Fakultas Informatika
School of Computing
Telkom University

Internet of Things

MATERI 5:
IoT End-to-End Application

What we learn today ...

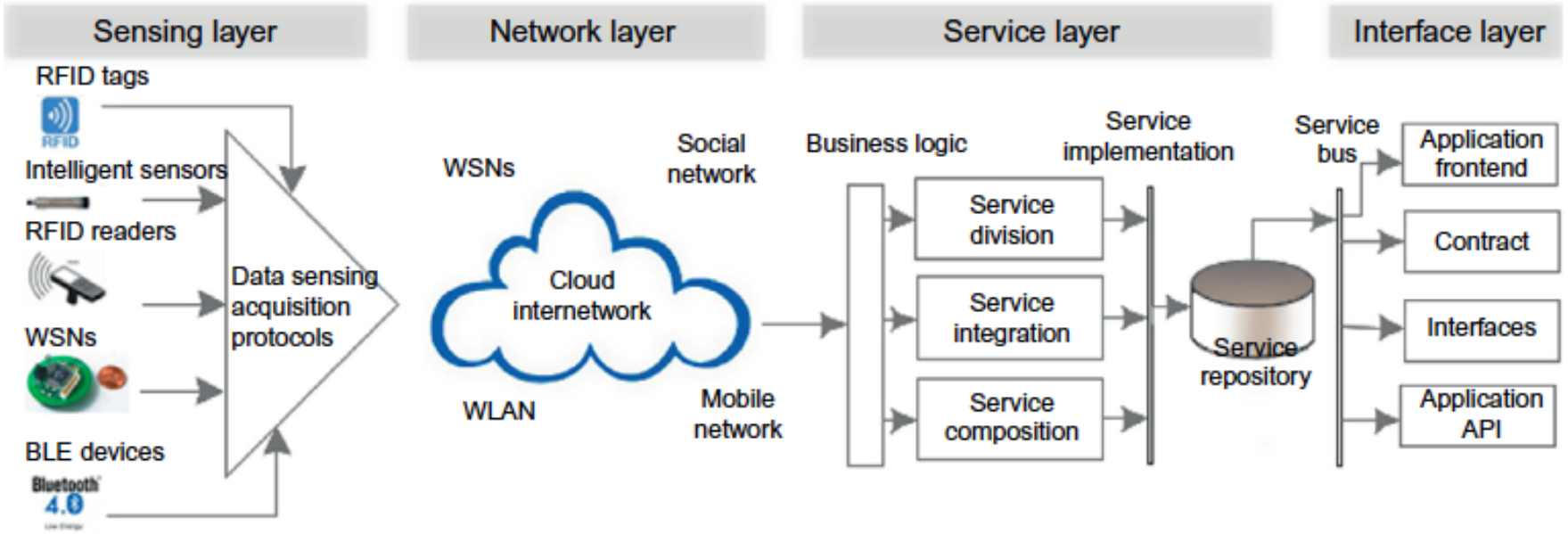
- Overview
- The Functional Blocks of an IoT Solution

Review Past Course and Discussion in Class

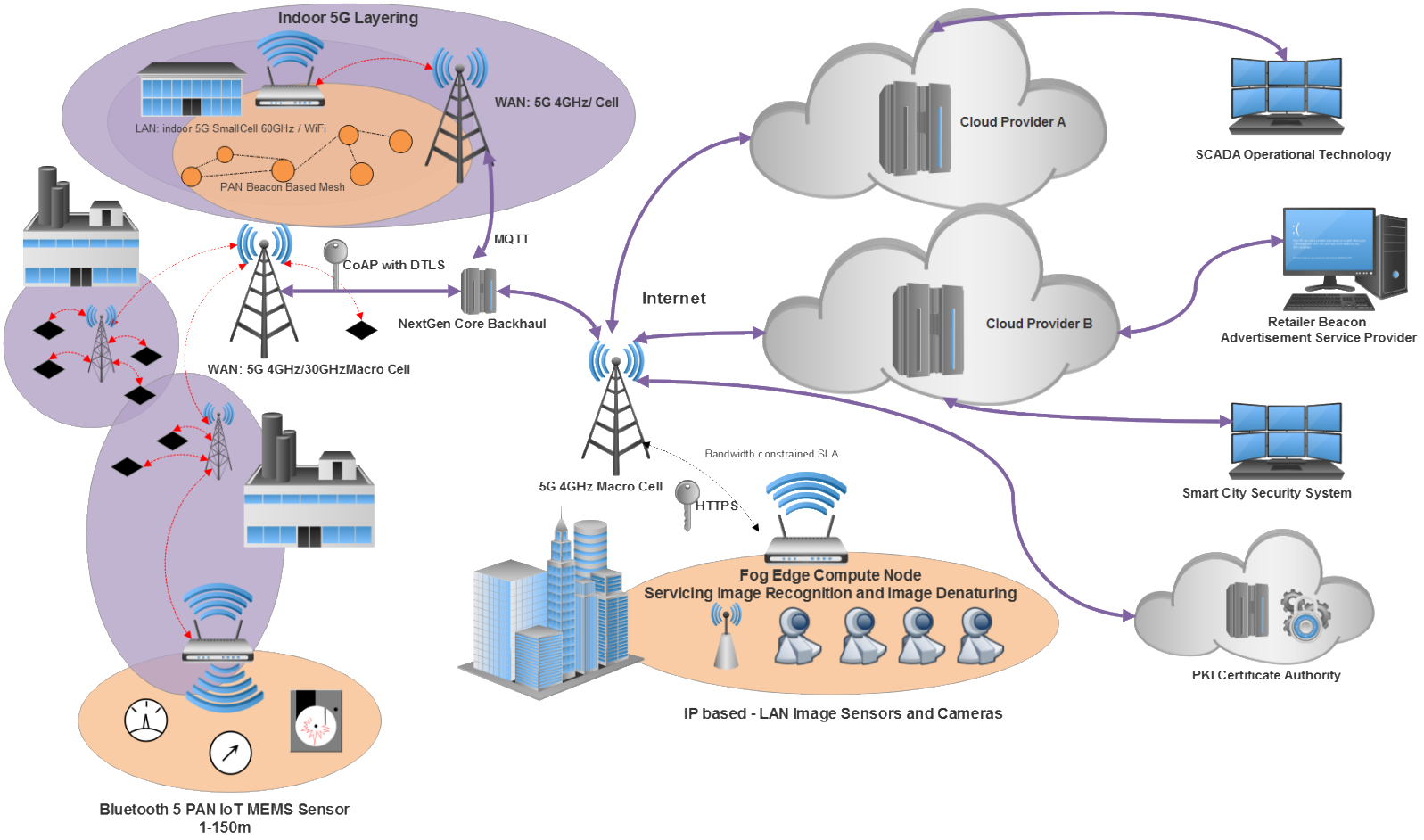
after that

Quiz Time !!!

Overview


Sensing layer
Network layer
Service layer
Interface layer
RFID tags
Intelligent sensors
RFID readers
WSNs
BLE devices
Data sensing acquisition protocols
WSNs
Social network
Cloud internetwork
WLAN
Mobile network
Business logic
Service division
Service integration
Service composition
Service implementation
Service repository
Service bus
Application frontend
Contract
Interfaces
Application API

Overview


Indoor 5G Layering
WAN: 5G 4GHz/ Cell
LAN: indoor 5G SmallCell 60GHz / WiFi
PAN Beacon Based Mesh
MQTT
CoAP with DTLS
NextGen Core Backhaul
WAN: 5G 4GHz/30GHzMacro Cell
Internet
Cloud Provider A
Cloud Provider B
SCADA Operational Technology
Retailer Beacon
Advertisement Service Provider
Smart City Security System
PKI Certificate Authority
5G 4GHz Macro Cell
Bandwidth constrained SLA
HTTPS
Fog Edge Compute Node
Servicing Image Recognition and Image Denaturing
IP based - LAN Image Sensors and Cameras
Bluetooth 5 PAN IoT MEMS Sensor
1-150m


ANY
QUESTIONS
?

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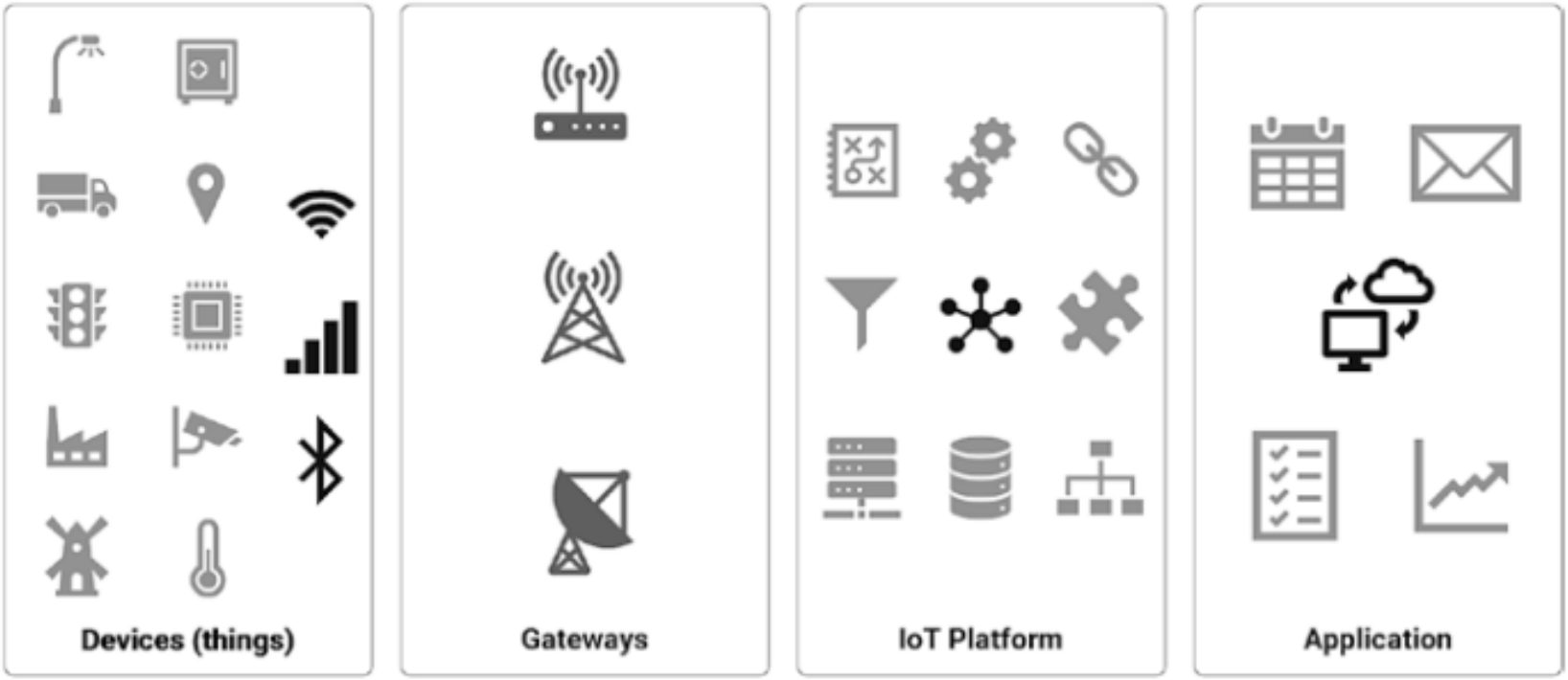
The Functional Blocks of an IoT Solution



The Functional Blocks of an IoT Solution

- **Devices** (a.k.a. “things”) are physical sensors and actuators. They measure various parameters and translate them into electrical or digital data.
- These sensors are either connected to the host devices (typical for legacy upgrades) or integrated into the host devices (modern).
- These devices are critical nodes of an IoT application and are required to deliver full-solution functionality by acting as inputs, outputs, or both.
- Typical examples of such devices are thermostats, intelligent mousetraps, connected refrigerators, and so forth.

The Functional Blocks of an IoT Solution

- **Gateways** are edge devices that can communicate with the upstream system in one of two ways: with or without a gateway.
- Some devices have the capability to communicate directly over Internet Protocol (IP) using various communication protocols, such as REST, MQTT, AMQP, CoAP, and so forth.
- These capabilities are usually a result of integrated communication modules, such as Wi-Fi or GSM chips, which enable a device to connect to network gateways, such as Wi-Fi routers and mobile towers, and communicate with the upstream layer directly.

The Functional Blocks of an IoT Solution

- However, not all devices are capable of direct Internet connectivity and do not have the necessary hardware built in.
- In these cases, they need to piggyback on some other device to help their data get pushed to the upstream layer.
- Typical examples of such gateway capabilities include GSM and RF, GSM and Bluetooth, Wi-Fi and Bluetooth, Wi-Fi and XBee, LoRaWAN and Ethernet, and so forth.
- In some cases, smartphones are used as gateways, which is more prominent with Bluetooth Low Energy (BLE) devices.

The Functional Blocks of an IoT Solution

- An **IoT platform** is the orchestrator of the whole IoT solution and is often hosted in the cloud.
- This block is responsible for communicating with downstream devices and ingesting large amounts of data at a very high speed.
- The platform is also responsible for storage of the data in a time series and structured format for further processing and analysis.
- Depending upon the sophistication built into it, a platform may support deep data analyses and other operations. However, the core of the IoT platform is as an orchestrator of the whole system.

The Functional Blocks of an IoT Solution

- In most scenarios, applications are the front face of the whole solution; it must be presented to the end user in a meaningful way.
- These applications are desktop based, mobile based, or both.
- Applications also enrich the data from the platform in various ways and present it to the users in a usable format.
- Additionally, these applications integrate with other systems and applications at the interface level and enable inter-application data exchange.
- A typical example of such an operation is inventory-tracking devices equipped with tracking mobile applications to the users, and the data fed to the ERP system for stock keeping.


ANY
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THANK YOU