



Technical Report

**Machine-to-Machine communications (M2M);  
Use Cases of M2M applications for Connected Consumer**

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Reference

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## Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Machine-to-Machine communications (M2M).

The present document may be referenced by other TRs and Technical Standards (TS) developed by ETSI TC M2M. The present document is a TR and therefore, the content is informative, but when the present document is referenced by a TS, the referenced clauses may become normative with respect to the content of the referencing TS.

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## 1 Scope

The present document includes Use Case descriptions for Connected Consumer applications in context of Machine-to-Machine (M2M) communications. The described Use Cases will be used to derive service requirements and capabilities of the functional architecture specified in ETSI TC M2M.

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## 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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### 2.1 Normative references

The following referenced documents are necessary for the application of the present document.

Not applicable.

### 2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**connected consumer:** generic terminology describing a class of applications that serve the purpose of improving life style of human in the aspects of conveniences and entertainments by means of the communication capability embedded consumer electronics and consumer devices in the terms of Machine-to-Machine technology

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CE	Consumer Electronics
M2M	Machine-to-Machine (Communications)
MMS	Multimedia Messaging Service
SMS	Short Message Service

## 4 M2M Use Cases for connected consumer

"Connected Consumer" referred to in the present document is a human equipped with communication means that allow monitoring and controlling of devices, and possibly sharing contents with other humans, via M2M applications.

Use Cases described below extend from leisure Use Cases to security Use Cases, and also include home automation Use Cases.

### 4.1 Use Case 1: Photo uploading from still camera

#### 4.1.1 General Use Case Description

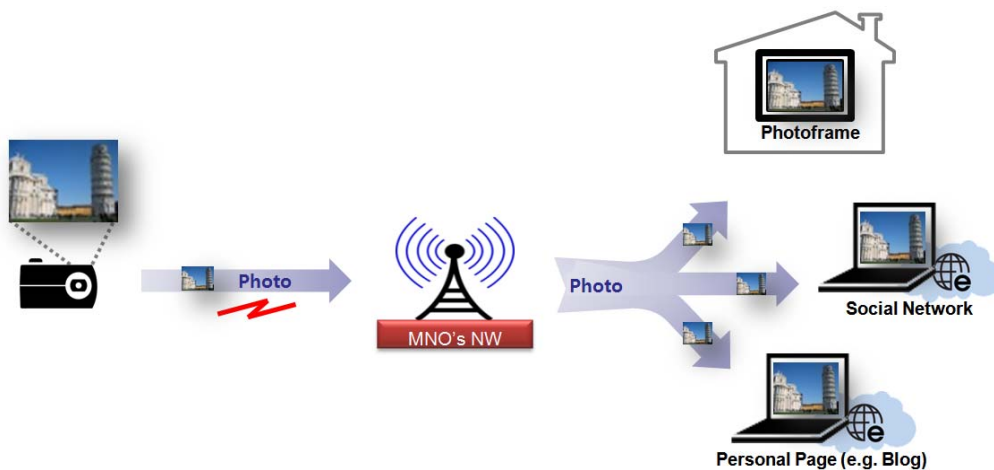


Figure 1: Photo uploading from still camera use case

This clause describes the use case where a user is uploading a picture to social networks and also to a photoframe at home.

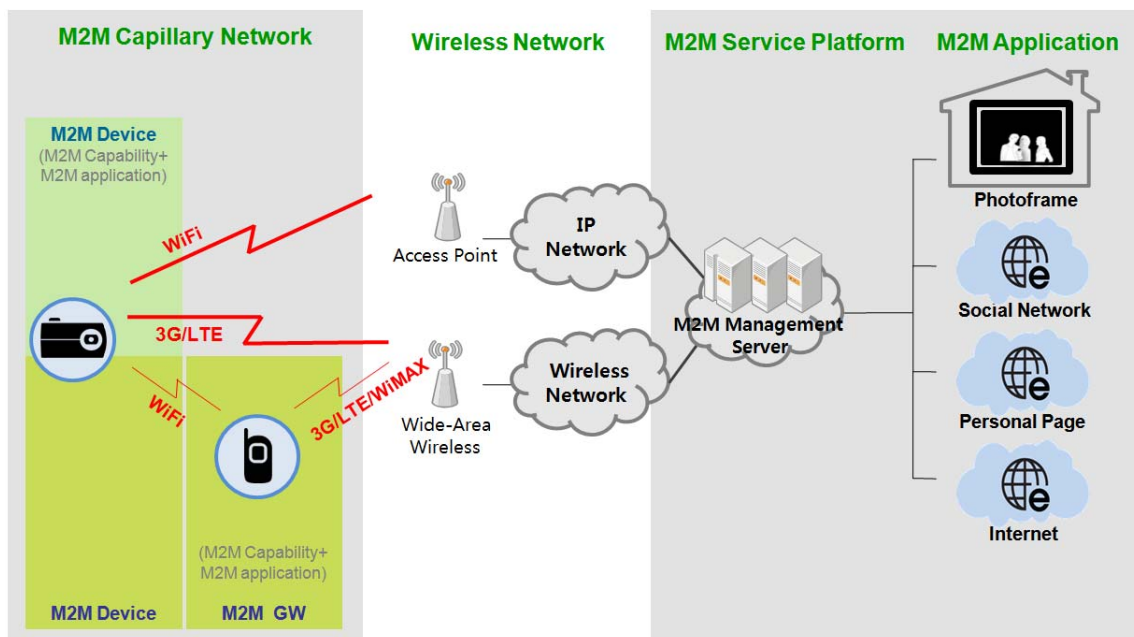


Figure 2: Generic framework for data uploading

## 4.1.2 Stakeholders

**Holiday maker:** The "holiday maker" is an individual, who could use the still camera with uploading capabilities to upload photos from his/her holidays to different social networking websites he/she is subscriber and also at a photoframe device that is residing at his/her house. This way other friends and family members will be able to see the photo instantaneously as it appears.

**Still camera with uploading capabilities:** Digital camera with uploading capabilities which acts like an M2M device with wireless network capabilities, user interface and interface into the M2M network. The device takes photos and uploads them to the different social networks the user is subscribed to or to photoframe where the user wants to send the pictures. Low power, low complexity protocols are likely required for these devices.

**M2M service capability provider:** Network entity that provides M2M communication services to the M2M application entities. These applications may support specific functional capabilities which assist in facilitating uploading of pictures from the still camera M2M device to the network. Additionally, the M2M service capability provider communicates with the social networking websites and the photoframe in order to adapt the photo to the requirements that are needed to be displayed at each one of them.

**M2M application entity:** Term created to bundle together, and treat as a single system element, stakeholders above the M2M scope. High-level application such as social networking websites, photoframe devices etc that receive the photos from the M2M service capability provider and display them for consumption by third party users (e.g. friends of the holiday maker).

**Friends of the holiday maker:** These are individuals, who are able to access the application entity either virtually e.g. through a website or physically if they are in the close proximity of the photoframe and they are able to see the photos that have been uploaded from the holiday maker.

## 4.1.3 Scenario

### Initialization

The still camera with M2M device capabilities is attaching to the wireless network and performs registration in the M2M system. Registration includes the capability to maintain information describing the still camera device capabilities (e.g. model type, resolution etc), the user of the device, and the M2M application that will be used in order to display the data (e.g. social networking website-1, social networking website-2). For example, this may include registering the device with the manufacturer or data intermediary and performing other functions to uniquely identify the device. Registration may also include registering data that can be used to verify the state of the still camera by the M2M service capability provider.

### Photo uploading

The photo uploading includes the tasks that the holiday maker takes a photo or even selects a photo from its already stored album photos and selects to upload it to a number of social networking websites that is subscribed to and also the photoframe that is at his/her home. The holiday maker after it selects the photo he/she wants to upload then chooses the appropriate destinations (e.g. social networking website-1, social networking website-2, my photoframe). Then he/she starts the uploading of the photo procedure.

### Photo Display

The M2M service capability entity after it receives the photo from the still camera with M2M device capabilities and the destinations it is required to upload the photo, it adapts the photo to appropriate specifications for it to be displayed in the right format e.g. file type, resolution etc. Then it sends the photo to the appropriate M2M application entities that have been indicated in the destination list. The M2M application entities that are indicated display the photo in the right format and the friends of the holiday maker are able to access it and see it.

## 4.1.4 Information Exchanges

### Registration

The still camera with M2M device capabilities is attaching to the wireless network and performs registration in the M2M system. Registration includes the capability to maintain information describing the still camera device capabilities (e.g. model type, resolution etc), the user of the device, and the M2M application that will be used in order to display the data (e.g. social networking website-1, social networking website-2). For example, this may include registering the device with the manufacturer or data intermediary and performing other functions to uniquely identify the device. Registration may also include registering data that can be used to verify the state of the still camera by the M2M service capability provider.

### Photo Uploading

Capability to upload the photo to the M2M system from the still camera device with M2M capabilities.

### Data Delivery

Capability to securely deliver data to the intended device (e.g. photoframe) or M2M application entity (e.g. social networking website) in the appropriate format and confirm delivery.

## 4.1.5 Potential new requirements

No potential new requirements identified.

## 4.2 Use Case 2: Contents download to eBook reader device

### 4.2.1 General Use Case Description

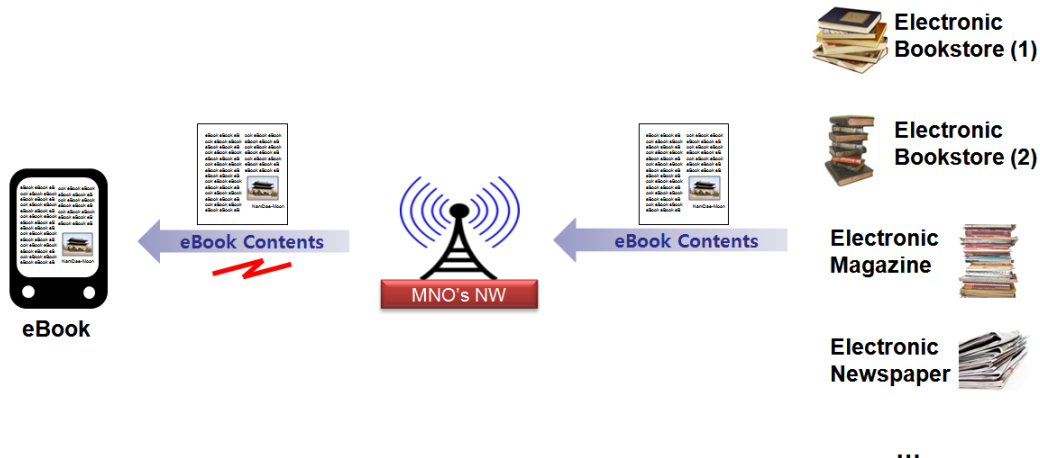


Figure 3: Electronic book download to eBook reader device

This clause describes the use case where a user is downloading books, magazines, or newspaper content in an eBook reader device from several suppliers e.g. electronic bookstores or content providers.



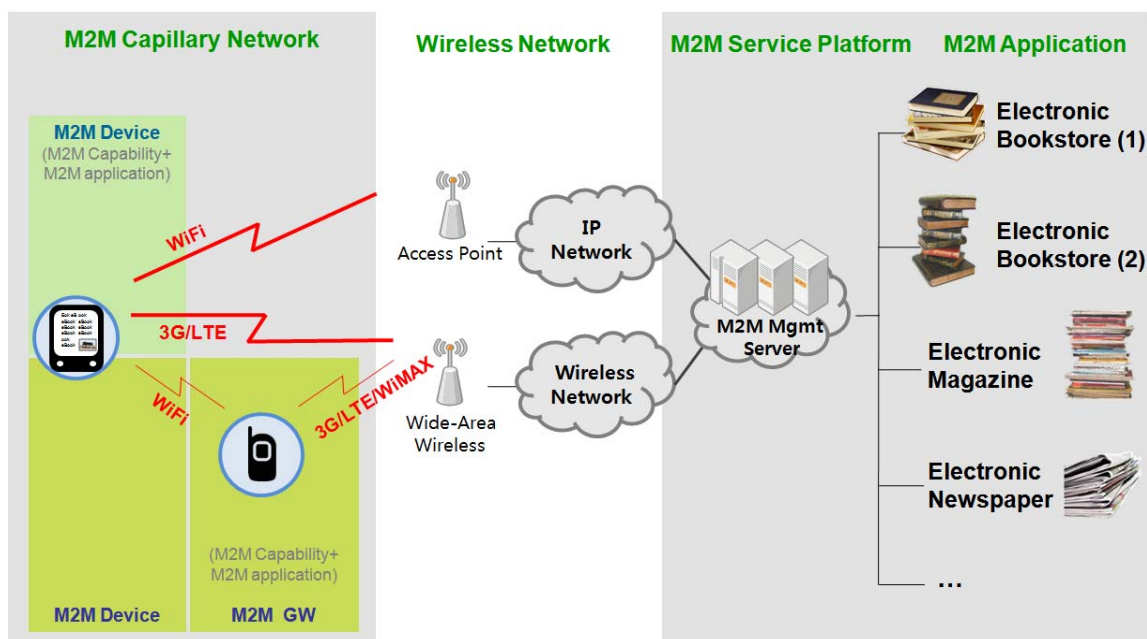


Figure 4: Generic framework for data downloading

## 4.2.2 Stakeholders

**Book reader:** The "book reader" is an individual, who could use the eBook reader device with downloading capabilities to content e.g. book or magazine material from different electronic bookstores or newspapers/magazines he/she is subscriber.

**eBook reader device with downloading capabilities:** eBook reader device with downloading capabilities which acts like an M2M device with wireless network capabilities, user interface and interface into the M2M network. The device downloads content from different content supplier websites, stores it and displays it to the book reader. Low power, low complexity protocols are likely required for these devices.

**M2M service capability provider:** Network entity that provides M2M communication services to the M2M application entities. These applications may support specific functional capabilities which assist in facilitating downloading content e.g. book material, news content, magazine articles. Additionally, the M2M service capability provider communicates with the third parties that supply the content in order to adapt the content to the requirements that are needed to be displayed to the type of eBook reader device that is downloading the content.

**M2M application entity:** Term created to bundle together, and treat as a single system element, stakeholders above the M2M scope. High-level application such as electronic bookstore websites, electronic news content suppliers etc that supply the content to the eBook reader device with M2M device capabilities.

## 4.2.3 Scenario

### Initialization

The eBook reader device with M2M device capabilities is attaching to the wireless network and performs registration in the M2M system. Registration includes the capability to maintain information describing the eBook reader device capabilities (e.g. model type, resolution, file format, screen type etc), the user of the device, and the M2M application that will be used in order to display the data (e.g. bookstore-1 or newspaper-2). For example, this may include registering the device with the manufacturer or data intermediary and performing other functions to uniquely identify the device. Registration may also include registering data that can be used to verify the state of the eBook reader device by the M2M service capability provider.

### Electronic book content downloading

The electronic book content downloading includes the tasks that the book reader selects the book from the list of supplied books from the electronic bookstore provider and selects the book to download. The book reader after he/she selects the electronic book he/she wants to download then chooses the appropriate format e.g. rich content with photos and embedded videos. Then he/she starts the downloading of the electronic book procedure.

### Electronic book display and storage

The M2M service capability entity after it receives the request from the eBook reader device with M2M device capabilities, the book that is required to be downloaded and the destinations it is required to download from,. Sends the request to the appropriate M2M application entities that have been indicated in the destination list. The M2M application entities that are indicated provide the electronic book format and then the M2M service capability entity adapts the book content to appropriate specifications for it to be displayed in the right format e.g. file type, dimensions, etc.

## 4.2.4 Information Exchanges

### Registration

The eBook reader device with M2M device capabilities is attaching to the wireless network and performs registration in the M2M system. Registration includes the capability to maintain information describing the eBook reader device capabilities (e.g. model type, resolution etc), the user of the device, and the M2M application that will be used in order to display the data (e.g. electronic bookstore-1, electronic bookstore-2). For example, this may include registering the device with the manufacturer or data intermediary and performing other functions to uniquely identify the device. Registration may also include registering data that can be used to verify the state of the eBook reader device by the M2M service capability provider.

### Book downloading

Capability to download the electronic book from the M2M system to the eBook reader device with M2M capabilities.

## 4.2.5 Potential new requirements

No potential new requirements identified.

## 4.3 Use Case 3: Remote Control of Home Appliance

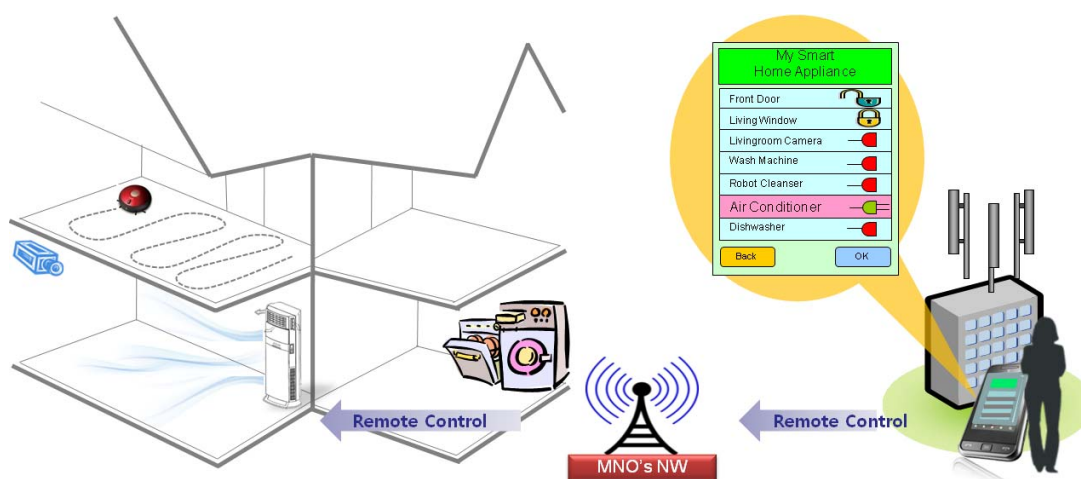


Figure 5: Remote Control of Home Appliances

This clause describes the use case where a user controls a home appliances remotely (being outside the house). For example, when it is too cold outside and the user wants to make his/her house warm before he/she returns home, he/she can turn on the air-conditioner by remote control device.

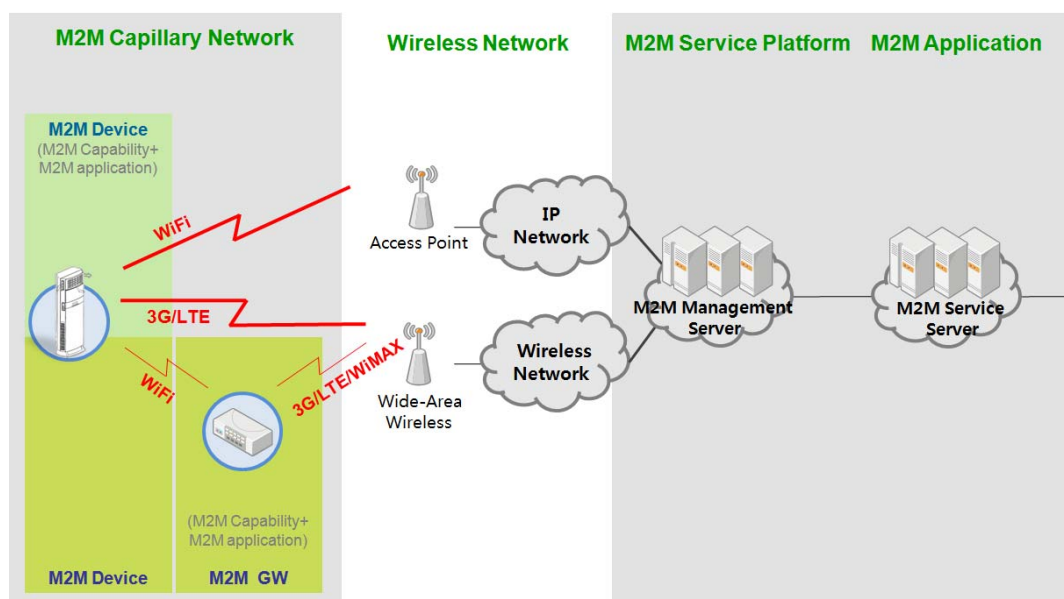


Figure 6: Example of High-level Architecture for Remote Control of Home Appliances

### 4.3.1 Stakeholders

**Home appliance with communication capabilities:** Home appliance with the communication capabilities which acts like an M2M devices with wireless network capabilities, interface and user interface into the M2M network. This M2M device can be operated by the remote control user via wireless network and it can be directly connected to the wireless network or can be connected via the M2M gateway to the wireless network.

**Remote control user:** The remote controlling user is an individual, who have authorization to remotely control his/her home appliances with his/her devices (e.g. handheld devices, note-pc, etc.).

**M2M service capability provider:** Network entity that provides M2M communication services to the M2M application entities. These applications may support specific functional capabilities which assist in communicating for remote control of home appliances with communication capabilities by remote controlling user.

**M2M application entity:** Term created to bundle together, and treat as a single system element, stakeholders above the M2M scope. High-level application such as remote service web-site, home appliances and personal devices with the remote control capabilities that sends and receives a command of remote control, that sends and receives the result of remote control and that displays the result of remote control.

### 4.3.2 Scenario

#### Initialization

The home appliances with the M2M device capabilities are directly attaching to the wireless network and perform registration in the M2M system. Or they setup the connection with the M2M gateway.

Registration includes the capability to maintain information describing the home appliances with the M2M device capabilities (e.g. the type of home appliances, etc.).

#### Request a Remote Operation

The remote control user using the handset or the PC sends a request to turn on or turn off the home appliance remotely. The result of the requested operation is returned to the remote control user from the home appliance with M2M capabilities via wireless network.

### 4.3.3 Information Exchanges

#### Registration

The home appliances with the M2M device capabilities are directly attaching to the wireless network and perform registration in the M2M system. Registration includes the capability to maintain information describing the home appliances with the M2M device capabilities (e.g. the type of home appliances, etc.).

#### Remote control Request

Remote control user sends a control message to the home appliance with M2M capabilities via the wireless network.

#### Remote control Response

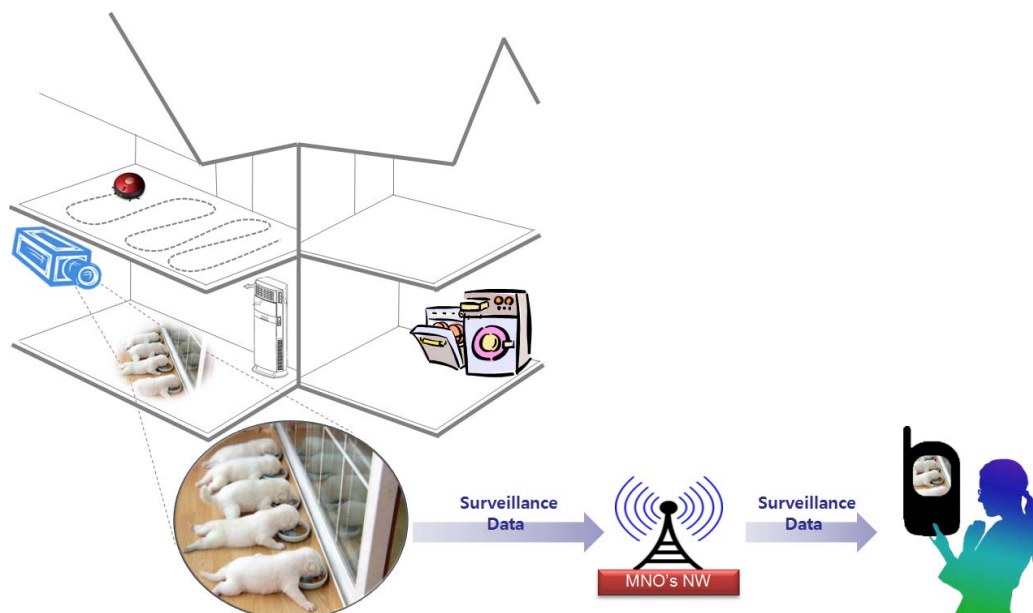
Remote control user receives a result of the requested remote control from the home appliances with M2M capabilities.

### 4.3.4 Potential new requirements

For the remote control of Home Appliance Use Cases, the requirements below will have to be supported:

- A M2M device should be able to register its capability information (e.g. access technology, its serial number, its accessible address, allowed user list, etc.) to the M2M System.
- M2M devices and M2M gateways should be able to perform access control that checks the access right of end-user, M2M device, M2M gateway who try to access the M2M device directly or via the M2M gateway or M2M System should be alternatively able to perform the access control of M2M devices.
- M2M devices and M2M gateways should be able to manage the scheduling of multiple accesses that multiple remote parties (i.e. end-users, M2M devices or M2M applications in M2M network, etc.) try to access one M2M device or one M2M gateway simultaneously.

## 4.4 Use Case 4: Surveillance Data Uploading



**Figure 7: Surveillance Data Uploading Use Case**

This clause describes the use case where a user is requesting a video streaming data from a surveillance camera when not at home.

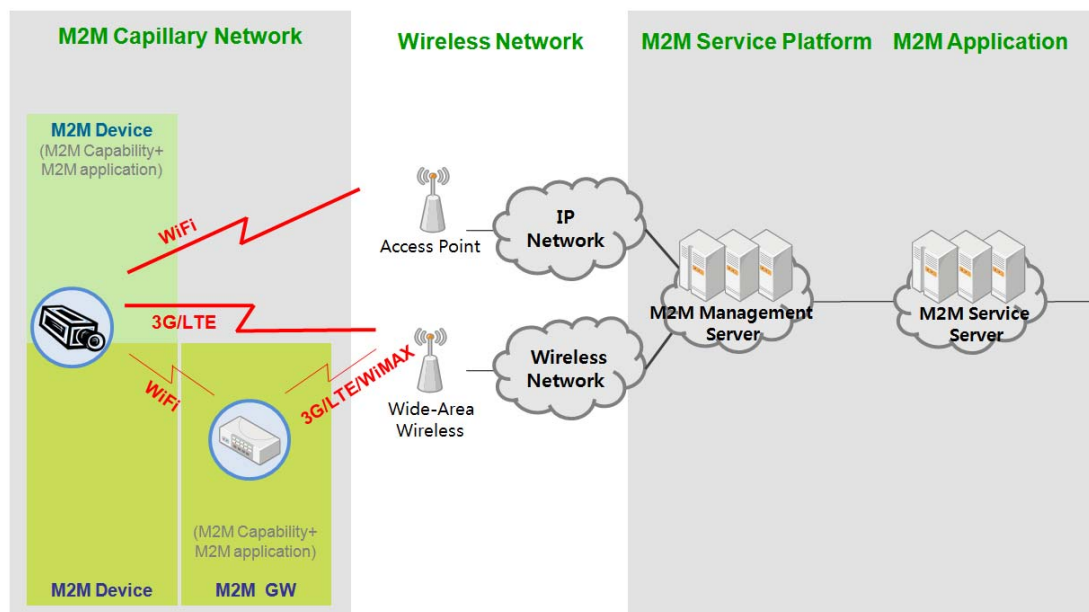


Figure 8: Example of High-level Architecture for Surveillance Data Uploading

#### 4.4.1 Stakeholders

**Surveillance camera with uploading capabilities:** Surveillance camera with uploading capabilities which acts like an M2M device with wireless network capabilities, interface and user interface into the M2M network. The device records a real-time event, periodic events or scheduled events and uploads them to the Surveillance Data Requestor via wireless network. The surveillance camera with uploading capabilities may connect to M2M gateway for communication with the surveillance video requester.

**Surveillance video requester:** The "Surveillance video requester" is an individual, who could trigger the surveillance video streaming data's downloading to his/her personal devices, e.g. handset or smart-phone at outside, note-pc or lap-top at his work place and so on. This way will make them to see whether their puppies or children are safe when he/she is not at home.

**M2M service capability provider:** Network entity that provides M2M communication services to the M2M application entities. These applications may support specific functional capabilities which assist in facilitating uploading of video streaming data from the surveillance camera (i.e. M2M device) to the network. Additionally, the M2M service capability provider communicates with the personal handheld devices or with the personal computing devices in order to adapt the video streaming to the requirements that are needed to be displayed at the each device of them and to forward the video streaming to the surveillance video requester.

**M2M application entity:** Term created to bundle together, and treat as a single system element, stakeholders above the M2M scope. High-level application such as surveillance video-sharing website, personal devices etc that receive and display the surveillance video streaming from the M2M service capability provider.

#### 4.4.2 Scenario

##### Initialization

The surveillance camera with M2M device capabilities is attaching to the wireless network and performs registration in the M2M system when it turns on or it receives a request of surveillance video streaming. Registration includes the capability to maintain information describing the surveillance camera device's capabilities (e.g. model type, resolution, codec, etc.), the registered user of device, the M2M application that will be used in order to record, store, forward the video streaming data.

### **Surveillance data recording and uploading**

The video data recording and uploading includes the task that the surveillance camera with uploading capabilities receives a request to send the recorded-and-stored video streaming data or the real-time video streaming data which contains the activities of the surveillance video requester's puppies or children at his/her house to his/her personal devices (e.g. handheld phone/smart-phone, note-pc, lab-top, etc.). After selecting the video or taking a real-time video streaming, the surveillance camera returns the video streaming data to the surveillance video requester. Then it starts the uploading of the surveillance video data.

### **Surveillance data display**

The M2M service capability entity after it receives the video streaming data from the surveillance camera with M2M device capabilities and the destinations it is required to forward a video, it adapts the video to appropriate specifications for it to be displayed in the right format e.g. codec, file type, resolution etc. Then it sends the video streaming data to the appropriate M2M application entities that have been indicated in the destination list. The M2M application entities that are indicated display the photo in the right format.

## **4.4.3 Information Exchanges**

### **Registration**

The surveillance camera with M2M device capabilities is attaching to the wireless network and performs registration in the M2M system. Registration includes the capability to maintain information describing the surveillance camera device capabilities (e.g. codec, model type, resolution, etc.), the registered user of device, and the M2M application that will be used in order to display the surveillance video (e.g. the surveillance video website, handheld devices).

### **Surveillance Data Request**

The surveillance video requester send a request surveillance video data and this request is forwarded to the surveillance camera via the wireless network. Surveillance data request includes his/her device capability (e.g. codec, resolution, etc.) and the requester's information which will be used to check the authorized requester or not.

### **Surveillance Data Uploading**

Capability to upload the surveillance video data to the M2M system from the surveillance camera with M2M capabilities.

### **Data Delivery**

Capability to securely deliver the surveillance video data to the intended device (e.g. handheld phone, website, etc.) in the appropriate format and confirm delivery.

## **4.4.4 Potential new requirements**

For the surveillance data uploading Use Cases, it should support the below requirements.

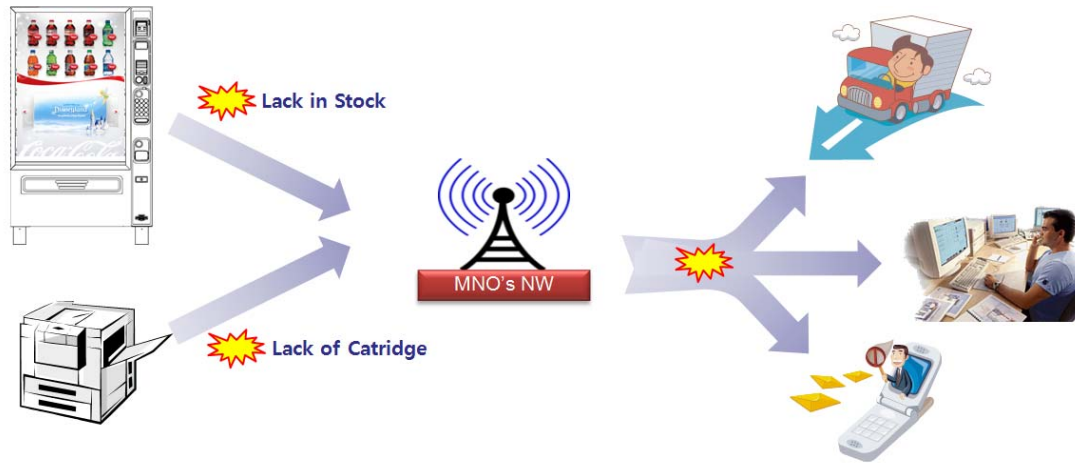
M2M capabilities in M2M Device and M2M Service Platform are able to support the following functionalities:

- 1) capability management of M2M Device and of M2M Application in Network and Application Domain.
  - An M2M device is able to register its device specific capabilities (e.g. resolution, screen size, memory size, supported codec, etc.).
  - An M2M service platform is able to manage the M2M device specific capabilities.
  - This capability information of M2M Device can be queried by the M2M Applications in Network and Application Domain.
- 2) Supporting of delivery mechanism such as:
  - Periodical delivery.
  - Scheduled delivery at pre-defined time.



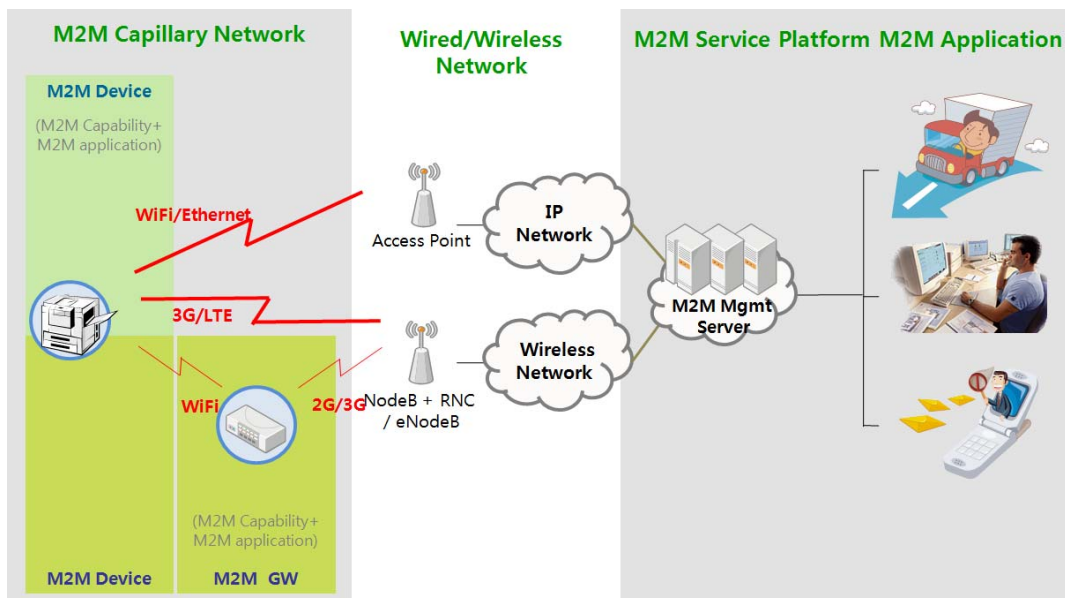
- On-demand delivery.
- Etc.

### 4.5 Use Case 5: Inventory Management



**Figure 9: Stock management of interactive Vending Machine and networked printer**

This clause describes the use case which communication module embedded vending machine or printer reports its status to the manager and/or the service centre. For example, if the stock of vending machine goes down to the any pre-defined level, the vending machine generates an alert message including the current status of stock and send the alert message to the vending machine owner and/or the service centre which takes a responsibility on the stock management of vending machine. In this use case, the vending machine has a capability of self-checking of the stock and a communication capability to send an alert message to the relative parties.



**Figure 10: Example of High-level Architecture for Inventory Management**

## 4.5.1 Stakeholders

**Connected vending machine with communication capabilities:** Vending machine with the communication capabilities as an M2M device has a connection to the network via unlicensed/licensed wireless connection or wired connection. This M2M device can monitor its status of inventory, configure an alert message (e.g. SMS, MMS) which indicate its lack of inventory and then send an alert message to an owner of vending machine and/or inventory management centre.

**Connected printer with communication capabilities:** Connected printer with the communication capabilities as an M2M device also has a connection to the network via unlicensed/licensed wireless connection or wired connection. This M2M device can monitor its status of inventory (e.g. toner, paper), configure an alert message (e.g. SMS, MMS) which indicate its lack of inventory and then send an alert message to an owner of connected printer and/or inventory management centre.

**Owner of vending machine/connected printer:** When it is not enough in stock of connected vending machine or connected printer, these M2M devices send alert messages to the owner.

**Remote inventory management centre:** When it is not enough in stock of vending machine or connected printer, these M2M devices send alert messages to the remote inventory management centre (i.e. After-sales service centre).

**M2M application entity:** M2M applications for remote inventory management and sending alert messages to remote inventory management centre and/or owner of vending machine/connected printer.

## 4.5.2 Scenario

### Initialization

The vending machine or connected printer with the M2M device capabilities are directly attaching to the network and perform registration in the M2M system.

### Detection of shortage in stock or operational error

Connected vending machine or connected printer can detect its status in stock and in operation.

### Notification of status information to owner of connected vending machine/printer or to inventory management service centre

The status information such as lack of inventory or external shock or internal operational error can be alerted to owner of machines or after-sales service centre.

## 4.5.3 Information Exchanges

### Registration

The vending machine or connected printer with the M2M device capabilities sends a registration request including its hardware, software, firmware information. After registration, the vending machine and connected printer are communication-ready state with the M2M network via access/core network.

### Sending Inventory Status Information

When the vending machine or connected printer detects a shortage in stock, they send a notification to M2M application.

### Sending Alert

When the M2M application receives the inventory status information, the M2M application sends an alert message to the owner of M2M devices.



#### 4.5.4 Potential new requirements

For the inventory management Use Cases, it should support the below requirements.

M2M capabilities in M2M Device and M2M Service Platform are able to support the following functionalities:

- 1) Multiple M2M Network Application management:
  - M2M service platform is able to manage the registration information of the M2M Network Application.
  - M2M service platform is able to send/forwards the message (or notification) to the multiple M2M Network Applications when it receives a message (or notification) from the M2M Device or M2M Gateway.
  - M2M service platform is able to support sending of a notification towards the M2M Device or M2M Gateway. The format of notification can be a SMS, MMS and so on.

#### 4.6 Potential new requirements resulting from Connected Consumer Use Cases

The list of requirements needed to support all the Use Cases in the previous clause is provided below. Each of these requirements could be used to derive corresponding M2M service requirements and/or capabilities in the M2M functional architecture.

M2M capabilities layer in M2M Device and M2M Service Platform should be able to support the following functionalities:

- 1) capability management of M2M Device and of M2M Application in Network and Application Domain.
  - An M2M device is able to register its device specific capabilities (e.g. resolution, screen size, memory size, supported codec, etc.)
  - An M2M service platform is able to manage the M2M device specific capabilities.
  - This capability information of M2M Device can be queried by the M2M Applications in Network and Application Domain.
- 2) Supporting of delivery mechanism such as:
  - Periodical delivery.
  - Scheduled delivery at pre-defined time.
  - On-demand delivery.
- 3) Multiple M2M Network Application management:
  - M2M service platform is able to manage the registration information of the M2M Network Application.
  - M2M service platform is able to send/forwards the message (or notification) to the multiple M2M Network Applications when it receives a message (or notification) from the M2M Device or M2M Gateway.
  - M2M service platform is able to support sending of a notification towards the M2M Device or M2M Gateway. The format of notification can be a SMS, MMS and so on.

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## Annex A: Bibliography

ETSI TR 102 725: "Machine-to-Machine communications (M2M); Definitions".

ETSI TS 102 689: "Machine-to-Machine communications (M2M); M2M service requirements".

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## History

<b>Document history</b>		
V1.1.1	August 2013	Publications