# oneM2M Testing and Certification

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ETSI CTI (Center for Testing and Interoperability)

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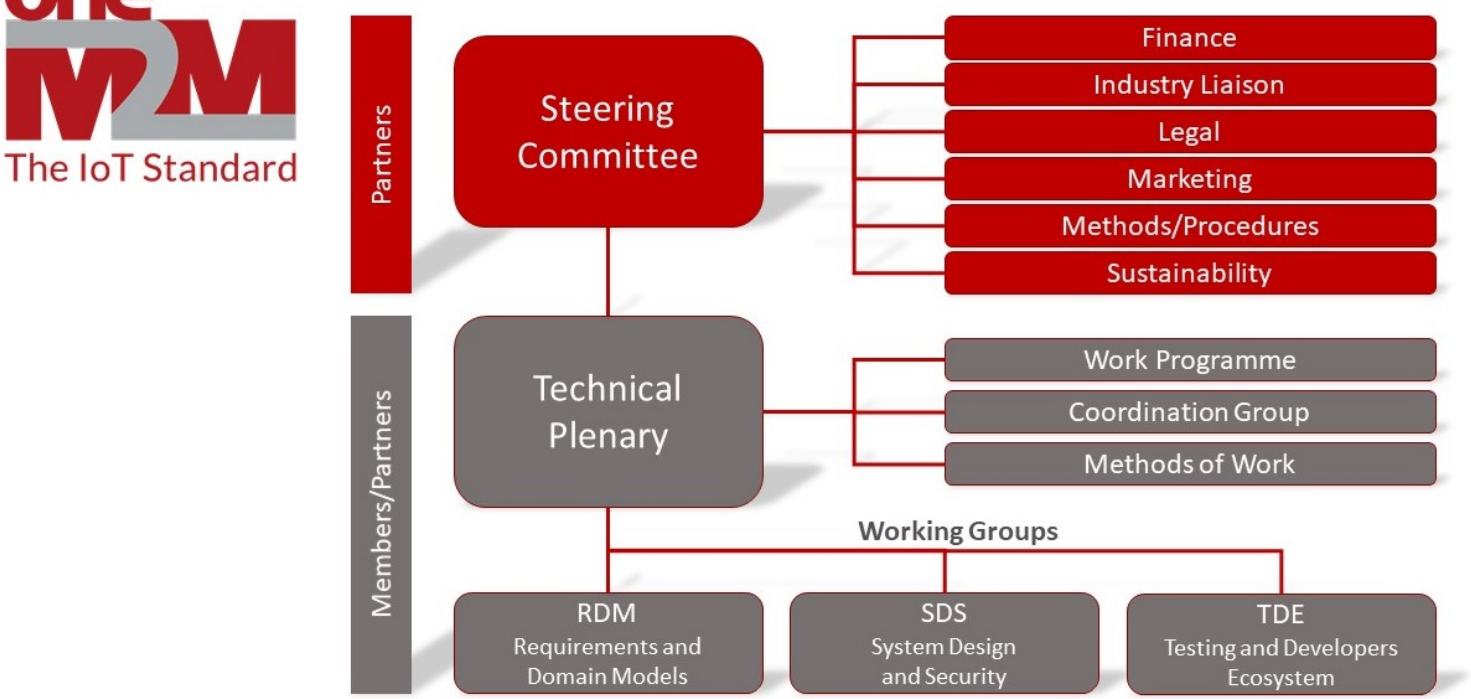
# Organization

http://onem2m.org/about-onem2m/organisation-and-structure




TDE Chair: Bob Flynn, Exacta GSS

Vice Chair: Sherzod Elamanov, SyncTechno Inc

# Why TDE Working Group

- To help stakeholders during their implementation phase
- To help oneM2M organization improve the quality of specifications
- To ease oneM2M adoption
- To support the certification programme
- To help developers understand oneM2M in an easy manner

Making sure that the standards **do the right thing** and that **they do it** right

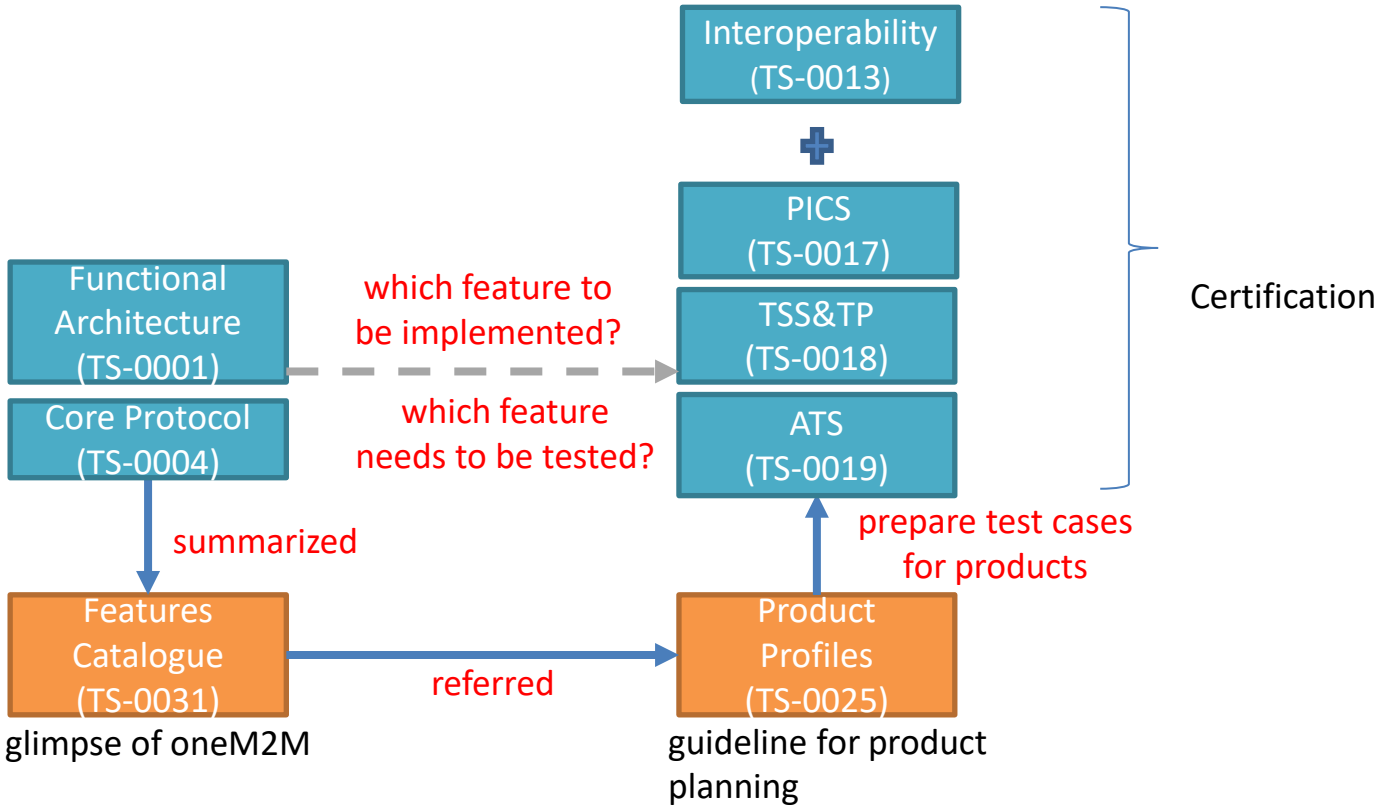
# WG TDE main objectives

- Objectives:
  - Development of conformance and interoperability test specifications
  - Support of test related events and developer events
  - Development of developer guides
- Main specifications:
  - Methodology: TS-0015: Testing Framework
  - Interoperability Testing: TS-0013: Interop Testing
  - Conformance Testing:
    - TS-0017: Protocol Implementation Conformance Statement
    - TS-0018: Test Suite Structure & Test Purposes (TSS&TP)
    - TS-0019: Abstract Test Suite (ATS)
  - Definition of product profiles : TS-0025 – Product profiles
  - Developer Guides

# Developer Guides

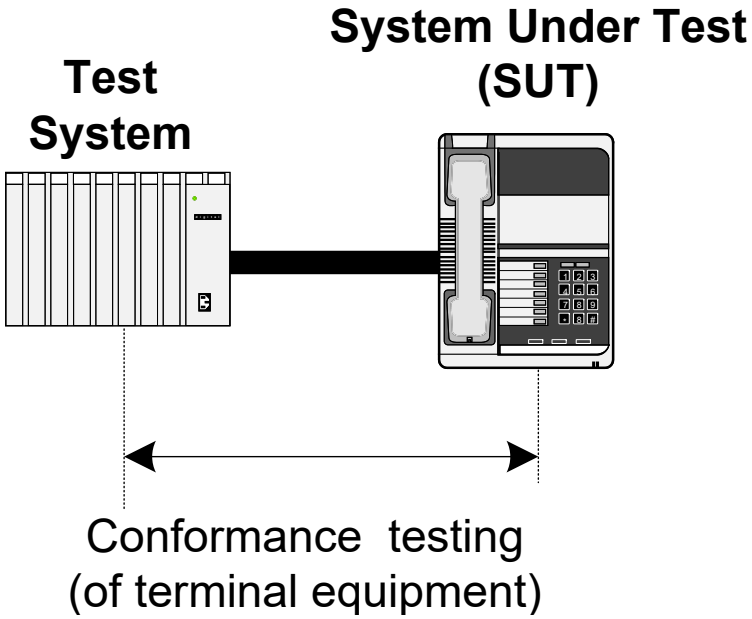
| | |
|---|---|
| TR-0025 | Application developer guide: Light control example using HTTP binding |
| TR-0034 | Developer Guide: CoAP binding and long polling for temperature monitoring |
| TR-0038 | Developer guide: Implementing security example |
| TR-0045 | Developer guide: Implementing Semantics |
| TR-0039 | Developer guide: Interworking Proxy using SDT |
| TR-0035 | Developer guide: Device Management use case |
| TR-0037 | Developer guide: smart farm example using MQTT binding |
| TR-0047 | Developer guide: 3GPP interworking example |

# Relation between oneM2M specifications



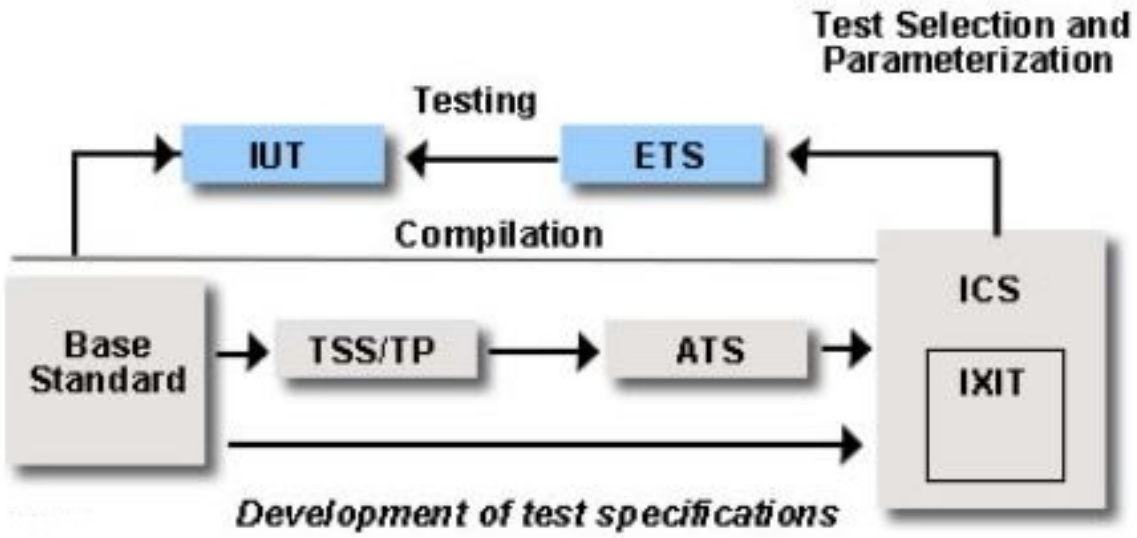
# Conformance testing

- Conformance testing concentrates on specific components in a system
- Conformance testing is applied over open interfaces and checks for conformance to the requirements in a base specification.
- Unit testing



# Development of Conformance Test Specifications

**ATS** : Abstract Test Suite
**TSS&TP** : Test Suite Structure And Test Purposes
**IXIT** : Implementation eXtra Information for Testing
**ETS** : Executable Test Suite
**ICS** : Implementation Conformance Statement
**IUT** : Implementation Under Test




Source: ISO 9646

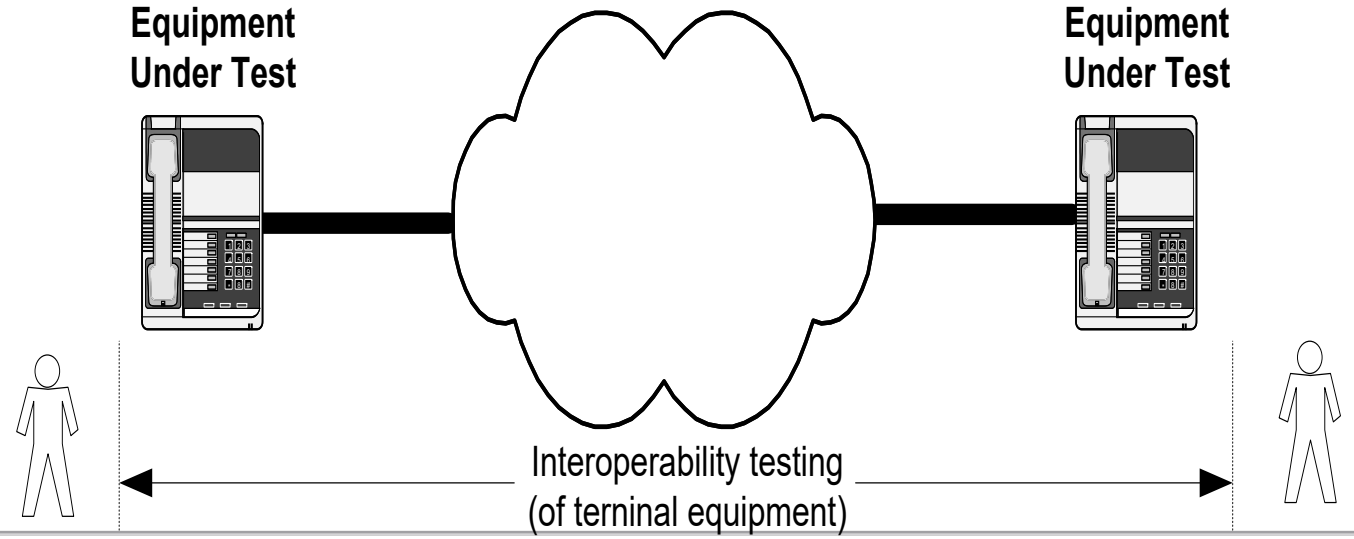
www.ttcn-3.org

# What is TTCN-3?

- Testing and Test Control Notation Version 3
- Internationally standardized language developed specifically for executable test specification
  - Specified by ETSI MTS Technical Committee
  - Is independent of a specific IUT or IUT interfaces
  - Is independent of a test execution environment
  - Standard available at portal.etsi.org via ETSI programme
- Allows unambiguous implementation of tests
- Look and feel of a regular programming language
- Good tool support (some commercial tools available)
- Successfully deployed in different organizations and industry in a variety of application domains
  - e.g., telecom, automotive, software, etc.

# Interoperability testing

- Tests (end-to-end) functionality between 2 or more products
- It shows, from the user's viewpoint, that functionality is accomplished (**but not how**).
- System testing
- Validation of specifications



# Why validate specifications?

- Validation reveals problems/errors in
  - Standards and Products
- Validated specifications give a higher chance of interoperable products
  - For standardisers gives assurance that they provide right functionality
  - For manufacturers and operators gives confidence to implement and go to market
- Provides an opportunity to correct errors in a controlled manner
  - Late fixes in the product cycle are more expensive than early ones
  - Decreases time to market

**Specifications can be validated by several means but one of the most practical and cost effective is by**
**interoperability events**

# Both are complementary

- Interop testing is more appropriate when the standard is in development phase . It helps to validate the standards

- Conformance testing is more appropriate for testing products. It checks that products are implemented according to the specifications

- Product could happen to be conformant but not interoperable and vice versa

# oneM2M Interop Events

- Co-organized and funded by TTA and ETSI
- Free of charge
- Open to all companies with oneM2M implementations (members and non-members)
- Covered by NDA. No companies' results are published
- Important technical feedback provided to oneM2M
- Past events
  - Sept 2015 Sophia-Antipolis (France)
  - May 2016 Seoul (South Korea)
  - Dec 2016 Kobe (Japan)
  - May 2017 Taipei (Taiwan)
  - Dec 2017 Seoul (South Korea)
  - July 2018 Washington DC (United States)
  - Nov 2020 Virtual
  - Dec 2022 Seoul (South Korea)

# Interop events

# Developer Events objectives

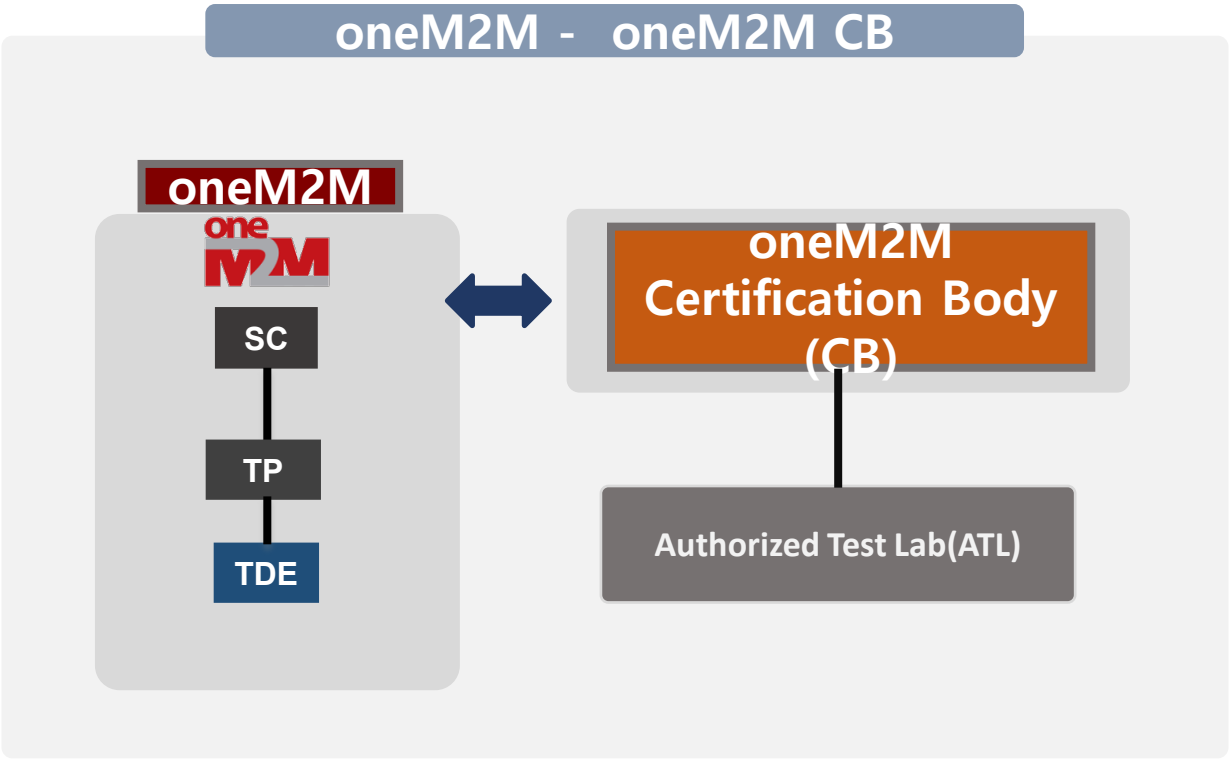
- Introduce oneM2M to developers' communities
- Driven by numerous oneM2M partners (ETSI, TTA, KETI, C-DOT, …)
- Common developer event agenda
  - Introduction to oneM2M basics
  - Hands on exercises (using IoT kits, software,…)
- Past developer events:
    - University of Texas at Dallas
    - C-DOT campus, New Delhi
    - IIT Hyderabad
    - University of Malaga
    - International hackathons by KETI (virtual)

# Developer Events



# oneM2M Certification & Certified Products

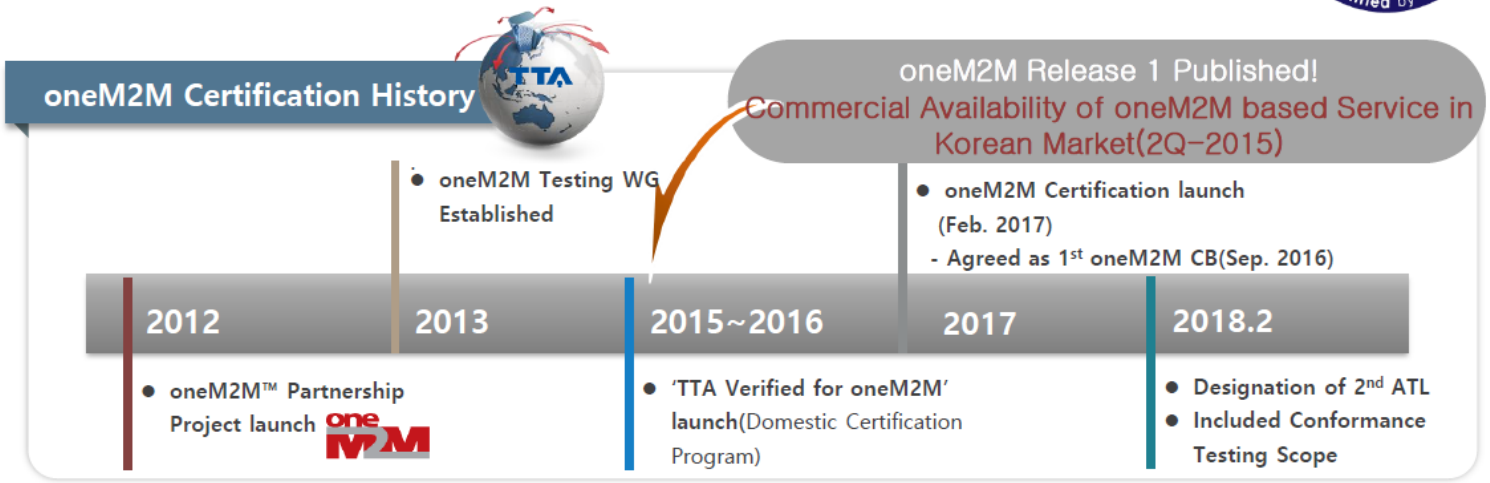
# oneM2M Certification Background



# Certification history

## oneM2M Certification Background

- First oneM2M Certification Body
  - TTA was agreed as the first oneM2M Certification Body at the 33rd Steering Committee meeting(Sep. 2016).
  - TTA oneM2M Certification Program was officially launched on Feb. 9, 2017.



# Certified Products(I)

| Product Vendor | Product Name | Product Website | Product Information | |
|---|---|---|---|---|
| **SK Telecom** | ThingPlug | http://Thingplug.sktiot.com |  | ThingPlug® is an open IoT platform of SK Telecom. |
| **nTels** | N-MAS | http://www.ntels.com |  | N-MAS is an open IoT platform that provides connectivity functions used in various service areas such as smart city, industry, healthcare, sports, and agriculture. |
| **KT** | IoTMakers Middleware | http://iotmakers.olleh.com |  | IoTMakers Middleware provides interface to communicate with KT Platform via oneM2M standard protocol.. |
| | IoTMakers | http://iotmakers.olleh.com | | IoTMakers is the OPEN IoT platform which can support IoT players to realize their idea and lead to success.. |
| **KEPCO** | e-IoT Energy Gateway | https://spin.kepco.co.kr |  | e-IoT Energy Gateway provides interface to communicate between sensors and the e-IoT Energy Platform via oneM2M standard protocol. |
| | e-IoT Energy Platform | https://spin.kepco.co.kr | | e-IoT Energy Platform is the OPEN IoT platform for a electrical power system and industry. |

# Global certification solution for oneM2M

**oneM2M Certification** is intended to **create an ecosystem of certified products** that **ensures interoperability** among oneM2M certified products

GCF™ Global Certification Forum

https://www.globalcertificationforum.org/

https://onem2m.globalcertificationforum.org/

# oneM2M certification by GCF

- GCF launched oneM2M Release 1 certification programme in July 2019 and oneM2M Release 2 certification programme in January 2023
- oneM2M Release 3 certification programme is underway targeting beginning of 2024.
- Program is open to both GCF members and non-members
- A product can be oneM2M certified as part of its normal GCF device certification. Alternatively, products can be oneM2M certified as a ‘standalone’ certification.

Source: GCF

# oneM2M certification program

## GCF Recognized Test Organizations (RTOs)

| Scope: IOP oneM2M TS-0013 | Contact | Address | Website |
|---|---|---|---|
| TTA | TTA IoT Center<br>+82-10-5110-7426<br>iot@tta.or.kr | 815, Daewangpangyo-ro, Sujeong-gu, Seongnam-city, Gyeonggi-do, 13449, Korea | www.tta.or.kr/English/index.jsp |
| DEKRA | Miguel Delorme<br>miguel.delorme@dekra.com | Westwing 7F, 1-28-10 Akebono-cho, Tachikawa-shi, 190-0012 Tokyo, Japan c/o TOYO Corporation, 1-6, Yaesu 1-chome, Chuo-Ku, 103-8284 Tokyo, Japan | www.dekra-product-safety.com/en/about-dekra/ |

| Scope: Conformance oneM2M TS-0018 | Contact | Address | Website |
|---|---|---|---|
| TTA | TTA IoT Center<br>+82-10-5110-7426<br>iot@tta.or.kr | 815, Daewangpangyo-ro, Sujeong-gu, Seongnam-city, Gyeonggi-do, 13449, Korea | www.tta.or.kr/English/index.jsp |
| SGS North America | Ben Kuo<br>Ben.Kuo@sgs.com | 15150 Avenue of Science, Suite 3001San Diego, CA 92128 | https://www.sgsgroup.us.com/ |

Source: TTA

# Contact names

- oneM2M WG TDE

Chair : Bob Flynn (Exacta) : bob.flynn@exactagss.com

Vice-chair : Sherzod Elamanav (SyncTechno Inc) : elamanov@synctechno.com

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# Q&A