oneM2M Testing Activities

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Outline

- Interop & Conformance Testing
- oneM2M Testing Activities
- oneM2M Interop. Events
- oneM2M Certification Program
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)
- Scenario-based system testing
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.
Interoperability & Conformance testing

- Both are complementary!

- Product could happen to be conformant but not interoperable

- 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 stable specifications and is for testing product and check if the standard is correctly implemented
oneM2M Testing Specifications

- **Methodology:**
  - TS-0015: Testing Framework

- **Interoperability Testing**
  - TS-0013: Interop Testing

- **Conformance Testing**
  - Conformance on oneM2M primitives: PICS TS-0017, TSS&TP TS-0018 and ATS TS-0019 (oneM2M TF-001 & ETSI STF 531)
  - Security conformance: PICS TS-0027, TSS&TP TS-0028 and ATS TS-0029

- **Definition of product profiles:** TS-0025

- **Developer Guides:** Series of eight technical reports
oneM2M Interoperability Testing

- Interoperability testing specification
  - R1 TS-0013 Interoperability testing ➔ Stable and used in Interop events
  - R2 TS-0013 Interoperability testing ➔ Under development with new features

- Release 2 Interop spec. features
  - Semantic testing
  - Security testing
  - Interworking testing
  - Data model testing

- Two oneM2M Interop. Testing events every year
oneM2M Conformance Testing

Status of Conformance Testing specifications

- TS-0017, Implementation Conformance Statement (ICS), 100%
- TS-0018, Test Suite Structure & Test Purposes, 99%
- TS-0019, ATS (TTCN-3), 95%
- TS-0025, Product profiles, 100%

TTCN-3 test cases are developed for all R1 product profiles

- oneM2M TF-001 and ETSI STF-531 collaborate to deliver TTCN-3 test cases
- Validation of the test cases with 2~3 implementations and 2~3 oneM2M testing tools
- Once all test cases are validated, the test cases will be used by oneM2M CB and Testing Lab
- Interop 5 will be used to validate the test cases and tools

All companion conformance testing specs will be prepared for approval at TP #33 Geneva meeting
Features catalogue & Product profiles

- product profiles and feature catalogue
  - guidebook to my oneM2M product features
  - fills the gap btw. function specs. and test specs.

- Functional Architecture (TS-0001)
- Core Protocol (TS-0004)
- Features Catalogue (TS-0031)
- Test Purposes (TS-0018)
- Abstract Test Suite (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
Referred
Summarized
Guideline for product planning
Product profiles

- Rel-1 profiles define in total **seven** products

<table>
<thead>
<tr>
<th>Profile</th>
<th>Description</th>
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<tr>
<td>ADN Profile 1</td>
<td>Constrained sensor as ADN</td>
</tr>
<tr>
<td>ADN Profile 2</td>
<td>Constrained actuator as ADN</td>
</tr>
<tr>
<td>ADN Profile 3</td>
<td>Normal sensor devices</td>
</tr>
<tr>
<td>ADN Profile 4</td>
<td>Small originator device types of oneM2M services</td>
</tr>
<tr>
<td>IN Profile 1</td>
<td>Server device type of oneM2M services</td>
</tr>
<tr>
<td>ASN Profile 1</td>
<td>Constrained actuator as ASN</td>
</tr>
<tr>
<td>MN Profile 1</td>
<td>Gateway devices that support multiple different area network technologies and connect devices</td>
</tr>
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</table>
**Developer guide series**

- **example scenarios and binding messages**

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Title</th>
<th>Examples of</th>
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<tbody>
<tr>
<td>TR-0025</td>
<td>Application developer guide</td>
<td>HTTP binding, XML/JSON serialization</td>
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<td>TR-0034</td>
<td>Temperature monitoring example using CoAP binding</td>
<td>CoAP binding, &lt;pollingChannel&gt;</td>
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<tr>
<td>TR-0035</td>
<td>Developer guide of Device Management</td>
<td>&lt;mgmtObj&gt;, OMA DM, LwM2M, BBF TR-069</td>
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<td>TR-0037</td>
<td>Smart Farm Example using MQTT Binding</td>
<td>MQTT binding</td>
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<td>TR-0038</td>
<td>Developer guide - Implementing security example</td>
<td>Provisioning, Security Association Establishment</td>
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<tr>
<td>TR-0039</td>
<td>Developer guide - SDT based implementation</td>
<td>SDT for home appliances</td>
</tr>
<tr>
<td>TR-0045</td>
<td>Developer Guide: Implementing Semantics</td>
<td>Semantic annotation and discovery</td>
</tr>
<tr>
<td>TR-0048</td>
<td>Developer Guide of 3GPP Interworking</td>
<td>(TBD)</td>
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</tbody>
</table>
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 (many commercial tools available)
- Successfully deployed in different organizations and industry in a variety of application domains
  - e.g., telecom, automotive, software, etc.
Why Validate Standards

- Validation reveals problems/errors in Standards and Products
- Validated standards 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

Standards can be validated by several means but one of the most practical and cost effective is by interop events
oneM2M Interop at a Glance

- Co-organized and funded by TTA and ETSI
- Twice a year
- 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
oneM2M Interop #1 ~ #4

Interop#1 Sophia-Antipolis (2015)

Interop#2 Seoul (2016)

Interop#3 Kobe (2016)

Interop#4 Taipei (2017)
oneM2M Interop #5

- Co-organized by TTA and ETSI
- When: 4th Dec (Mon) to 8th Dec (Fri) 2017, 5 days
- Where: Global IoT Certification Center, in Pangyo, Korea
- Scope:
  - Interoperability and conformance testing (TS-0013, TS-0018, TS-0019)
  - Release 1 & 2 (TS-0001 & TS-0004 & Binding baselines from TP #31)
- Conformance Testing is the core of Interop5
  - In 5th Interop Event, Conformance session will be expanded to
    - Validate Test Purpose, TTCN-3 (oneM2M ATS)
    - Validate Test Systems
    - Run Conformance Test on participants’ implementations
    - **Semantic testing**
      - Semantic testing (an half-day)
- Expecting many oneM2M members and Test System vendors to join!!
- Please register to oneM2M Interop5 ASAP!!

http://www.etsi.org/newsevents/events/1211-onem2m-interop-5
oneM2M Certification program

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

- TTA was agreed the first **oneM2M Certification Body** in SC #33(Sep. 2016).

- **oneM2M Certification Program** was officially launched at **Feb. 9, 2017**.

www.onem2mcert.com
oneM2M CB Organization

oneM2M CB Organization

oneM2M - oneM2M CB

oneM2M

oneM2M CB

1st oneM2M Certification Body!

oneM2M Certification Body (CB)

Authorized Test Lab (ATL)
# oneM2M Certified Products

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<tr>
<th>Product</th>
<th>Webpage</th>
<th>Vendor</th>
<th>Product Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>GWP</td>
<td><a href="http://www.irexnet.co.kr">http://www.irexnet.co.kr</a></td>
<td>IREXNET</td>
<td>End product(IN-CSE)</td>
</tr>
<tr>
<td>AiSOP</td>
<td><a href="http://www.irexnet.co.kr">http://www.irexnet.co.kr</a></td>
<td>IREXNET</td>
<td>End product(IN-CSE)</td>
</tr>
<tr>
<td>Insator™</td>
<td><a href="https://www.samsungsds.com">https://www.samsungsds.com</a></td>
<td>SAMSUNG SDS</td>
<td>End product(IN-CSE)</td>
</tr>
<tr>
<td>HANDYPIA IoT Platform</td>
<td><a href="http://www.handysoft.co.kr/">http://www.handysoft.co.kr/</a></td>
<td>HANDYSOFT, Inc.</td>
<td>End product(IN-CSE)</td>
</tr>
<tr>
<td>IoT Healthcare Platform</td>
<td><a href="http://www.hconnect.co.kr/">http://www.hconnect.co.kr/</a></td>
<td>HealthConnect Co., Ltd</td>
<td>End product</td>
</tr>
<tr>
<td>ThingPlug</td>
<td><a href="https://www.thingplug.net">https://www.thingplug.net</a></td>
<td>SK Telecom</td>
<td>Software component</td>
</tr>
<tr>
<td>N-MAS</td>
<td><a href="http://www.ntels.com">http://www.ntels.com</a></td>
<td>nTels</td>
<td>End product</td>
</tr>
<tr>
<td>IoT Makers Middleware</td>
<td><a href="http://iotmakers.olleh.com">http://iotmakers.olleh.com</a></td>
<td>KT</td>
<td>Software component</td>
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<tr>
<td>e-IoT Energy Platform</td>
<td><a href="https://spin.kepco.co.kr">https://spin.kepco.co.kr</a></td>
<td>KEPCO</td>
<td>End product</td>
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<td>e-IoT Energy Gateway</td>
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Summary

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THANK YOU
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