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**IoT:
WHAT, WHEN
AND HOW?**



The Rugby World Cup is unfolding in Japan as I write these words, giving us a great example of how the Internet of Things (IoT) can directly help the health and fitness of sports professionals. Players in Tokyo are wearing a variety of sensors to measure their heart rate, velocity, distance covered, acceleration and impact force to determine whether they are at risk of injury.

In ETSI we are also addressing technical specifications for eHealth: in our **Tech Highlight** section on page 10 you can find out more about our standards for Assistive Listening Devices. The World Health Organization anticipates that 10% of the world's population will be affected by a form of hearing loss during their lifetime by 2050. Our standards try to address this issue.

These two examples begin to answer the questions of "what", "when" and "how" IoT can be successfully implemented in the health sector. But as the Chair of our committee on SmartM2M, Enrico Scarrone, states in **In the Spotlight**, there is still room for improvement to make IoT devices talk to each other in the same language and thus be interoperable. Standards developed in our oneM2M partnership project, along with various ETSI specifications for semantic interoperability in smart cities, smart agriculture and industry 4.0 help achieve this.

The Rugby World Cup gives us a great example of how IoT can help the health of sports professionals.

South Korea and India are moving forward using ETSI and oneM2M standards for the smart city ecosystem. In **Zoom on Europe** the smart city project manager in Bordeaux, France, confirms that a common standardized platform is crucial for the deployment of smart cities services. Our two-page overview on Smart Cities in ETSI by Board Member Lindsay Frost will also update you on our latest work covering some of the diverse applications of IoT in urban environments.

From an enterprise's perspective, Jim Nollan from InterDigital outlines in an exclusive interview why businesses want sustainable solutions that are scalable and re-usable. And Tim Courtenay, managing director of ATIO, gives us insight into the IoT market in Africa and why harmonizing measurement and reporting methodologies in the network are essential.

One last reminder: the best way to learn about latest IoT trends and meet experts from around the world is to register for ETSI IoT Week, taking place from 21 to 25 October at our headquarters in Sophia Antipolis

Enjoy reading!

Luis Jorge Romero,
ETSI's Director-General



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Enjoy! The ETSI Mag

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SME roadshow: the first of a series

In July, the first of a series of technology awareness roadshows for SMEs took place. This initiative aims to raise awareness and encourage innovation amongst SMEs regarding the benefits of using technological solutions based on standards such as 5G communications, Internet of Things (IoT) and cybersecurity. Italy was chosen as the pilot country and Telecom Italia hosted the first event. The successful ETSI Technology Awareness roadshow in Torino sets the tone and the standard (pun intended) for future stages. The next one will be hosted by Leonardo in Rome later this year.



New ETSI group on Securing Artificial Intelligence, come and join!

ETSI has recently created an Industry Specification Group on Securing Artificial Intelligence (ISG SAI). This group will develop technical specifications to mitigate threats arising from the deployment of AI throughout multiple ICT-related industries. This includes threats to AI systems, from both conventional sources and other AIs. The planned outcome of the ISG work includes technical standards to identify, block and neutralise threats to/from AI, and on the use of AI to enhance security. It will also contain best practices and recommendations of mitigating mechanisms to be implemented in the domains most likely to be impacted by threats to/from AI.

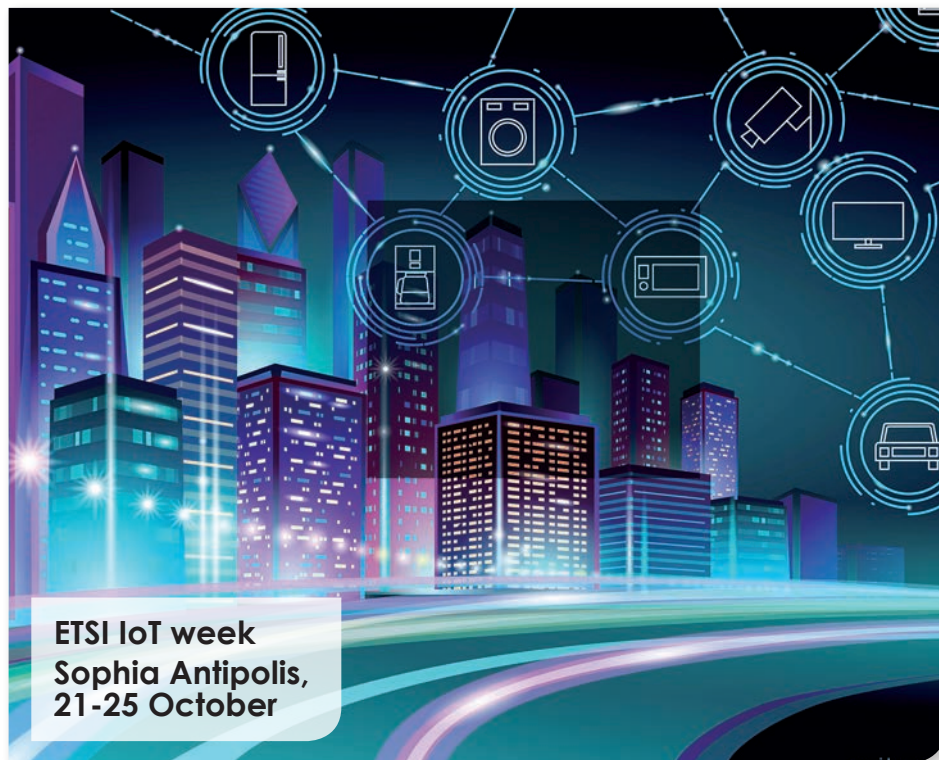
The founding members of the new ETSI group are BT, Cadzow Communications, Fortinet, Huawei Technologies, NCSC and Telefónica.

The first meeting of ISG SAI will be held in Sophia Antipolis on 23 October and you are invited to come along and define the future path for Secure Artificial Intelligence.

The ETSI IoT week: key topics

The upcoming IoT week will unfold around various topics, namely IoT connectivity, IoT for industry and manufacturing, IoT security and privacy, IoT semantic and ontology-based interoperability, AI and big data in the IoT standards and mobile edge computing in the context of IoT services. It will also cover smart energy,

smart home, buildings and environment, smart cities and communities, water management, cooperative and connected mobility, asset monitoring and management, logistics and supply chain, smart agriculture, wearables and body area networks, e-health and ageing well. Come and register!



ETSI IoT week
Sophia Antipolis,
21-25 October

Open meeting on smart cities and communities

ETSI is organizing an open meeting on smart cities and communities on 11 December 2019 in Brussels. The aim of the meeting is to discuss how standardization can meet citizen and consumer requirements. Standards are confusing for cities in the first place, and the needs of the citizen, including usability, accessibility and data security, are seldom considered. The ETSI technical committee on Human Factors is preparing a Technical Report that will explore these issues and make recommendations to standards bodies and cities as to how the landscape can be improved. The draft Report will be presented, and the outcome of the meeting will be taken into account in the final version of the Report.



In our exclusive interview, Jim Nolan outlines how the mobile and IoT sectors are converging on a scalable, open-standards model.

What value does InterDigital gain through ETSI?

InterDigital has participated in various ETSI initiatives for over 20 years. We began in the mobile arena, with 3GPP which has seen massive adoption and proven the model for multi-party collaboration and global adoption.

In 2008 we started participating in the ETSI TC SmartM2M initiative which ultimately initiated a global collaboration project with other international standards developing organizations. In 2012, this group formed the oneM2M project with a goal of creating a global standard for the IoT Service Layer. Think of this as a middleware layer sitting between IoT applications and connected devices. We saw value in defining scalable and re-usable components for IoT platforms that could evolve over time to support communications and data interoperability and avoid wasteful, siloed solutions.

James Nolan,

Executive Vice President Products at InterDigital

James J. Nolan is EVP, Products at InterDigital, where he is responsible for the development of products and solutions from the vast array of technologies created at InterDigital. He is also responsible for developing and sustaining InterDigital's partner relationships including Convida Wireless, a joint venture with Sony focused on IoT and 5G technology development.

Prior to leading InterDigital's Products and Solutions teams, he created and ran InterDigital R&D Labs from 2009 to 2014. Jim holds a BSEE from SUNY Buffalo, an MSEE from NYU Tandon School of Engineering and an MBA from Hofstra University.

We value ETSI's environment for testing new ideas in areas such as mobile edge computing, smart cities and semantic data management.

ETSI promotes knowledge diffusion in Europe and India, for example, and coordinates regular interoperability testing events. These are critical for solution maturity and market adoption. In addition to 3GPP and oneM2M, we value ETSI's environment for testing new ideas in areas such as mobile edge computing, smart cities and semantic data management.

What are your views on how the IoT market is developing?

Firstly, the hype around IoT is disappearing. That's because businesses executives accept the value of IoT in managing their operations, supply chains and customer interactions.

The hype around IoT is disappearing. Businesses want sustainable solutions that are scalable and re-usable.

Secondly, the focus has moved to sustainable solutions. Pilots or Proof of Concepts used to be a way to test new ideas. Now, they are a milestone on the path to operational solutions.

And, thirdly, businesses want scalable and re-usable solutions. Otherwise, the economics won't work from a total and longer-term cost of ownership.

How do these developments affect standardization?

Reusability leads you to scalable horizontal IoT platforms that can support many individual applications. You can see this scenario play out in the industrial, transportation and smart city sectors which are obvious candidates for oneM2M adoption.

Constrained, low-power devices account for huge, IoT growth projections. That is one reason why NB-IoT standardization for connectivity is important.

With 5G and ultra-reliable and low latency communication, the need for end-to-end coordination across the different protocol layers and standards bodies is crucial.

Another is the recent work in oneM2M and 3GPP to coordinate and develop functions that avoid harming networks from potentially adverse IoT device behaviours. With the development and rollout of 5G and its targeted features such as ultra-reliable and low latency communication, the need for end-to-end coordination across the different protocol layers and standards bodies is crucial. ETSI is well positioned to play a key role in this coordination.

How is InterDigital applying oneM2M?

We began by building an IoT platform and testing its application in several sectors. Recently, we launched this as a separate business under the chordant.io brand.

Our business development efforts succeeded initially at the intersection of intelligent transport and smart city applications after a set of trials with four municipalities. They wanted a common platform for multiple use cases and for regional solutions. They also wanted an open-standard solution to avoid locking into a single vendor.

The trials showed the value of a platform to share data between data 'producers' and 'consumers'. As a result, we used the oneM2M standard and created the oneTRANSPORT data marketplace. We took that from a regional pilot into a commercial service that is available across the UK.

Now, we see interest in the horizontal platform concept to overlay transport network and environmental monitoring in cities. We are also building the capabilities to share data between road infrastructure owners and companies offering connected and autonomous mobility services.

Looking ahead, what new developments is InterDigital working on?

With the growth in NB-IoT devices, as well as Fog-Edge architectures, mobile networks will play a more important role in IoT applications.

There has been a start on initiatives to expose network capabilities that will improve the quality of IoT applications. At the same time, network operators want well behaved IoT applications and devices. We therefore expect to see a stronger interplay between 3GPP and oneM2M standardization efforts.

Another important area is the market for constrained devices. oneM2M is already used as an interworking bridge with devices using complementary standards such as OCF. As a parallel effort, we are contributing to open-source solutions to grow the population of compatible devices to support native oneM2M applications.

Mobile networks will play a more important role in IoT applications with the growth in NB-IoT devices and Fog-Edge architectures.

Finally, we continue to support the international adoption of oneM2M. The Indian government is currently evaluating standards it will recommend for its IoT and smart cities market. In China, we are assisting oneM2M to formalise a liaison with the IoT Connectivity Alliance and Alibaba whose aims match those of oneM2M.

Welcome to our **NEW** members



AKEP, Albania

AKEP (the Albania Electronic and Postal Communications Authority) is the Albanian Telecoms regulatory body in the field of electronic communications and postal service, which supervises the regulatory framework defined by the law on electronic communications, by the law on postal service and the development policies, defined by the Council of Ministers. AKEP is a forward-looking independent regulator for the telecommunications market seeking to achieve a regulatory framework, which promotes an investor-friendly environment that provides better choice, price and quality for all telecommunications users in Albania.

ATIO Corporation, South Africa

The ATIO Corporation is a South African IT and Telecoms service provider. It is a leading ICT services and solutions provider with 2 semi-autonomous divisions Intelligent Business Solutions and Telecommunication Services. They have supplied specialized ICT services for over 20 years. They provide service assurance and network performance management solutions to telecom operators, service providers, technology vendors and regulatory authorities. ATIO offers unique products to permanently enable service assurance and the quality of management processes.

National Chung Cheng University (CCU), Taiwan

This was the first publicly funded University in Taiwan in the late 1980s and is a strongly research-oriented university to provide its students with advanced skills and a deep knowledge in science and technologies. The goal is to deal with the challenges being faced in the 21st century. It covers areas of high technology and innovation, especially in the research domain with industry and in testing.

Federated Wireless, USA

Federated Wireless is at the forefront of innovation that will transform mobile communications globally: spectrum sharing. Federated Wireless advocates the commercial use of the 3.5 GHz band and contributes actively to the establishment of the Citizens Broadband Radio Service (CBRS). Spectrum sharing will lead to future 5G applications through a massive increase in the reach, capacity, and resiliency of wireless networks.

Harman GmbH, USA

Harman Becker Automotive Systems offers communication, in-car audio, multi-channel audio, based navigation systems, DVD players, digital processors, amplifiers, and speakers. It developed and integrated complete infotainment systems worldwide. Harman Becker Automotive Systems GmbH is a part of the car division of the American manufacturing company, Harman International Industries, a subsidiary of South Korean company Samsung Electronics.

Infoblox, USA

Infoblox joined with a main interest in network security. They are a recognized leader in core network services which include Domain Name Systems (DNS), Dynamic Host Configuration Protocol (DHCP), and IP address management (IDAM) – collectively known as DDI. They are bringing DDI to the next level with their Secure Cloud-Managed Network Services.



ITMO University, Russia

ITMO University is the large State University in Saint Petersburg concentrating on Information Technologies, Mechanics and Optics (ITMO). It is one of Russia's National Research Universities selected to improve international competitiveness. It is among the world's leading research and educational centres. Research priorities are concentrated on Information Technologies.

National Taipei University (NTPU), Taiwan

NTPU has a strong interest in education and research. NTPU has always put an emphasis on academic and industrial research and has always taken opportunities to build a strong bridge with industry through cooperative projects in the IT and Telecommunications sector. Over the past few decades, the NTPU has traditionally played a significant and pivotal role in educating and developing the mid- and high-level talents in the areas of law, business, public administration, as well as social sciences.

USMF, USA

The University System of Maryland Foundation Inc. is the state's public higher education system. USMF comprises 11 universities, three regional higher education centres, and an environmental research centre, located throughout the state of Maryland, USA. All USMF institutions have been ranked among the nation's best by such publications as U.S. News & World Report, Kiplinger, The Princeton Review, Washington Monthly, and others.

WaveSense Inc., USA

WaveSense enables the safest and most reliable navigation for self-driving vehicles by creating and tracking against subterranean maps of roadways using ground-penetrating radar. Self-driving vehicles using WaveSense can navigate in snow, rain, fog, poor/no lane markings, and other common but challenging conditions created by surface dynamics. WaveSense can be used immediately after driving the route and creating the map - no post processing is required.

Whitestack LLC, USA

Whitestack is a training provider for Cloud, SDN, NFV and NetDevOps. Its goal is to deliver unprecedented value to the IT & Telecom Industry through the use of open, efficient and innovative technologies, geared towards large-scale deployments, and leveraging contributions from the open source community. The outcome will be to achieve agile, efficient and accessible telecommunication services, regardless of the users' geographical location or social condition.



Tim Courtenay, from ATIO, a South Africa based ICT organization, gives us an insight into the specificities of the African market and why ETSI standards are helpful.

ATIO is one of only a few companies from Africa who are members of ETSI. Briefly, what does ATIO do?

ATIO provides specialized ICT services in the areas of telecommunication service assurance (network benchmarking and optimization), cybersecurity, operational support systems, contact centres and unified communications. We are Africa-based with a mission of trying to improve the quality and security of communications in our market. We work with many industry verticals, including telcos and government regulatory authorities.

Tim Courtenay,

Managing Director, Executive committee,
Board of directors, ATIO

Tim Courtenay is Managing Director of ATIO Telecoms, a division of ATIO Corporation, where he has worked for 15 years. ATIO is based in Johannesburg, South Africa with customers across Africa. Tim holds a Master's Degree in Electronic Engineering. He started his career in communications at a mobile network operator in South Africa, where he was part of the business

at launch. This was followed by a period working for a large multinational pay-TV and media organization with projects in Africa, Australasia, South East Asia and Europe. Before joining ATIO, Tim ran a business developing technology to autonomously benchmark mobile networks and providing automated revenue assurance platforms.

Why did ATIO join ETSI?

Mobile network benchmarking is a common practice in competitive markets. ATIO has been providing this service to operators and regulators for many years. Whilst there are existing ETSI standards and working groups regarding the measurement of quality metrics (e.g. TS 102 250-2, TS 102 250-5, TR 101 578), requirements to quantify customer experience of mobile networks have become more complex and the methodologies and approaches to benchmarking have been varied. It is therefore not uncommon for each operator and the regulatory authority in a country to have completely different measurement and reporting methodologies! ATIO wants to assist in harmonizing this and therefore specifically wanted to get on board with ETSI TR 103 559, which addresses mobile network Quality of Service benchmarking and ranking.

We want to assist in harmonizing different measurement and reporting methodologies and ETSI can help do this.

We believe that this Technical Report, once fully adopted, will allow mobile operators and regulators to 'speak the same language' when assessing the quality of experience of users on mobile networks. The focus on scoring the quality of customer experience is a new approach that has been lacking up until now, and we are pleased to see this being addressed. In our view, industry stakeholders are positive about this and eager to start adopting the best practices of this Report.

How do you think the benefits of being a member of ETSI will be realised?

One of our goals is to have a positive impact on the quality of communications in Africa. We believe we can do this through the adoption and promotion of ETSI standards. Mobile networks have

Smartphone penetration in Africa lags far behind that of European countries but as smartphone costs reduce, this is changing.

had a transformational effect in many African economies, with very innovative services being developed to meet the needs of markets within these countries, such as mobile banking.

Smartphone penetration in Africa, and all the benefits this brings, lags far behind that of European countries.

Standards will help drive the adoption of digital services and connectivity and have an overall positive economic effect.

As smartphone costs reduce, this is changing. This has been well researched and documented. As operators try to push the uptake of these devices and roll out newer technology standards,

managing the quality of customer experience is very important, since you cannot manage what you cannot measure. We also believe that being able to measure against ETSI standards should also be possible in a more cost-effective way, which is a generic benefit of standardization. This will help elevate the performance of mobile communication services, drive the adoption of digital services and connectivity and have an overall positive economic effect.

ETSI is also driving development in IoT standards. Will this be relevant in ATIO's business?

Definitely! IoT solutions have seen good adoption in a few countries in Africa, for example in the areas of smart metering, vehicle monitoring solutions, remote telemetry, security and other applications. Research shows that many businesses in

IoT solutions have seen good adoption in a few countries in Africa.

South Africa are expecting to deploy IoT solutions on a significantly higher scale over the next couple of years. Right now, however, there are various competing technologies and therefore technology choice (NB IoT, LoRa, Sigfox, etc.) and interoperability are issues which are of concern to a lot of enterprises.

Because of our experience in the mobile communications industry, ATIO's current point of reference is Narrow-Band IoT ("NB-IoT"), however we will not be limited to this and will follow market developments. As the IoT ecosystem develops we expect that the focus on performance and quality of service will inevitably become important and benchmarking, testing and optimization will start to feature heavily. Interoperability at different layers within the IoT stack will be resolved and users will focus on the 'experience' of IoT devices across multiple connection technologies.

Help with hearing difficulties: standards for Assistive Listening Devices

Our technical specifications provide daily benefit to millions of individuals suffering from some form of hearing loss.

Hearing loss or impairment is the most common sensory deficit, afflicting more than 466 million people including 34 million children. By 2050 this number is expected to increase to 900 million, according to the World Health Organization. This means 10% of the world's population will be affected by some form of hearing loss during their lifetime.

Assistive Listening Devices (ALDs) are 'hearing aids' but with radio communication abilities. One example of the use of ALDs is with cochlear implants that are now commonly used on babies from six weeks upwards.

The sooner a child is able to hear, the better their life outcome in terms of education and social interaction. While

hearing loss takes many forms, the increasing use of cochlear implants has brought hearing to many people who would have otherwise spent their lives in silence. One Professor from the University of Manchester reports her favourite experience as seeing the expression on a baby's face when it hears its mother's voice for the first time.

ALDs themselves take many forms. A popular application is induction loop systems found in public environments such as shops, schools, theatres, cinemas and places of worship where you can see the familiar blue symbol. Hearing aids and cochlear implants often include a miniature wireless receiver that's capable of receiving electromagnetic signals from the loop, allowing the listener to hear sounds far more clearly.

How ETSI standards help

Developed in 1991, the first ETSI specifications for Assistive Listening Devices are now part of the EN 300 422 series of European standards. Then considered as wideband devices, ALDs were originally included in our work on radio microphone systems.

Following introduction of the Radio Equipment Directive (RED), this suite of standards now also embraces the widely-used T-Coil ('telecoil') induction loop system, with receivers covered by EN 300 422 and the loop that provides the magnetic signal by EN 303 348. T-Coil remains the only universal induction loop system that all suitably equipped hearing aids and cochlear implants can work with.

Standards extend the benefits of ALDs

Assistive Listening Devices are considered in these ETSI standards: EN 300 220, EN 300 330, EN 300 440, EN 300 328, EN 300 422.

As well as adhering to EN 300 422 standards, many ALDs now include proprietary Bluetooth technology. This considerably broadens their application, allowing easy wireless connectivity with devices such as smartphones and laptops.

■ Brian Copsey, Chair of the Task Group 17 in ETSI Technical Committee ERM.



The SAREF Initiative: paving the way towards semantic interoperability

The SAREF family of standard ontologies, ETSI TS 103 410, aims to bring common understanding for cross-domain systems.

Without speaking the language, have you ever tried to recharge a SIM card in a Chinese application? Or to book a boat trip in an Arabic one? Isn't it discouraging to have such information and options at your fingertips without being able to achieve your goal?

Unfortunately, most of the ICT systems that try to consume information from other systems "feel" that way. Besides, they require human beings to guide them step by step on doing even the simplest tasks. Clearly, a first step to enable communication is to be able to interchange information between the interested parties. However, without the ability to use such information, communication can be pointless.

One of the key points in using information from others - whether people or machines - is to be able to understand such information unambiguously. To address this issue, ETSI's committee on Machine-to-Machine, TC SmartM2M, is leading the SAREF initiative with the goal of bringing a common understanding across cross-domain heterogeneous systems.

The SAREF family of standards

The Smart Applications REFerence ontology (SAREF) is intended to enable interoperability between solutions from different providers and among various activity sectors in the Internet of Things (IoT), thus contributing to the development of the global digital market.

To do so, and to cope with the current fragmented IoT landscape across various vertical domains, different extensions of the SAREF ontology have been produced



and published as ETSI standards for different sectors: energy, buildings, environment, smart cities, industry and manufacturing, and smart agriculture and the food chain.

New extensions are coming

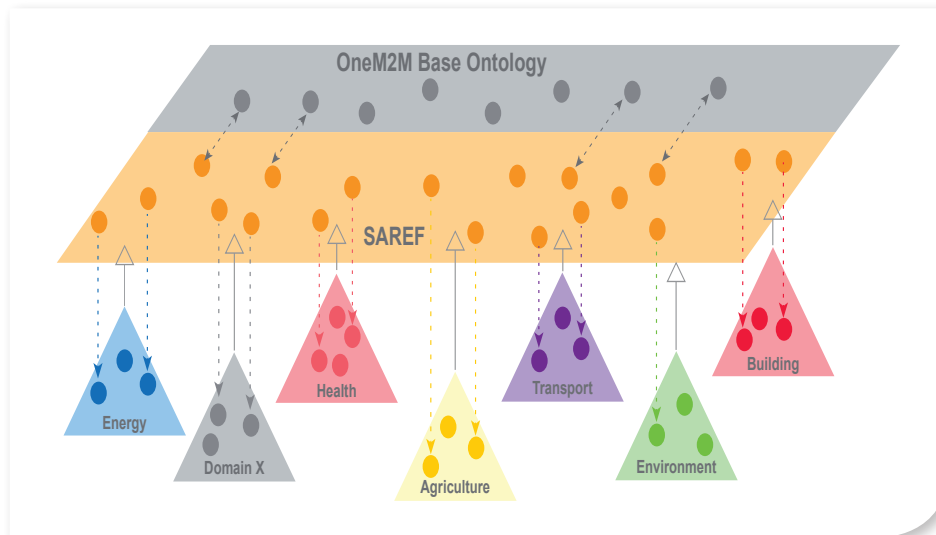
Following these six SAREF standards, four new extensions are currently under development for the automotive, eHealth and ageing well, wearables, and water domains. The Technical Reports with the requirements for these extensions have just been published. Feel free to give us your feedback; it will be valuable as we develop the final specifications!

The SAREF ontology portal

In order to better interact with the SAREF community of users and developers, the ETSI SmartM2M committee is also working to develop an open portal where stakeholders will be able to give direct feedback on the way they use the ontologies and on their specific requirements.

■ *Dr Raúl García Castro, Universidad Politécnica de Madrid, Rapporteur at ETSI TC SmartM2M for SAREF.*

Ontology specifications for Smart Cities, Industry 4.0 and Smart Agriculture



Following the first three SAREF (Smart Applications REFerence ontology) specifications for energy, environment and buildings, the ETSI SmartM2M Technical Committee has just released three specifications for smart cities, industry and manufacturing, and smart agriculture and food chain domains.

The SAREF4CITY specification ETSI TS 103 410-4 has been developed with the stakeholders who would need an ontology to implement their services in the best way. These stakeholders include other bodies, associations, IoT platforms and European projects and initiatives. Use cases include eHealth and smart

parking, air quality monitoring, mobility and street lighting. It provides a common core of general concepts for smart city data for the IoT.

The SAREF4INMA specification, ETSI TS 103 410-5, addresses the lack of interoperability between various types of production equipment in a factory. It also enables different organizations in the value chain to uniquely track back the manufacturer items. The zero defects manufacturing use case has been used to improve the flexibility to the manufacturing process, in order to switch from one manufactured product to another in a timely manner, generating as little yield loss as possible.

The SAREF4AGRI specification, ETSI TS 103 410-6, use cases focus on livestock farming and smart irrigation, and the integration of multiple data sources to provide decision support services to farmers. Sources of interest include GPS, meteorological data, remote observation via satellite and local observation using near or proximal sensors.

Zero-touch network and Service Management: two major specifications out!

Full end-to-end automation of network and service management has become an urgent necessity to deliver the 5G services with agility and speed and ensure the economic sustainability of the very diverse set of services. The ultimate target is to enable largely autonomous networks which will be driven by high-level policies and rules (AKA intent); these networks will be capable of self-configuration, self-monitoring, self-healing and self-optimization without further human intervention.

The Zero-touch network and Service Management (ZSM) Industry Specification Group has released two major specifications: ETSI GS ZSM 001, ZSM Requirements and ETSI GS ZSM 002, ZSM Reference Architecture. GS ZSM 001 examines various business-oriented scenarios and the related automation challenges faced by operators and vertical industries, and specifies the architectural,

functional and operational requirements for end-to-end network and service automation. The ZSM architecture specified in ETSI GS ZSM 002 was designed to satisfy these requirements. The architecture is modular, flexible, scalable, extensible and service-based. It is designed for closed-loop automation and optimized for data-driven machine learning and artificial intelligence algorithms.

Work done in organizations such as 3GPP, ETSI NFV, IETF, BBF, ONAP, ETSI OSM, TMF and others fits nicely into the ZSM architecture and can help to enable the orchestration and automation of end-to-end services.

The ZSM architecture provides a common foundation which allows a diverse ecosystem of open-source groups to produce interoperable solutions.



IoT: WHAT WHEN AND HOW?

If IoT services, applications and implementations have increased gradually over the last few years in various sectors, there is still “room for improvement” to reach vendors, manufacturers and consumers’ expectations. At the end of the day, the “what”, “when” and “how” remain the key questions.

The beginning of Artificial Intelligence and a growing attention to cybersecurity have made their way into the IoT and must be taken into account. When the first standard on what was called machine-to-machine at the time was released in ETSI, it was decided that IoT needed a complementary offer, and that led to the creation of the global partnership project oneM2M, now comprising 8 regional standards bodies, including ETSI of course.

In our “spotlight”, Enrico Scarrone, our ETSI smartM2M committee Chair and oneM2M steering committee Chair gives us his view on the IoT. This section also features how Busan, the second largest city in Korea and Goyang, the eco-friendly city, used oneM2M standards to build their smart city services.

IoT: what, when and how?

IoT is now a growing reality that does not yet fit the enormous expectations we have. We know that we are just scratching the surface of the IoT market and its related social impacts with all the new services and possibilities that IoT could offer.

IoT today...

Even though we are still far from the volumes that in very recent years were forecasted, there is no doubt it will happen. And when it starts to accelerate, it will be a terrific wave that will quickly change our lifestyle. The major question that remains for the market is: "When?".

For the people working on the standards, the point of view is slightly different; they are part of the processes that are leading to the IoT, so the main questions are "Why?" and, more importantly, "What can we do to accelerate this process?".

IoT will be a terrific wave that will change our lifestyle quickly.

...still too fragmented

10 years ago, the ETSI SmartM2M committee identified fragmentation and integration costs as a 'show stopper' for the IoT market. That may not seem the case now as we are seeing a growing IoT market and the attention that some technical aspects, such as Artificial Intelligence (AI) and security, are attracting. Nevertheless, the main issue remains the same: too much fragmentation and too much in the way of integration costs.

These are major factors behind the dismissal of several solutions that have been launched in the IoT market. You can find examples from the large companies to retailers that adopted the smart

We are seeing a growing IoT market with a special attention to AI and security.

"something" whether they be home, wearables or industry.

It is painful to see proprietary IoT platforms and solutions being discontinued a few years after their launch, even when large and financially secure organizations are involved. Stories like these make us even more convinced of the value of a standard solution, with products and services that can be provided by everyone, without dependencies from specific proprietary ecosystems.

The role of standards

The reaction of the standards community was to try to cope with this problem. Just making a full IoT standard solution was not enough; the risk was to generate even more fragmentation. Looking at ETSI, the result was to lead to two complementary directions. The first was to complete the standard offer to ensure that the missing enabling technologies are available, from security enhancement and energy efficiency features to all the IoT dedicated functionalities offered by cellular 4G and 5G networks today.

The second was to define a new standard designed to integrate the diversities, defining an interworking framework capable of interconnecting and interworking the specific sector solutions,

the legacy solution and the new emerging ones. Today, this standard exists and it has a global collaborative footprint: it is called oneM2M and is a major opportunity for businesses to exploit the IoT market profitably with solutions that are replicable and by leveraging economies of scale while respecting all the needs and the peculiarities of each specific sector solution.

Imagine a future where there are many, many different IoT applications and they



oneM2M provides a very good basis for data exchange and management of IoT applications.

have a need to exchange data with one another. oneM2M provides a very good basis for data exchange and management of IoT applications. It also provides a significant foundation for semantic interoperability. oneM2M standards offer a supporting framework that helps IoT applications to understand the information carried by sensor data.

IoT's potential

Sharing information among different application environments will unlock the full potential of IoT, creating more and more IoT services and opportunities exploiting the so-called digital transformation. That's the potential of IoT. We could say that IoT "is" sharing information across diverse sectors and groups.

The ETSI Smart Application REFerence ontology unifies commonalities among verticals.

But more work is still needed before we have seamless semantic interoperability. There is a need for more information-sharing among vertical IoT business sectors. As a result, we are working in a collaborative manner with stakeholders from the different industry associations and with other standards bodies.

Among all the other ETSI activities, attention is increasingly being paid to enabling the understanding of the information generated by the different IoT components (smart cities, connected vehicles, utilities, e-health/ageing well, wearables, smart agriculture, smart manufacturing, industrial IoT, etc.).

In this area it is worthwhile to mention the ETSI Smart Application REFerence ontology standardization, a result of stimulus and collaboration with the European Commission. It unifies the commonalities

among the different vertical ontologies in a single semantic approach. Based on oneM2M, it has been developed with the help of several vertical stakeholders and associations and also aligned with non-ETSI relevant initiatives such as W3C semantic WEB.

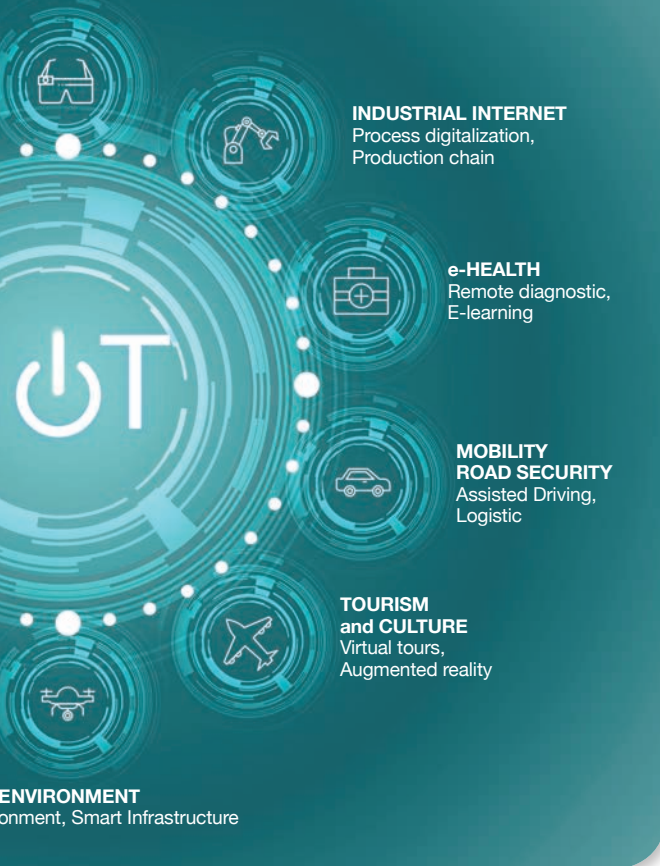
Adopting IoT standards

Standards represent the future for IoT, and the use of a standard interworking framework to merge the diversity is the leading path. Standards also represent an excellent occasion to benefit from a significant collaborative effort leading to innovation, especially for small and medium-sized organizations. But we need to be pragmatic: today there is not a default decision that works for all companies and different product time frames. Each business needs to look carefully at what it has to do and what time frame applies to its IoT solutions. Companies need to understand how much they can do in-house, how much depends on system integrator partners, and how much depends on external providers. Some companies will discover that there is a quick, off-the-shelf solution. Other companies who are looking at a sustainable product will see the need and the benefits of a standards-based solution.

Companies need to understand how much they can do in-house, how much depends on system integrator partners, and how much depends on external providers.

■ Enrico Scarrone, ETSI TC Smart M2M Chair, oneM2M Steering Committee Chair.

A - VIRTUAL REALITY
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Korean smart cities based on oneM2M standards

Since 2015, cities in South Korea have gradually deployed oneM2M-based smart city solutions. It began with the smart city pilot project funded by the government, the key requirement of the project being to use standard-based solutions. Discover how Korea implemented smart city services.

Busan, the second largest city in Korea

Busan was the first city to adopt oneM2M standards for its smart city platform and guarantee interoperability for devices and services. Proxy applications such as Application Entity (AE) on gateways bridged non-oneM2M smart city devices with different network protocols in various domains to the oneM2M system. The smart city platform was designed as “oneM2M plus alpha”. oneM2M played its role as a common service function platform while the other half filled up with smart city supporting features. On top of the platform, services like dashboard and mobile applications were provided as well as an open data portal interworking with the oneM2M-enabled platform. Those services included domains like transport, energy and safety.

Goyang, the eco-friendly city

Goyang, located near the capital city of Seoul, was the second city to use oneM2M standards. Interoperability was key and devices from different vendors could easily be connected and provide data to the platform, leveraging an open source oneM2M AE implementation. With the oneM2M standard APIs implemented on the smart city platform, Goyang also runs the open data portal for citizens and developers.

Goyang is an eco-friendly city and therefore focused on environmental services. The smart eco city service provides water quality management and controls water fountains in parks. The air quality management service offers real-time information on wall-pads in kindergartens and mobile applications to citizens.

After the successful smart city service of mosquito monitoring in Goyang, another city, Yongin decided to deploy the solution as well. The same oneM2M-based smart city platform as the one used in Goyang has been deployed and is currently in operation.

On the field, the mosquito device emits CO2 to attract mosquitos and the infra-red

sensor counts the number of mosquitos. The number as well as temperature and humidity measurements are reported to the smart city platform. The monitoring service also provides forecasts with sensor data. To date, it has been done by heuristic method, but it will soon be replaced with machine learning algorithms using data from the oneM2M platform.

In Korea, since 2015, several cities looked for interoperability and turned to oneM2M standards. Successful trials and commercial deployment led to other smart cities gradually implementing oneM2M based solutions for their citizens.

■ SeungMyeong Jeong, Senior Researcher, Smart City PL, Autonomous IoT Research Center, Korea Electronics Technology Institute.



An overview of the IoT journey in India

India is on the cusp of a new era, a series of growth-oriented initiatives, driven by the Government are focused on transforming an agrarian society into a new digital, smart and technology-oriented nation. Find out how.



The Internet of Things (IoT) is envisaged to play a crucial role in India's transition to a digital economy, by supporting and nurturing a sustainable and connected society. IoT is also expected to be key in government programmes such as *Digital India, Make in India* and *Smart Cities Mission*.

As per the various reports and analysis, India is poised to have a minimum of 6% of the worldwide IoT/M2M devices. The Telecom Regulatory Authority of India envisages enabling access for connecting 1 billion M2M sensors/devices by 2020 and 5 billion by 2022.

The journey of M2M and IoT started in 2012 with the National Telecom Policy-2012, in which M2M was mentioned as the future technology. However it really started in

October 2014 when MEITY released an IoT policy, proposing a multi-pillar approach to its implementation. It comprised five verticals - demonstration centres, capacity building and incubation, R&D and innovation, incentives and engagements, and human resource development - and two horizontal supports - standards and governance structure.

In 2015, the Department of Telecommunications released the National Telecom M2M roadmap that focused on the communication aspects of M2M with the aim to have interoperable standards, policies and regulations suited for Indian conditions across sectors.

The National Digital Communications Policy-2018 is a testament of the significance and commitment of the

government towards creating a digitised society in which M2M/IoT will play a key role and expand the IoT ecosystem to 5 billion connected devices.

The three organizations TEC, TSDSI and BIS have been diligently committed towards supporting the implementation of M2M/IoT in India.

With the Indian government focused on the creation of *100 smart cities*, where IoT will play a pivotal role, there is a strong demand for standardized IoT solutions. TEC has been entrusted to finalise the M2M/IoT standards for India and is working on making the oneM2M specification as transposed by TSDSI to become National Standards. oneM2M common Service layer standards and specifications are expected to be used as the horizontal layer for the *Smart Cities Mission* in India.

ETSI with its project SESEI (Seconded European Standardization Expert in India), and the India EU ICT standards collaboration project, have steadfastly supported BIS, TSDSI, TEC and C-DoT in their endeavour to establish a standardized framework based on the oneM2M common service layer for its deployment in the country. In this regard, several hackathons, developer's tutorial and workshop were jointly organised. SESEI also contributed in the M2M Working Groups of TEC/TSDSI and promoted oneM2M common Service Layer implementation as part of Smart Cities through various events and workshop participations.

■ *Dinesh Chand Sharma, Director, Standardization, Policy and Regulation, SESEI*

Introducing...

ETSI's standards enabling Smart City service deployments

Urban areas contain over half the world's population. This puts cities at the forefront of tackling the issues of water shortages, energy constraints, aging populations, transport (in)efficiency and climate change. ETSI is creating specifications for technologies that enable the transformation of our urban spaces, and this is happening across all of ETSI's standardization work. Find out more below.

Since the 1990's, ETSI has worked on a variety of standards for technologies that assist cities and their population to connect and evolve in an ever-changing urban environment. Our 3GPP partnership project established 3G, 4G and is presently enabling 5G as the reliable mobile communication network.

Our Intelligent Transport Systems group has produced many standards for improved transportation safety and digital services. Our M2M and IoT work has created an open and solid foundation for the "smart" of smart cities. Most recently, ETSI technical work has progressed on energy-efficient networks, simplification

of video systems for street traffic and safety monitoring as well as exchange of information between diverse services for citizens and areas of eHealth.

This article provides an update on the latest smart city activities in ETSI.

ETSI events on smart cities: network with our experts

ETSI organizes many workshops and open events which address technologies and standards for cities. These include dedicated city sessions in our annual ETSI IoT Week. The all-important topics of cybersecurity and privacy that are crucial to cities were covered during the annual ETSI Security Week in June. Presentations of this event are available on our website. From this year onward, ETSI is also organizing a dedicated City Roadshow demonstrating relevant technologies to a number of European cities. Please note that all events are listed on our website and you can attend free of charge upon registration.



Context Information Management

Smart cities need cross-domain exchange of information between services, so that citizens get multiple benefits from sharing their data and so that city departments get all the information they need for efficiently supplying their services. Our group

on cross-sector Context Information Management (ISG CIM) develops technical specifications for exchange of Context Information, for smart cities applications and beyond. ISG CIM maintains an open area with numerous presentations and white papers as well as the main API specification NGSI-LD. The EC "Connecting Europe Facility" has chosen ETSI NGSI-LD for enabling digital services in future for the public good.

The Internet of Things

The Internet-of-Things (IoT) nowadays includes everything where a sensor or a machine interacts with computers and users over a network. ETSI SmartM2M committee has analysed the interaction of smart cities and the Internet of Things in an ETSI Technical Report, TR 103 290, addressing the impact of smart city activity in the IoT environment.



To allow applications to share data with confidence and interoperability, the SmartM2M group has created a series of specifications on high-level definitions designed to enable smart city applications for such domains as smart energy, smart agriculture, smart buildings, smart environment and smart industry and manufacturing. The ETSI SAREF (Smart Applications REFERENCE) work is also contributing towards the oneM2M baseline ontology definitions to ensure a global standards-based solution.

Green smart cities

Our Access, Terminals, Transmission and Multiplexing committee and particularly the working group on Sustainable Digital Multiservice Communities is working towards standards for efficient deployment of ICT systems and services within cities and communities, e.g. KPIs for sustainability, global KPIs, and their mapping to broadband deployment KPIs, also for 5G.

Our group on Operational energy Efficiency for Users is developing global Key Performance Indicators for energy consumption in green smart cities, covering both residential and office environments, for example for fire and alarm systems.

Global reach

Smart cities worldwide have similar major issues, but with many local differences. ETSI is collaborating globally with other Standards Development Organizations (SDOs), for example by co-chairing the smart cities sessions at the 2019 Global Standards Collaboration meeting involving eleven regional standards bodies.

Much of the work relating to M2M takes place in our global standards initiative oneM2M which is a collaboration between the 8 regional standards organizations representing every continent. Smart city applications using oneM2M are appearing globally, as you can see on page 16 and 22.

IoT is already so pervasive and linked to everyday lives that the role of IoT in alerting, monitoring and alleviating emergency situations is becoming significant, particularly in cities. Therefore the ETSI Special Committee on emergency telecommunications (EMTEL) has examined the use cases and opportunities for IoT in emergency situations, such as emergency calling, mission critical communications, Public Warning System communications and



automated emergency response, where IoT devices can act after receiving a trigger in order to prevent hazardous situations.

User-centric design and eHealth



The eHealth group is evaluating the interaction between ICT and citizen and private health, beginning with a White Paper outlining various use cases in eHealth and examining gaps in the European Commission ICT Standardization Rolling Plan.

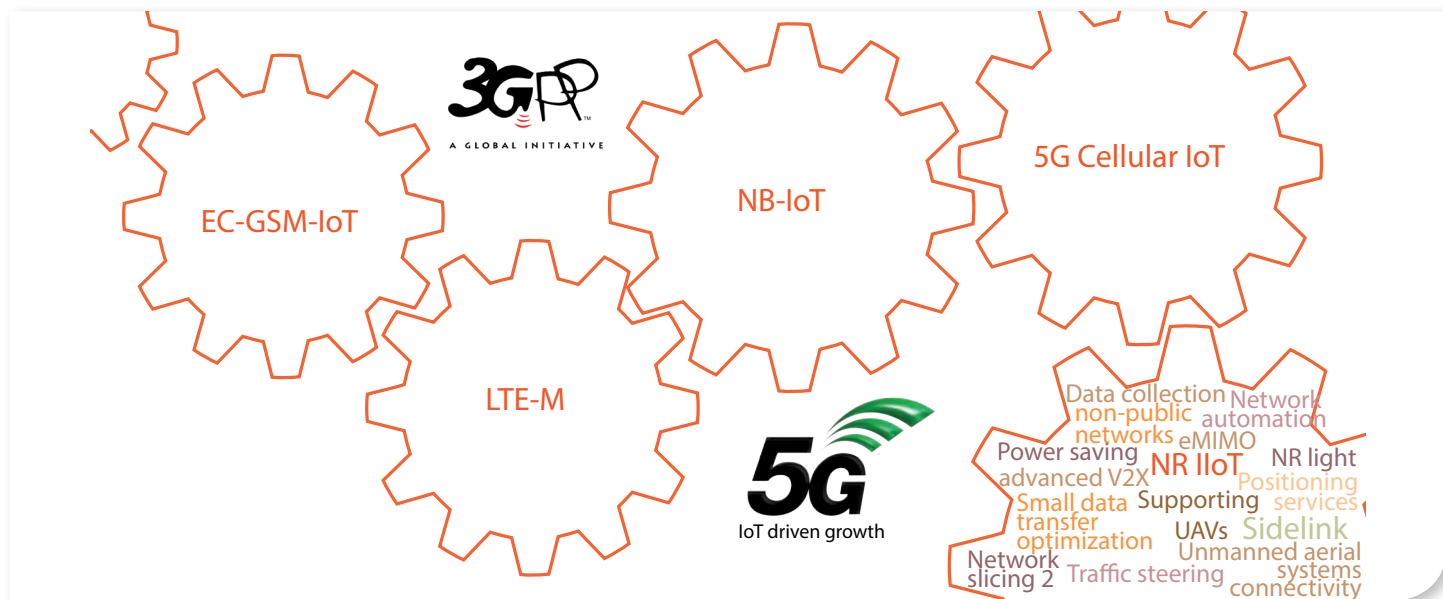
The ETSI Special Committee for USER topics considers human-ICT interaction, including organizational aspects and has created a guide on best practices to interact in the digital ecosystem. This activity has produced a set of high-level user oriented recommendations for providers and standardization makers, including guidance on security, data protection and privacy.

The Human Factors Technical Committee is currently examining how to improve the usage and deployment of ICT systems, especially concerning ease-of-use and design-for-all. An overview of standards for citizens in smart cities led to the publishing of a guide for user-centric design, with a very comprehensive terminology in 5 languages on various sectors.

■ Lindsay Frost (NEC), ETSI board member, ETSI ISG CIM Chairman.

3GPP IoT becomes priority #1

The prioritization process, currently in full flow in the radio and architecture specification groups, to decide which technologies will make it in to the next 3GPP release (Rel-17) is largely focused on making further strides towards massive machine type communications (mMTC) over Ultra-reliable and low latency (URLLC) networks.



Some exciting use cases will be supported by these technologies, with augmented reality and virtual reality applications, factory automation, unmanned transportation and a variety of new time-sensitive services made possible. They will go well beyond what the existing pre-5G low-power-wide-area-network features, namely EC-GSM-IoT, LTE-M and NB-IoT, were designed for.

Such is the interest and priority given to IoT in 3GPP that we are now seeing work items moving on from having 'Machine type communications' or 'IoT' in their 3GPP work item name. The Radio enhancements for small data transfer optimization, NR light, NR antennas (incl. eMIMO), Sidelink, power saving, data collection and positioning services...are all IoT related, without the feature level work items being branded as such.

One key IoT enabling feature under consideration in 3GPP TSG RAN is 'NR light', focusing on cost aspects and power efficiency of devices in a new user equipment category for 5G use cases. At data rates below 100 Mbps, it addresses applications that will enable smart cities equipment and wireless industrial sensors.

On the network and services side and as Release 17 IoT work is increasingly granular, the groups will go deep in the detail of features to cover advanced interactive services, satellite in 5G systems, traffic steering, supporting unmanned aerial vehicles, enhanced IMS to 5GC integration, location services, network automation, enhancement of support for edge computing, support of non-public networks, network slicing (Phase 2), advanced V2X services,

flexible local area data network and unmanned aerial systems connectivity... Again, all of this work will support IoT, but will tend not to be labelled as such in the 3GPP work plan.

The end of 2019 is a busy period in the 3GPP groups. The work on Release 16 specifications is in full swing and the approval of the future content of Release 17 is to be done by December 2019. IoT and massive MTC are at the heart of both Releases as 5G comes to life.

The full 3GPP Work Plan is available on-line at www.3gpp.org/specifications/work-plan

■ Kevin Flynn, 3GPP Marketing and Communications Officer.



IoT standards: key ingredient in a smart city recipe

According to Deloitte, the Government of India's planned investment of \$1 billion over the next five years for 100 smart cities is expected to be a key enabler for IoT adoption across industries such as utilities, manufacturing, automotive and transportation and logistics.

While this may represent an exciting market opportunity for India, the Indian Internet of Things (IoT) ecosystem will never reach its full potential if a standardized, IoT framework isn't in place. As IoT technology continues to build on the economic and societal footing in India, government, city authorities, developers and operators across the nation must put interoperability at their heart of their plans if citizens are to experience a truly digital India.

Making cities smart

As more of the global population converges in urban areas, citizens are now demanding more savvy and efficient city services as a result of this urbanisation. Thus, cities across the globe are looking to exploit smart services and solutions to satisfy this demand. Whilst many cities around the world have begun their transformation towards becoming "smart", adoption has proven to be slower in India.

Subsequently, the Government of India has launched its Smart City Mission, which

aims to develop 100 cities across the country to make them more citizen friendly and sustainable.

Siloed applications

Today, vertically siloed application vendors make up a large percentage of the IoT application environment in India. This is especially the case in the smart city ecosystem and, following the announcement of the Government of India's smart city vision, proprietary platform providers are continuing to fill the smart cities space.

As a result, cities are at risk of being locked into expensive proprietary solutions when deploying and extending their IoT applications. This, in turn, is driving a deeper understanding of standards in smart cities across the nation and is why oneM2M, the global IoT standards body, is working with its partner TSDSI and C-DOT, the Centre for Development of Telematics, to raise awareness of the benefits of a standardized IoT framework.

oneM2M – a global solution

Standards can overcome the challenges faced by stakeholders across the nation. A common IoT framework provides cities with the means to connect and communicate with any smart city asset, be it a bin, a row of streetlights or an environmental sensor. Through standardization, cities can mix-and-match vendor solutions, overcoming the risk of vendor lock-in and generating a competitive supplier base which will lower costs.

By deploying IoT standards for common service functions, interoperability and security can unlock the full potential of interworked applications, which will, in turn, create harmonised smart city environments and unleash a truly digital India.

How a standardized framework can enable a safer and smarter future for cities across India was a key focus of oneM2M's, C-DOT's, TSDSI's and ETSI's recent IoT workshop in New Delhi, India, in August. This was quickly followed by oneM2M's Industry Day in Hyderabad, India, in September. At this event, attendees heard how oneM2M has successfully been deployed across the globe, as well as how standards are playing a critical role in enabling mass adoption of the IoT across Asia and Europe. oneM2M is also being considered as the national IoT standard for India as part of its smart cities vision – highlighting that now, more than ever, standards are critical to the success of smart cities.

■ Roland Hechwartner, Technical Plenary Chair at oneM2M.



Hyderabad

IoT in a European smart city: instrumental in deploying 5G

Following several field trials in Bordeaux (France) and other cities, it became clear that deploying IoT in silos (e.g. lighting, mobility, waste management) would limit the ability to scale smart city solutions. Another outcome was that IoT platforms based on open standards are best capable of supporting a diverse range of IoT applications, the sharing of associated data and avoiding lock-in to technology providers.

A report from Machina Research identifies three routes a smart city journey could take: 'anchor route', 'beta route', 'platform route'. The smart city journey of Bordeaux is best described as an iterative sequence of these three routes, beginning with the beta route and moving towards the platform route to integrate data from legacy anchor applications and build new ones. Bordeaux's 'city as a platform' path could be described as a non-sequential approach: consolidation through IoT platform, laying the foundation for data economy, building a true multi-service network.

Consolidation through IoT platform

The city started with deployment of an IoT platform based on an open international standard, namely oneM2M, to support

all new ICT applications. There are considerable advantages to this approach when it comes to the ownership of city data and the responsible management of citizen data in line with Europe's General Data Protection Regulation (GDPR). It enables the reuse of data beyond originally intended purposes and avoids vendor lock-in, moving away from data silos and laying the foundation for new cross-domain ICT applications.

Laying the foundation for data economy

As a next step, Bordeaux is creating the conditions necessary for the growth of a data economy with the establishment of a data lake and an associated data governance strategy. These conditions will lead to the storage of fresh as well as historical anonymized data that could be

reused by different city departments or ICT application developers.

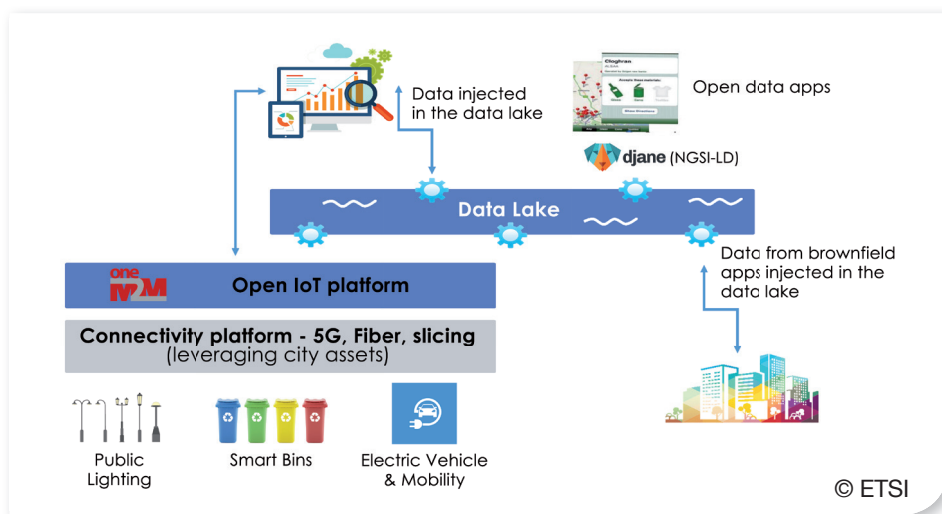
Building a true multi-service network

If a city manages its own data or processes citizen data, data collection must rely on a city-managed network, without the city necessarily being the owner of the network. Multi-service networks, combining fibre and 5G, will also encourage smart city innovation by increasing the speed and cost-efficiency of ICT services introduction.

Bordeaux smart city blueprint

Emerging business models speak in favour of next-generation infrastructure 'as a service', where actors such as utilities, network operators and city administrations could enter joint ventures to share infrastructure investment and the benefits resulting from this investment. At a technical level, this would materialize through the provisioning of network slices that could be reused by the different venture stakeholders, including the city. Smart cities have the potential to play an instrumental role in expediting the deployment of 5G. City infrastructure such as multipurpose lampposts, for instance, could provide valuable support to the deployment of 5G equipment, especially where high densities of 5G equipment are required.

■ *Christophe Colinet, smart city project manager, city of Bordeaux*



As many pupils and students went back to school after the summer holidays in many parts of the world, the communication team in ETSI is happy to offer you a full “back to the office” package of communication tools that emphasizes ETSI’s strategy.

ETSI POWERPOINT CORPORATE PRESENTATION

We completed the corporate brochure, featured in the last edition, with a folder that will be useful to hold several documents and hand out to your various targets.

A revamped ETSI corporate presentation is also now available for all, Secretariat and members, on the portal in “events”, “ETSI presentations”.



Video: ETSI CORPORATE VIDEO

Only have 3 minutes to know more about ETSI? Need an introduction of ETSI for an external event or within your organization?

You will soon be able to watch our brand new corporate video on our website and Youtube channel and find out who we are, what we do, our strategic long-term objectives and at last but not least, what benefits we offer to our more than 900 members from around the world.

Stay tuned!

Latest news in the Secretariat

Introducing Testing Task Forces

Testing Task Forces are a new way to manage testing and methodology projects funded by ETSI. In place for the 2020 budget year, Testing Task Forces (TTFs) will operate alongside Specialist Task Forces (STFs) but will cover testing and methodology-related activities. While they will operate similarly to STFs, Testing Task Forces will have a different selection and start-up process. Each year a dedicated budget for them is allocated as part of the ETSI annual budget. The amount of budget is based on proposals for Testing Task Forces submitted by TBs and ISGs prior to the September Board meeting. The Director-General will approve the creation of each Testing Task Force, based on a technical roadmap which is updated

throughout the year and presented to the Board for consultation. Once set up, each TTF will operate similarly to an STF. The Director-General will report to the Board at regular intervals on the progress of TTF work. In this he will be assisted by the Centre for Testing and Interoperability (CTI), which will monitor their progress. There are several advantages of this new process for our members. The annual budget required for testing and methodology work can be adjusted according to the needs of TBs and ISGs in each year. We can ensure all relevant and justified TTF proposals get funded. With budget secured at the start of the year, TTFs can start their work when

required. A simplified Testing Task Forces Terms of Reference template has been introduced. The process facilitates longer-term planning, because testing standards can typically be planned ahead and often follow a multi-annual development and update process. Similar adjustments to the STF process have also been put in place for 2020 and beyond. Full details of the new Testing Task Forces and Specialist Task Forces processes are available on the STF/TTF pages on the ETSI Portal.

■ *Ulltan Mulligan, Director of the ETSI Centre for Testing and Interoperability.*

New IPR Database Reporting format

Over the last two years, we have been actively working on improving the current set of tools that we offer to make Standard Essential Patents (SEP) declarations.

After the release in January of the Bulk Upload feature that allows our members to submit large declarations in a simple way, we decided to re-think the reporting made around the IPR Database, with which users have been struggling for so long.

With that in mind, we have completely re-engineered the Special Report published twice a year to include all declaration/disclosure information in a single Excel file.

This file will also include some reports and graphs that will provide a quick overview of the current status of the IPR Database, aggregate numbers for declarations/disclosures, standards, patents and patent families, projects, etc.

In addition to the 6-monthly Special Report, the same file will also be kept up to

date and made available to the members as a complement to the existing reporting solutions.

An official presentation and release was held during the last IPR SC meeting (IPR#32) in Mainz, Germany on 1-2 October 2019.

With this new format, we hope to greatly simplify access to quality information and increase the transparency of SEP declarations made at ETSI.

■ *Philippe Cavé, IT Project Manager.*



Welcome to our new staff member



Guillaume Hamonnou, Functional Analyst, IT department.

After living in the Paris area, Guillaume joined the ISEN engineering school in Brest, Brittany (Bretagne), France, graduating in 2008. During his course of studies, he was an active member of the Student Office and a member of the Student Office at national level. This position allowed him to meet with peers from other French engineering schools, discussing issues that students might face in their various environments and daily school life.

He started his career as a developer, then Project Manager at Sequoiasoft, a start-up based in Sophia Antipolis, selling software for professionals in hospitality, restaurants and wellness. He then began a different project as a Functional Analyst within Docomo (French postal service), where his job was to digitalize the social activities of the Works Council. His third experience led him to Amadeus, Sophia Antipolis, where he wrote the specifications for a new project intended to facilitate the shopping end-user experience with their travel software.

Yet behind this “classical” IT career and after his first professional experience, he actually thought of becoming a primary school teacher. After a skill assessment analysis, he was advised to join a not-for-profit organization that would suit his social mindset.

Hear from us in conferences and meet with us at exhibitions.

Find more information and register on our website at: www.etsi.org/events

October 2019



SDN & NFV World Congress

14-17 Oct., The Hague, NL

The event tackles head-on the real-world issues operators and vendors alike encounter on the journey towards network transformation. Senior technologists, business leaders, product managers, and architects alike will discuss both technology and business challenges. ETSI is endorsing the event and is actively participating in multiple tracks and on the conference agenda via our ISGs on MEC, ZSM, ENI and NFV.



ETSI IoT Week 2019

21-25 Oct., Sophia Antipolis, FR

The ETSI IoT Week 2019 features a oneM2M Developers Tutorial and the ETSI IoT Workshop. It is the must-attend event for anyone involved in IoT and who understands the importance of standards-enabled technologies for IoT service deployments.



TU-Automotive Europe

29-30 Oct., Munich, DE

Endorsed by ETSI, this 2-day event offers networking opportunities with 40+ presentations plus discussion panels and debates. There will also be 45+ booths showcasing the best in class automotive technology. Hear about ETSI's multi-access edge activities for transportation at the conference.



UCAAT

22-24 Oct., Bordeaux, FR

ETSI's UCAAT Conference, now in its seventh year, is dedicated to application aspects of automated testing including artificial intelligence techniques, cloud testing, mobile testing, test methodologies, test management and standardized test specifications by focusing on the practical challenges that are often faced in industry.

November 2019



ITS Cooperative Mobility Services #7 4-8 Nov., Sophia Antipolis, FR

This ITS-CMS event, organized jointly between ETSI and ERTICO, and supported by the EC and EFTA, will focus on testing ITS Security features to support the industry in the C-ITS deployment in the common single European trust domain.



ETSI/IQC Quantum Safe Cryptography Workshop 5-7 Nov., Seattle, US

Hosted by ETSI Member Amazon Web Services, the joint ETSI/IQC QSC Workshop will kick-off with an Executive Track followed by a two-day in-depth technical track. All three days are open to those who wish to learn more about how we are all affected by the fast-evolving race to build a quantum computer.



NG eCall TESTFEST 18-22 Nov., Malaga, ES

Organized by ERTICO-ITS Europe and ETSI, and hosted by Dekra, the event enables vendors to run interoperability test sessions for Next Generation eCall as well as legacy eCall using test descriptions provided in approved guidelines.



5G Techritory 27-29 Nov., Riga, LV

The 5G Techritory attracts up to 1 000 industry senior-level participants, including more than 70 speakers from Europe, Asia, and the USA. It is organized by the Electronic Communication Office of Latvia and supported by several industry-leading organizations and companies, including ETSI.

December 2019



The Great TELCO debate Telecom TV 10 Dec., London, UK

The organizers will be bringing together some of the world's leading thinkers and players in the telecoms ecosystem for a day of open, honest and often heated discussion on the challenges and opportunities facing the telco of today as they transition into the digital service provider of tomorrow.



Smart Cities and Communities - Standardization to meet citizen and consumer requirements 11 Dec., Brussels, BE

ETSI is organizing an open meeting on smart cities and communities to discuss how standardization can meet citizen and consumer requirements.

ETSI SNAPSHOT

YTD = January – August 2019

913
members
End of August

322
standards
YTD



26%
SMEs

+723
standards
under development
YTD

100
technical groups

15M
standards' downloads
YTD

408
face-to-face
meetings
YTD

20.600
participants to
face-to-face meetings
YTD



2472
eMeetings

22.095
eParticipants
YTD

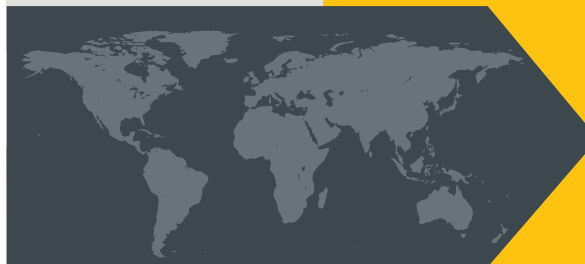
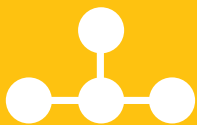
37
conferences
& Plugtests
YTD

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110
partnerships
End of August

123
people
19
nationalities



65
countries

About ETSI

ETSI provides members with an open and inclusive environment to support the development, ratification and testing of globally applicable standards for ICT systems and services across all sectors of industry and society. We are a not-for-profit body with more than 850 member organizations worldwide, drawn from 65 countries and five continents. Members comprise a diversified pool of large and small private companies, research entities, academia, government and public organizations. ETSI is officially recognized by the EU as a European Standards Organization (ESO).

For more information please visit: www.etsi.org

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ETSI 
The Standards People

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