M2M/IoT standards in ETSI and oneM2M

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TC SmartM2M (formerly TC M2M) ETSI

- Has been founded in 2008

- to develop and maintain an end-to-end overall telecommunication high level architecture for M2M

- to identify gaps where existing standards and provide specifications to fill these gaps

- TC SmartM2M has faced the challenge of developing a common M2M framework as an answer to the fragmentation of the solution that is penalizing the M2M market developments the understanding of the shared data

- Release 1 finalized end 2011

- Release 2 finalized in end 2012 TC SmartM2M is fully committed to the global initiative of oneM2M has already transferred the technical work of ETSI M2M Release 1 and 2 to oneM2M.
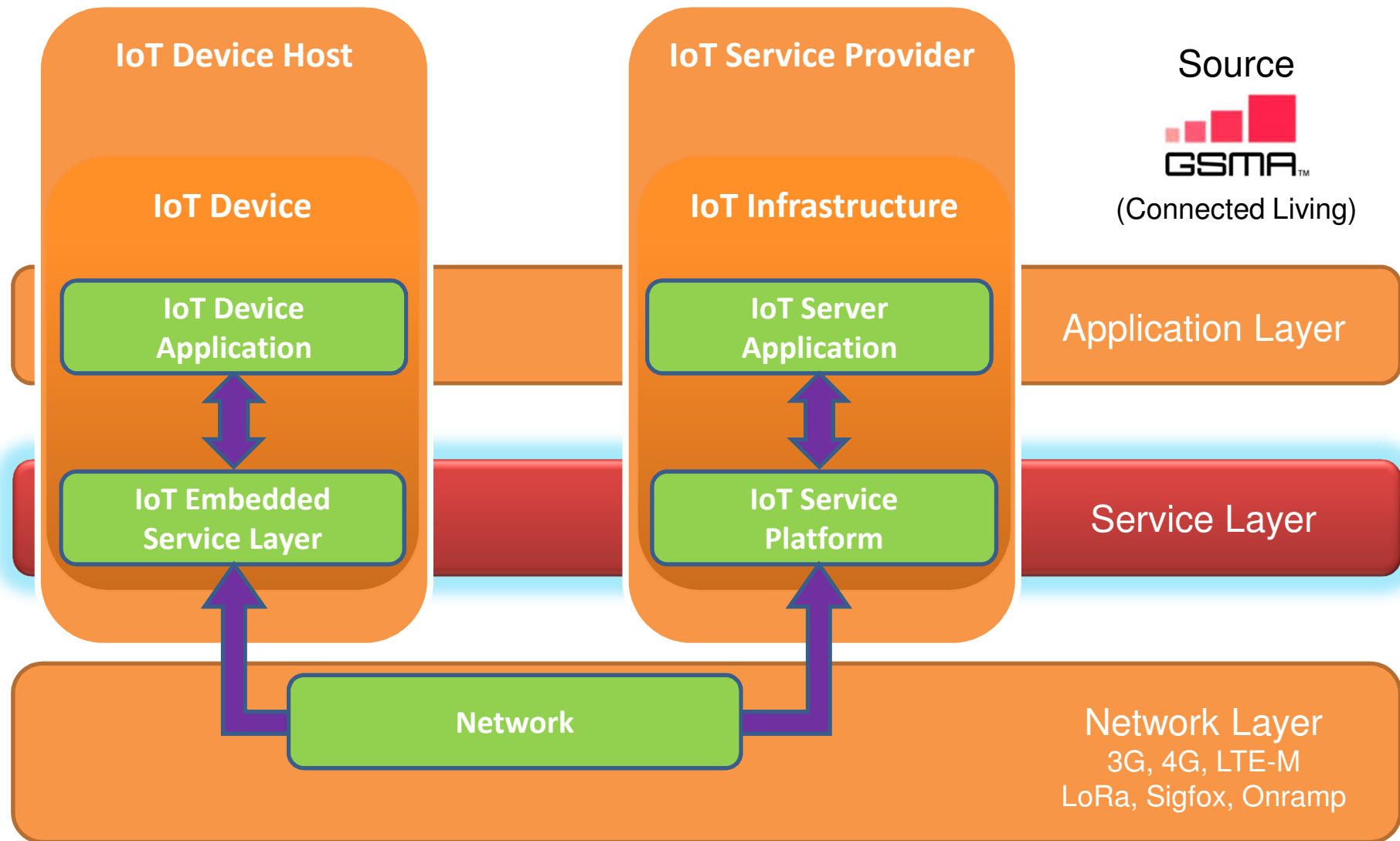
oneM2M – Partnership Project (2012)

Over 200 member organizations in oneM2M

oneM2M – Some member organizations

oneM2M – The Service Layer

ETSI

IoT Device Host

IoT Service Provider

Source

GSMA

(Connected Living)

IoT Device

IoT Infrastructure

IoT Device Application

IoT Server Application

Application Layer

IoT Embedded Service Layer

IoT Service Platform

Service Layer

Network
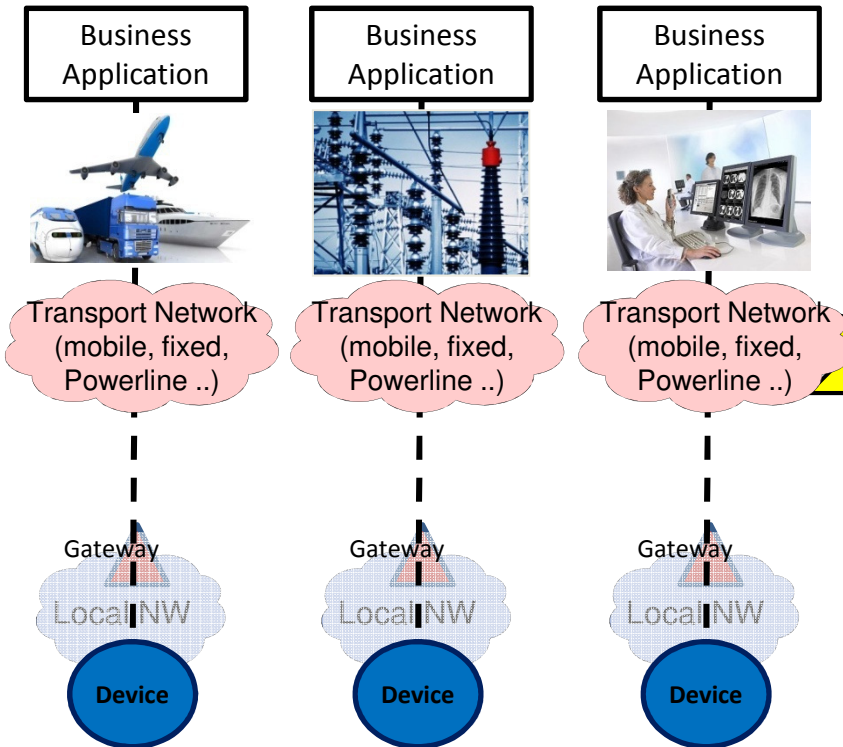
Network Layer
3G, 4G, LTE-M
LoRa, Sigfox, Onramp

Simplify the environment

Pipe#1
1 Application,
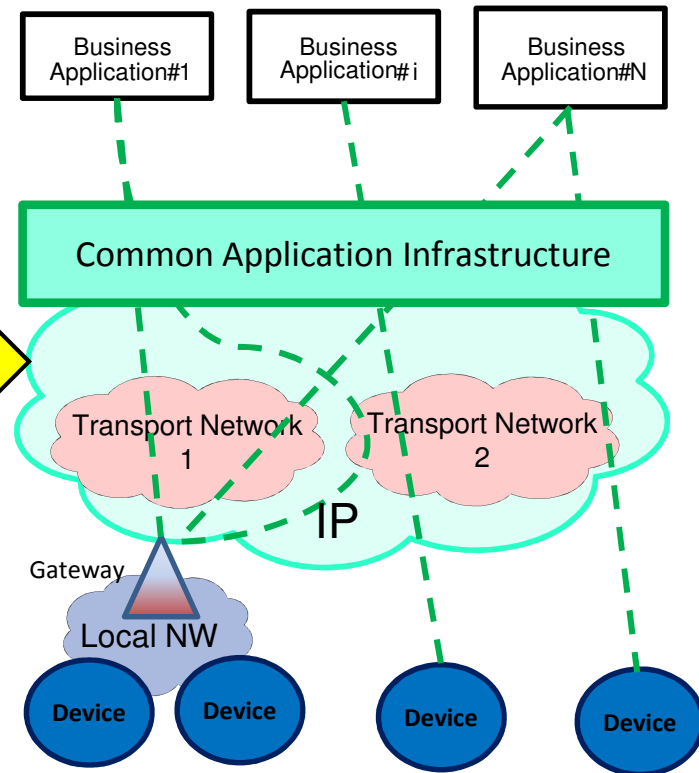1 Network
1 (or few) types of
Device

Pipe#2
1 Application,
1 Network
1 (or few) types of
Device

Pipe#N
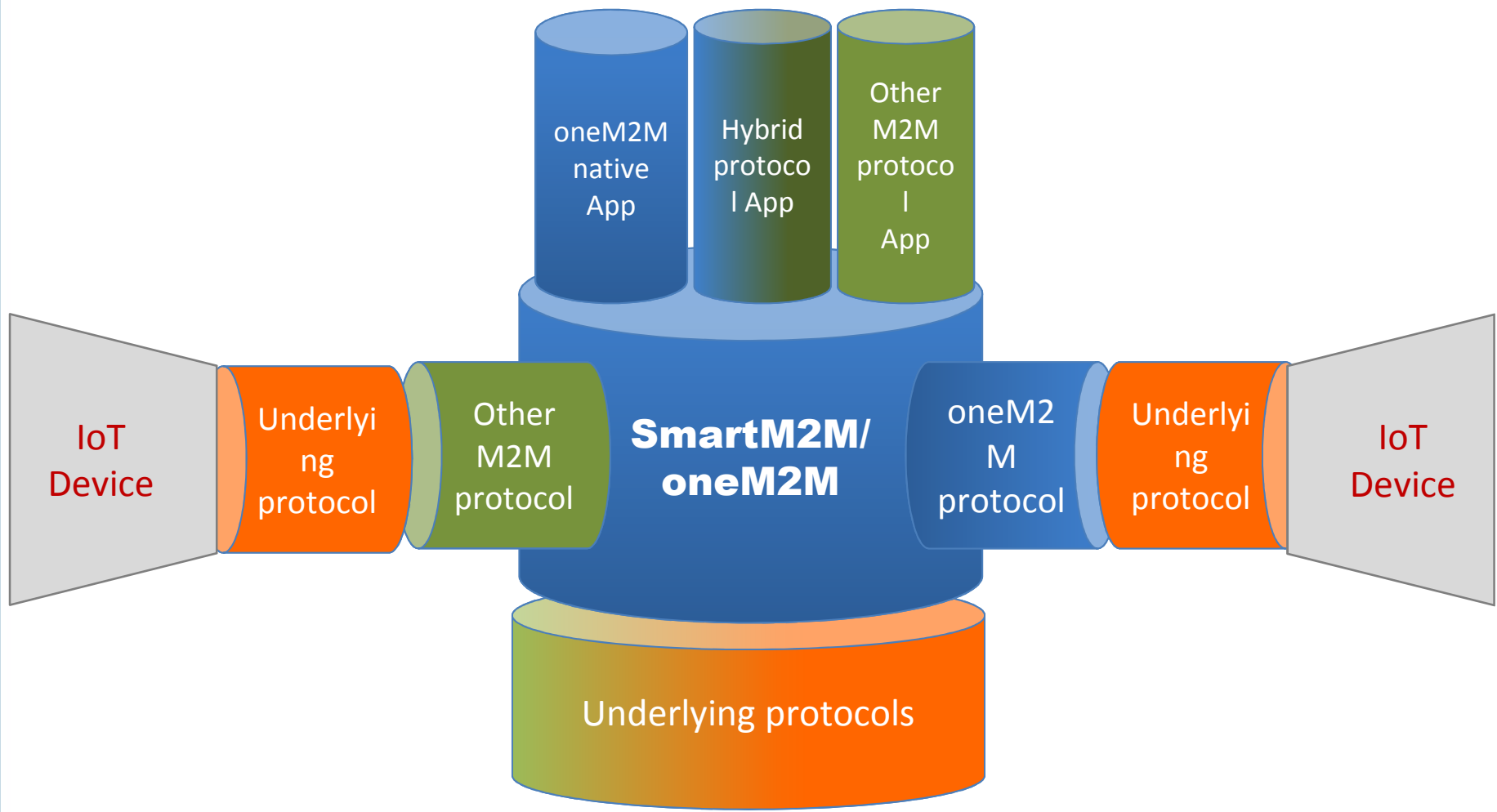1 Application,
1 Network
1 (or few) types of
Device

Horizontal (based on common Layer)
Applications share common infrastructure,
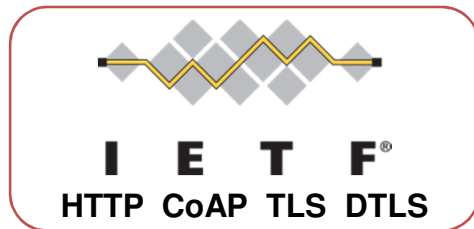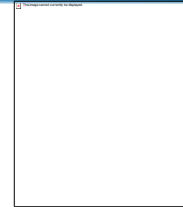environments and network elements

Business
Application

Business
Application

Business
Application

Business
Application#1

Business
Application#i

Business
Application#N

Common Application Infrastructure

Transport Network
(mobile, fixed,
Powerline ..)

Transport Network
(mobile, fixed,
Powerline ..)

Transport Network
(mobile, fixed,
Powerline ..)

Transport Network
1

Transport Network
2

IP

Gateway

Gateway

Gateway

Gateway

Local NW

Local NW

Local NW

Local NW

Device

Device

Device

Device

Device

Device

& provide the Interworking framework ETSI

oneM2M landscape

Guidelines

Protocols

Full platforms

- OASIS — MQTT — uses
- oma Open Mobile Alliance — OMADM LWM2M — uses
- IETF — HTTP CoAP TLS DTLS — uses
- oneM2M
- OPEN INTERCONNECT CONSORTIUM — interworks with
- ALLSEEN ALLIANCE — interworks with

OneM2M

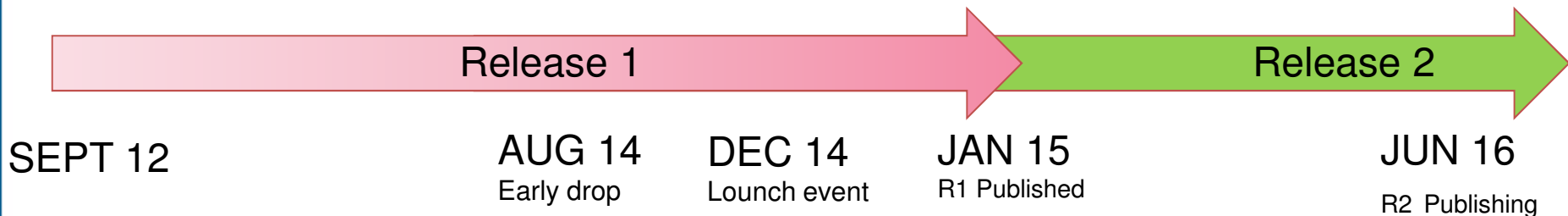Connectivity ▷ Deployment ▷ Integration
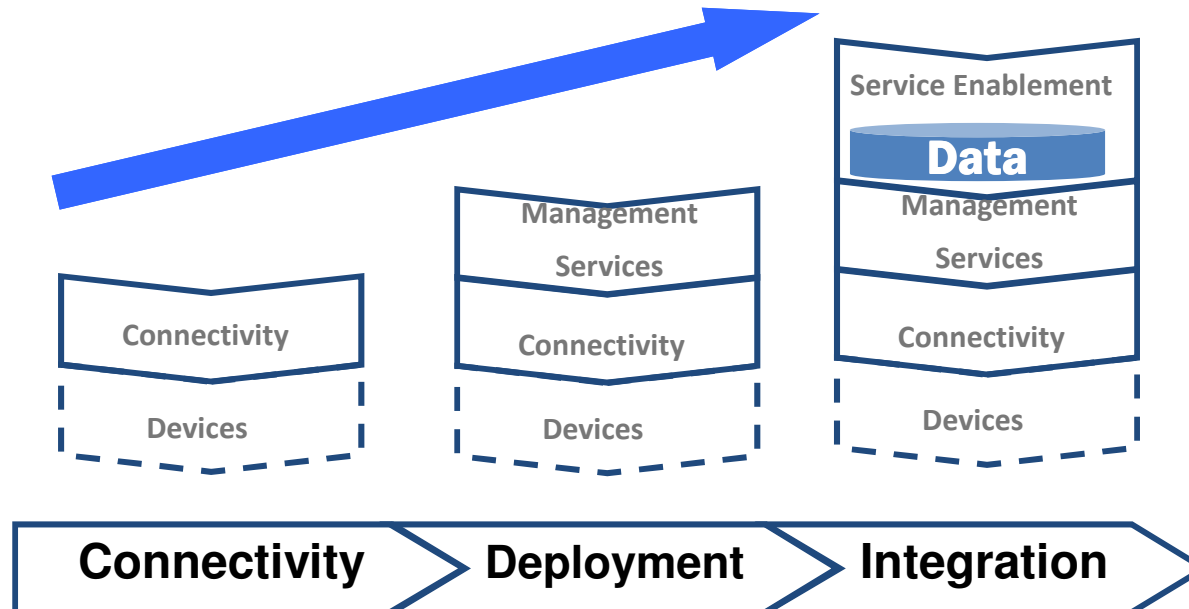
- ▸ **OneM2M standard is based on a "Store and Share" resource based paradigm.**
- ▸ **The data may be made available in the platform to the other applications, interested application are notified by means of subscription**
- ▸ **Privacy is ensured by a strict Access Control Management, which relies on underlying network security, providing a secure light solution**
- ▸ **oneM2M is heavily reusing underlying network functionalities, including TR069 and OMA DM management, LCS, subscription management, QoS, Charging, etc.**
- ▸ **OneM2M release 1 has been released January 2015,**

oneM2M status highlights

- **<u>Release 1</u> has been released in <u>January 2015</u>**
  - ▸ Being de facto an evolution of ETSI Specification, is significantly stable
  - ▸ It includes interworking support, but limited semantic support
- ▸ <u>Launch event took place on December 2014</u> with more than 10 multivendor demos,
- ▸ <u>First commercial full service launched in May 2015 in Korea</u>
- ▸ Testing specification are in progress, Interoperability test events was successfully run in September 2015

- ▸ 8 multivendor demos at the ETSI WS in December 9-10-11 2015 (No participation fee)
- ▸ Release 2 planned June 2016, focus on Semantic interoperability

| Release 1 | Release 2 |

SEPT 12

AUG 14
Early drop

DEC 14
Lounch event

JAN 15
R1 Published

JUN 16

R2 Publishing

And SmartM2M?

- **Support EU Commission needs and mandates in area of IoT and M2M**, (Smart Metering, Smart Grid, Smart Appliances) with direct normative work or bridging it to oneM2M as appropriate

- Support the EU driven initiative AIOTI, expecially WG3 on standardization, with use cases, landscape and architectural gap analysis

- **Support the potential issuing of a European M2M plug&play label** by 2016-2017, with the following set of specifications (Driven by DG Connect and DGE):

  - **Communication system for Smart Appliances (June 2015)**

  - **Common Smart Appliances Reference ontology (November 2015)**

    + related ETSI oneM2M data models mapping (June 2016)

- **Test suites for Smart Appliances (November 2016)**

- **Support onM2M plug tests in ETSI**

- **Support Visibility and dissemination of oneM2M**

EU Smart Appliance Initiative

M2M SEMANTICS FOR SMART APPLIANCE

The Energy using and producing Products (Appliances) in the home and in the industrial buildings are responsible for the biggest part of the energy consumption
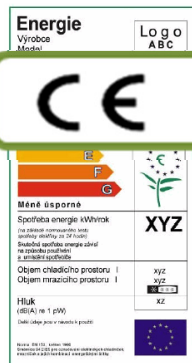
The objective is to allow a label that assures P&P capability among Smart appliances and toward application servers, both in term of semantic data models and communication framework.

Timeframe: 2016-2017

The DG Connect in coordination with DG Energy developed a study to analyse and develop a common semantic for Smart Appliances

DG Connect assigned to ETSI TC smartM2M the task to standardize it, complementing it with the communication framework (i.e. oneM2M)

oneM2M – introduction

oneM2M in a nutshell:
Principles, Functions,
Architecture & API

oneM2M in a nutshell

OneM2M is an IoT Interworking Framework

- Designed to interwork with legacy, proprietary and sector solution. This is based on a separation betwenn protocol interworking an semantinc interworking.
- Semantic interworking is already present in oneM2M Release 1, extention to full semantic support will be completed in oneM2M Release 2.

OneM2M is an IoT common Service Enablement layer

- Service independent
- Distruibuited (Devices, Gateways, Network servers)
- Application portability

oneM2M in a nutshell

Main Characteristics

- URI identification (and separation from IP addressing)
- IP based (irrelevant the version, IPv4 or IPV6)
- Network independent (but network aware!)
- REST approach
- Application protability
- Device and subscription management
- Accounting and charging
- HTTP/COAP/MQTT transport

Peculiary functions

- Store and share paradigm
- Data management and historization
- Separation among Security and Privacy
- Flexible deployment (large, small, distributed, centralized)
- Network functionality re-use (Location, Device Management, Security, etc)
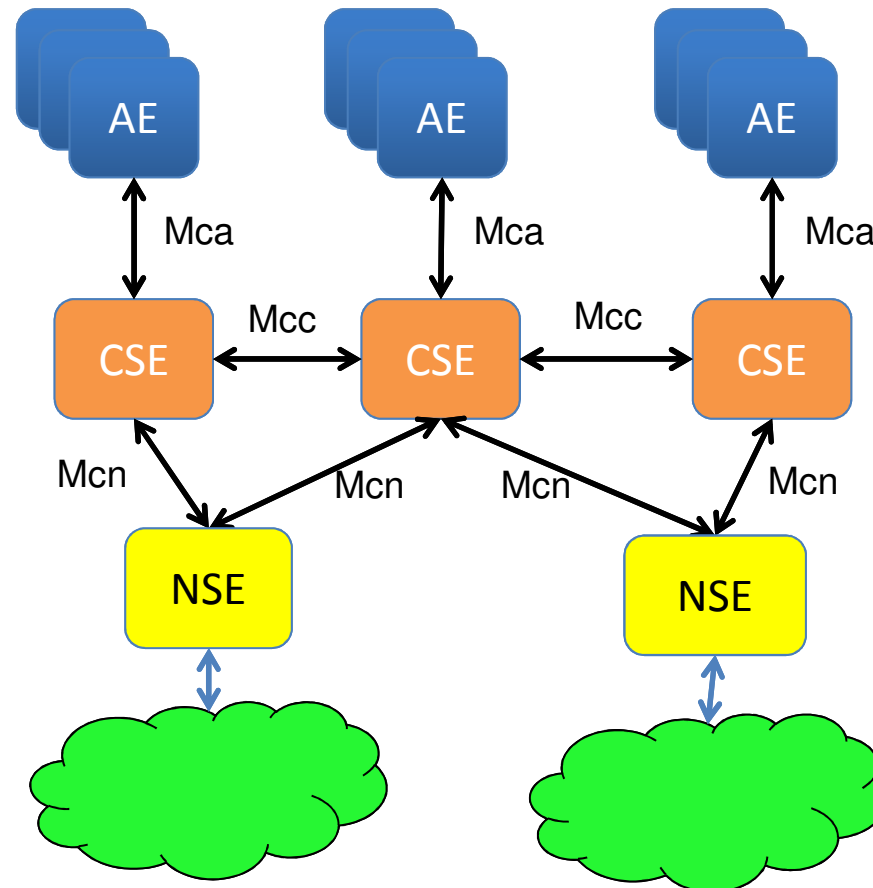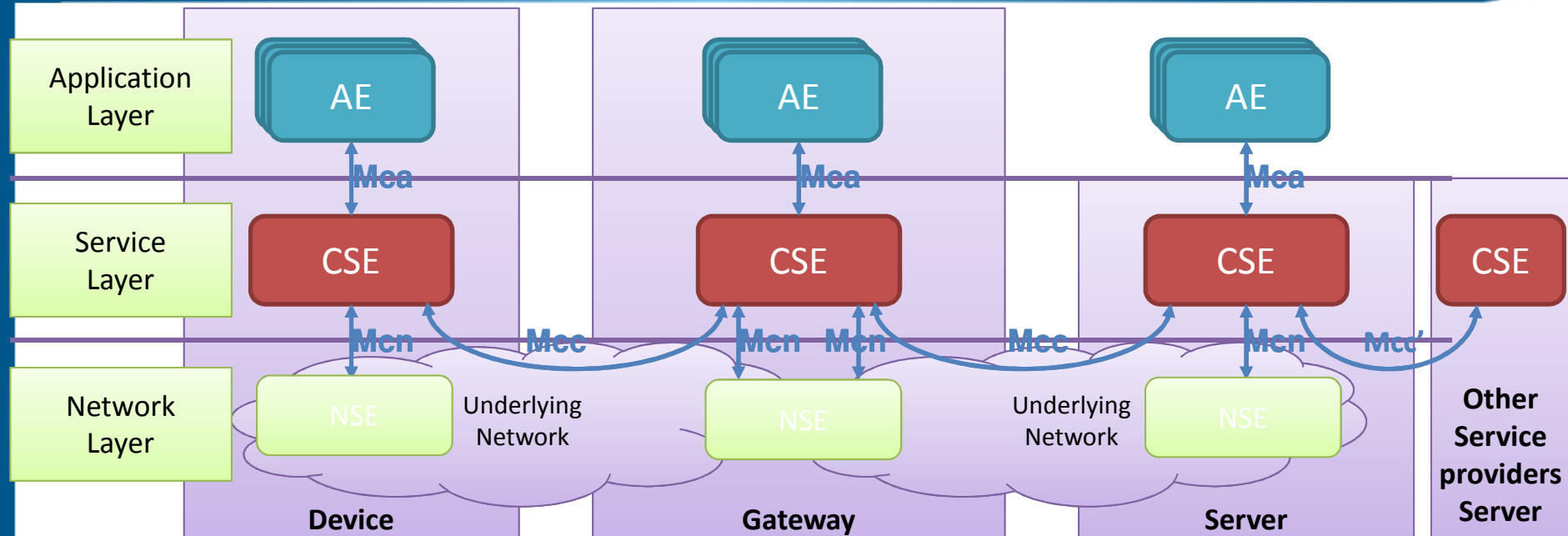
oneM2M simplified Architecture

M2M Applications

M2M Service layer

Network Service Entity

Underlying Transport

AE — Mca — CSE — Mcc — CSE — Mcc — CSE
NSE — Mcn — NSE

oneM2M – Common API

Entities	AE (Application Entity), CSE (Common Services Entity), NSE (Network Service Entity
Reference Point	Mca, Mcn, Mcc and Mcc'

EXAMPLE REQUEST

GET http://provider.net/home/temperature/la
HTTP/1.1
Host: provider.net
X-Orig: /CSE-1234/WeatherApp42
X-M2M-RI: 56398096
Accept: application/vnd.onem2m-res+json

EXAMPLE RESPONSE

HTTP/1.1 200 OK
X-M2M-RI: 56398096
Content-Type: application/vnd.onem2m-res+json
Content-Length: 94
{"ri":"28375964","cnf":"application/json:0",
"con":"{'timestamp':1413405177000,'value':25.32}"}

OneM2M architecture entities

- **AE:** Application Entity, containing the application logic of the M2M solution like home management functions, fleet management, blood sugar monitoring

- **CSE:** Common Service Entity containing a set of common service functions (CFE) that are common to a broad range of M2M environment (verticals). This is the main part of the oneM2M specification

- **CSF:** Common Service Functions included in a CSE, CSFs can be mandatory or optional, CSF can contain sub-functions (mandatory or optional)

- **NSE:** Network Service Entity, provides network services to the CSE, like device triggering, device management support, location services. These services are related to the underlying network capabilities

OneM2M architecture Reference points

- **Mca- Reference Points:** the interface point between the AE and the CSE, the Mca point provides the M2M applications access to the common services included in the CSE. The AE and CSE my be co-located in the same physical entity or not

- **Mcc- Reference Points:** This is the reference point between two CSEs. The Mcc reference point shall allow a CSE to use the services of another CSE in order to fulfil needed functionality. Accordingly, the Mcc reference point between two CSEs shall be supported over different M2M physical entities. The services offered via the Mcc reference point are dependent on the functionality supported by the CSEs

- **Mcn- Reference Points:** This is the reference point between a CSE and the Underlying Network Services Entity. The Mcn reference point shall allow a CSE to use the services (other than transport and connectivity services) provided by the Underlying Network Services Entity in order to fulfil the needed functionality.

- **Mcc'- Reference Point:** interface between two M2M service providers, As similar as possible to the Mcc reference point. But due to the nature of inter-M2M Service Provider communications, some differences are anticipated.

QUESTIONS?

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www.etsi.org

www.oneM2M.org

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