SNS COLLEGE OF TECHNOLOGY

Coimbatore – 35

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19ECT311 / Wireless Communication

III ECE/ VI SEMESTER

Unit III - **CELLULAR NETWORKS**

Topic : M2M Communication

Introduction

- In M2M communication, objects can talk to each other without human intervention.
- Today there is insufficient integration of real physical world with virtual world (computers, servers, etc).
- Today Human translates physical world information in to digital world information to use computers.

What is m2m?

- What is M2M?M2M refers to technologies that allow both wireless and wired systems to communicate with other devices of the same type.
- 4 basic stages that are common to just about every M2M application

  1) Collection of data

  2) Transmission of selected data through a communication network

  3) Assessment of the data

  4) Response to the available information

M2m components

The main components of an M2M system include:

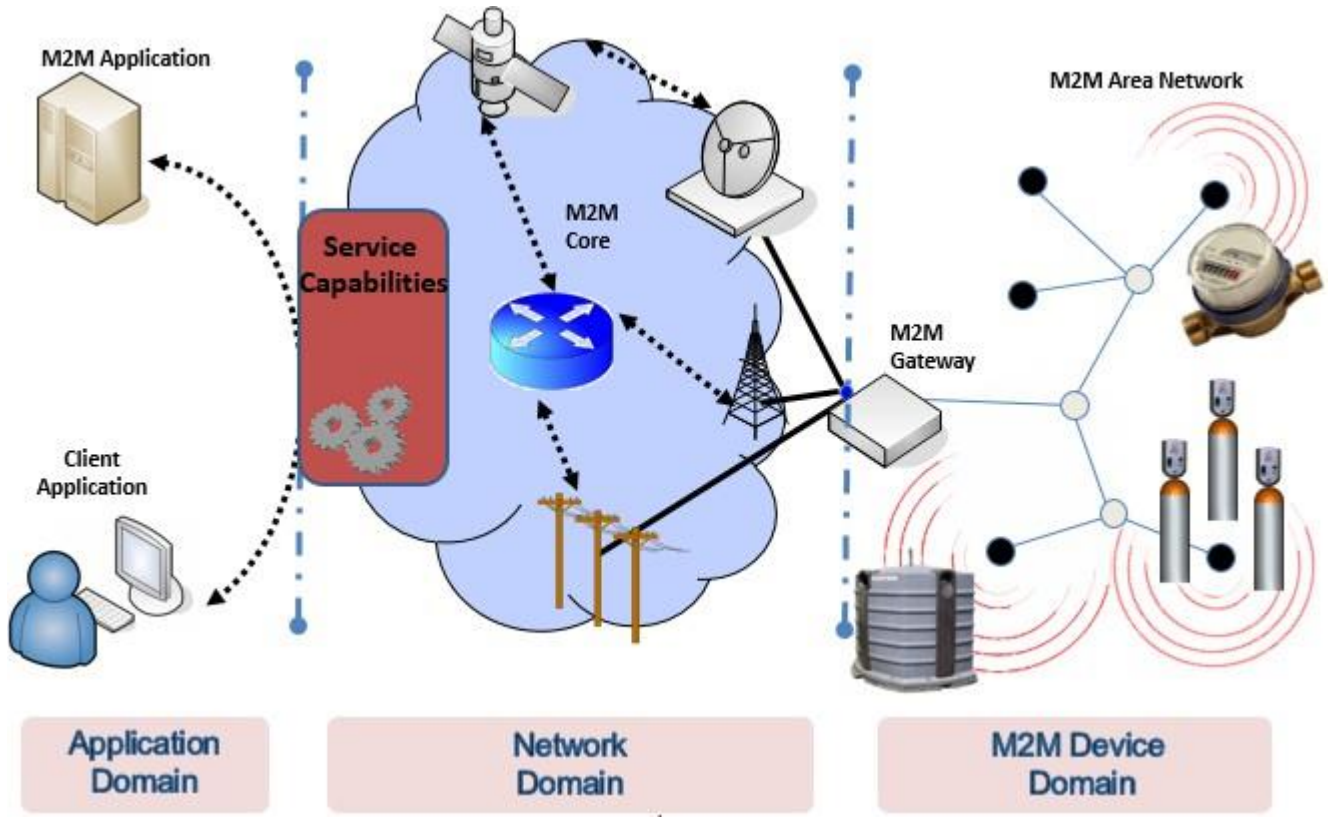
- Sensors (e.g. RFID sensor)
- Wireless network or cellular communications link
- Internet connected computer
- System software for data processing

Engineers place sensors in strategic locations, where they can record and send data in real-time to a wireless network which is connected to the internet. They can use specialized software to monitor the entire process, analyzing the incoming data.

Working

- Machines in a network make up an M2M network, which is similar to a LAN or WAN network.
- These devices send information they collect back to other devices on the network. Users, or any other intelligent control unit, can assess the network and issue appropriate instructions to network connected devices.
- M2M technology relies on software-controlled communication between machines and devices. Special applications translate information into data relevant to the end user.
- This data is analyzed and monitored according to device specifications. Certain data can trigger automated actions, while manual actions can be triggered by machines and users from anywhere, due to the remote nature of their communication.

M2m architecture



M2M DEVICE DOMAIN

- **In this domain, an M2M area network** is formed by the collaboration of a large number of devices (e.g. sensors, actuators, and smart meters) and gateways (data aggregation points/concentrators).
- **These devices** collect the sensory data from different parts in the M2M area domain, and collaboratively make “intelligent decisions” to transmit the sensory and monitored data to a gateway.
- **The gateway** itself is an “intelligent device”, which receives the sensory data and intelligently manages the received data packets.
- **It forwards** the data packets through efficient paths by single-hop or multi-hop channels via a network domain to the back-end server of the application domain.
- **When there are multiple gateways** in an M2M area domain, they can further communicate with each other directly (peer-to-peer communication) to make collaborative decisions.

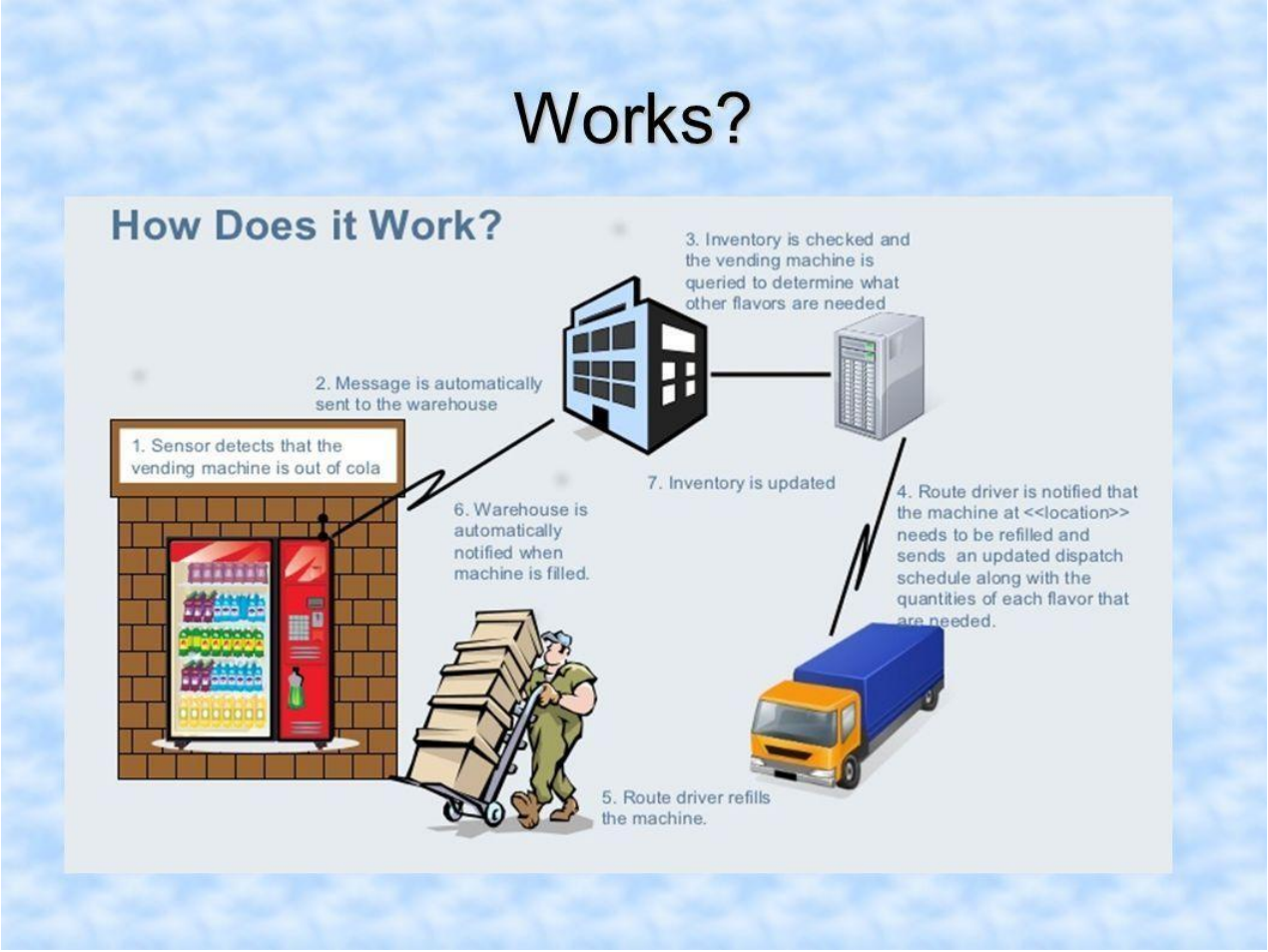
M2M NETWORK DOMAIN

- **The network domain** acts as an interface between M2M device domain and M2M application domain.
- **In this domain,** long-range wired/wireless network protocols (e.g. telephone networks, WiMAX, and 3G/4G cellular networks) are used to provide cost efficient and reliable channels with wide coverage to convey the sensory information from M2M device domain to the application domain.

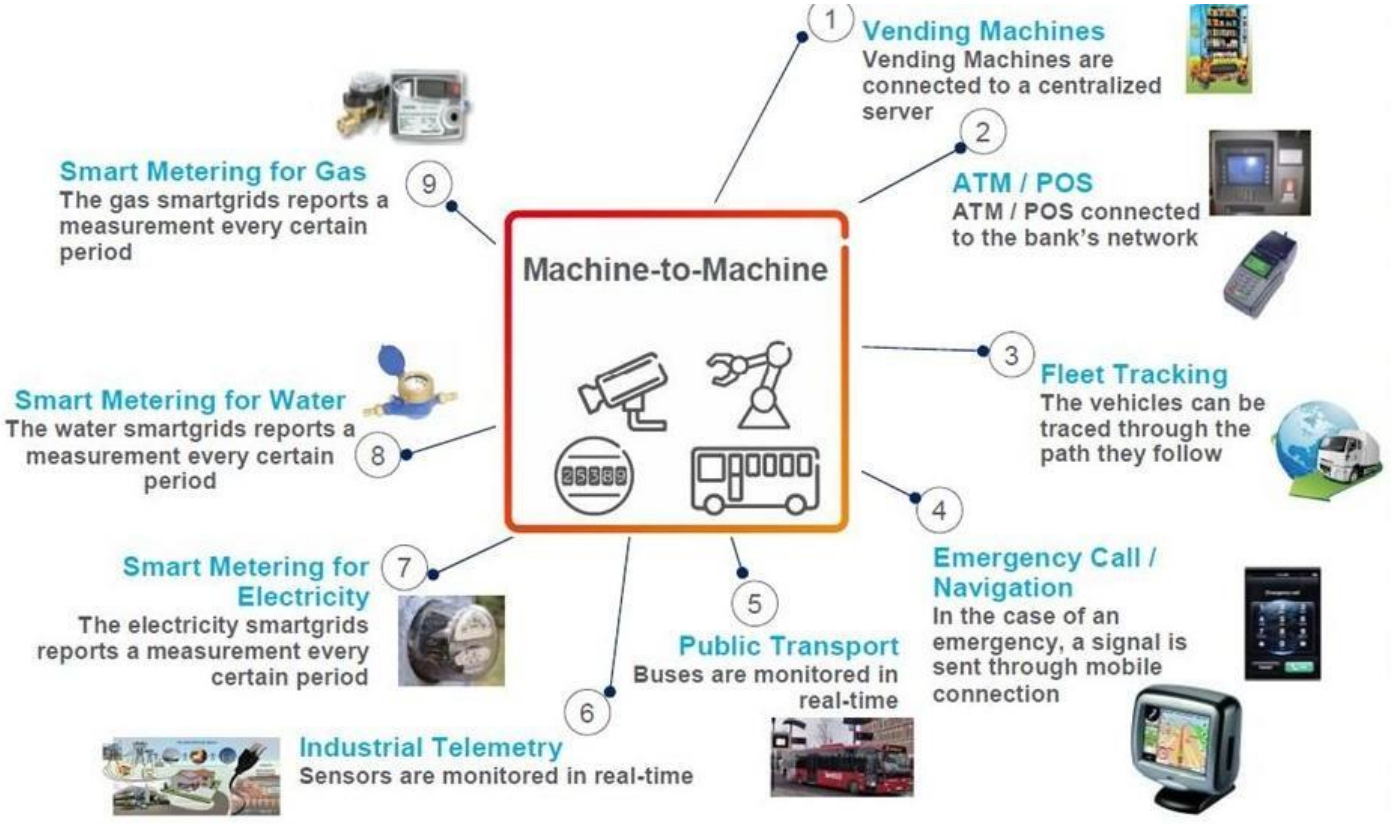
M2M APPLICATION DOMAIN

- **The application domain** consists of a back-end server (BS) and M2M application clients.
- **The back-end server** is the main component of the M2M system and acts as an integration point to store all the sensory information transmitted from the M2M device domain.
- **It also provides the real-time monitoring data** to various client applications for real-time remote monitoring management (RMM), i.e. smart metering, e-health care, and traffic monitoring.
- **The BS** can also vary for different applications; e.g. in smart grids, the control center acts as the BS, whereas in ehealthcare systems, the BS is the M2M health-monitoring server.

WORKING EXAMPLE



REAL TIME EXAMPLES



Advantages of m2m

- M2M communication is supported by cellular networks either directly or through gateway.
- It is easy to roll out and maintain.
- It is available with fixed and mobile networks both indoors and outdoors. It offers higher range, minimum latency, higher throughput and consume less energy.
- It enables communication of smart devices without any human intervention.
  The security and privacy issues in IoT networks are resolved by using M2M communication facility.
- Large protection, data collection and data processing is possible.

drawbacks of m2m

- Use of cloud computing in M2M means dependence on others which could limit flexibility and innovation.
- Security and ownership of data is a big concern. Interoperability between cloud/M2M IoT devices is a big concern in such networks.
- It is designed and optimized for small number of network devices.
- M2M communication requires availability of constant internet connection with reasonable speed.

conclusion

- M2M related technologies are in place and the market has massive potential for growth
- Standardization is essential for long term development of the technology and for interoperability of networks and service
- Operators, integrators and vendors have expressed the need to standardize end to end M2M
- Regulation in Europe, USA and Asia is pushing for a standards based solution-
- It is essential to have globally compatible standards