Smart Device Template

Abstraction layer for IoT objects for breaking silos

Application to object sharing

Implementation in oneM2M standard and Eclipse OM2M

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Eclipse IoT Day Grenoble 2017

March 9th, 2017

Plan

Standardized Abstraction Model for Connected Devices

- Abstraction model based on Smart Device Template (SDT) standardised at HGI then oneM2M TS-0023 (data model based)

Rights management delegation for object sharing

- Homogeneous Rights management thanks to the SDT abstraction model.

Contributions to the IoT standards & open source ecosystems

- Contribution on the SDT specification - oneM2M, on its implementation in Eclipse IoT ecosystem

Future work

- European project, wider scope, bigger ecosystem.

Use Cases targeted

An homogeneous right management of users, applications and devices between Cloud and Embedded

Sharing

Allowing easy delegation of rights management of devices and applications from one to another user

Need a homogeneous device abstraction model to manage heterogeneous IoT ecosystem

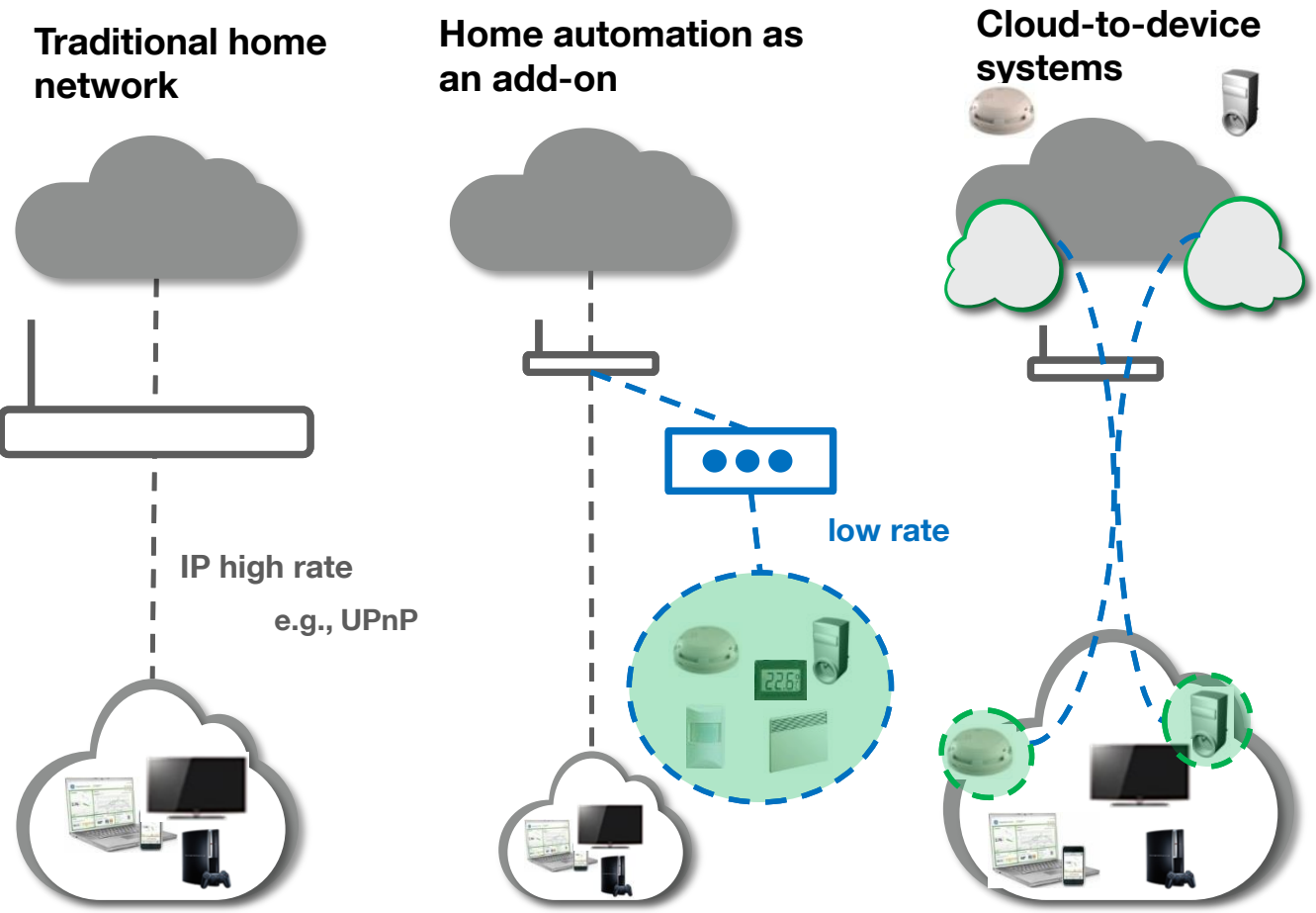
Allowing replacement of a device by an equivalent device of a different technology

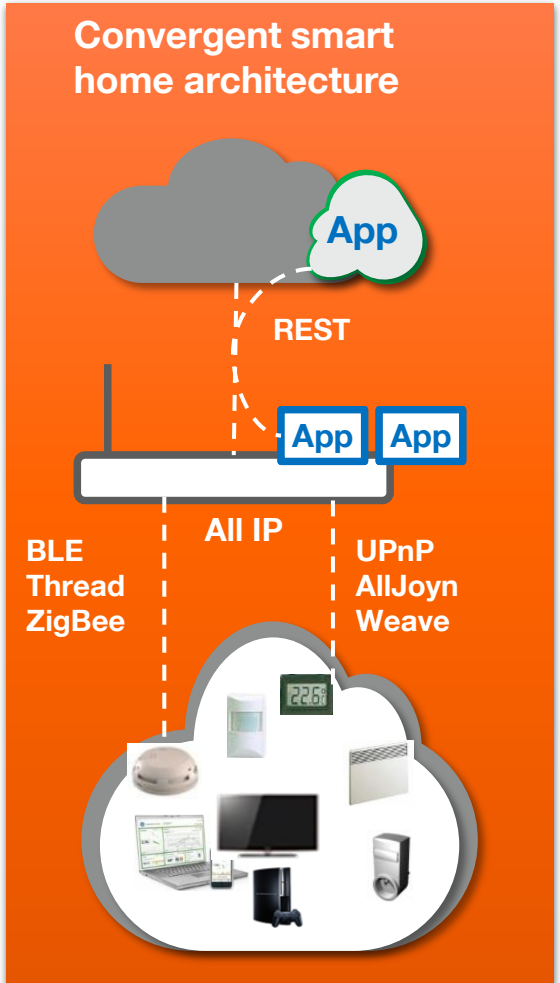
Breaking silos

Empowering interoperability thanks to standards

A hybrid execution environment

Applications in the box and the cloud





A candidate standard: oneM2M

oneM2M Common Service Layer in a nutshell

A software layer that

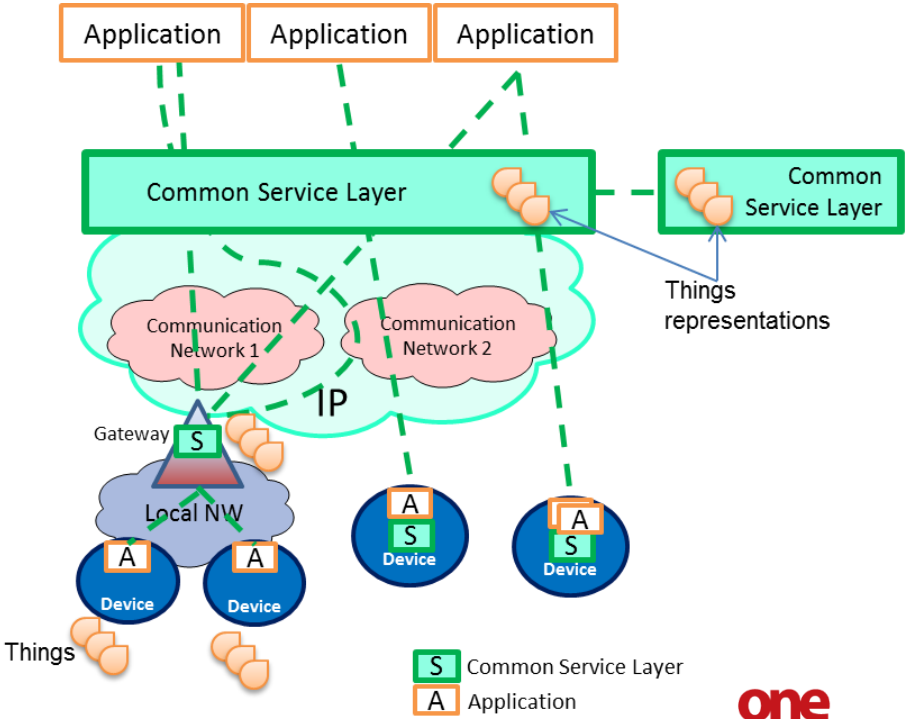
- **is language agnostic.**
- **sits between M2M applications and communication HW/SW that provides data transport**
- **specifies a RESTful approach for M2M/IoT communication**
- **with a mapping to common industry protocols such as CoAP, MQTT and HTTP**
- **allows for distributed intelligence (device, gateway, cloud apps)**

OneM2M has been created by 8 international and regional standard bodies: ARIB, ATIS, CCSA, ETSI, TIA, TSDSI, TTA, TTC

200 members contribute to oneM2M

Horizontal (based on common Layer)

Applications share common service and network infrastructure
Multipoint communications



from Omar Elloumi, OneM2M Technical Plenary chair

I. Generic Abstraction model for heterogeneous smart home ecosystem

smart device template - SDT

Smart Device Template – Goal

Initially created by **Home Gateway Initiative,** which needed a way to bring smart Home devices in home Gateways and created SDT.

Goal

Describe devices and device services in a way which is independent of the LAN technology in a format which is convenient and reliable for integration.

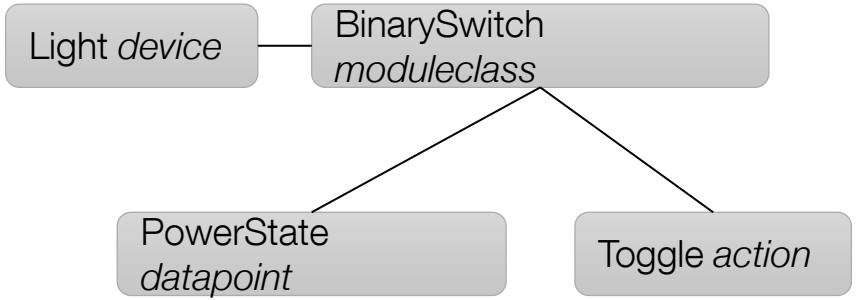
1. **Keep it simple**, especially for manufacturers to contribute
2. **Modularity** for functions and device types
3. Make it easy for developers to create unified APIs
4. Be **independent** of underlying home-area network technologies

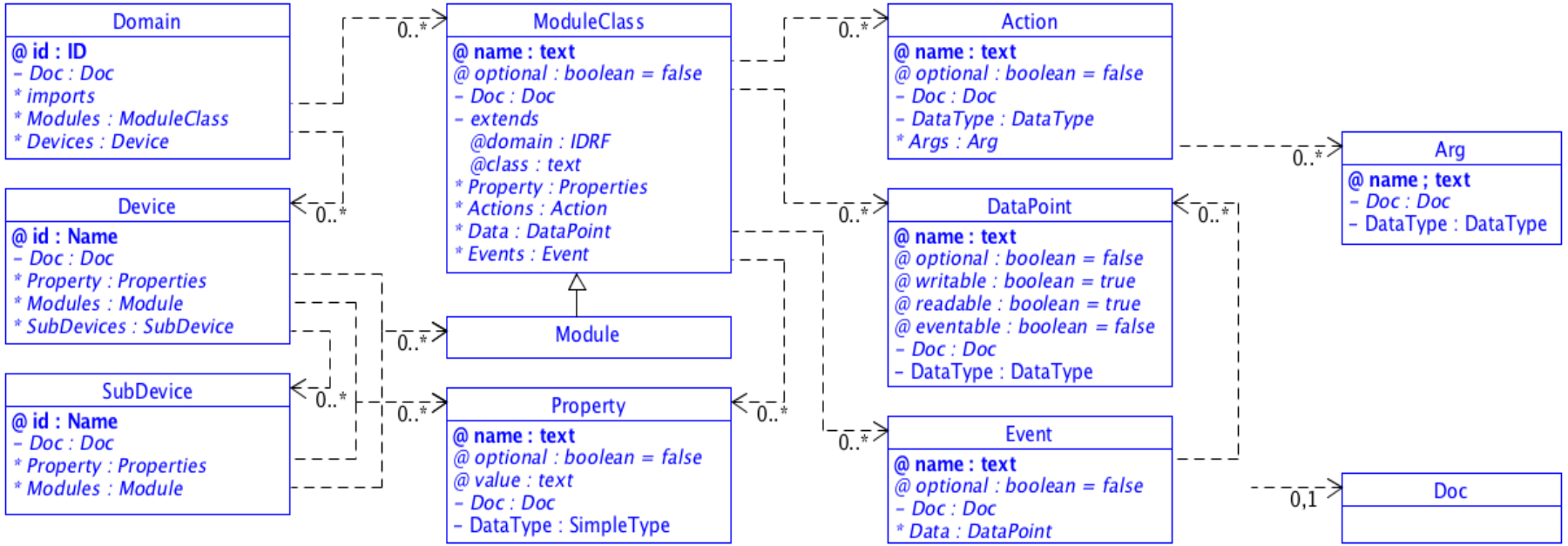
Available under an open license (APL2)

oneM2M is the new home for SDT, allowing extension of its use required by oneM2M use cases and its ecoystem**.**

Smart Device Template
Modular Description of objects

oneM2M Smart Device Template allow representation by reusable modules of any devices in a unified data model and a fully generic abstraction.





SDT for connected Light bulbs (described in TS-0023)

Hue / LIFX example

Smart Device Template Viewer

org.onem2m.home.device.deviceLight__d073d51209ad

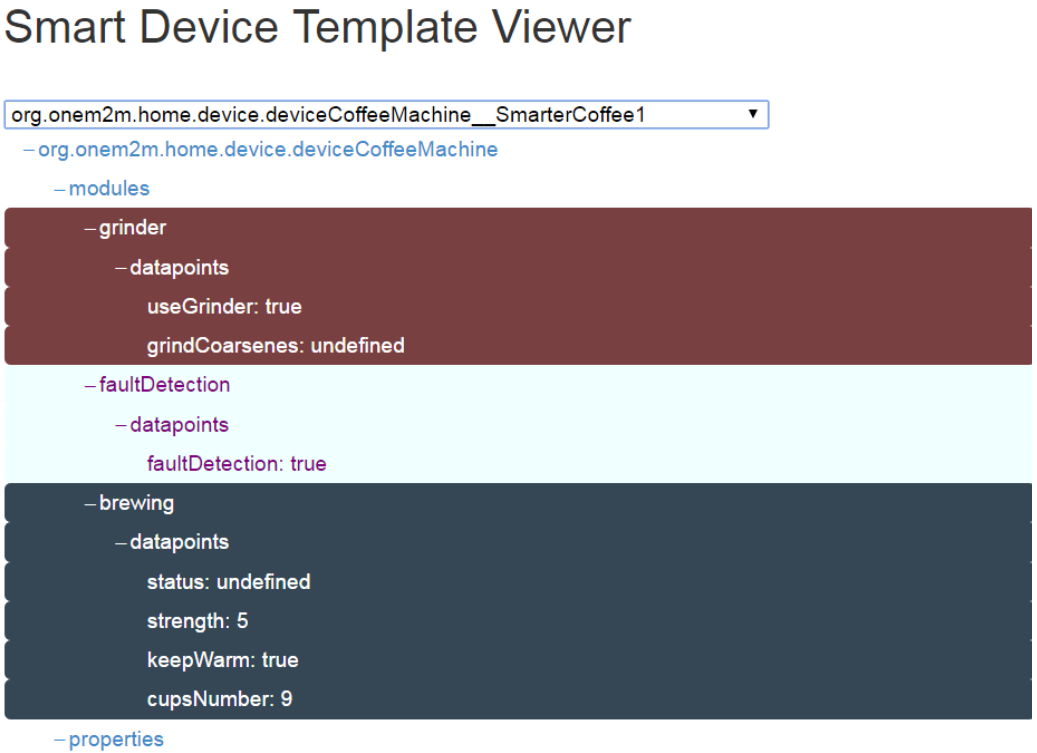
- org.onem2m.home.device.deviceLight
  - modules
    - colour
      - datapoints
        - red: 0
        - green: 255
        - blue: 0
    - binarySwitch
      - datapoints
        - powerState: false
  - properties
    - Protocol:LIFX
    - DeviceSerialNum:d073d51209ad
    - DeviceName:Ampoule LIFX 1209ad
    - DeviceModelName:Color 1000
    - DeviceAliasName:LIFX Color Bubble
    - DeviceManufacturer:LIFX

org.onem2m.home.device.deviceLight__1

- org.onem2m.home.device.deviceLight
  - modules
    - runMode
      - datapoints
        - supportedModes: [effect.none, effect.colorloop, alert.none, alert.lselect, alert.select]
        - operationMode: [effect.none, alert.none]
    - faultDetection
      - datapoints
        - status: false
    - colourSaturation
      - datapoints
        - colourSaturation: 56
    - binarySwitch
      - datapoints
        - powerState: true
    - colour
      - datapoints
        - red: 90
        - blue: 0
        - green: 143

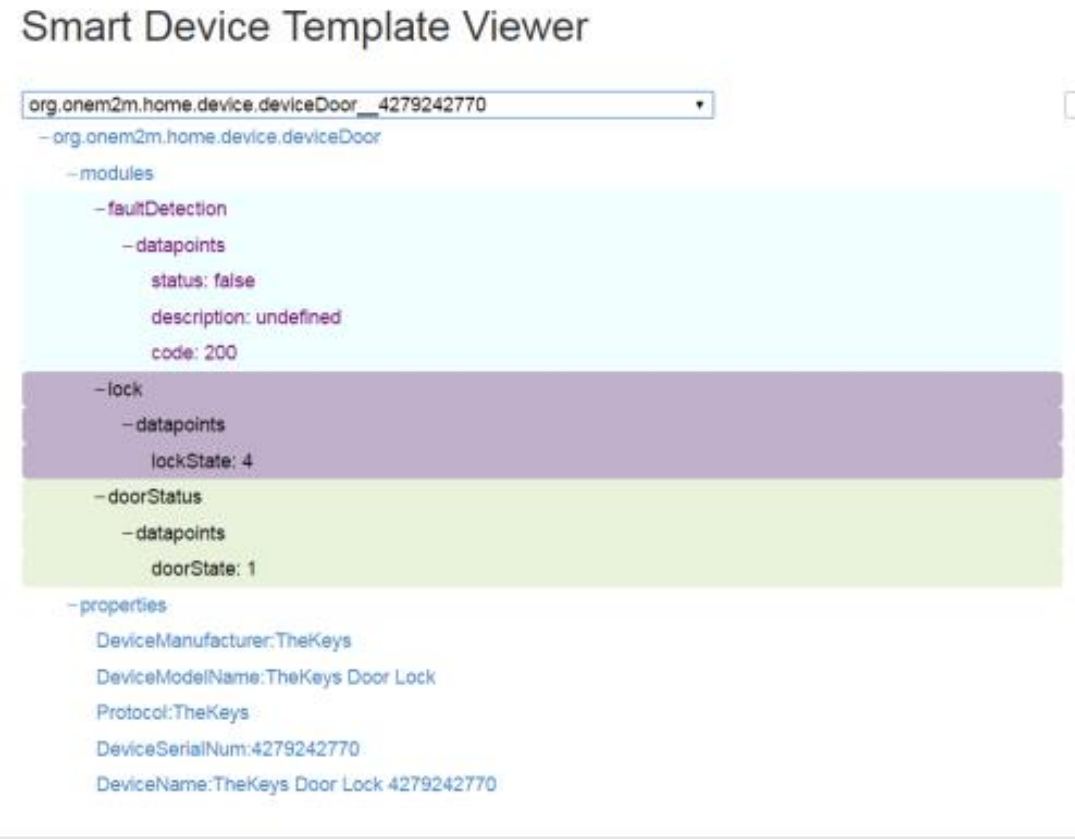
SDT for connected devices (submitted proposal in October)

Connected Coffee Machine (not in TS-0023)



SDT for connected devices

Door Lock (not in TS-0023)



II. Security and sharing

Users, devices and applications access rights

Access rights management in a standard architecture

Apps, data, devices are discovered as resources by 3rd party cloud apps

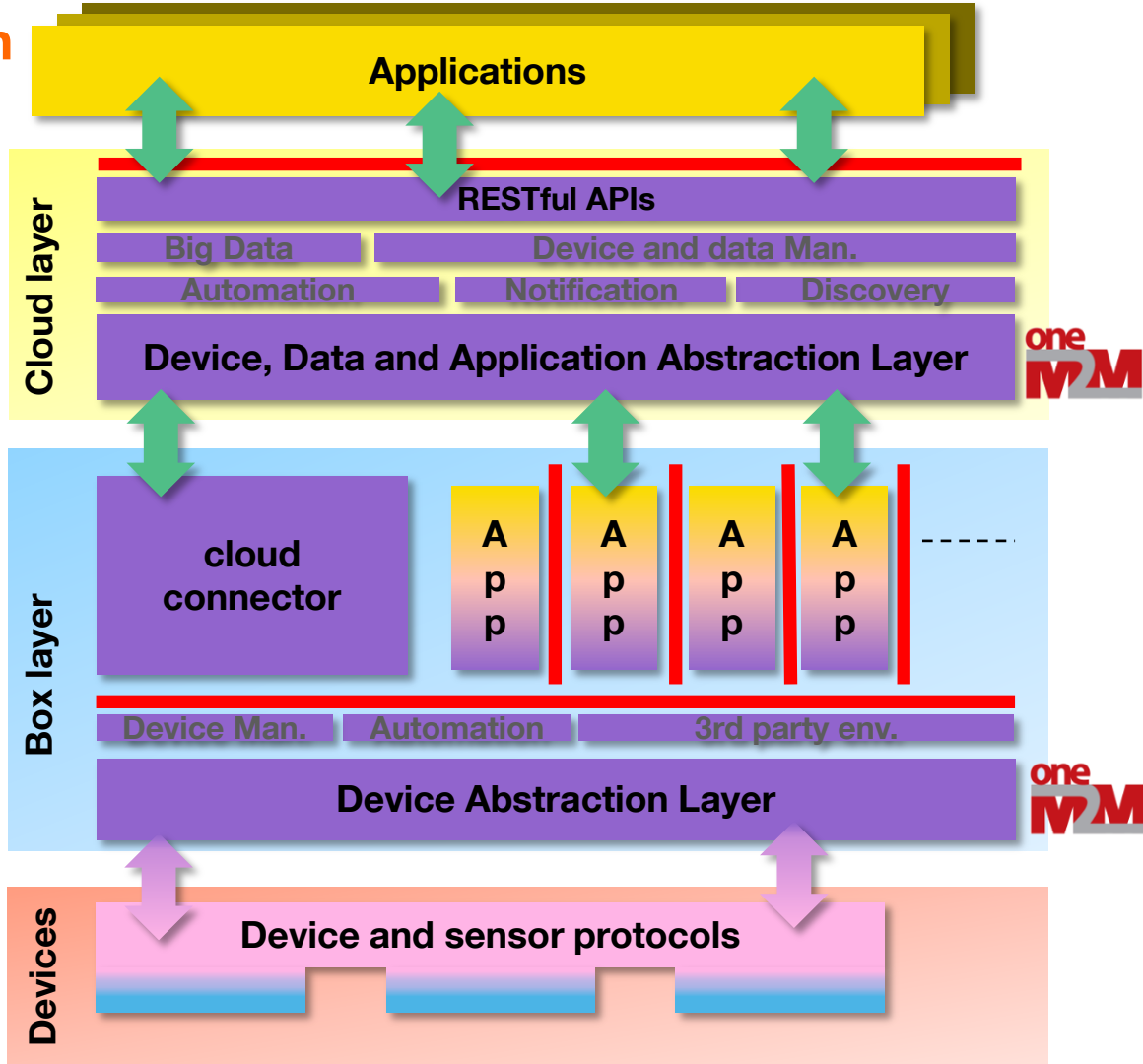
Access rights on devices and embedded apps are first checked at cloud level

Apps and devices are discovered as services by embedded apps

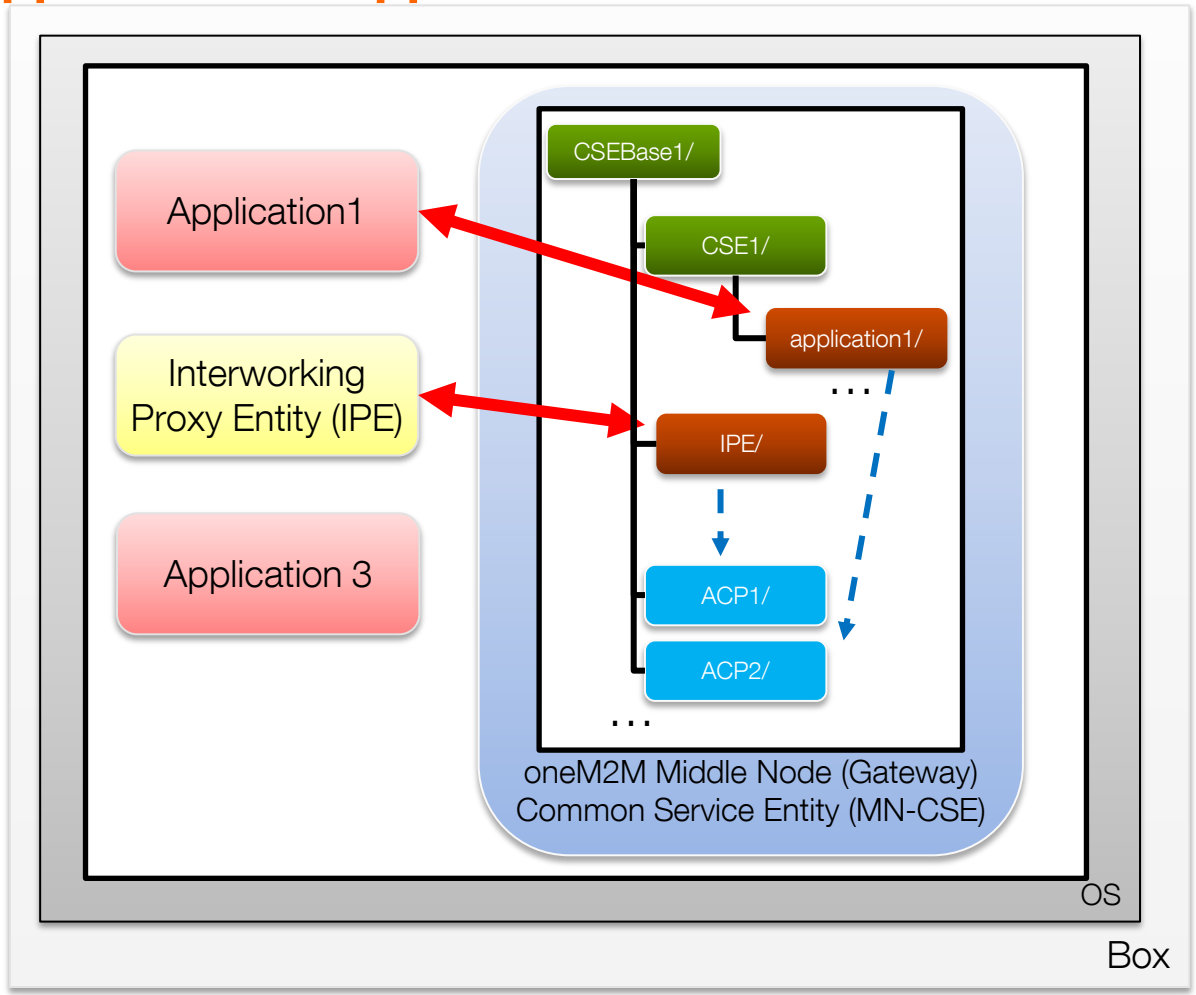
Embedded apps expose external services (APIs) whose access rights are checked

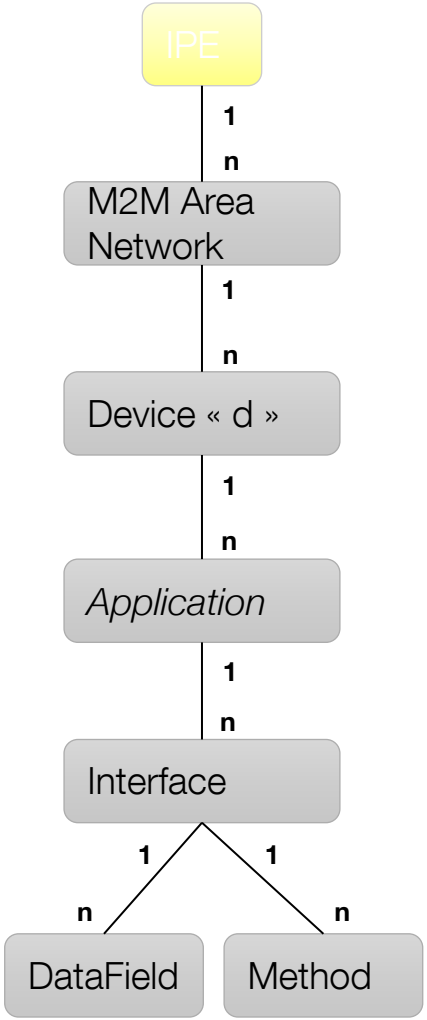
Local access rights on technical services and networked devices are checked at the embedded framework level

Service access rights are checked thanks to Java permissions in one only process.

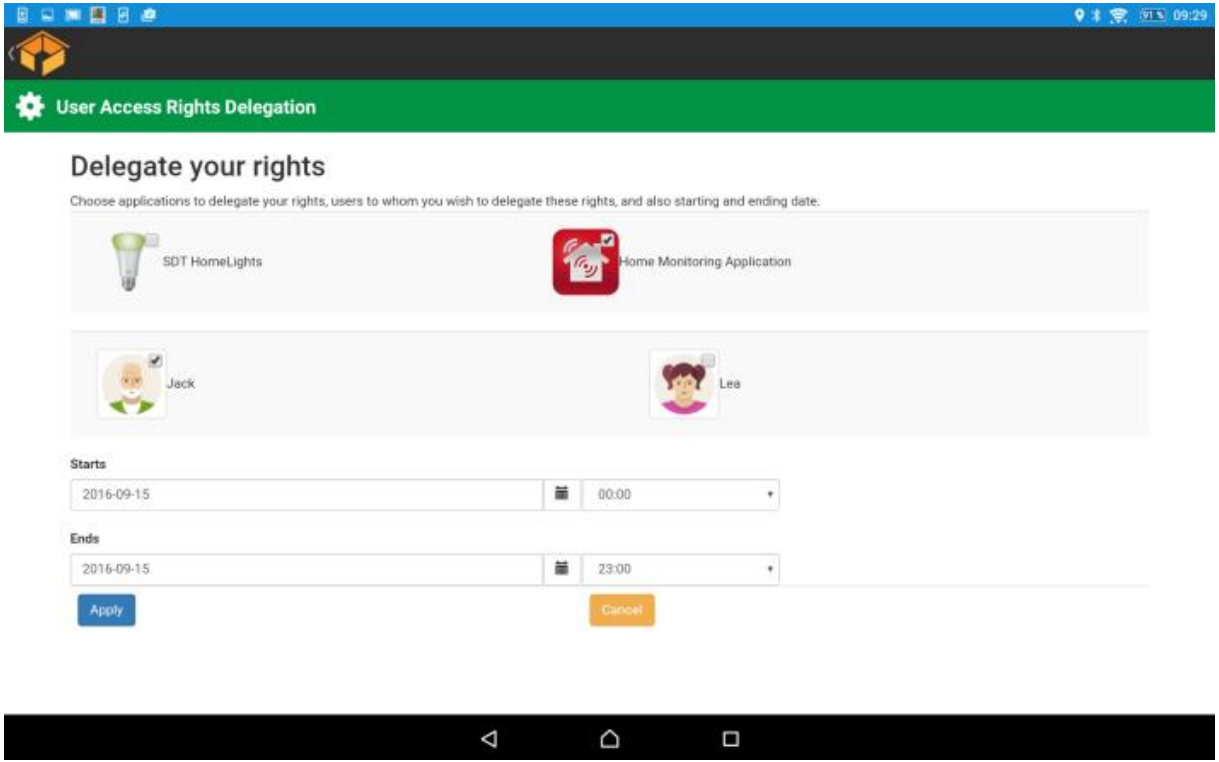


Applications mapped in the oneM2M data model





Rights management for delegation



A user can delegate rights to another user on applications (and related devices) and for a defined period of time

III. Standard and open source contributions

Standards & Open source contributions

eclipse OM2M 1.0 OSGi-based framework

Using oneM2M OM2M implementation.

Providing oneM2M release 2 FlexContainers open source implementation.

Providing SDT and Home Information model open source implementation.

eclipse SmartHome

OSGi EnOcean base driver.

OSGi Alliance

RFP smart Device Template Abstraction Layer (RFP number in progress). Providing a SDT Java API to OSGi Community.

Orange contributions to oneM2M (as author & co-author)

MAS-2016-0213 Oct.2016 – « Add the CoffeeMachine device model in TS-0023 » related to Information Model for Home appliances – Orange

MAS-2016-0172 July 2016 - “Additional text and section to complete TR-0022” (added section on link with OSGi work) related to the WI on Continuation of HGI smart home activities in oneM2M (TR-0022) - Huawei; DT and Orange as co-authors

MAS-2016- 0139 *May 2016 // only for discussion – target Rel3 // – “Proposed modification to the Mapping of Module Classes to oneM2M flexContainer” related to Information Model for Home appliances TS-0023 – Orange*

TP-2016-0107R02 May 2016 “New WI for a technical report with OSGi Alliance” related to Synergy with OSGi - Orange as a supporter of the new WI prepared by Huawei

MAS-2016-0149R02 May2016 “Additional text and section to complete TR-0022” related to the WI on Continuation of HGI smart home activities in oneM2M (TR-0022)

MAS-2016- 0085R2 March 2016 – “enumeration type & supported modes for a thermostat device” related to the Information Model for Home appliances TS-0023 – Orange

TP-2016-0090R2 *March 2016 – “Proposed Liaison Statement Out to OSGi” Related to Collaboration between oneM2M and OSGi - Help provided to WG2 chair to draft the LS, together with DT, NTT, Huawei…*

MAS-2016- 0046R2 Jan.2016 ”Add the Thermostat device model in TS-0023” related to Information Model for Home appliances - Orange

MAS-2016- 0047 Jan.2016 “Define the possible values for the thermostat mode” related to Information Model for Home appliances - Orange

MAS-2016-0040 Jan.2016 “Input to TR-0022” on the SDT from HGI related to Technical hand over (HGI to oneM2M) - Orange, co-authored with DT

TP-2016-0017R1 *Jan2016* // for discussion // “*Collaboration with HGI and with OSGi Alliance” – Orange + Huawei*

MAS-2015-0663R02 - Nov2015 “Update of TR-0017 to provide more description on Smart Device Template Information Model for Smart Home” - Orange + DT + NEC + NTT

This contribution also resulted in the selection of the SDT as the reference for TS-0023

MAS-2015-0657R02 Nov2015 “Input to TR-0022 to explain the possible mapping of HGI smart home architecture and reference points to oneM2M ones.” Related to Technical handover (HGI to oneM2M) – Orange

IV. Orange Labs Proof of Concept

Orange Labs Proof of Concept

Showcased at ETSI IoT Workshop, Sophia Antipolis, November 2016

Tablet

User Application

LIFX

Philips Hue

netatmo

Third-parties IoT Cloud Platforms

netatmo welcome

netatmo weather station

smarter Coffee

Orange Livebox 4

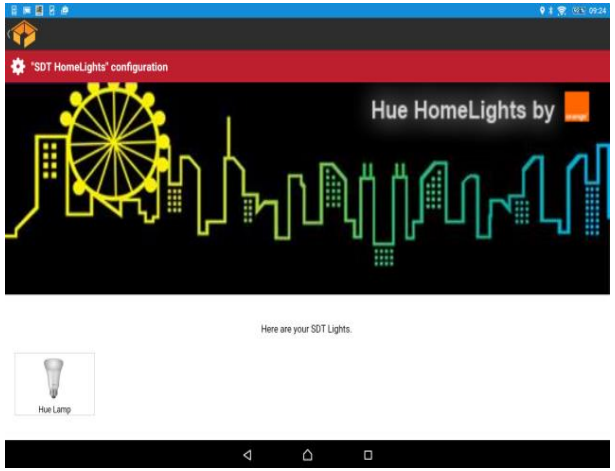
IoT Gateway

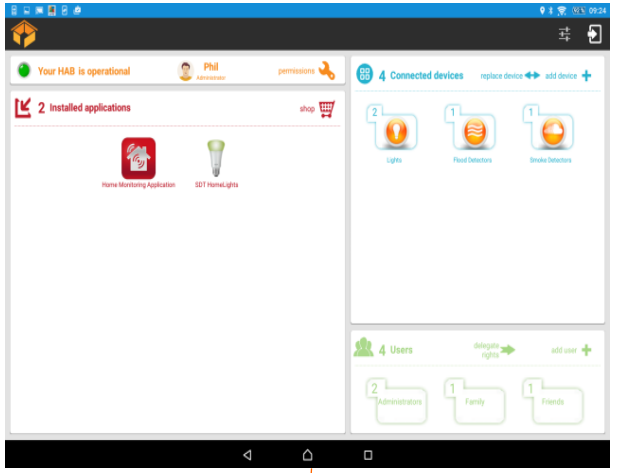
Laptop

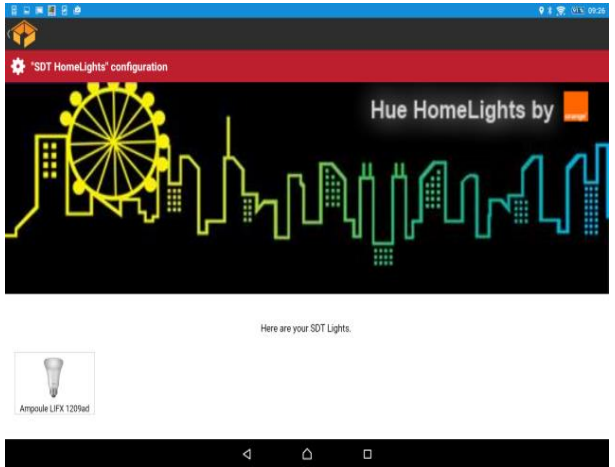
Orange IoT Cloud Platform

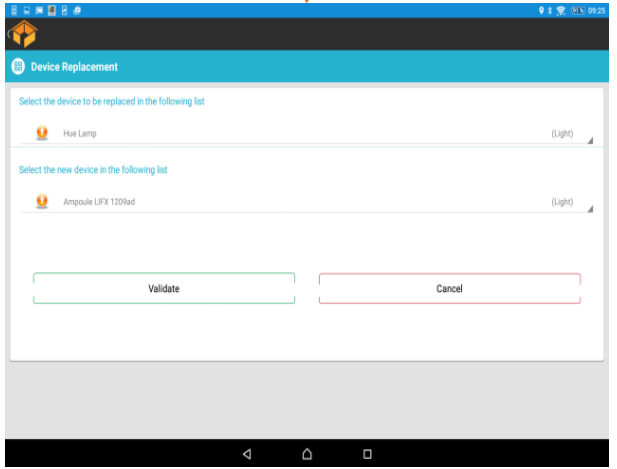
smart Home ecosystem of connected devices

Use Case 1 – Replacement of a device by an equivalent device

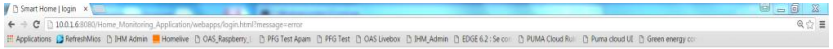


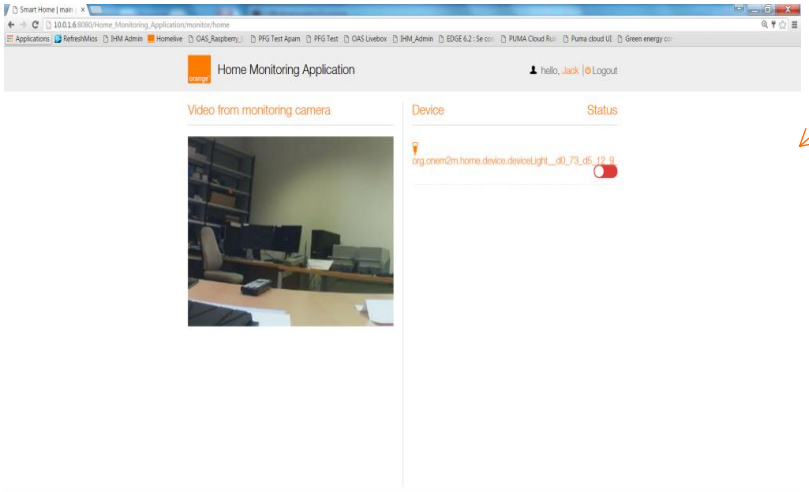


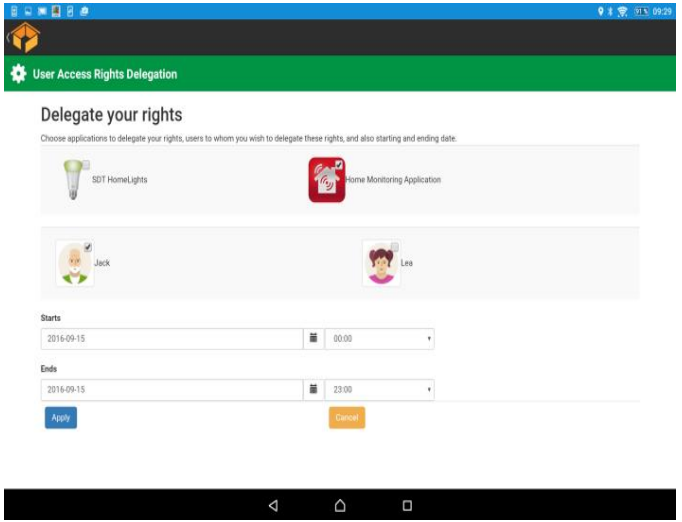




Use case 2 – Rights delegation







V. Conclusion & Future Work

Conclusion and Future Work

oneM2M standard set is large, very flexible and addresses many aspects.

Smart Device Template is simple, modular and agnostic to underlying technology. Its implementation with OM2M allows to manage heterogeneous ecosystem of devices in a easy way (see you at demonstration booth).

Orange Labs has conviction of semantic added-value in IoT and uses with these abstraction models, and SDT is a great model to work in and extend.

Device Management (e.g. Device Administration) with oneM2M is also a topic Orange Labs will study.

Celtic-Plus
Smart Connected World

A European Celtic-Plus Research project might start in 2017 (Netherlands, France, Germany, Portugal & Turkey), in order to dig deeper on devices descriptions, semantics & ontologies, and investigate how to go beyond smartHome ecosystem (smartBuilding, smartCities…) and federate interested actors and players in a dynamical community.


THANK YOU
Relax