



GSC | 22
MONTREUX, SWITZERLAND



oneM2M Smart Data Usage in Smart Cities

GSC 22 - Montreux, Switzerland
2019-03-27

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oneM2M Steering Committee Vice Chair
Huawei Technologies



IoT Isn't Easy...

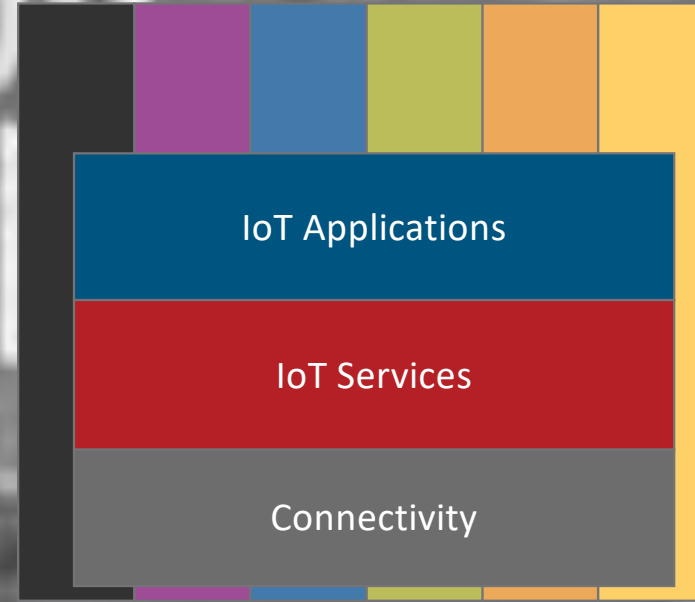
- IoT is an integration business even for seemingly “simple IoT deployments”
- Solutions require expertise in:
 - Vertical specific processes
 - Vertical specific Technologies
 - Modbus, Bluetooth, OPC-UA, ...
 - Software development
 - Hardware development
 - Connectivity technologies
 - wired, wireless / cellular connectivity



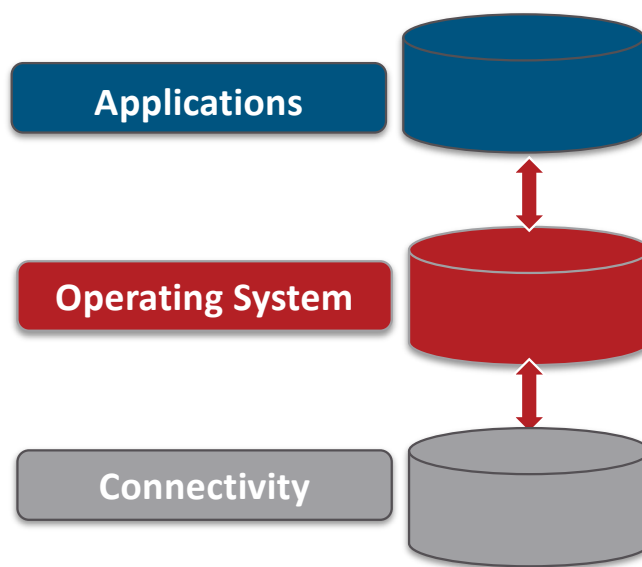
Today each vertical develops the whole technology stack, leading to silos and cross vertical interoperability issues



A global interoperable Standard, enables a cross-vertical IoT Eco-System



Learn from the Modularity of Smart Phones - Offer an IoT Framework for IoT Device and App Developers



- **Applications** access the Connectivity Layer and built-in sensors, via API's provided by the Operating System
- **Operating System** collects connectivity requests from applications, buffers messages, optimizes & controls device's network use
- **Connectivity Layer** provides device access to the Internet via the 3GPP mobile network, Wi-Fi, etc..

Governance:



Apply similar concepts to IoT and provide a modular framework of services for IoT Devices and IoT Application Developers



oneM2M a Global Partnership Project to Standardize the IoT Service Layer



Over 200 member organizations in oneM2M



8 regional Standards Development Organizations coming together to jointly develop the oneM2M technical specifications. oneM2M standards are then referenced by regional legal and regulatory bodies



Scope and Purpose of IoT Technology Layers



IoT Field Device(s)

IoT Infrastructure

IoT Application

- Measuring of Physical Parameters
- Execution of commands

- UI / Presentation of Device Data
- Data Analytics etc.

Service Layer

- Storing of data in case of lack of connectivity
- Security, Authentication & Authorization
- Device Management & Firmware update mechanism
- Connectivity Management
- Developer API

- Developer API to control:
 - Data Management
 - Security
 - Device Management
 - Connectivity Management
 - ...

Connectivity Layer

- Reliable & efficient data transport

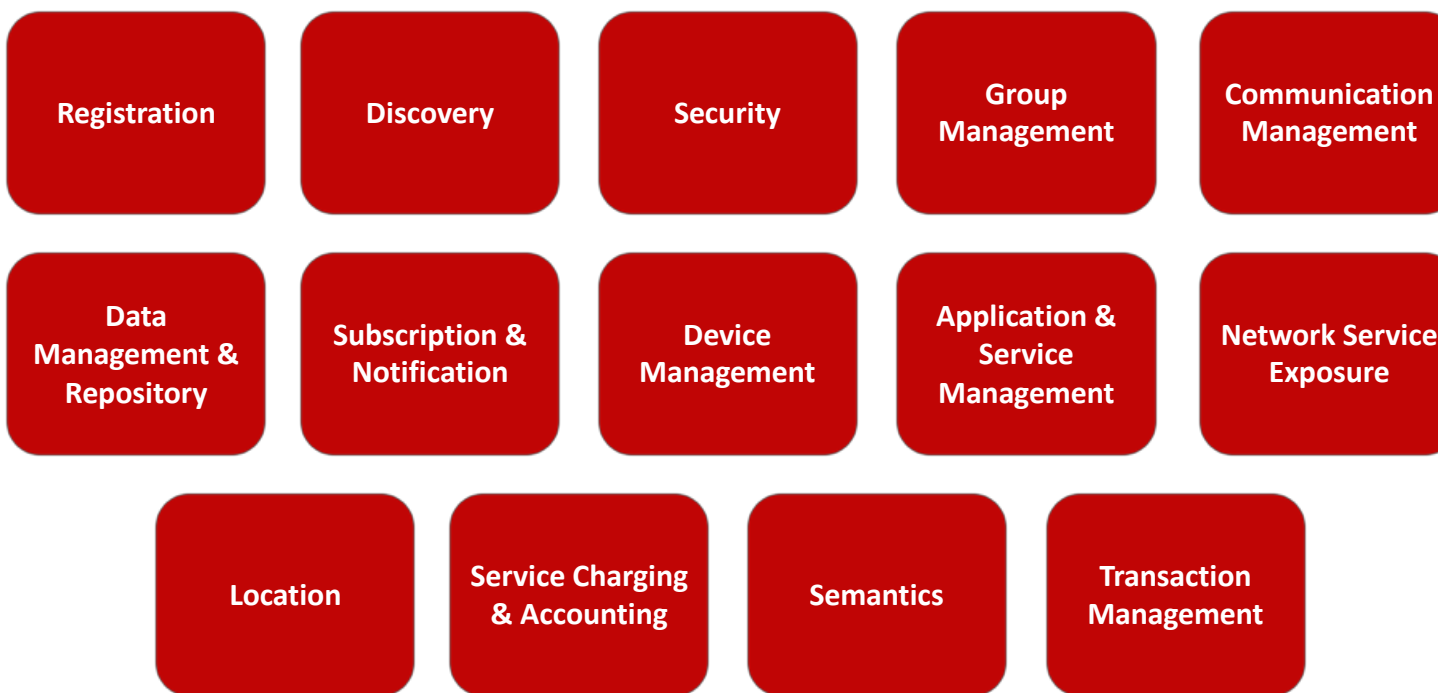
- Reliable & efficient data transport



oneM2M Common Service Functions



Service Layer



Individual Technologies / Protocols Used Today



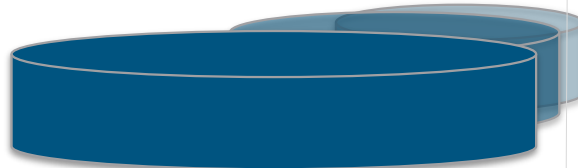
IoT Field Device(s)



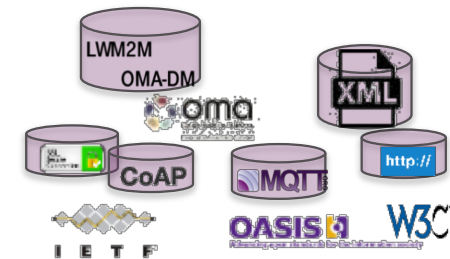
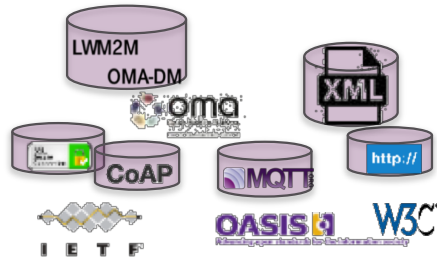
IoT Infrastructure



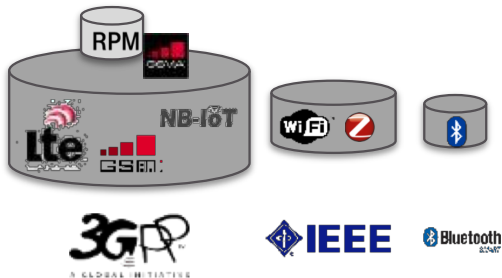
IoT Application



Service Layer Standards



Connectivity Layer Standards



Bundling of Individual Service Layer Technologies by oneM2M



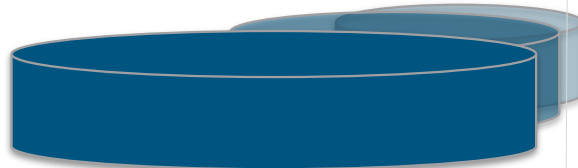
IoT Field Device(s)



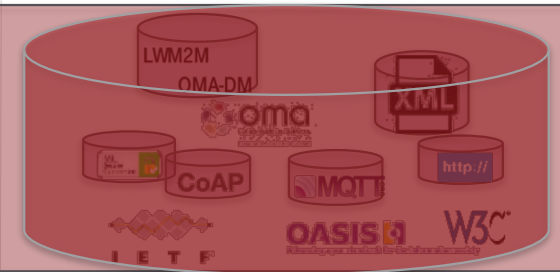
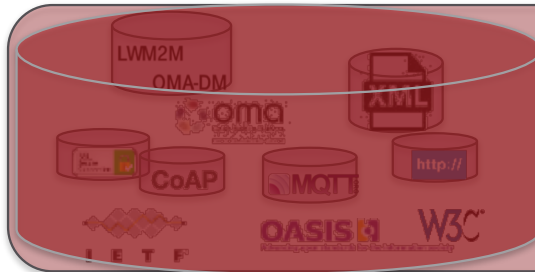
IoT Infrastructure



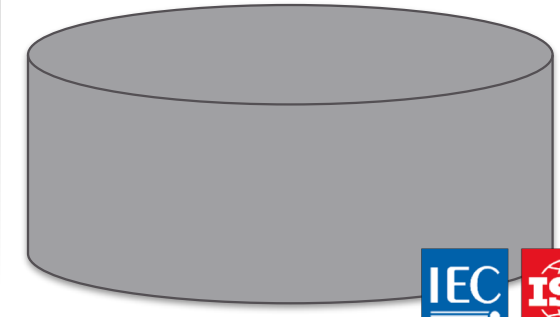
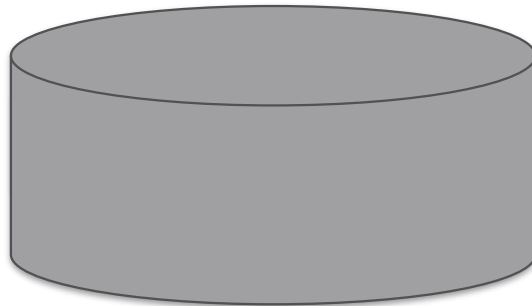
IoT Application



Service Layer Standards



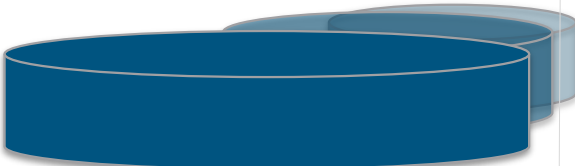
Connectivity Layer Standard



Functions Provided by oneM2M



IoT Application



IoT Field Device(s)

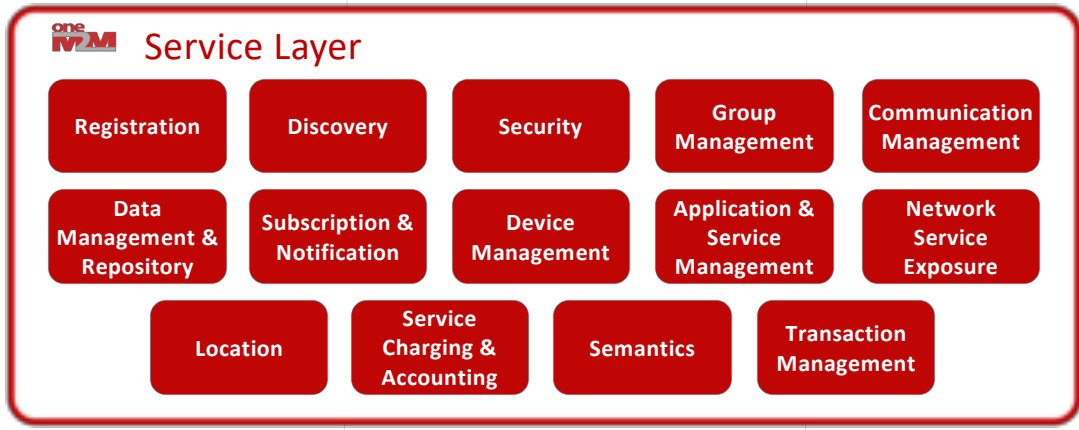


IoT Infrastructure

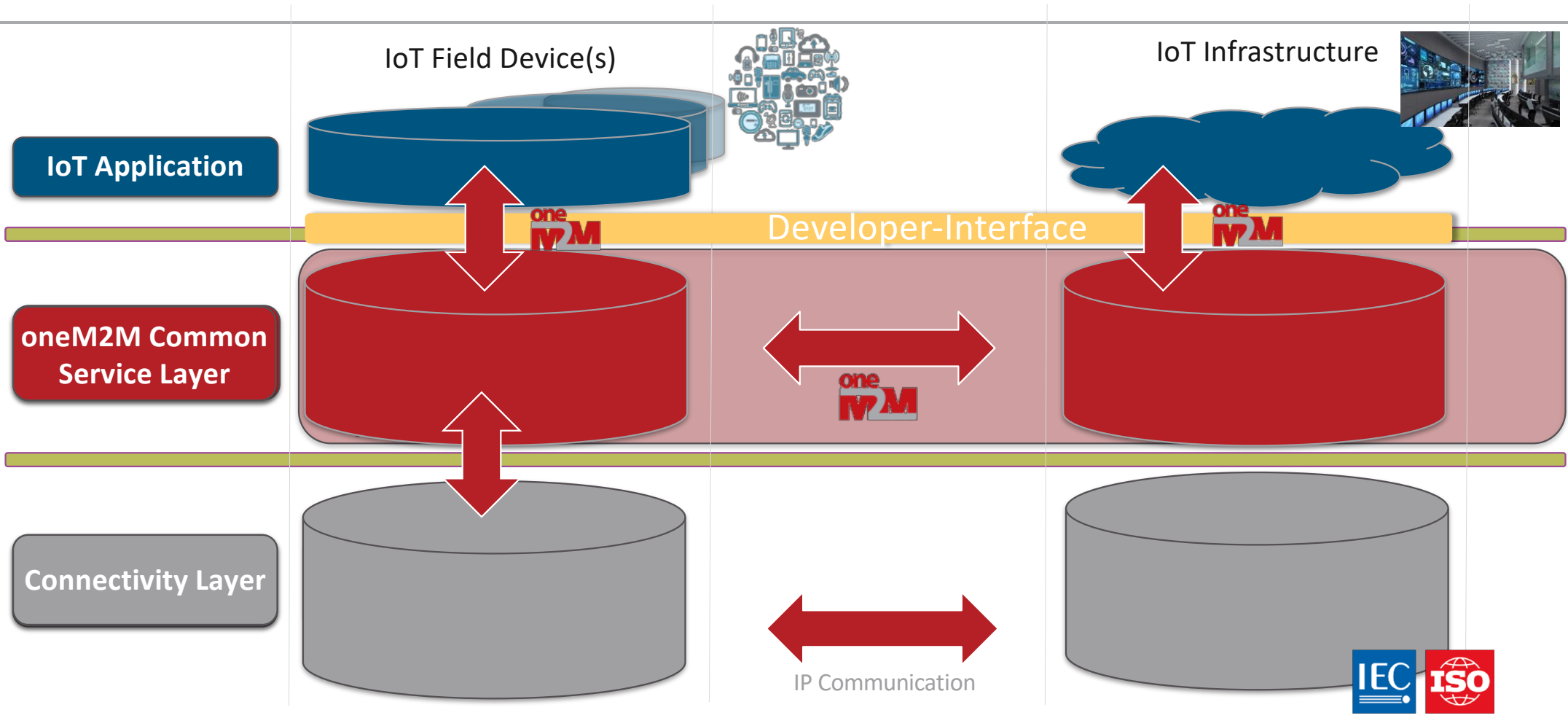


Application developers can leverage
Common Service Functions (CSF's) provided by oneM2M

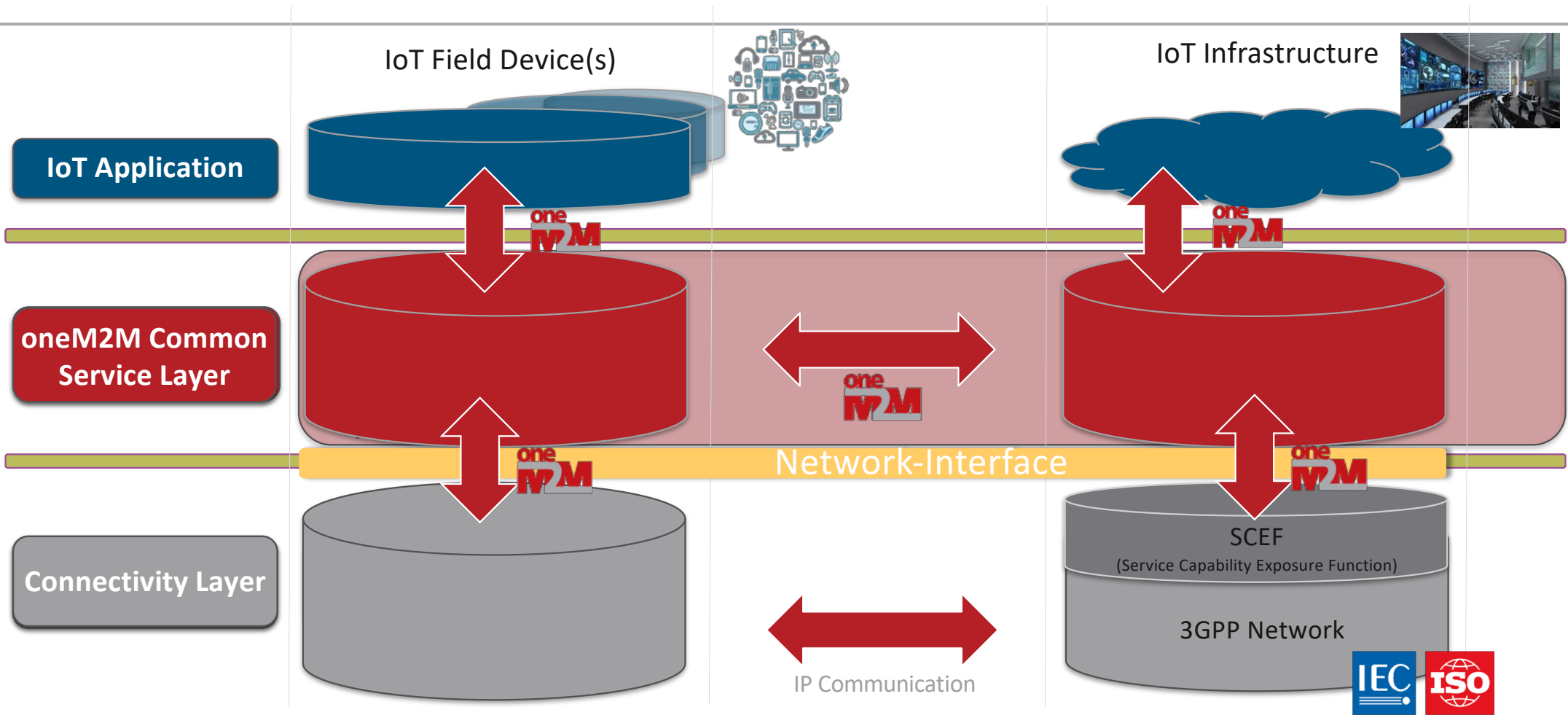
oneM2M
Common Service
Layer



oneM2M Application Developers Interface

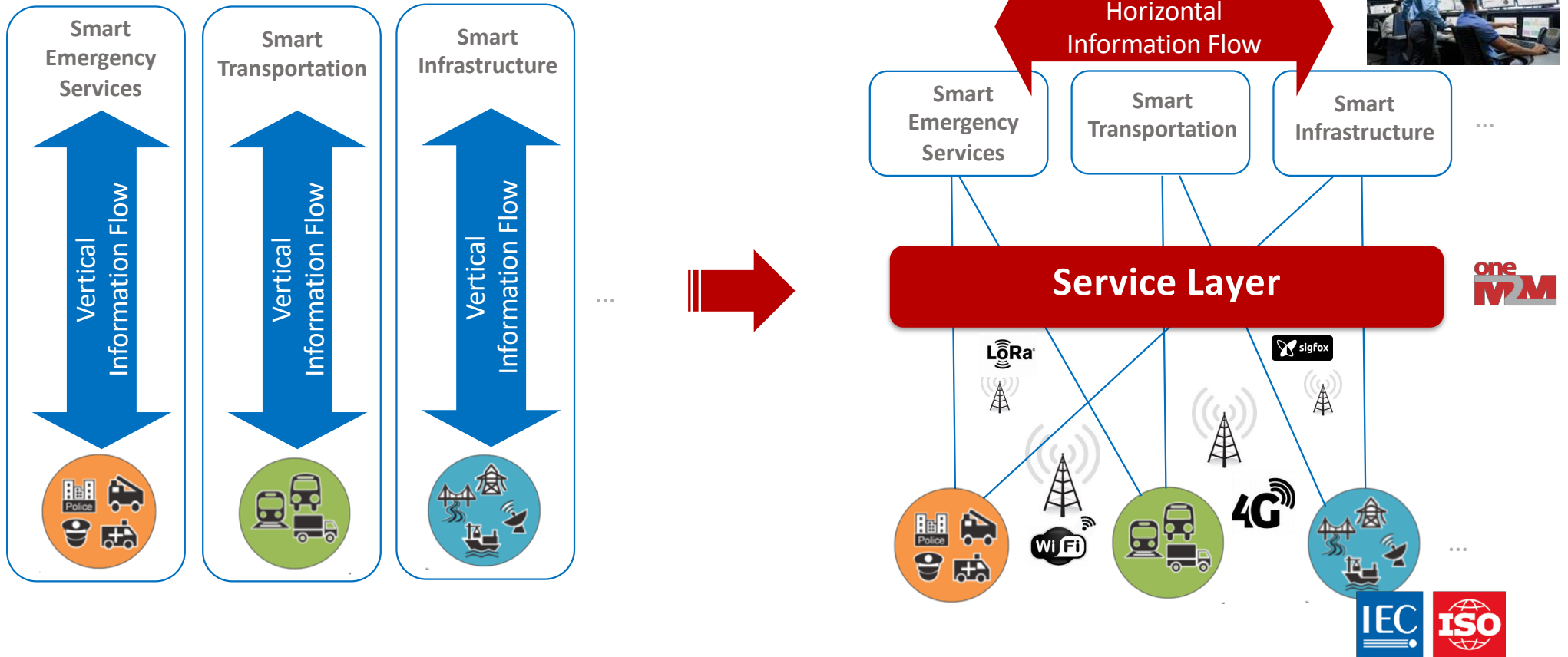


oneM2M Interfaces with Underlying Transport Networks

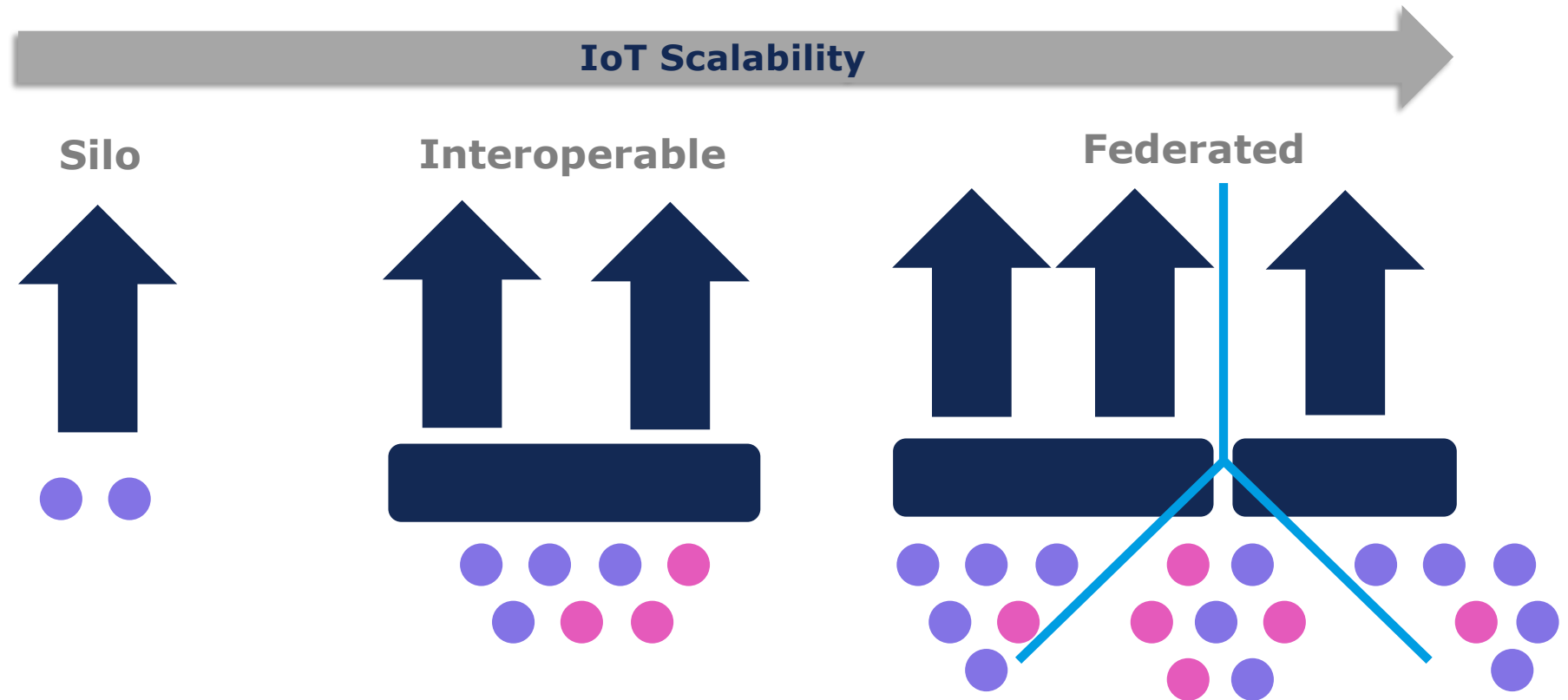


So how does oneM2M help?

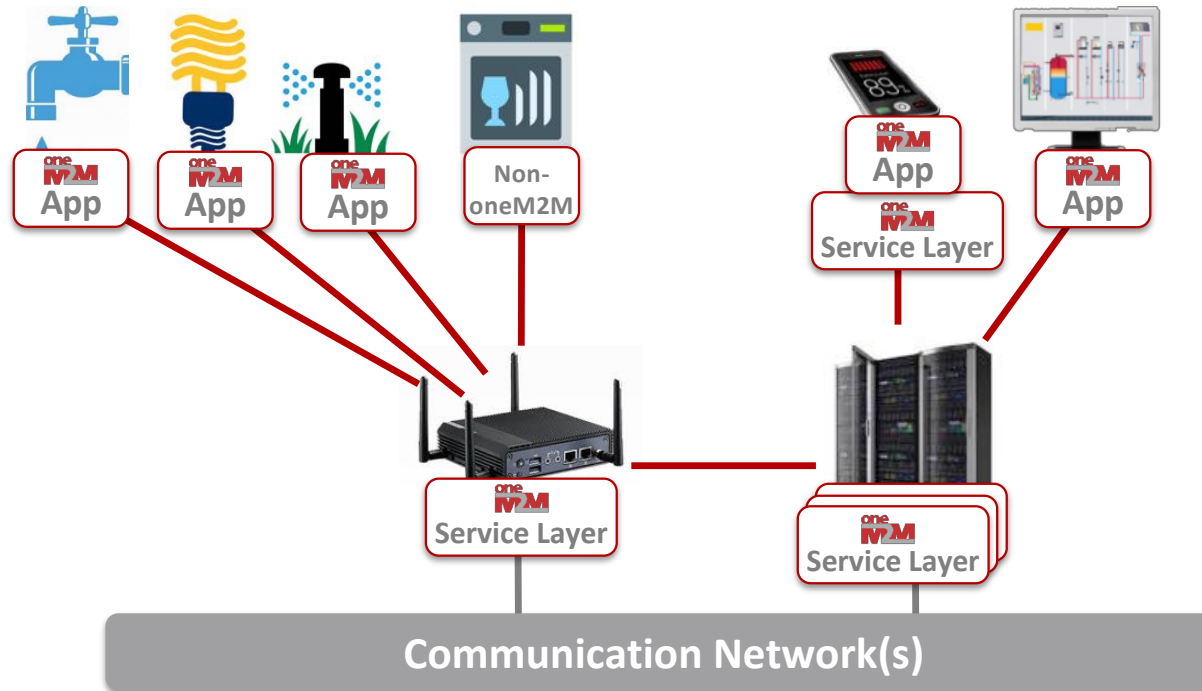
oneM2M Breaks Down the Silos



oneM2M Enables Scalability of IoT



oneM2M is an End-to-End IoT Technology

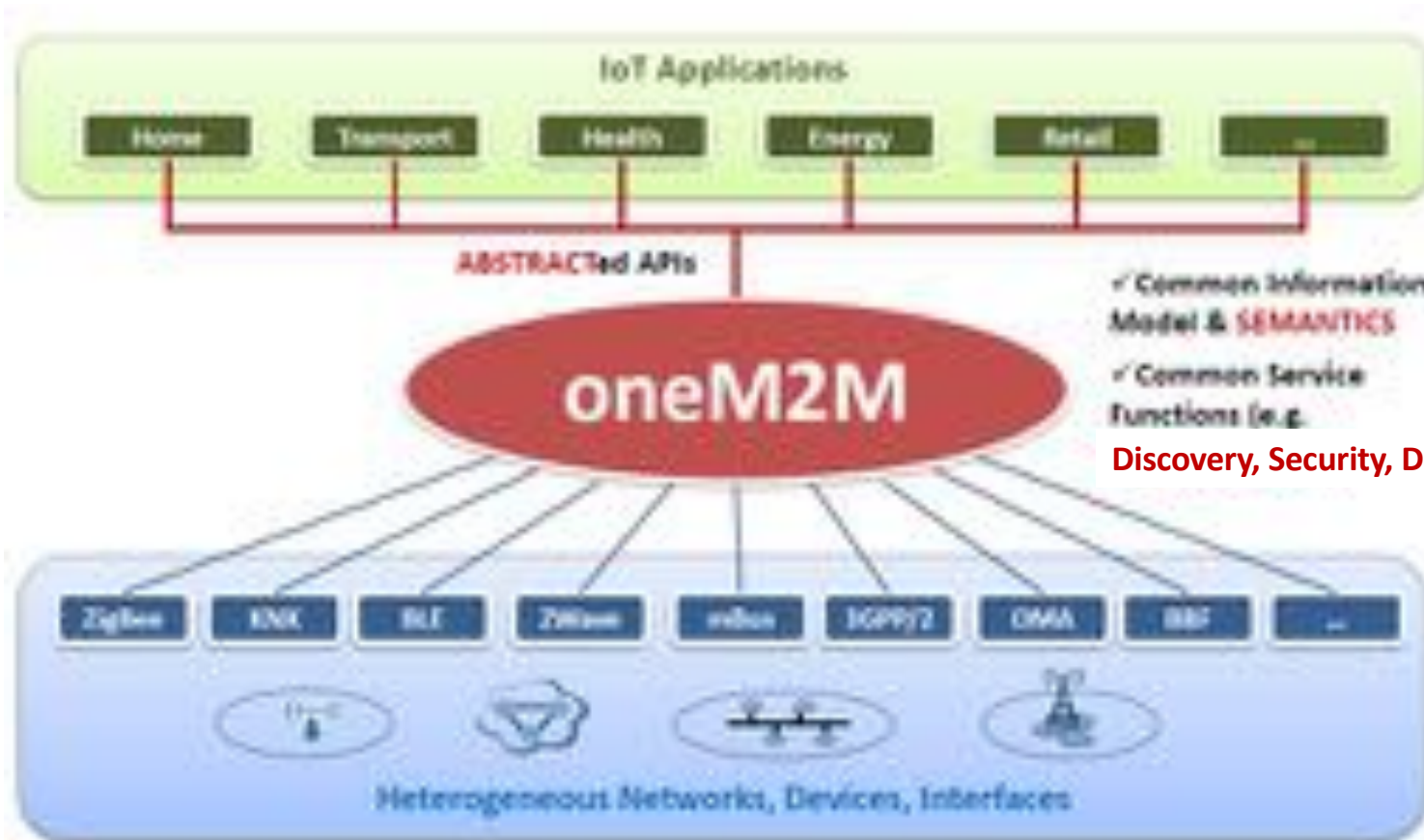


Flexible Deployment Options

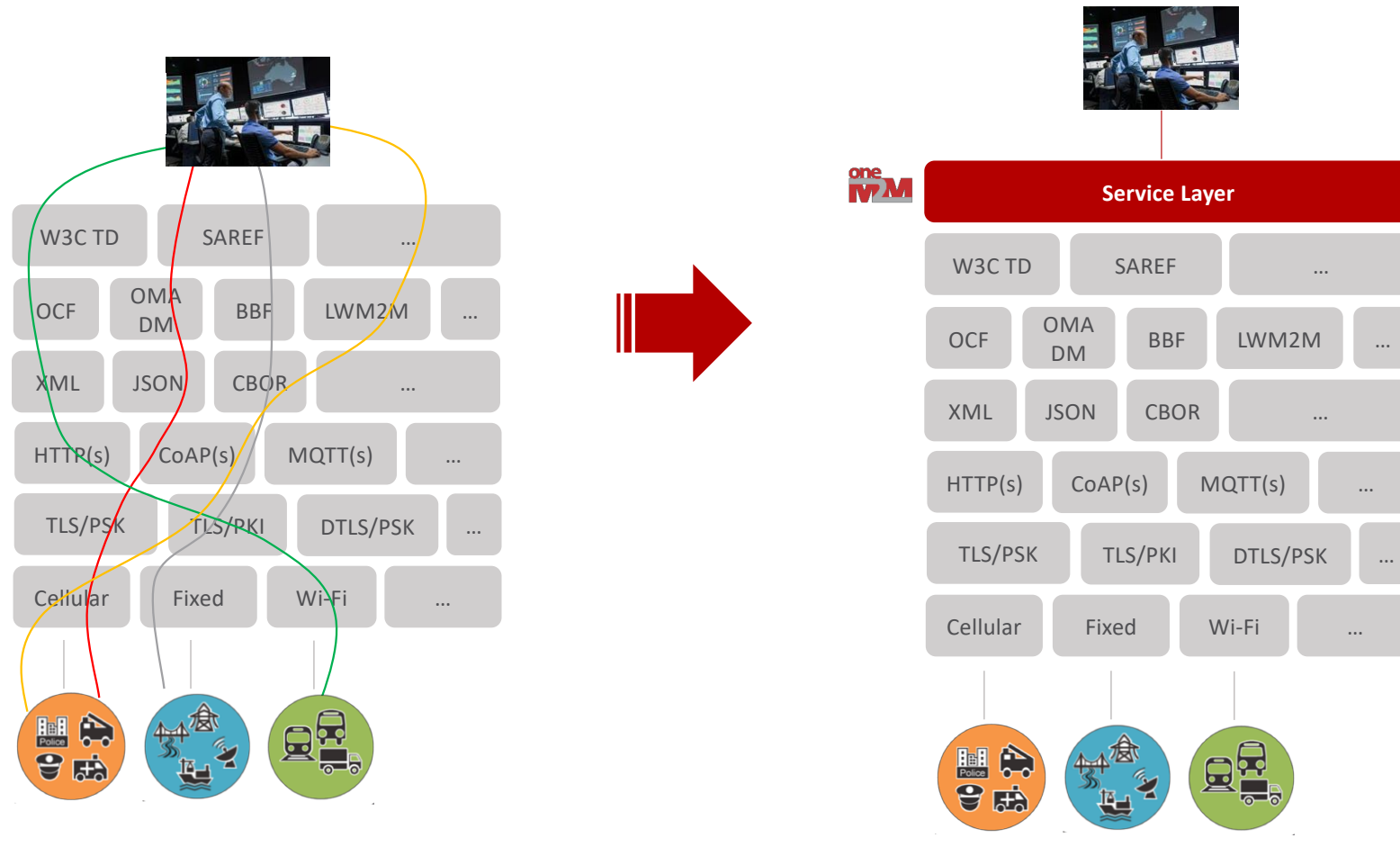
- IoT Cloud / Enterprise
- IoT Gateway
- IoT Edge Device
- IoT User Devices



oneM2M Interworking Framework



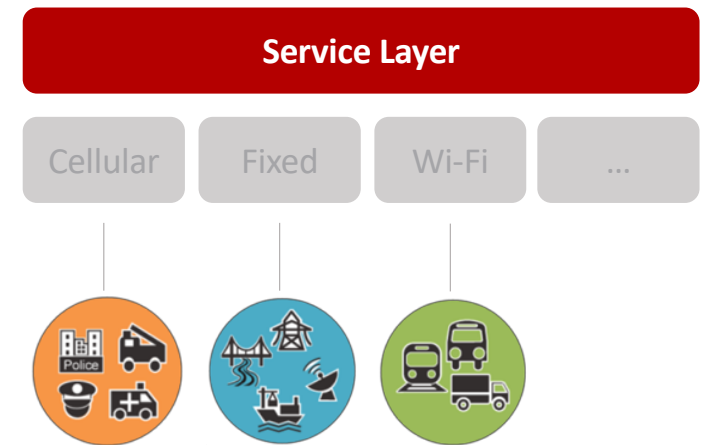
How does oneM2M enable interworking?



Underlying Network Connectivity Abstraction



- oneM2M interworks with underlying network technologies to help manage network connectivity and communication to IoT devices on behalf of the apps
 - Scheduling and buffering of messages based on device reachability
 - Selection of underlying network connectivity options for device communication
 - Triggering of devices to establish a network connection based on when apps need to communicate with devices
 - QoS configuration based on app's needs



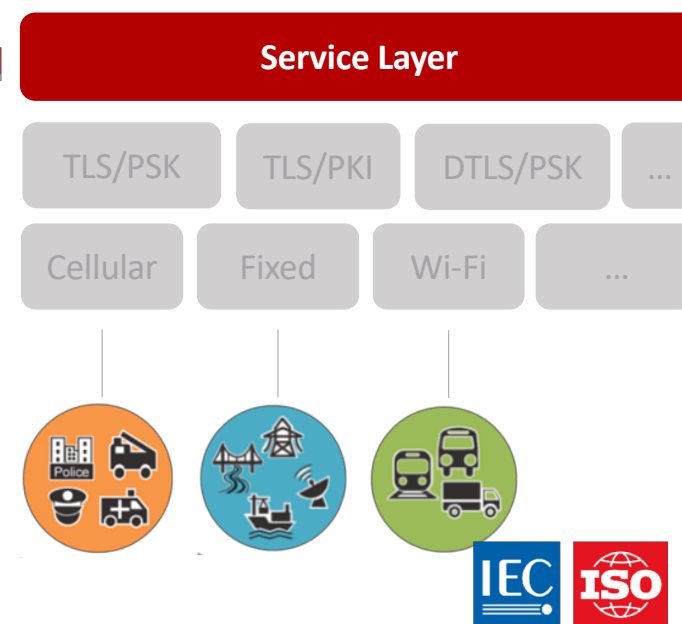
* oneM2M is closely working with 3GPP on interworking via 3GPP defined SCEF API



IoT Device Security Abstraction



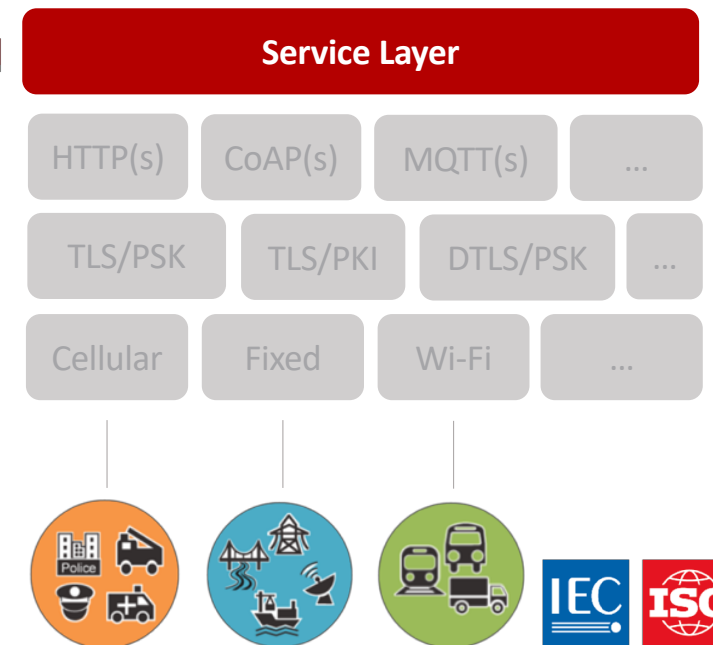
- oneM2M hides the different security frameworks of each IoT device technology from the App Developer.
- A Developer's app can establish a security association with the oneM2M service layer and via this security association, communicate securely with IoT devices
- The oneM2M service layer establishes and manages the security association with each of the IoT devices on behalf of the app
 - **Enrolment, credential bootstrap/management, authentication, integrity, privacy, and authorization network connectivity of the devices from the app developer.**



Transport Protocol Abstraction



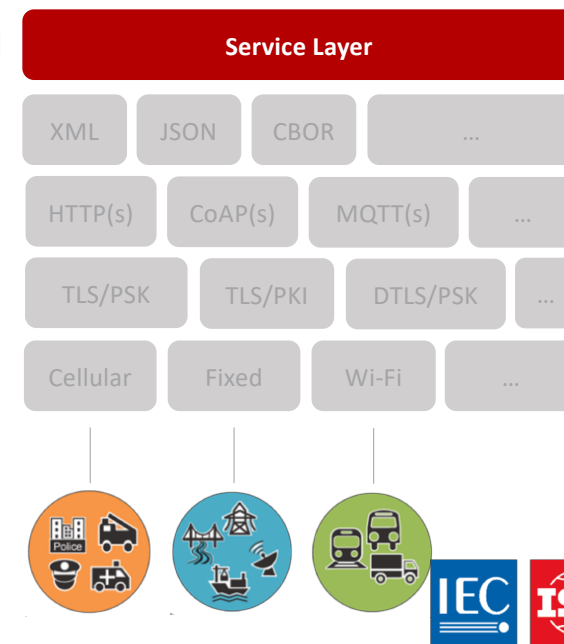
- oneM2M hides the different transport protocols used by different devices from the App Developer.
- Applications can use different transport protocols than the one or more different devices they choose to communicate with
 - E.g. HTTP(s), CoAP(s), MQTT(s), WebSockets
- oneM2M will handle converting the transport protocol so the App Developer does not need to



Content Serialization Abstraction



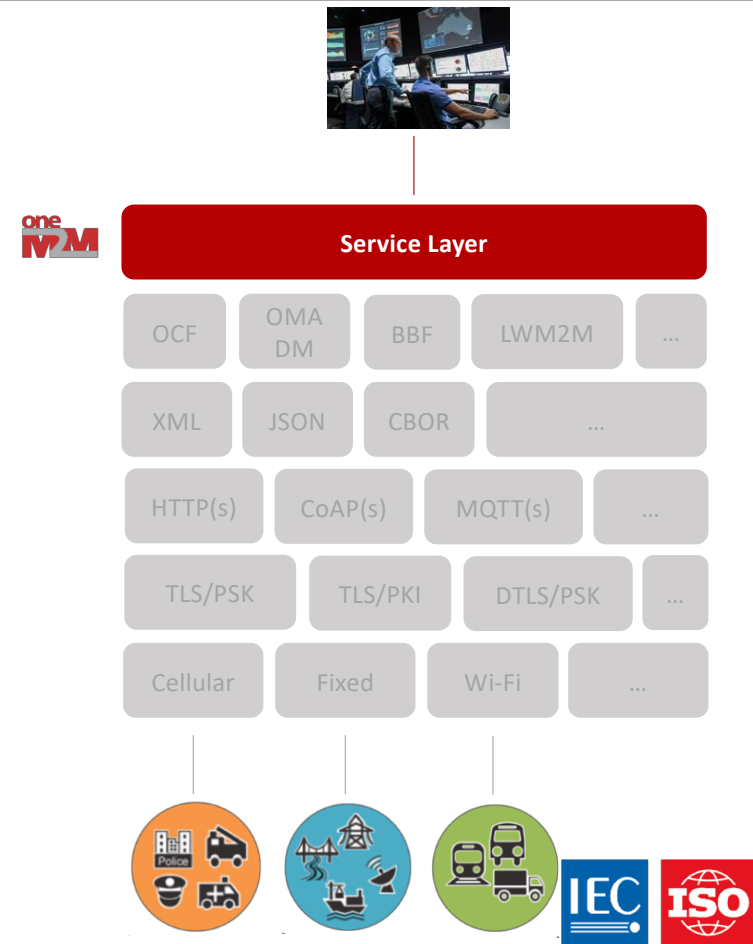
- oneM2M hides the different content serializations used by the devices from the App Developer.
- Applications can use different types of content serialization formats than the one or more devices they choose to communicate with
 - E.g. XML, JSON, CBOR, Plain-Text
- oneM2M will convert the content serialization format so the App Developer does not have to



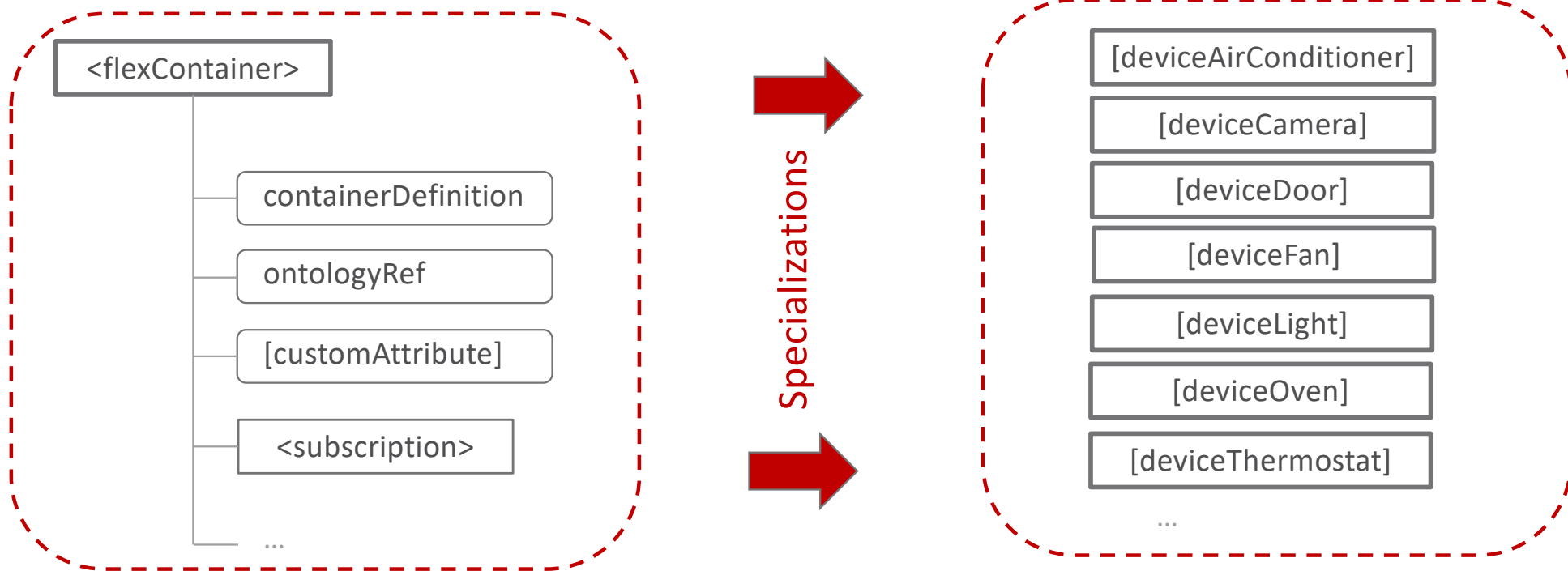
IoT Data Model Abstraction



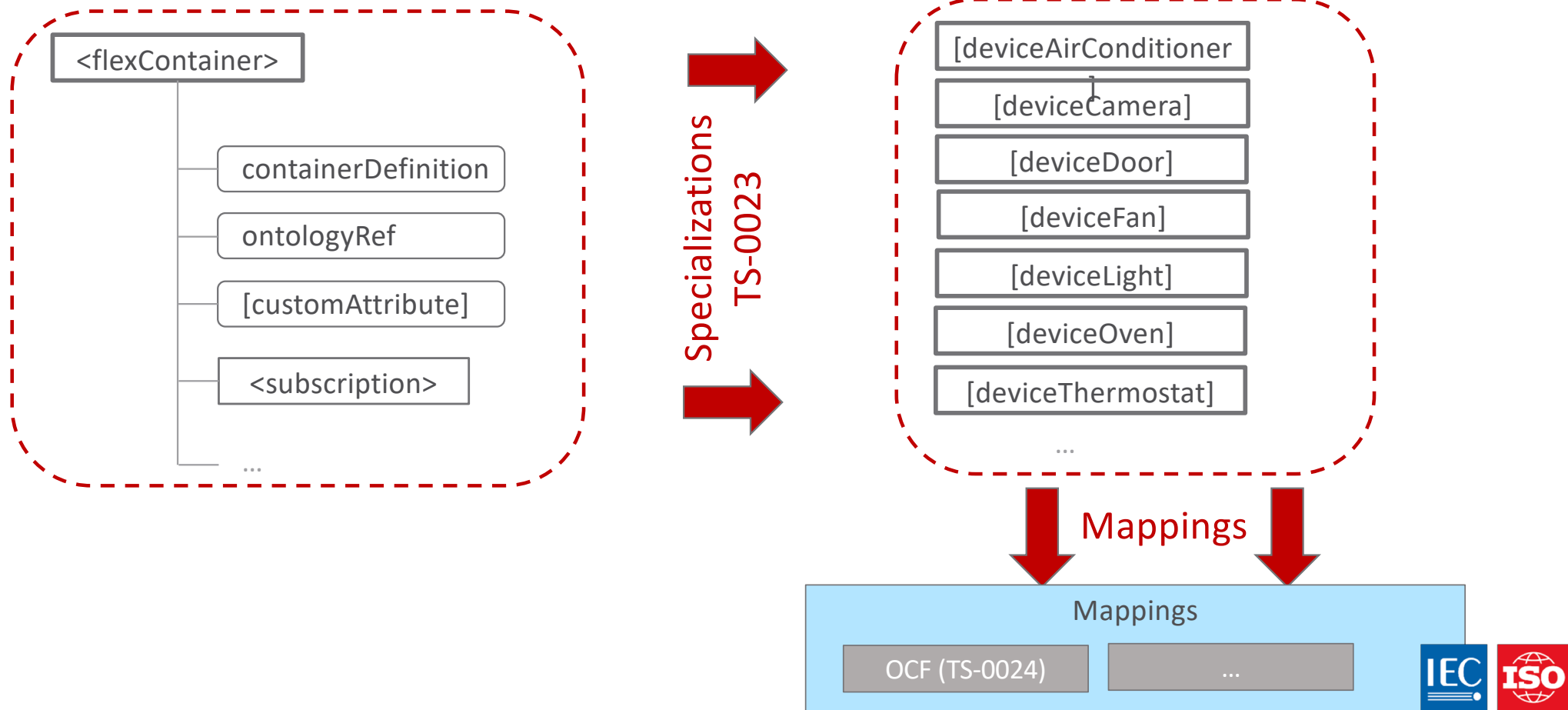
- oneM2M interworks different IoT device data models with one another
 - E.g. OCF, LWM2M, ...
 - All devices are presented to the App via oneM2M API
 - Via standardized oneM2M API, App developers can use device services and manage devices
- Once the data model is abstracted into oneM2M, App Developers can access all devices in a common manner and make use of oneM2M value-add capabilities such as
 - Resource Discovery
 - Generating Events via subscriptions and notifications
 - Grouping
 - Access Controls



oneM2M Abstracted Interworking Information Model



Mapping non-oneM2M Information Models to oneM2M



IoT Semantics Abstraction

- oneM2M supports a semantic framework and a oneM2M base ontology
- This framework supports interworking different semantic ontologies together
 - Ontologies defined by other organizations can be interworked with the oneM2M base ontology
- Once interworked, the framework enables semantic ontology abstraction
 - Semantic descriptions expressed in terms of other ontologies can be interworked to oneM2M's Base Ontology to provide abstraction at the semantics level



oneM2M + ETSI SAREF

