Lesson 4
Case Study: Connected ATM Premises Monitoring Project

Premises Monitoring

- Need to monitor the premises remotely

- Banks, bank-ATM machines, offices, stores, company's business places, residences, hotels and others

- Internet enable premises monitoring

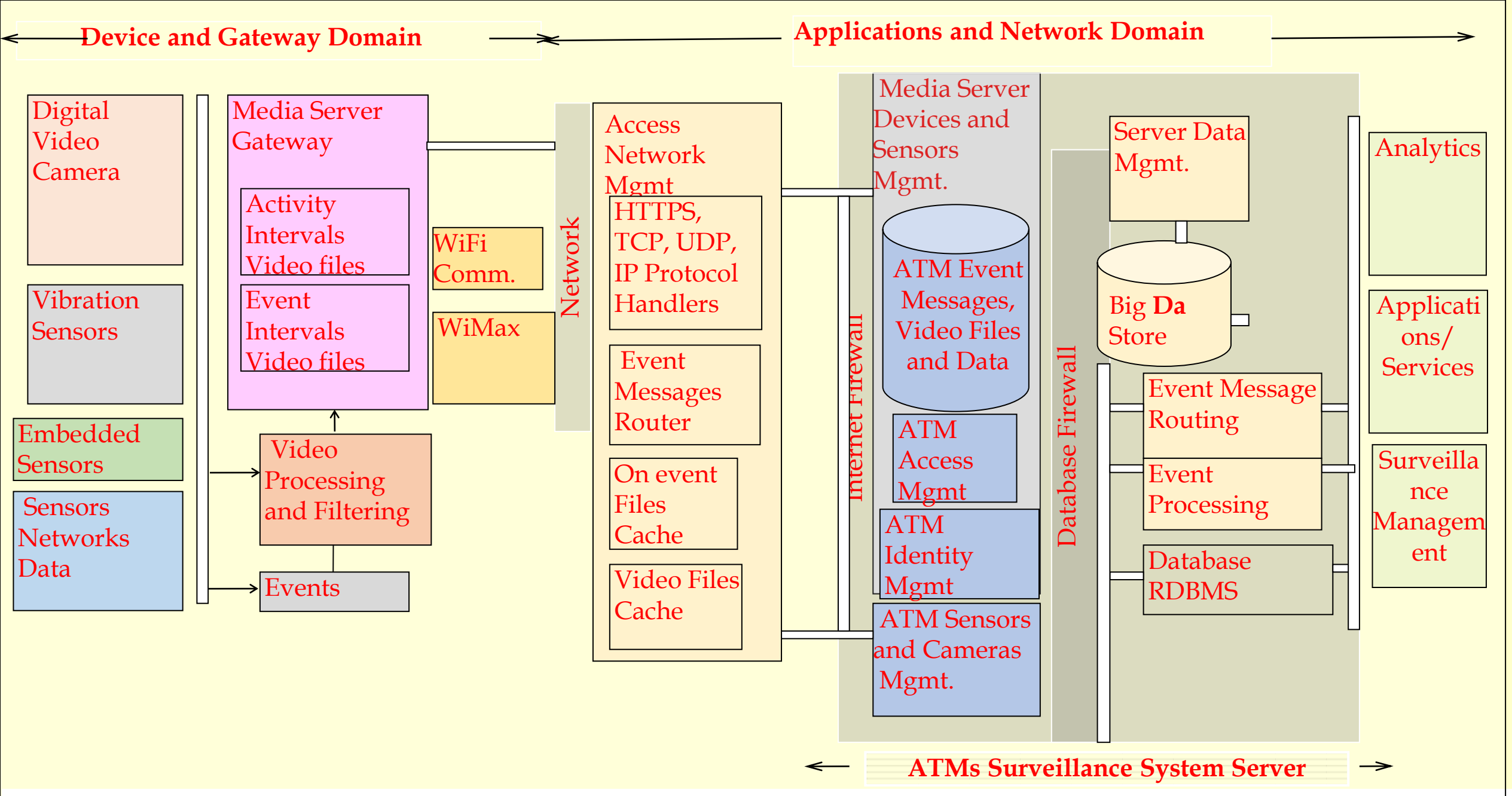- Using sensors, digital cameras and other devices connected to the Internet

Device and Gateway Domain

Applications and Network Domain

Digital Video Camera

Media Server Gateway
- Activity Intervals Video files
- Event Intervals Video files

Vibration Sensors

WiFi Comm.

WiMax

Embedded Sensors

Sensors Networks Data

Video Processing and Filtering

Events

Network

Access Network Mgmt
- HTTPS, TCP, UDP, IP Protocol Handlers
- Event Messages Router
- On event Files Cache
- Video Files Cache

Internet Firewall

Media Server Devices and Sensors Mgmt.

ATM Event Messages, Video Files and Data

ATM Access Mgmt

ATM Identity Mgmt

ATM Sensors and Cameras Mgmt.

Database Firewall

Server Data Mgmt.

Big Da Store

Event Message Routing

Event Processing

Database RDBMS

Analytics

Applications/ Services

Surveillance Management

ATMs Surveillance System Server

Fig. 12.2 Data flow diagram and Domain architecture for ATMs premises monitoring and surveillance system Management

ATM Premises Monitoring System

- Number of subsystems

- System design process divides into number of steps

Design Steps

1. Abstraction

2. Reference Model

3. Identifying Requirements of Device and Gateway Domain

4. Identifying Requirements of Network Sub-domain

Design Steps

5. Design Implementation of Device and Gateway Domain Hardware and Software

6. Design Implementation of Application and Network Domain Software

7. Testing and Validation

Abstraction

- Abstraction of Suspicious activity detection
- As s a system *event for the* activities that endangers the physical safety of the machine and its cash
- Triggers, messages and data on the premise events
- Communicate in real time using Internet
- Abstracts the video clips recorded from the camera as data files that communicate to data store

Abstraction

- A software developer abstracts the hardware as source of events and data files

- Abstracts software as communicating process for the triggers, messages, data and data files

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 capabilities

- Digital video camera data

- Spatially arranged vibration sensors data

- Enriches the data into the events, data files

- Processes the events generated

- Data filtering, time stamping and encrypting

- Media Server Gateway communicating the enriched data deploying the TCP/IP

Applications and Network Domain Capabilities

- Surveillance management functions using the accessed data

- Data storage and organising functions for the video files

- Initiation of actions on detection of security breaches at the ATM

Device and Gateway Domain Requirements

- 24 × 7 active digital video cameras;

- Number of spatially-distributed embedded vibration-sensors at the ATM premises

- Sensors data processing for detection of suspicious activities;

- Video-processing and filtering

Device and Gateway Domain Requirements

- Hardware for communication network connectivity for the events

- On the event, real time videos;

- Connectivity for the large voluminous data

Requirements of Hardware at Network Sub-domain

- Network hardware and software design components
- Wi-Fi/WiMax access network
- Core IP network
- Surveillance system server

Requirements of Software at Network Sub-domain

- Network management functions
- Secure communication network between device and gateway domain and applications/services

Design Implementation of Device and Gateway Domain Hardware and Software

- Raspberry Pi 2 model B+ (RPi 2) embedded real time systems for 24 × 7 active digital video cameras

- RPi with Spatially-distributed embedded vibration sensors

- Sensors data processing

- Video-processing and filtering; and

- communication network

Eclipse IoT stack based End-to-end IoT solutions

- OSGi

- Eclipse Mihini

- Eclipse.Pi4J for using the framework based on WiringPi and PiFace, Gertboard and other shields,

- Eclipse Koneki functions

- Eclipse Krikkit rules system for configuring the device platforms,

Eclipse Kura for the Raspberry Pi

- Kura development environment

- Gateway Services

- Cloud connectivity

- Management of device

- Network configuration and applications

Testing and Validation

- Laboratory environment using sensors and cameras
- Implanted hardware/software of both domains need thorough test

Summary

We learnt

- Premises monitoring deploying a surveillance system
- Communicating source of events, triggers, messages, data and data files
- Communication between the ATMs and bank server
- Device and Gateway, and Network and Applications domains

Summary

We learnt

- Design process steps

- Abstraction

- Design of hardware and software in a reference model

- Identifying requirements of embedded hardware and software modules for the domains

Summary

We learnt

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• Design implementation for the domains hardware and software

• Testing and validation

End of Lesson 4 on
Case Study: Connected ATM Premises Monitoring Project