onEM2M

ONEM2M DEVELOPER SUPPORTS AND CERTIFICATION
oneM2M Developer Supports and Certification for you to consider oneM2M adoption

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oneM2M Developer Supports
oneM2M Developer Guides (TRs)

• Since Release 2, oneM2M has been publishing developer guide series in TRs
  • TR-0025-Application Developer Guide
  • TR-0034-Developer Guide CoAP binding and long polling for temperature monitoring
  • TR-0035-Developer guide of device management
  • TR-0038-Developer guide Implementing security example
  • TR-0039-Developer guide SDT-based implementation
  • TR-0045-Developer Guide Implementing Semantics
  • TR-0047-Developer Guide of 3GPP Interworking
  • TR-0051-oneM2M API guide
oneM2M Developer Guides (TRs)

- TR-0025-Application Developer Guide, for example
  - System configuration: Which oneM2M entities need to be implemented and deployed?
  - Call flows: What are the use case scenarios for oneM2M actors?
  - Messages: What are the oneM2M defined request and response messages in XML/JSON over HTTP?

```
GET /~mn-cse/home_gateway/light_ae/light/lia HTTP/1.1
Host: in.provider.com:8080
X-M2M-Origin: /in-cse/Csmartphone_ae
X-M2M-RI: mn-cse-11223
Accept: application/json

HTTP Response:
200 OK
X-M2M-RSC: 2000
X-M2M-RI: mn-cse-11223
Content-Type: application/json

{
    "m2m:cin":
    {
        "ty":4,
        "cn":"cin-394798749",
        "pt":"cnt-1518049105",
        "cnf":"cin-394798749",
        "ct":20150925T045938
    }
}
```
### Open-Source Implementations

- Members support different projects for different dev. environments
- Different open sources gives better opportunity for standard adoption

<table>
<thead>
<tr>
<th>Open-Source Implementations</th>
<th>ACME</th>
<th>OCEAN</th>
<th>OS IoT</th>
<th>tinyIoT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lead</strong></td>
<td>LAAS-CNRS</td>
<td>Andreas Kraft</td>
<td>KETI</td>
<td>Mediterranean University of Technology</td>
</tr>
<tr>
<td><strong>Homepage</strong></td>
<td><a href="http://www.eclipse.org/om2m">www.eclipse.org/om2m</a></td>
<td>Github.com/ankraft/ACME-oneM2M-CSE/</td>
<td>developers.iotocean.org</td>
<td>os-iot.org/TBD ('23.11)</td>
</tr>
<tr>
<td><strong>License</strong></td>
<td>EPL 1.0</td>
<td>BSD 3-Clause</td>
<td>BSD 3-Clause</td>
<td>BSD 3-Clause</td>
</tr>
<tr>
<td><strong>Offering</strong></td>
<td>Platform</td>
<td>Platform</td>
<td>Platform, Dev Tools</td>
<td>Lightweight Dev API/Platform &amp; Edge</td>
</tr>
<tr>
<td><strong>Binding</strong></td>
<td>HTTP, CoAP</td>
<td>HTTP, MQTT</td>
<td>HTTP, CoAP, MQTT, WebSocket</td>
<td>HTTP, MQTT, CoAP (under dev.)</td>
</tr>
<tr>
<td><strong>Format</strong></td>
<td>XML, JSON</td>
<td>JSON, CBOR</td>
<td>XML, JSON, CBOR</td>
<td>XML, JSON/JSON</td>
</tr>
<tr>
<td><strong>Language, Framework</strong></td>
<td>Java / OSGi</td>
<td>Python</td>
<td>Node.js, Java</td>
<td>C++/C</td>
</tr>
<tr>
<td><strong>Interworking</strong></td>
<td>KNX, ZigBee, HUE, LoRa, SigFox, etc.</td>
<td>-</td>
<td>OCF, Nest, ZigBee, FIWARE, JawBone</td>
<td>Modbus</td>
</tr>
</tbody>
</table>
oneM2M Developer Tutorials

• A series of developer tutorial videos are available on the web like Youtube

https://www.youtube.com/@iotketi
oneM2M Developer Tutorials

- Tutorials from KETI are available 24/7 on the Youtube (ENG/KOR) and include
  - oneM2M Overview
  - oneM2M Platform (i.e. Mobius) and Tools
  - oneM2M Architecture and APIs
  - oneM2M Protocols
  - oneM2M Practice 101 (i.e. Postman and MQTT client)
  - oneM2M Practice 102 (i.e. Jupyter Notebook w/ javascript kernel)
  - oneM2M Virtual Devices
  - oneM2M Access Control
  - oneM2M Dashboard
  - oneM2M Interworking overview with SDT
  - oneM2M – ZigBee Interworking
  - oneM2M – LoRaWAN Interworking
  - oneM2M Node-RED Application
  - oneM2M Vue.js Application

IoT Drone GCS (Ground Control System)
Digital Twin Interworking (w/ Unity 3D)
oneM2M International Hackathons

- There has been oneM2M hackathons by ETSI and Mobius developer events by KETI
- Since 2021, KETI, ETSI and TTA host oneM2M International Hackathon together, funded by KETI
- The hackathons are run online/remotely with tutorials and the mentors’ support
oneM2M International Hackathon (2021)

1st Prize: oneM2M Autonomous cooperative smart delivery system (KR)
2nd Prizes: Cellular IoT Irrigation System (US)
   A smart automatic pet feeder (CN)

Video of the Hackathon Awards Ceremony
oneM2M International Hackathon (2022)

Winners

1st Prize: Fire Situation Monitoring System (KR)
2nd Prizes: Air quality monitoring system (AT)  
Smart School Bus (KR)
oneM2M International Hackathon (2023)

• More oneM2M APIs implemented, and more participations from SMEs

Smart Traffic Light Alarm App

Smart Farm Infrastructure with Metaverse

Remotely Operated AI Enabled Robot Using oneM2M

Awards Ceremony (2023)
Other Activities

• Exhibitions in 2023
  • 2023 AIoT Week Korea (11th ~ 13th in Oct.) in Seoul
  • 2023 AIoT Taiwan (25th ~ 27th in Oct.) in Taipei

• International Workshop & Industry Day
  • oneM2M Workshop along with AIoT Taiwan (2023.10.25)
  • oneM2M Industry Day along with oneM2M TP#62 (2023.12.06)

• Follow-up in Asia-Pacific oneM2M events in 2024
  • Malaysia along with Int’l Hackathon (TBD)
  • co-hosts: KETI, TTA, ETSI

• KETI is planning next events for east Asian market
  • E.g., Vietnam, Indonesia, India
oneM2M Testing and Certification
Specifications for certification

- Feature catalogue and product profiles
  - summary to oneM2M features
  - guide to product planning with interested features
  - fills the gap between technical specs. and test specs.

What oneM2M Rel-3 newly provides

- Interoperability Test (TS-0013)
- 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 conformance test cases for products
Guideline for product planning
oneM2M certification program

• Chordant, InterDigital, is certified as the first product performing conformance test
• Mobius is the first certified open source oneM2M platform

Certified Products (Not limited to)

<table>
<thead>
<tr>
<th>Product</th>
<th>Webpage</th>
<th>Vendor</th>
<th>Product Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chordant™ Platform</td>
<td><a href="https://www.chordant.io">https://www.chordant.io</a></td>
<td>Chordant™</td>
<td>End product(IN-CSE)</td>
</tr>
<tr>
<td>SysOne</td>
<td><a href="http://www.c3systems.com">http://www.c3systems.com</a></td>
<td>C3SYSTEMS</td>
<td>End product(IN-CSE)</td>
</tr>
<tr>
<td>Universal IoT Gateway</td>
<td><a href="http://web.modacom.co.kr">http://web.modacom.co.kr</a></td>
<td>Moda Inc.</td>
<td>End product(IN-CSE)</td>
</tr>
<tr>
<td>HuRa IoT Platform</td>
<td><a href="http://www.herit.net">http://www.herit.net</a></td>
<td>HERIT</td>
<td>End product(IN-CSE)</td>
</tr>
<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>IoTmakers Middleware</td>
<td><a href="http://iotmakers.olleh.com">http://iotmakers.olleh.com</a></td>
<td>KT</td>
<td>Software component</td>
</tr>
<tr>
<td>iOTMakers</td>
<td><a href="http://iotmakers.olleh.com">http://iotmakers.olleh.com</a></td>
<td>KT</td>
<td>Software component</td>
</tr>
<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>
</tr>
<tr>
<td>e-IoT Energy Gateway</td>
<td><a href="https://spin.kepco.co.kr">https://spin.kepco.co.kr</a></td>
<td>KEPCO</td>
<td>End product</td>
</tr>
</tbody>
</table>

https://onem2m.globalcertificationforum.org/
History of certification program

• oneM2M Certification Background
  • First oneM2M Certification Body
    • TTA was agreed as the first Certification Body (Steering Committee #33, Sep. 2016)
    • TTA oneM2M Release 1 Certification Program was officially launched (Feb. 9, 2017.)
    • GCF took over oneM2M certification program from TTA (Jul, 2019)
    • GCF launched oneM2M Release 2 Certification Program (Jan. 9, 2023)

oneM2M Certification History

- 2012
  - oneM2M™ Partnership Project launch
- 2013
  - oneM2M Testing WG Established
- 2015~2016
  - ‘TTA Verified for oneM2M’ launch (Domestic Certification Program)
- 2017
  - oneM2M Rel-1 Certification launch (Feb. 2017)
    - Agreed as 1st oneM2M CB (Sep. 2016)
- 2018.2
  - Designation of 2nd ATL
  - Included Conformance Testing Scope
- 2023.1
  - oneM2M Rel-2 Certification launch
  - Commercial Availability of oneM2M based Service in Korean Market (2Q~2015)
Rel-1 certification program

• Testing Scope for certification (oneM2M Rel-1, WI-0292)
  • Interoperability Testing
    • Verification of end-to-end functionality in accordance with oneM2M binding protocols (HTTP, CoAP and MQTT) and serializations (XML and JSON).
      • Interoperability test specification for oneM2M certification based on TS-0013(Interoperability Testing)
    • Total Test Cases : 288

• Conformance Testing
  • Based on oneM2M conformance testing specifications
    • TS 0017 Implementation Conformance Statements
    • TS 0018 Test Suite Structure and Test Purpose
    • TS 0019 Abstract Test Suite and Implementation eXtra Information for Test
    • TS 0025 Product Profiles
  • Total Test Cases : 328
Rel-2 certification program

• Testing Scope for certification (oneM2M Rel-2, WI-0314)
  • Interoperability Testing
    • Verification of end-to-end functionality in accordance with oneM2M binding protocols (HTTP, CoAP, MQTT, Websocket) and serializations (XML, JSON, CBOR).
      • Interoperability test specification for oneM2M certification based on TS-0013 (Interoperability Testing)
    • Total Test Cases: 576

• Conformance Testing
  • Based on oneM2M conformance testing specifications
    • TS 0017 Implementation Conformance Statements
    • TS 0018 Test Suite Structure and Test Purpose
    • TS 0019 Abstract Test Suite and Implementation eXtra Information for Test
    • TS 0025 Product Profiles
  • Total Test Cases: 450
Next certification program

- Next certifications may support Rel-4, which is the latest release (TBD)

<table>
<thead>
<tr>
<th>Q1/23</th>
<th>Q2/23</th>
<th>Q3/23</th>
<th>Q4/23</th>
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<tbody>
<tr>
<td>oneM2M Rel 5 Ratification</td>
<td>ETSI STF559 oneM2M Rel-4 TTCN Verification and Delivery (TBC)</td>
<td>ETSI STF559 oneM2M Rel-5 TTCN Verification and Delivery (TBC)</td>
<td>oneM2M Rel4 WIP submission to SG#97</td>
</tr>
<tr>
<td>oneM2M Release 3 Conformance and IOP Testing WID Development</td>
<td>oneM2M Portal Update</td>
<td>Validations (additional Bindings &amp; Serialisations)</td>
<td>oneM2M Rel 3 Validations</td>
</tr>
<tr>
<td>oneM2M Rel 2 Conformance (HTTP-JSON) Activation (GCF CC 3.87.1)</td>
<td>oneM2M Portal Update (GCF &amp; TTA)</td>
<td>DCC update following MACREG</td>
<td>oneM2M Rel 3 Conformance target Activation (GCF CC 3.91.0)</td>
</tr>
<tr>
<td>RTO Accreditations Update on Portal</td>
<td>ValCon</td>
<td>oneM2M Portal Update with Annex F7.2</td>
<td>oneM2M Rel 3 IOP Testing (TBC) Annex F7.2 target GCF=CC 3.91.0</td>
</tr>
<tr>
<td>oneM2M Rel 2 IOP Testing (Websocket-CBOR) Annex F7.2 target GCF=CC 3.89.0</td>
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<td></td>
</tr>
</tbody>
</table>

Source: GCF
Application for certification

- Submit on the certification website and test with test labs

GCF Recognised Test Organisations (RTOs) and Assessment Capable Entities (ACEs)

<table>
<thead>
<tr>
<th>RTO Type</th>
<th>Scope</th>
<th>Contact</th>
<th>Address</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOP RTO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>oneM2M TS-0013</td>
<td>Rel-1 Rel-2</td>
<td>Hyeonyeo Shin <a href="mailto:feature77@tta.or.kr">feature77@tta.or.kr</a></td>
<td>815, Daewangpangyo-ro Sujeong-gu Seongnam-city Gyeonggi-do, 13449, Korea</td>
<td><a href="https://www.tta.or.kr/tta/index.do">https://www.tta.or.kr/tta/index.do</a></td>
</tr>
<tr>
<td>Conformance RTO</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>oneM2M TS-0018</td>
<td>Rel-1 Rel-2</td>
<td>Hyeonyeo Shin <a href="mailto:feature77@tta.or.kr">feature77@tta.or.kr</a></td>
<td>815, Daewangpangyo-ro Sujeong-gu Seongnam-city Gyeonggi-do, 13449, Korea</td>
<td><a href="https://www.tta.or.kr/tta/index.do">https://www.tta.or.kr/tta/index.do</a></td>
</tr>
<tr>
<td>SGS North America</td>
<td>Rel-1</td>
<td>Ben Kuo <a href="mailto:Ben.Kuo@sgs.com">Ben.Kuo@sgs.com</a></td>
<td>15150 Avenue of Science Suite 3001 San Diego, CA 92128</td>
<td><a href="https://www.sgs.com">https://www.sgs.com</a></td>
</tr>
<tr>
<td>Third Party ACE</td>
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<tr>
<td>oneM2M</td>
<td>Rel-1 Rel-2</td>
<td>Hyeonyeo Shin <a href="mailto:feature77@tta.or.kr">feature77@tta.or.kr</a> Keebum Kim <a href="mailto:keebum.kim@tta.or.kr">keebum.kim@tta.or.kr</a></td>
<td>815, Daewangpangyo-ro Sujeong-gu Seongnam-city Gyeonggi-do, 13449, Korea</td>
<td><a href="https://www.tta.or.kr/tta/index.do">https://www.tta.or.kr/tta/index.do</a></td>
</tr>
</tbody>
</table>

https://www.globalcertificationforum.org/services/onem2m/onem2m-submission.html
Thank you!