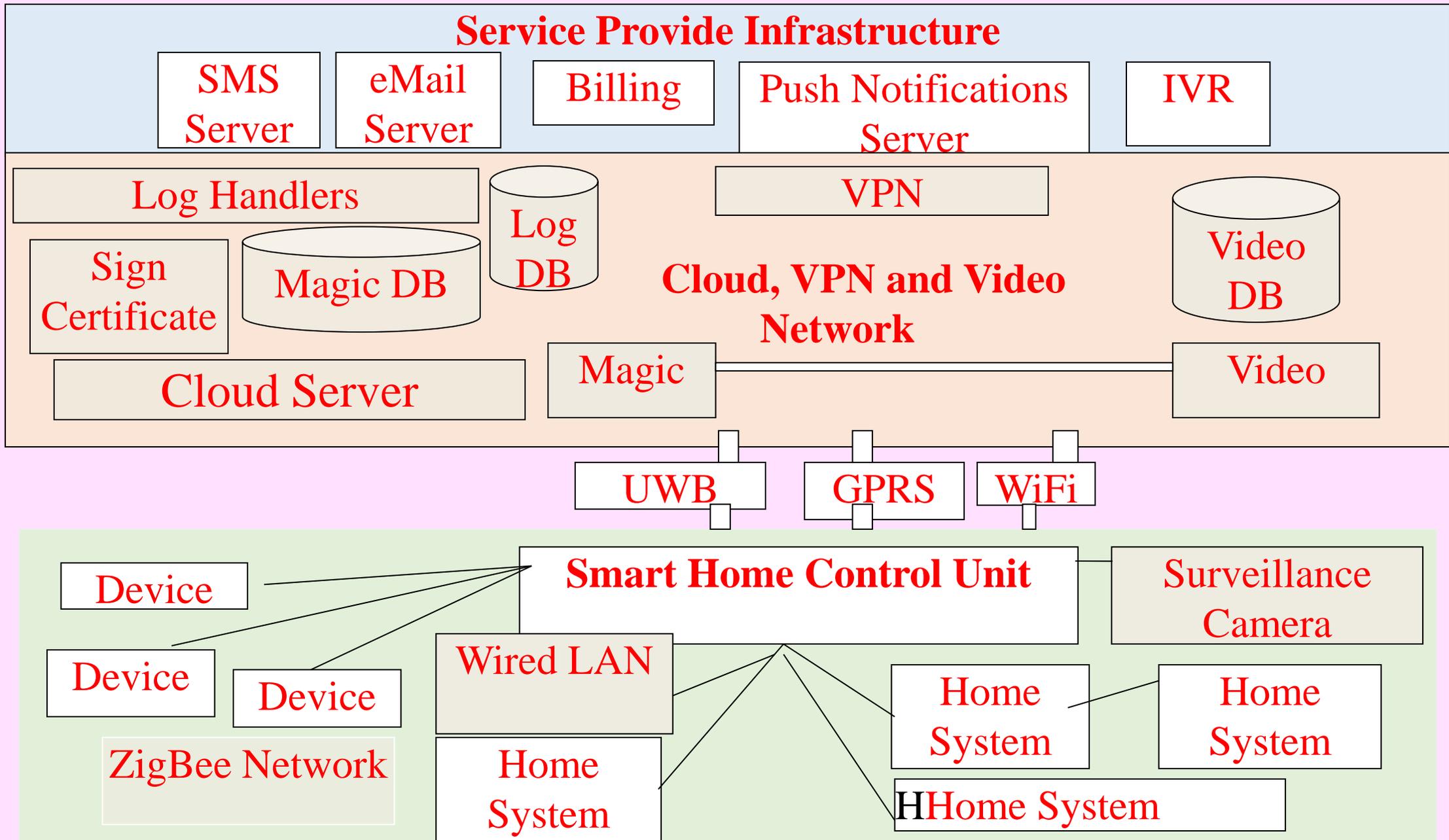# Lesson 8
Internet Connected Smart Home Services And Monitoring

Internet Connected Smart Home Services And Monitoring

- Smart home services

- Home lighting control

- Control and monitoring of appliances

- Security and intrusion detection,

- Video-surveillance, access control and security alerts

- Wi-Fi

- Control and monitoring deploying Internet and the remote cloud access

An architectural view

- Cloud (named Magic) based IoT platform for smart home

Service Provide Infrastructure

| SMS Server | eMail Server | Billing | Push Notifications Server | IVR |

Cloud, VPN and Video Network

Log Handlers

Sign Certificate

Magic DB

Log DB

VPN

Video DB

Cloud Server

Magic

Video

| UWB | GPRS | WiFi |

Smart Home Control Unit

Device

Device

Device

ZigBee Network

Wired LAN

Home System

Surveillance Camera

Home System

Home System

HHome System

An architectural view Abbreviations used

- VPN: Virtual Private Network

- DB: Database

- IVR: Interactive Voice Response System,

- UWB: Ultra Wideband

Smart-home Devices Development and Deployment using an Open-source Software

- All smart home devices communicate using openHAB (Home Automation Bus)

- Developer deploys Java and OSGi services

- GUI clients designed and can be used as downloads from git.

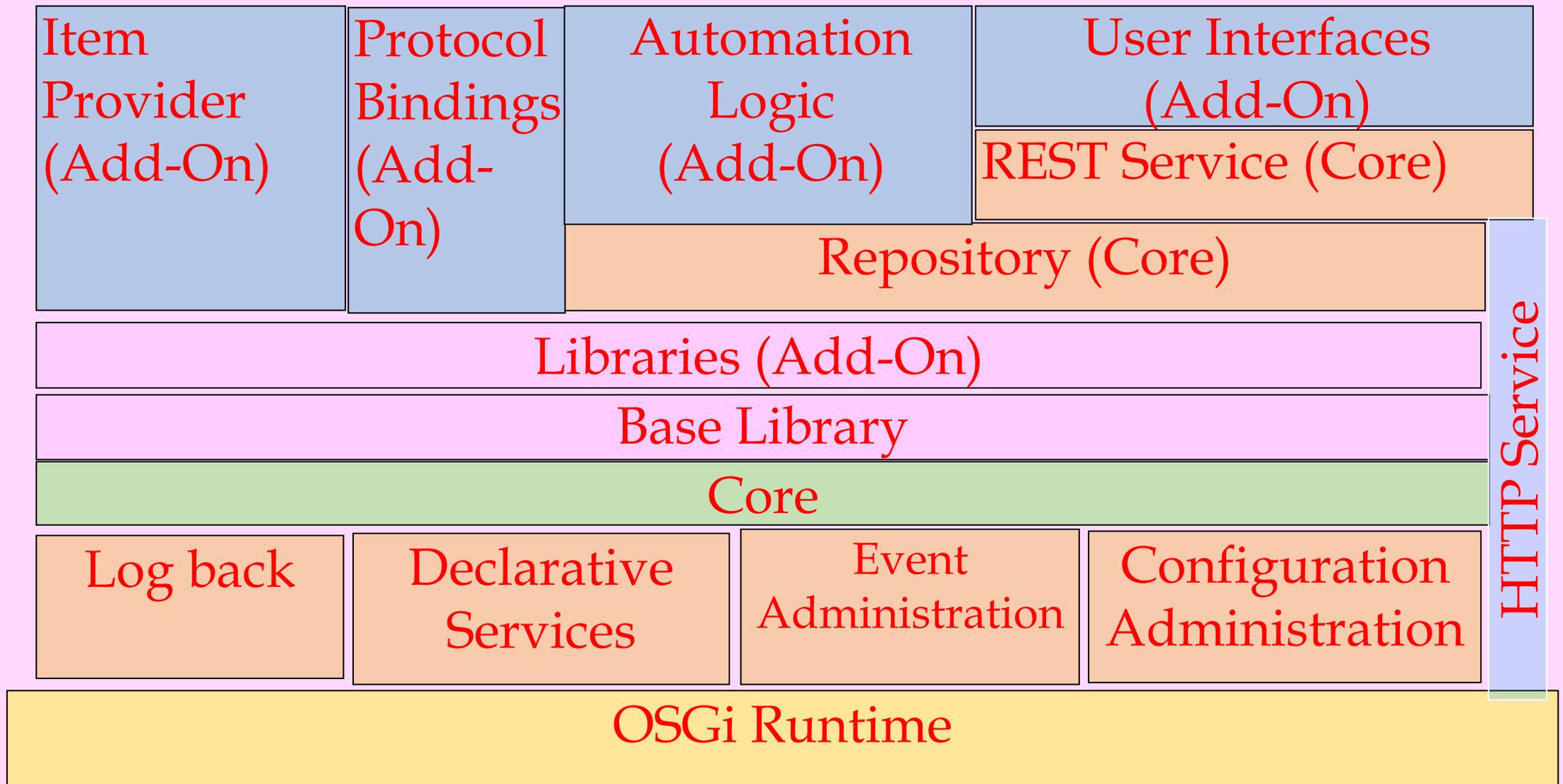- IDE, guidelines, bindings for code development provided for openHAB

Fig. 12.7 Architectural layers in openHAB development environment

OpenHAB Architecture

1. Core openHAB objects—REST service and repository; base library

2. openHAB add-on objects—Item provider, protocol bindings, automation logics, user interfaces and libraries

3. OSGi framework services—Configuration-administration, event-administration service, declarative services, log-back, Runtime and HTTP services

OpenHAB Architecture

4. OpenHAB deploys event administration service of OSGi with pub/sub mode.

5. A stateful repository for querying and for use by automation logics

OpenHAB Stateful Reprository

- Some functions stateless, does not depend on previous action(s)

- Remaining actions stateful, dependent on previous chain of actions.

- State of items in repository as per the

- actions

Smart-home Using an Open-source Cloud Platform and Services

- Accompanying Cloud platform my.openHAB

- Provides communication between that with the cloud.

- my.openHAB cloud connector also provides REST

- Cloud based services, such as IFTTT

Smart-home Services an Open-source IFTTT

- The operating system versions Android 4.1 onwards and iOS7onwards for IFTTT
- Enables the services such smart home controls and automation using mobile phones or tablets

Design Steps

1. Abstraction

2. Reference Model

3. Identifying Requirements of Device and Gateway Domain

4. Identifying Requirements of Network Sub-domain

Reference Model

- Two domains and their high-level service capabilities in the surveillance system IoT architecture reference model

(1) Device and gateway domain

(2) Applications and network domain

Device and Gateway Domain — **Applications and Network Domain**

Control of Home Devices

Remote Control of Internet connected Home Devices

Smart Lights $1, ..., j$

Proximity Sensors $1, ..., j$

Intrusion Sensors $1, ..., k$

Appliances $1, ..., l$

User Interfaces

Protocol Bindings

Item Provider

Automation Logic

Events

Event Messages Router

openHAB

OSGi Frame-work

HTTP Service

my.openHAB.org

Event Message Routing

Event Processing

Home Event Messages

intrusion data Files

IFTTT

Applets (Trigger and Actions)

Analytics

Applic-ations/ Services

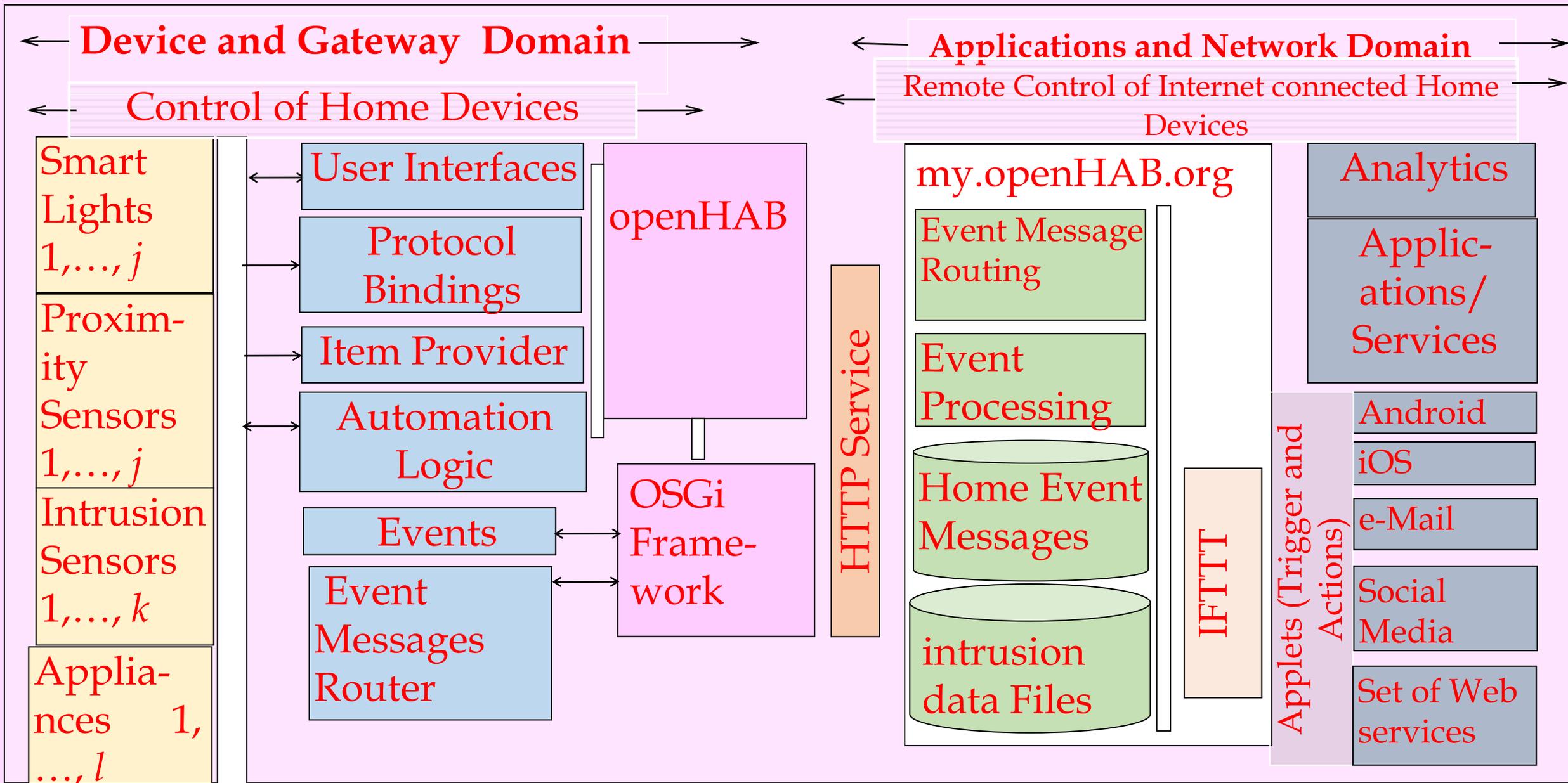Android

iOS

e-Mail

Social Media

Set of Web services

Fig. 12.8   Data flow diagram and domain architecture reference model for the Home Automation lighting, appliances and intrusion monitoring services <Style Element>

Device and Gateway Domain capabilities Example

- Assume *j* lighting devices, each with a proximity sensor.

- Automation logic provisioning that if no change found in proximity due to present of person (s) then the devices switch off

Device and Gateway Domain capabilities Example

- Assume k intrusion sensors and l appliances

- Automation logic provisioning that on intrusion, communicate a trigger (s) to a local or remote web-service

- Communicate using configuration setting at the configuration administration service of OSGi framework

Application and Network Domain Capabilities

- Deploys the applications, services and high-level capabilities.

openHAB service

- Integration-hub between such devices and bindings between

- different protocols used for networking the home devices, OSGi and HTTP service

- Usually just one instance of openHAB run on a some central coordinator (computer) at home

openHAB service

- Event Administration service of OSGi service is used for remote service. Several

- distributed openHAB instances can connect and deploy the event Bus.

Devices Hardware Design components

- 24 × 7 active digital video cameras for intrusion detection

- Number of spatially-distributed embedded proximity sensors,

- Home premises sensors

- Data processing for detection of suspicious activities

- Video-processing and filtering hardware

Devices Hardware Design components

- Software design modules at the device domain are software components for embedded deviced, distributed proximity sensors data processing; filtering and extraction of events;

- Communication on the events, and media server gateway for communication of events.

Code Development Environment, Development, Debugging and Deployment

- IDE
- OSGi

Requirements of Network Sub-domain

- Network hardware and software design components
- Wi-Fi/WiMax access network,
- Core IP network
- Server

Requirements of Network Sub-domain

- Network management functions to ensure secure communication network between device and gateway domain and applications/services.

- The openHAB cloud connector connects the local openHAB runtime to a remote openHAB cloud, such as my.openHAB, instance from openHAB foundation

Summary

We learnt

- Smart home services enable home lighting control, control and monitoring of appliances, security, intrusion detection, video-surveillance, access control and security alerts, Wi-Fi, Internet, and the remote cloud access for the control and monitoring

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- Smart home services enable home lighting control, control and monitoring of appliances, security, intrusion detection, video-surveillance, access control and security alerts, Wi-Fi, Internet, and the remote cloud access for the control and monitoring

Summary

We learnt

- An open source openHAB platform

- Neutral to hardware and interfacing protocols. For example, a security camera device

- The automation logics can connect different

- systems.

- A cloud platform is my.openHAB. The my.openHAB cloud connector also includes REST and cloud based services

Summary

We learnt

- IFTTT service enables a developer to create a sequential set of conditional (If This Then That) statements, called applets, which trigger actions by change to other web-service, such as Facebook,

- Twitter, Gmail. APIs of the application control the actions using the triggers

End of Lesson 8 on
Internet Connected Smart Home Services And Monitoring