

Lightweight

M2M

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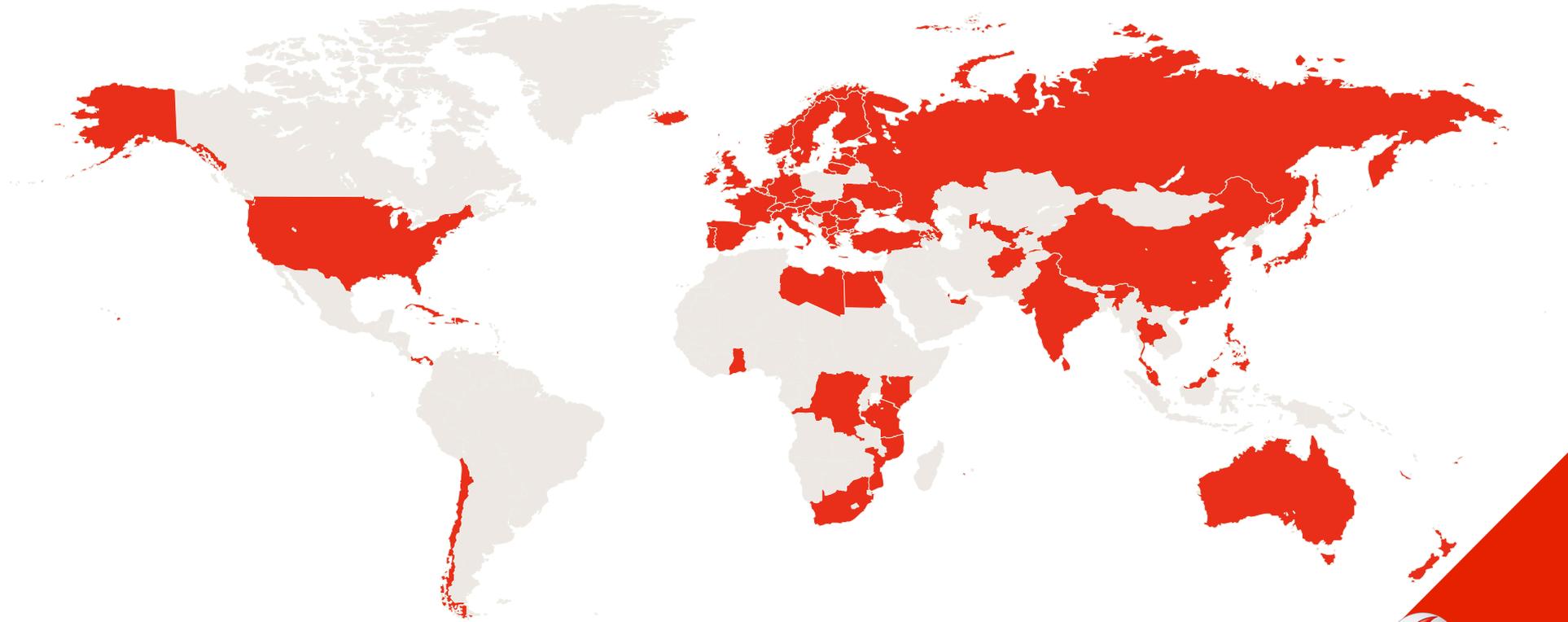
Vodafone Group R&D

27 Oct 2014



LWM2M update for Eclipse Foundation
Unconference 27th Oct 2014
Ludwigsburg, Germany

Vodafone footprint



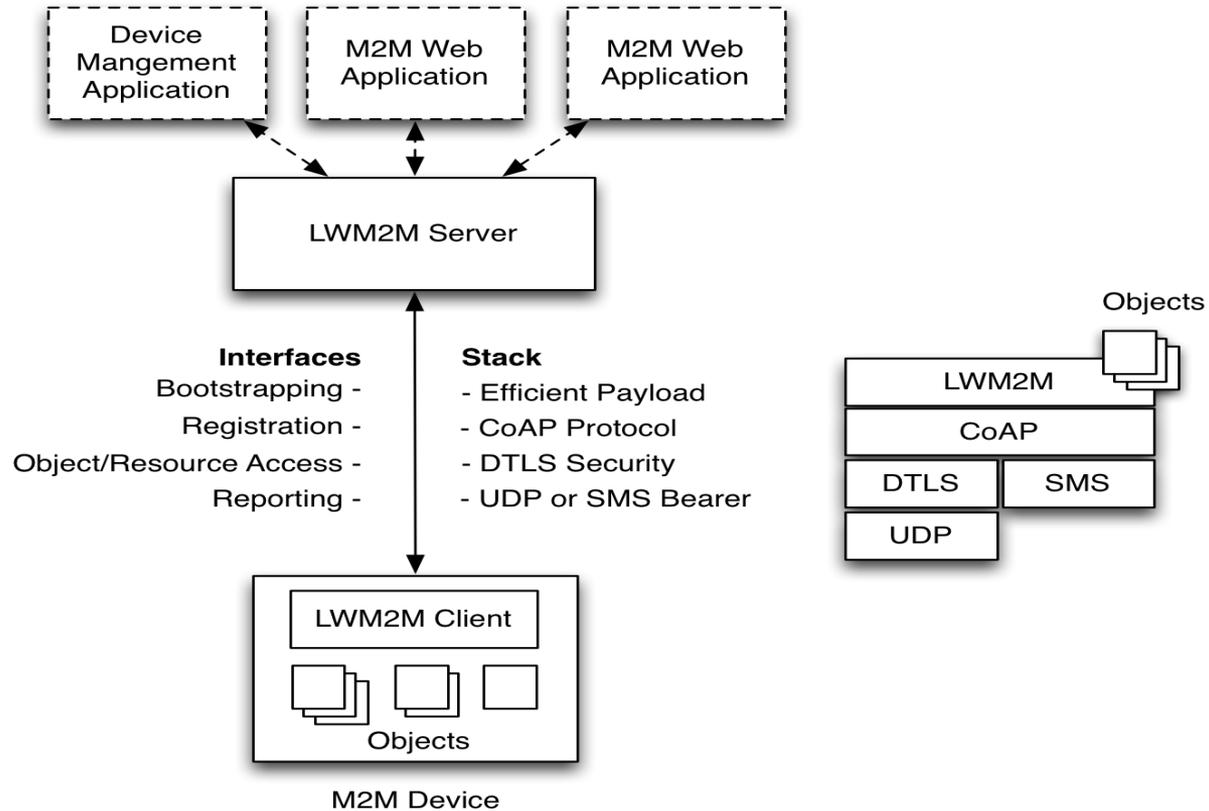
Lightweight M2M

The new standard for the internet of things



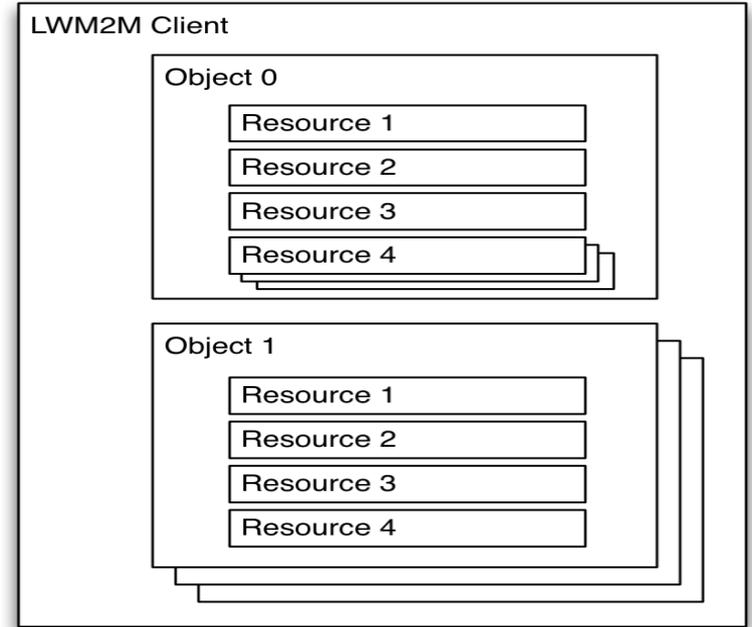
- Standardised **Device Management** and **Asset Management**
- For M2M-applications highly optimised protocol
 - small CPU and memory footprint -> lower device costs
 - highly efficient protocol -> reduced traffic, reduced power consumption
 - standardised: many devices, many services ... **one** server
 - simplified development of M2M-applications
 - > reduced development costs and fast time to market

Architecture



LWM2M Object Model - overview

- Functionality is grouped into Objects
(examples: Firmware Object, Connectivity Object, Location Object, Sensor Object)
- A Client has one or more Objects
- An Object is a collection of Resources
- A Resource is an atomic piece of information that can be Read, Written or Executed
- Resources can have multiple instances
- Objects/Resources are accessed with GET, PUT, POST, DELETE commands via simple URIs: /{Object ID}/{Resource ID}
e.g. POST /3/4 causes a device reboot
e.g. GET /5 retrieves the device location



LWM2M Object Model – LWM2M 1.0 objects

Object	Object ID
<i>LWM2M Security</i>	<i>0</i>
<i>LWM2M Server</i>	<i>1</i>
<i>Access Control</i>	<i>2</i>
<i>Device</i>	<i>3</i>
<i>Connectivity Monitoring</i>	<i>4</i>
<i>Firmware</i>	<i>5</i>
<i>Location</i>	<i>6</i>
<i>Connectivity Statistics</i>	<i>7</i>



IP Smart Object alliance LWM2M objects

Object	Object ID *	Multiple Instances?
IPSO Digital Input	200	Yes
IPSO Digital Output	201	Yes
IPSO Analogue Input	202	Yes
IPSO Analogue Output	203	Yes
IPSO Generic Sensor	300	Yes
IPSO Luminosity Sensor	301	Yes
IPSO Presence Sensor	302	Yes
IPSO Temperature Sensor	303	Yes
IPSO Humidity Sensor	304	Yes
IPSO Power Measurement	305	Yes
IPSO Actuator	306	Yes
IPSO Set Point	308	Yes
IPSO French TIC Info	309	Yes
IPSO Load Control	310	Yes
IPSO Light Control	311	Yes
IPSO Power Control	312	Yes
IPSO Accelerometer	313	Yes



OMA LWM2M 1.0 - status

Approved Dec 2013 (OMA „Candidate Approval“)

Minor bug fixing ongoing

Resource type „object link“ added

Items which might still be added to LWM2M 1.0

- SMS security: DTLS over SMS in addition to ETSI TS 102 225-based ?
- Proposal for object versioning





LWM2M evolution

New LWM2M object: connectivity management

Features

- cellular config
- configuring APNs
- selecting preferred bearer (WLAN, 2G, 3G, 4G, ...)
- WLAN config
- connection log

Approval expected Nov 2014



New LWM2M object: software management

Features

- Software download
- Software installation
- Software deinstallaton
- Software activation
- Softare deactivation
- Update state and result reporting

Approval expected Nov 2014



New LWM2M object: lock&wipe

Features

- Lock the M2M device – partially or fully
- Unlock the M2M device
- Wipe the M2M device – partially or fully
- Report the result of the above operations

Approval expected Nov 2014



New LWM2M object: device capability management

Features

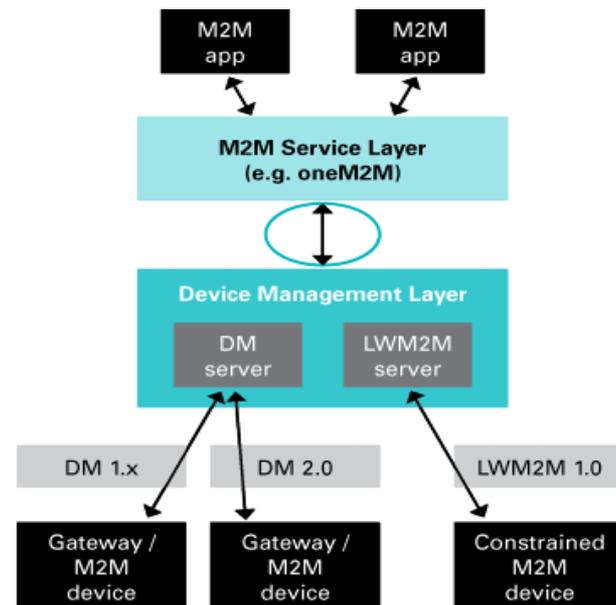
- Remote control (mainly activation/deactivation) of device capabilities and interfaces e.g. Bluetooth, USB, camera, sensors, removable storage, attached devices

Work just started



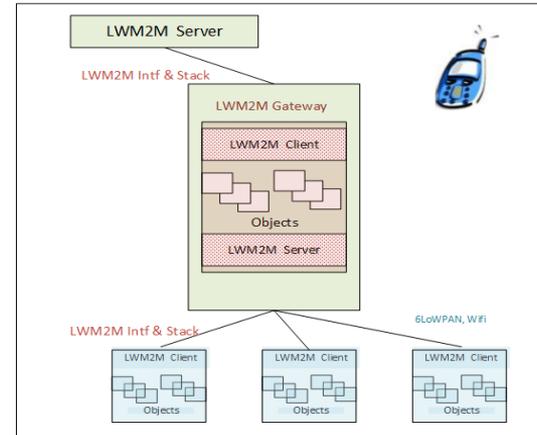
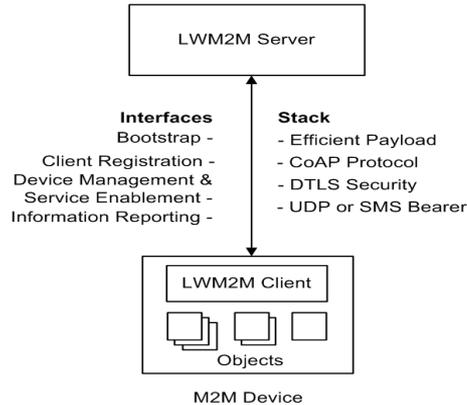
Lightweight M2M – *Mobile Application Interface (MAI)*

- MAI = OMA DM / LWM2M server northbound interface towards application
- joint collaboration with oneM2M and BBF to «Define a framework and requirements for the interaction between the M2M Service Layer and the Device Management Layer»
- Requirement definition work nearly completed – feedback from oneM2M incorporated



Lightweight M2M - Gateway Proposal

- New proposal to start working on **LWM2M gateways**
- Gateway functionality useful in certain M2M scenarios and would also fit with oneM2M architecture
- Dedicated gateway object possibly plus protocol enhancements



LWM2M 1.1 : early thoughts

Ideas (no work started yet)

- TLS support and TCP support
- Security alignments with new IETF work (security enhancements being worked on by IETF like TLS 1.3/DTLS 1.3, and the DICE WG is profiling DTLS which might be useful for LWM2M to support)
- Peer – to peer support between clients, e.g. security camera and motion detector, sensor to be configured to tell the camera to switch on when there is some motion, access control needs to be configured
- Gateway support
- What else ?



LWM2M – OMA Tools

Tools under development

- LWM2M object editor
- LWM2M object converter (XML)
- LWM2M client and server simulator
- Website with developer support incl. links to Eclipse LWM2M projects

btw ...

LWM2M object registry can be found here:

<http://technical.openmobilealliance.org/Tech/OMNA/omna-lightweight-m2m-object-resource-registry.aspx>



OMA LWM2M Developer ToolKit

OMA is developing a web site that contains the following deliverables: (available end of December 2014)

OMA Developer ToolKit:

LWM2M Technical Specifications

Web based documents, easy to search and manipulate

LWM2M Technical Summary

Interactive pdf presentation

Provides a technical overview in just 10 minutes

LWM2M Enabler Tutorial

Simulates Client and Server functions

Allows developers to analyze and modify message exchange between Client

Currently, Client side is under development. It will be available at the end of 1

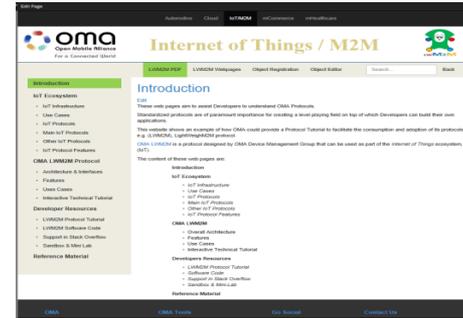
Object Registration & Object Editor

OMA provides a register (**OMNA**) for Management Objects (MO),

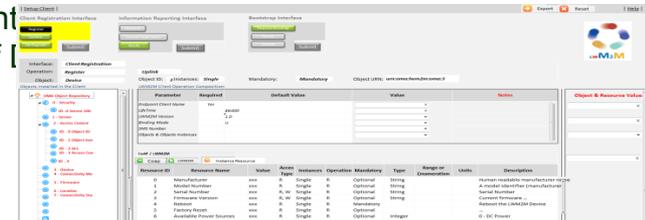
Objects & Resources.

Editor tool to construct MO as well as LwM2M Objects & Resources

This tool will be available at the end of December



OMA Developer ToolKit web site



Enabler Tutorial



OMA LWM2M Developer ToolKit

Sandbox (LwM2M Server)

This Test LwM2M server is maintained and provided by the Eclipse Foundation

Lab Kit

Provides a list of platforms that support OMA LwM2M Client

Basic examples will be linked to each platform

Examples & pointers to LwM2M Open Source

Wakaama (LwM2M Client/Server)

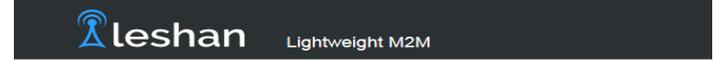
Leshan Server Code, this code has been now moved to Eclipse Foundation, Leshan in Eclipse

Libwm2m

Liblwm2m Is an implementation of OMA LwM2M protocol

LWM2M Enabler Support

This support aims to answer any questions related to the OMA LwM2M protocol



Connected clients: 0

LwM2M Sandbox Server



LWM2M – Test Events

Next LWM2M test event by OMA

- Vodafone Innovation Park. Düsseldorf, Germany offers to host
- Planned for Jan/Feb 2015 – date not yet confirmed
- Incl. Eclipse/OMA workshop on developer tools and projects



LWM2M – Feedback from implementations

Opportunity for feeding developer feedback back into OMA LWM2M standard

- *Bugs*
- *Performance improvements*
- *New LWM2M protocol features*
- *New LWM2M objects*

Feedback from Eclipse is very welcome!





Thanks!