OVERVIEW OF ETSI M2M ARCHITECTURE

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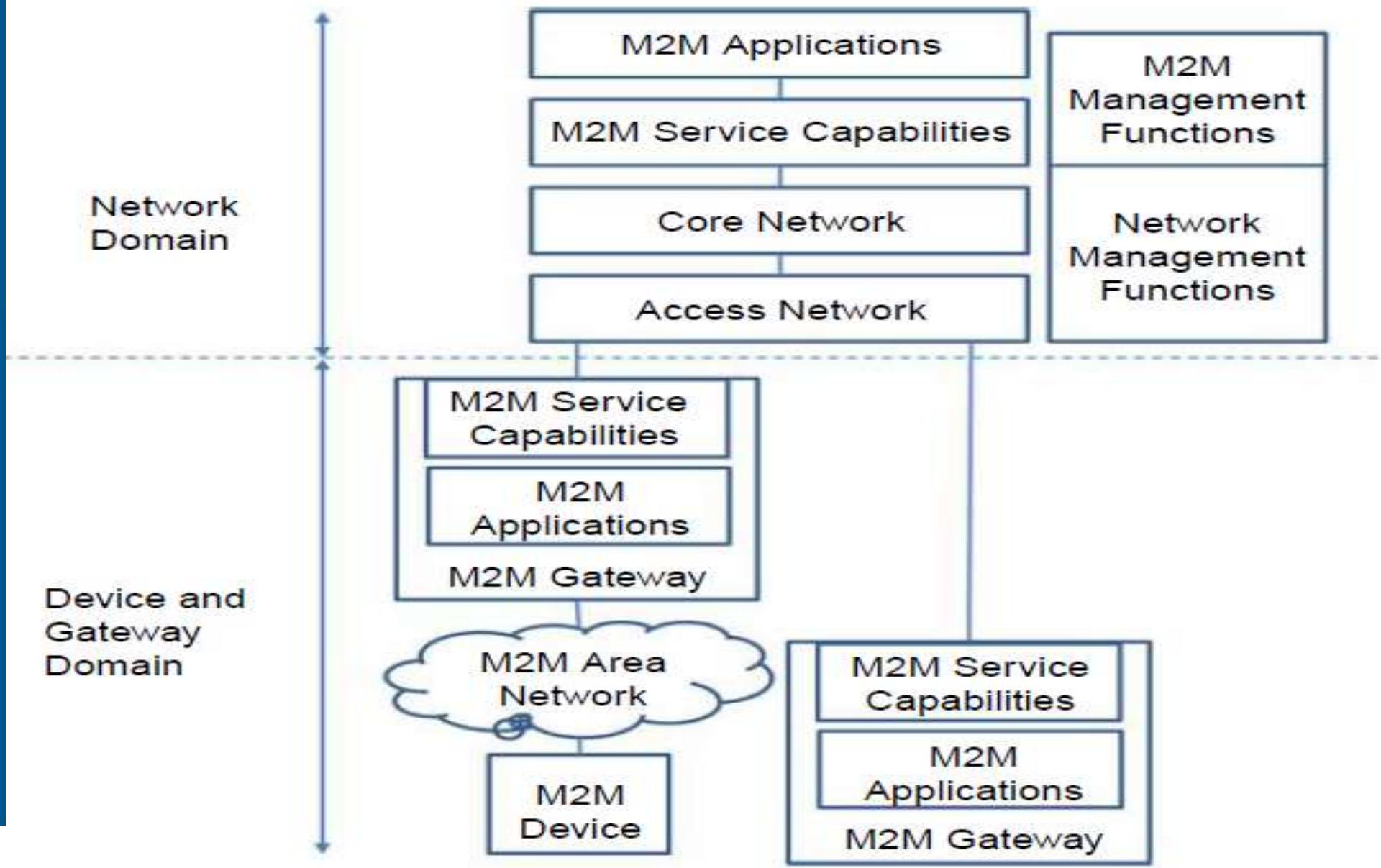
- Provide an M2M architecture with a generic set of capabilities for M2M services
- Provide a framework for developing services independently of the underlying network
- Facilitate deployment of vertical applications
- Facilitate innovation across industries by exposing data and information and providing services.

ETSI M2M high level architecture



Device and gateway domin

Direct connection: The M2M Device is capable of performing registration, authentication, authorization, arrangement, and provisioning to the Network Domain.

M2M Area Network: This is typically a local area network (LAN) or a Personal Area Network (PAN) and provides connectivity between M2M Devices and M2M Gateways

M2M Gateway: The device that provides connectivity for M2M Devices in an M2M Area Network towards the Network Domain. The M2M Gateway contains M2M Applications and M2M Service Capabilities. The M2M Gateway may also provide services to other legacy devices that are not visible to the Network Domain.

Network domain

- Access Network: this is the network that allows the devices in the Device and Gateway Domain to communicate with the Core Network.
- Example Access Network Technologies are fixed (xDSL, HFC) and wireless (Satellite, GERAN, UTRAN, E-UTRAN W-LAN, WiMAX).
- Core Network: Examples of Core Networks are 3GPP Core Network and ETSI TISPAN Core Network.
- It provides the following functions:
  - IP connectivity.
  - Service and Network control.
  - Interconnection with other networks.
  - Roaming.

Network domain Cont.

- M2M Service Capabilities: These are functions exposed to different M2M Applications through a set of open interfaces.
- These functions use underlying Core Network functions, and their objective is to abstract the network functions for the sake of simpler applications.

- M2M Applications: These are the specific M2M applications (e.g. smart metering) that utilize the M2M Service Capabilities through the open interfaces.

Network domain Cont.

- Network Management Functions: These are all the necessary functions to manage the Access and Core Network (e.g. Provisioning, Fault Management, etc.).
- M2M Management Functions: These are the necessary functions required to manage the M2M Service Capabilities on the Network Domain while the management of an M2M Device or Gateway is performed by specific M2M Service Capabilities.

M2M Server capabilities

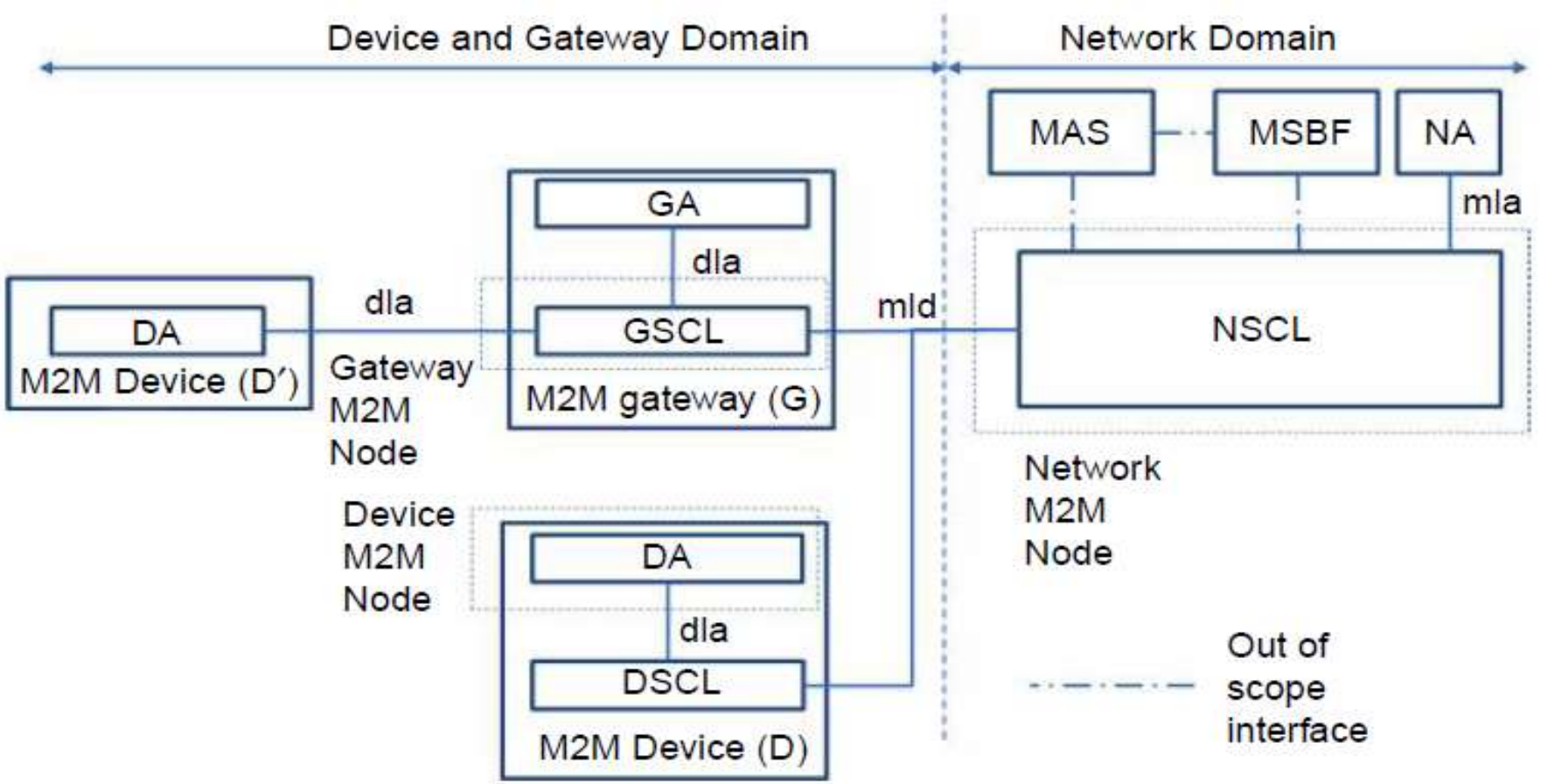


FIGURE 6.2

M2M Service Capabilities, M2M Nodes and Open Interfaces.

DA-Device Application, GSCL -Gateway Service Capabilities Layer, NSCL-Network Service Capabilities Layer, GA-Gateway Application, NA-Network Application, MAS -M2M Authentication Server, MSBF-M2M Service Bootstrap Function

Key M2M Elements

Connecting Things

M2M Device

- Device capable of replying to request for data contained within those devices or capable of transmitting data autonomously.

M2M Area Network (Device Domain)

- Provide connectivity between M2M Devices and M2M Gateways, e.g. personal area network.

M2M Gateway

- Uses M2M capabilities to ensure M2M Devices inter-working and interconnection to the communication network.

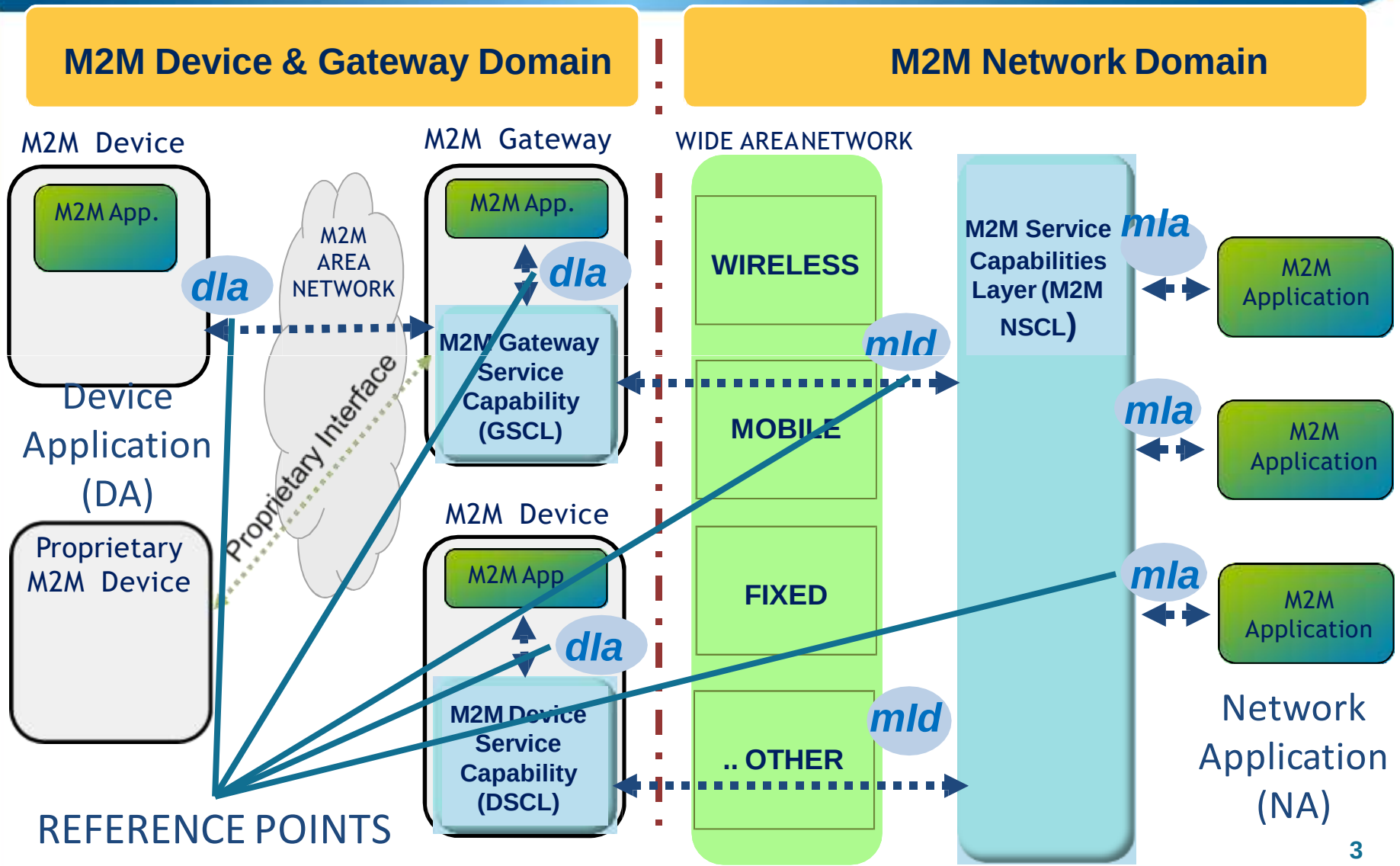
M2M Communication Networks (Network Domain)

- Communications between the M2M Gateway(s) and M2M application(s), e.g. xDSL, WiMAX, and WLAN.

M2M Applications

- Contains the middleware layer where data goes through various application services and is used by the specific business-processing engines.

M2M – High Level Architecture



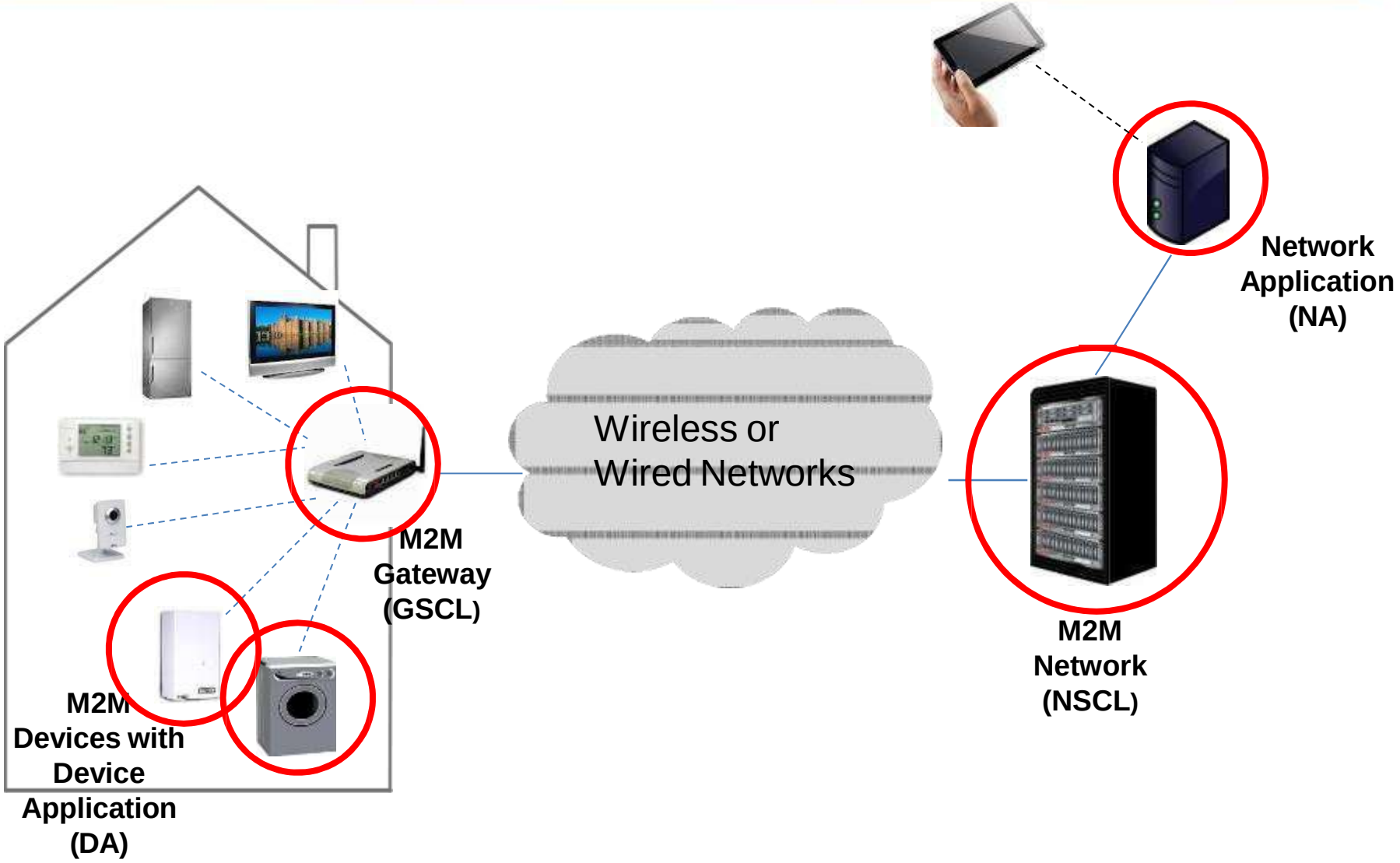
- ETSI M2M adopted a RESTful (Representational state transfer)architecture style
  - Information is represented by resources which are structured as a tree
- ETSI M2M standardizes the resource structure that resides on an M2M Service Capability Layer (SCL)
  - Each SCL contains a resource structure where the information is kept
- M2M Application and/or M2M Service Capability Layer exchange information by means of these resources over the defined reference points
- ETSI M2M standardizes the procedure for handling the resources

- Identification of the M2M Application and the M2M Devices
- Asynchronous and synchronous communication
- Store and forward mechanism based on policies for optimising the communication
- Location information
- Device management based both on wireless and wireline

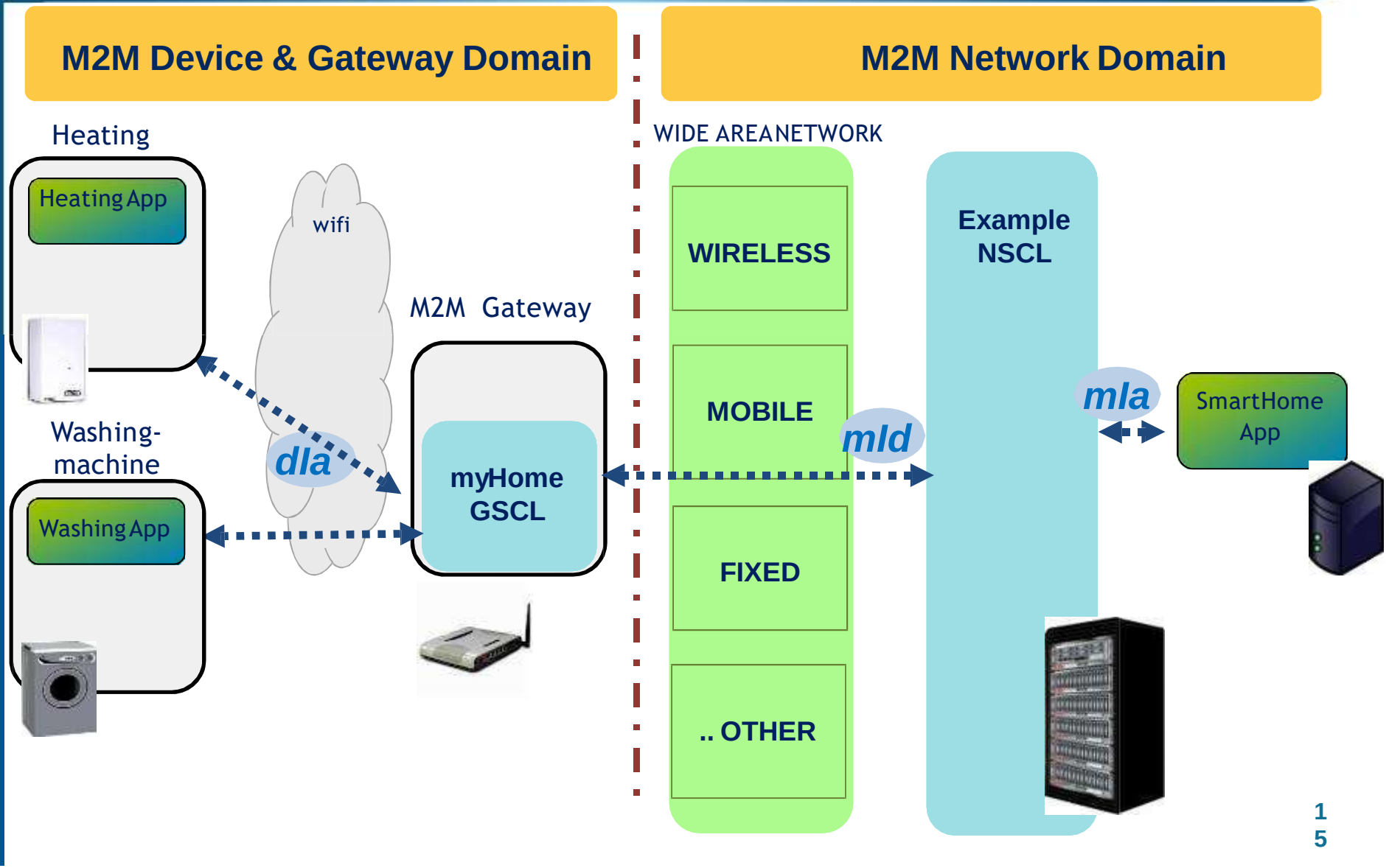
- Mutual authentication between Network Service Capability Layer and Device/Gateway Service Capability Layer that are connected
- Secure channel for transporting data over mId reference point
- And much more ….

- ETSI M2M Release 1 provides standardized security mechanism for the reference point *mId*
- The device/gateway needs to have keys for securing the connection.
- The device/gateway is provisioned with the key M2M Root Key.
- The high level procedure are to
  - Perform mutual *mId* end point authentication
  - Perform M2M Connection Key agreement
  - Optionally establish a secure session over *mId*.
  - Perform RESTful procedures over the *mId*

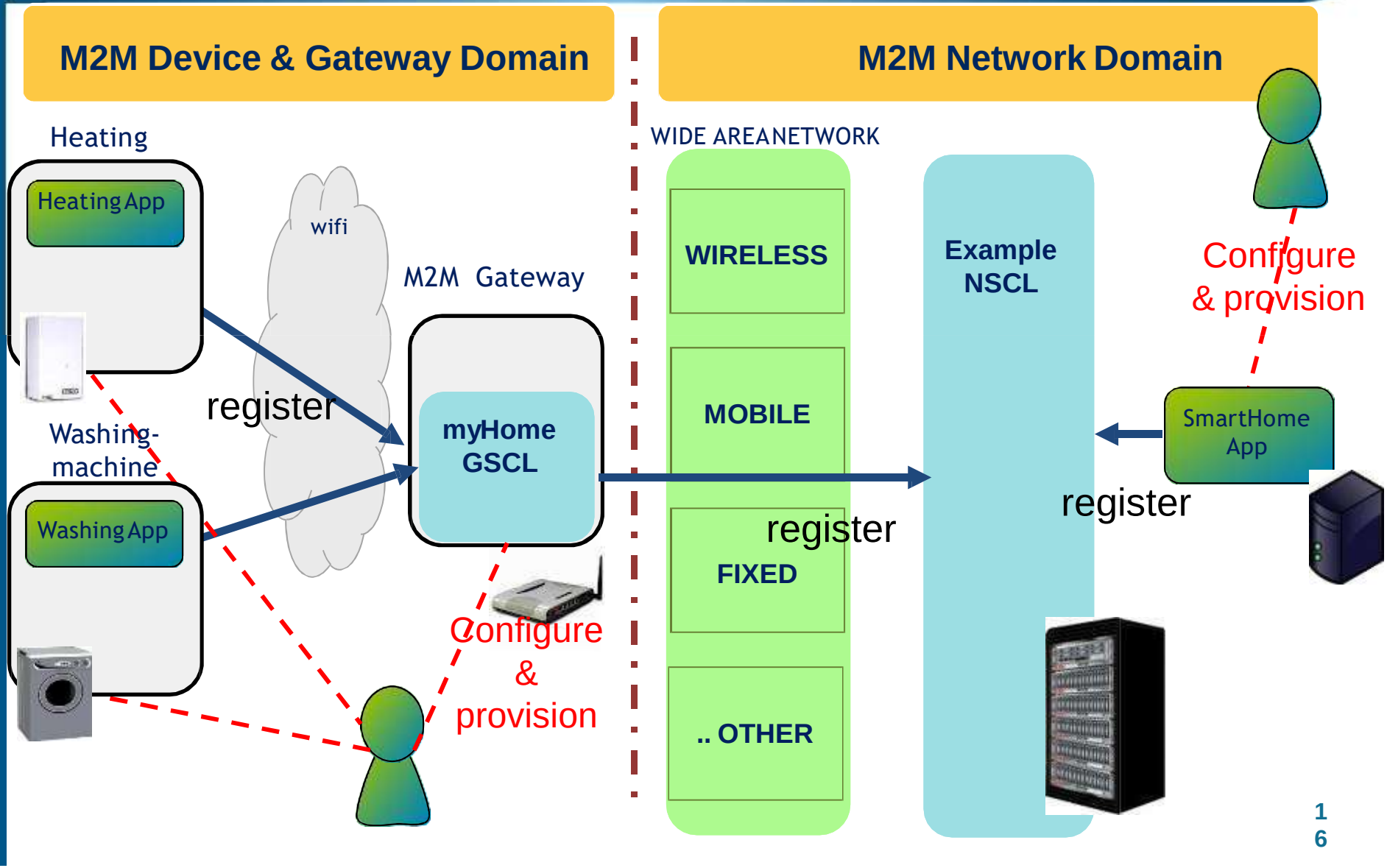
Example:
Connected home



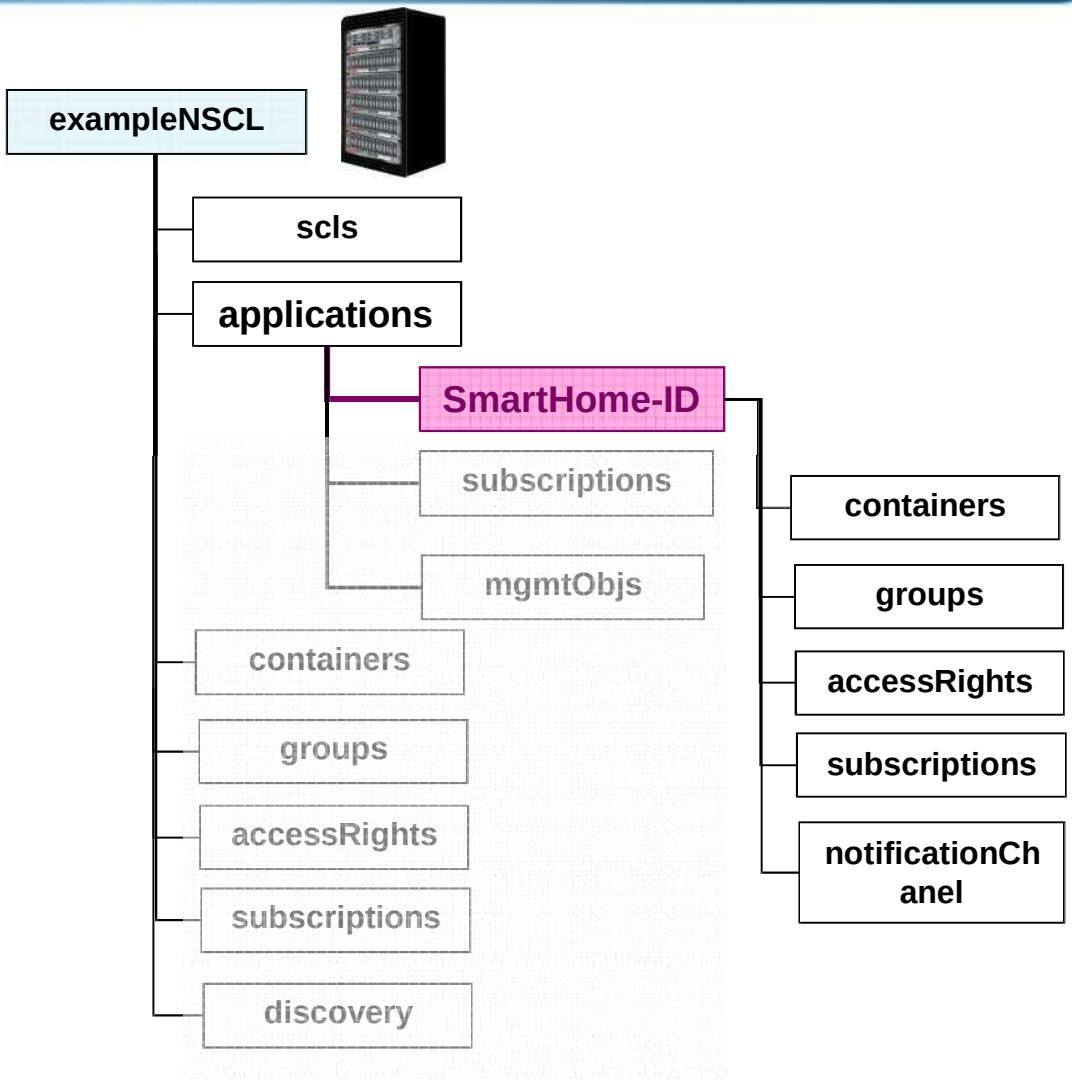
High level deployment



Flow of events

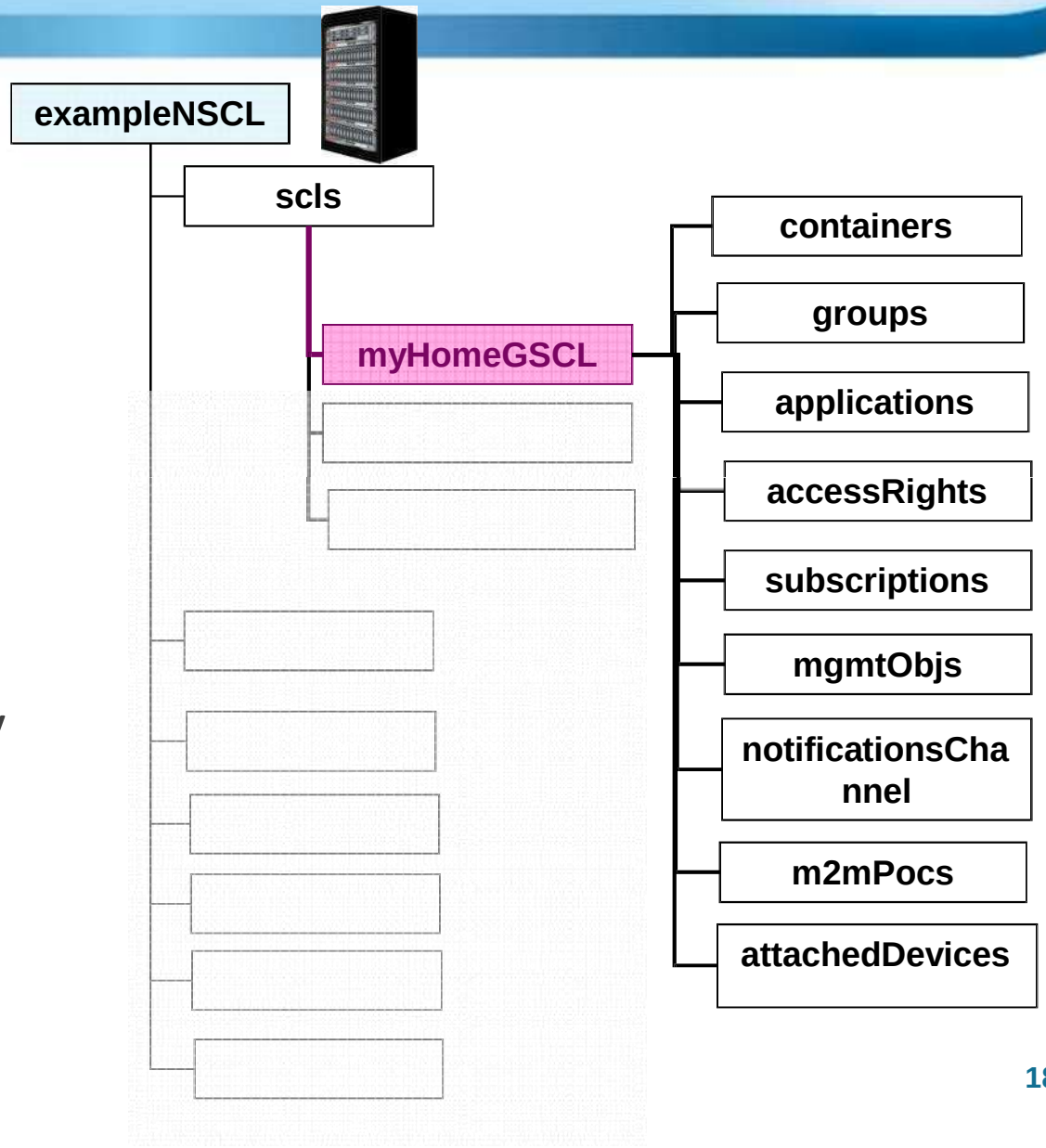


- Name of the NSCL = exampleNSCL
- Network application register with the ID = SmartHome-ID

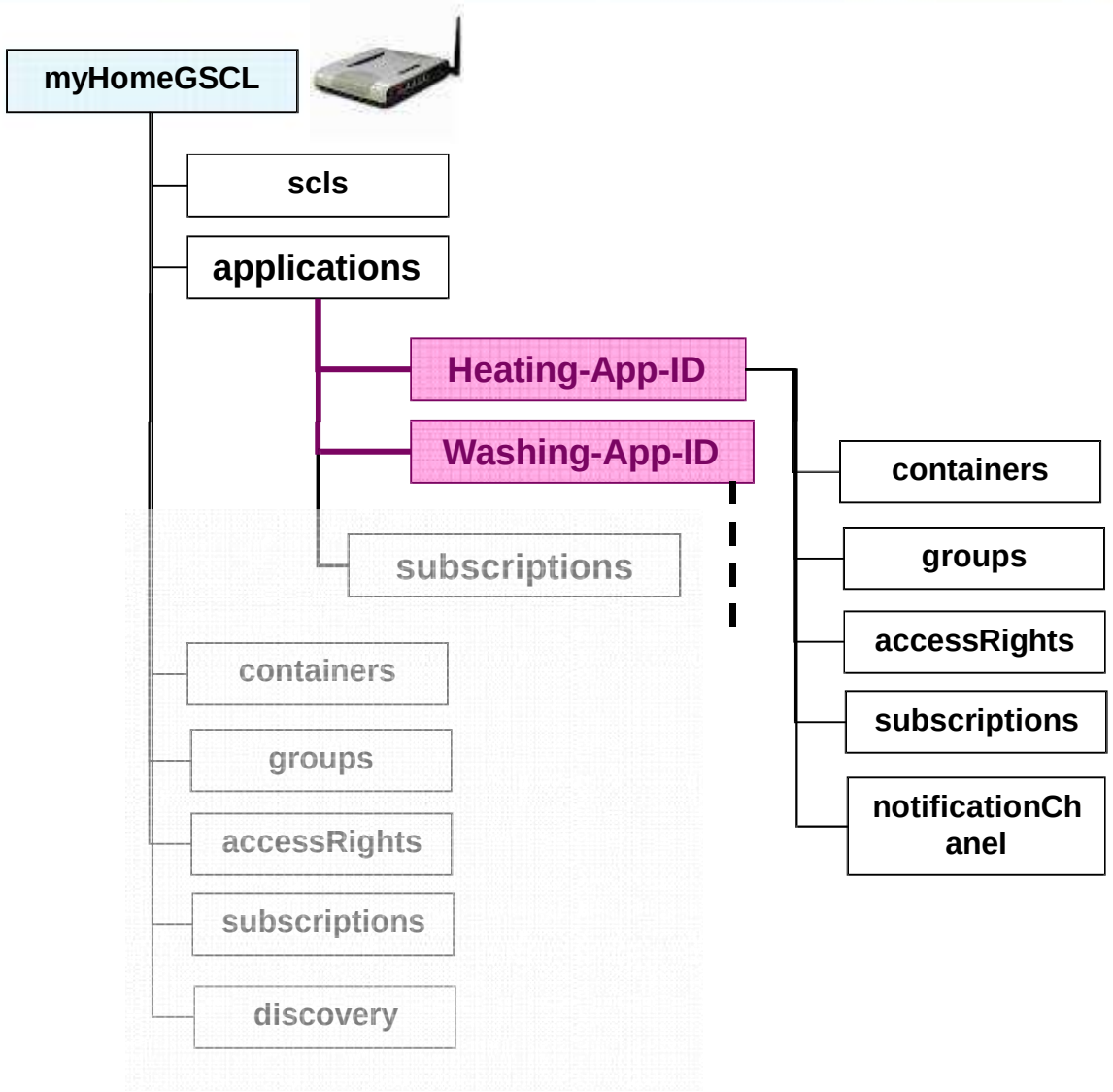


- Name of the NSCL = exampleNSCL
- Name of the GSCL =

- Before registration the GSCL and NSCL are authenticated by means of the M2M Communication procedures



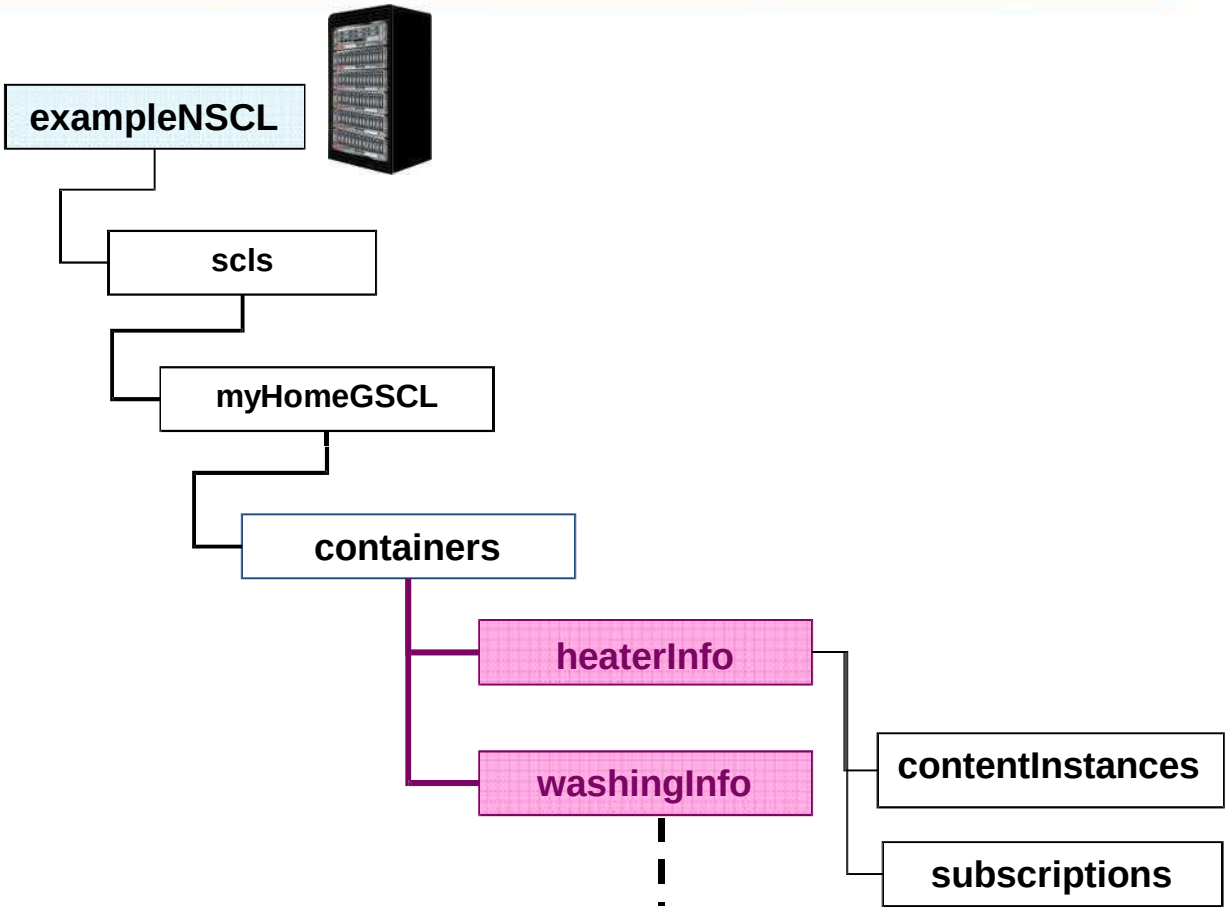
- Name of GSCL = myHomeGSCL
- Device application heating register with the ID = Heating-App-ID
- Device application washing-maching register with the ID = Washing-App-ID



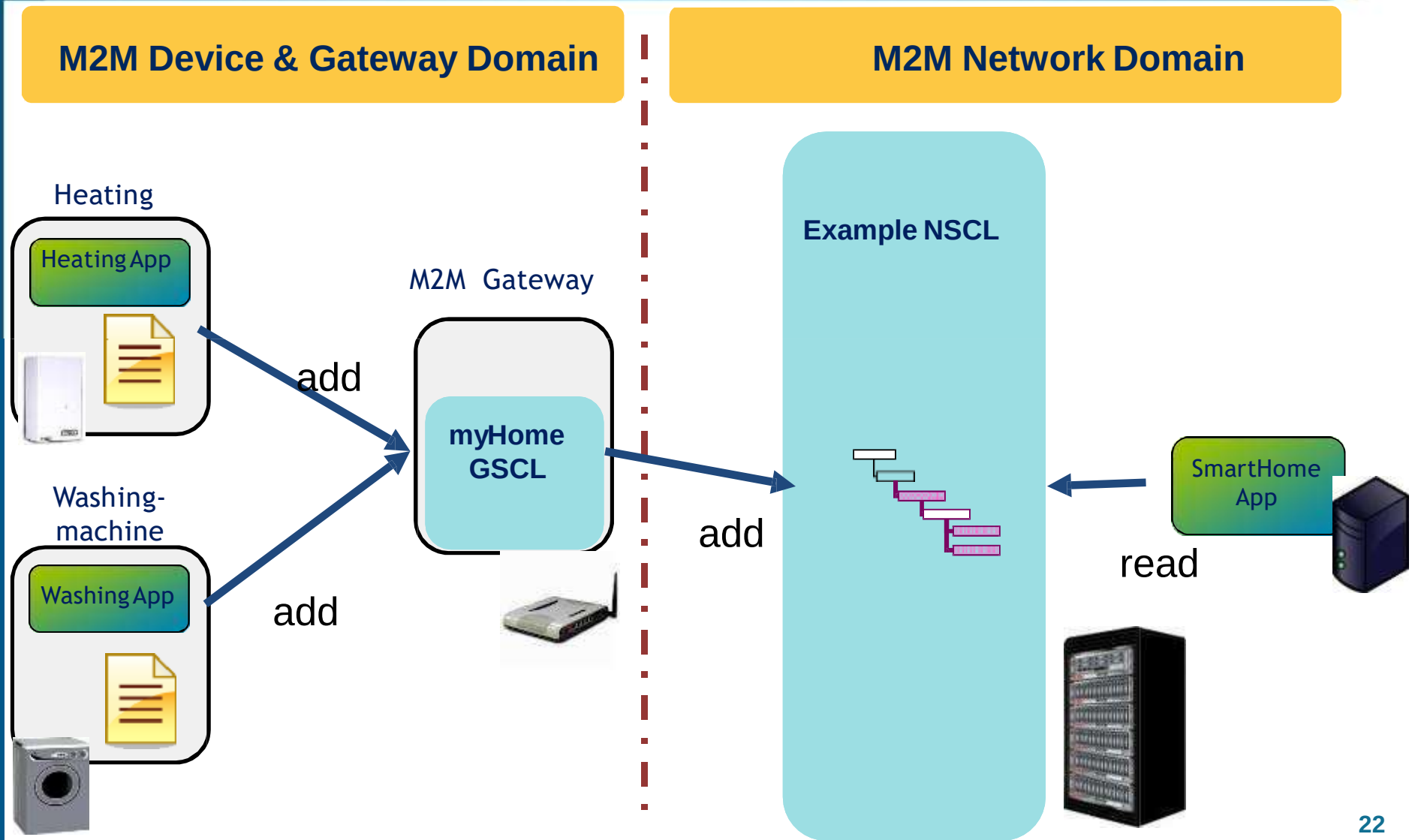
- Appropriate access rights needs to be set up.
  - For example the network application that knows the GSCL and the applications is setting up the accessRights
- information can now be transferred over the mId.

Store information

- The information from the 2 device applications are stored in the containers in the NSCL



Flow of events: add & read data



Flow of events: subscribe & notify

M2M Device & Gateway Domain

M2M Network Domain

Heating

Heating App

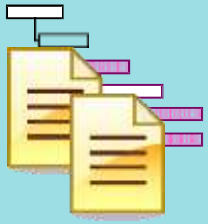
Washing-machine

Washing App

M2M Gateway

myHome GSCL

Example NSCL



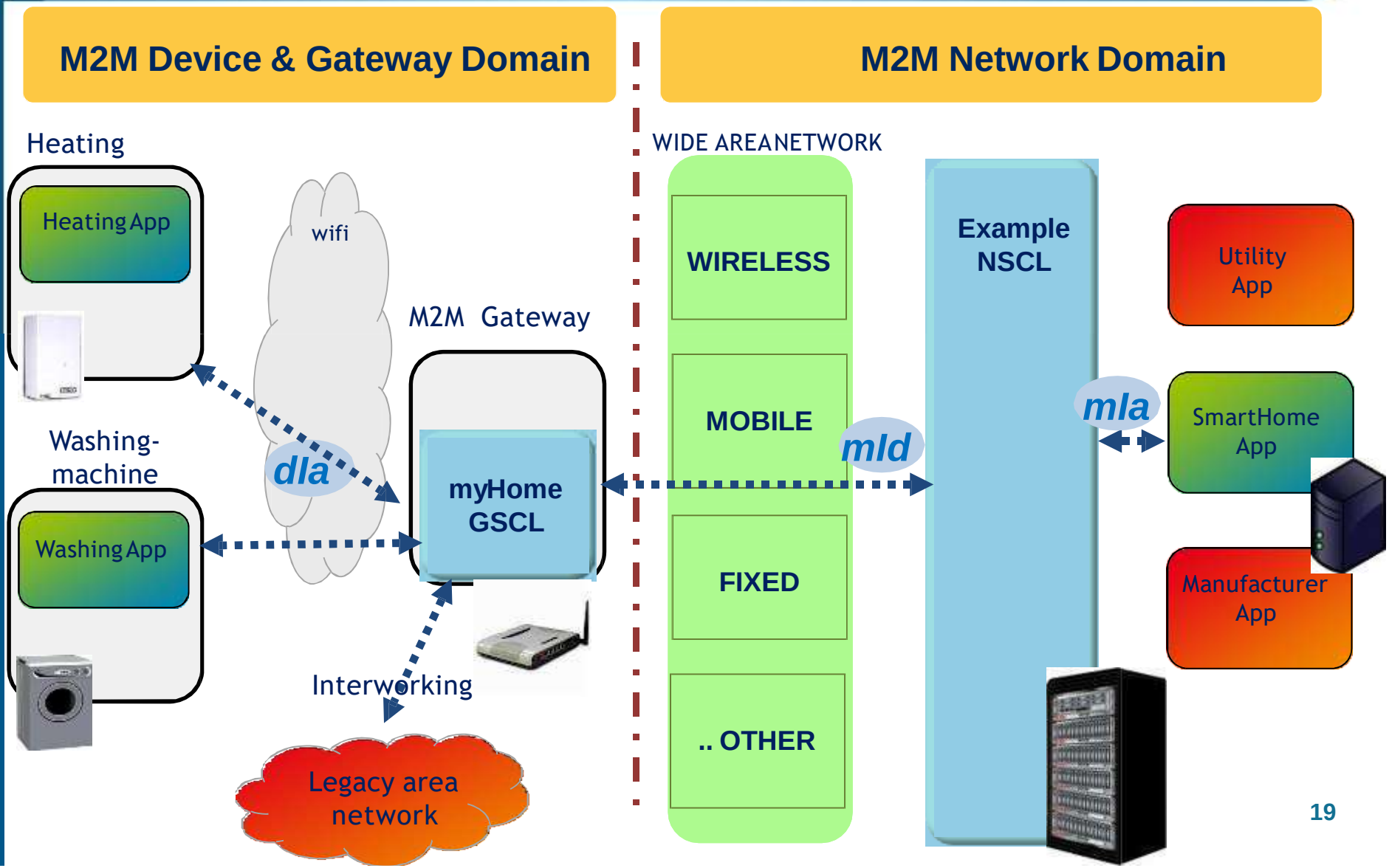
subscribe

SmartHome App

notify

- A new Network Application would like to reuse some of the data produced?
  - For example the device manufacturer that controls the performance and status of the device
  - The utility company that monitors the levels of utilization for each appliances
  - ….
- All you need to do is to develop the Network Application and
  - Ask the “owner” of the information to give you read permission by updating the access right
  - Retrieve the information and consume it

High level deployment



ITU-T IoT Reference Model

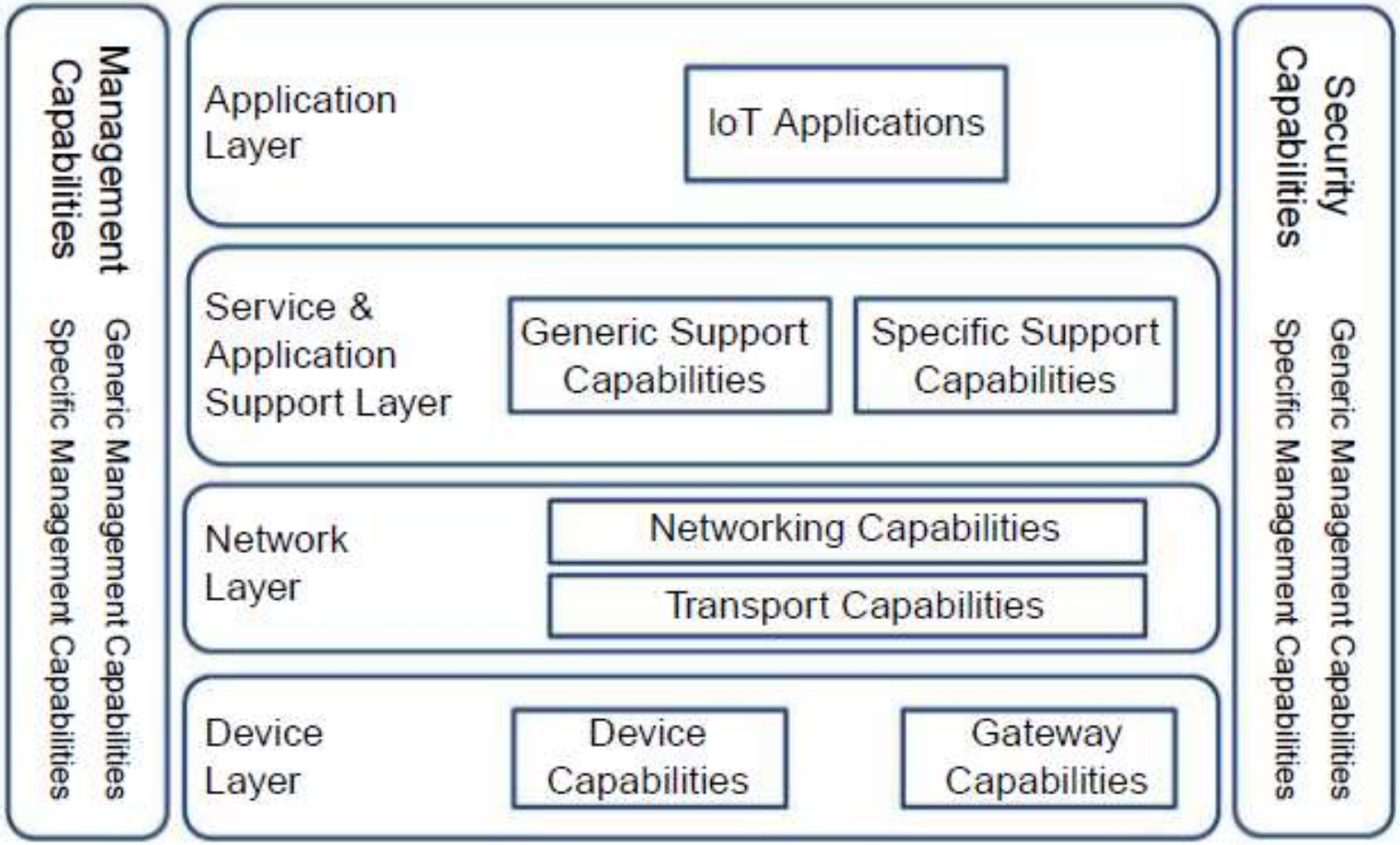


FIGURE 6.6

ITU-T IoT Reference Model.

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