Showcase D: oneM2M Enriched Personal Life

oneM2M Showcase, 2014-12-09
Source: Huawei Technologies Co., Ltd. , China United Network Communications Group Company Limited

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oneM2M Enriched Personal Life

Huawei Technologies Co., Ltd. ,

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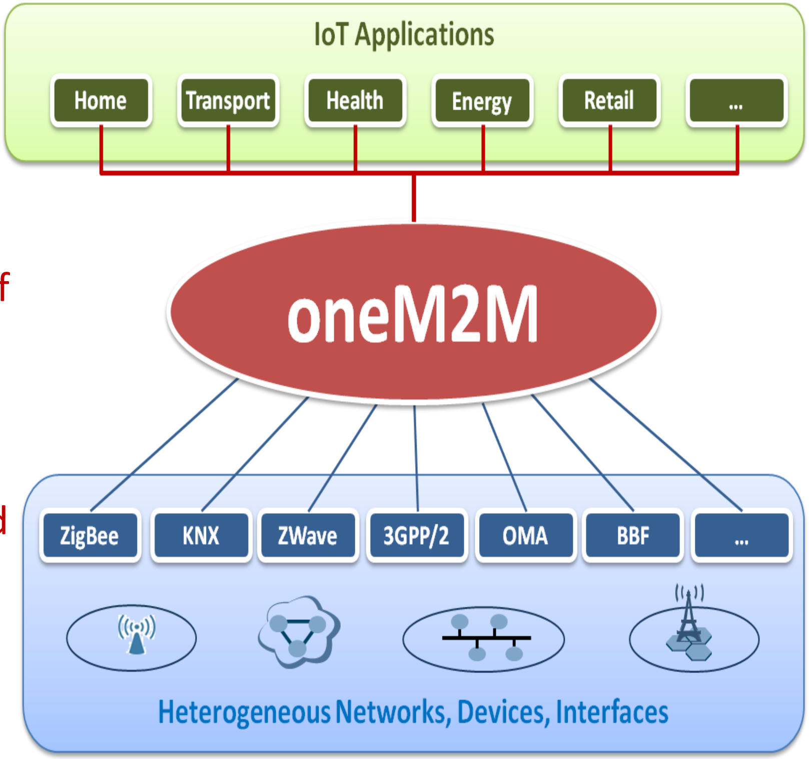
Issues and Challenges

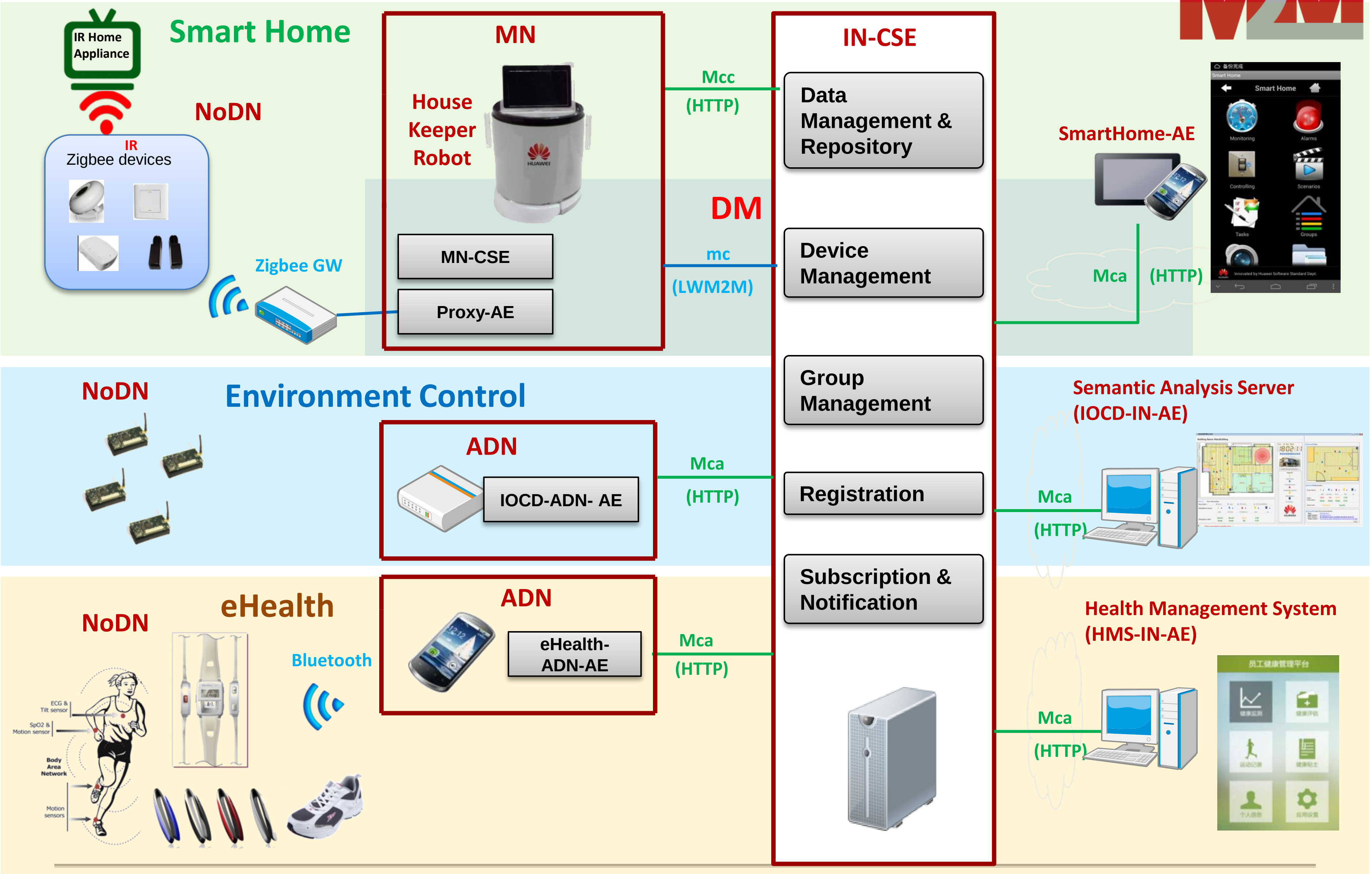
- **Multi-domain Applications**
  - Different vertical applications need common service functions (e.g. data collection, security, management, etc.)
- **Heterogeneous Devices & Networks**
  - A general interworking and abstraction framework is needed to connect a variety of devices/networks while hiding the complexity from IoT Applications
- **Remote Management**
  - IoT Applications need simple and abstracted management APIs without understanding technology specific protocols
- **Data Interoperability and Analytics**
  - Connectivity is not enough, data exchange has to be meaningful to add value and to enable cross domain business



How oneM2M addresses issues

- **Multi-domain Applications**
  - oneM2M provides Common Service Entities and Functions via RESTful resources & APIs: e.g. <container>, <subscription>, <group>, …
- **Heterogeneous Devices & Networks**
  - Abstracted resources like <AE>, <container>, <contentInstance> can be used as the generic modeling tools for sensor network interworking
- **Remote Management**
  - Common management functions (ASM CSF, DMG CSF) provided via abstracted management resource <mgmtObj> and its specializations e.g. [firmware], [software], [battery], [memory], [areaNwkInfo]…
  - Support mapping to OMA DM1.x/2.0, LWM2M, BBF TR069
- **Data Interoperability and Analytics**
  - Semantic technologies including ontology, annotation, reasoning, mash-up and data analytics are investigated and leveraged

Introduction to Demo



Function Overview

Registration

- Exchanged information include Point of Access and other context information
- Sensor devices represented as <container> of the registered <AE> resource

Data Management & Repository

- <container> and <contentInstance> resources for data management
- Data report and sharing among AEs and CSEs.

Subscription & Notification

- Filter criteria for notification filtering.
- Notifications used to inform new devices or data availability

Device Management

- Resource type <mgmtObj>, <node>, [deviceInfo], [firmware] for remote firmware management
- OMA LWM2M used as the underlying technology

Group Management

- Bulk operation on devices (e.g. switch off all lights) through <fanOutPoint> resource
- <group> member management for user defined scenarios

Resource Representation

- resource representation XML serialization
- support short name of attributes and parameters

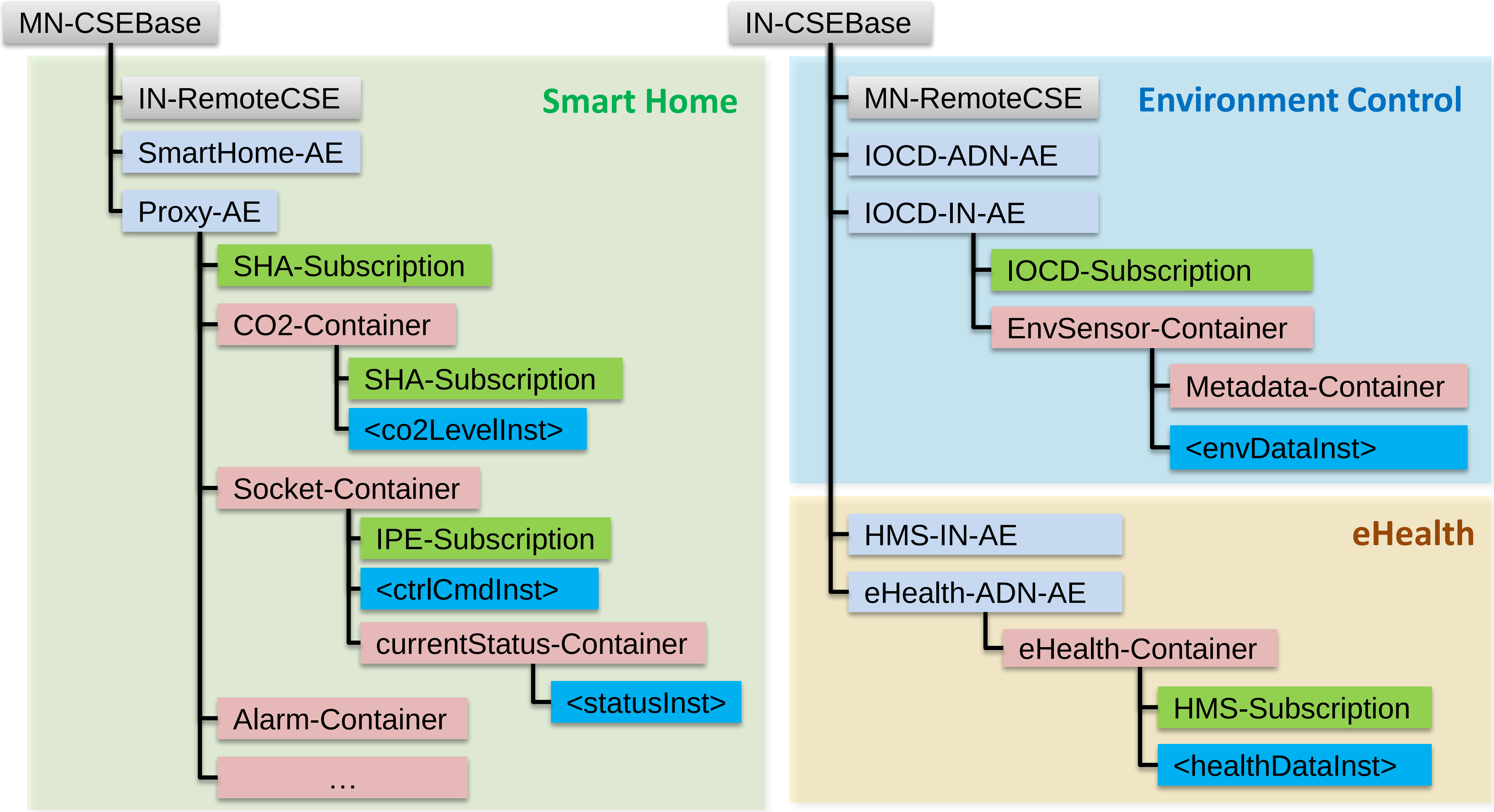
Protocol Bindings

- HTTP binding
- LWM2M/CoAP mapping

Semantic Enablement

- External 'IOCD' ontology for M2M device and data modeling
- Support 'ontologyRef' attribute in <AE> & <container> for semantic annotation
- Mash-up results (by semantic reasoning) trigger actuators

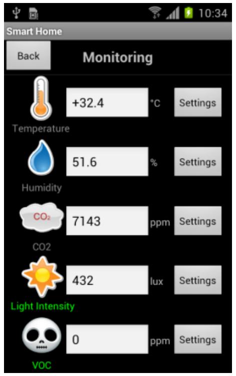
Resource Structure



S1: Smart Home – Sensing & Controlling

Sensing & Actuating

- Monitor the in-home sensor value e.g. temperature.
- Control the in-home actuators e.g. power socket.



Temperature +32.4 °C

Humidity 51.6 %

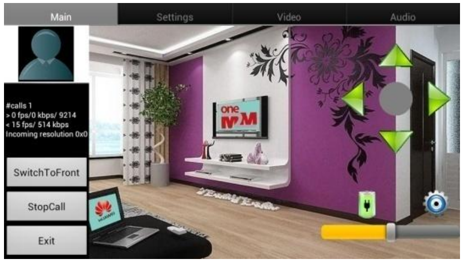
CO2 7143 ppm

Light Intensity 432 lux

VOC 0 ppm

Real Time Video

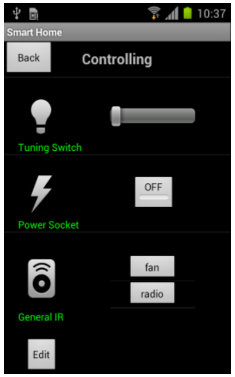
- Remotely walking the robot
- Bi-directional video comm.
- Build-in sensors to monitor the env.



#calls 1
> 0 fps/0 kbps/ 9214
< 15 fps/ 514 kbps
Incoming resolution 0x0

Infra red Control

- Self learning IR remote controller
- Compatible with major commercial IR controllable appliances

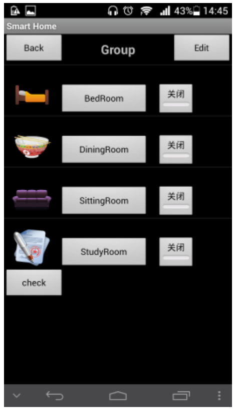


Grouped Operation

- On one click:

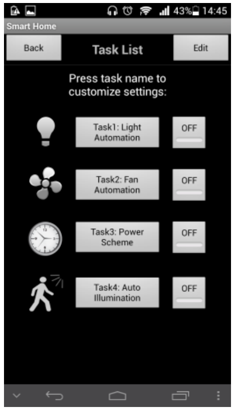
✓Switch all lights in the room

✓Close all windows and shut all curtains



Automated Tasks

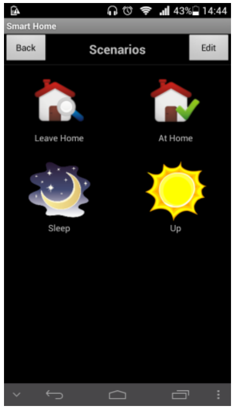
- Configurable rules to make sensors & actuators a closed feed back loop e.g. "turn on the fan when temperature is to high"



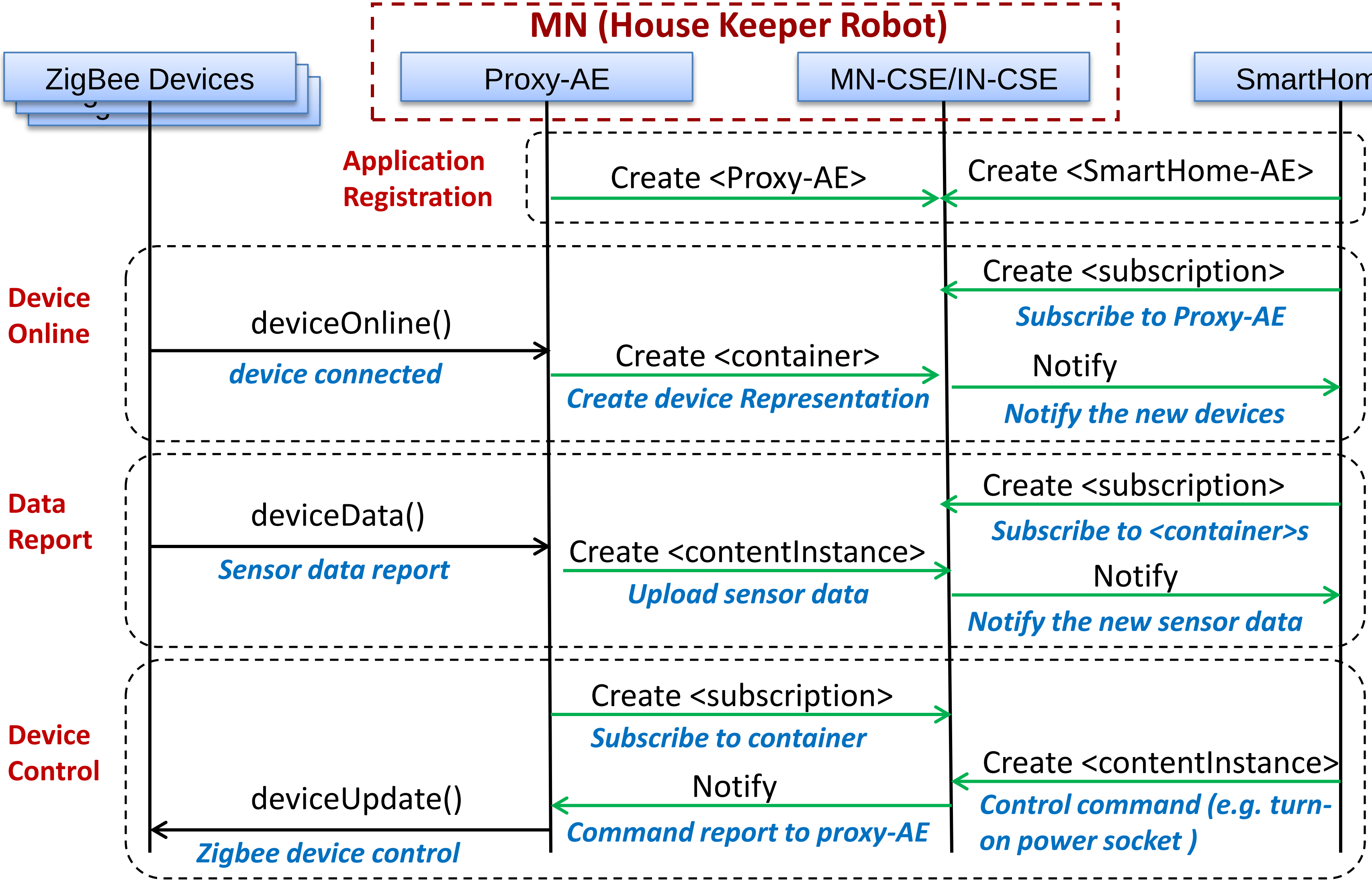
Press task name to customize settings:

Scene-based

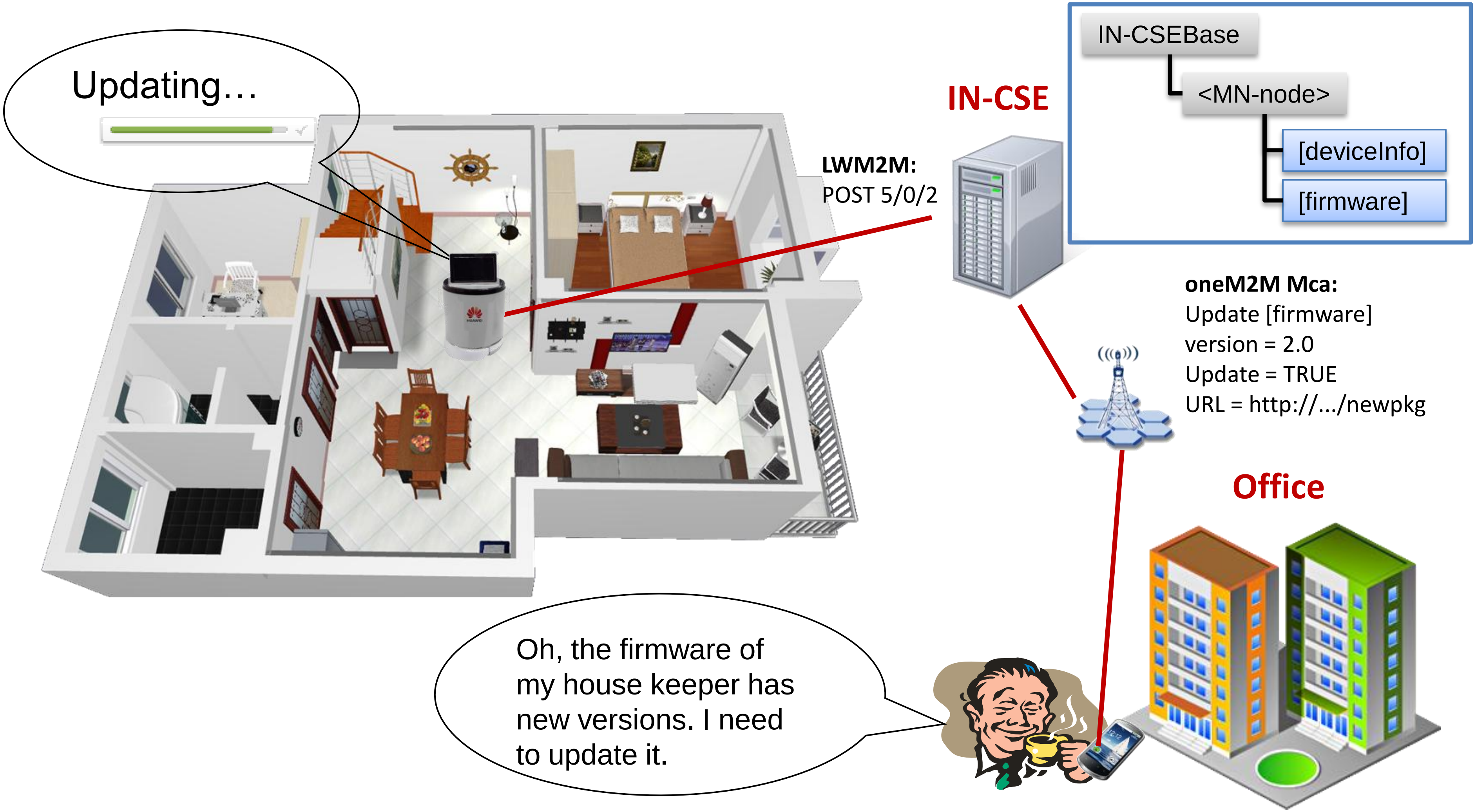
- Pre-defined scenes e.g. leave home, sleep, wake up
- Allow bulk operation to different home appliances



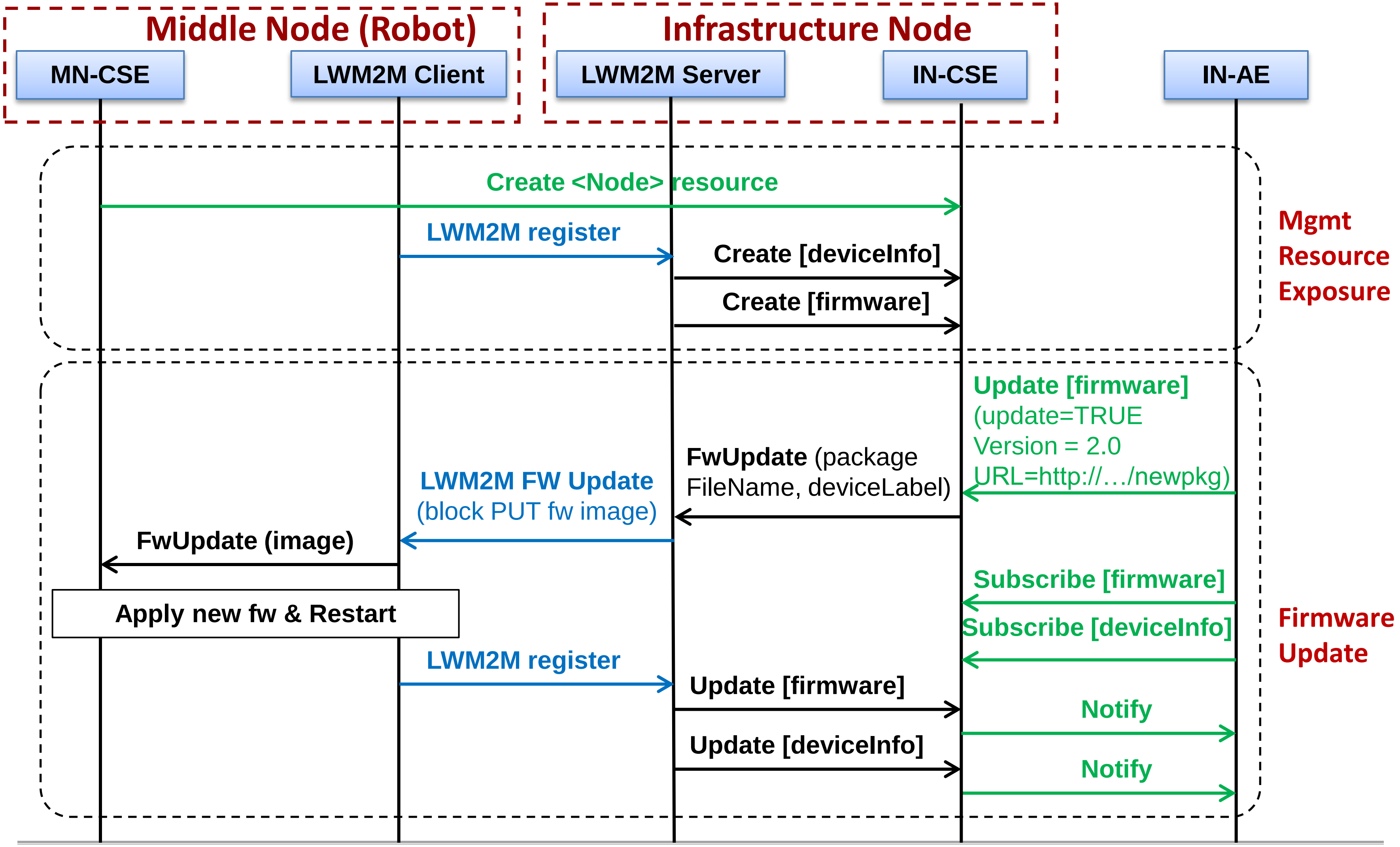
S1: Example Flow – ZigBee Interworking



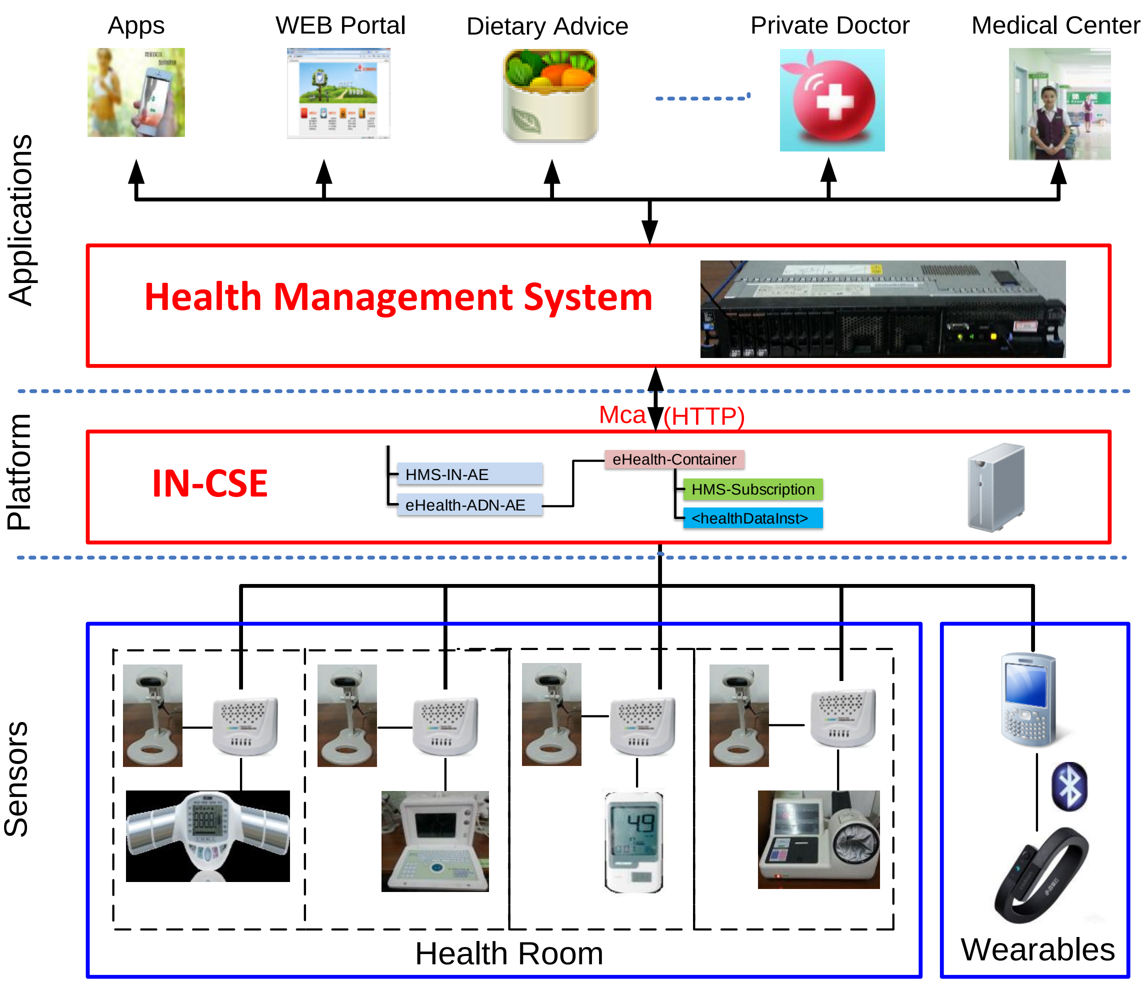
S1: Smart Home – Remote Management

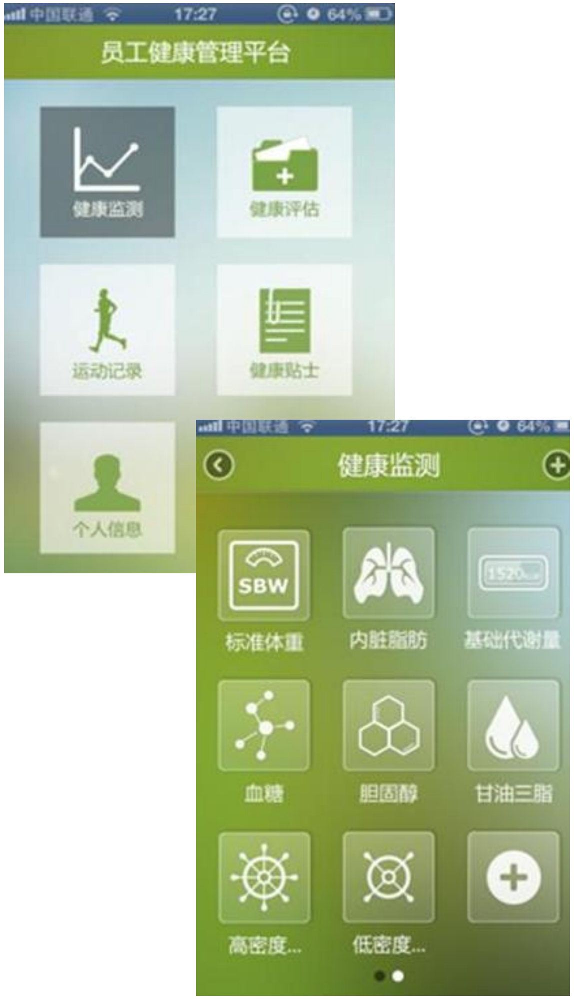


S1: Example Flow – Device Management

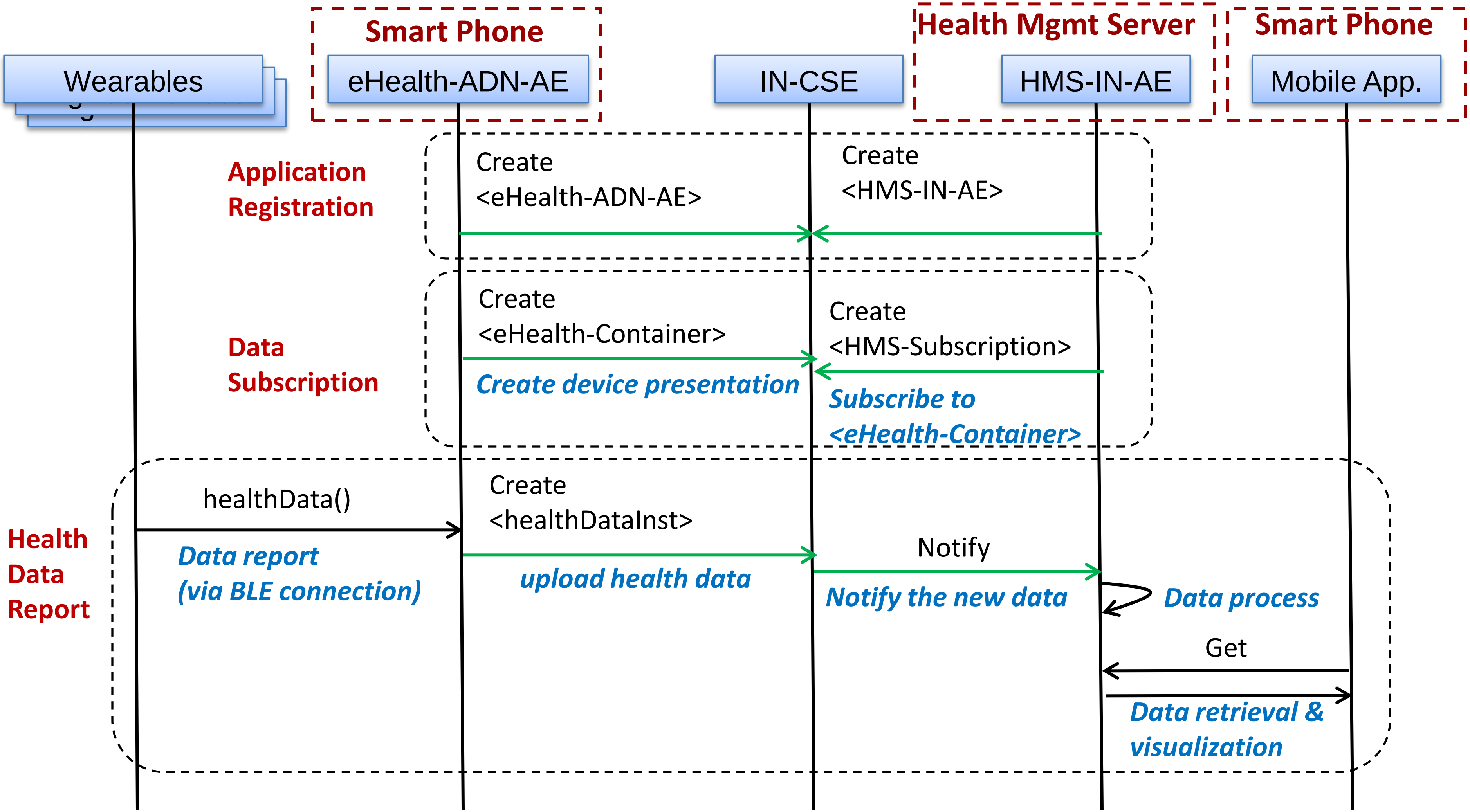


S2: Health Condition Monitoring

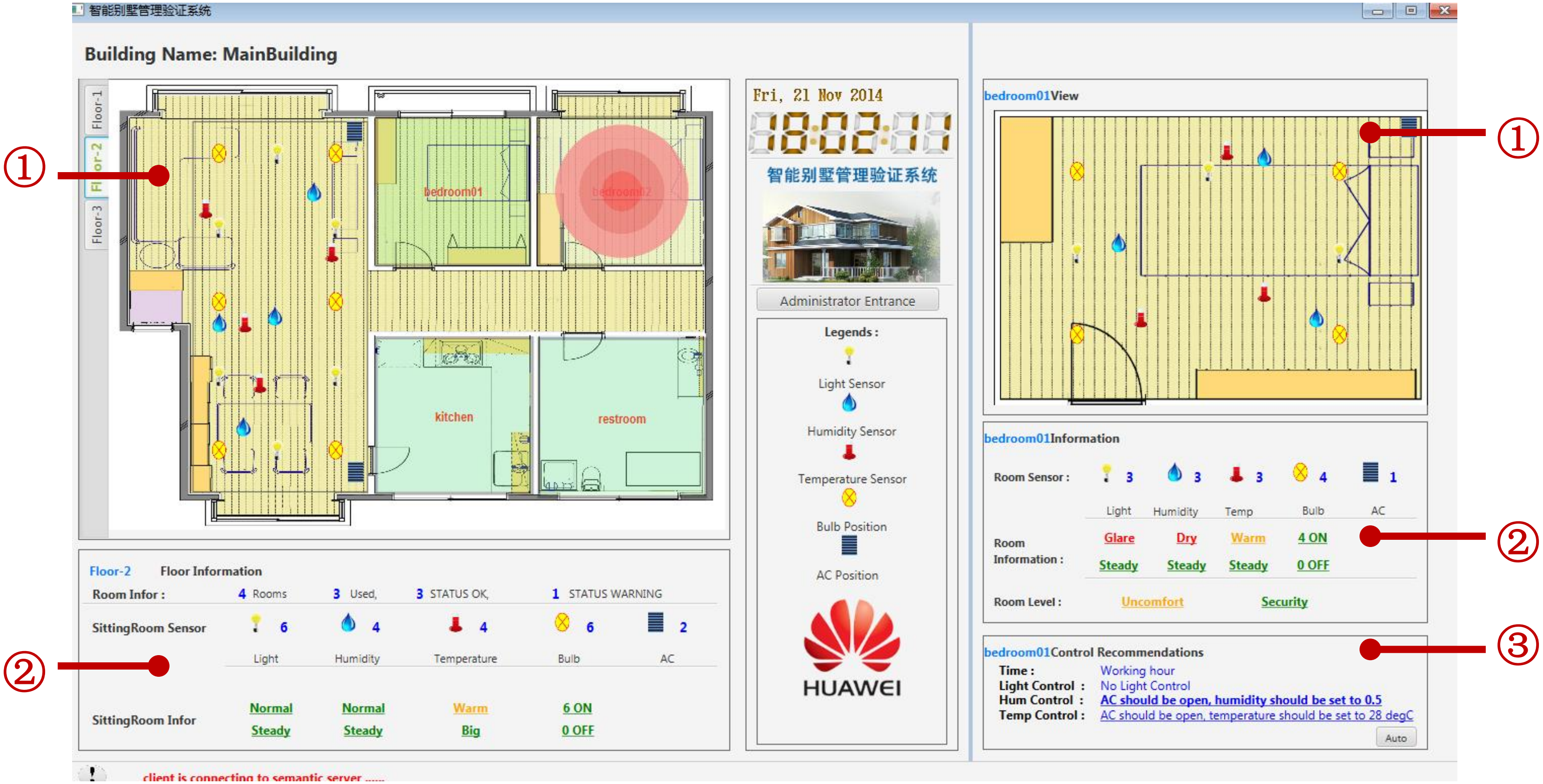




S2: Example Flow – Heath Monitoring



S3: Intelligent Environment Control



Building Name: MainBuilding

Fri, 21 Nov 2014

18:02:11

Floor-2 Floor Information

Room Infor :	4 Rooms	3 Used,	3 STATUS OK,	1 STATUS WARNING	
SittingRoom Sensor	6	4	4	6	2
	Light	Humidity	Temperature	Bulb	AC
SittingRoom Infor	Normal Steady	Normal Steady	Warm Big	6 ON 0 OFF	

client is connecting to semantic server ......

bedroom01View

bedroom01Information

Room Sensor :	3	3	3	4	1
	Light	Humidity	Temp	Bulb	AC
Room Information :	Glare Steady	Dry Steady	Warm Steady	4 ON 0 OFF	
Room Level :	Uncomfort		Security		

bedroom01Control Recommendations

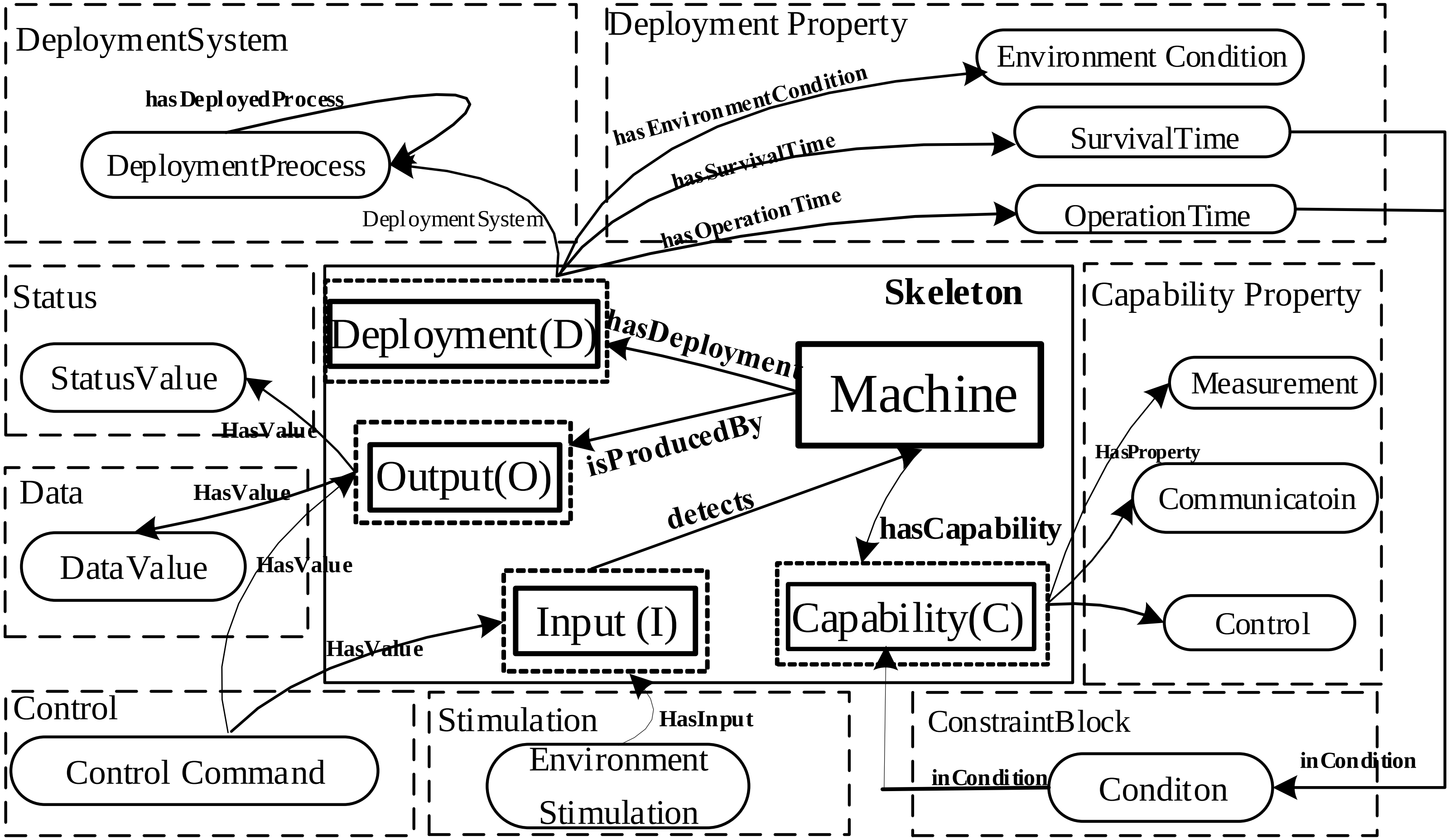
Time : Working hour
Light Control : No Light Control
Hum Control : AC should be open, humidity should be set to 0.5
Temp Control : AC should be open, temperature should be set to 28 degC

① Collect the sensor values (temperature, humidity, illumination, etc) with semantic annotation

② Data analytics on environment comfort conditions based on semantic mash-up/reasoning.

③ Intelligent recommendation & auto-control based on semantic rules

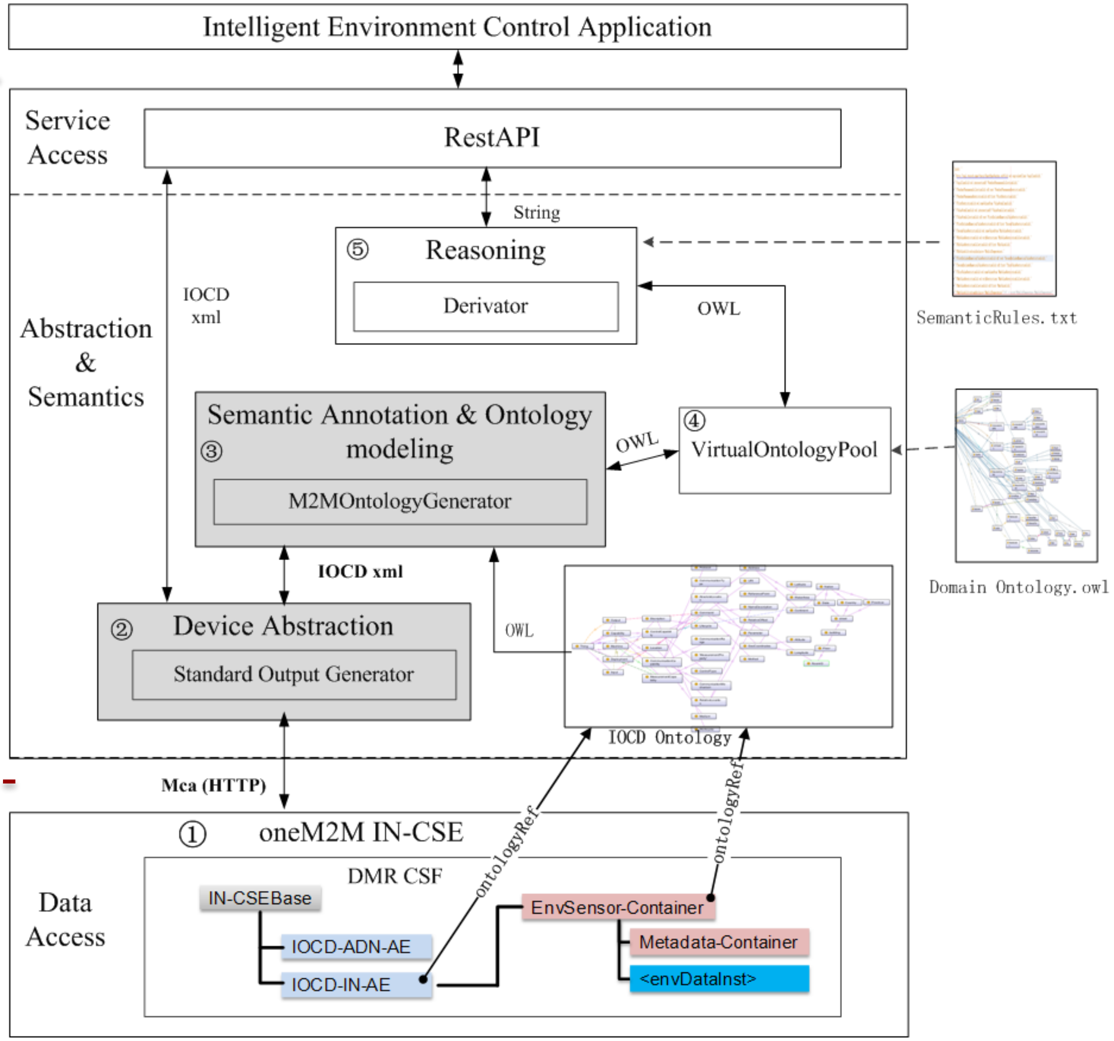
S3: Intelligent Environment Control – IOCD Ontology Model



S3: Intelligent Environment Control – Semantic Architecture

Semantic Analytics Server (IN-AE)

IN-CSE



Intelligent Environment Control Application

Service Access

RestAPI

String

⑤ Reasoning

Derivator

IOCD xml

Abstraction & Semantics

OWL

SemanticRules.txt

Semantic Annotation & Ontology modeling ③

M2MOntologyGenerator

OWL

④ VirtualOntologyPool

Domain Ontology.owl

IOCD xml

② Device Abstraction

Standard Output Generator

OWL

IOCD Ontology

Mca (HTTP)

ontologyRef

ontologyRef

① oneM2M IN-CSE

Data Access

DMR CSF

IN-CSEBase

IOCD-ADN-AE

IOCD-IN-AE

EnvSensor-Container

Metadata-Container

<envDataInst>

① Data collection with semantic annotation referring to the common ontology model - 'IOCD'

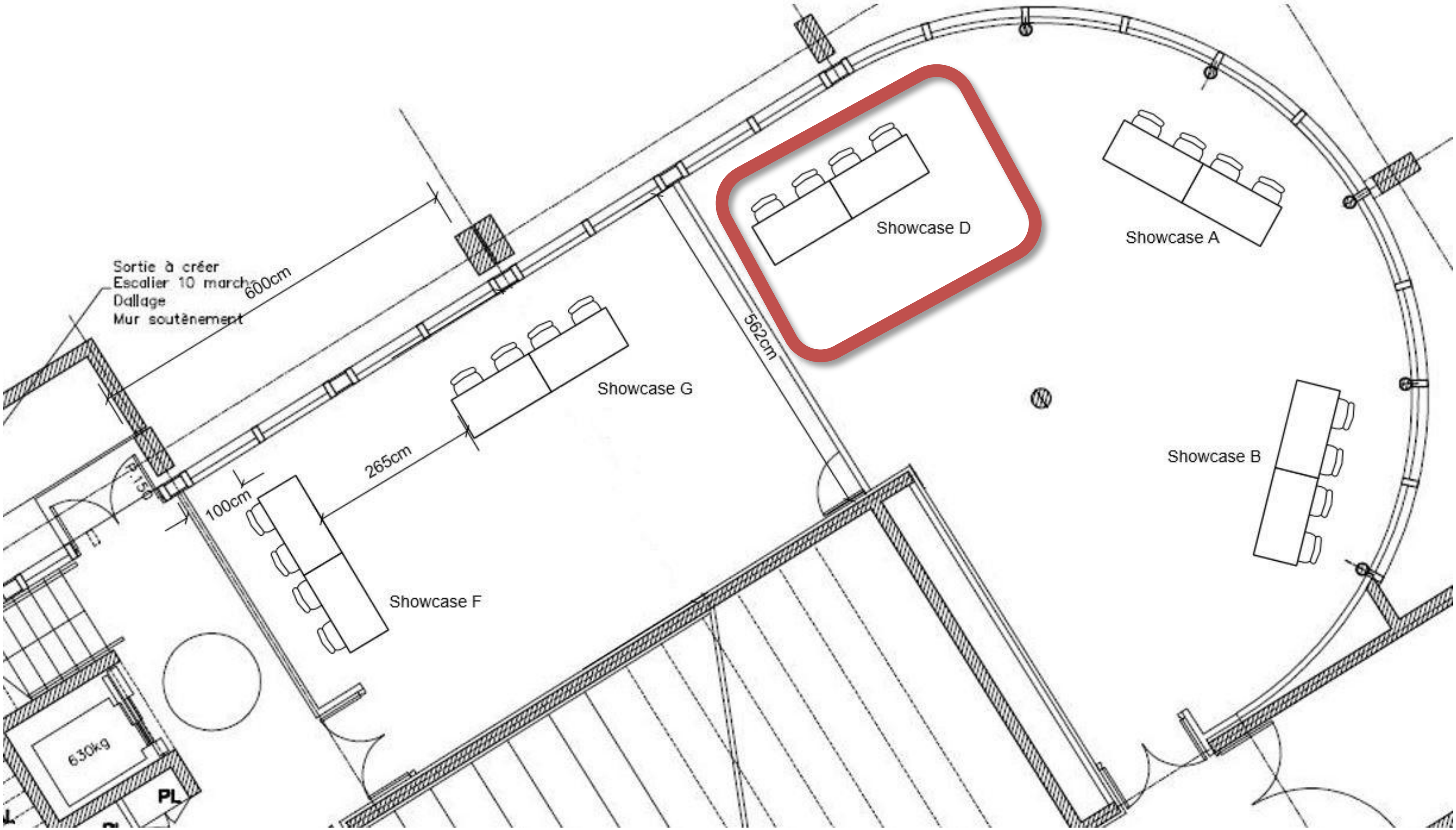
② Data formatting

③ Semantic annotation & ontology instantiation

④ Import external domain ontology

⑤ Reasoning based on semantic rules & ontologies.

Check it out in B2B3!



Thank You!

oneM2M

Q&A