



**Webinar Series**

**Episode #3: Smart sustainable city architectures: challenges and opportunities of Digital Transformation for Cities and Communities(DT4CC)**

# **OneM2M: the IoT integration framework for technological diversity**

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ETSI TC smartM2M Chairman**

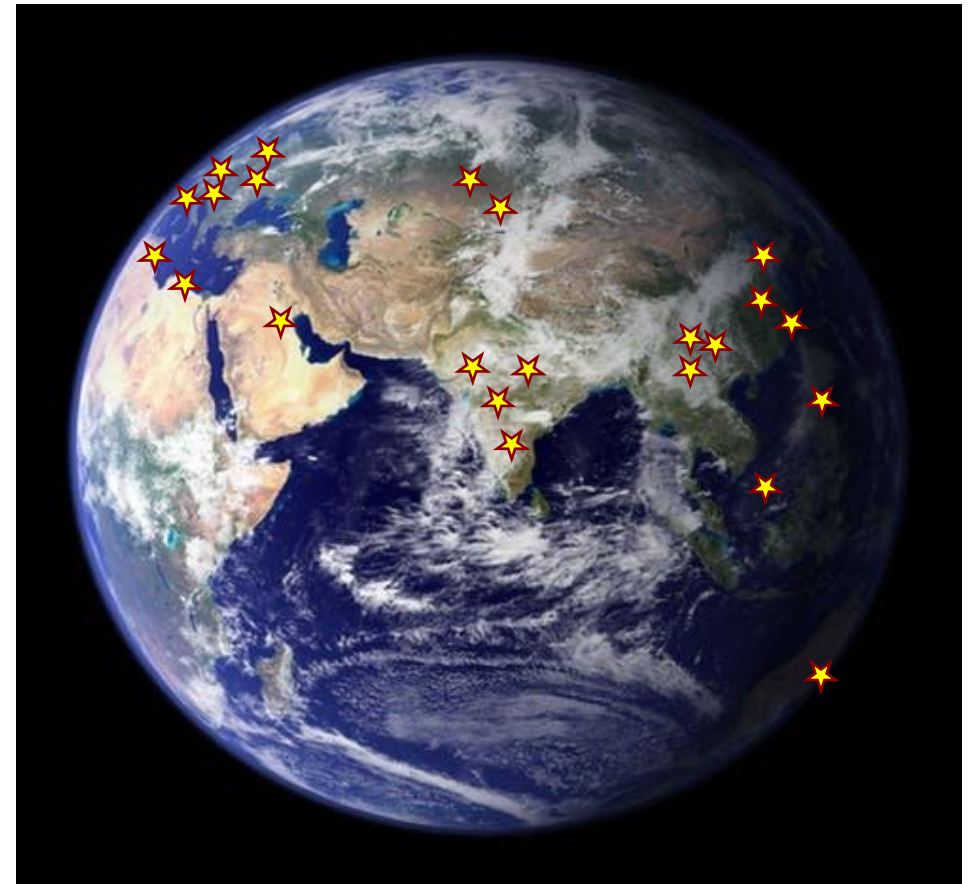
# Internet of Things

It is a significant reality but it is far from expectations

Do you remember the forecasts?

-20 billion devices by 2020

-50 billion devices by 2025



# Internet of Things

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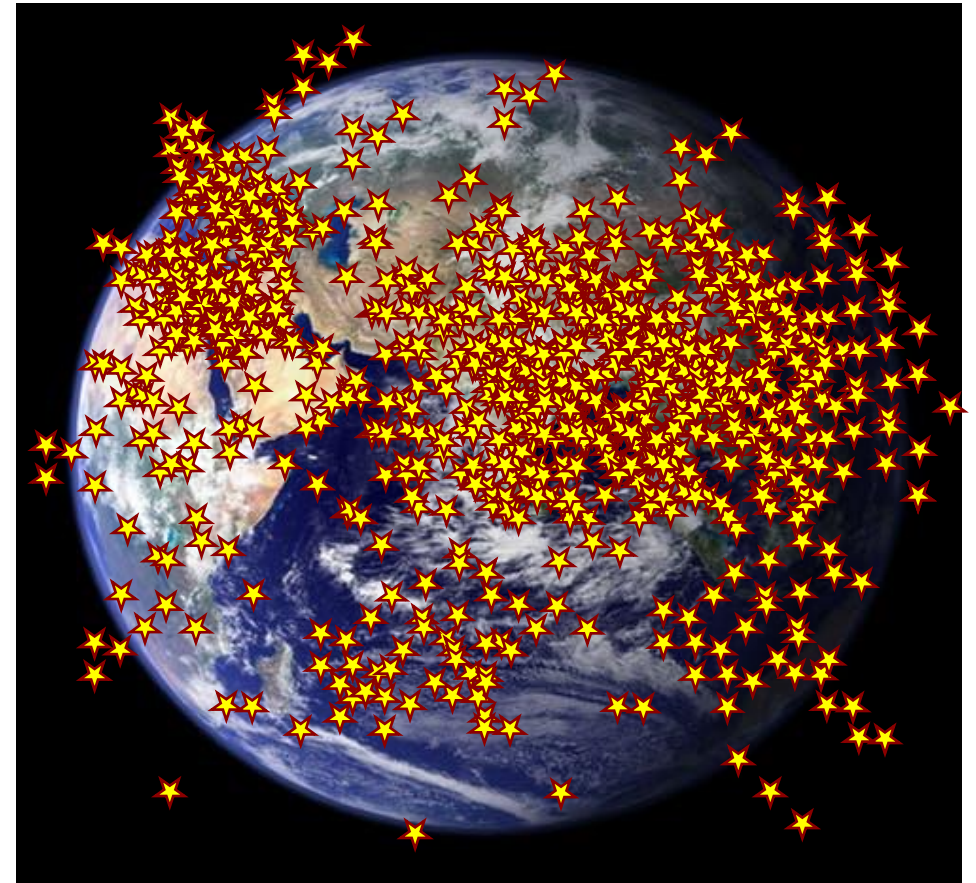
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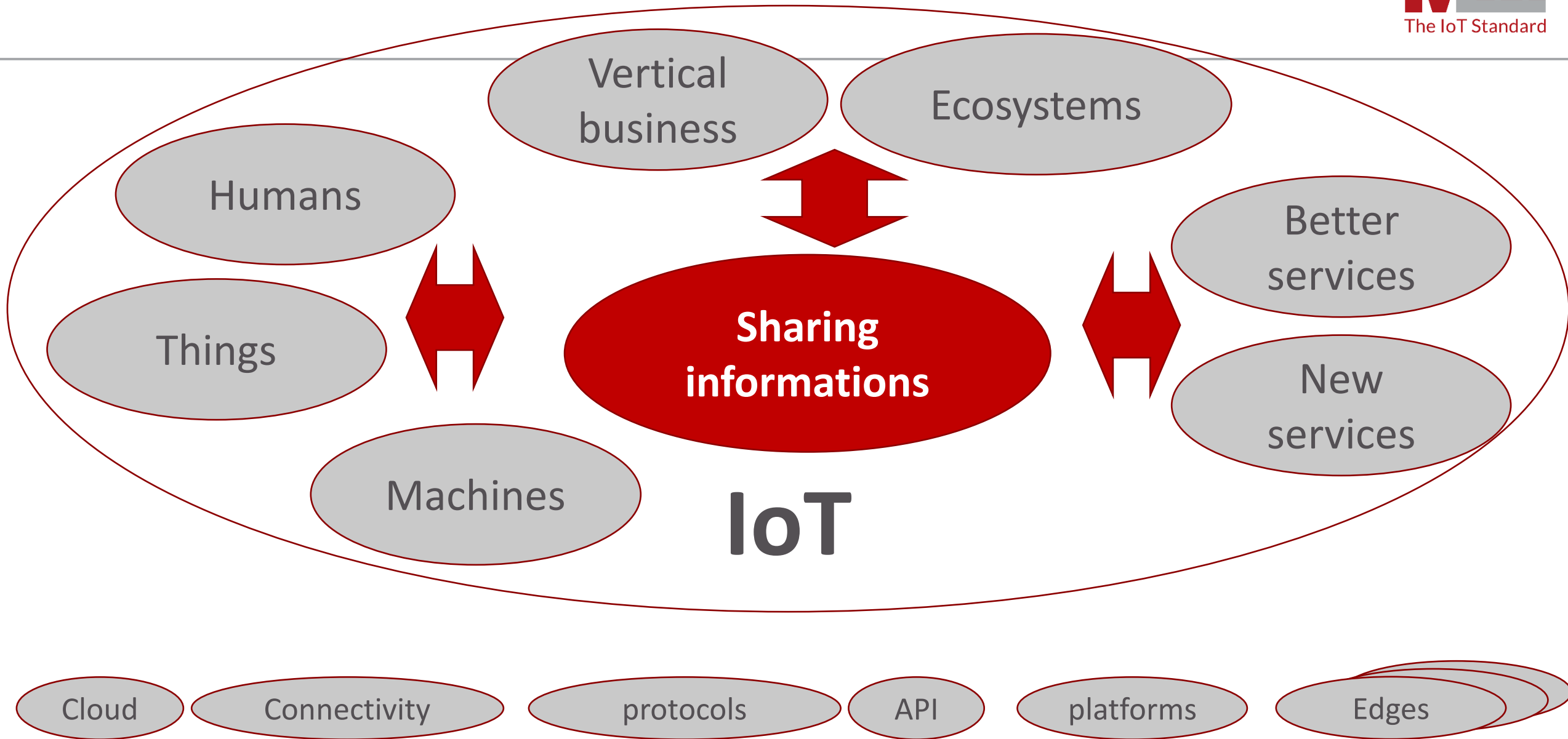
IOT is a really a bigger promise...

much more than 50 billion....

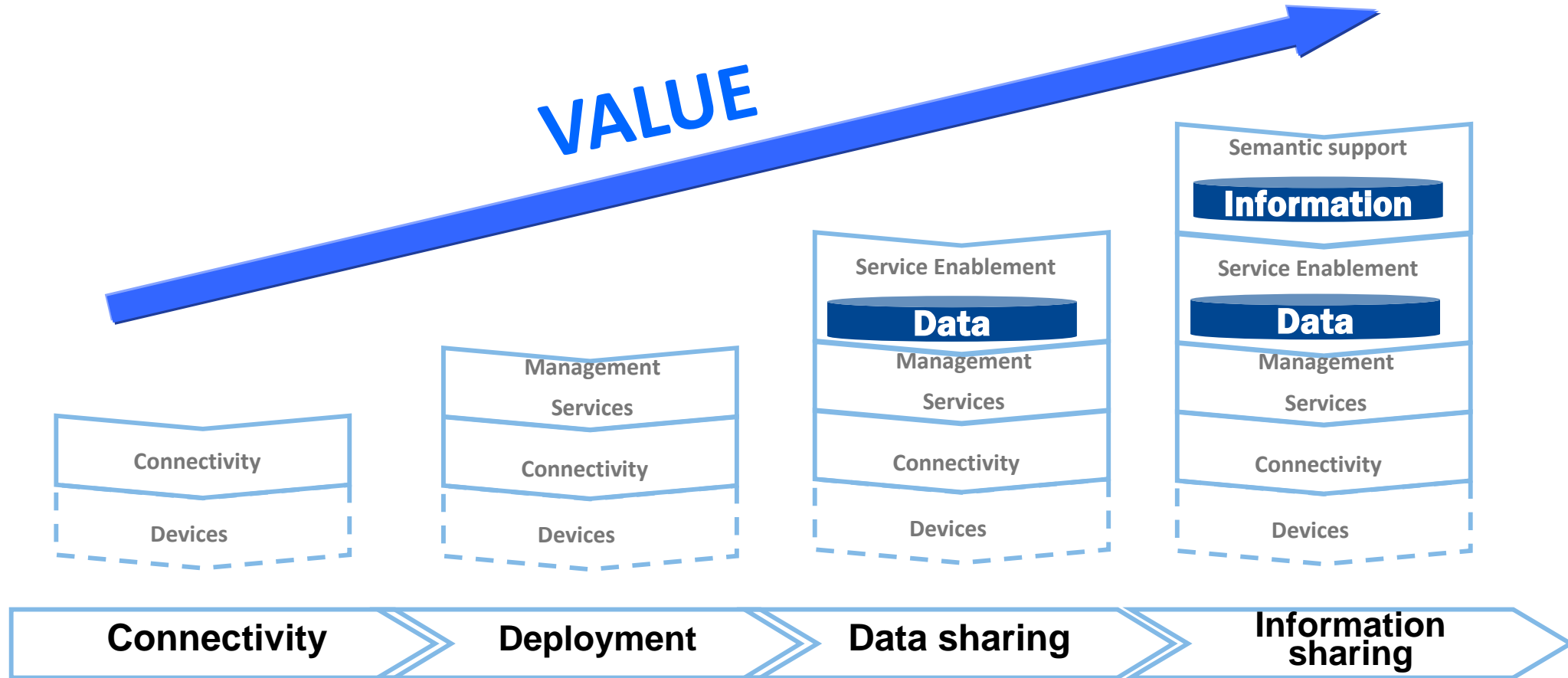
But WHEN? WHY is late?



# IoT: what is about!



# VALUE: From Connectivity to Information sharing



# Internet of Things: the main showstopper

- The main effort is today on **INTEGRATION** of **DATA PLATFORMS, TECHNOLOGY, COMMUNICATION PROTOCOLS**
- **FRAGMENTATION** is the major **SHOW STOPPER**:

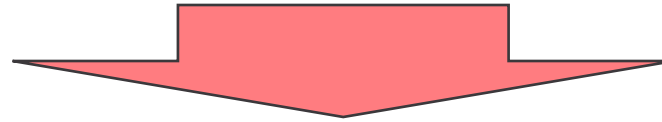
FRAGMENTATION and solution(s!) LOCKING  
ARE DRAINING MOST of the IOT resources

- The main effort should be on the **SERVICES DEVELOPMENT** and on the **INTEGRATION OF INFORMATION** generated by the different sources.

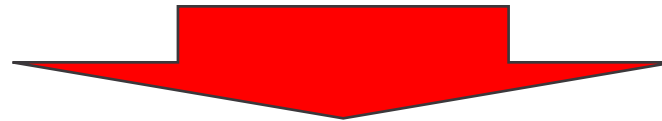
So it is necessary to **MITIGATE** the **FRAGMENTATION** and **LEVERAGE** on the **DIVERSITY** of the current investment gathering together the existing ecosystems.

# The role of Standardization for IOT

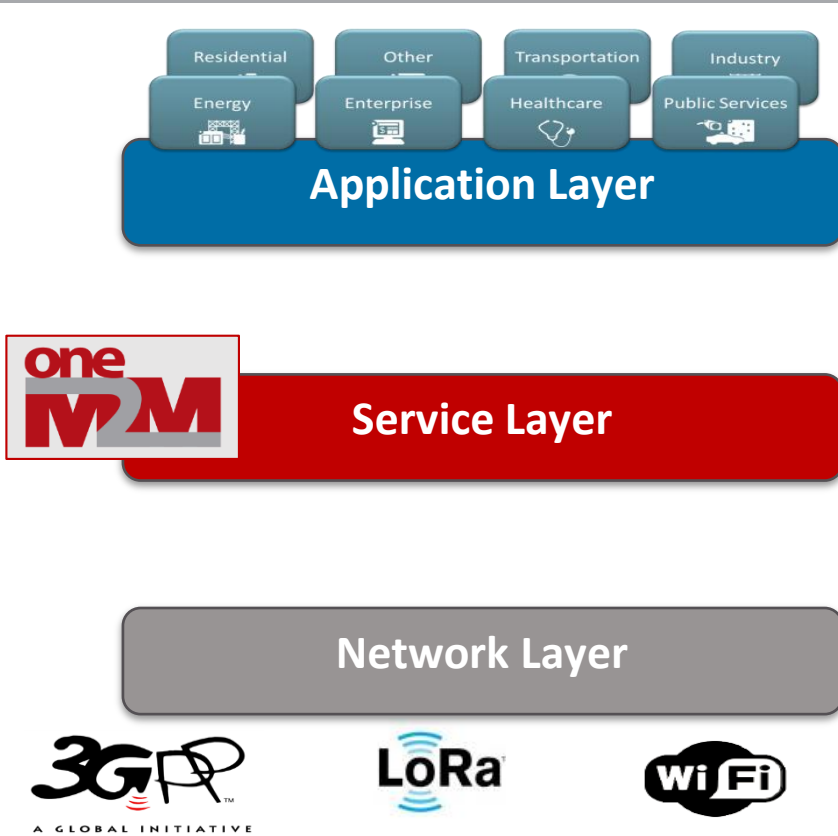
- **Simplify** the environment, **deprecate** the unnecessary duplicated solution, **preserve** the necessary/opportune solution specialization by **interworking**, **amplify the value of existing ecosystems**



- Support the **developers community** accelerating the development of IoT
- Transfer the competition from integration and platforms **to services unlocking the market**
- Enable Inter-technology and inter-domain data sharing generating **new services and new business opportunity, putting together the markets and the existing ecosystems**



**Reduce platform development and integration costs,  
Enlarge the market, gather the existing ecosystems  
Enable real competition on services**



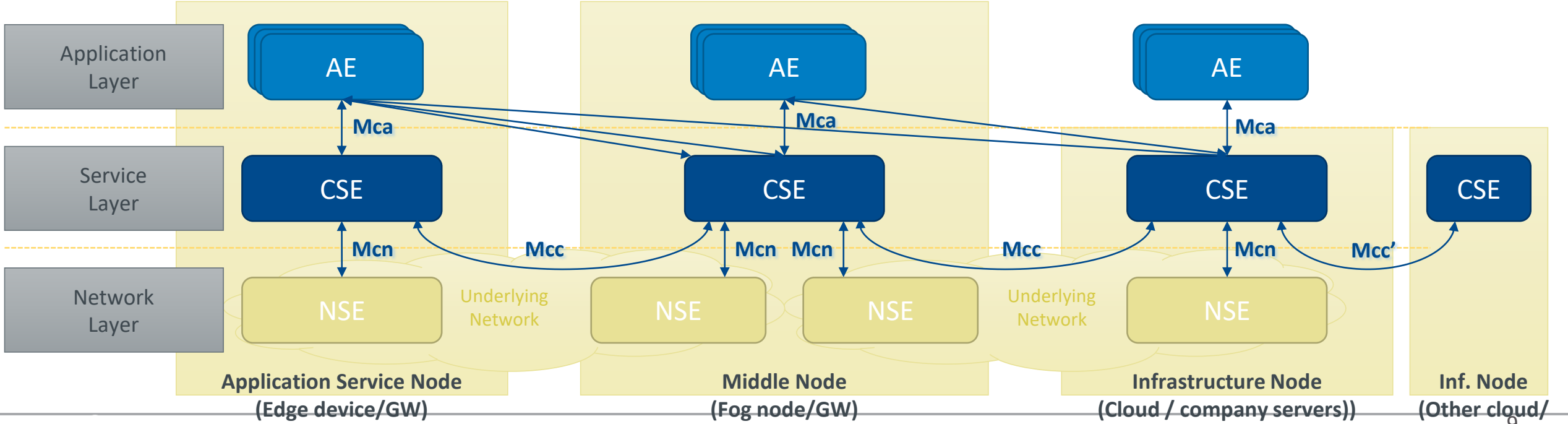
- oneM2M specifies a **distributed software/middleware layer**, sitting between applications and underlying communication networking HW/SW, Integrated into **devices gateways & servers**
- **Bridges** communication technologies, e.g.: **fixed, NB-IoT, 3GPP 4G, 5G, LoRa..**
- **Interworks** existing solutions
- **Manages data** (communicate, store, share)
- **Manages devices and nodes**
- Allows to **annotate data** with **semantic descriptions**
- It is **IP based and URL/URI based**
- **Identifiers** are IP domain based (**URI-like format**)
- **Separation** of **communication** (data management) from specific **semantic** aspects (the information)

...and most importantly:  is a **Global Standard** – not controlled by a single private company!



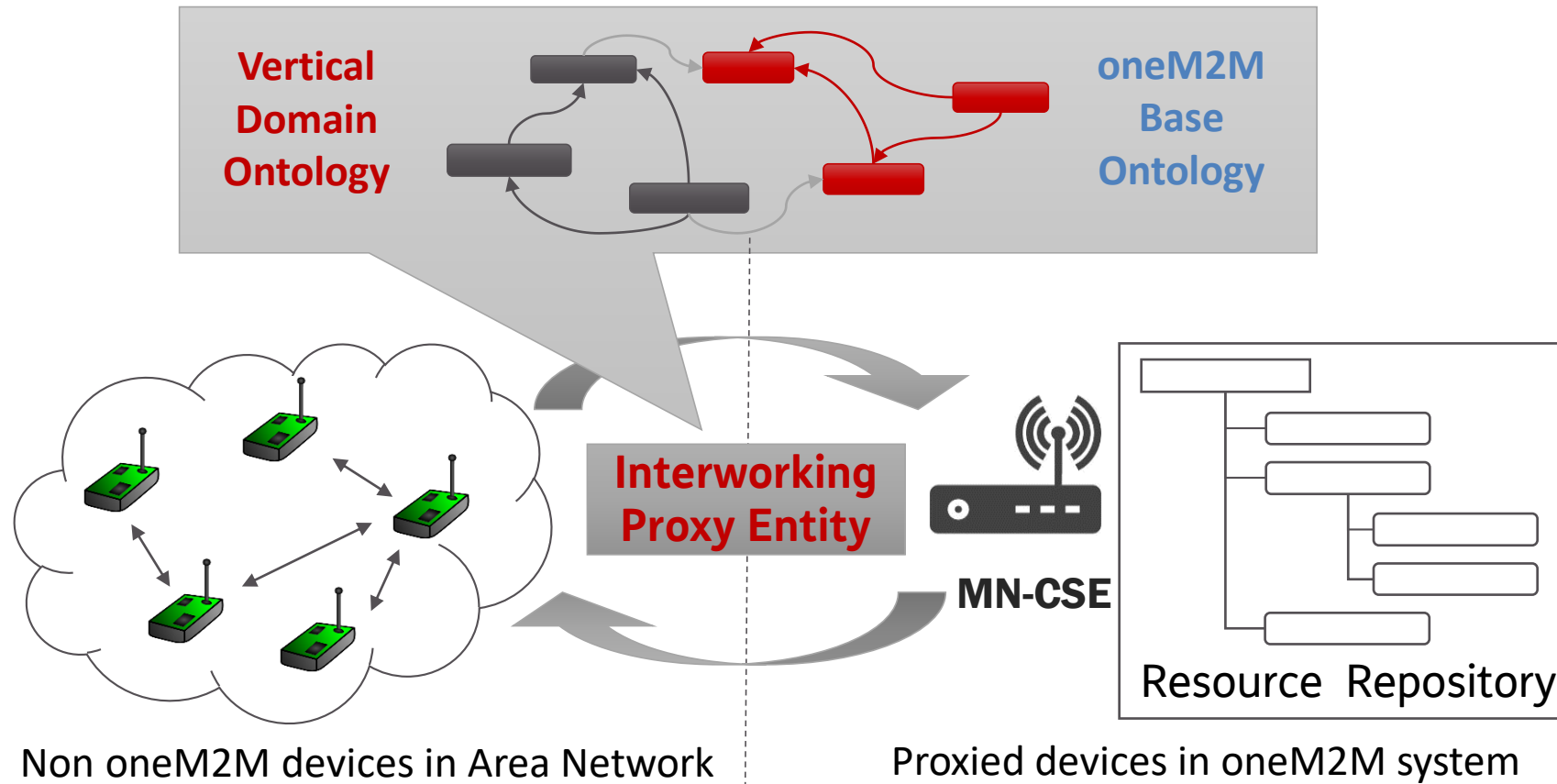
# oneM2M simplified Architecture

- Reference Point** One or more interfaces - Mca, Mcn, Mcc and Mcc' (between 2 service providers)
- Common Services Entity** Provides the set of "service functions" that are common to the IoT environments
- Application Entity** Provides application logic for the end-to-end IoT solutions
- Network Services Entity** Provides services to the CSEs besides the pure data transport
- Node** Logical equivalent of a physical (or possibly virtualized, especially on the server side) device



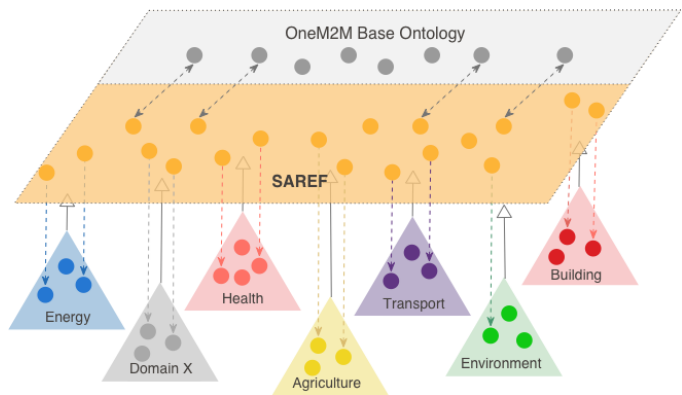
# Generic interworking using semantic

- Non oneM2M devices are described using the oneM2M base ontology + domain specific extensions.
- The Interworking Proxy Entity translates the ontology instance to resources on the CSE based on pre-defined instantiation rules.

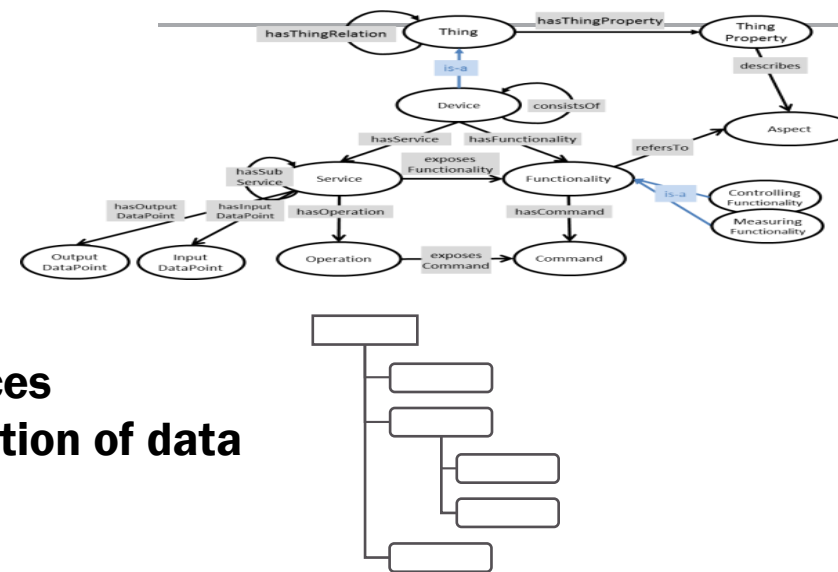


# Universal semantic interoperability SAREF/oneM2M

Specific Abstraction Models, grouped around a core common ontology



General base Ontology



OneM2M resources  
Semantic annotation of data



1) Vertical ontologies support



SAREF and its extensions



2) Semantic Support



IoT base ontology + Data annotation



3) Communication Framework



IoT Data sharing



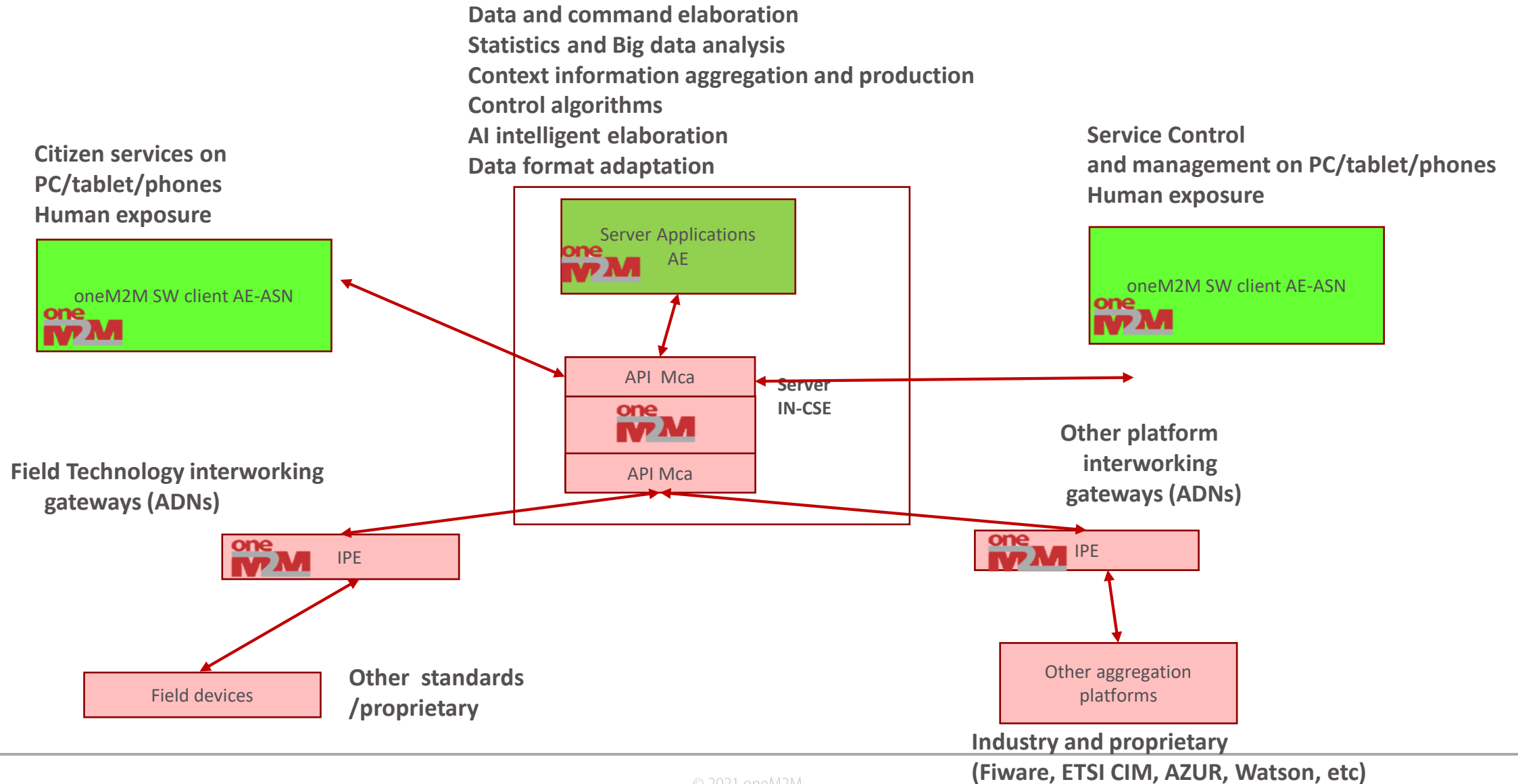
# WHY to use oneM2M?

- **THE ONLY STANDARD “DE JURE” DEDICATED TO ENABLE HORIZONTAL IOT INTEGRATION**
- **DATA MANAGEMENT - DATA HISTORIZATION - INFORMATION SHARING**
- **VERY DYNAMIC PRIVACY AND ACCESS CONTROL**
- **SECURE: MULTIPLE SECURITY LEVELS**
- **STORAGE AND EXPOSURE FOR**
  - Historical data
  - Data search and aggregation
  - Context information
  - Dynamic data
  - Real time control and actuation
  - Field device management
  - Network technologies independence
- **EASY DB AND CLOUD INTEGRATION**
- **NATIVE DEVICE MANAGEMENT (DM; TR 069)**
- **FLEXIBLE IN THE DEPLOYMENT** to adapt to the requirements of the various domains
- **SCALABLE ARCHITECTURE**
- **INTER-PROVIDER NATIVE SUPPORT**
- **DESIGNED BE AN INTERWORKING FRAMEWORK FOR**
  - Legacy field and core server technologies
  - Other technologies
  - Proprietary solution

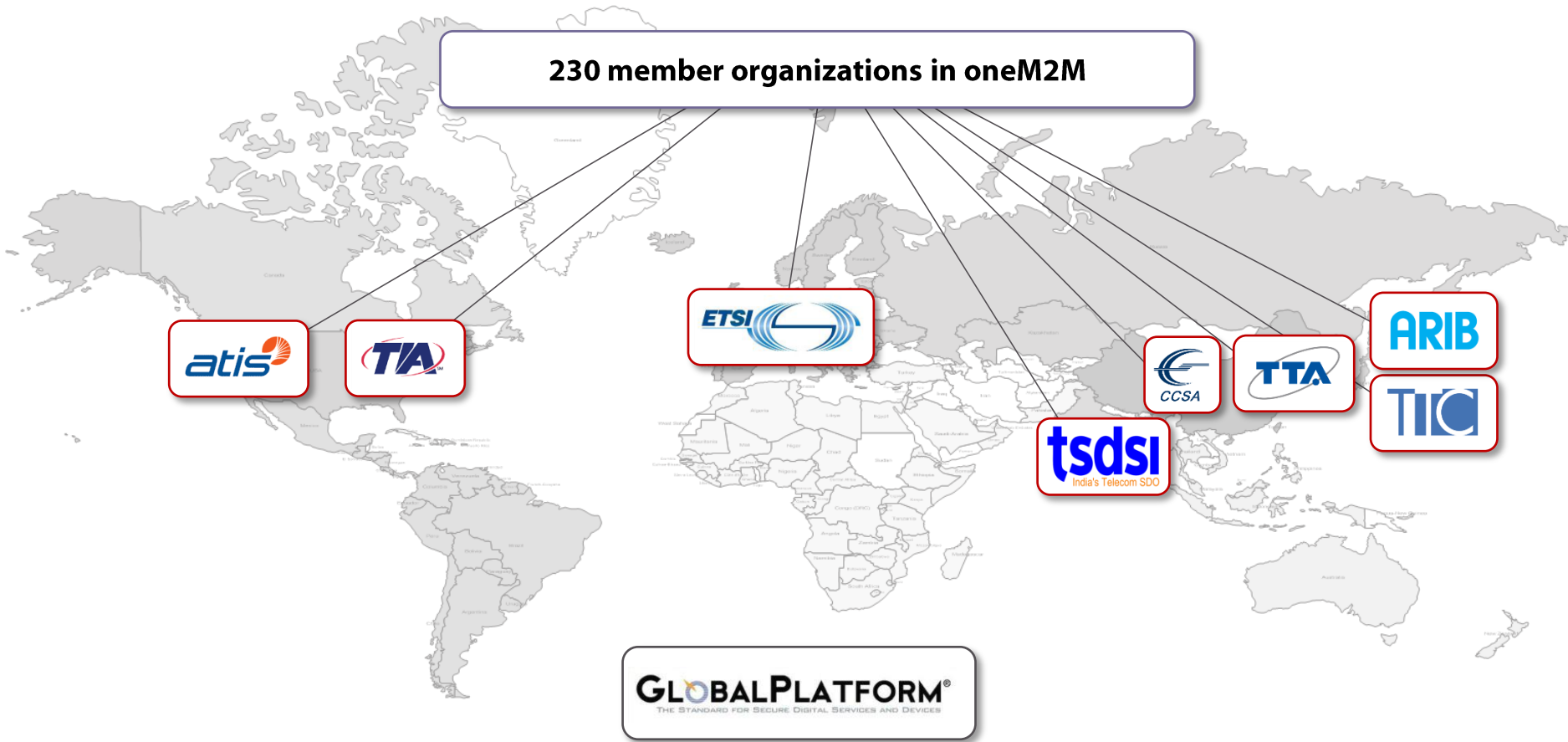
-> Not an additional solution, but a standard to integrate the different solutions
- **SEMANTIC ENABLED TO SHARE INFORMATION**
- **INTERNET FRIENDLY FOR HUMAN INTERACTION**
- **SIMPLE** if you use the core functions and know your deployment architecture

oneM2M is hugely complete (is sharing the innovation effort and the experiences of hundreds of companies with more than 500 man years of work)

# Some examples of REAL USE



# oneM2M Partnership Project



founded<sup>1</sup> July, 24<sup>th</sup> 2012

Based on ETSI M2M Rel 1 and Rel 2 standards)

Join forces

- => reduce fragmentation
- => Integrate existing solutions
- => Merge Ecosystem

Partner transpositions

- => De jure Standard
- => "collaborate on standard"
- => focus on interoperability
- => "compete in implementation"

"do not re-invent the wheel"

=> Reuse e.g.



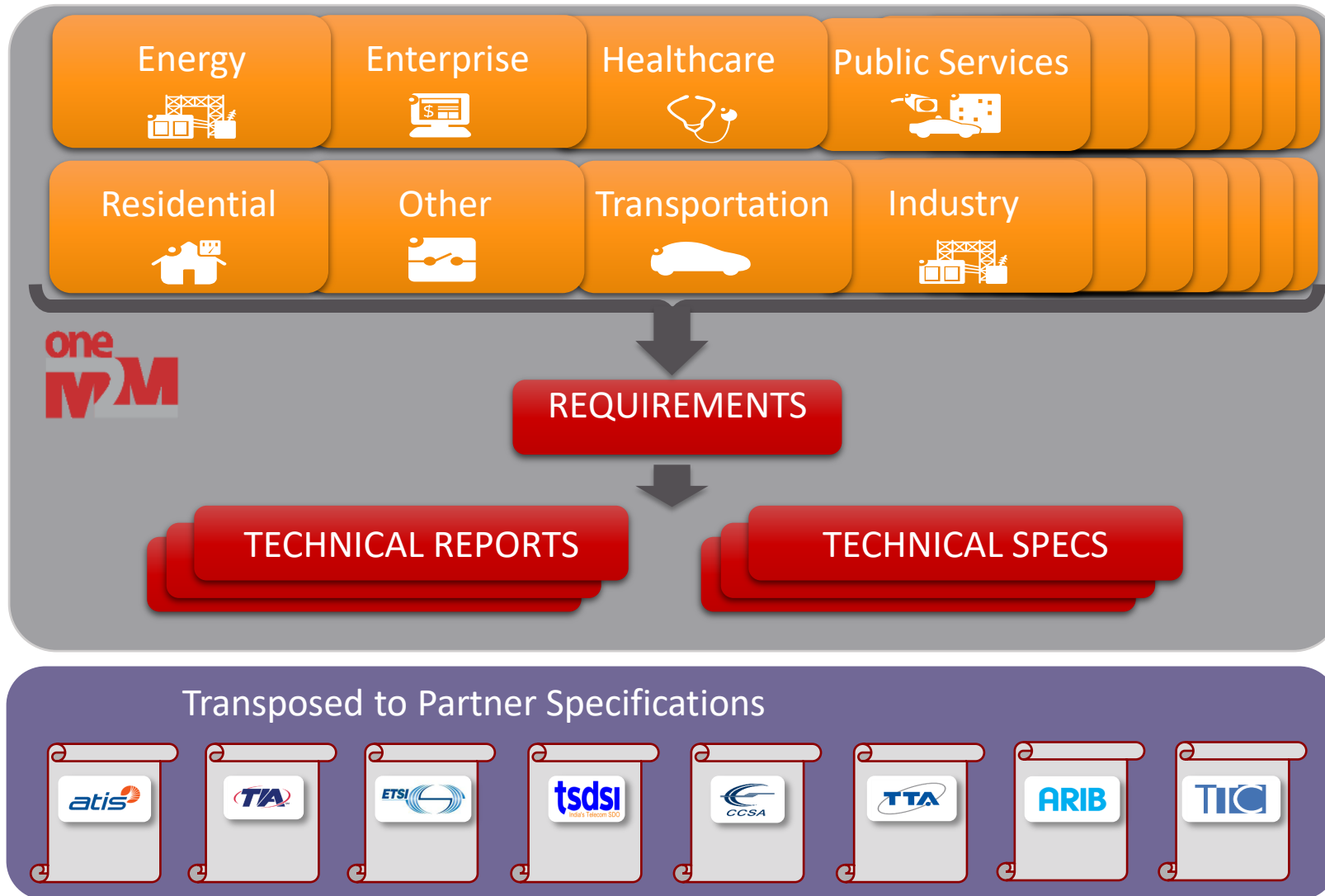
Release 2 transposition  
ITU-T SG20 Y.4500.x

[www.oneM2M.org](http://www.oneM2M.org)

All documents and specifications are publically available

# oneM2M

## Standard-Testing-Certification-Opensource



Interoperability Test Events

Certification Program

Opensource projects: several inetworkable opensource solutions available

ITU-T SG20  
Y.4500.x transposition

# oneM2M Adoption is Global



Organisation	Type	Country	Name	Classification	Supported Functionality
AT4 Wireless / Dekra	Commercial	Global	-	Certification	N/A
ATIS	Commercial	USA	App-ID Registry	Product	ARF
ATIS	SDO	USA	OS-IoT	Open Source Project	AE
Actility	Commercial	France	ThingPark Cloud	Product	IN-CSE
C3SYSTSEMS	Commercial	Korea	SysOne	Product	IN-CSE
(C-DOT)	Commercial/Research	India	CDOT Common Service Platform (CCSP)	Product	IN-CSE, MN-CSE, ASN-CSE, AE
Cisco	Commercial	Global	IoTDM	Open Source Project	IN-CSE
Cisco	Commercial	Global	Ultra-IoT / eSCEF	Product	IN-CSE
Deutsche Telekom	Commercial	W. Europe	IoT Solution Optimizer	Product	IN-CSE, MN-CSE, ASN-CSE, AE
Deutsche Telekom	Commercial	W. Europe	Smart Home as a service	Prototype / Pilot	IN-CSE, AE
Deutsche Telekom/T-Mobile Austria	Commercial	Austria	oneM2M prototype	Prototype / Pilot	AE
ETSI	SDO	Europe	oneM2M Conformance Tests	Open Source Project	N/A
Easy Global Market	Commercial	France	-	Product	N/A
F-Interop	Open Source Project	France	oneM2M devKit	Open Source Project	A/E
Fraunhofer	Research	Germany	OpenMTC	Open Source Project	IN-CSE, MN-CSE
HANDYSOFT	Commercial	Korea	HANDYPIA IoT Platform	Product	IN-CSE
HPE	Commercial	Global	HPE Universal IoT Platform	Product	IN-CSE
Hansol (NexG)	Commercial	Korea	oneM2M based IoT Security Solution	Product	Security CSF
Harman	Commercial	India	-	Product	MN-CSE
HealthConnect	Commercial	Korea	IoT Healthcare Platform	Product	IN-CSE
Herit	Commercial	Korea	HUBISS	Product	IN-CSE
Huawei	Commercial	Global	OceanConnect	Product	IN-CSE, MN-CSE, AE
InterDigital / Chordant	Commercial	Global	Chordant IoT Platform	Product	IN-CSE, MN-CSE, ASN-CSE, IPE, AE
InterDigital / Chordant	Commercial	UK	oneTRANSPORT.io	Product	IN-CSE
InterDigital / Chordant	Commercial	UK	ConVEx	Product	IN-CSE
KDDI	Commercial	Japan	Privacy Policy Manager (PM)	Prototype / Pilot	PPM
KEPCO	Commercial	Korea	e-IoT Energy Platform	Product	IN-CSE, ADN-AE
KEPCO	Commercial	Korea	e-IoT Energy Gateway	Product	IN-CSE, ADN-AE
KETI, OCEAN	Research	Korea	Mobius, Oasis SI	Open Source Project	IN-CSE
KETI, OCEAN	Research	Korea	nCube (Thyme, Lavender, Rosemary)	Open Source Project	ASN-CSE
KT	Commercial	Korea	IoTmakers	Product	IN-CSE



Organisation	Type	Country	Name	Classification	Supported Functionality
<b>LAAS</b>	Research	France	Eclipse OM2M	Open Source Project	IN-CSE
<b>LG</b>	Commercial	Korea	INFIoT	Product	IN-CSE
<b>LG CNS</b>	Commercial	Korea	City Hub	Product	IN-CSE
<b>LG U+</b>	Commercial	Korea	-	Product	IN-CSE
<b>LG U+</b>	Commercial	City of Goyang, Korea	-	Prototype / Pilot	IN-CSE
<b>Modacom</b>	Commercial	Korea	Smart Brain IoT Gateway (hub)	Product	MN-CSE
<b>N2M</b>	Commercial	Korea	nTOMIoT	Product	IN-CSE
<b>NEC</b>	Commercial	EMEA	Cloud City Operation Center (COOC)	Prototype / Pilot	IN-CSE
<b>NTT</b>	Commercial	Japan	-	Prototype / Pilot	IN-CSE
<b>NexG</b>	Commercial	Korea	oneM2M-based IoT Security Solution	Product	Security CSF
<b>Orange</b>	Commercial	France	Standard Open Source Cloud APIs for the Smart Home	Prototype / Pilot	IN-CSE, AE
<b>Orange</b>	Commercial	France	IoT Objects with heterogeneous Access Management	Prototype / Pilot	IN-CSE, AE
<b>Pilot Things</b>	Commercial	Canada, France	IoT Platform	Product	IN-CSE, MN-CSE, ASN-CSE, IPE, AE
<b>Qualcomm</b>	Commercial	Global	-	Prototype / Pilot	IN-CSE
<b>SK Telecom</b>	Commercial	Korea	ThingPlug	Product	IN-CSE
<b>SK Telecom</b>	Commercial	City of Busan, Korea	ThingPlug	Product	IN-CSE
<b>Samsung SDS</b>	Commercial	Korea	Insator	Prototype / Pilot	IN-CSE
<b>Sejong University</b>	Research	Korea	Upper Tester	Prototype / Pilot	AE
<b>Sensinov</b>	Commercial	France	Sensinov IoT	Product	IN-CSE, MN-CSE, ASN-CSE, IPE, AE
<b>Sierra Wireless</b>	Commercial	Canada, France	-	Prototype / Pilot	AE
<b>Spirent</b>	Commercial	UK	TTsuite-oneM2M	Product	N/A
<b>SyncTechno</b>	Commercial	Korea	-	Product	N/A
<b>TATA Communications</b>	Commercial	City of Bhopal, India	-	Prototype / Pilot	IN-CSE
<b>TTA</b>	SDO	Korea	Certification Test Tools	Certification	N/A
<b>Telecom Italia</b>	Commercial	Europe, Brasil	ICON (IoT services testing and prototyping)	Prototype / Pilot	IN-CSE, IPE, AE
<b>Telecom Italia</b>	Commercial	Italy	ICON (commercial)	Product	IN-CSE, IPE, AE
<b>UANGEL</b>	Commercial	Korea	C.FMS (Facility Management Solution for Smart City)	Product	IN-CSE, VNPT
<b>Vietnam PT Group</b>	Commercial	Vietnam	VNPT IoT Platform	Product	IN-CSE
<b>e-device</b>	Commercial	France	HealthGO Mini	Product	IN-CSE
<b>grid-net</b>	Commercial	USA	PolicyNet M2M Platform	Product	IN-CSE, MN-CSE, ASN-CSE
<b>irexnet</b>	Commercial	Korea	AiSOP	Product	IN-CSE
<b>ntels</b>	Commercial	Korea	IoT Platform, Open M2M Platform (OMP), N-MAS	Product	IN-CSE
<b>ntels</b>	Commercial	Korea	e-IoT Platform	Product	IN-CSE
<b>oneM2MTester</b>	Open Source Project	Korea	oneM2MTester	Open Source Project	N/A

**Benefits of oneM2M** <https://www.onem2m.org/using-onem2m/what-is-onem2m>  
**The IoT Standard for Interoperable and Scalable Systems**

<https://www.onem2m.org/using-onem2m/what-is-onem2m#standard>

**oneM2M's Value Proposition** <https://www.onem2m.org/using-onem2m/what-is-onem2m#value>

**oneM2M Technical Specifications** <https://www.onem2m.org/technical/published-specifications>

**OneM2M opensource resources** <https://www.onem2m.org/using-onem2m/devices-examples/onem2m-device-and-platform-software-resources>

**oneM2M Adoption and User Experiences** <https://www.onem2m.org/using-onem2m/what-is-onem2m#adoption>

**oneM2M Implementation Guidance** <https://www.onem2m.org/using-onem2m/what-is-onem2m#implementation>

**Develop with oneM2M** <https://www.onem2m.org/using-onem2m/developers>

**Deploy with oneM2M** <https://www.onem2m.org/using-onem2m/devices-examples>



Some useful  
links  
on the  
oneM2M  
webpages

# Contact details

## Dr. Enrico Scarrone

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oneM2M Steering Committee Chairman

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## IOT:

It is NOT about selecting a protocol... or a platform...or a cloud....

**IoT is sharing the information and its meaning  
between different systems, different applications,  
different business sectors !**

Thank you!