



5G Outlook: Technology, Standards, Applications. What can we expect?

Current mobile systems are defined in terms of generations. Third Generation systems are considered to be those capable of meeting the IMT-2000 performance requirements laid down by the International Telecommunications Union. Numerous mobile technologies meet this requirement, the most common is UMTS (Universal Mobile Telecommunications System), standardized by a global consortium of standards bodies, the Third Generation Partnership Project (3GPP), of which ETSI is a founding partner. A similar process was put in place for IMT-Advanced, i.e. 4G. Industry has largely converged on a single principal 4G standard, LTE (Long Term Evolution), which is also standardized by 3GPP.

Just as 3G and 4G mobile systems are defined in terms of performance capabilities, and not a specific technology or a single radio interface, 5G will be the same. However, while the ITU is developing its set of performance requirements for "IMT for 2020 and beyond" that should embody the ITU's opinion of what defines a 5G mobile system, and which is expected to be delivered in the 2016-2017 timeframe, other parts of this industry are moving faster.

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ETSI Mobile-edge Computing Industry Specification Group starts work, opening the door to a fresh ecosystem

Boosting user experience through innovation at the mobile network edge

On 24 September 2014, a new multi-stakeholder industry initiative on Mobile-edge Computing (MEC) was formed under the auspices of an ETSI Industry Specification Group (ISG).

The aim of this initiative is to create a standardized, open IT environment at a location considered to be the most lucrative point in the mobile network: the Radio Access Network (RAN) edge. Characterized by proximity, ultra-low latency and high bandwidth, this environment will offer cloud computing capabilities as well as exposure to real-time radio network and context information.

One of the objectives of the ISG MEC is to leverage this open and standardized IT service environment in order to allow applications from network equipment vendors, mobile operators, OTT (Over The Top) players, content providers and application developers to be efficiently and seamlessly integrated across multi-vendor, mobile-edge computing platforms.

As a result, applications will be able to use the service environment intelligently and transform the mobile-broadband experience. Interactive and delay-sensitive applications, located in close proximity to users, will, for example, benefit from the increased responsiveness of the edge as well as from maximized speed and interactivity. Popular and locally-relevant content will be delivered directly from the edge.

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New ETSI Member Logo



We have developed a new logo for our members to show their link to ETSI. The ETSI Member logo can be displayed by ETSI members wherever and

whenever they need to highlight their membership of ETSI. The logo will be rolled out to our members during the next month together with guidelines and instructions on its use. It is initially trialled at this year's Mobile World Congress in Barcelona, where ETSI members who are exhibiting have been offered the opportunity to display the logo on their stands.

oneM2M unveils Release 1 standards - World's First Global Standards for M2M Deployment

The era of widespread deployment of Machine to Machine (M2M) technology and the foundation for the Internet of Things (IoT) advanced significantly when oneM2M, the global standards



initiative for M2M and the IoT, issued its Release 1 global standards at the end of January 2015.

More than 200 member companies from across the world contributed to Release 1's development through the seven leading ICT standards development organizations including ETSI and five industry consortia that founded oneM2M.

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Welcome to the World of Standards



Welcome to the February 2015 edition of The Standard. In this issue we focus on emerging mobile technologies. We examine the development of 5G mobile technologies and associated standards. We also take a look at two new mobile technology related ETSI Industry Specification Groups, on Mobile-edge Computing and on millimetre Wave Transmission. Both of these will deliver their results well in advance of 5G standards. We also receive an update from our highly successful Industry Specification Group on Network Functions Virtualisation, which has recently completed its first phase of activity.

oneM2M, our partnership project for Machine to Machine communication and the Internet of Things, has just completed its first release of specifications. You can read about the highly successful oneM2M Showcase held at ETSI in December, as well as the oneM2M white paper, released at the same time as the specifications.

Our new Seconded European Standardization Expert for China (SESEC) has recently taken up her post. In the same way as the SESEI has been of great benefit in developing ETSI's relations in India, we expect the SESEC to help expand ETSI's visibility in China. You can read about the SESEC expert's background and her approach to this challenging task.

In addition to these articles, we have our regular roundup of news stories from ETSI: the election of the new chairman and vice-chairs of our General Assembly, and the chairman of the Board; results from Industry Specification Groups on Low Throughput Networks and Surface Mount Techniques; progress in our Smart Appliances work, as well as details of the workshops and events we have planned over the coming months.

I hope that you enjoy this issue,

Luis Jorge Romero, Director General, ETSI

The SESEC Project Officially Launched in China

The Seconded European Standardization Expert in China (SESEC) is a visibility project co-financed by the European Commission (EC), the European Free Trade Association (EFTA) secretariat and the three European Standardization Organizations (CEN, CENELEC and ETSI).

Since 2006, there have been two SESEC projects in China, SESEC I (2006-2009) and SESEC II (2009-2012). The project partners worked closely together to implement the third phase of the SESEC project, which builds on the experience that was acquired during the previous phases. In December 2014, SESEC III was officially launched in Beijing, China. Dr Betty XU was nominated as the SESEC expert and will spend the next 36 months on promoting EU-China standardization information exchange and EU-China standardization cooperation.

Betty Xu was born in China and got her university education in China. She holds a PhD in Electrical Engineering from the University of Queensland (Australia), and has extensive industry experience gained while working for Chinese and multinational companies. Betty Xu has been involved in national and international standardization activities since 2006, and chaired the Standardization and Conformity Assessment Working Group of the European Union Chamber of Commerce in China (EUCCC) for more than three years. Dr Xu has also worked for the Australian National Standardization Body and National Electrotechnical Committee (Standards Australia). From September to November 2014, Dr Xu was trained by the SESEC project partners in Europe. During these three months, she had opportunity to meet various members and partners of ETSI. Dr Xu also attended the ETSI General Assembly in November and learned a lot about standardization activities in several priority sectors that have been identified, including Internet of Things, M2M, Future Networks, Smart topics and security.

The SESEC project supports the strategic objectives of the European Union, EFTA and the European Standardization Organizations (ESOs). Its ultimate goal is the enhancement of EU-China dialogue and cooperation in the field of standardization. In particular, it is expected to support the Framework Cooperation Agreement between the ESOs and SAC, the National Standardization Body (NSB) of China. Betty Xu speaks English and



Mandarin fluently, which will be a big benefit for SESEC project acting as the interface between the European Standardization System and China.

After moving to Beijing in December 2014, Dr Xu's first months were



dedicated to meeting and introducing the SESEC III project to all relevant stakeholders, including the government, industry and research institutes. As a result, the establishment of the new SESEC Project has been very well received and welcomed by the Chinese stakeholders. Several contacts have already been refreshed and progress is being achieved in topics of importance to ETSI, for instance discussions on cooperation agreement renewal with CESI (China Electronics Standardization Institute), and information exchange with Intelligent Transport Systems (ITS) communities in China. Several newsletters and special reports on some identified priority sectors were also made.

Dr Xu's months to come will be committed to continuing to establish and strengthen EU-China cooperation on standardization by increasing the visibility of the European Standardization System in China.

The project website will be online shortly, where those interested can follow Dr Xu's activities and subscribe to a regular newsletter, similar to that already in place for the Seconded European Standardization Expert in India (SESEI) (www.eustandards.in).

NGMN Industry Conference & Exhibition 2015 24-25 March 2015, Frankfurt, Germany

ETSI is pleased to endorse the NGMN Industry Conference and Exhibition, 24-25 March 2015, in Frankfurt, Germany. The highlight of the event will be the presentation of the NGMN 5G White Paper, the consolidated 5G operator requirements intended to guide the development of 5G mobile systems.

Please visit <http://ice2015.ngmn.org> for more details.



NGMN Industry Conference &
Exhibition 2015
24 – 25 March 2015
Kap Europa, Frankfurt,
Germany

ETSI issues new specification for Embedded Communication Modules for Machine to Machine Communications

ETSI's Industry Specification Group for Surface Mount Technique has released its Group Specification for Embedded Communication Modules for Machine to Machine Communications.

Embedded communication modules based on surface mount technology, where the module is soldered directly on the main circuit board, offer significant advantages in terms of cost and flexibility of the manufacturing process when integrating communications functionality into a larger device or system.

ETSI's specification for embedded communication modules, GS SMT 001, provides common physical specifications or form factors and common electrical characteristics for modules. This will enable widespread adoption of common form factors allowing easier transition to next generation communication modules, will ease development for device vendors due to consistent designs and offer a second source option for integrators.

"Any Machine to Machine application, whether it be a tablet, eReader, personal health monitoring device or a smart utility meter, relies on a hardware module that provides 2G, 3G or 4G connectivity" says Johan Zuidweg, chairman of ISG SMT. "These modules must be very small and must withstand extreme temperatures, vibrations or other physical conditions. As wireless devices proliferate, the market for such modules expands and a specification was needed."

The specification covers electrical as well as mechanical aspects including the I/O interfaces, their assignment to pads, pad placement and module dimensions. It also takes into account environmental considerations which affect electrical and mechanical aspects. The group specification covers the majority of use cases for embedded wireless modules. Yet not every pad or function is fully characterized thus leaving room for custom flexibility and future functionalities. Module suppliers may select which interfaces, capabilities, and configuration they intend to supply, based on their market demand.

ETSI GS SMT 001 will facilitate economies of scale, allowing communication capabilities to be integrated into more and more devices and products, and will become an important hidden enabler for widespread adoption of Machine to Machine communications, leading to the Internet of Things.

NetSoft 2015 13-17 April, London, UK

1st IEEE CONFERENCE ON
NETWORK SOFTWARIZATION



Bridging Networking with IT

LONDON, U.K. – APRIL 13-17, 2015

<http://sites.ieee.org/netsoft/>



CALL FOR PAPERS

ETSI is pleased to endorse NetSoft 2015, the first IEEE International Conference on Network Softwarization, which is being held at the Cruciform Building of University College London, UK, from 13 to 17 April 2015. The conference will explore how SDN, NFV and network programmability are creating the conditions to reinvent network and cloud architectures, accelerate service deployment and facilitate infrastructure management.

Visit the conference website at:
<http://sites.ieee.org/netsoft/>



Meet ETSI & 3GPP at Critical Communications World 19-21 May 2015



19-21 May 2015
Fira Gran Via, Barcelona



ETSI and 3GPP are pleased to endorse the 17th Critical Communications World, incorporating the Tetra World Congress, taking place on 19-21 May 2015 at the 'Fira Gran Via' in Barcelona.

ETSI and 3GPP are actively participating in the event and conference attendees will be given the opportunity to hear presentations from both organizations:

Adrian Scrase, ETSI's CTO & Head of 3GPP Mobile Competence Centre, will be presenting 'Developing Critical Communications Standards For Today And Tomorrow' from an ETSI perspective.

Andrew Howell, convenor of 3GPP Mission Critical Working Group SA6, will report on the creation of the 3GPP SA6 Working Group, to cover application elements and interfaces supporting specialized communication over 3GPP systems - Initially focusing on Mission Critical Communications work.

Visit the joint ETSI/3GPP booth A102 to get the latest updates on our standardization activities for public safety.

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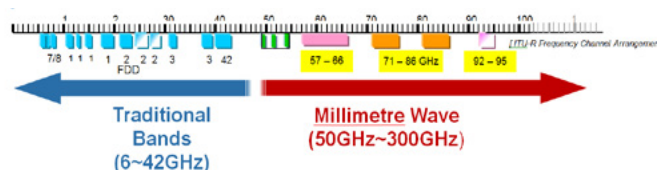
New Industry Specification Group on millimetre Wave Transmission at ETSI

ETSI has created a new Industry Specification Group (ISG) to work on millimetre Wave Transmission (mWT), with the first meeting held at ETSI on 14-15 January 2015.

There is increasing interest in using millimetre wave spectrum, in the 30GHz to 300GHz range, for radio transmission. There is one order of magnitude of more spectrum available in this band than in lower bands. Larger bandwidth channels are possible, of 2GHz, 4GHz, 10GHz or even 100GHz. This allows radio systems to offer fibre-like capacity. The spectrum can be made available quickly, and can be reused easily with the limited propagation range in this band. Lower spectrum license costs also lead to a lower total cost of ownership and lower cost per bit of radio systems using this spectrum.

However there are barriers to using this spectrum. Regulations for millimetre wave radio differ greatly from country to country. There is a lack of key components leading to high equipment costs. There is huge variety in the types of equipment and applications using this spectrum and there is still a lack of confidence in the technology.

ETSI's new Industry Specification Group on millimetre Wave Transmission (ISG mWT) will facilitate the use of the V-band (57-66 GHz), the E-band (71-76 & 81-86 GHz) and, in the future, higher frequency bands (up to 300 GHz) for large volume backhaul and fronthaul applications to support mobile network implementation, wireless local loop and any other service benefitting from high speed wireless transmission.



The approach is to analyze issues, to exchange information and to develop common views across the industry, on subjects including regulation and licensing schemes, propagation channel models, simulation results, measurements, semiconductor technology roadmaps, and experiences gained from early roll-outs and trials. Other ISG mWT work will focus on use-cases and requirements and identify the most suitable millimetre wave bands for the most important transmission applications.

At the ISG's first meeting Mr. Renato Lombardi of Huawei Technologies was elected as the chairman of the Industry Specification Group while Mr. Nader Zei of NEC Europe was elected as the vice chairman.

"ISG mWT was conceived as an industry wide platform to prepare for large scale usage of millimetre wave spectrum in current and future transmission networks by improving the conditions to make millimetre wave spectrum a suitable and convenient choice for all stakeholders. The ISG aims to be a worldwide initiative with global reach and to address the whole industry: national regulators, standards organizations, telecom operators, product vendors and key component vendors." says Mr. Lombardi.

During the meeting, a plan was agreed to develop five new specifications. These cover:

- An analysis of the maturity and field proven experience of millimetre wave transmission
- Potential applications and use cases of millimetre wave transmission
- An overview of V-band and E-band worldwide regulations
- An analysis of V-band street level interference
- Analysis of the millimetre wave semiconductor Industry technology status and evolution.

Participation in the millimetre Wave Transmission Industry Specification Group is open to all ETSI members as well as organizations who are not members, subject to signing ISG Agreements. A complete list of ISG mWT members is published on the ETSI Portal pages for mWT.

For information on how to participate please contact ISGsupport@etsi.org.

ETSI - Bringing People Together

ETSI's entrance hall has been enlightened with a new installation. This interactive design *"Bringing People Together"* visualizes the Members of ETSI and their joint force when working together to create standards.

ETSI is seen as the lighthouse leading the way in the world of technology by bringing people together and facilitating the standards creation process.

Each box represents an ETSI Member. Stand-alone a Member is bright, and when Members come together in ETSI, they shine even brighter.

The interactive design was developed and constructed by Ms. Stine Lund, a student of Experience Design at Aalborg University, Denmark. Stine was at ETSI for 4 months' work experience.



oneM2M unveils Release 1 standards - World's First Global Standards for M2M Deployment - continued (from page 1)

oneM2M's Release 1 is a set of 10 specifications, all publicly available from oneM2M's website at www.onem2m.org/release1, covering requirements, architecture, API specifications, security solutions and mapping to common industry protocols such as CoAP, MQTT and HTTP. oneM2M Release 1 also makes use of OMA (Open Mobile Alliance) and Broadband Forum specifications for Device Management capabilities. Release 1 provides sufficient building blocks to enable today's generation of M2M and IoT applications to interwork with each other.



"Release 1 utilizes well-proven protocols to allow applications across industry segments to communicate with each other as never before – not only moving M2M forward but actually enabling the Internet of Things," said Dr Omar Elloumi, Head of M2M and Smart Grid Standards at Alcatel-Lucent and oneM2M Technical Plenary Chair.



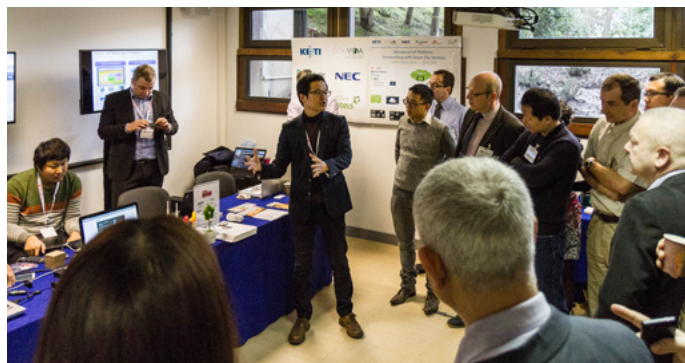
"Having such a set of specifications working together at the service layer to truly stitch M2M together will allow service providers to support applications and services across a range of industries. This opens up a whole new world - a future of seamless interaction to transform the way we all work and play in the future."

"The horizontal service platform we have created is already useable over several underlying transport technologies, such as Wi-Fi, fixed-line, and cellular. This reduces the complexity for the M2M application developer, allows lower CAPEX and OPEX for the service providers and creates a world where ultimately people will interact more seamlessly with other people and machines in their daily lives," he added.

oneM2M Release 1 follows the announcement last August of oneM2M's Candidate Release specifications – the first circulation of the specifications which have now become Release 1. In December a highly successful showcase event took place at ETSI, where demonstrations were

conducted by leading technology companies and organizations. At the showcase the first commercial deployments of oneM2M were announced. A series of four webinars were also held leading up to the showcase, and these are still available for viewing from the oneM2M website.

"But this is just the start of our role in the process. We now need to work on making the whole experience of using M2M much easier for everyone, as well as looking to achieve further seamless interworking with other IoT technologies through collaboration with the groups working on them," added Dr Elloumi.



In addition to its Release 1 set of specifications, oneM2M has also published a white paper (www.onem2m.org/whitepaper) which provides an overview of the issues facing the M2M and IoT market and how oneM2M will contribute to solving them.



ETSI continues work on Smart Appliances

In the future, domestic or industrial energy using and producing products, also called appliances, will not be stand-alone systems anymore. They will be highly intelligent, networked and smart devices, which form complete energy consuming, producing, and managing systems. One of the requirements for making such systems commercially successful and widely adopted, is that they can be extended over time according to the needs and budget of the user. Such systems will therefore consist of devices from different vendors added at different points in time, with open interfaces enabling further extension. These systems will also need to be able to communicate with service platforms from different energy service providers.

The European Commission has launched a "Study on the available semantics assets for the interoperability of Smart Appliances; Mapping into a common ontology as a M2M application layer semantics" (SMART 2013/0077), which will provide input to ETSI's TC SmartM2M. The Dutch research institute TNO is performing this study.

To date, ETSI together with the European Commission has held three open workshops on the subject of Smart Appliances: the first on 27-28 May 2014 in Brussels, the second on 14 October 2014 at ETSI, and the third on 10 February 2015 in Brussels again. Participants have included manufacturers of home and building sensors, white goods, HVAC, lighting, micro-renewable home solutions, the construction and facility management sector, the energy Sector, the ICT industry at large and standardization organizations.

At each workshop, TNO have provided an update on their study and ETSI an update on the standardization work. The workshops offer an opportunity for discussion on the ontology, on mapping to ETSI's and oneM2M's M2M architecture, and on certification.

New ETSI specification for Internet of Things and Machine to Machine Low Throughput Networks

ETSI's standardization group dedicated to Low Throughput Networks technology has just released the first three specifications of an Internet of Things (IoT) network dedicated to low throughput communications.

These new requirements provide a breakthrough in the machine to machine business, allowing object connection for a few euros per year, with a few milliwatts for transmission and a modem costing less than 1 euro. The key to the success of IoT standardization and implementation, these assumptions are the basis for many new and innovative applications.

Low Throughput Network (LTN) technology is a wide area bidirectional wireless network with key differentiators compared to existing networks. It enables long-range data transmission (distances around 40 km in open field) and/or communication with buried underground equipment and operates with minimal power consumption allowing several years of operation, even with standard batteries. This technology also implements advanced signal processing that provides effective protection against interference.

As a consequence, LTN is particularly well suited for low throughput machine to machine communication where data volume is limited and low latency is not a strong requirement. Applications include remote measurement, smart metering for water, gas or electricity distribution or smart cities applications such as air pollution monitoring or public lighting.

LTN could also cooperate with cellular networks to address use cases where redundancy, complementary or alternative connectivity is needed.

Providing connections to the billions of connected objects projected to form part of M2M and the IoT networks is a major challenge. A great number of these objects need only low throughput connectivity, but they also require an efficient connection that is both cost effective and low energy-consuming.

LTN IoT networks have a similar topology to existing networks used for high data rates and dynamically adapt power and frequency in the same way, but will also manage new requirements concerning power consumption and the number of base stations required to cover an entire country. Low power, very low throughput, long battery life, simple, effective and robust radio communication principles are the key features of the first ETSI LTN specifications. The three new ETSI group specifications defining LTN are GS LTN 001 containing the use cases, GS LTN 002 describing the functional architecture and GS LTN 003 defining the protocols and interfaces.

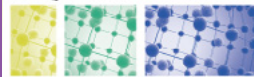
ETSI develops new Test Description Language for automated testing support

ETSI's Technical Committee for Methods for Testing and Specification (MTS) has launched a new specification language to assist in developing test specifications. The Test Description Language is a standardized test modeling language with an XML-based exchange format and a common information platform. This allows alternative views of tests: graphical using sequence charts, or text-based. The language was designed to meet industry needs, as well as for use by ETSI's technical bodies in developing standardized test specifications. The language fulfils the need for a simple testing approach for complex systems, fitting easily into an agile development environment. In this respect it complements TTCN-3 by providing a higher level of abstraction of tests and a better overview of test case behaviour. TC MTS plans further extensions to the language and industry tool support is currently under development.

NFV World Congress 5-7 May 2015, San Jose, US

NFV WORLD CONGRESS

May 2015 | Silicon Valley, USA



Accelerating
Carrier Innovation
with NFV & SDN



The NFV World Congress is taking place
in San Jose, US, on 5-7 May 2015,
organized by Layer 123, and ETSI is pleased to endorse it.
This will be the first NFV World Congress to take place
and will feature speakers from ETSI's Network Functions
Virtualisation (NFV) Industry Specification Group.

For more information please visit:
www.layer123.com/nfv

Upcoming ETSI event

3rd UCAAT User Conference on Advanced Automated Testing



Sophia Antipolis, French Riviera
20-22 October 2015



UCAAT is ETSI's annual conference on test automation focusing on both automated test design and test execution automation. The conference brings together experts from industry and academia to share their experience in advanced test automation techniques, methods and tools.

UCAAT is dedicated to the practical engineering and application aspects of automated testing including model-based testing, test methodologies, test management and use of test languages such as TTCN-3. This industrial conference gives users from different application domains such as Telco, Banking, IT Services, Automotive, Robotics, Software vendors and Defence a chance to meet and share their practical experiences & lessons learned.

For more information, please visit <http://ucaat.etsi.org/2015/>

ETSI Network Functions Virtualisation: first phase completed, 2nd phase on its way and successful PoC event

Phase 1 completed in record time

ETSI's Network Functions Virtualisation (NFV) Industry Specification Group (ISG) has successfully completed Phase 1 of its work with the publication of 11 ETSI Group Specifications. These specifications build on the first release of ISG documents published in October 2013 and include an infrastructure overview, an updated architectural framework and descriptions of the compute, hypervisor and network domains of the infrastructure. They also cover management and orchestration, security and trust, resilience and service quality metrics.



These documents result from two years of intensive work by more than 240 organizations sharing the same common goal to quickly define Network Functions Virtualisation.

"I'd like to thank all of the NFV ISG participants for their tremendous dedication through our numerous face-to-face meetings and conference calls to evolve the NFV vision from the original operator white paper and bring these documents to publication" said Steven Wright, Chair of ETSI NFV ISG.

NFV ISG Continues

NFV Phase 2 is now well underway. Work started immediately after the eighth plenary meeting in November 2014 on 28 new documents and more are expected over the coming two years. The main objectives of this second phase of work are to encourage interoperability building upon the achievements made in the first two years of the ISG. This new phase of work will include both normative and informative content. Adding normative requirements will provide the clarity required for interoperability and formal testing. Another key element of Phase 2 will be to work more closely with other standards bodies to help focus their



work and to avoid duplication, and to collaborate within open source projects developing NFV implementations.

Proof of Concept: a real success in Düsseldorf

One critical success factor recognized up front within the NFV community was the need to motivate operators and vendors alike to validate key concepts through Proof of Concept (PoC) demonstrations. The NFV ISG



PoC initiative has already elicited strong vendor and operator interest, with several alliances already coalescing to validate a broad range of network functions.

ETSI has partnered with Layer123 for the SDN & OpenFlow World Congress, which took place on 14-17 October 2014 in Düsseldorf, Germany. ETSI organized the first ETSI NFV PoC ZONE as an integral part of the event. The ETSI NFV PoC ZONE was an area within the exhibition, dedicated to the demonstration of Network Functions Virtualisation Proofs of Concept (NFV PoCs) accepted by ETSI NFV ISG.



The ETSI NFV PoC ZONE has enabled the demonstration of 12 multi-vendor Proof of Concept (PoC) projects that have been developed according to the NFV ISG PoC Framework. It was a unique opportunity to gain first-hand knowledge and insight about NFV technology and help identify which NFV solutions may be viable in the network.

"The ETSI NFV PoC ZONE is an important opportunity to gauge industry prowess on NFV implementation and to interact with the PoC participants to discuss their results, learn about the challenges they faced and what they see as the next steps for NFV implementation" - Don Clarke, Chair of the Network Operator Council, ETSI NFV ISG.

NFV PoCs are intended to demonstrate NFV as a viable technology. Results are fed back to the NFV Industry Specification Group. NFV PoCs also help to develop a diverse, open, NFV ecosystem.

NFV is progressing rapidly, driven by unprecedented network operator collaboration and extensive industry support. By motivating members to validate novel NFV-driven applications leveraging PoCs, the NFV ISG seeks to accelerate adoption of NFV for a broader range of applications. As the requirements firm up, and lab investigations and subsequently trials begin to emerge, NFV is poised to reshape the carrier landscape with a pervasive impact to streamline operations.

Watch the video of the NFV PoC Zone at the SDN & OpenFlow World Congress at:
www.vimeo.com/channels/etsi/112084328

5G Outlook: Technology, Standards, Applications.

What can we expect? - continued (from page 1)

The GSMA has recently released a white paper on 5G. They describe two alternative definitions of 5G. One defines 5G as a consolidation of existing and new radio technologies to provide greater coverage and a more reliable 'always-on' experience. The other concerns a step change in data rate and an order of magnitude improvement in latency. The GSMA describes a set of requirements for 5G systems to meet which has evolved from research studies:

- 1-10Gbps connections
- 1 millisecond end-to-end round trip delay (latency)
- 1000x bandwidth per unit area
- 10-100x number of connected devices
- (Perception of) 99.999% availability
- (Perception of) 100% coverage
- 90% reduction in network energy usage
- Up to ten year battery life for low power, machine-type devices.

It may not be possible to meet all these requirements with a single radio technology, and some, in particular the latency requirement, may not be met until well into 5G's lifetime.

The NGMN (Next Generation Mobile Networks) Alliance, a consortium of many of the world's largest mobile network operators, is developing its view of 5G mobile requirements. NGMN will release a white paper in March this year which will outline the end-to-end requirements that they expect future 5G systems to meet. In an executive version of their paper, released in December 2014, they outline an end-to-end vision of 5G networks which goes beyond radio interface aspects and which encompasses core network evolution. They believe that 5G networks will combine a number of radio access technologies, with the potential need to develop a new access technology to meet some of the 5G requirements they have outlined.

The NGMN has also proposed a timetable for 5G development that points to first deployments occurring around 2020.

Technologies for 5G

Whatever technology choices are made for 5G networks, they must clearly satisfy some high-level characteristics: they must offer much greater capacity than current networks can be expected to offer; they must be cheaper to deploy and install, and their operational costs must also be much lower – in particular they need to offer significant savings in energy consumption over today's networks in order that such massive use of mobile connectivity be economically and ecologically viable.

The European Union has established a 5G Public Private Partnership (5GPPP) in 2013, announced at the 2014 Mobile World Congress. This programme will invest an EU budget of €700m in research, development and innovation on 5G over the next six or seven years, matching a corresponding investment by industry. A previous round of funding from the EU resulted in projects such as METIS and 5GNow. These projects have been developing requirements and exploring potential technologies for 5G.

Some of the technologies and techniques being considered include making use of new spectrum bands including millimetre wave spectrum (30-300 GHz), increasing use of shared spectrum, very large MIMO, non-orthogonal waveforms, moving networks, context awareness, and integrating broadcast solutions into a 5G interface – to cater for broadcast type content increasingly being delivered to mobile users.

5G is not an exclusively European effort, of course. Each region of the world is pursuing the development of 5G technologies, and the various research initiatives exchange information in the many international conferences on the subject. Structures such as the Wireless World Research Forum assist in this dialogue. The key industry players are involved in these initiatives, and the dialogue they have established will be continued into the standardization forum as the research progresses towards development and implementation.

Continued Development of 4G

4G LTE technology is only at the early stages of its development, despite already performing well beyond initial expectations. The peak capabilities of 3G and earlier

2G technologies were reached between 15 and 20 years after their launch. Similarly, with a market launch in 2010, LTE will continue to evolve well into the early years of 5G deployment.

Many of the techniques being considered for 5G technologies are in fact expected to appear in LTE. Beyond the deployment of LTE-Advanced, expect to see extended channel aggregation, dual carrier or dual connectivity, congestion control for M2M traffic, interference cancellation techniques, and efforts to increase spectral efficiency and take LTE into higher spectrum than is currently used.

With such a large scope for development and enhancement of LTE, it's not unreasonable to believe that LTE will evolve to meet many of the performance requirements of 5G networks.

Standards for 5G

While we don't yet know what a 5G standard will contain, there are some aspects which we can predict. 5G will be a mobile technology, by definition. The mobile industry develops its standards in 3GPP, a partnership between seven different standards bodies, including ETSI. 3GPP has proven to be very successful in delivering high quality specifications which meet industry needs. Therefore we expect that 3GPP will develop the dominant 5G standard, mirroring the development of LTE. This is not to deny the fact that 3GPP will have to work with other standards bodies to build components of a 5G network.

In order to meet the anticipated launch date of 2020 for initial deployments, standards must be available by the end of 2018. To achieve this, standardization will have to start approximately 2 years earlier, during 2016. This implies initial preparation work must be carried out during this year – which is already happening, both in 3GPP, and of course in parallel in NGMN, GSMA and ITU.

A 5G radio access technology alone will not achieve all the performance expectations outlined above. Significant enhancements are required for the core network. Standardization is already underway in technical fields such as Software Defined Networking (SDN), Networks Function Virtualisation (NFV), autonomic network management, mobile edge computing etc. This work doesn't need to wait for a formal definition of 5G, and ETSI is already developing standards for these topics, as they will benefit 4G and 5G networks alike. Likewise, preparatory standardization which will benefit 5G is underway in ETSI, in our work on millimetre Wave Transmission, Mobile-edge Computing, and our work on shared spectrum management techniques in our Reconfigurable Radio Systems committee.

Conclusion

A strict definition of 5G is not yet agreed, but key characteristics have emerged and are already influencing standardization. The anticipated delivery date of 2020 is realistic, and approaching rapidly. In preparation, ETSI has already commenced work on technologies which can be components of 5G.

5G will be a global technology, and we anticipate that the principal 5G standard will be developed by 3GPP, bringing together the many initiatives and trials that are underway throughout the world. 3GPP continues to develop today's 4G LTE standard and it may well qualify as being capable of 5G performance at the peak of its development.

5G should offer an experience of being always connected, always in coverage, with very high capacity and bandwidth. Predicting the services which can make use of this type of connectivity is difficult: much depends on the price at which 5G is offered, and the cost of deployment and operation for network operators. If these costs can be constrained sufficiently, we can expect to see mobile connectivity being added to many pieces of equipment and enabling whole new ways of interacting with and using objects around us. We will enter a world of truly pervasive connectivity which even the most avid user of mobile technology today cannot imagine.

by Luis Jorge Romero, ETSI Director General.

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We expect that 3GPP will develop the dominant 5G standard, mirroring the development of LTE

Each region of the world is pursuing the development of 5G technologies

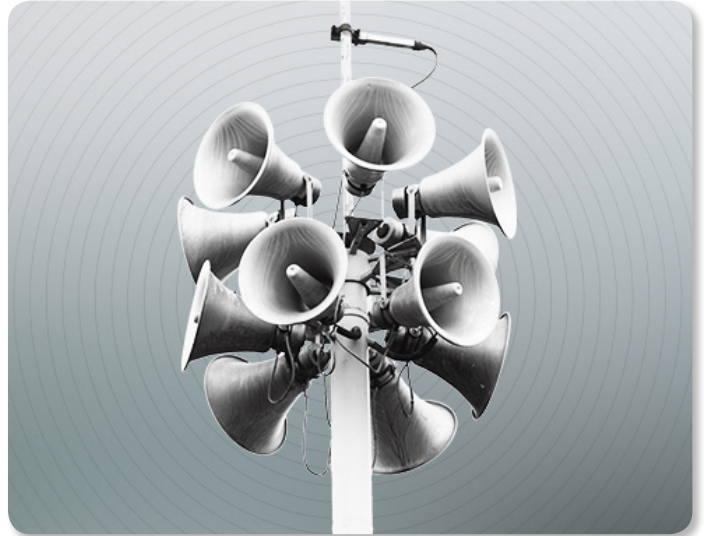
ETSI Summit on Critical and Emergency Communications explores solutions to make the world safer for all

The ETSI summit on critical and emergency communications, held on 20 November 2014 in ETSI's newly extended amphitheatre in Sophia Antipolis, attracted participants from many sectors. Regulators, public authorities, users, analysts, standard organizations and industry associations gave insights of their expertise and shared their own experiences in the provision of critical and emergency communications, or in using these technologies to save lives.

Through short and highly interactive presentations, topics covered included public warning systems, citizen to authority communications, LTE for critical communications and post incident recovery and disaster relief. Feedback from outside Europe showed that education was key to the successful implementation of public warning systems, and that several communication channels such as broadcast, mobile or IP based systems had to be used. To contact authorities and emergency services, citizens should gradually be able to use modern social media networks, SMS or apps along with traditional telephony, and emergency services need to be reachable by people of all abilities.

The summit also addressed issues to be resolved for the 112 eCall service of automatic vehicle crash notification, including the need to choose a technology that would not become obsolete during the lifetime of the vehicle. LTE, standardized by 3GPP, is now being considered for use alongside TETRA to provide broadband services to first responders, either through private or public mobile networks. But interoperability is a key factor and European member states must work at harmonizing their views. In post-incident recovery and disaster relief scenarios, it was said that satellite communications could complement mobile communications, provided interoperability between terrestrial and space segments is enabled.

The summit established that if standardized critical communications solutions offer significant economy of scale, clear policy supported by regulation is needed to speed up adoption of standards. Economic issues are just as important. These may include allocating sufficient resources to all parties (end users, first responders, public authorities), or using innovative cost or resource sharing models between the public and private sectors, in order to deploy an end to end emergency service.



ETSI has established itself as a leader in the standardization of technologies for critical and emergency communications. While the TETRA radio system is now sold throughout the world, numerous standards activities related to emergency communications are ongoing. ETSI public safety standardization ranges from maritime personal emergency locator beacons to public warning systems. ETSI is also analyzing how to correctly locate those who place emergency calls on VoIP systems – when these systems may not be managed or located in Europe. And the Satellite Emergency Communications work will most likely have its greatest impact in disaster relief operations in remote areas of the globe.

ETSI's Critical Communications Summit was a unique opportunity to share and receive information on state of the art developments, and debate with key decision makers in this sector.

ETSI renews leadership team, appoints Mr. Simon Hicks as General Assembly Chairman

At their 64th General Assembly held on 18-19 November 2014, ETSI members have appointed Mr. Simon Hicks of the UK government Digital Economy Unit as Chairman of the ETSI General Assembly, for a two-year term of office.

At the same time, ETSI members have appointed Mrs. Isabelle Valet-Harper of Microsoft, and re-appointed Mr. Peter Statev of SBS (Small Business Standards) as vice-chairs of the General Assembly.

Also in the General Assembly, the members elected a new ETSI Board and selected Mr Dirk Weiler of Nokia Networks as Chairman of the ETSI Board.

Mr. Hicks is Principal Technologist in the joint departmental Digital Economy Unit, responsible for the development of UK policy for standards and technology activity in ICT, electronic communications and cyber security. A Chartered Engineer and corporate member of the Institution of Engineering and Technology, Mr. Hicks is also the UK's representative on the European Commission's Multi-Stakeholder Platform on ICT Standardization. Mr. Hicks has served as vice-chairman of the ETSI Board and has been a member of the Board of ETSI since 2002.

Mrs. Valet-Harper is Senior Standards and Interoperability Strategist at Microsoft. She has been a member of the ETSI Board since 2011, and has participated in a number of French, European and international standards bodies over the past 25 years, holding numerous official positions.

Mr. Statev is co-founder and chairman of the managing board of the Bulgarian Cluster for Information and Communication Technologies as well as co-founder and vice-chairman of the Bulgarian Association of Business

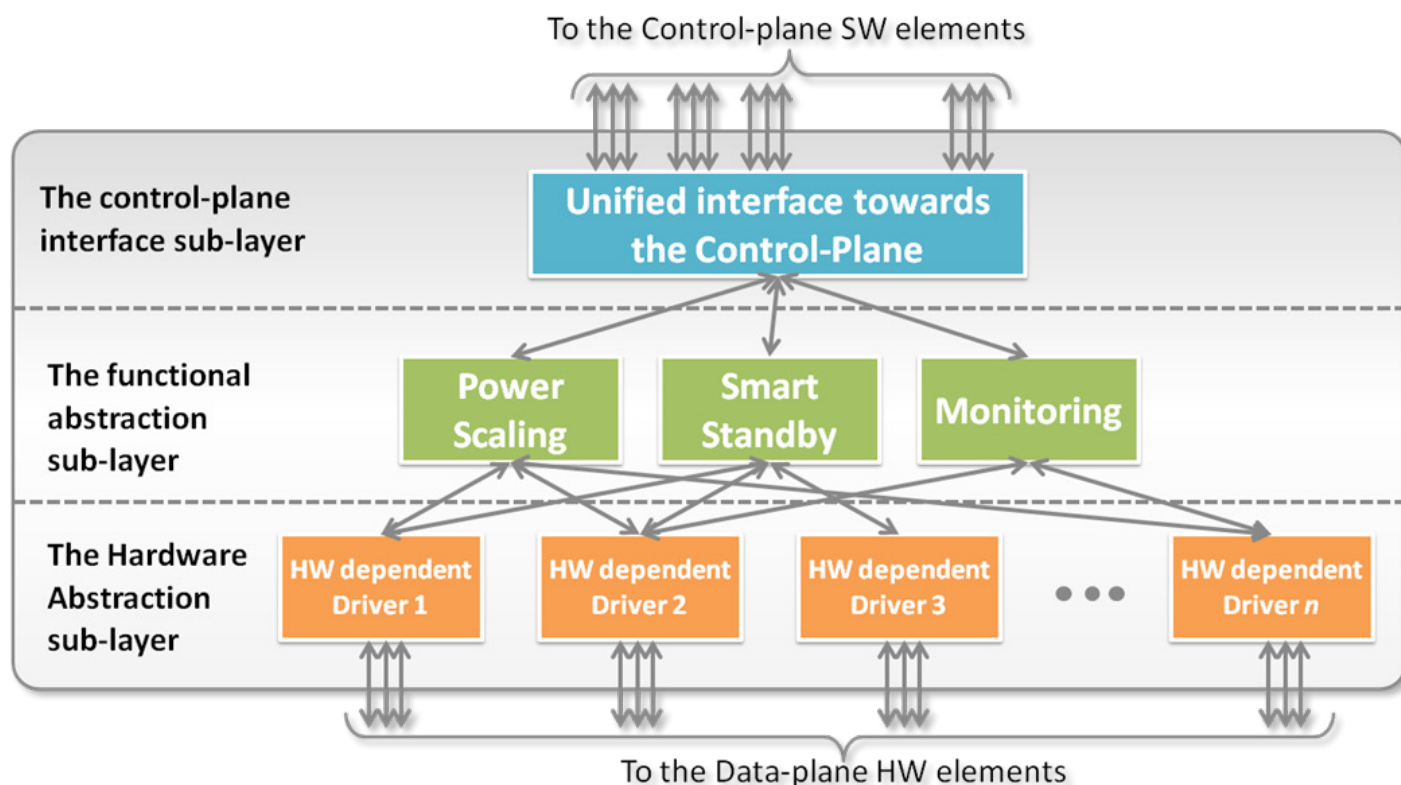
Clusters. He is also chairman of Smartcom Group, a leading telecom system integrator and developer in the Balkan region. He represents Small Business Standards, the association established with the support of the European Commission to represent European SMEs in the standards making process at European and international levels.

Mr. Weiler is Head of Standards Management at Nokia Networks. He has served as chairman of the ETSI General Assembly for the four years since 2010 and has served as chairman of the ETSI IPR Special Committee since 2008. Mr. Weiler is also the ETSI representative to the European Commission's Multi-Stakeholder Platform on ICT Standardization. In addition to his ETSI roles, Mr. Weiler is a member of the German DIN Presidential Committee FOKUS.ICT and Vice Chairman of the German ICT industry association BITKOM Working Group on standardization.

ETSI's Director General, Mr. Luis Jorge Romero, works closely with the leaders of the General Assembly and the Board in the management of the institute. The General Assembly is the highest authority of the Institute, it meets twice yearly and is made up of the entire ETSI membership. Its chair and two vice chairs are elected for a two-year term of office and can serve a maximum of two consecutive terms.

The ETSI Board meets more regularly and operates under powers delegated by the General Assembly, in particular being responsible for managing ETSI's Technical Committees. The new Board consists of 29 members, including representatives of SMEs and of Users. Members of the ETSI Board are elected for a three-year term of office.

Green Abstraction Layer standard to manage energy consumption of telecom networks



A new ETSI Standard - the 'Green Abstraction Layer (GAL)' – enables operators for the first time to manage the energy consumption of telecom networks easily, offsetting network performance and capacity against energy costs.

Network efficiency is an important goal for telecommunications operators today but telecom management systems are not designed to be sufficiently flexible or scalable to manage energy efficiency. Traditionally, to improve energy efficiency, operators have had to install more energy-efficient equipment, with consequent upgrading costs. Instead, network device manufacturers and operators have adapted their network capabilities – and hence their energy requirements – to actual traffic profiles, but there is no easy way to monitor or set this configuration.

Now ETSI has published ETSI Standard ES 203 237 – the 'Green Abstraction Layer' (GAL), opening the way to managed energy efficient networks of the future. The GAL is an architectural interface/middleware that gives access to the green networking capabilities of specific devices. It is then able to adapt energy consumption to take account of load variations. The GAL offers a framework for information exchange between power-managed data-plane entities and control processes. It enables energy management protocols to determine consistently which power-management capabilities are available at the data-plane, their potential effects on both energy

consumption and network performance, and how to interact with them. The protocols can then be insulated from the specific hardware features of underlying devices and still choose the most suitable energy configuration. As a result, operators can now dynamically seek better trade-offs between network performance, capacity and energy costs.

GAL-enabled applications can be developed easily and installed in telecom management systems to manage the energy efficiency of network devices. Like traditional network systems, the GAL supports the following main functionalities:

- discovery – to retrieve information about available energy configurations and other related information about a network device and its components
- provisioning – to set the energy configuration for a network device and/or its components
- monitoring of the physical devices and relevant parameters.

The GAL was produced by ETSI's Environmental Engineering Technical Committee (TC EE) with the support of the European ECONET project (www.econet-project.eu).

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For more information please visit: <http://dectconference.com/>

ETSI EVENTS CALENDAR - What's on? 2015

10-11 March	LPRA conference	Sophia Antipolis, FR
16-20 March	CeBIT	Hannover, DE
23-25 March	Critical Communications Asia Conference	Kuala Lumpur, MYS
24 March	NGMN Industry Conference	Frankfurt, DE
26-27 March	Intelligent Transport Systems ETSI workshop	Helmond, NL
01 April	Smart Appliances ETSI workshop	Brussels, BE
14 April	Journée Française des Tests Logiciels (JTFL)	Montrouge, FR
29-30 April	M2M for Oil and Gas Conference	London, UK
03-05 June	Sustainability ETSI workshop	Sophia Antipolis, FR
05-07 May	NFV World Congress	San Jose, USA
06 May	Wireless Media Distribution Beyond 2020 ETSI workshop	Sophia Antipolis, FR
19-21 May	Critical Communications World	Barcelona, SP
26 May	Network Virtualization and SDN World	London, UK
22-26 June	Security Week ETSI workshop	Sophia Antipolis, FR
05-06 October	Quantum Safe Cryptography ETSI workshop	Seoul, SKR
05-09 October	Intelligent Transport Systems World Congress	Bordeaux, FR
07-08 October	Network Virtualization & SDN Asia	Singapore, SG
20-22 October	ETSI UCAAT conference	Sophia Antipolis, FR
21-22 October	STQ ETSI workshop	Vienna, AT
01-03 December	Carrier Network Virtualization	Palo Alto, USA

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We are happy to consider contributions from ETSI Members, including 'Open letters to Members' to facilitate your communication with the ETSI community.

Please contact newsletter@etsi.org

About ETSI ETSI produces globally-applicable standards for Information and Communication Technologies (ICT), including fixed, mobile, radio, converged, aeronautical, broadcast and internet technologies and is officially recognized by the European Union as a European Standards Organization. ETSI is an independent, not-for-profit association with more than 700 member companies and organizations, drawn from over 60 countries across 5 continents worldwide, who determine the work programme and participate directly in its work.

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