



WHITE PAPER

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BOOST LPWA REVENUE THROUGH ONEM2M

1. EXECUTIVE SUMMARY

Do an online search for Internet of Things (IoT) and you'll likely stumble across some very large numbers. According to the GSMA, a mobile industry trade association, an enormous \$1.8 trillion revenue IoT opportunity is in the offing for mobile network operators by 2026¹. That's about the same size as Italy's GDP, the world's ninth-largest economy.

Analyst firm Machina Research thinks the total number of IoT devices worldwide, including those connected to short-range technologies, such as Wi-Fi and ZigBee®, will jump from six billion in 2015 to 27 billion by 2025². That's roughly the equivalent of four devices for every person on the planet.

One driver for this incredible IoT growth story is low power wide area (LPWA) networks. Increasingly used by communication service providers (CSPs) to complement their traditional cellular infrastructure, and to tackle IoT use cases that typically require infrequent transfers of small data payloads, Analysys Mason, a research consultancy, thinks there will be some 3.4 billion LPWA connections by 2025³. That's a massive leap from the estimated 64 million LPWA connections in play by end-2016. By comparison, the research outfit reckons there will be around 1.3 billion mobile IoT⁴ connections by 2025, up from 317 million in 2016.

In terms of IoT connectivity, LPWA is where the main action will be for many CSPs.

1.1 ULTRA-LOW ARPC NEEDN'T BE A SHOWSTOPPER

LPWA networks, whether cellular variants backed by standards body Third Generation Partnership Project (3GPP) — key ones are Cat-NB1 (NB-IoT) and Cat-M1 (LTE-M) — or license exempt technologies pushed by, say, the LoRa® Alliance or SIGFOX™, are specifically designed to target IoT use cases with low average revenue per connection (ARPC). Soil-quality sensors for agriculture and farming, for example, or smart building monitoring. LPWA can tackle the demands of long battery life and tiny data volumes associated with these use cases much more efficiently than traditional cellular gear.

What might come as a surprise is how low the ARPC looks set to be. According to Analysys Mason, ARPC on LPWA networks could drop to as little as \$0.15 per month by 2025. Connectivity revenue, as a percentage of the total IoT pie, is another worryingly small figure. Analysys Mason predicts it will account for only 14% of its projected \$201 billion revenue opportunity by 2025. The bulk, over 60%, is expected to come from applications. Hardware makes up the rest.

Faced with these sort of LPWA revenue trends, many CSPs are pushing hard on volume generation to compensate for ultra-low ARPC. By focusing only on volumes, however, it leaves large chunks of the revenue pie to other parties.

¹ *GSMA highlights US\$1.8 trillion IoT revenue opportunity for mobile network operators* — GSMA, 6 September 2017.

² *Global Internet of Things market to grow to 27 billion devices, generating US\$3 trillion revenue in 2025* — Machina Research, 3 August 2016. Gartner acquired Machina Research in November 2016.

³ *IoT value chain revenue: worldwide trends and forecasts 2016–2025* — Analysys Mason, February 2017.

⁴ Analysys Mason defines 'mobile IoT' as covering 2G, 3G, 4G and 5G networks.

It doesn't have to be this way. To help climb up the value-chain ladder, a growing number of CSPs and network equipment providers (NEPs) are turning to an open-standards approach to IoT: oneM2M. Moreover, oneM2M helps drive economies of scale. The prospect of higher connectivity *and* non-connectivity revenue is now on the LPWA table.

1.2 THE TROUBLE WITH LEGACY

Let's step back a moment and briefly consider the main drawbacks of legacy IoT architectures and what might be called 'vertical' solutions. By doing so, it helps explain why oneM2M was developed in the first place. It also demonstrates how CSPs can give their LPWA rollouts a business-case boost by exploiting open standards.

When enterprises first dipped their toes into machine-to-machine (M2M) communications, it was typically done on a 'silo' basis. One device linked to one application, and often restricted to one connectivity method. The initial challenge was to establish an M2M connection, manage the device, then maintain appropriate data flows.

Customers soon realised, however, there were lots of use cases possible with M2M and IoT. Yet to implement each one in a silo or 'vertical' way would clearly cause headaches. System integration would need to be redone, over and over, for every new IoT and M2M implementation.

Aside from cost inefficiencies and a brutal lack of scale, another huge drawback from vertical deployments is the stifling of innovation. If sensor data is limited to one application, for example, it's less likely to pique the interest of app developers. Much better also if app developers can build apps without having to worry about different connectivity requirements and device management. Instead they can focus on app logic and not have to bother about repeating app development efforts for every IoT platform. It's not a trivial problem to overcome in what is a hugely fragmented IoT marketplace⁵.

Making life easier for app developers is vital. They are the engines of innovation, so getting them on board in large numbers is a must-have. For this to happen a 'horizontal' IoT platform is needed, not a vertical one. Cue oneM2M.

1.3 ONEM2M TO THE RESCUE

When mobile networks were in their infancy, owners of 'brick' phones could typically only talk to others on the same network. The spur for mobile growth, however, was not just the emergence of network interoperability. Applications could also be accessed, regardless of the underlying device hardware. This encouraged greater economies scale, service innovation and lower device costs. oneM2M plays a similar interoperability role in the highly-fragmented IoT market.

Using the oneM2M 'reference architecture'⁶, which is based on open standards and developed in partnership with some 200 oneM2M members worldwide — including various regional standards bodies — CSPs and NEPs that align with it can break down silos that inhibit growth. Sensor data can be reused in different applications; devices can be deployed for more than one purpose; and the sharing of software across different applications, such as device management and security, is also made possible. The need for application-specific platforms is eliminated. oneM2M creates a single and horizontal platform for the exchange and sharing of data among all applications.

⁵ 450 global IoT platform vendors marks a new record — IoT Analytics, 27 June 2017.

⁶ More details can be found at <http://www.onem2m.org/technical/published-documents>.

Moreover, the oneM2M 'common services layer' (CSL) — the core of the oneM2M platform — is 'agnostic' to different types of connectivity (*see sidebar: Peace of mind for CSPs mulling different LPWA options*). Acting as a sort of 'glue' between disparate IoT platforms, the CSL can even automatically select the most appropriate connectivity-type available to best suit an app's particular performance requirements.

Why is all this important? Not only are OpEx savings to be had from not having to manage multiple silos, but it also enables new business opportunities. By cross-sharing resources and data, perhaps enriched by analytics, new service-innovation possibilities are opened up. This is essential to build a stronger LPWA business case and realise profitable revenue. Improved economies of scale, helped by broader app developer support and wider appeal to enterprise customers, can also bring module prices down. This, in turn, will help stimulate IoT demand.

2. LPWA ON ITS OWN WILL ONLY TAKE YOU SO FAR

2.1 A LITTLE BIT OF BACKGROUND

The projected boom in the number of IoT devices focused minds. If CSPs were to make a serious play to meet burgeoning IoT demand — and if they were to leverage their cellular networks (to lower costs) and licensed spectrum (to avoid interference) — then new overlay connectivity standards, capable of attracting a vibrant ecosystem, were seen by many as the best way forward. GSM and LTE networks were simply not suited to address diverse use-cases that require long device battery life, deep indoor coverage, long-range signals, and the sporadic transmission of small data payloads. 'Massive IoT' needed a smarter approach.

In a remarkably swift standardisation process, coordinated by 3GPP, three new cellular-based LPWA standards emerged: Cat-NB1, Cat-M1 and EC-GSM. Each is supported by the GSMA, and each is capable of supporting a variety of IoT use cases (*see Table 1: Cellular LPWA options using licensed spectrum*). Cat-NB1 is gaining traction in Europe, primarily through the efforts of Deutsche Telekom and Vodafone, while Cat-M1 is picking up speed in the US. Both AT&T and Verizon Wireless have thrown their considerable weight behind nationwide Cat-M1 rollout. Non-cellular LPWA options have also emerged, creating a highly-competitive marketplace (*see Table 1: Selected non-cellular LPWA options using unlicensed spectrum*).

TABLE 1: CELLULAR LPWA OPTIONS USING LICENSED SPECTRUM

Technology	Key characteristics	Overview	IoT use cases
Cat-NB1 Also known as Narrowband Internet of Things (NB-IoT)	Deployment LTE in-band or guard-band Re-farmed GSM channels Standalone deployments Bandwidth 180MHz Peak rate <i>Downlink:</i> 10s of kbps <i>Uplink:</i> 10s of kbps	Finalised within 3GPP <i>Release 13</i> in June 2016, Cat-NB1 promises low-cost devices, low energy consumption, and deeper indoor coverage than traditional cellular networks. Connected-device battery life anticipated up to ten years with two AA batteries (assuming Cat-NB1 typical usage patterns), Proponents claim Cat-NB1 mode of complexity is simpler than Cat-M1, so chipsets will likely be cheaper. Voice is not supported, although 3GPP enhanced mobile management of Cat-NB1 in <i>Release 14</i> gives mobile capability.	Typically targeted at small payloads associated with sensor-style applications. Target markets include smart metering, smart home and smart cities.
Cat-M1 Also known as LTE-M or enhanced Machine Type Communications (eMTC)	Deployment In-band LTE Bandwidth 1.4MHz Peak rate <i>Downlink:</i> 300Kbps <i>Uplink:</i> 375Kbps	Core 3GPP specifications were completed in March 2016 as part of 3GPP <i>Release 13</i> . An overlay to LTE, Cat-M1 is designed to support less complex devices, increase battery life, and improve coverage compared with mainstream LTE networks. A purported advantage of Cat-M1 is that operators need only upload new baseband software onto their LTE base stations to turn it on. There is no need to invest in new antennas. Cat-M1 also supports Voice over LTE, as well handover ability between multiple mobile end points to support mobile capability.	The ability to send relatively large amounts of data, as well as support voice and mobility, makes Cat-M1 suitable for a number of use cases. These include tracking objects, wearables, energy management, utility metering, and smart city applications. ATMs with video surveillance, or retail kiosks with financial transaction components and/or voice command options, are other possible use cases cited by Cat-M1 proponents.
EC-GSM-IoT Extended Coverage GSM-IoT	Deployment In-band GSM Bandwidth 200MHz Peak rate <i>Downlink:</i> 10s of kbps <i>Uplink:</i> 10s of kbps	Another 3GPP <i>Release 13</i> initiative, EC-GSM is designed to increase GPRS/EDGE coverage and make IoT enhancements. Proponents claim the technology can support up-to-50,000 devices-per-cell on a single transceiver. Device battery life targeted at more than ten years.	Use cases similar to Cat-NB1, but EC-GSM allows CSPs to support them on 2G networks. Orange is piloting EC-GSM to connect sensors that can measure environmental conditions, such as temperature, humidity and air pollution. The France-headquartered Group also has plans to use the technology to support smart agriculture solutions in emerging markets.

Sources: Ericsson, GSMA, Hewlett Packard Enterprise, Nokia, SDxCentral, Sequans

TABLE 2: SELECTED NON-CELLULAR LPWA OPTIONS USING UNLICENSED SPECTRUM

Solution	Key characteristics	Overview	Typical use cases
LoRa®	<p>Deployment Europe: 868MHz US: 915MHz Asia: 433MHz</p> <p>Bandwidth Various settings: 500kHz/250kHz / 150kHz/125 kHz.</p> <p>Peak rate Downlink: 50kbps Uplink: 50kbps</p> <p>Range Urban: 2-5km Rural:15km</p>	<p>The LoRa® Alliance has over 400 members since its inception in March 2015. It promotes and develops the LoRa®WAN protocol.</p>	<p>Smart metering, smart grids, smart city (street lighting, waste management, smart parking), asset tracking, vehicle telematics.</p>
SIGFOX™	<p>Deployment Europe:868MHz US: 915MHz</p> <p>Bandwidth 200khz</p> <p>Peak rate: Uplink:100bps</p> <p>Range Urban: 3-10km Rural: 30-50km</p>	<p>French firm SIGFOX™ launched its LPWA system in 2010. As of January 2017. It was available in 29 countries, including the US. The aim is to reach 60 countries by end-2018</p> <p>Using UNB (ultra-narrowband) radio technology, network message length is limited to 12 bytes; the number of messages is limited to 140 per day for any given device.</p>	<p>Smart metering, transportation, remote monitoring and control, retail point-of-sale.</p>
Ingenu (Formerly On-Ramp Wireless)	<p>Deployment 2.4GHz</p> <p>Bandwidth 1MHz</p> <p>Peak rate Downlink: 624kbps Uplink: 156kbps</p> <p>Range Urban: 1-3km Rural: 5-10km</p>	<p>A dedicated IoT solution based on random phase multiple access (RPMA) technology.</p>	<p>Ingenu supports private deployment of RPMA networks for various industrial applications, including meter reading, asset location tracking and industrial sensors.</p>

Sources: Ingenu, LoRa®, Lux Research, Orange, Real Wireless, SDxCentral, SIGFOX™

2.2 ADDRESSING THE SMALL DATA CHALLENGE

As we have seen, the nature of many LPWA applications means they generate relatively low volumes of data. According to the GSMA, a smoke detector device — whether in the enterprise or home — will typically send only two ‘messages’ a day, each comprising 20 bytes⁷. A miniscule amount, especially when you consider that a megabyte (MB) comprises around one million bytes.

True, there are other LPWA apps that require more toing and froing of data, but they are still unlikely to quicken the pulse of chief financial officers if revenue streams are restricted to the charging of bits and bytes. A water/gas metering device, observes the GSMA, might generate just 1,600 bytes per day. Industrial asset-tracking drums up a bit more data, a daily dose of 5,000 bytes, but that still means more than six months have to pass before tracking devices of this sort clock up even 1MB.

If CSPs want to build a stronger LPWA business case, a connectivity land-grab is no doubt attractive. oneM2M, however, allows CSPs to move up the value chain and be part of a wider eco-system (see *sidebar: Easier ecosystem-building with oneM2M*). In this way, they can tackle a much bigger addressable market.

PEACE OF MIND FOR CSPS MULLING DIFFERENT LPWA OPTIONS

oneM2M is agnostic when it comes to connectivity. CSPs can exploit advantages of the horizontal oneM2M platform whether they choose to roll out non-3GPP LPWA options, such as LoRa[®] and SIGFOX[™], or opt for 3GPP-backed standards. Those CSPs exploring both sides of the LPWA coin – cellular and non-cellular – can rest assured they can onboard different LPWA connectivity flavours onto the same oneM2M software middle layer.

For those CSPs adopting LoRa[®], oneM2M brings a particular advantage. While the LoRa[®] architecture standardises interactions between the device and the LoRa[®] network server, the link between an application server and the LoRa[®] network is not standardised. The upshot is complexity. If an IoT application is to send or consume data over a LoRa[®] network, it must work with different specifications, depending on the network server vendor. oneM2M, however, hides all that complexity so enterprise customers and app developers don’t have to worry about adapting to different APIs.

By being able to collect and ‘normalise’ data from different sources on a single platform, pretty much regardless of device hardware and connectivity type — and to expose that information to app developers through easy-to-use application programming interfaces (APIs) — the oneM2M platform provides a breeding ground for new and innovative services, including ‘mashups’, that can add value to the enterprise. Through partnerships with device manufacturers and app developers, via oneM2M, CSPs can play a more prominent role in the app space. Additional revenue might also be generated by leasing APIs to third parties.

Costs, as we shall see, can also be reduced for cellular LPWA variants through oneM2M compliance with the GSMA’s connectivity framework and

interworking with various 3GPP functions, such as device triggering and network monitoring. First, however, let’s look at how oneM2M can smash down silos, handle data in a smarter way, and help CSPs climb up the value-chain ladder

⁷ 3GPP low power wide area network technologies — GSMA white paper, October 2016.

2.3 CAPTURE THE VALUE-ADD BY MOVING HORIZONTALLY

One way to illustrate the business-case advantages of a horizontal platform is to consider the smart city, which can be viewed as an umbrella term for supporting multiple use cases. Smart-city oneM2M deployments provide an insight into the possibilities available for forward-thinking enterprises looking to squeeze the most out of their data assets.

The oneTRANSPORT service implemented in the UK, developed by Interdigital and based on a oneM2M-compliant platform, is a good example of multiple partners coming together to create valued-added services and different business models. Making available various data assets from multiple owners on a single platform — information from roadside sensors and data about parking spaces, for example, and even data records about planned road maintenance — innovators have been able to build multiple oneTRANSPORT apps. These include a city journey-planning app; advice for commuters on their travel routes; and helping people go to a stadium or concert. If smart cities or enterprises 'lock in' data, trapped in enclosed IT systems perhaps, its value is not fully realised and innovation gets stifled.

The beauty of the oneM2M CSL is it can bring together data from a variety of sources onto one common environment, accessible by app developers through easy-to-use APIs. The building of different apps, reusing the same data, is possible. Exposing various datasets to independent app developers and specialists, through the creation of so-called data marketplaces, drives innovation. No one organisation can do it all.

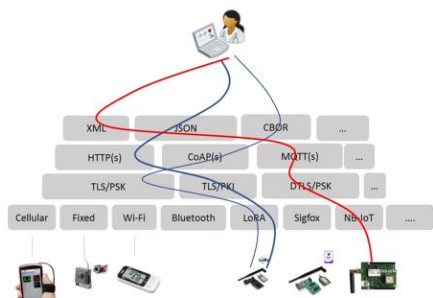
Using an open-standards approach offers other incentives to boost innovation and grow the oneM2M ecosystem. One important reason why the South Korean government chose oneM2M as its underlying platform for smart-city deployments was to dangle the carrot of scale in front of innovators. A device manufacturer developing a healthcare solution in partnership with specialists in one South Korean city, say, can then sell that solution to another city using oneM2M, where it can easily be onboarded. As oneM2M picks up momentum around the world, it opens up a much bigger market for IoT solutions and apps than would be possible with proprietary platforms (See sidebar: *oneM2M goes global*).

EASIER ECOSYSTEM-BUILDING WITH ONEM2M

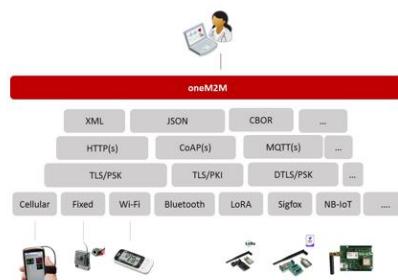
The design of the oneM2M platform, based on open standards, means each part of the IoT ecosystem can interoperate much more easily. Connectivity providers, IoT 'platform' providers, device manufacturers, and application developers can all interact independently of each other without having to adapt to a diverse range of proprietary protocols. This is important. By reducing the amount of effort needed for interaction between different IoT players, oneM2M lays the foundation for greater economies of scale – a vital requirement in the LPWA world where monthly ARPC is measured in cents not dollars.

Onboarding app developers

Equally as important, oneM2M makes life much easier for app developers. In the absence of a oneM2M software middle layer, they would be faced with an intimidating number of different protocols and technologies before they could even establish an LPWA connection. oneM2M does away with all that by providing an 'abstraction' of the underlying technology complexity through easy-to-use APIs (see Figure 1: Look at all the complexity that oneM2M avoids). Think of it as like driving a car. Drivers only need to understand the basics – gears, steering wheel, pedals and so on – in order to get going. They don't need to re-learn the ability to drive for each size or brand of car that's out there. Likewise with app developers using oneM2M. They can get on with what they're good at, developing apps, without getting bogged down with other time-consuming tasks that can stifle innovation.



Today a developer is exposed to many different technology choices to build an LPWA connection. This leads to complexity and hampers interoperability.



By implementing oneM2M CSL, at the device and the infrastructure side, the developer only uses the globally specified oneM2M APIs to push data from the device into the cloud.

Figure 1: Look at all the complexity that oneM2M avoids

3. ONEM2M INTERWORKING WITH GSMA AND 3GPP

3.1 FEWER SIGNALS, GREATER PEACE OF MIND

For many CSPs, the prospect of supporting millions of IoT devices on their networks is a double-edged sword. On the one hand, there is a sizeable LPWA revenue opportunity. On the other, explosive growth in IoT endpoints and their associated apps can pose serious challenges.

One big risk, as the GSMA points out, is network disruption from mass deployment of inefficient, insecure or defective devices. By generating enormous volumes of ‘signalling traffic’ — which is used to establish connections, and is separate from data traffic — these devices can impact services for all users on the network. In a worst-case scenario, warns the GSMA, they can even bring down the mobile network. It’s why the GSMA developed “IoT Device Connection Efficiency Guidelines”⁸, and is arguably an advantage for 3GPP-backed LPWA standards compared with their non-cellular counterparts. The aim, by establishing basic principles that IoT devices must adhere to before connecting to mobile networks, is to strike a “sensible balance” between data traffic and signalling need.

ONEM2M GOES GLOBAL

oneM2M is picking up momentum worldwide, stretching across Asia, Europe and North America. In South Korea, each of the big three operators — ST Telecom, KT and LG U+ — has rolled out a oneM2M-certified IoT platform. Busan, the second-largest city in South Korea with a population of 3.6 million, delivers more than 25 smart city services across the oneM2M software middle layer. South Korea’s operators are aiming to take innovative smart-city IoT solutions developed in their domestic market, courtesy of oneM2M’s open standards, to a global audience.

In India, Tata Communications is rolling out a huge LoRa[®] network, supported by a oneM2M platform from Hewlett Packard Enterprise (HPE), with the aim of reaching around 400 million people in different cities¹. In Europe, Deutsche Telekom has trialled oneM2M as part of its Cat-NB1 activities. Other oneM2M city rollouts in Europe, backed by local authorities, include Bordeaux and Turin. In the US, Verizon Communications resells a ‘smart-grid’ solution, based on oneM2M standards, to target the utilities market. The oneM2M-based solution was developed by Grid Net, a software specialist in IoT and smart-grid technology.

⁸ IoT device connection efficiency guidelines version 3.0 — GSMA, 30 March 2016.

Reassuringly for CSPs, the oneM2M platform complies with GSMA'S guidelines. It means IoT devices connected to the CSL middleware will not swamp the network with signalling traffic. Extended battery-life is another benefit. By using oneM2M CSL middleware, the GSMA's requirements for efficient connectivity are guaranteed. The trade association's guidelines are already baked into oneM2M-based platforms.

3.2 3GPP network functions on the application layer

If oneM2M compliance with the GSMA's device connectivity guidelines gives peace of mind to network managers, then oneM2M interworking with 3GPP functions can do the same for app developers. Simply put, app developers do not want to worry about 3GPP specifics, such as Power Saving Mode (PSM) and extended discontinuous reception (eDRX). They just want simple-to-use APIs that do that sort of heavy-lifting for them.

With oneM2M, 3GPP network functions are enabled on the service layer, which gives the helping hand that app developers want. This will encourage wider participation from the app developer community since network communications specialists are not needed to develop and onboard apps. Moreover, because oneM2M APIs are user-friendly, there is no need to have 3GPP or connectivity 'specialists'. oneM2M is an easy-to-use springboard for innovation.

oneM2M, too, is keeping up with latest 3GPP developments and can interwork with the Service Capability Exposure Function (SCEF). oneM2M allows the application server to access core network services and vice versa. Aside from providing greater functionality, many of the core network services that are exposed can also be used to achieve battery savings for Cat-NB1 and Cat-M1 devices. For example, a oneM2M API can be used by the application layer to provide the core network with information about how long the device should be allowed to sleep and how long the device needs to be available. Another oneM2M API also can be used by the application server to efficiently distribute the message to a group of devices that are located in a particular geographical area via 3GPP multicasting.

4. CONCLUSION

It's tempting to be dazzled by the large numbers bandied about when it comes to IoT. Projected device volumes are typically counted in billions, revenues measured in dollar trillions.

oneM2M, however, deals with the smaller numbers that all prudent CSPs should be wary about: ultra-low ARPC associated with LPWA use cases, and connectivity revenue that accounts for only a sliver of the overall IoT opportunity.

By driving open standards, oneM2M offers CSPs a way to boost LPWA connectivity volumes by attracting device and application providers onto their networks — an essential requirement when ARPC is so low — and to move up the value chain. There is no need for CSPs to be restricted to pure connectivity. By striking up partnerships, on the back of the oneM2M platform and a vibrant ecosystem, they can move into the applications space.

oneM2M: a way to boost LPWA revenue.

GLOSSARY OF TERMS

3GPP	Third Generation Partnership Project
ARPC	Average Revenue Per Connection
API	Application Programming Interface
CBOR	Concise Binary Object Representation
CSP	Communication Service Provider
CSL	Communications Services Layer
CoAP	Constrained Application Protocol
eDRX	Extended Discontinuous Reception
DTLS	Datagram Transport Layer Security
IoT	Internet of Things
JSON	JavaScript Object Notation
LPWA	Low Power Wide Area
LTE-M	LTE-Machine
M2M	Machine-to-machine
MQTT	MQ Telemetry Transport
NB IoT	Narrowband Internet of Things
NEP	Network Equipment Provider
PKI	Public Key Infrastructure
PSM	Power Saving Mode
PSK	Pre-Shared Key
SCEF	Service Capability Exposure Function
XML	Extensible Mark-up Language

ABOUT ONEM2M

oneM2M is the global standards initiative that covers requirements, architecture, API specifications, security solutions and interoperability for Machine-to-Machine and IoT technologies. oneM2M was formed in 2012 and consists of eight of the world's preeminent standards development organisations: ARIB (Japan), ATIS (U.S.), CCSA (China), ETSI (Europe), TIA (U.S.), TSDSI (India), TTA (Korea), and TTC (Japan), together with five industry fora or consortia (Broadband Forum, CEN, CENELEC, GlobalPlatform, OMA) and over 200 member organisations. oneM2M specifications provide a framework to support applications and services such as the smart grid, connected car, home automation, public safety, and health. oneM2M actively encourages industry associations and forums with specific application requirements to participate in oneM2M, in order to ensure that the solutions developed support their specific needs. For more information, including how to join and participate in oneM2M, see: www.onem2m.org.