Integration Technology and Tools for IoT Environment

CSI 421-Internet Of Things

Universitas Esa Unggul

- *Integration Technology and Tools for IoT Environment*

- **Semua Bahan mengacu kepada buku :** The Internet of Things: Enabling Technologies, Platforms, and Use Cases [Pethuru Raj, Anupama C. Raman]

- The technologically inspired capability of instrumenting and intercon- necting computationally powerful as well as resource-constrained devices (physical, mechanical, electrical, and electronics) with one another in the vicinity as well as with cloud-hosted software applications and data sources over any network is to enable the devices to exhibit a kind of shrewdness in their operations and outputs.

integration scenarios:

- 1. Sensor and actuator networks
  2. Device-to-device (D2D) integration
  3. Cloud-to-cloud (C2C) integration
  4. Device and sensor-to-cloud (D2C) integration

IoT Communication Protocol Requirements

- One definition of IoT is connecting devices to the Internet that were not previously connected.
- A factory owner may connect high-powered lights. A triathlete may connect a battery-powered heart-rate monitor.
- A home or building automation provider may connect a wireless sensor with no line power source.
- But the important thing here is that in all the above cases the *thing* must communicate through the Internet to be considered an *IoT* node.

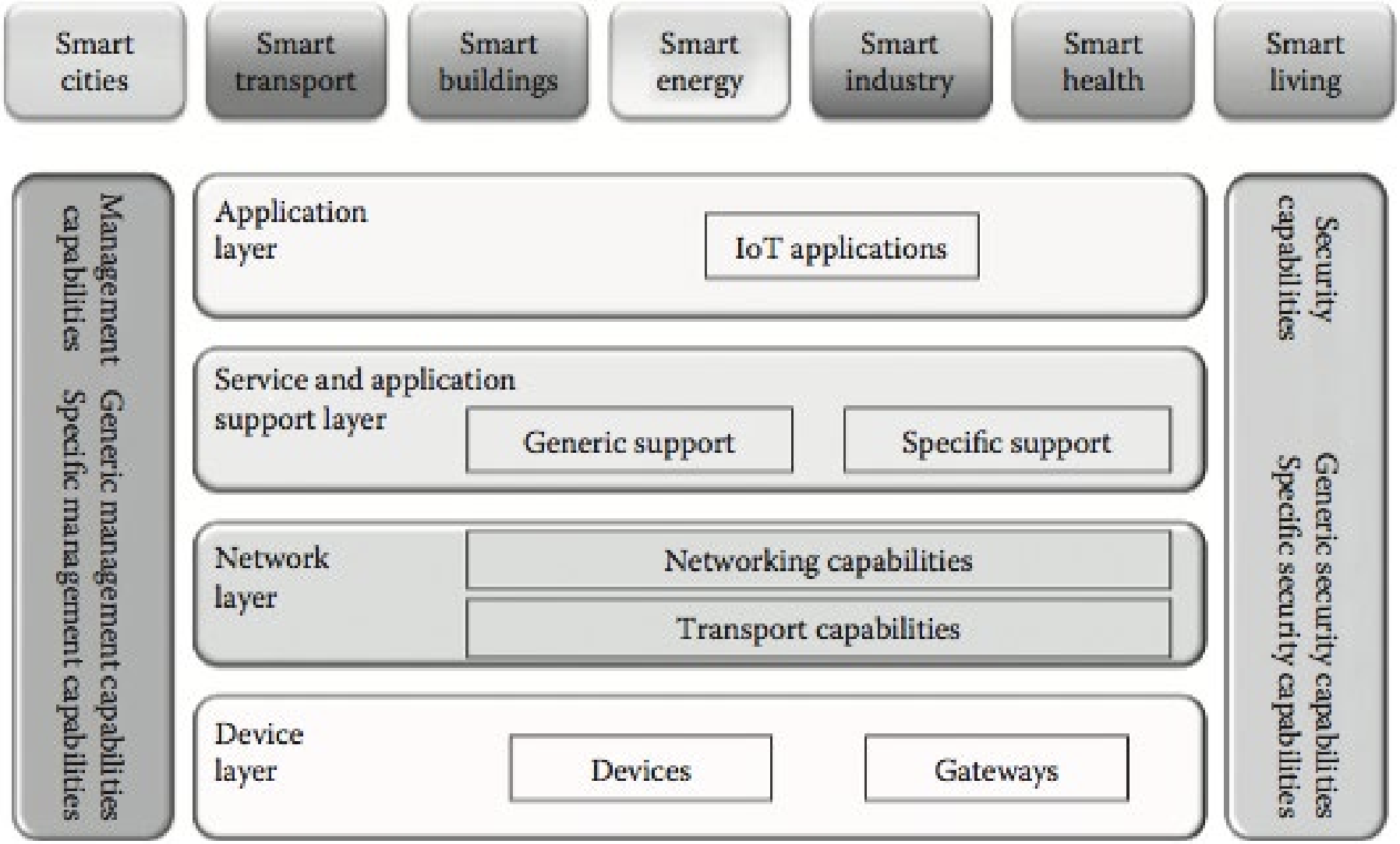
The IoT Devices Networking Requirements

IoT End Network Requirements	*Networking Style Impact*
Self-healing/scalable	Mesh capable
Secure	Scalable to no, low, medium, and high security without overburdening clients
End-node addressability	Device-specific addressing scalable to thousands of nodes
Device Requirements	*Messaging Protocal Impact*
Low power/battery-operated	Lightweight connection, preamble, packet
Limited memory	Small client footprint, persistant state in case of overflow
Low cost	Ties to memory footprint

enterprise transformation happens through the following ve tasks:

- Infrastructureoptimization
- Processexcellence
- Architectureassimilation
- Technology adaption and adoption
- Leveraging data (internal as well as external) for deriving insights

The IoT reference architecture.

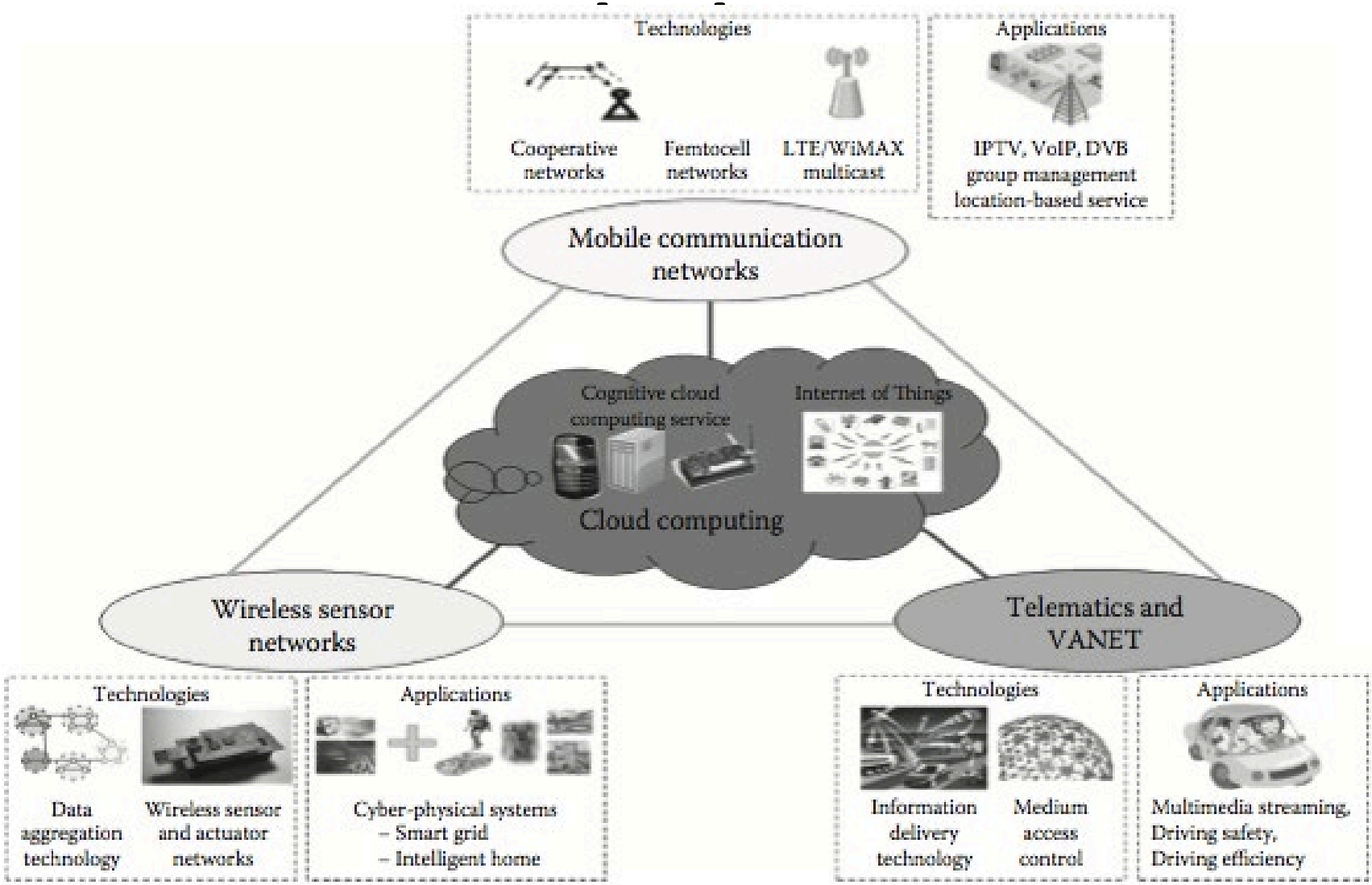


(From ITU Telecommunication Standardization Sector, http://www.itu.int/en/ITU-T/Pages/default.aspx.)

Sensor and Actuator Networks

- Sensing is tending to be ubiquitous.
- Sensors are being touted as the eyes and ears of next-generation software applications.
- A number of technologies especially miniaturization, networking, com- munication, and so on are contributing immensely to the unprecedented success of the sensing paradigm.
- Sensors are becoming exceptionally tiny to be easily disposable, disappearing, and yet elegantly deft.

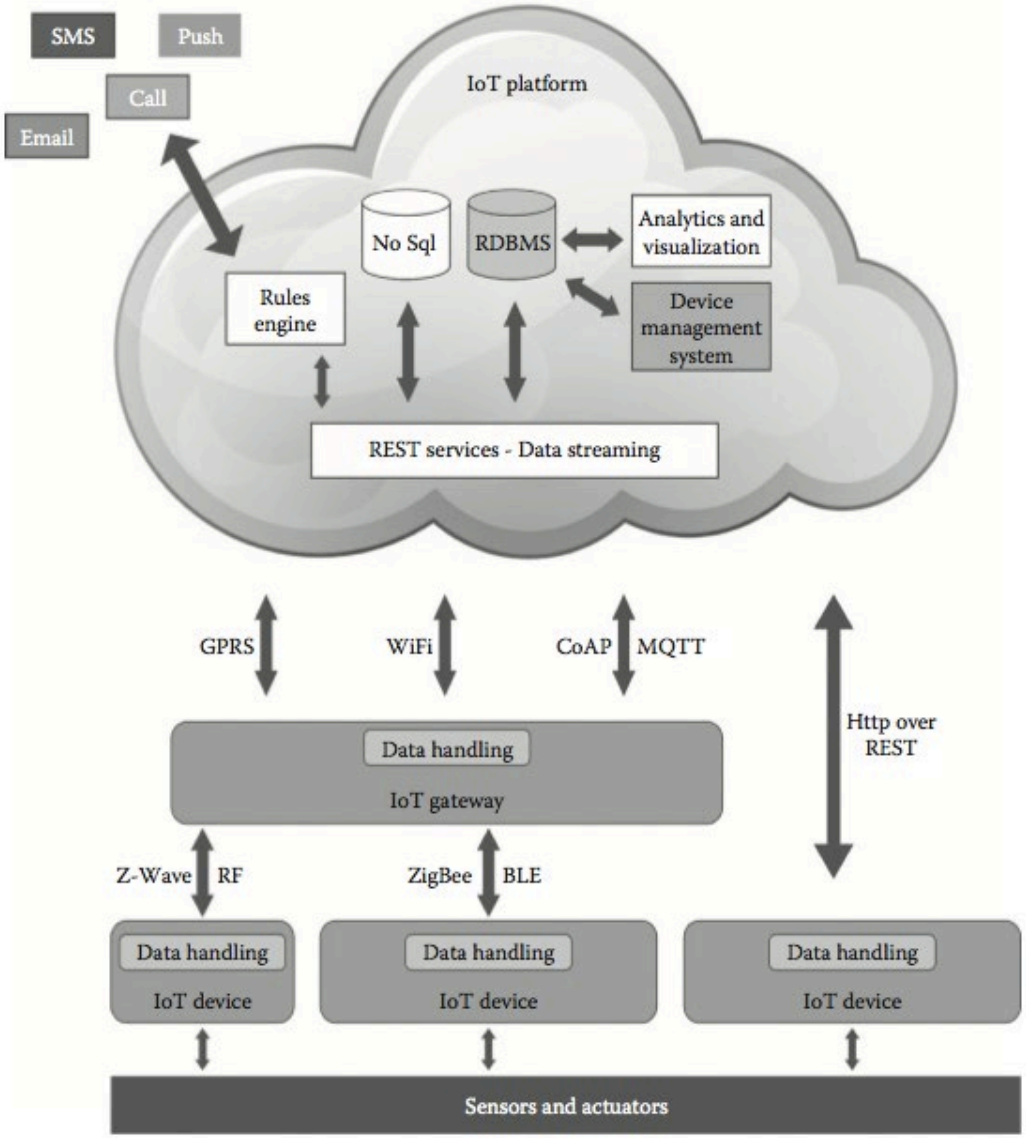
Networks of networks of sensors and



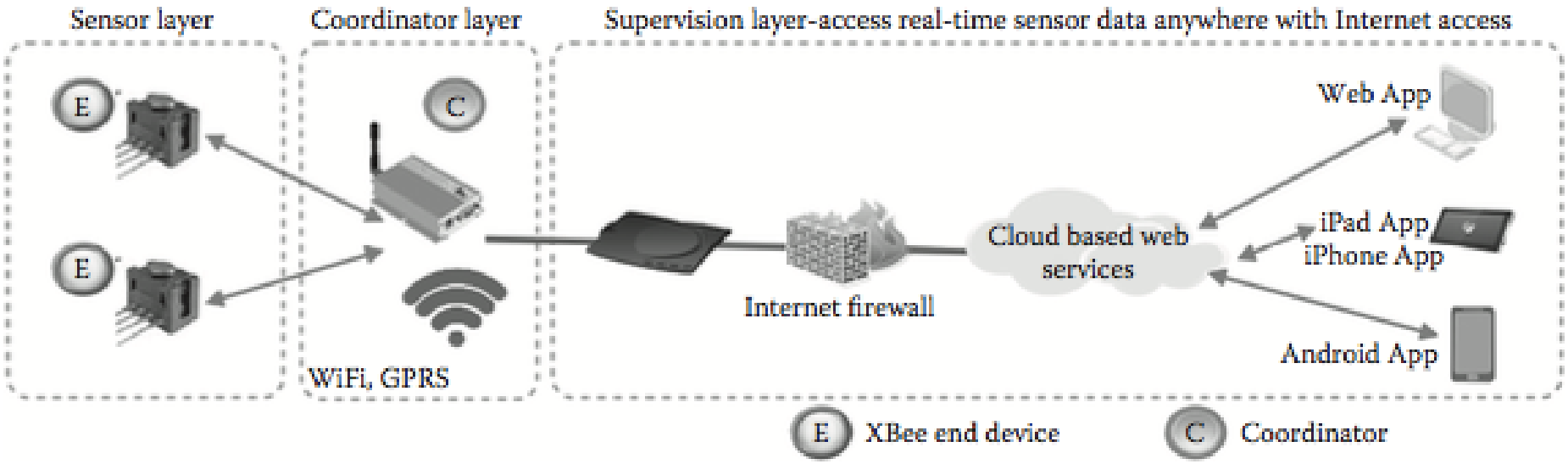
Sensor-to-Cloud Integration

- Sensor and actuator data need to be taken to nearby or faraway clouds for storage and analyt- ics. ere are multiple cloud options ranging from o -premise, on-premise, and to edge clouds.
- Public clouds are typically for historical, comprehensive, and batch processing whereas interac- tive, stream, and real-time processing in a secure fashion are better accomplished by edge or fog clouds wherein proximate or local processing gets done comfortably.

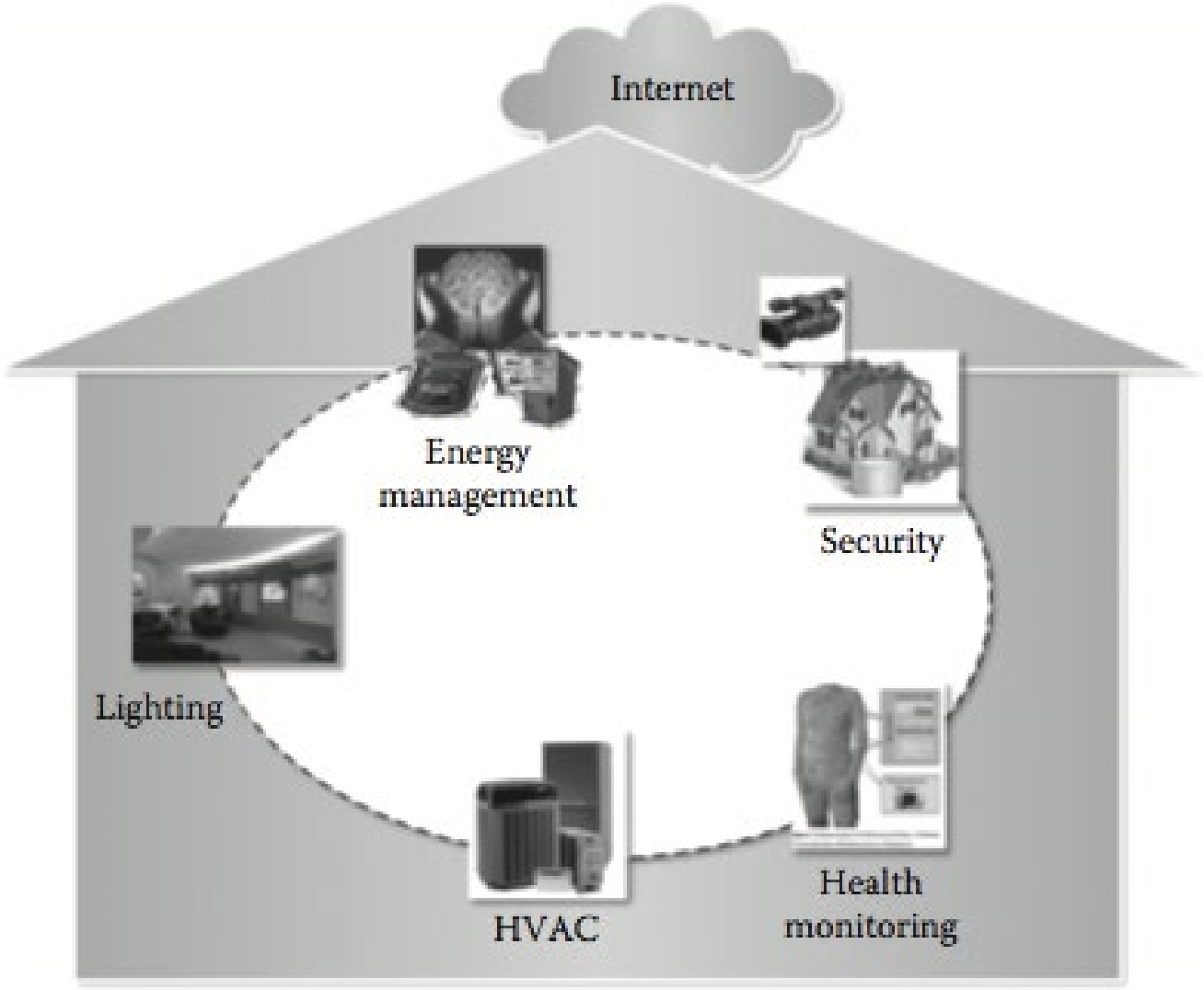
The passaging architecture for sensor and actuator data to cloud



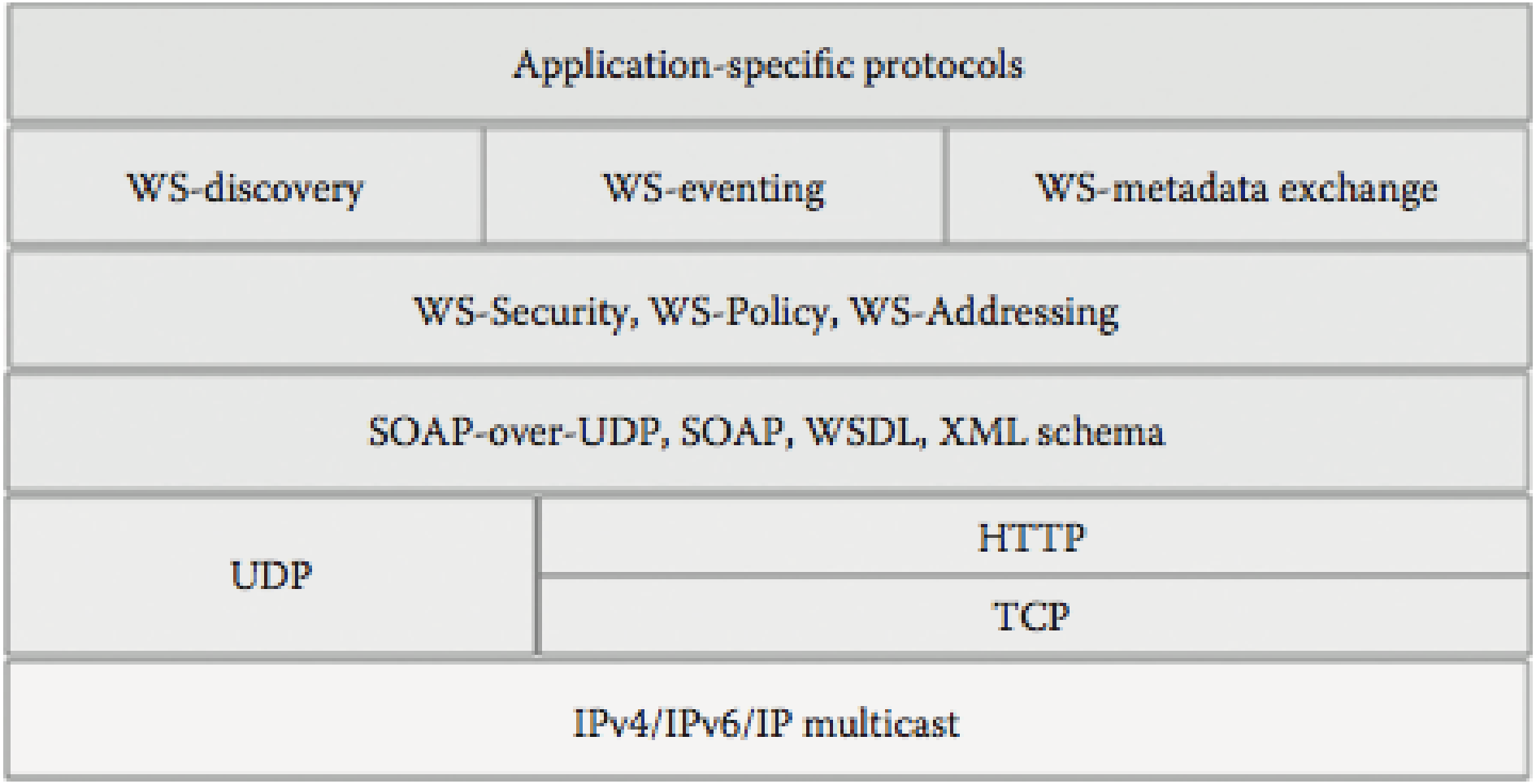
The layered architecture for sensor-to-cloud integration



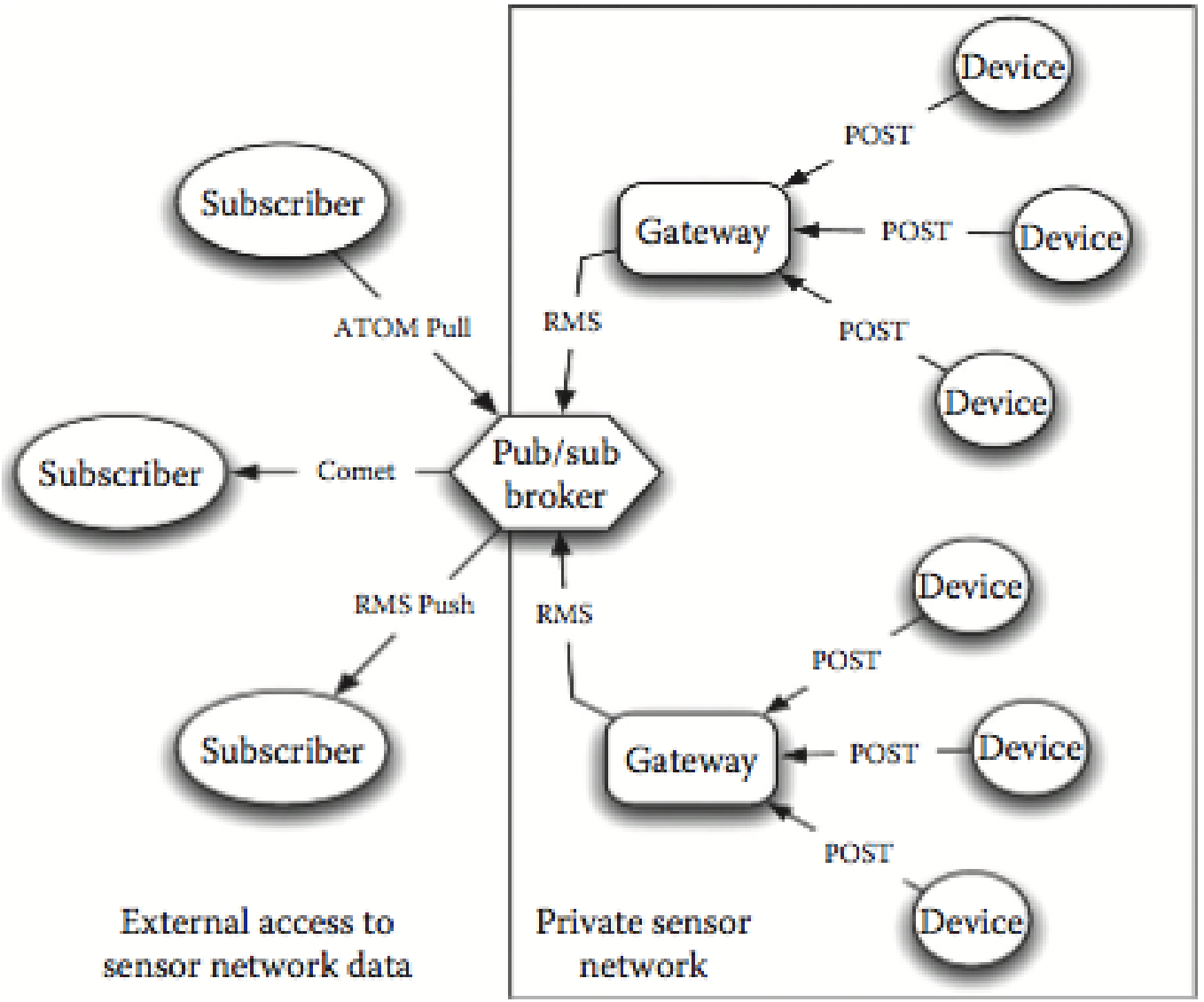
A smarter home use case.



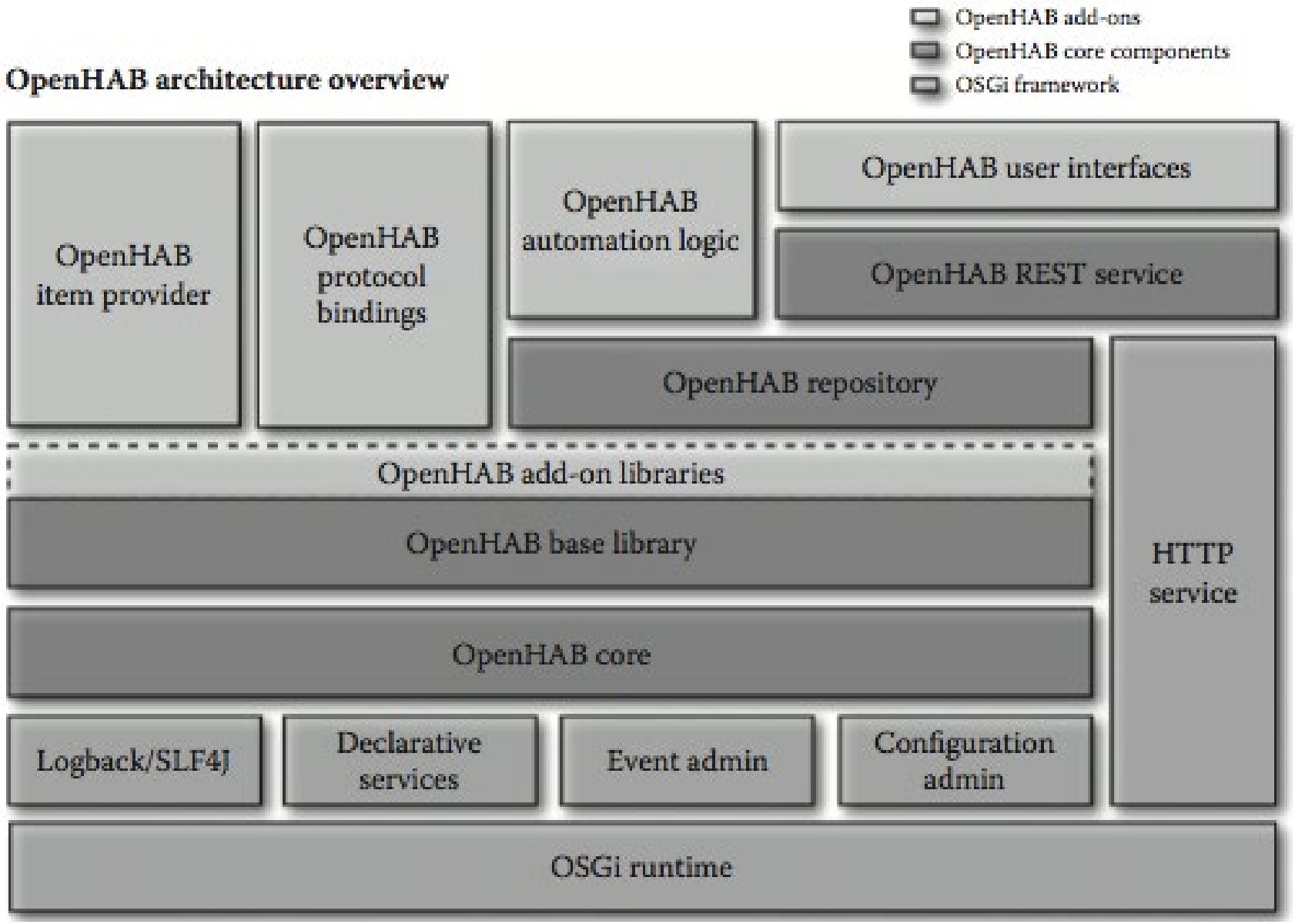
The DPWS OSI model.



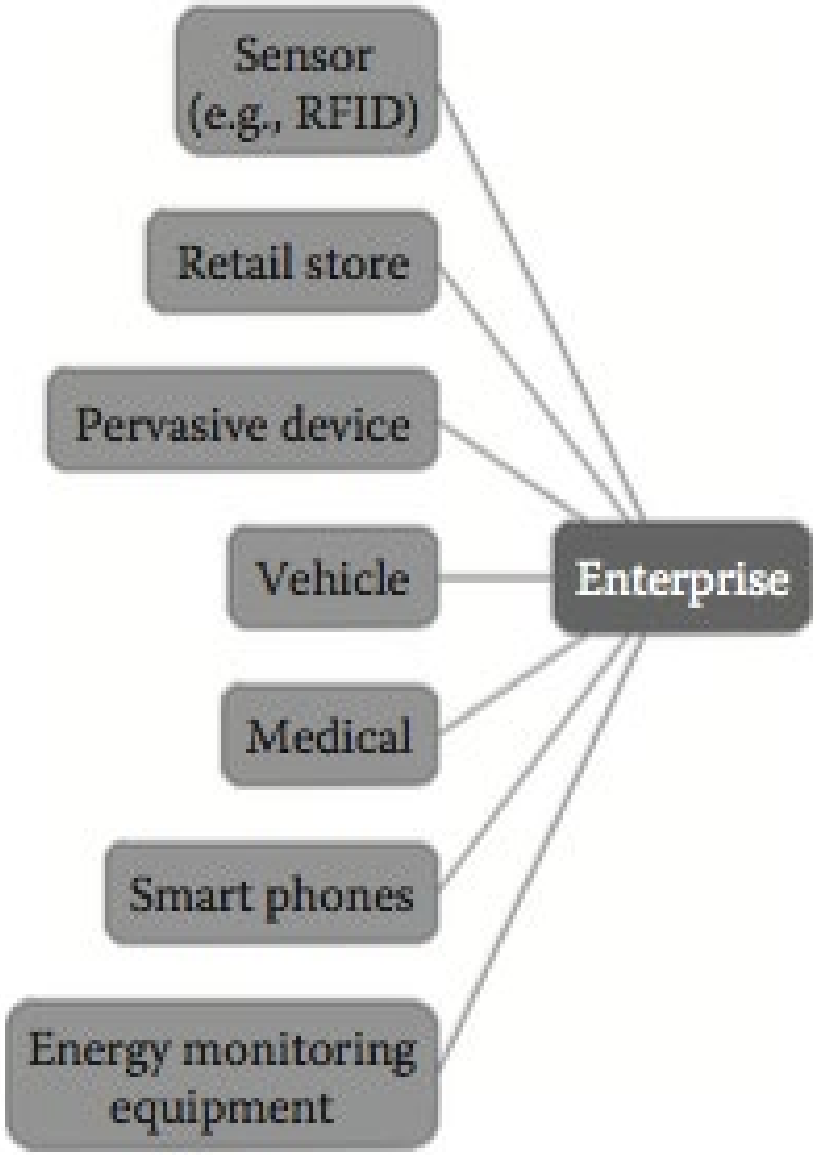
The role of pub/sub broker toward device integration.



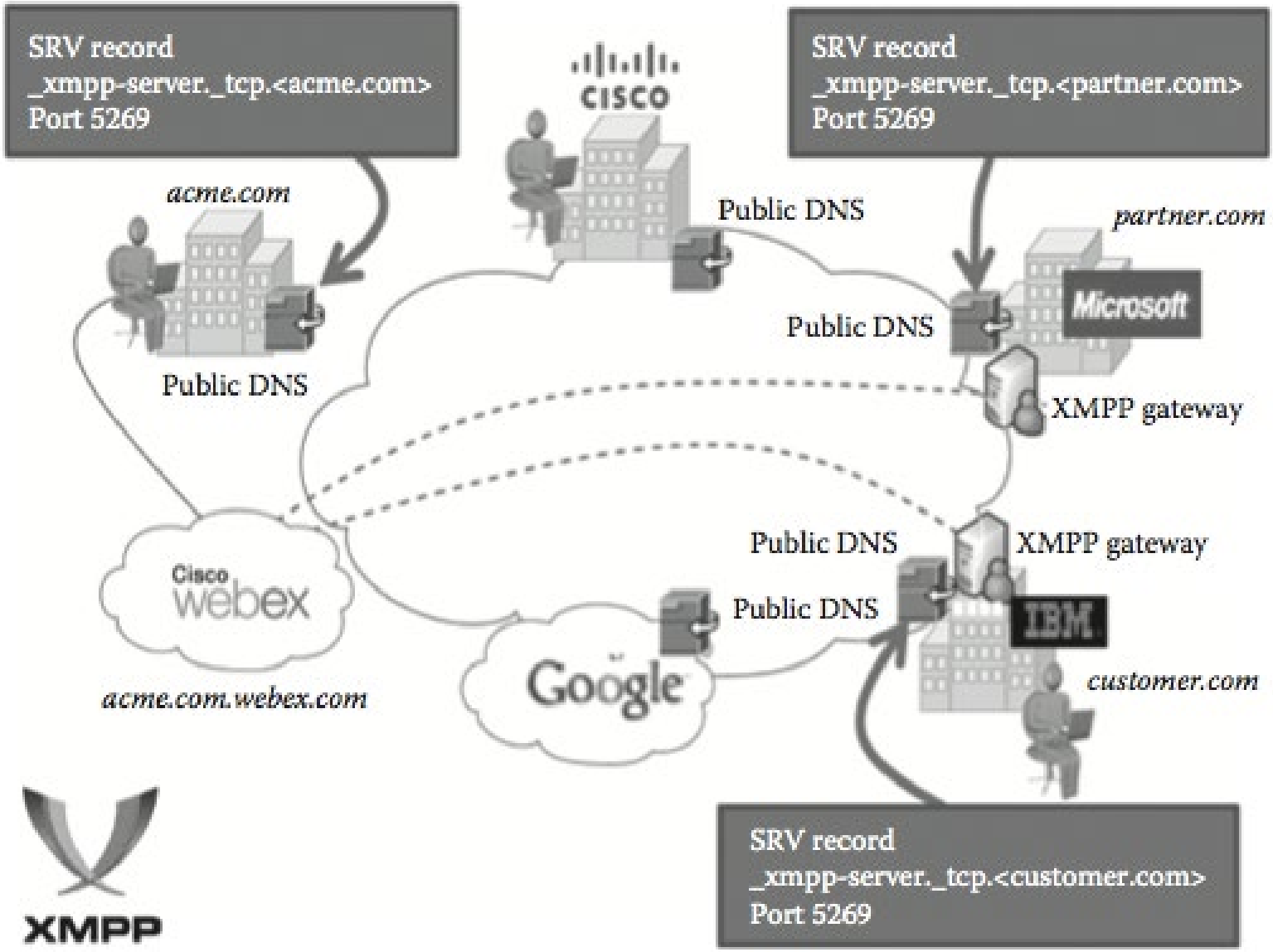
The openHAB reference architecture.



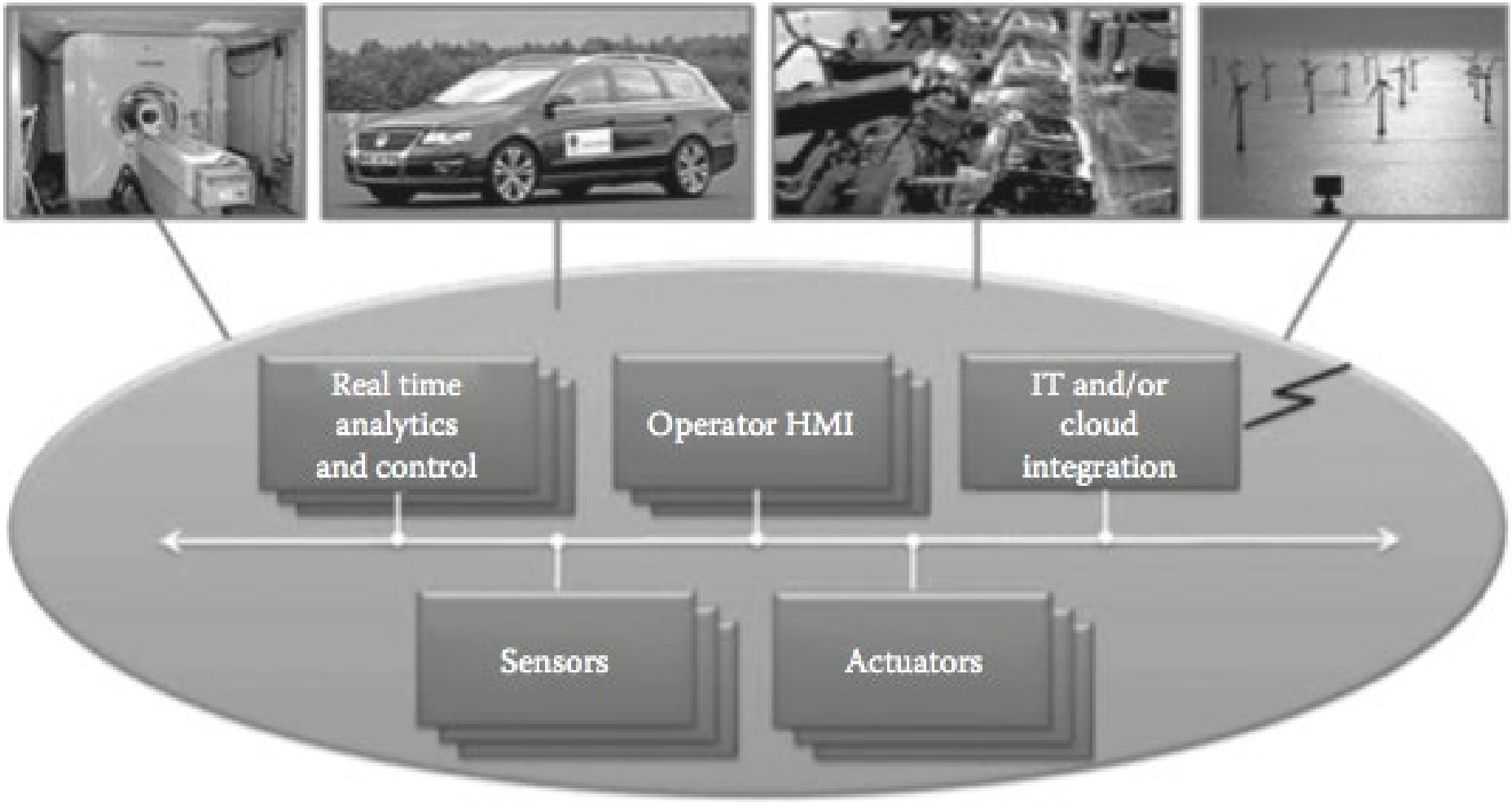
The MQTT-enabled device connectivity



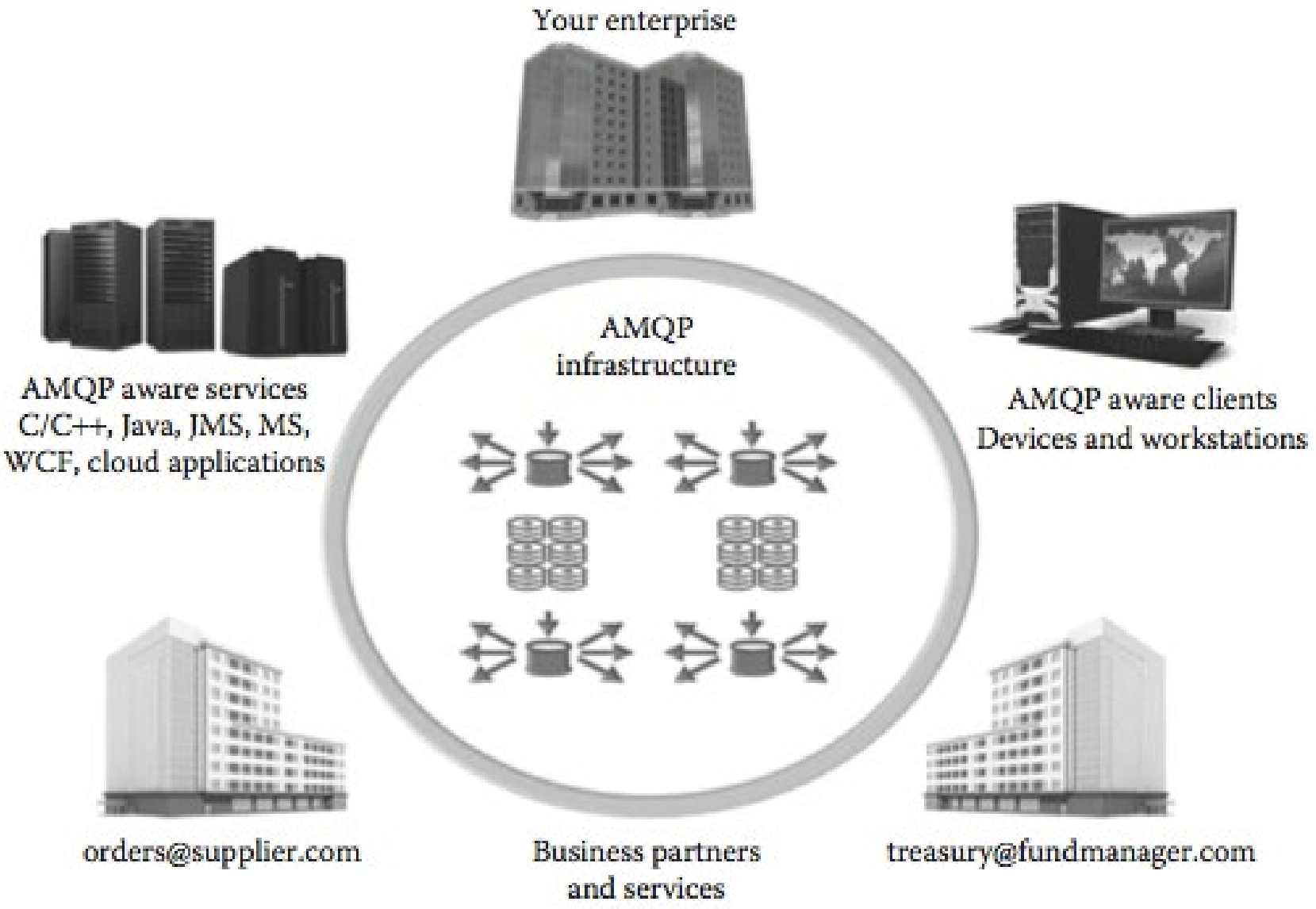
The device interactions scenario



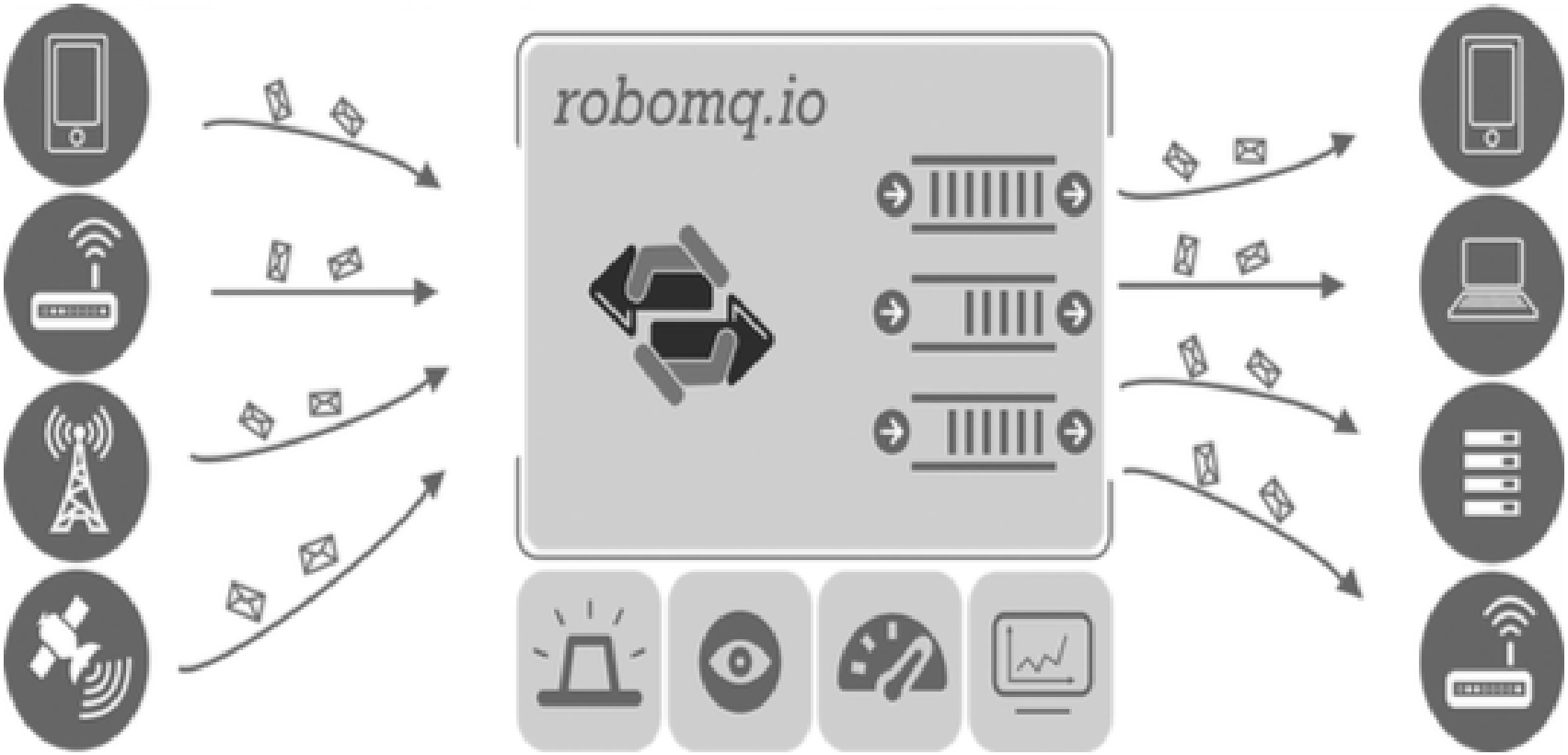
The device interactions scenario



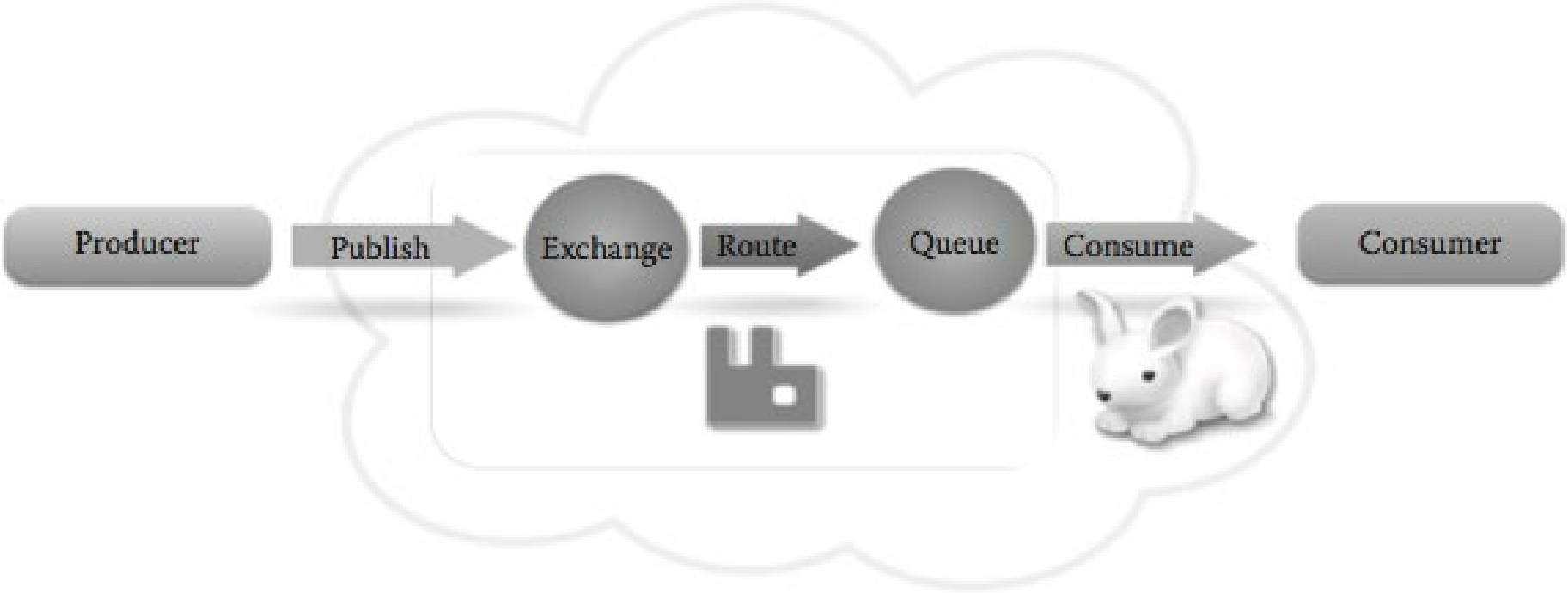
Internal and external interactions through AMQP.



The robomq's queuing solution for device interactions.



The end-to-end steps of cloud AMQP.



The comparison of HTTP and CoAP stacks