WORKSHOP ON IOT SEMANTIC/HYPERMEDIA INTEROPERABILITY
a LwM2M perspective
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M2M IN THE TELECOM NETWORK: THE TARGET FOR LwM2M DEVICES
Org’s and usage of LwM2M
- IPSO Objects on LwM2M
- oneM2M integrating LwM2M in its architecture blocks
- GSMA integrating LwM2M as device management protocol for MIoT project

- XML based approach for object and resource definition
- Certain data types are supported in v1_0
- Execution type is possible
OMNA registry for aggregation of objects, resources with allocated bands on type of registrations
  • Object Versioning is supported
Plugfest is planned at the least twice a year for LwM2M
LwM2M 1.0 is approved in Feb 2017
  • Maintenance release 1.0.1 is completed, planned to be released in July 2017
LwM2M 1.1 requirement collection is ongoing
  • Planning to have a candidate approval by Feb 2018
LwM2M V1_1 FEATURES

- LPWAN support for 3GPP CIoT adaptations (see next slide), LoRA
- CoAP over TCP/TLS
- Support upgrade safeguards for necessary configurations
- Support ability to gain in one command multiple resources from multiple objects and instances
- Improvements to bootstrap and registration interfaces
- Legacy Gateway support in LwM2M with device running on BLE etc., behind the LwM2M gateway
- Introduction of secure element in LwM2M server/client ecosystem
- E2E device to LwM2M Server/Application secure packet transfer
- Incorporate group concept between LWM2M Servers and Clients
- Ability to use HTTP2 for non-constrained devices
Provides enablers and device management for delivery of data over the control plane for both Non-IP Data (NIDD) and IP data

- External identifiers support for LPWAN
- Support message identity for data delivery in the control and user planes as well as other applications like Gateways
- Integration of SGi and SCEF paths for NIDD.
- Support delayed/no-acknowledgement methods
- Support rate and byte quotas for devices
Organizational view
- 2 is happening everywhere in all the standards bodies, which is not idea situation
- 3 is ideal, but the discussion to start with 1 and move towards 3 would help the IoT world

Semantic missing links
- Architectural commonality agreement
  - Dictionaries to come together among various IoT organizations
  - Blocks among various IoT organizations
- Units are standardized, complexity in service layer is emerging beyond units
  - Service use cases (some good examples are available in ACE)
  - new areas (Analytics/.. ?)
- Security yardstick - IoT devices
• No Inputs at this stage from LwM2M
Thank You

OMA HELP
M2M IN THE TELECOM NETWORK: THE TARGET FOR LwM2M DEVICES
OMA recommends utilization of LwM2M for both data plane (data reporting and device actuation) as well as device management due to benefits such as:

- Increased bandwidth efficiency based on COAP bandwidth optimization
- Transport-agnostic design that supports UDP, TCP, SMS
- Developer toolkit for application development
- DTLS-based security based on CoAP (IETF)
- Low power client footprint designed for battery constrained devices
LwM2M can be used for both data plane (data reporting and devices actuations) and device management.

Strengths of LwM2M:

- LwM2M is a standard defined by OMA
- Adequate for both fixed and mobile devices
- Adequate for both data plane and device management
- Made for constrained devices (e.g. < 20 kB RAM)
- Adequate for low powered battery devices thanks to low client footprint
- Minimizes bandwidth thanks to optimized bandwidth consumption, by definition of COAP (COAP is a simplified HTTP; COAP header = 4bytes)
- Simple, stateless protocol
- Crosses FW and NAT systems thanks to support of COAP/UDP and COAP/TCP
- Offers security by design; COAP over UDP or TCP relies on DTLS or TLS respectively
LWM2M: CORE FUNCTIONALITIES

- Bootstrapping
- Device Conf
- Firmware Update
- Lock & Wipe
- Data Reporting
- Control
- Conn. Mgmt.
- Diagnostics
POST /bs? Ep=node34141

2.04 Changed

Delete /

PUT /0/1
(Security Object Instance)

PUT /1/0
(Server Object Instance)

PUT /2/0
(ACL Object Instance)

Post /bs
DEVICE CONFIGURATION
➢ Power sources and its values of the LwM2M Device
➢ Battery level of the LwM2M Device
➢ Memory status of the LwM2M Device
➢ Supported binding modes of the LwM2M Device
➢ Version of hardware/software of the LwM2M Device
➢ Capabilities of the LwM2M Device
➢ Mapping of necessary Cellular and Wi-Fi technologies
➢ Managing basic parameters needed for those technologies functioning like APN, WEP keys etc.,
➢ Adding relevant parameters for bearer selection for cellular connectivity
➢ Security is covered by DTLS and relevant section provide multiple details
Ability to setup access control on Objects for various LwM2M server

Wake up the LwM2M Device using SMS

Reboot the LwM2M Device

Disable the LwM2M Device for a specified time

Ask the LwM2M Device to perform registration
LwM2M Client

Delete/

PUT /0/1
(Security Object Instance)

PUT/1/0
(Server Object Instance)

PUT/2/0
(ACL Object Instance)

Post/ bs

LwM2M Bootstrap Server

Server Initiated Bootstrap

LOCK & WIPE
LwM2M SECURITY

Types of credential procedures supported
➢ Certificates
➢ Pre-shared key
➢ Public Raw Key

Security paths
➢ DTLS
➢ SMS
➢ DTLS over SMS

LwM2M Security abilities
➢ Initial keys can be replaced during bootstrap procedure
➢ Multiple servers could be added with different credentials
➢ Provide security in every path
LwM2M SECURITY – CONT'D.

- **Security Keys**
  - Factory Provisioned
  - First Contact

- **Bootstrap Server**
  - Provisioning after First contact

- **LwM2M Server1**
  - Pre-provisioned
  - Using Provisioned Credential 1

- **LwM2M Server2**
  - Using Provisioned Credential 2
➢ URI based approach for target identification
➢ Objects and resource classification
➢ Supports versioning of objects
➢ OMA, Organizations and private registrations possible
➢ OMNA has the collection of LwM2M Objects and Resources registry
➢ Simple resource model with the core set of objects and resources defined in this specification. The full list of registered objects can be found at [OMNA].

➢ Operations for creation, update, deletion, and retrieval of resources.

➢ Asynchronous notifications of resource changes.

➢ Support for several serialization formats, namely TLV, JSON, Plain Text and binary data formats and the core set of LightweightM2M Objects.

➢ UDP and SMS transport support.

➢ Communication security based on the DTLS protocol supporting different types of credentials.
Queue Mode offers functionality for a LwM2M Client to inform the LwM2M Server that it may be disconnected for an extended period of time and also when it becomes reachable again.

Support for use of multiple LwM2M Servers.

Provisioning of security credentials and access control lists by a dedicated LwM2M bootstrap-server.