Lesson 10

OSGi and Eclipse IoT for Devices, Gateways, Internet and Web/Cloud Services Software-Development

Software Development For Applications And Services

- Five levels for software development for applications and services in the IoT or M2M

- The software need are for the devices, local network, gateway, cloud web connectivity and web/cloud APIs.
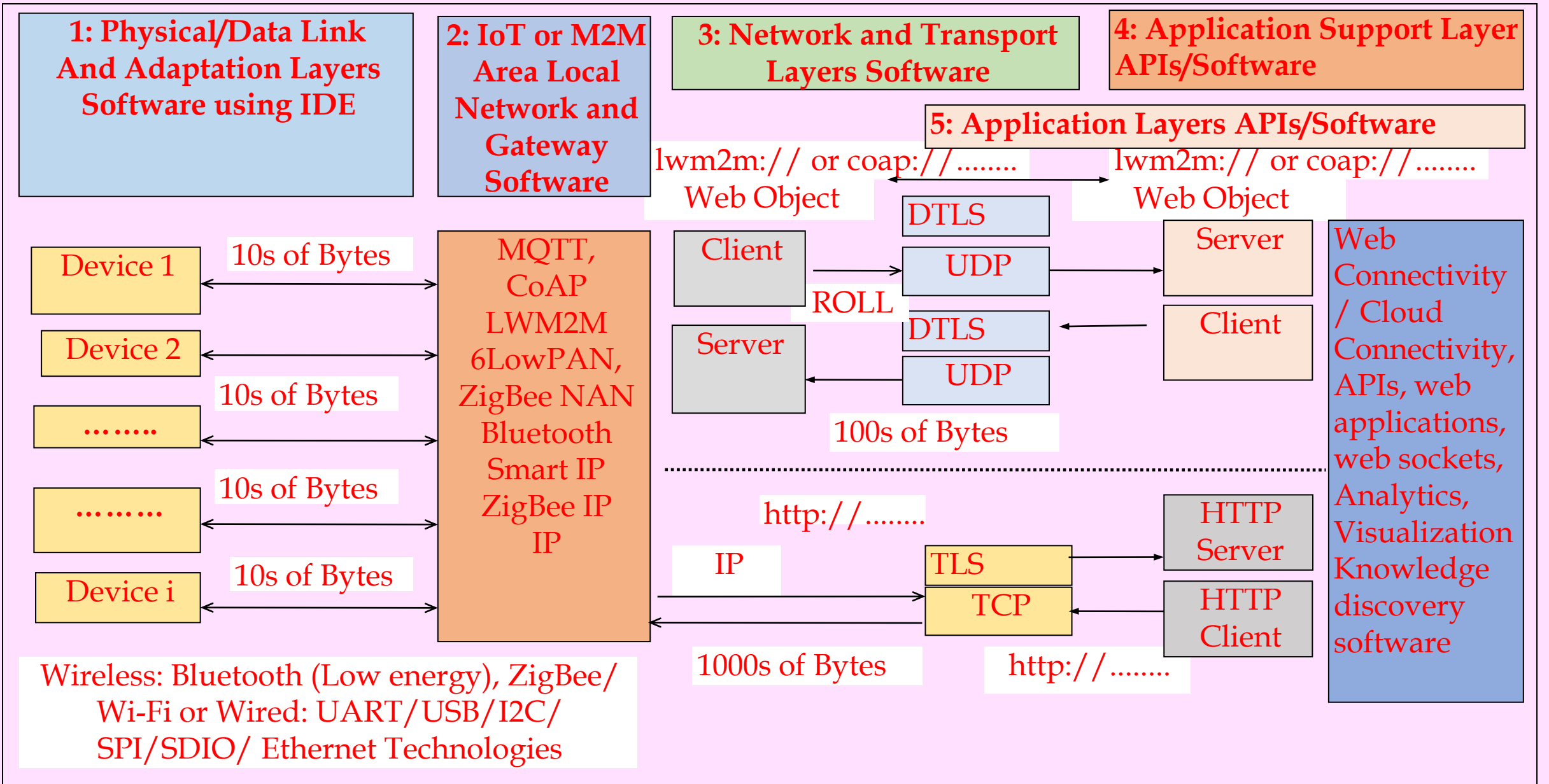
Fig. 9.1 Software development at five levels for Applications and Services for the IoT or M2M: the software for the devices, local network, gateway, cloud/web connectivity, and web/Cloud APIs

Eclipse IoT

- Software enable the development of software for the first, second and third levels

- The software enables the device gateways connectivity to Internet and cloud server

- Enables open source implementations of IoT protocols.

Eclipse IoT Implementable Protocols

- The include MQTT, CoAP, OMA-DM and OMA LWM2M and the Internet connectivity protocols

Use of Software Stack for an Intended Complete Solution

- A stack, a full set, consisting of frameworks, applications and services that are minimum needs for intended complete solution.

- Connected devices use variety of protocols; LWM2M, CoAP, MQTT, and methods for connecting to web

- Web communication uses the Gateway, SOAP, REST, RESTful HTTP and WebSockets functions.

OSGi

- Open Services Gateway initiative (OSGi) initiative (now OSGi Alliance) provides and maintains open standard specifications

- OSGi describes the specification of management of Java packages/classes in a modular system

- Enables the implementation of a complete and dynamic component-model

OSGi Additional Specifications given

- For service platforms in Java language

- The component or application life-cycle management uses a set of APIs

- When a service registers, then service bundles detect the deletion or addition of new services and get adapted.

Component and Bundles

- A component means software which can reuse a core set of frameworks and services for provisioning the solutions

- The components and applications deploy in the form of bundles

- Can be remotely installed, started, stopped, updated, and uninstalled without requiring system reboot

Additional OSGi service functions

- Now evolved specifications for beyond the gateways
- Eventing
- configuration management
- Clock
- Crypto (AES, base64, SHA-1)
- Geolocation
- Data and cloud services

Eclipse IDE and Eclipse open IoT stack

- IDE, An application using OSGi specifications
- Stack is a set of Java frameworks, protocols, development tools and OSGi services

Features of IoT Stack

- Provides open source specifications which are as per open OSGi standard specifications

- Provisions for simpler open source implementations, and programs, services and bundles development using the open source Java frameworks and services

Features of IoT Stack

- Consists of the components and frameworks for the IoT solutions

- The Stack taking care of the complexity of creating IoT solutions and enables fast development of the Solutions

- Running the codes in JVM or Eclipse Concierge (a lightweight implementation of OSGi runtime)

Chapter-9 L10: "Internet of Things " , Raj Kamal,
Publs.: McGraw-Hill Education

Connectivity and Interoperability Features of IoT Stack

- Enables usages of protocol functions provided in lightweight M2M (OMA M2M standard), MQTT (OASIS IoT standard), CoAP (IETF IoT standard) and standard network protocols

Features of IoT Stack

- Provisions for new solutions for devices connectivity to the Internet

- Remote management and Application management functions and APIs for using server or cloud provided functions

- Support of large number of institutions, including Cisco and IBM

Eclipse implementations and frameworks included in Eclipse IoT stack

- Eclipse Pi4J

- Eclipse Koneki

- Eclipse Mihini

- Eclipse Krikkit

Summary

We learnt

- Need of five levels for software development for applications and services in the IoT or M2M

- Software need are for the devices, local network, gateway, cloud web connectivity and web/cloud APIs

- OSGi specifications, components and bundles

Summary

We learnt

- Features of Eclipse IoT stack

- Four Eclipse implementations and frameworks included in Eclipse IoT stack

End of Lesson 10 on
OSGi and Eclipse IoT for Devices, Gateways, Internet and Web/Cloud Services Software-Development