

# Machine-to-Machine communication with resource sharing capability

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## Outline

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- Introduction
- Crazy idea: *“M2M with resource sharing capability”*
- Conclusions

## Introduction

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- Machine-to-Machine (M2M) communication
  - It aims to interconnect the devices presented in the human life
  - Creating smart environments
    - Devices communicate **autonomously**
    - **Heterogeneous** network technologies
    - Devices will be controlled **remotely** by Intelligent software
    - Low human intervention

Scenario	Applications
Home	Heating control, Lighting control
Tracking and tracing	Asset tracking, cargo tracking, order tracking, human monitoring
Telemetry	Smart metering, parking metering, vending machines

## Introduction

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- What is the main challenge?
  - Provide communication to a **massive** number of devices
    - The current number of devices in the world is about **50 billion**
    - It represents **10 times** the number of mobile phones
    - Solutions that reduce the number of deployed devices **are need** for M2M
- The problem
  - Despite the huge number of devices ...
  - Every single M2M application deploys
    - Its own sensors/actuators, Aggregation Devices and Backend Servers
  - M2M applications do not make available
    - Neither data nor devices are shared with other M2M applications

## Crazy Idea: “M2M with resource sharing capability”

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- Clarifying the problem
  - Suppose some M2M vehicular applications

	Applications
1	Traffic Management
2	Insurance company
3	Fleet Asset
4	Safe Drive
5	Electric Vehicle Recharging

## Crazy Idea: “M2M with resource sharing capability”

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- Clarifying the problem
  - Observe the interested data of these applications

	Applications	Speed	Position	Break	Fuel Level
1	Traffic Management				
2	Insurance company				
3	Fleet Asset				
4	Safe Drive				
5	Electric Vehicle Recharging				

## Crazy Idea: “M2M with resource sharing capability”

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- Clarifying the problem
  - This set of applications are interested in several common data

	Applications	Speed	Position	Break	Fuel Level
1	Traffic Management	Yes	Yes	No	No
2	Insurance company	Yes	Yes	Yes	Yes
3	Fleet Asset	Yes	Yes	No	Yes
4	Safe Drive	Yes	Yes	No	No
5	Electric Vehicle Recharging	Yes	Yes	No	Yes

- Even with several common data
  - These applications deploy **dedicated devices**
  - Access **individually** the sensors
  - *“N sensors for N applications”*

## Crazy Idea: “M2M with resource sharing capability”

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*“Share devices and common data with multiple M2M applications”*

- Each device could be accessed by multiple applications
  - *“1 sensor data is accessed by N applications”*
- The set of N applications could work cooperatively
  - It avoids end-to-end request-response approaches
    - When an application wants some data
    - Firstly, it consults a responsible entity in the system to have data



## Crazy Idea: “M2M with resource sharing capability”

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- Without sharing capability
  - M2M communication is a **disjointed** group of M2M applications
    - However, the current research solutions have **NOT** considered M2M with resource sharing capability
      - E.g.: Cluster algorithms, QoS and energy management do not consider that devices could be used by multiple applications
      - Most of the solutions aim to **deal** with a massive number of device
- Standards have some actions towards capabilities sharing
  - ETSI and TTA
    - Define a standard **application architecture**
    - Objective is that M2M application share functionalities
  - WiMAX (IEEE 802.16p) and LTE (3GPP)
    - Develop solutions to **support** massive number of devices
    - Restricted for each respective network technology

## Conclusion

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- M2M communication with resource sharing capability  
*Maybe not so crazy, but:*
  - It is a potential idea to reduce the number of deployed devices
  - The applications could work cooperatively
  - It will save device and network resources
- The discussion about how to develop this idea is **OPEN**
  - Other crazy things to think about
    - Information-Centric Networking (ICN)
    - Service-Centric Networking (SCN)
    - Cloud computing
    - Virtualization
    - ???

# Thanks !

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