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oneM2M overview
oneM2M overview

TIM provides an instance of ICON, a store&share platform compliant with oneM2M standard

oneM2M ([http://www.onem2m.org/](http://www.onem2m.org/)) is a standards for Machine to Machine (M2M) Communications and the Internet of Things (IoT).

oneM2M is a global organization that defines requirements, architecture, API specifications, security solutions and interoperability for M2M and IoT technologies.

Main features supported by oneM2M standard:
• Software/middleware layer
• Common set of functions to applications via APIs
• Stores and shares data
• Access control
• Notify about events to applications
oneM2M entities

In the oneM2M functional architecture two basic types of entities are defined:

- **Application Entity (AE)** that produces data (e.g. RSU, OBU) or reads data (e.g. a cloud application or an app of a smartphone)

- **Common Services Entity (CSE)** provides a common set of functions: Data Management & Repository, Subscription & Notification, Registration, Security etc. **ICON platform is a CSE**

The **Mca reference point** is used to interface an AE and CSE.
ICON platform
ICON platform: what is

• **TIM provides the oneM2M platform as Platform as a Service (PaaS)** that is a cloud model that provides all the infrastructure required to create and manage custom cloud applications

• **ICON is installed in a TIM Self Data Center**, a commercial platform for hosting, managed by TIM

• **The platform is exposed on public Internet at** [https://icon-lab.tim.it](https://icon-lab.tim.it)

• **It is based on Ocean platform**, an open source product developed by a Korean consortium
Main features of ICON platform

• Compliance with the oneM2M standard
• Southbound and northbound Rest APIs for data storage and sharing
• Data sharing by means of pull/push (subscription/notification)
• URIs for identifying resources
• Web console for resource management and provisioning
• Web console for administrators
• Service independent, interworking with legacy platforms and non-OneM2M platforms by means of Adapters/Proxies
• Multi-tenancy: each tenant has credentials for access to its data
Security of ICON platform

Security is based on the following features:

• oneM2M services and APIs are exposed through SSL (HTTPS, MQTTs).

• Authorization is based on credentials (username/password) associated with a specific user (tenant).

• An Access Control Policy (ACP) needs to be created for each Application Entity; ACP is defined as a set of conditions that determine whether entities are permitted to access a protected resource.
Platform high-level architecture

Applications

REST oneM2M

ICON

API oneM2M

OCEAN

API oneM2M

REST oneM2M

Proxy NBioT

Adapters

UDP/COAP

Gateway

Legacy IoT platform

Core NBioT

oneM2M compliant

oneM2M compliant

AUTOPILOT – AUTOmated driving Progressed by the Internet of Things
Resource tree
Resource tree

The resource tree is the data structure used by ICON platform.

In the figure an example of resource tree for Autopilot tenant: for each RSU there is a container for CAM messages for each vehicle of pilot site.
Example of a message

An example of a CAM message received and stored on ICON platform

Values of attributes

oneM2M attributes: Name, ID, time, type of content, etc.

Identifier

A CAM message that is the content stored on ICON
Interfaces
Interfaces

These are the interfaces available on ICON platform compliant with oneM2M standard:

- **HTTPS** (JSON format)
- **MQTTs** (a simple messaging protocol, designed for constrained devices and with low-bandwidth)
- **CoAP** (a protocol that allows small devices with low-power sensors and actuators to communicate over the Internet)

«Adaptation layer» for converting a custom protocol/interface to oneM2M standard protocol supported by ICON