oneM2M Testing and Certification

Miguel Angel Reina Ortega
ETSI CTI (Center for Testing and Interoperability)
Organisation

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:
  – 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

© 2023 oneM2M Partners
# Developer Guides

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

© 2023 oneM2M Partners
Relation between oneM2M specifications

- Functional Architecture (TS-0001)
- Core Protocol (TS-0004)
- Features Catalogue (TS-0031)
- Interoperability (TS-0013)
- PICS (TS-0017)
- TSS&TP (TS-0018)
- ATS (TS-0019)
- Product Profiles (TS-0025)

Which feature to be implemented?
Which feature needs to be tested?
Prepare test cases for products

Glimpse of oneM2M
Summarized
Guideline for product planning

© 2023 oneM2M Partners
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
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


Kobe (2016)

Taipei (2017)

Seoul (2017)
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
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)

<table>
<thead>
<tr>
<th>Product Vendor</th>
<th>Product Name</th>
<th>Product Website</th>
<th>Product Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK Telecom</td>
<td>ThingPlug</td>
<td><a href="http://Thingplug.sktiot.com">http://Thingplug.sktiot.com</a></td>
<td>ThingPlug® is an open IoT platform of SK Telecom.</td>
</tr>
<tr>
<td>nTels</td>
<td>N-MAS</td>
<td><a href="http://www.ntels.com">http://www.ntels.com</a></td>
<td>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.</td>
</tr>
<tr>
<td>KT</td>
<td>IoTMakers Middleware</td>
<td><a href="http://iotmakers.olleh.com">http://iotmakers.olleh.com</a></td>
<td>IoTMakers Middleware provides interface to communicate with KT Platform via oneM2M standard protocol.</td>
</tr>
<tr>
<td></td>
<td>IoTMakers</td>
<td><a href="http://iotmakers.olleh.com">http://iotmakers.olleh.com</a></td>
<td>IoTMakers is the OPEN IoT platform which can support IoT players to realize their idea and lead to success.</td>
</tr>
<tr>
<td>KEPCO</td>
<td>e-IoT Energy Gateway</td>
<td><a href="https://spin.kepco.co.kr">https://spin.kepco.co.kr</a></td>
<td>e-IoT Energy Gateway provides interface to communicate between sensors and the e-IoT Energy Platform via oneM2M standard protocol.</td>
</tr>
<tr>
<td></td>
<td>e-IoT Energy Platform</td>
<td><a href="https://spin.kepco.co.kr">https://spin.kepco.co.kr</a></td>
<td>e-IoT Energy Platform is the OPEN IoT platform for a electrical power system and industry.</td>
</tr>
</tbody>
</table>
Global certification solution for oneM2M

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

https://www.globalcertificationforum.org/

https://onem2m.globalcertificationforum.org/
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)

<table>
<thead>
<tr>
<th>Scope: IOP oneM2M TS-0013</th>
<th>Contact</th>
<th>Address</th>
<th>Website</th>
</tr>
</thead>
</table>
| TTA                         | TTA IoT Center  
+82-10-5110-7426  
iot@ttta.or.kr | 815, Daewangpangyo-ro, Sujeong-gu, Seongnam-city, Gyeonggi-do, 13449, Korea | www.tta.or.kr/English/index.jsp |
| DEKRA                       | Miguel Delorme  
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/ |

<table>
<thead>
<tr>
<th>Scope: Conformance oneM2M TS-0018</th>
<th>Contact</th>
<th>Address</th>
<th>Website</th>
</tr>
</thead>
</table>
| TTA                                | TTA IoT Center  
+82-10-5110-7426  
iot@ttta.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  
Ben.Kuo@sgs.com | 15150 Avenue of Science, Suite 3001San Diego, CA 92128 | https://www.sgs.com/ |

Source: TTA

© 2023 oneM2M Partners
Contact names

- **oneM2M WG TDE**
  Chair : Bob Flynn (Exacta) : bob.flynn@exactagss.com
  Vice-chair : Sherzod Elamanav (SyncTechno Inc) : elamanov@synctechno.com

- **Conformance Testing:**
  Miguel Angel Reina Ortega (ETSI) : MiguelAngel.ReinaOrtega@etsi.org

- **oneM2M Certification:**
  Asif Hamidullah (GCF) : asif.hamidullah@globalcertificationforum.org
  Keebum Kim (TTA and Relation GCF-oneM2M) : keebum.kim@tta.or.kr
Q&A