oneM2M Industry Day

LG CNS IoT Platform based on oneM2M

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Introduction

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I. Decision behind oneM2M
Even before the term “IoT” became a trending topic,

LG CNS, with its own standards, has been providing services, which are now what we call IoT, for factory and energy industries as well as buildings
With the advent of IoT..

Issues

✓ The difficulty for a company-specific standard to be widely used in the market
✓ The difficulty in creating an ecosystem embracing device manufacturers, IoT platform providers and service developers
✓ IoT devices each with their own protocols and message formats
✓ Absence of a standardized platform service
Due to the limitation of creating an IoT ecosystem with only company-specific standards, we decided to adopt the global standard (2015)
II. From oneM2M to INFioT
From oneM2M to INFioT

- oneM2M Implementation
  - 2015

- 2nd oneM2M Interoperability @Korea
  - 2015. 9

- INFioT Launch
  - 2016. 7

- INFioT Developer Site
  - 2018. 7

- 1st oneM2M Interoperability @France
  - 2016. 5

- oneM2M TTA Certification
  - 2018. 7

- CityHub TTA Certification
  - 2018. 9
From oneM2M to INFiIoT

oneM2M IoT Platform Implementation

< Initial oneM2M platform >
From oneM2M to INFiIoT

- oneM2M Implementation
- 2nd oneM2M Interoperability @Korea
- INFiIoT Launch
- INFiIoT Developer Site

- 1st oneM2M Interoperability @France
- oneM2M TTA Certification
- CityHub TTA Certification
First oneM2M Interoperability event, 14-16 September 2015, in Sophia Antipolis, France

Published: Friday, 03 July 2015

oneM2M, the global standards initiative for Machine to Machine (M2M) and the Internet of Things (IoT), will hold its first interoperability testing event from 14 to 16 September 2015. This will be the first opportunity for organizations implementing the oneM2M Release 1 Specifications to validate interoperability and end-to-end functionality via oneM2M interfaces.

oneM2M partners ETSI (European Telecommunications Standards Institute) and TTA (Telecommunications Technology Association of Korea) will host the event at the ETSI headquarters, in Sophia-Antipolis, France.

Richard Brennan, oneM2M’s MARCOM Chair explains the event’s significance: “Within the industry we see more initiatives building towards a ubiquitous Internet of Things. oneM2M is working with multiple organisations to establish interoperability standards for connected things, across multiple industry sectors. We are excited about this first Interoperability event and the support from oneM2M, ETSI, TTA, and the European Commission. We encourage industry players to attend this event and test their implementation of the oneM2M standards.”

The event is open to all industry participants developing solutions based on the oneM2M specifications. The deadline to register is 31 July 2015.
From oneM2M to INFioT

- oneM2M Implementation
  - 2015. 9

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  - 2016. 7

- INFioT Launch
  - 2018. 7

- INFioT Developer Site
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- oneM2M TTA Certification
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From oneM2M to INFioT

LG CNS oneM2M Platform TTA Certification

Title: LG CNS, acquired International Standards Certification for IoT (Internet of Things)
Date: 2016-07-27

- 'oneM2M', 'CoAP protocol' certification, the first in IT services industry-

- Ensuring compatibility and expanding IoT products and services to foreign markets with international standards certification
- Leading to the spread of IoT use based on low power IoT services

LG CNS (Young-Seob Kim, Representative) has recently acquired IoT (Internet of Things) International standards certification for 'oneM2M' and 'CoAP protocol', which is the first in the IT services industry.

'OneM2M' is the world IoT standards participated by 230 enterprises including companies in the fields of communication, manufacturing, solutions, etc. LG CNS has laid the groundwork to enter the foreign markets as well as domestic market through this certification with IoT products and services.
From oneM2M to INFioT

- oneM2M Implementation (2015. 9)
- 2nd oneM2M Interoperability @Korea (2016. 5)
- INFioT Launch (2018. 7)
- INFioT Developer Site (2018. 9)
- 1st oneM2M Interoperability @France (2016. 7)
- oneM2M TTA Certification (2018. 7)
- CityHub TTA Certification (2018. 9)
From oneM2M to INFioT

The launch of INFioT, IoT Platform based on oneM2M

oneM2M grows membership as momentum around IoT accelerates

Published: Tuesday, 21 August 2018

Ever-increasing efforts to advance the IoT has brought a jump in new oneM2M members.

Sophia Antipolis, France, 20 August 2018: A cybersecurity specialist, research institutes, service providers and Ireland’s official standards body are among the latest companies to join the global Internet of Things (IoT) standards initiative oneM2M as it continues to evolve its universal framework to empower mass adoption of the IoT across a range of sectors.

The newest additions to oneM2M’s vast membership – which is made up of vendors, operators and national bodies – highlights the wide relevance of oneM2M’s work across the globe, with the new members coming from Canada, America, Europe and Asia.

LG CNS, another new addition to oneM2M’s membership, has recently launched INFioT, an international standard which is based on oneM2M’s horizontal platform. LG CNS has also embedded the oneM2M standard into its recently launched smart city platform ‘Cityhub’ which collects and analyses data generated and sent by various city infrastructures via IoT technology.
From oneM2M to INFioT

- oneM2M Implementation
- 2nd oneM2M Interoperability @Korea
- oneM2M TTA Certification
- INFioT Launch
- INFioT Developer Site

Timeline:
- 2015
  - 1st oneM2M Interoperability @France
- 2016
  - 2016. 5
  - oneM2M TTA Certification
- 2018
  - 2018. 7
  - INFioT Launch
  - CityHub TTA Certification
- 2018. 9
LG CNS launches IoT-linked smart city platform ‘Cityhub’

By Sohn Ji-young

Published: Jul 5, 2018 - 15:55  Updated: Jul 5, 2018 - 15:55

LG CNS, the information technology services unit of South Korea’s LG Group, announced Thursday the launch of a comprehensive smart city management platform that collects and analyzes data generated and sent by various city infrastructure via internet of things technology.

Tentatively named “Cityhub,” the smart city platform collects data from IoT sensors attached on vehicles, buildings, transportation infrastructure and street lights. Such data can also be analyzed via LG CNS’ artificial intelligence engines to design, build and provide intelligent services, the firm said.
From oneM2M to INFioT

- **2015**
  - 1st oneM2M Interoperability @France
- **2015.9**
  - oneM2M Implementation
- **2016.5**
  - 2nd oneM2M Interoperability @Korea
- **2016.7**
  - oneM2M TTA Certification
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- **2018.9**
  - CityHub TTA Certification
- **2018.9**
  - INFioT Developer Site
From oneM2M to INFioT

INFioT Open Developer Portal

What features are available in INFioT?

- **Device management**: Registers and manages a device that uses INFioT.
- **Data collection**: Creates dashboard and checks sensor data.
- **Open API**: Offers Open API for the interaction with INFioT.

http://infiot.lgcns.com
Ⅲ. Evolution into INFioT
What is INFioT?
After the development of oneM2M platform

There were no oneM2M compatible device
oneM2M seemed too complicated for small device companies to utilize

Smaller services required support for RDBMS, rather than NoSQL

Tools for creating services were also required besides platform functionalities

Evolution into INFioT, LG CNS IoT Platform based on oneM2M
In practice, there were requirements demanding support for industry standard protocols as well as user defined message formats, rather than oneM2M spec.
Expanding Connectivity

Supports widely used protocols for IoT: HTTP, MQTT, CoAP and WebSocket

Added support for industry standards: Modbus, SNMP, BACnet and more..

Dynamic configuration for device connection using device profile
Device manufacturers and developers had to understand oneM2M specs to connect to oneM2M platform
SDK Improvements

Was.. (2015)

- Low-level API based on oneM2m specs
- 5 Steps, connecting to INFioT

Device manufacturers had to learn oneM2M to use the older version of SDK

Improved (2018)

- High-Level API based on property configuration

```yaml
# General configuration
# protocol=http
# 포트번호 명(http://mqtt/coap 중 1)
host=http://infiotapi.lgcnsw.com
# infiot api 도메인(고정 값)

# ---------------------------------------------------------------

# Device Detail
# ---------------------------------------------------------------

deviceId=6_AF-D-322be78eeed-ADEVA
# 6.1 3)의 디바이스 아이디
deviceEnrollmentKey=drGtovVzRDPQpsBj047Ju0ESc-U5Vn5DSKz-_jish4=
# 6.1 3)의 디바이스 등록 키

# ---------------------------------------------------------------

# repository
# ---------------------------------------------------------------

resourceName=ae-1iyi9by9zu8tq1uvj6a
# 6.1 3)의 리소스 명
metaDataId=cnt-s1666xtmc1jz1j10105w, cnt-udm9v2j1j1j51usvuz
# 6.1 3)의 메타데이터 아이디(함께로 구분하여 순서대로 입력)
```
Not all IoT services need NoSQL based DBMS to handle massive data

The type of DBMS to be used should be selected depending on project’s characteristics and size
RDBMS Support

Provides options to use NoSQL or RDBMS depending on the IoT service.

DBMS options: MongoDB, MariaDB, MySQL, PostgreSQL, Oracle and MSSQL.
UI Designer

Web-based dashboard designer for creating real-time data monitoring views
UI Designer

HTML5 WYSIWYG editor with various widgets to help create webpages for monitoring real-time data
Navigation info and marine engine status monitoring view of a sailing ship
Monitoring Scene - Home IoT

Monitoring view of a Home IoT device

Smart Home Control
by INFiIoT

**BEDROOM 1**
- Temperature: 24°C
- Main Light: On
- Desk Lamp: Off
- Air Conditioner: Off

**LIVING ROOM**
- Temperature: 24°C
- Humidity: 63%
- Electricity: 7.2 kW
- Main Light: On
- TV: Off
- Air Filter: Off

**BEDROOM 2**
- Main Light: On
- Desk Lamp: Off
- Air Conditioner: Off
- TV: Off
- Stand Lamp: Off
- CCTV: Off
- Main Door: Off

**BEDROOM 3**
- Main Light: On
- Desk Lamp: Off
- Sub Light: Off
- TV: Off
Monitoring Scene - Energy

Wind farm’s power generation status monitoring view
To fulfill the needs for easily developing services and connecting devices to INFioT, we provide the SDK and developer support through our Developer Portal
Developer portal provides the SDK and oneM2M experience to support developers and device manufacturers

http://infiot.lgcns.com
IV. INFioT References
INFioT has been integrated into Smart City Platform. CityHub incorporates oneM2M standard, event based mass data processing, visualization to aid city control.
Using our oneM2M Platform, since 2015, we launched our client's IoT services that utilize Wifi devices.
Now, with INFioT, these services are expanding their device range to support Zigbee certified products, partnership products, and many more.

<table>
<thead>
<tr>
<th>Device</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug</td>
<td>WiFi</td>
</tr>
<tr>
<td>Power meter</td>
<td>LTE</td>
</tr>
<tr>
<td>Bidet</td>
<td>NB-IoT</td>
</tr>
<tr>
<td>Rice cooker</td>
<td></td>
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<tr>
<td>Multitap</td>
<td></td>
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<tr>
<td>Air quality sensor</td>
<td></td>
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<tr>
<td>Air purifier</td>
<td></td>
</tr>
<tr>
<td>Water purifier</td>
<td></td>
</tr>
</tbody>
</table>
Ship Control Center Solution

INFioT has been integrated into Ship Control Center Solution which provide monitoring through LTE/satellite communication of navigation/institutional equipment data within large ships (currently operational in ships of Korea Maritime And Ocean University and more)

**Ship**

- NDDS For Ship
- Kafka Broker
- NDC
- Sensor Device

**Satellite /LTE**

- SCC Service Server
- Uplink Processor
- Uplink Adapter
- Kafka Receiver
- oneM2M Receiver
- NMEA Sentence using Kafka
- Serial, TCP/UDP

**Ground Center**

- Real-time flight Monitoring
- Optimal Economy Navigation
- Navigation Training Simulation
- External Service Broker
- Ext. Service Server
Marine Traffic Impact Assessment System

Currently under implementation to provide safety assessment, navigation plans, seaport entry/exit support, etc. based on data collected from ship tracking and ship density maps.

- Marine Traffic Monitoring
- Ship entry/exit route analysis, density analysis
- Data from radar, AIS, manual input and public data (e.g. climate)

- Display passage route & entry/exit traffic per route
Laboratory Safety Environment

We are currently in development to create lab safety monitoring system based on INFioT that detects any safety threats and alarms central control system in case of emergency.
V. Wrapping Up
oneM2M platform spec can be quite complicated.

Do all the service developers need to know oneM2M spec?

oneM2M Service Framework for Service Developer
Wrapping up

oneM2M is continuously improving

But there aren’t many devices using oneM2M

How can we let developers create new services more easily?

Needs more focus on not only the platform but also devices and services
LG CNS’s IoT Korea Exhibition 2018