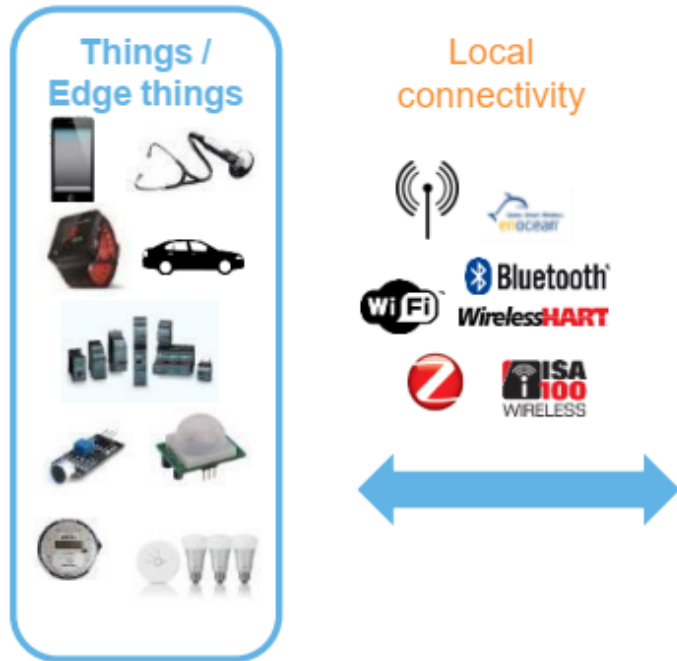


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Traditional Data Flow in IoT

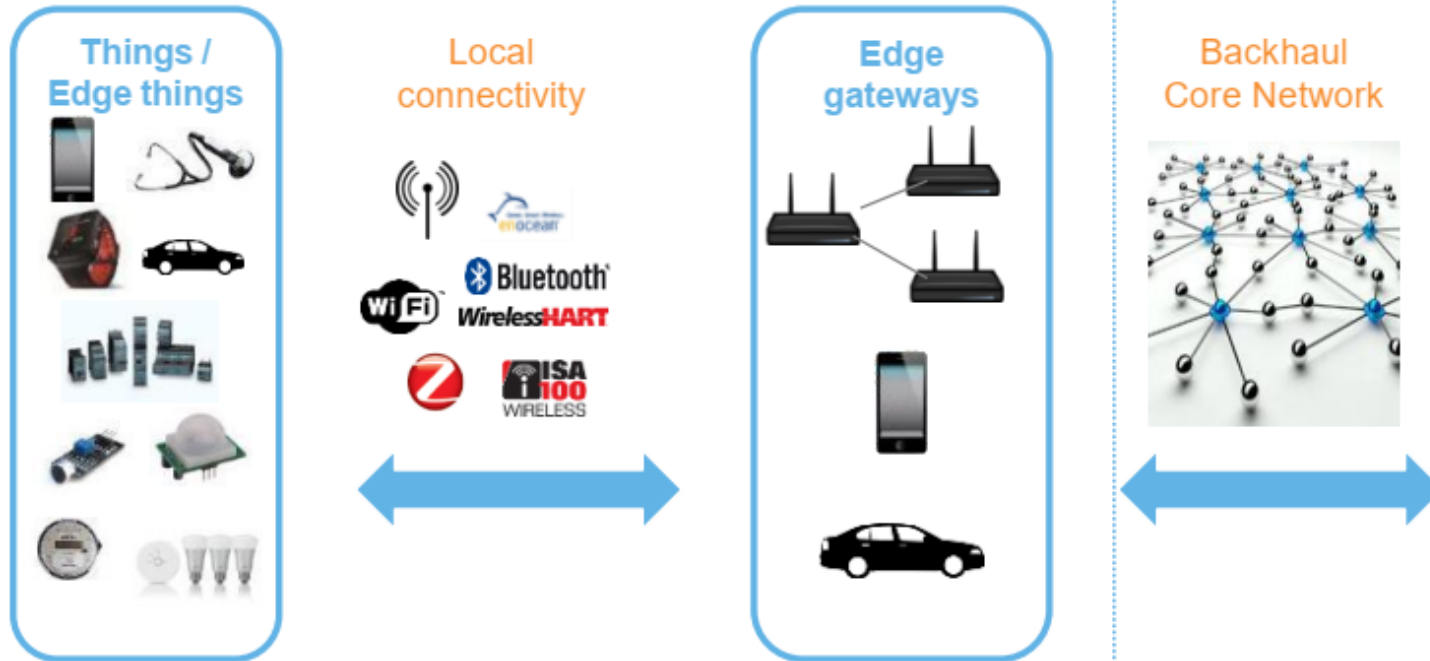
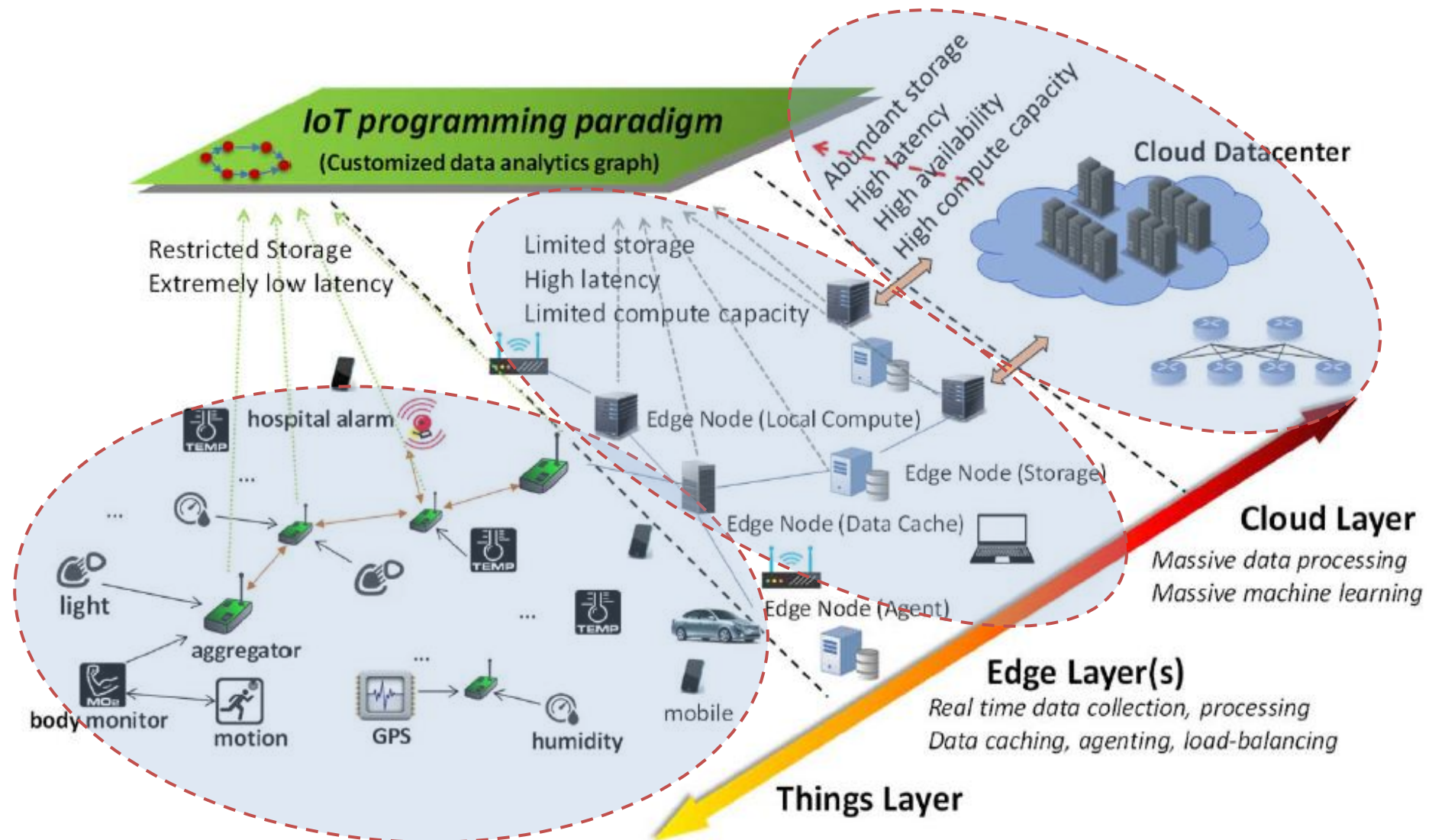


Image Source: <http://events17.linuxfoundation.org/sites/events/files/slides/Intelligence%20at%20the%20Edge.pdf>



Data Processing Layers



Source: Rajiv Ranjan et. al., "Integrating the IoT and Data Science" *IEEE Cloud Computing*, 2018

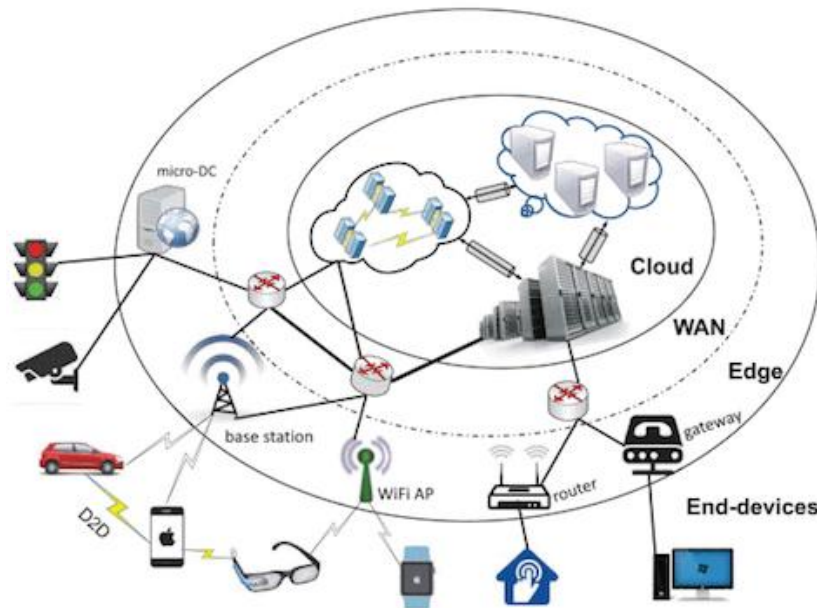
Data Processing at the Edge

Cloud computing

- On-demand delivery of computing resources—such as servers, storage, databases, networking, software, analytics—over the internet, with a pay-as-you-go pricing model.

Edge Computing

- Host the computation tasks close to data sources and end users.
- Edge computing suits better than Cloud Computing in IoT applications.



AI: It extracts insights that leads to better decisions & strategic moves

Edge Intelligence:

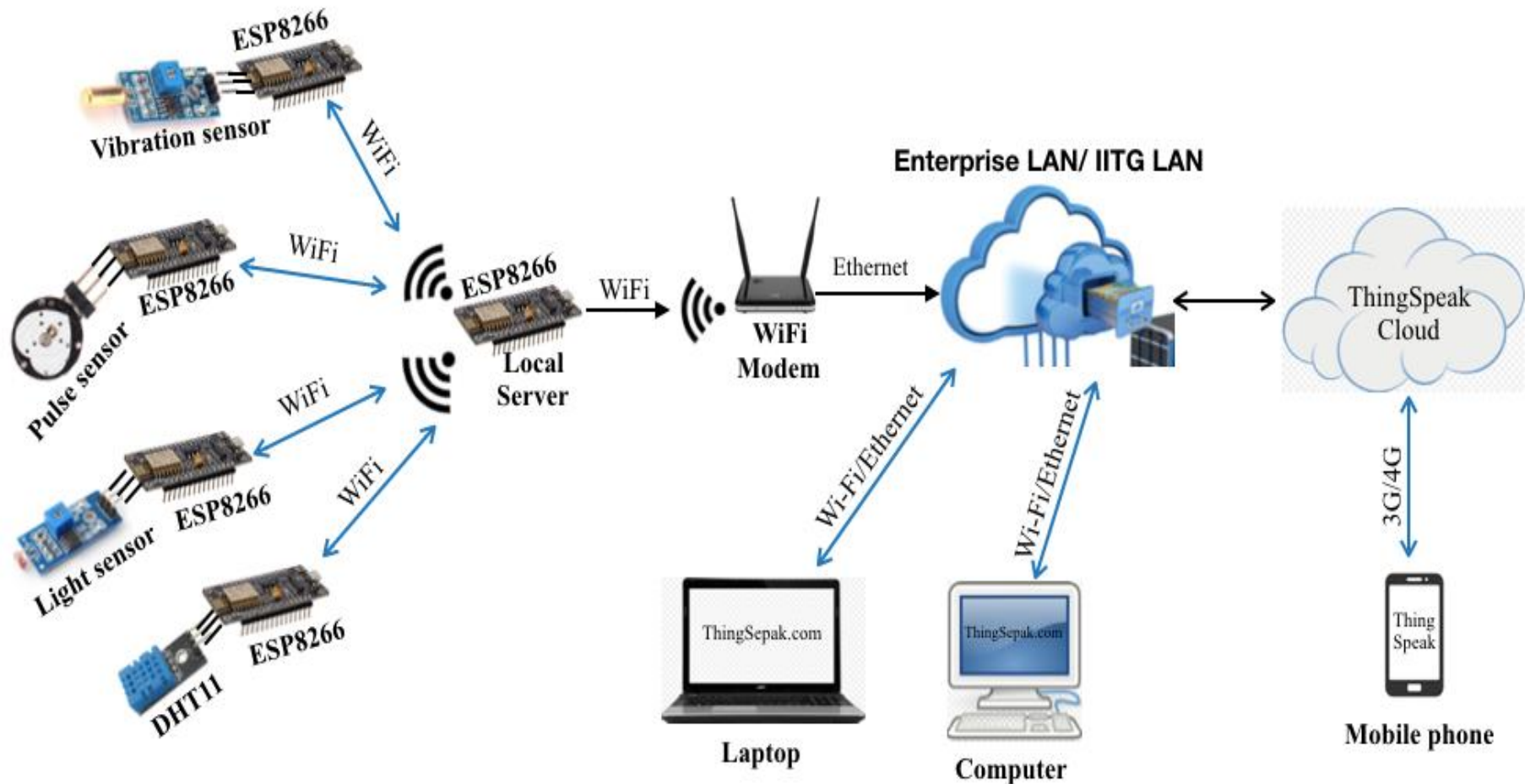
- Apply AI on data analysis at Network Edge

What needs to know?

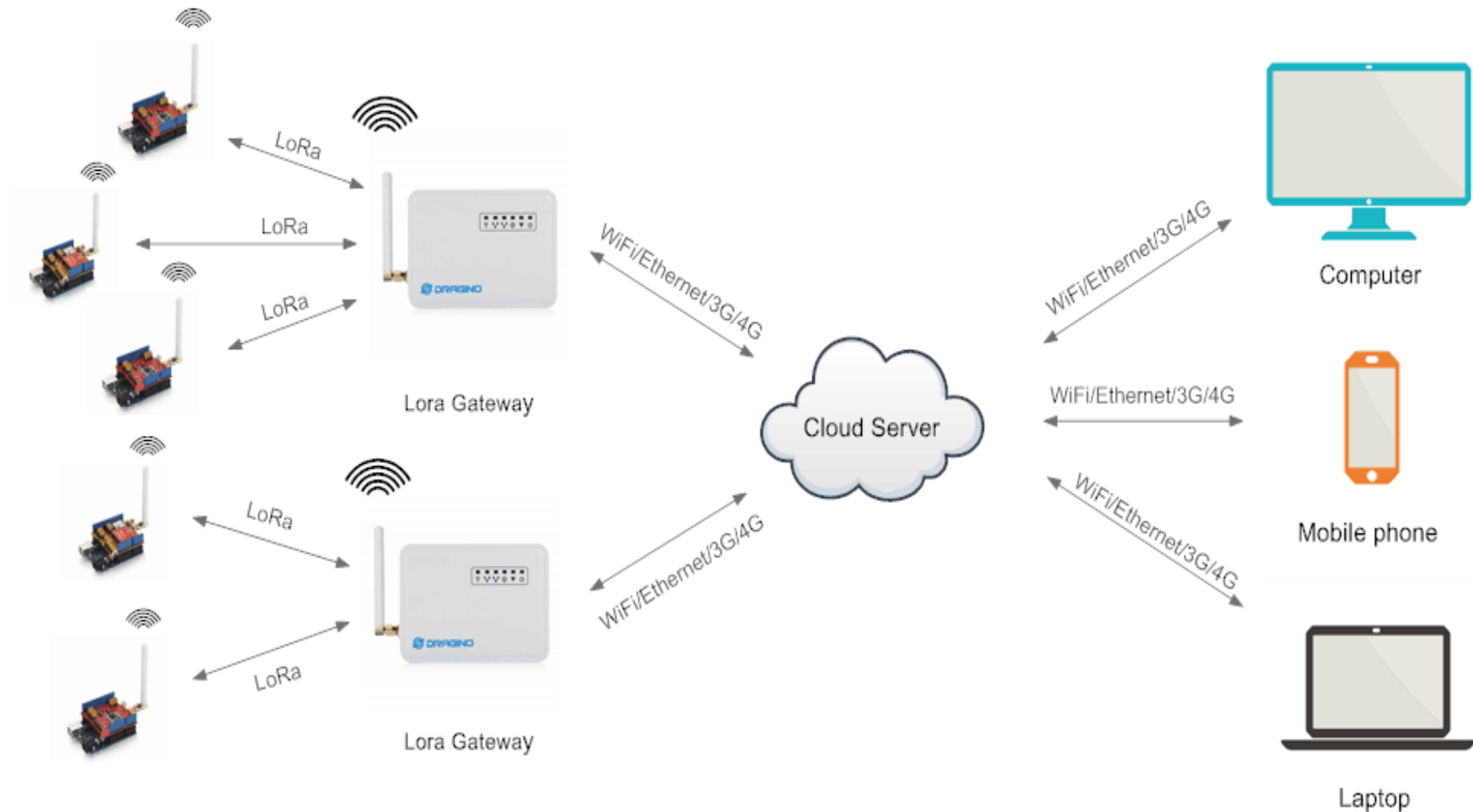


- **IoT Components**
 - Application developer needs to know what are the **required components** for designing an IoT application
- **IoT Architecture**
 - For any IoT application it is required to know the **physical arrangement** of IoT sensors, actuators, gateway, edge devices and Internet connectivity
- **IoT Network Access Technology**
 - Types of IoT Network Access Technology or **Connectivity Technology** used to connect the sensors/actuators with each other, and with the IoT gateway or Internet
- **IoT Data Processing / Analysis**
 - Sensed data needs to be **stored and analyzed** to take business decision or to get new business insight or to generate alerts/warnings

DIY: Smart Home Monitoring



DIY: Long-range Monitoring & Control



Lessons Learned



- Topology for IoT Networks
- Single-hop vs Multi-hop
- Traditional Data Flow in IoT
- Data Processing Layers in IoT
- What is needed to know before developing IoT Applications

Thanks!

