OM2M: Standardized service platform for M2M interoperability

LAAS-CNRS

Yassine Banouar
Thierry Monteil
Mahdi Ben Alaya
Christophe Chassot
Khalil Drira

yassine.banouar@laas.fr
@YassineBANOUAR

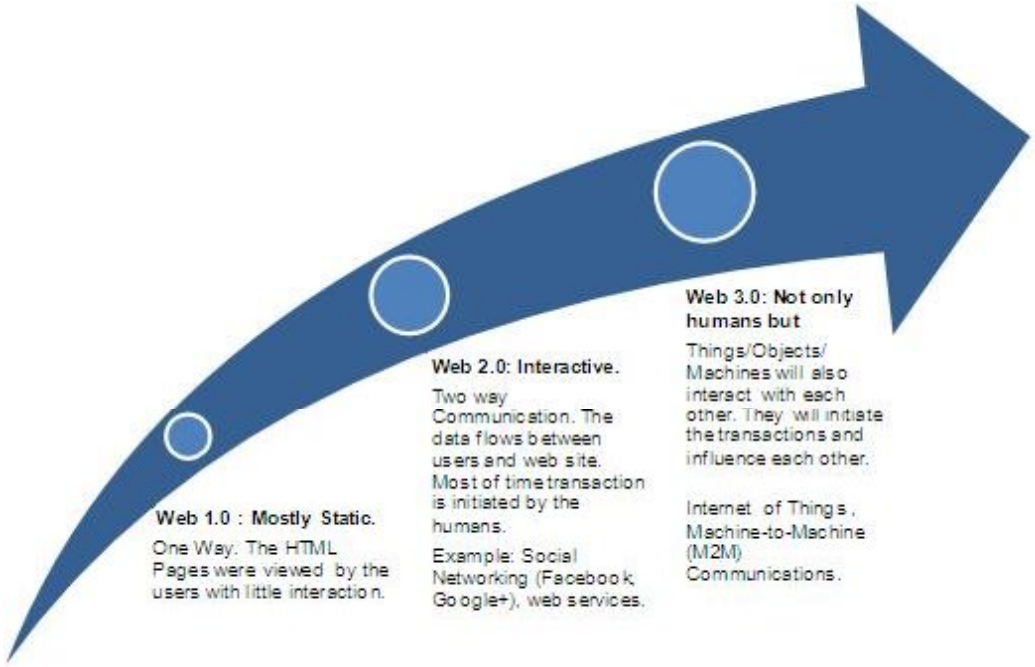
www.om2m.org

eclipsecon France 2014 Toulouse June 18-19, 2014

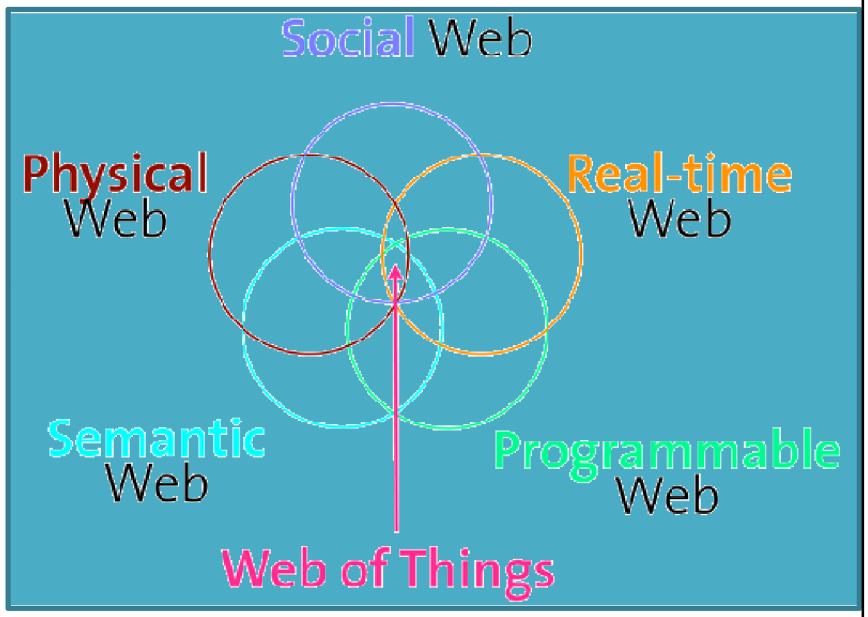
Agenda

- Introduction
- ETSI M2M standardization
- OM2M service Platform
- Subscribe/Notify scenarios
- Conclusion

The Web evolution



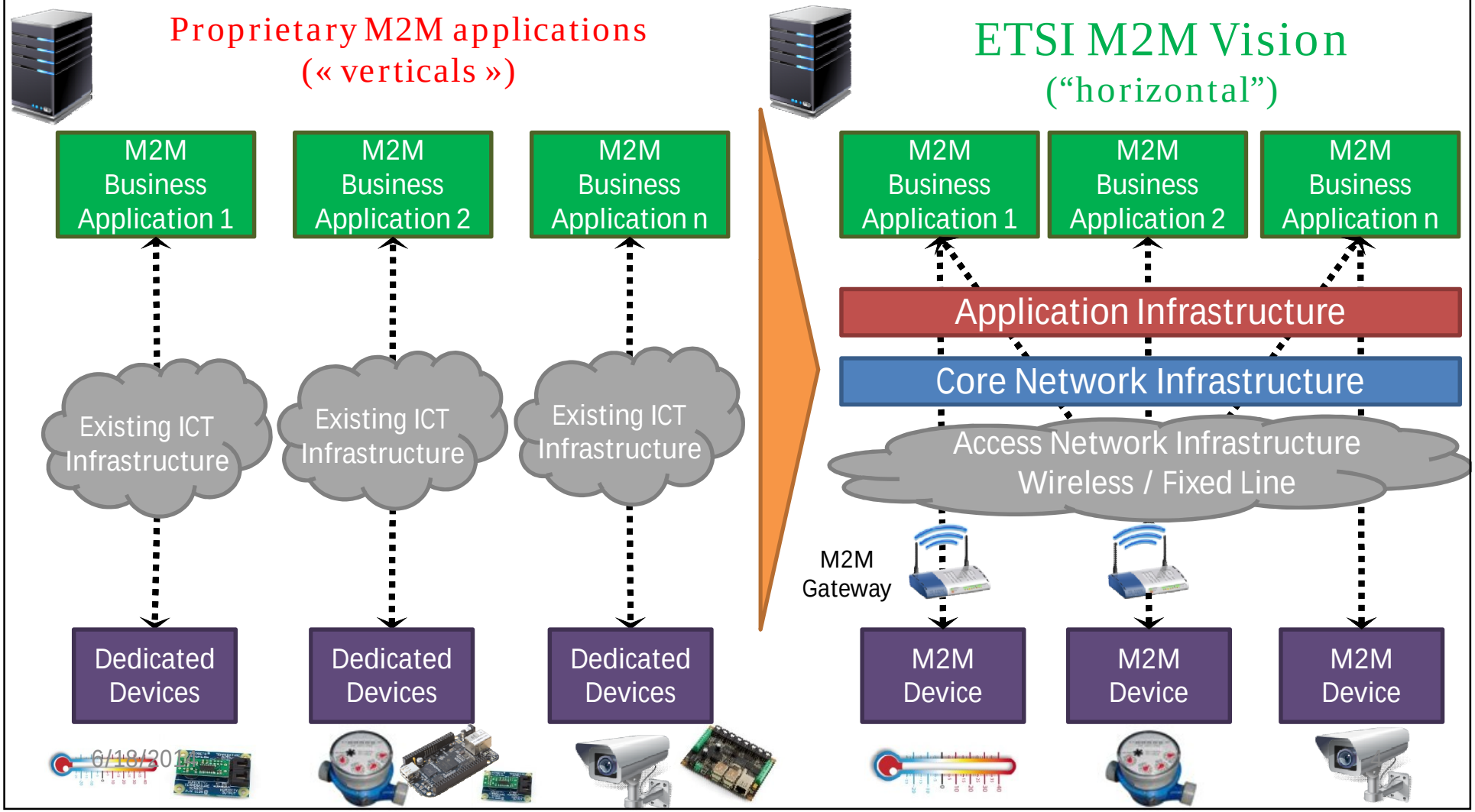
http://www.webofthings.org/2011/02/04/lift11-talk-transcript/



- Smart buildings
- Smart Home
- Smart grid
- smart factories
- etc.

Machine-to-Machine

ETSI M2M Standardization



ETSI M2M Standardization

PC/Dedicated Appliance

Network and Application Domain

M2M Applications

mIa

M2M Core

M2M Service Capabilities

Core Network (e.g. 3GPP, TSPAN)

Access Network
(e.g. xDSL, 3G, GPRS, HFC, satellite, WiFi, WiMAX, etc.)

ETSI M2M – High level architecture

mId

mId

M2M Gateway

M2M Applications

dIa

M2M Service Capabilities

M2M Area Network
(e.g. Zigbee, BT, WiFi, etc.)

M2M Legacy Device

M2M Device/ Gateway Domain

M2M ETSI Device

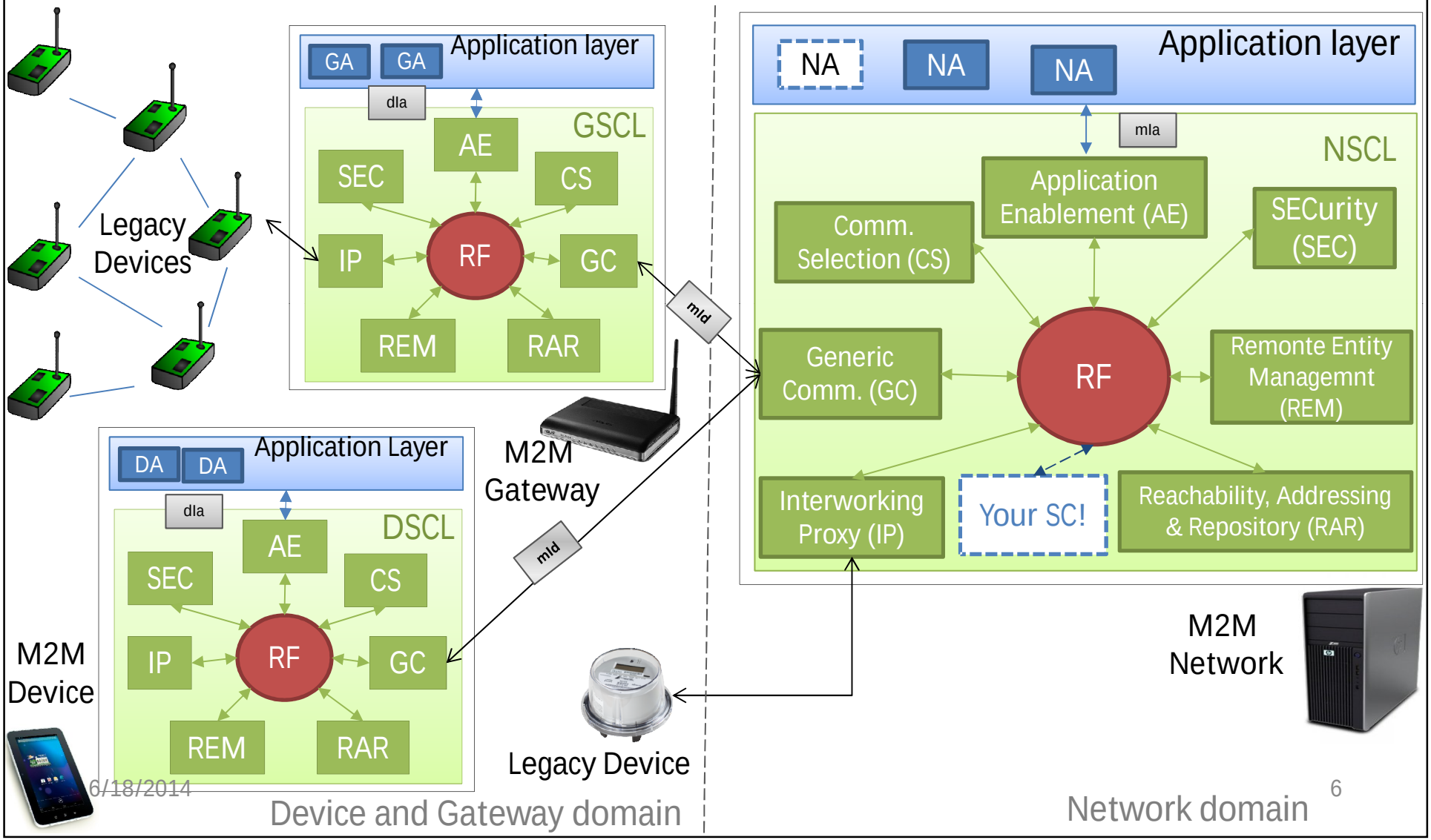
M2M Applications

dIa

M2M Service Capabilities

ETSI M2M Standardization

- ETSI M2M standard provides a Service Capability Layer (SCL) including a set of common services for M2M interoperability.



OM2M features

- OM2M implements a RESTful API (using an URI and CRUD Methods)
- All M2M communications are performed based on simple primitive procedures

OM2M Demo1

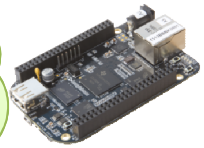
« *Yes! I can turn it ON ☺* »

LAAS ADREAM experimental building

WAN

M2M Server
(NSCL)

LAN
LAAS



BeagleBone
Black
M2M Gateway
(GSCL)

Phidgets HUB

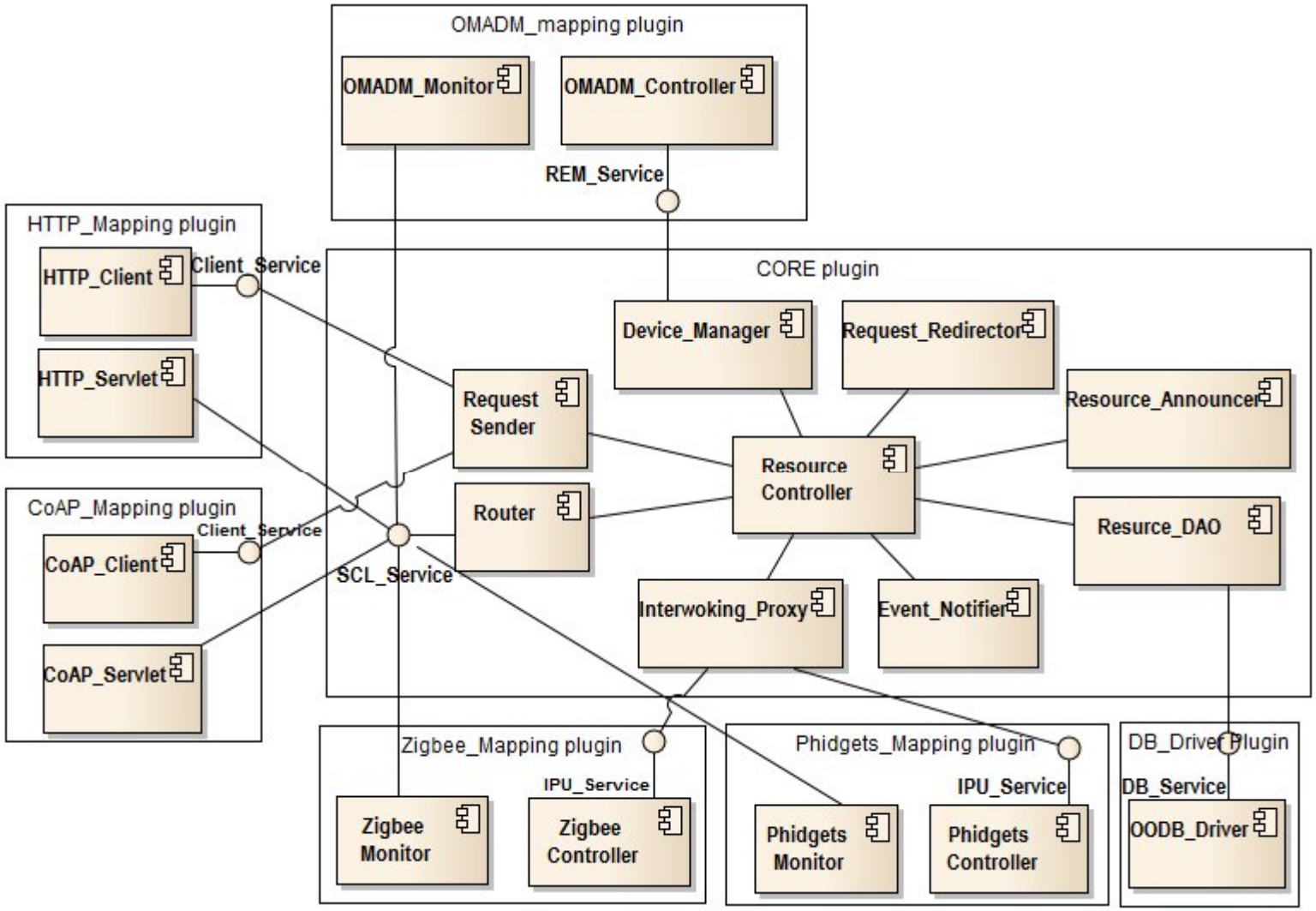
Temperature
Sensor

Luminosity
Sensor

Fan
Relay

Lamp
Relay

OM2M component diagram



- The CORE plugin routes received request to the correct controller.
- It checks access rights, persist data, notifies interested subscribers, do request redirect or resource announcement if needed.

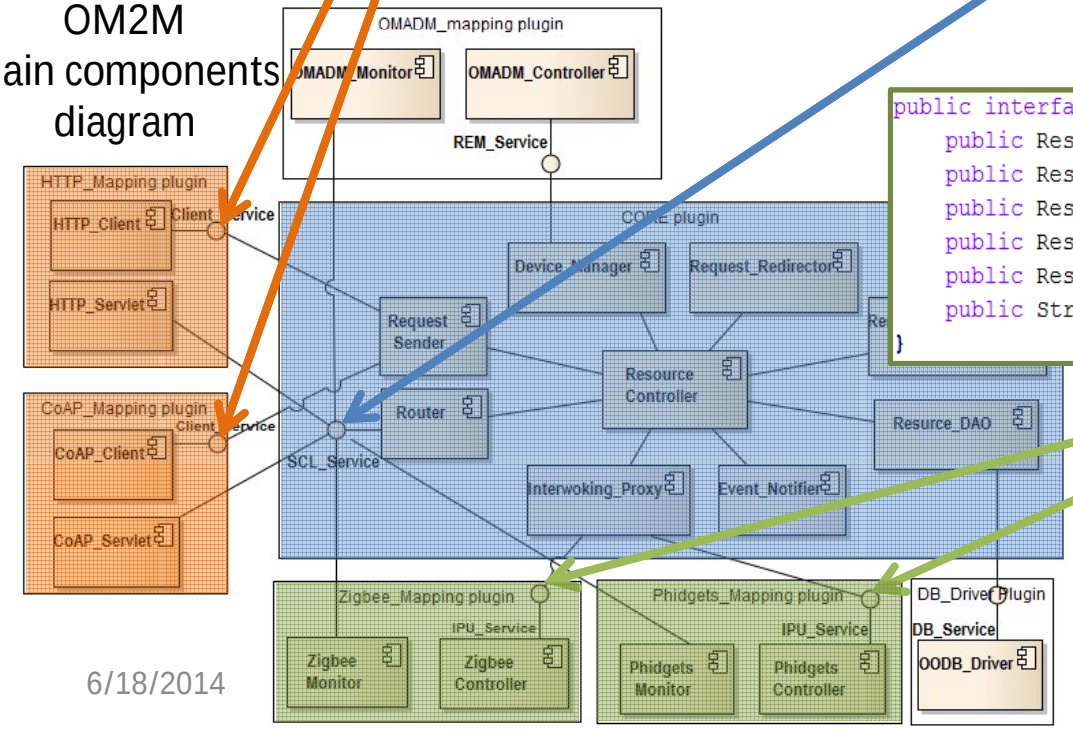
OM2M component diagram

```
public interface RestClientService {
    public ResponseConfirm sendRequest(RequestIndication requestIndication);
    public String getProtocol();
}
```

```
public interface SclService {
    public ResponseConfirm doRequest(RequestIndication requestIndication);
}
```

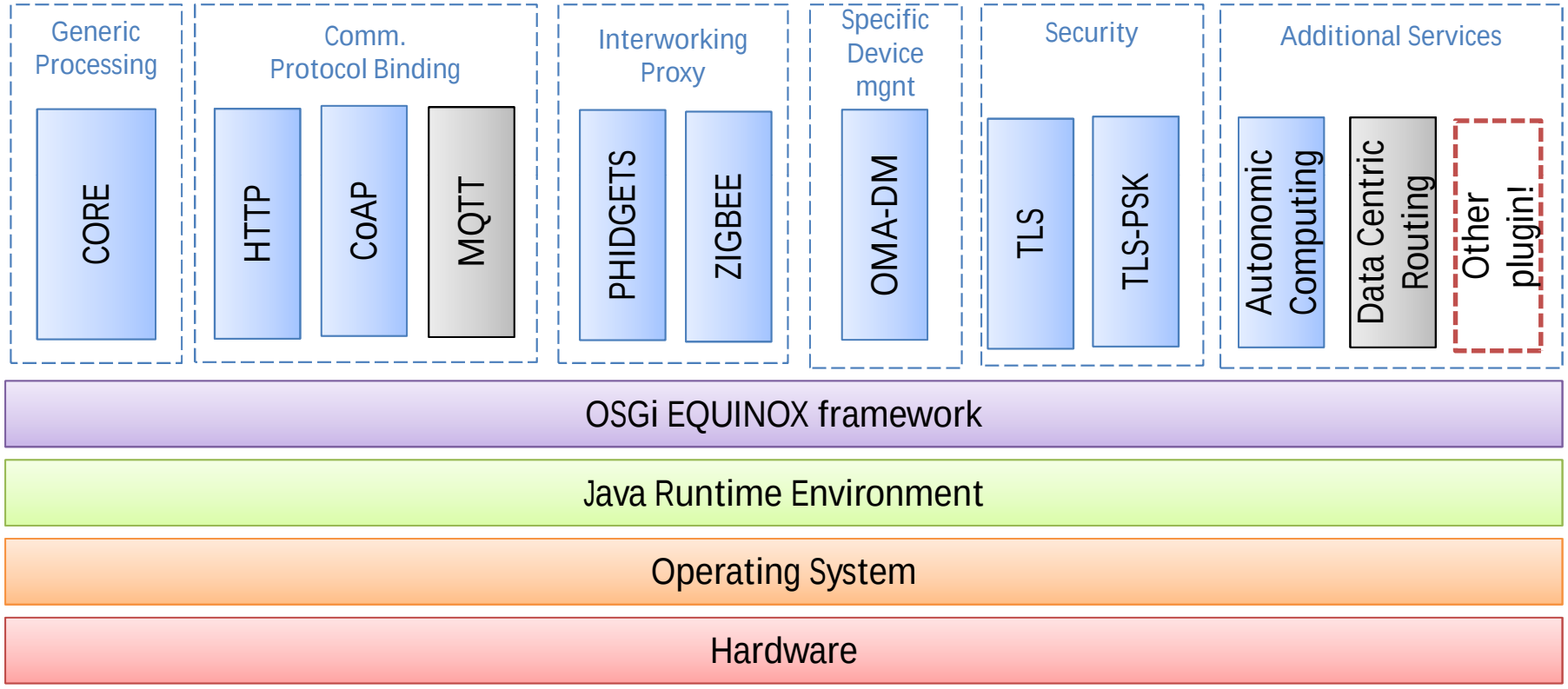
```
public interface IpuService {
    public ResponseConfirm doCreate(RequestIndication requestIndication);
    public ResponseConfirm doRetrieve(RequestIndication requestIndication);
    public ResponseConfirm doUpdate(RequestIndication requestIndication);
    public ResponseConfirm doExecute(RequestIndication requestIndication);
    public ResponseConfirm doDelete(RequestIndication requestIndication);
    public String getAPOCPath();
}
```

OM2M main components diagram

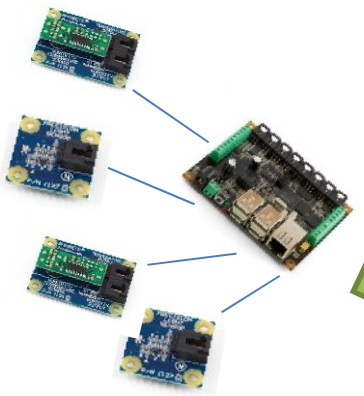


OM2M building blocks and plugins

- OM2M runs on top of an OSGi Equinox runtime.
- Each SCL includes required plugins and is build as an Eclipse product using Maven and Tycho.



Interworking Proxy Unit



Phidgets Request

Phidgets Response

HTTP App

Phidgets IPU

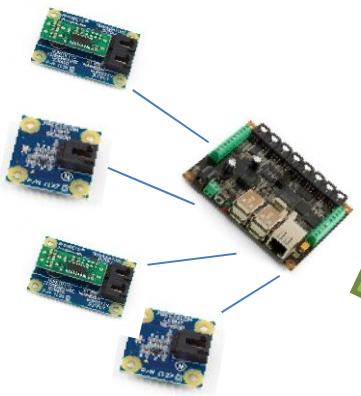
Technology independent Request

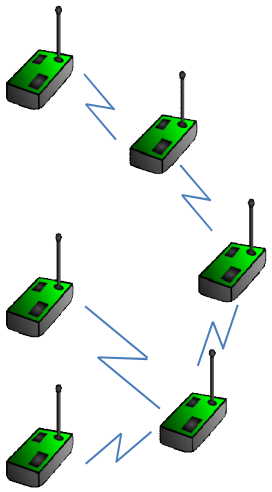
Technology independent Response

CORE

Service Capability Layer (SCL)

Interworking Proxy Unit





Your techno

HTTP App

Phidgets Request

Phidgets Response

Zigbee Request

Zigbee Response

Specific Request

Specific Response

Phidgets IPU

Zigbee IPU

Your techno IPU!

Technology independent Request

Technology independent Response

CORE

Service Capability Layer (SCL)

Communication Protocol mapping

HTTP App

HTTP Request

URI: http://ipAddress:port/context/*resourceTargetId*
Method: GET, POST, PUT, DELETE

HTTP Response

StatusCode: 200, 201,404

HTTP Request

HTTP Response

CoAP App

CoAP Request

CoAP Response

Other Comm. Protocol

Specific Request

Specific Response

HTTP Mapping

CoAP Mapping

Other Mapping

Protocol Independent request

targetId: resourceTargetId
Method: RETRIEVE, CREATE, UPDATE, DELETE, EXECUTE

Protocol independent request

Protocol independent response

Protocol independent Response

ResponseStatus: Ok, Created, Not Found, etc.

CORE

Service Capability Layer (SCL)

CoAP Request

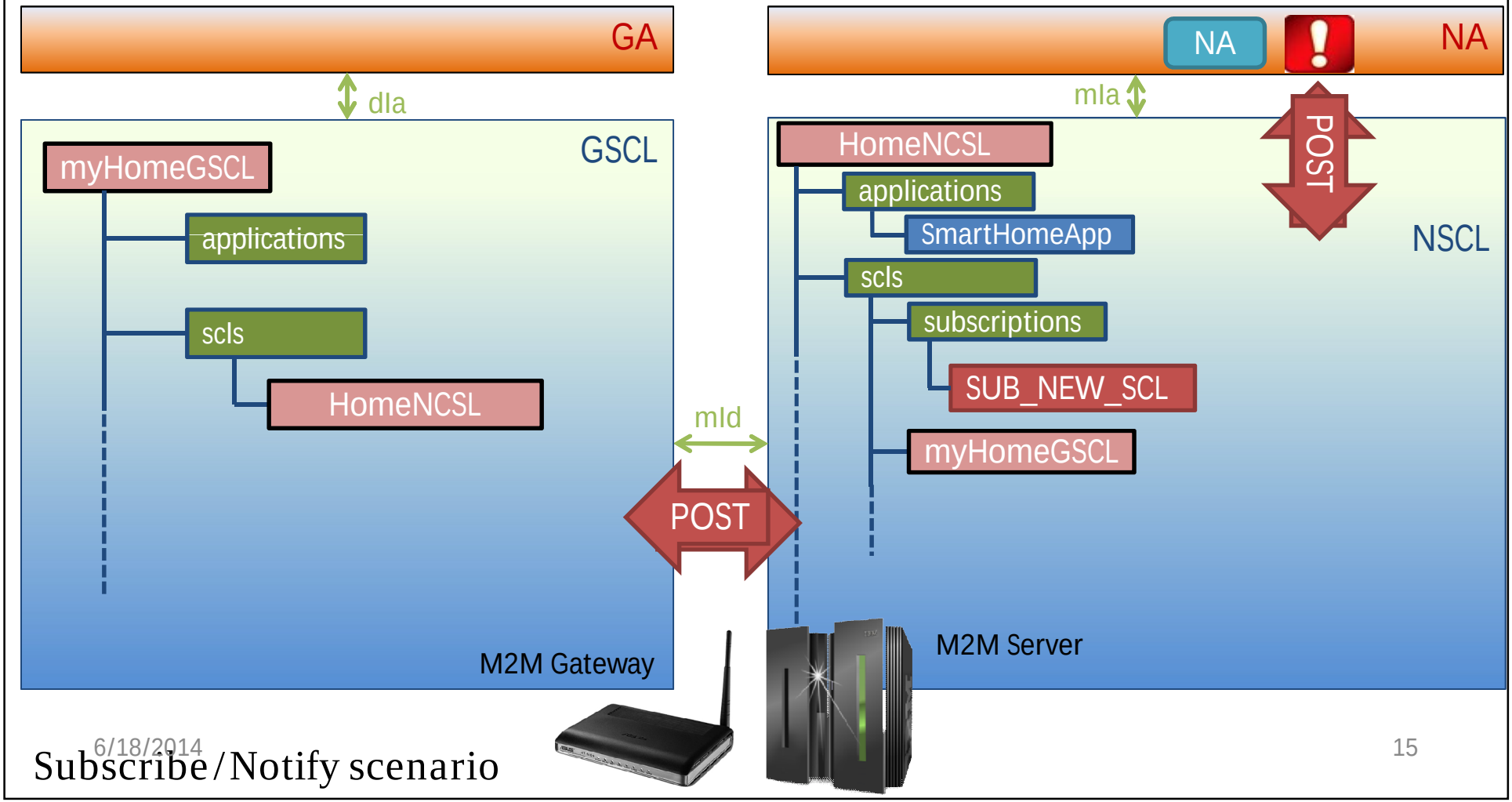
URI: coap://ipAddress:port/context/*resourceTargetId*
Method: GET, POST, PUT, DELETE

CoAP Response

StatusCode: 2.00, 2.01, 4.04

ETSI Communication techniques

- request/response
- long polling (NA server enabled)
- subscribe/notify (NA server enabled)



Subscribe/Notify scenario

OM2M Demo2

« Yes! I can remotely monitor it »

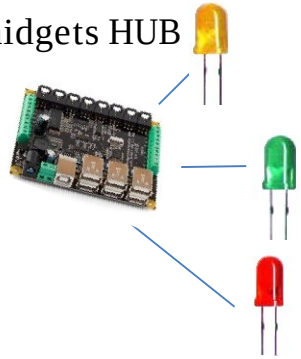
Group Management
✓Switch ON/OFF a group of lamps

M2M Server
(NSCL)

LAN
The Pierre Baudis conference center

BeagleBone Black
M2M Gateway
(GSCL)

Phidgets HUB



NA
(server enabled)

Subscribe/Notify

WAN

M2M Server
(NSCL)

LAN
LAAS

BeagleBone Black
M2M Gateway
(GSCL)

Phidgets HUB

Temperature Sensor

Luminosity Sensor

Fan Relay

Lamp Relay

Thanks!
Questions?

Project Contributors

Thierry Monteil
Mahdi Ben Alaya
Yassine Banouar
Christophe Chassot
Khalil Drira