

Achieving the IoT Dream

By Omar Elloumi, Chair of the oneM2M Technical Plenary, (Nokia corporate CTO group)



*Dr Omar Elloumi,
Chair of oneM2M
Technical Plenary,
and Nokia
corporate CTO
Group*

Dr. Omar Elloumi is Chair of the oneM2M Technical Plenary, (Nokia corporate CTO group). He is also the chair of oneM2M Technical Plenary after having led the oneM2M Architecture group delivering the first release of specifications. Omar joined Alcatel-Lucent in 1999 and held several positions including research, strategy and system architecture. He holds a Ph. D. Degree in computer science and served on the ATM Forum and IPSphere Forum Board of Directors. Omar Elloumi is co-editor of books on M2M communications and Internet of Things published in 2012. He is also involved in program committees of several international conferences on M2M and IoT.

The Internet of Things (IoT) – a term established less than ten years ago – is a phenomenon that has evolved rapidly from conception to reality. Today, it is impacting our lives more and more and becoming a prominent trend in every aspect of society, with numerous vertical industries such as Smart Cities now beginning to emerge as ways for Governments and businesses to increase efficiency and reduce costs.

Analysis and forecasts around IoT's longer-term impact support this picture. Gartner has predicted that 6.4 billion IoT devices will be in use worldwide in 2016 and a figure that could reach 20.8 billion by 2020. The revenue the IoT market is expected to generate is also remarkable with analyst firm

Machina Research expecting total IoT revenue opportunity to reach \$3 trillion in 2025, up from \$750 billion in 2015.

But impressive industry forecasts aside, there is one group that is less enthusiastic to embrace IoT technology: the consumer. According to the latest Deloitte Consumer Review, there is a slower uptake of home IoT systems, with 70 percent of UK consumers not planning on purchasing an IoT device in the next year, due to concerns around security price and perception.

Within the IoT market, this example of uncertainty suggests more work is needed. So, what is the solution? With the number of online products and consumer goods continuously increasing, there is a risk of creating siloed systems incapable of seamlessly interacting with each other. For consumers to fully buy in to and benefit from the IoT, integrated communication across all devices, regardless of the product brand, is required, while attention must also be given to concerns surrounding efficiency and security.

Unlocking the potential of IoT

Tackling this problem from the core is oneM2M, the global Machine-to-Machine (M2M) and IoT standards initiative made up of more than 200 member companies from around the world. In this brave new digital world, oneM2M works to eliminate the potential problems within the IoT space and has recently passed another major landmark in achieving this. Building on the publication of our first set of specifications – Release 1 – last year, oneM2M has recently finalised the next set of specifications – Release 2, which addresses market requirements for IoT in the consumer, enterprise and industrial domains.

Emphasising the major role of industrial applications within the IoT, Release 2 introduces 14 additional specifications for the expansion of seamless IoT interconnectivity across multiple sectors, including automotive, healthcare, smart homes and smart cities. These specifications build on the stability and reliability of the oneM2M standards previously introduced in Release 1 to increase IoT interoperability.

Without this, the dream of the IoT could quickly become a nightmare, with segregated systems where products

can only communicate with others of the same brand. The result of this would be overly complex and time-consuming operations, vendor lock-in and reduced innovation, hindering overall progress. oneM2M's Release 2 greatly reduces the risk of this worst case scenario by expanding the number of devices that can be included in an IoT ecosystem.

What is Release 2?

oneM2M's technical specifications address the need for a common M2M service layer which sits between M2M applications and communication hardware and software that transports data. The layer is software-based and provides functions that M2M applications across different industry segments commonly need, which are then exposed to applications via APIs, allowing for distributed intelligence.

Compared with Release 1 specifications, Release 2 contains a number of significant developments in order to expand the use of IoT technology. Semantic interoperability, for example, takes the IoT from simply connecting devices to understanding, across IoT domains, the data being collected. Within the IoT industry there is a whole host of different technologies and a range of different vertical industries, to which the IoT can be applied. When it comes to these different technologies and vertical industries communicating, there are also multiple languages being spoken, despite the meaning often being similar. This presents a need to decode, or translate, the language. Release 2 does just that by extracting the data from different devices into the common abstract layer, enabling semantic descriptions to be created. This allows the data to be exchanged and understood between different devices which, in turn, enables it to be collected, distributed and reused in a secure manner – a huge value-add, therefore, an important factor in ensuring the IoT industry continues to grow.

Legacy or proximity network IoT equipment is another important consideration in Release 2, with the specifications enabling even devices without the oneM2M protocol to be added to the IoT sphere. This is especially relevant in industrial IoT applications, where more legacy equipment is in use. Also with oneM2M's Release 2 enabling interworking with popular IoT device ecosystems such as AllSeen Alliance, Open Connectivity Foundation (OCF) and Open Mobile Alliance Lightweight Machine-to-Machine (OMA LWM2M), application developers can enjoy rich features offered by the abstraction layer of oneM2M.

Application developer APIs and guidelines are also given in Release 2, providing the first global set of guidelines for application developers to use. oneM2M's Release 3 will build on this further by making the standard more reader-friendly for developers.

Further building on this is the information modelling of Release 2 which specifically extends the oneM2M protocol into the home and industrial domains, allowing different devices to look the same to an application based in the cloud.

Also, Release 2 makes a significant contribution to improve IoT security, with the specifications including substantial security enhancements and dynamic authorizations. This enables secure communications between applications and their host servers, providing end-to-end security.

oneM2M based Smart City Deployment – Busan

When applied to the growing Smart Cities concept, Release 2 can unlock the ability for various vertical organisations, such as smart utilities, to share data. This is achieved through the abstraction, mechanisms and the information models, as well as semantic interoperability. As a result, information can be shared between various utility providers in one city to serve the community.

Here, oneM2M can be considered as a harmonisation platform. Our standards are especially useful for smart cities because of the number of different companies, services and applications to consider – each needing to interwork between different systems and different platforms.

A successfully established Korean IoT Cluster Project – Busan Global Smart City – facilitates the conjunction of various IoT services based on the oneM2M platform, which are tailored to regional characteristics. The MSIP's (Ministry of Science, ICT and Future Planning) supports the Korean project and encourages the growth of profitable services and to establish an IoT ecosystem in the region with the smart city frameworks validated from oneM2M's global standards. The project involves developing an Open Smart City platform based on oneM2M standards, creating a clear path way for urban services and establishing governance for the operation.

Future Steps

Naturally, the IoT ecosystem, including Smart Cities, is still evolving and oneM2M's Release 3 specifications will expand oneM2M's work even further. These are expected to be completed by mid-2017 and will focus on three main areas:

- Increased interoperability – enabling interworking between additional devices, particularly in the industrial domain (including DDS, OSGI, OPC-UA as well as proximal IoT interworking).
- Cellular industry – Providing the technology that IoT systems can take advantage of in order to efficiently utilise new types of low power networks, including narrow band constrained networks, such as 3GPP NB-IoT.
- Application developers – continuing to make the system easier for the application developers with an additional set of guidelines, as well as the ability to provide profiles for various types of devices.

Development of the test specification documentation started in Release 2 will also be continued in Release 3, along with improvements and technical corrections based on feedback from implementers and from participants of the oneM2M Interoperability event which took place in May 2016 in Korea.

As IoT devices continue to increase and grow in popularity, oneM2M's work becomes more significant in achieving universally accepted specifications and protocols for true interoperability between IoT devices and applications. With this in mind, it is only a matter of time before the extraordinary projections currently being forecast by industry analysts are realised, along with the full potential of seamless connectivity and a globally interconnected society.