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oneM2M

## **ONEM2M DEVELOPER SUPPORTS AND CERTIFICATION**

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# 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 needs 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?

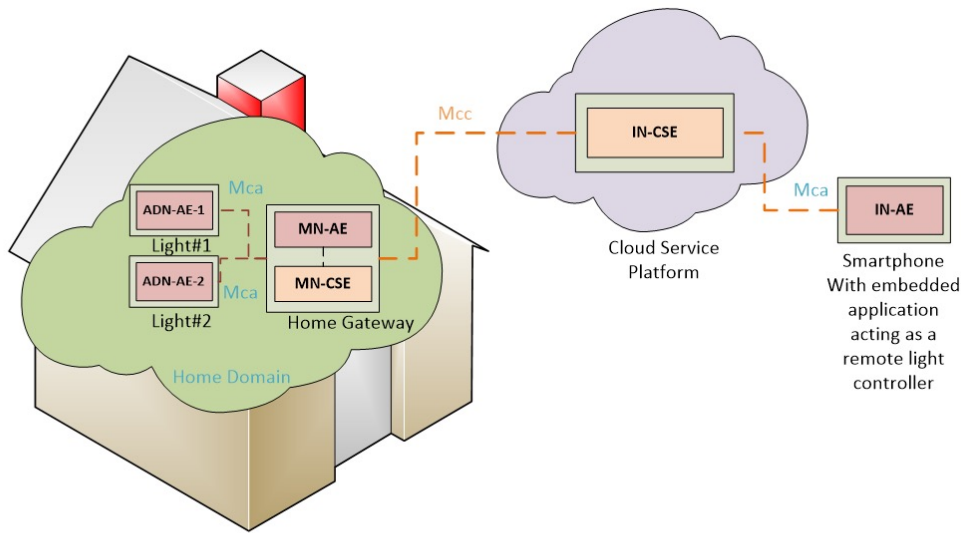


Figure 6-1: oneM2M functional architecture of remote lights control use case

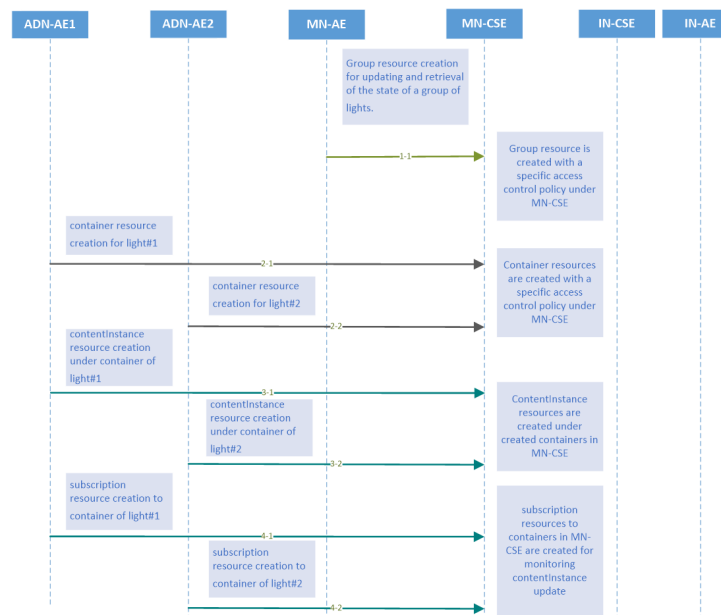


Figure 7.2.2-1: Initial resource creation phase call flows

```
GET ~/mn-cse/home_gateway/light_ae1/light/1a HTTP/1.1
Host: in.provider.com:8080
X-M2M-Origin: /in-cse/Csmartphone_ae
X-M2M-RI: mncse-11223
Accept: application/json
```










HTTP Response:

```
200 OK
X-M2M-RSC: 2000
X-M2M-RI: mncse-11223
Content-Type: application/json
```

```
{
  "m2m:cin":
  {
    "ty":4,
    "ri":"cin-394798749",
    "pi":"cnt-181049109",
    "rn":"cin-394798749",
    "ct":"20150925T045938",
    "lt":"20150925T045938",
    "et":"20151107T154802",
    "st":0,
    "cnf":"text/plain:0",
    "cs":3,
    "con":"OFF"
  }
}
```

# Open-Source Implementations

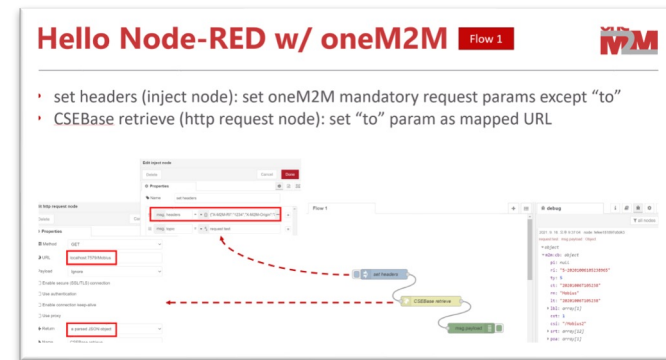
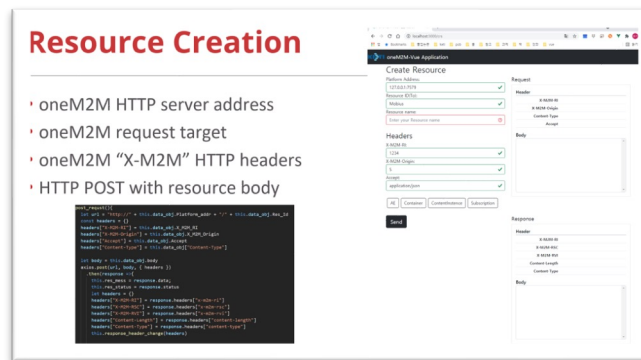
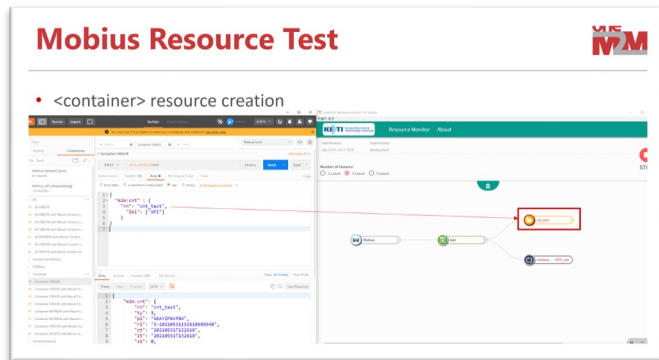
- Members support different projects for different dev. environments
  - Different open sources gives better opportunity for standard adoption

					
Lead		Andreas Kraft			
Homepage	<a href="http://www.eclipse.org/om2m">www.eclipse.org/om2m</a>	<a href="https://github.com/ankraft/ACME-oneM2M-CSE/">Github.com/ankraft/ACME-oneM2M-CSE/</a>	<a href="http://developers.iotocean.org">developers.iotocean.org</a>	<a href="http://os-iot.org">os-iot.org</a>	TBD ('23.11)
License	EPL 1.0	BSD 3-Clause	BSD 3-Clause	BSD 3-Clause	BSD 3-Clause
Offering	Platform	Platform	Platform, Dev Tools	Lightweight Dev API	Platform & Edge
Binding	HTTP, CoAP	HTTP, MQTT	HTTP, CoAP, MQTT, WebSocket	HTTP	HTTP, MQTT, CoAP (under dev.)
Format	XML, JSON	JSON, CBOR	XML, JSON, CBOR	XML, JSON	JSON
Language, Framework	Java / OSGi	Python	Node.js, Java	C++	C
Interworking	KNX, ZigBee, HUE, LoRa, SigFox, etc.	-	OCF, Nest, ZigBee, FIWARE, JawBone	-	Modbus

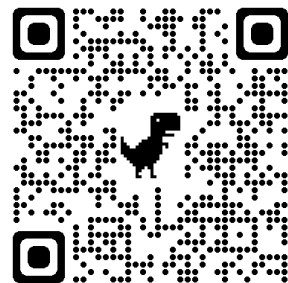
# oneM2M Developer Tutorials



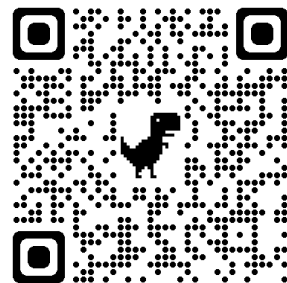
- A series of developer tutorial videos are available on the web like Youtube



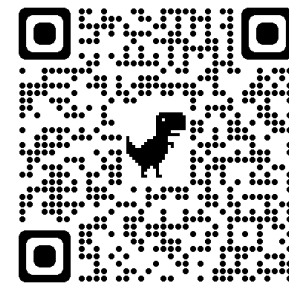
oneM2M  
Developers  
Tutorial 2020  
(ENG, KETI)



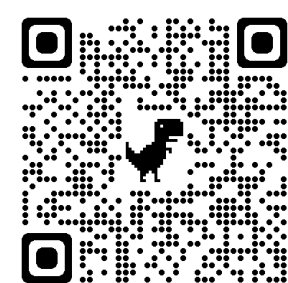
oneM2M  
Developers  
Tutorial 2021  
(KOR, KETI)



oneM2M Developers Tutorial 2022  
(basics and advanced courses)  
(KOR, KETI)



MOOC  
(ENG, C-DOT)



Tutorial w/  
Jupyter  
Notebook  
(ENG, DT)

# 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)

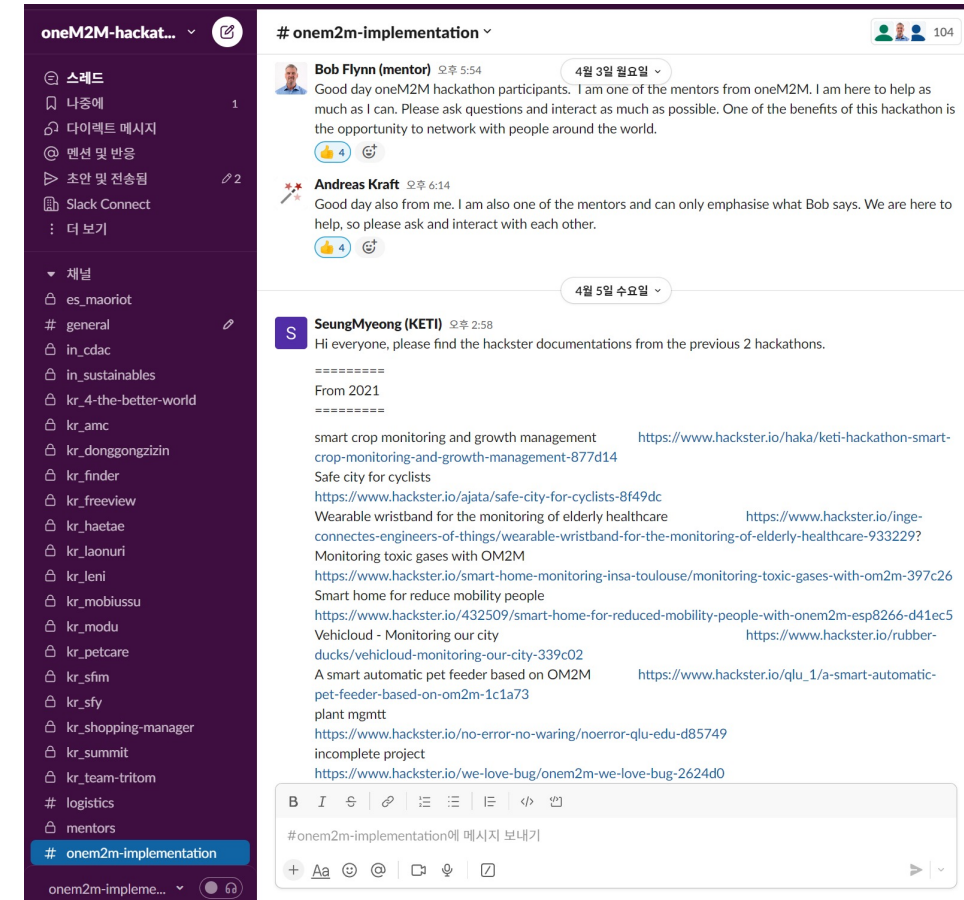
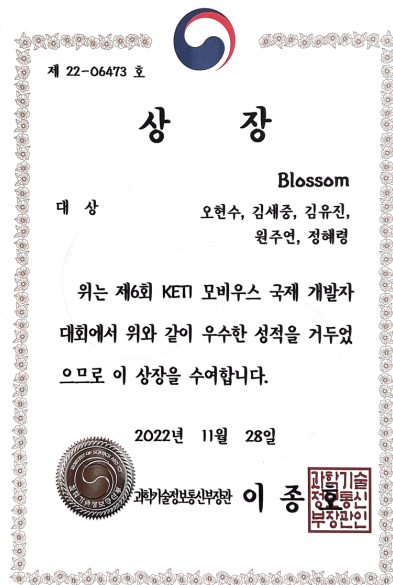




# oneM2M International Hackathons



- 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)






## 제5회 KETI 모비우스 국제 개발자 대회

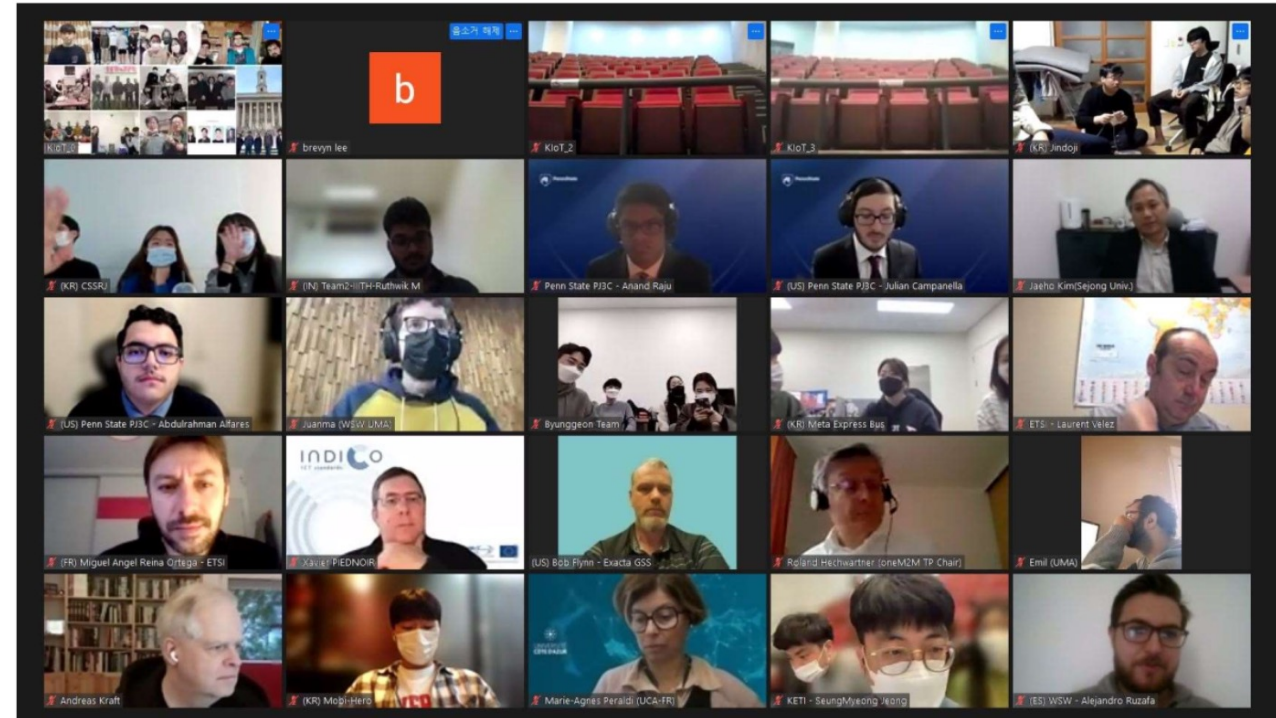
□ 신청 자격: 제한 없음  
□ 신청 기간: 2021. 9. 10(금) ~ 2021. 9. 23(목)

**주 관** KETI 한국전자기술연구원  
Korea Electronics Technology Institute

**후 원** 한국지능형사물인터넷협회 KTIOTS 한국정보통신기술협회 TTA

### 대회 개요

- 목적
  - 모비우스 3.0 플랫폼을 활용한 IoT 응용서비스 아이디어 발굴
  - ※ 모비우스 : IoT 표준(oneM2M)을 기반으로 KETI가 개발한 오픈소스 플랫폼
  - 실제 아이디어 구현을 통한 글로벌 사용자 저변확대 및 모비우스 인프라 활용촉진
- 신청대상 : 제한 없음
  - ※ 국내 참가팀은 10-15개팀 내외 선정 예정
  - ※ 해외 참가팀은 미국, 프랑스, 인도 등 모집 중 (10-20개팀 내외)
- 대회 공통 언어 : 영어 (리코프 및 중간점검 미팅, 최종평가, 시상식)
  - ※ 국내 참가팀은 '아이디어 공모 심사, 다국어까지 마 하국어로 진행'



## Winners



Video of the Hackathon Awards Ceremony

1st Prize: oneM2M Autonomous cooperative smart delivery system (KR)

2nd Prizes: Cellular IoT Irrigation System (US)  
A smart automatic pet feeder (CN)



# oneM2M International Hackathon (2022)



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Video of the Hackathon Awards Ceremony

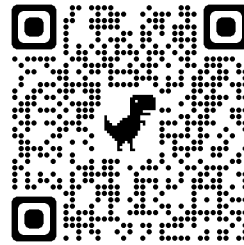
## Winners

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

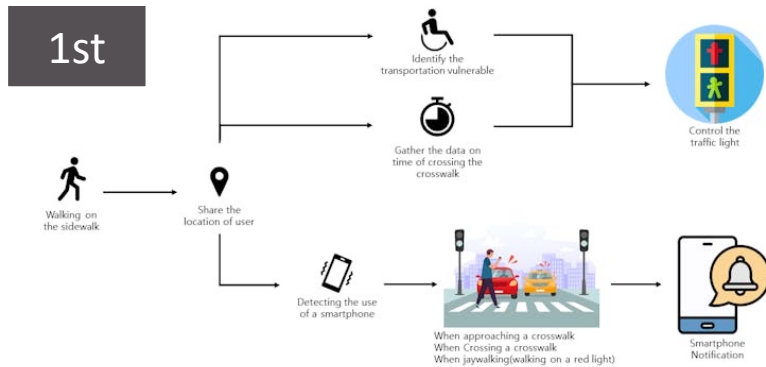
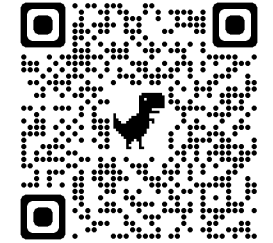
# oneM2M International Hackathon (2023)



- More oneM2M APIs implemented, and more participations from SMEs



Awards Ceremony (2023)



Smart Traffic Light Alarm App



Smart Farm Infrastructure with Metaverse



Remotely Operated AI Enabled Robot Using oneM2M



Doc



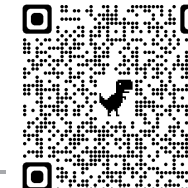
Demo



Doc



Demo



Doc



Demo



# Other Activities

- Exhibitions in 2023
  - 2023 AIoT Week Korea (11<sup>th</sup> ~ 13<sup>th</sup> in Oct.) in Seoul
  - 2023 AIoT Taiwan (25<sup>th</sup> ~ 27<sup>th</sup> 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

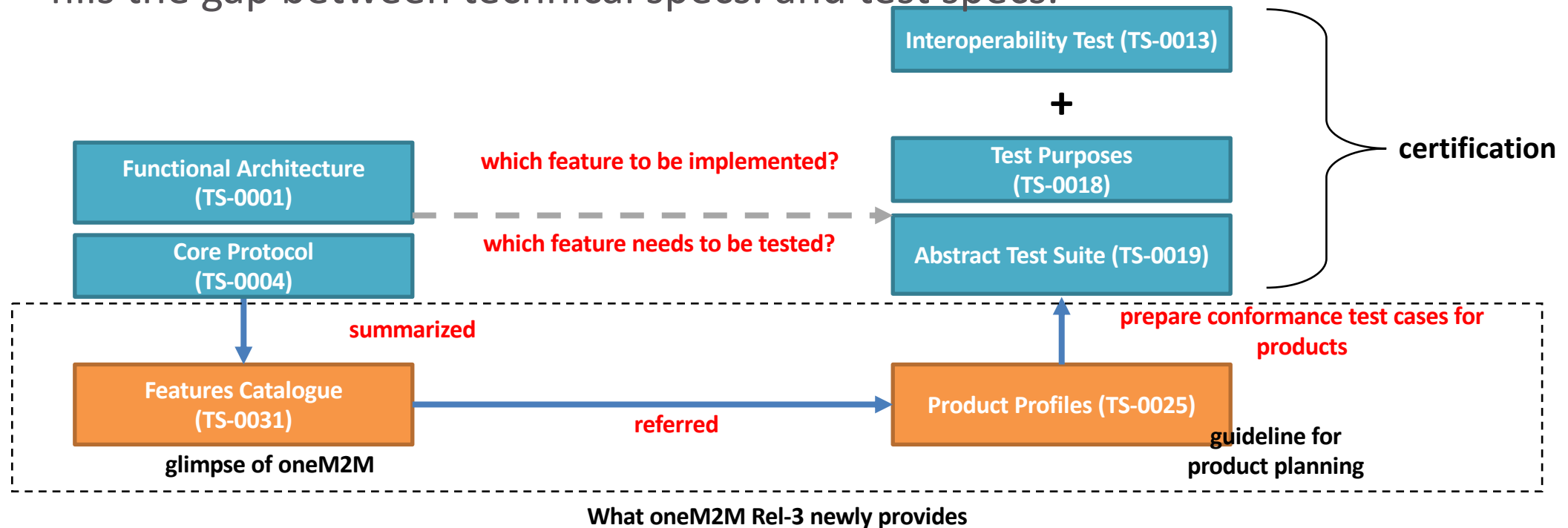




# oneM2M Testing and Certification

# 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.



# 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)

Product	Webpage	Vendor	Product Type
Chordant™ Platform	<a href="https://www.chordant.io">https://www.chordant.io</a>	Chordant™	End product(IN-CSE)
SysOne	<a href="http://www.c3systems.com">http://www.c3systems.com</a>	C3SYSTEMS	End product(IN-CSE)
Universal IoT Gateway	<a href="http://web.modacom.co.kr">http://web.modacom.co.kr</a>	Moda Inc.	End product(IN-CSE)
HuRa IoT Platform	<a href="http://www.herit.net">http://www.herit.net</a>	HERIT	End product(IN-CSE)
GWP	<a href="http://www.irexnet.co.kr">http://www.irexnet.co.kr</a>	IREXNET	End product(IN-CSE)
AiSOP	<a href="http://www.irexnet.co.kr">http://www.irexnet.co.kr</a>	IREXNET	End product(IN-CSE)
Insator™	<a href="https://www.samsungsds.com">https://www.samsungsds.com</a>	SAMSUNG SDS	End product(IN-CSE)
HANDYPIA IoT Platform	<a href="http://www.handysoft.co.kr">http://www.handysoft.co.kr</a>	HANDYSOFT, Inc.	End product(IN-CSE)
IoT Healthcare Platform	<a href="http://www.hconnect.co.kr">http://www.hconnect.co.kr</a>	HealthConnect Co., Ltd	End product
ThingPlug	<a href="https://www.thingplug.net">https://www.thingplug.net</a>	SK Telecom	Software component
N-MAS	<a href="http://www.ntels.com">http://www.ntels.com</a>	nTels	End product
IoT Makers Middleware	<a href="http://iotmakers.olleh.com">http://iotmakers.olleh.com</a>	KT	Software component
IoT Makers	<a href="http://iotmakers.olleh.com">http://iotmakers.olleh.com</a>	KT	Software component
e-IoT Energy Platform	<a href="https://spin.kepco.co.kr">https://spin.kepco.co.kr</a>	KEPCO	End product
e-IoT Energy Gateway	<a href="https://spin.kepco.co.kr">https://spin.kepco.co.kr</a>	KEPCO	End product



<https://onem2m.globalcertificationforum.org/>



# History of certification program

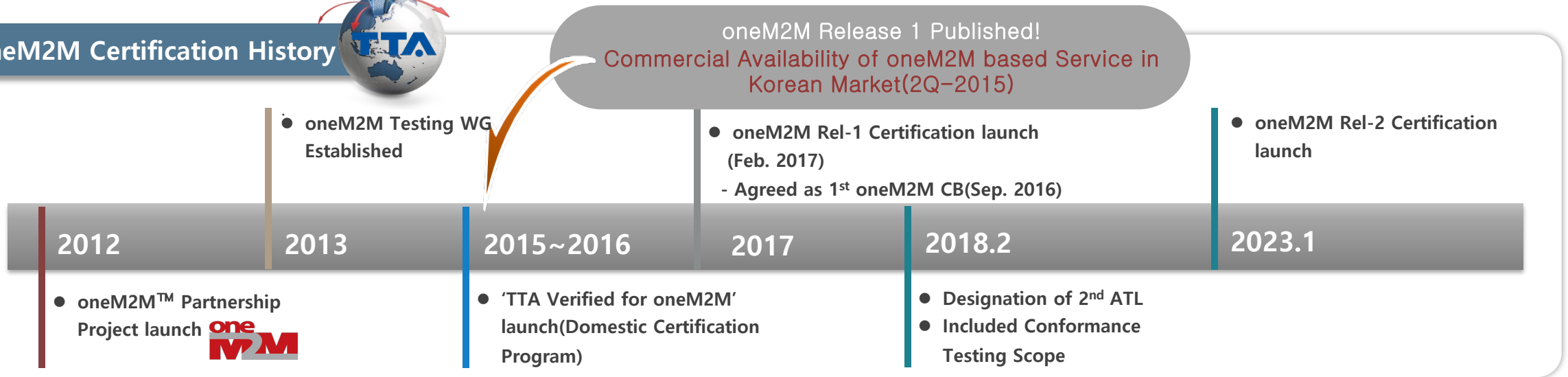


- oneM2M Certification Background

- 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



# 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

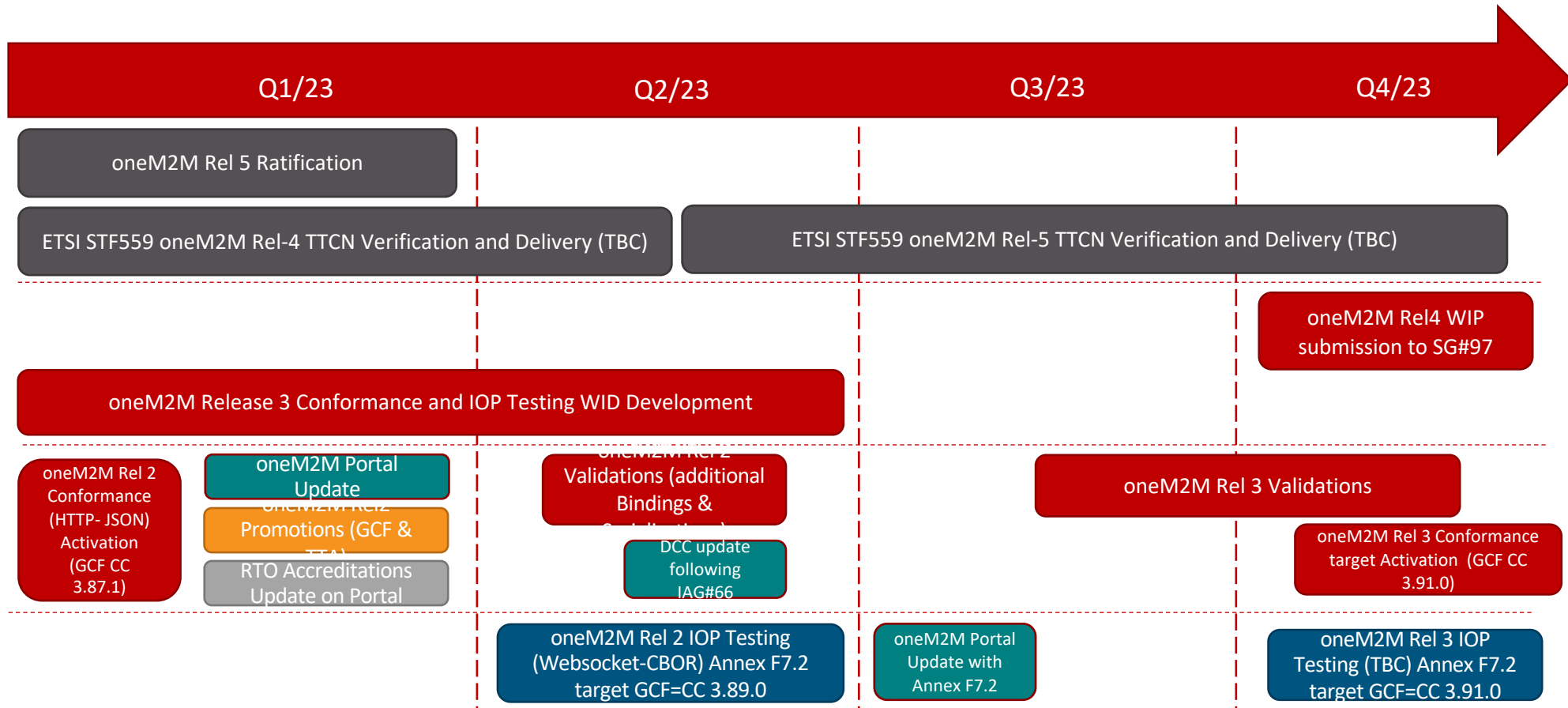


- Testing Scope for certification (oneM2M Rel-2 , WI-0314)
  - Interoperability Testing
    - Verification of end-to-end functionality in accordance with oneM2M binding protocols (HTTP, CoAP, MQTT, **Websocket**) and serializations (XML, JSON, **CBOR**).
      - Interoperability test specification for 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)



Source: GCF

# Application for certification



- Submit on the certification website and test with test labs

<https://www.globalcertificationforum.org/services/onem2m/onem2m-submission.html>

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

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

Thank you!