Enjoy!
THE ETSI MAG

TOMORROW'S WORLD

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ETSI

Editorial

This edition explores what the world may look like in a few years' time.

As I write these words, SpaceX has just launched the first civilian crew into space, leveraging technological innovations we wouldn't have envisioned a few years ago. The new edition of Enjoy! explores what **Tomorrow's World** may look like in a few years' time, what technology breakthroughs we foresee emerging to be part of the 6th generation of mobile telecommunications and what human beings can expect to be using in their daily lives.

Is a pianist going to "feel" his teachers' skills across continents? Is predictive AI going to circumvent the physical restrictions of the speed of light? These are some of the questions that Chair Prof. Mischa Dohler, from Kings College, London, addresses in his interview. As for Alex Gruzen, the CEO of new member WiTricity, he is convinced that innovative wireless charging of electric vehicles will be instrumental in smart mobility. Our **Tech Highlight** section gives you some insight into reconfigurable intelligent surfaces (RIS) and our newly created ISG while in the **Spotlight**, EURECOM highlights the path from research to standardization for 6G.

In our **Zoom on Europe**, DG Connect tells us more about the Smart Networks and Services initiative kicking off and the need to build technology capacities for the following generation. **3GPP** drives us forward as well with Release 17 and its main features, while **oneM2M** is tackling some new issues in Release 4 and in the plans for Release 5.

Demands for network automation, cybersecurity and edge computing will be even stronger in the coming years. Have a look at our latest **Just Released** specifications on these topics.

Please don't forget to nominate our next ETSI fellows and meet our new staff members in the **Inside** section.

Enjoy reading!

Luis Jorge Romero,
Director-General ETSI

New group on **Reconfigurable Intelligent Surface**

The new Industry Specification Group "Reconfigurable Intelligent Surface" (ISG RIS) has been launched with a first meeting on 30 September. RIS relates to a new type of system node with surfaces that may have reflection, refraction, and absorption properties through many small antennas or metamaterials elements which can be adapted to a specific radio channel environment. The ISG will Identify and describe RIS related use cases and deployment scenarios, specify derived requirements and identify technology challenges in several areas including fixed and mobile wireless access, fronthaul and backhaul, sensing and positioning, energy and EMF exposure limits, security and privacy. It will also document a networking e2e reference architecture including RIS elements, describe RIS based specific deployment practice / guidelines, provide a gap analysis for RIS microelectronics and enabling technologies and will make proofs of concepts.
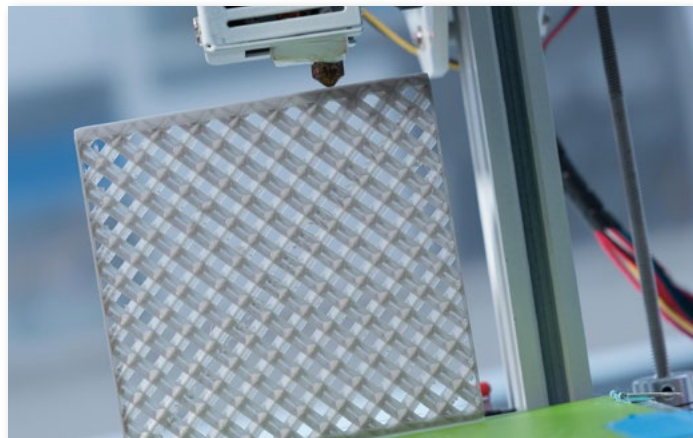
Call for nominations to **the Fellowship award now open!**

The ETSI Fellowship Programme was established to honour and reward those individuals who have made an outstanding personal contribution to ETSI, to building the work of ETSI, or raising its reputation in specific sectors of standardization. Any individual representative of a Member, with the exception of the members of the Awards Committee, may propose a candidate for Fellowship.

Although nominations may be made at any time, ETSI Fellowship awards are announced at the spring General Assembly each year. In order to be considered for an award at GA#79, nominations must be received before 31 January 2022 and sent to the ETSI Director-General using the application form on our website.

In order to increase the visibility and attractiveness of our fellowship wall, we have revamped it totally. It is now located near Athena amphitheatre. We hope you will enjoy it when you are back in our premises!

More information is available on our website: www.etsi.org/membership/fellows

New Chief Executive at partner TCCA

Tony Gray, TCCA's Chief Executive since September 2017, is set to retire at the end of this year. He will be succeeded by Kevin Graham, formerly a founding director of the Australasian Critical Communications Forum, a TCCA affiliate.

During his tenure at TCCA, Tony has overseen the association's transition from its focus on TETRA to a broader range of support,

including driving the development of standards for critical broadband. The number and scope of TCCA partnerships and associates has also been significantly expanded, and the status and importance of the annual Critical Communications World event greatly enhanced. We wish Tony all the best in his retirement and extend a warm welcome to Kevin Graham.

Mischa Dohler—an engineer, a composer and pianist— gives us an insight into a multi-disciplinary future.

Going back to King's College London, after many months of lockdown, you said you were gearing up for 6G. What are the novel concepts of 6G you are pioneering?

I think first that 6G will be the dawn of a machine-driven era, where previously human-designed 5G services and applications will be created by machines for machines and thus replaced by a continuous spectrum of highly volatile services. The big challenge will be on the architecture side.

The second disruption will be the acceleration of the innovation cycles with self-synthesizing networks. My vision is to use AI in the system designs, in the standards and the prototyping phase so that you can reduce the traditional

Chair Professor Mischa Dohler

Mischa Dohler is full Professor in Wireless Communications at King's College London, driving cross-disciplinary research and innovation in technology, sciences and arts. He is a Fellow of the IEEE, the Royal Academy of Engineering, the Royal Society of Arts (RSA) and the Institution of Engineering and Technology (IET), and a Distinguished Member of Harvard Square Leaders Excellence. He is a serial entrepreneur with 5 companies;

composer and pianist with 5 albums on Spotify/iTunes; and fluent in several languages.
He sits on the Spectrum Advisory Board of Ofcom, and acts as policy advisor on issues related to digital, skills and education. He has had ample coverage by national and international press and media, and appears on Amazon Prime.
He is a frequent keynote, panel and tutorial speaker, and has received

numerous awards. He has pioneered several research fields, contributed to numerous wireless broadband, IoT/M2M and cyber security standards, holds a dozen patents, organized and chaired numerous conferences, was the Editor-in-Chief of two journals, has more than 300 highly-cited publications, and authored several books.

10-year cycles of mobile network generations to something significantly shorter. It will be very different to the current plans for partially autonomous networks where humans design the whole system, the architecture, and the protocols and we only use specialized AI to optimize the parameters.

And last but not least, 6G must provide global, and not only local, ultra-low latency. For the internet of skills, we need to come down to a latency of 10 milliseconds, e.g. London to LA takes more than 100 milliseconds with network congestion, application delay and speed of light. The biggest challenge in 6G is to cater for an AI-enabled mobile edge cloud where we use (standardized) predictive AI so that we can circumvent the physical restrictions of the speed of light.

You talked about an Internet of Skills; can you tell us more about that concept?

Remember, the internet has continually evolved from a fixed internet, to a mobile internet, and to the internet of things—what was to come next? The 2014 Ebola crisis inspired me when in Sierra Leone, doctors were telling us they were lacking skills. So I thought why don't we just build an internet which allows us to virtualize the essential skills in the same way as we transmit an audio and video file today? We should seek to transmit physical skills using the internet to the locations they are needed the most. We need to combine three major constituents, edge-robotics such as sophisticated exoskeleton, global low-latency networks and predictive AI to allow us to transfer skills from anywhere to anywhere. For example, I could teach anybody in the world how to play the piano, a surgeon could perform remote surgery.

When performing the World's First 5G Distributed Concert, you gave technology a "soul": how?

The world's first was doing this concert in 2019 with my daughter Noa being 1,000 kilometres away. She was in the Guildhall in London and I was in Berlin under the Brandenburger Tor, playing the piano. We used ETSI OSM to orchestrate that and managed to connect within milliseconds. And why is that important? Because we know that we are in front of somebody physically when the audio and the video

signals come within a few milliseconds, creating an emotional bond. That doesn't happen in online meetings where the latency is often above 100s of milliseconds, but with 5G we proved seamless emotional connections could happen. This is what I call giving technology a soul.

In addition, I really wanted to understand what the end users really needed so we reached out to theatres, hospitals, and other industry verticals. For instance, Jamie Cullum did the world's first three-way 5G music training. All these use cases have shown that low-latency 5G technology may be orchestrated in a way that can really change society.

Cross-Disciplinary Co-Design seems to be one of your research areas…

Yes, I really believe in the original concept of cross-disciplinary co-design. When I started my IoT company, Worldsensing, in 2009, IoT was projected to be a billion-dollar market, but being on the supply side, I realized that both understanding and educating the demand side takes time and resources. So, when I joined King's College in 2013, I applied the experience learnt straight back into the 5G era. I met Professor Prokar Dasgupta, a pioneer in robotic surgery, and we realized that instead of wasting time commuting, we could virtualize his skills and those of other surgeons and distribute those skills remotely. But robotic surgery was missing the all-essential haptic feedback, and this was achieved with the haptic

glove invented by a colleague of mine, Dr Hongbin Liu, so that Prokar would actually "feel" what he was cutting when he operated. Remote surgery is a real opportunity to aid the social divide.

Another area we explored was new art forms. Since the theatre stage hasn't changed in the past 2,000 years, the question was, could we use ultra-low latency, 5G, 6G technology to actually change the platform? We tried to do a Shakespeare play on distributed platforms where we separated the actors, the musicians and the audiences but it was a disaster as it was written for the traditional stage. Then, we hired a screenwriter who wrote a piece of art

where we could really play with space and time. That demonstrated that we could change the platform on which the art is being created and consumed.

What is the hottest topic for you in 2021 as a technology professor and an artist?

I think there are three technical areas which are both disruptive and exciting. First, the next generation of AI by spiking neutral networks on neuromorphic computing architectures. The second one is quantum: when quantum computing becomes mainstream, we will need to rethink opportunities in compute and challenges in security. And the third one is blockchain or distributed ledgers. I have actively contributed to ETSI GR PDL 010, which defines what happens if you use blockchains when part of the connecting network is offline. My dream is to push this as a new function into the future 3GPP architecture.

But as an artist, the hot thing in 2021 is NFT, non-fungible tokens, or how you record your unique piece of digital art using blockchain. The hype around NFTs has dropped a little but I think it will pick up quite soon. I have put some of my compositions as an NFT on dedicated websites. I love it because it combines my tech knowledge with my love for the arts.

Is all of this leading to digital Timeless Memories?

That's a great question, and I like your reference to my composition, Timeless Memories. So, should we keep data forever? We all have what I call a digital aura made up of our data: our mobile phone records, video cameras capturing us, shopping, etc. But if we keep collecting all that data, the energy consumption to just keep it alive will probably at some point be more than what we can afford. So, when do we start compressing this into some digital meta memories, rather than having a factual photo?

Interestingly, blockchain tends to go the other way, as e.g. the Bitcoin chain is being stored on millions of computers. The big question is: can we find something which gives us the peace of mind and data provenance of blockchains whilst being as efficient and effective as a centralized entity? This is a really exciting area for future research and standardization...

Welcome to our NEW members

🇫🇷 **Dust Mobile**, France

Dust Mobile offers protected and resilient mobile communication to support businesses, critical operations and organizations worldwide for exposed individuals and connected objects. Based on a proprietary SIM/eSIM designed as a hardware security module (HSM) and a global GRX/IPX connectivity, Dust Mobile has developed an innovative and disruptive technology – OnSIM®– providing multi-layer authentication, signalling protection, end-to-end security, global resilient connectivity in 203 countries and territories through 580 cellular network partners, transport-layer communication encryption and real-time security monitoring to counter cellular network attacks.

🇱🇺 **East SA, Luxembourg**

EAST develops expertise and IPR in various domains. These include go-to market strategy, technical design and business valuation of telecommunication services offered over broadband wireline and wireless access networks. They offer market survey and technical analysis of smartgrids' technology, for functional design and technical analysis of DPI/PCEF/PCRF-based solutions for real time access and policy control of bandwidth usage and surveys for natural refrigerant heat-pump solutions. Their services include definition and testing of new designs and manufacturing processes for thermodynamic solar panels and applied research on biomass torrefaction and pyrolysis.

🇬🇧 **EIP Europe** LLP, United Kingdom

EIP is one of the world's leading patent law firms providing a multi-disciplinary team which combines patent attorneys and litigators. They actively support clients in a range of licensing matters ranging from due diligence work on acquisitions and investments through to performing pre-litigation and licensing patent claim analysis and assisting with validity challenges in licensing and litigation. Their Licensing and Standards team provide support in the analysis of patent portfolios for licensing-related activities. This advice extends across the lifecycle of portfolios including the acquisition, monetisation, and defence of clients' patents and their inter-play with standards.

🇺🇸 **FiRa Consortium**, USA

The FiRa Consortium is dedicated to the development and widespread adoption of seamless user experiences using the secured fine ranging and positioning capabilities of interoperable Ultra-Wideband (UWB) technologies. They develop compelling UWB use cases based on IEEE 802.15.4, making UWB technology relevant to end users and giving developers powerful reasons to embrace it. They seek to ensure seamless UWB interoperability to offer a better, safer experience. They develop specifications and a certification program to ensure interoperability among chipsets, devices, and solutions.

🇨🇳 **Honor Device Co.**, Ltd, China

Honor is a smartphone brand owned by Shenzhen Zhixin New Information Technology Co. Ltd. It was formerly owned by Huawei Technologies. They provide smartphone handsets targeting young consumers but have also released tablet computers and wearable technology.

🇵🇹 **INESC TEC**, Portugal

INESC TEC is a private non-profit research association, with Public Interest status, dedicated to scientific research and technological development, technology transfer, advanced consulting and training, and pre-incubation of new technology-based companies. They aim to achieve advancement in science and technology and to enable science-based innovation through the transfer of new knowledge and technologies to industry, services and public administration. Their goal is to be a leading Science and Technology Institution at international level, perceived as an important world player, in the domains of Computer Science, Industrial and Systems Engineering, Networked Intelligent Systems, and Power and Energy.

Kepler Communications, Canada

Based in Toronto, the company aims to deliver affordable network connectivity across the globe via a growing network of small satellites. More specifically they are on a mission to build the Internet in space. They are seeking to establish, using the same platform of satellites, an Internet of Things (IoT) communication system that will ease the problems caused by a global disparity between established communications methods and protocols across regions (no antenna currently exists which can communicate across all existing cellular networks). This solution is designed to be a low-power, low-bandwidth, and low-cost connectivity platforms for IoT devices around the globe.

Perey Research & Consulting, Switzerland

They provide industry-specific knowledge and services that are packaged in the way businesses in fast-moving markets need them — concise, concrete and actionable. They offer investors, service providers and technology vendors who want to expand their mobile augmented reality communications and community opportunities the tools and partnerships that they need. This organization works with a variety of internal experts, consultants and publishers to match skills and meet deadlines.

Saab Inc., USA

Saab, Inc. serves the U.S. government, industry, and commercial customers with world-leading products, services and solutions including military and civil security. Saab's U.S. portfolio is based on technology developed both in the United States and in Sweden. Technology is transferred from Sweden where appropriate, while utilizing a supplier base across 24 U.S. states. Among many other solutions, they have supplied radars and sensors, signature management products, aircraft after-market support to Silver Airways, Peninsula Airways, C&L Aviation, and the Argentine Air Force, air traffic control solutions and total airport management solutions.

Ubble, France

In just under 3 years, Ubble has become a major player in online identity verification with their proprietary technology being the only one of its kind. They already have traditional players (Société Générale, Crédit Agricole, Bpifrance) and start-ups (Vybe, Yousign, Heetch, Bolt, Virtuo, Side, Stuart, Frichti) as customers. Ubble provides citizens with the convenience and security of using their personal identity in the digital world, building a sense of trust between online services and their users. They protect users against identity theft and from having their personal data leaked or misused. They also shield service providers from fraud and improve conversion throughout their customer experience.

Ultra Radio Ltd, United Kingdom

Ultra Radio Ltd is a private technical consulting company dealing with a number of radio issues in the UK. They possess an excellent theoretical background in digital signal processing and wireless algorithm design as well as an extensive practical experience in research and development of ASIC implementations. The areas covered include Wireless System Architecture (Signal Processing, Algorithm Design, IP, ASIC), Standards, Regulations and Compliance, Ultra-Wideband Applications (IEEE, UWB Alliance, Ranging, Keyless Entry, Vital Signs Monitoring, RTLS, Localisation, Radar, Imaging), and Spectrum Regulations and Product Compliance (FCC, Emissions, EMC, Safety, Radio Equipment Directive, CE-Mark).

Alex Gruzen, CEO of US-based WiTricity, is convinced that WiTricity's pioneering wireless charging technology is key to the future of mobility, which is clearly electric, and increasingly shared and autonomous.

There are beeps at night and pyjamas at the root of WiTricity technology; what is the story behind that?

WiTricity was founded out of MIT in 2007 to productize the wireless power technology that MIT Professor Marin Soljačić (pronounced Soul-ya-cheech) had envisioned. As the story goes, he was standing in his pyjamas, staring at his mobile phone on the kitchen counter. It was the sixth time that month that he was awaken by his phone beeping to let him know that he had forgotten to charge it. At that moment, it occurred to him: "There is electricity wired all through this house, all through my office—everywhere.

Alex Gruzen
Chief Executive Officer

Alex Gruzen is the CEO of WiTricity, the industry pioneer in wireless power transfer over distance. Before WiTricity, he co-founded Texas-based Corsa Ventures, where he focused on building leading technology companies via early-stage investments. Prior to Corsa, Alex was the Senior Vice President of the Consumer and Small Medium Business Product Group at Dell, and previously led the company's global notebook computer business. His experience spans product development, global sales and marketing, operations, and growth through mergers and acquisitions, having also held leadership roles at Hewlett Packard, Compaq, and Sony. Alex holds an MBA from Harvard Business School and an S.M. and S.B. in Aeronautical and Astronautical Engineering from the Massachusetts Institute of Technology (MIT).

This phone should take care of its own charging!" But to make this possible, one would have to find a way to transfer power from the existing wired infrastructure to the phone—without wires. Soljačić started thinking of physical phenomena that could make this dream a reality.

So, you've created WiTricity to develop the technology known as magnetic resonance?

Indeed, WiTricity is the pioneer in wireless charging based on magnetic resonance. WiTricity power sources and receiver devices are specially designed magnetic resonators that efficiently transfer power over distances via the magnetic

> ## "Wireless charging is a radical improvement for customer experience of electric vehicles."

near field. With electric vehicles, our goal is to make the act of charging completely transparent: it happens in the background, you just park your car and it starts charging. That's the basis of a radical improvement in the whole customer experience of electric vehicles (EVs).

Why is it a radical improvement?

With wireless charging you're able to charge at the same speed and the same rates as if you had plugged in to a Level 2 charger, but without the fuss of cables and finicky plugs. There are no moving parts needed. Any vehicle height can be accommodated—with one common charger on the ground, you can charge a sports car, a sedan, a pickup, an SUV. You're not dependent on ultra-precise alignment either, unlike the experience you have charging your phone on a pad where it needs to be in one specific spot. Since there's a lot of competition for space on a vehicle, another benefit is that the receiver can actually be smaller than the pad on the ground. The pad itself can be embedded into the ground and the magnetic field can go through asphalt or concrete, mud, ice, snow without any interference or loss of efficiency.

So, it's totally appropriate for the urban environment. All of these characteristics are unique to WiTricity's technology.

Can EV wireless charging help the future of mobility in urban environments?

Yes, when those urban areas become "smart cities," EV wireless charging will be essential to mobility. We all hear about the need for "fast charging," which is true for long-distance driving, but most people – and particularly people who live in urban areas – see their cars parked 18 or more hours each day. For them, wireless charging installed where the cars are already parked will provide safe, reliable, and efficient charging in a way that is much more sustainable both for the EV battery and for the electrical grid. Wireless charging can also play a key role in car sharing. The car returned to the parking spot would always be ready for the next customer whether the prior

> ## "In 'smart cities,' electric vehicles wireless charging will be essential to mobility."

customer plugged it in or not. Of course, when autonomy deploys, then wireless charging becomes essential as there is no one to plug it in.

You're involved in several standards bodies—why?

Standards are incredibly important. We've been working with global automakers and their suppliers to set global standards for the technology to enable interoperability among all brands. We saw confusion with plug-in chargers for EVs, where multiple automakers had their own plug, and nothing was compatible across cars. We knew from the outset that we had to solve this from a wireless charging perspective. We've worked closely with SAE and other global standards bodies to set wireless charging standards so automakers can start building EVs with wireless charging and infrastructure can be deployed. Common infrastructure is incredibly important for mass adoption of EVs.

In addition to global interoperability standards, WiTricity has been actively participating in standards and studies related to electromagnetic compatibility for wireless power transfer for EVs. WiTricity has contributed to the ITU-R and joined in conversations with administrations around the world to help them understand the underlying technology better. We joined ETSI to provide important relevant information to studies and reports in CEPT SE 24 as well as to assist with improvements in standards that need to be updated such as EN 303 417. We are glad to be a part of ETSI to continue standards work.

Has deployment started yet?

Yes, automotive manufacturers are introducing passenger vehicles this year that have been built at the factory to support it, and more are to come in 2022 and 2023. Commercial fleets are also great candidates for wireless charging. When vans, for example, can charge while loading and unloading, the fleets are able to flatten the power demand curve with significant savings as a result.

What else can we expect to see in the future with wireless charging and EVs?

We envision equipping a taxi queue at the airport or at a train station with wireless charging – in fact, there is a pilot underway in Nottingham, England doing exactly that. The idea is to save taxi drivers time and money while being environmentally friendly. Another opportunity would be wireless vehicle-to-grid (V2G) charging systems that sends the power to the vehicle to charge it, but equally back to the grid when needed. And of course, for autonomous vehicles to be truly autonomous, a hands-free methodology for wireless charging will be key.

So the future is bright! We believe that wireless charging will reduce the barriers to EV adoption, which results in a greener future for all of us.

> ## "Wireless charging will result in a greener future for all of us."

Encrypted Traffic Integration: first Report released

ETSI's Industry Specification Group on Encrypted Traffic Integration (ISG ETI) has concluded the early part of its work in identifying problems arising from pervasive encrypted traffic in communications networks. ETSI Group Report 'ETI 001', entitled Encrypted Traffic Integration (ETI); Problem Statement, identifies the impact of encrypted traffic on stakeholders and how these stakeholders' objectives inter-relate. The rise of the use of encryption places networks and users at risk whilst offering promises of security. The risks are that the networks and governance in place to protect users are rendered ineffective by over-enthusiastic application of encryption to content and signalling data. Without being overdramatic, the rise of a pervasive encryption model allows many of the worst elements of societal and human behaviour to go unobserved, with trusted networks not being in a position to help protect users.

Zero-touch Network and Service Management major specifications

ETSI ZSM has released major specifications that provide a significant boost for enabling full end-to-end network and service automation. GS ZSM 003 specifies end-to-end network slicing management architecture blueprint and solutions, supporting both fulfilment and assurance processes. GS ZSM 009-1 specifies "Governance" services that allow the creation, execution, life-cycle management and steering of a closed loop, as well as interaction between closed loops to ensure consistency. GR ZSM 010 identifies potential security threats related to the ZSM framework and solutions and proposes mitigation options that should be considered by the ZSM specifications to ensure that the automated processes are secured and deliver the intended business outcomes.

ETSI MEC federation
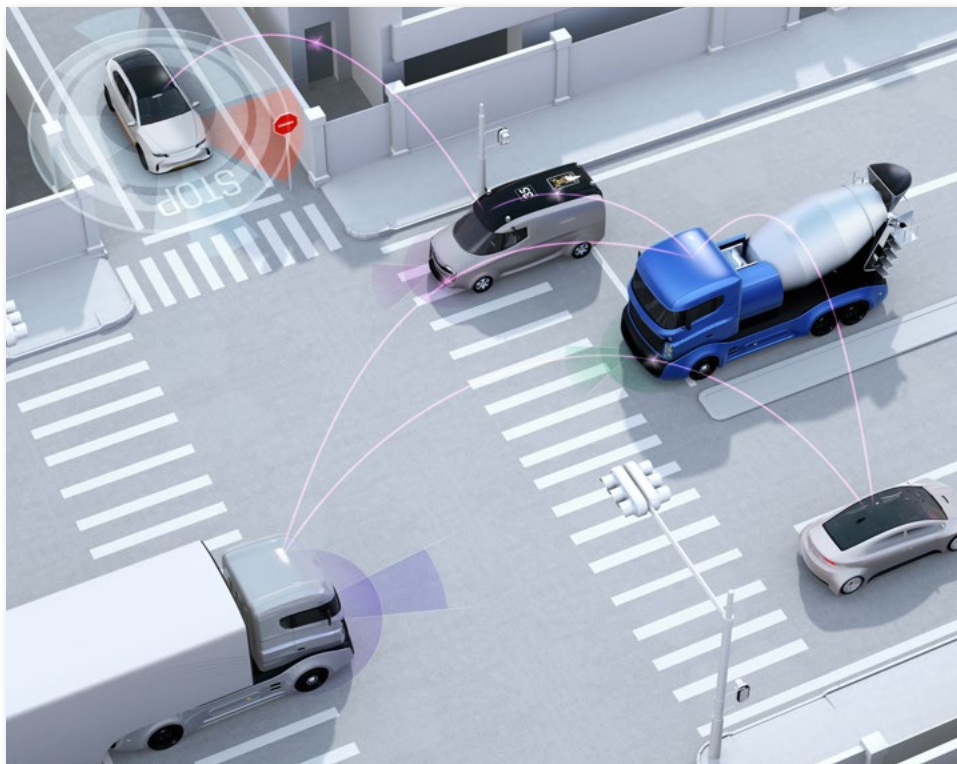
The ETSI MEC Industry Specification Group (ETSI ISG MEC) has recently released a new Group Report ETSI GR MEC 0035 to enable inter-MEC system deployment and MEC-Cloud system coordination.

ETSI GR MEC 0035 analyses eight use cases that require inter-system coordination, including those in multi-Mobile Network Operator (MNO) environments. Recommendations, evaluations and possible technical solutions to solve key issues are issued for each use case. Two use cases make recommendations to achieve V2X service continuity, using a typical MEC federation scenario of V2X services in a MEC-system environment with multiple operators and multiple equipment manufacturers. Another use case describes a location-based immersive Augmented Reality game where a MEC federation can serve as a solution to limitations in providing an interactive AR application with users connected via different mobile operators.

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In our **spotlight** article, Eurecom, a graduate school and research center in digital science based in Sophia Antipolis, France, gives us an insight into potential use cases for the next generation of telecommunications. They believe that a redesign of communications strategies, radio spectrum sharing policies, QoS control modes and eventually the overall architecture of mobile networks must be carried out. This results in two research goals, first the need to make advances at the fundamental and applied levels in several technologies and secondly to evolve the new concepts into practical system oriented innovations by leveraging open interface specifications and open-source experimental platforms. In their **use case**, they introduce the OpenAirInterface Software Alliance (OSA), the home of OpenAirInterface (OAI), a set of open source-code software packages implementing the 3GPP Cellular Radio Access Network (RAN) and Core Network (CN) procedures. In September 2021, the ETSI Open Source MANO Hackfest was fully dedicated to OAI 5G Core Network Functions packaging and onboarding to OSM Release TEN.

6G highlights:
The path from research to standardization

Communication networks are facing unprecedented rates of change that are driven by new and rapidly evolving use cases that will serve the present and future needs of an ever-increasing number and diversity of end users. EURECOM, graduate school and research center in digital science, tells us more.

On the Road to 6G

New use cases include for example the emergence of immersive Virtual Reality (VR) in multiple industries as well as extensive applications in both private and public networks tailored to smart cities, intelligent transportation (ITS), and industry 4.0 scenarios. In addition to the need for ever-increasing data rates, the emerging use cases also introduce new requirements in terms of latency and energy efficiency. From an architectural perspective, the mobile networking world is experiencing a convergence of Internet, broadcast, Internet of Things (IoT), and classical telecommunication paradigms. Moreover, most domains now rely more and more on machine learning and artificial intelligence both in applications and devices and for optimizing network functions. The latter leads to the so-called data-driven networking that requires distributed processing comprising co-localized or edge computing for latency critical or private applications and highly centralized processing for massive public applications.

In order to provide the required services and performance to the diverse range of public and professional end users, a redesign of communications strategies, radio spectrum sharing policies, QoS control modes and eventually the overall architecture of mobile networks must be carried out, in the context of beyond-5G evolution and 6G. Medium-term research goals should be aligned with this evolution and implement a twofold approach: First to make advances at the fundamental and applied levels in domains ranging from information and communication theory, signal processing, graph theory and learning for networks, and secondly to evolve the new concepts into practical system-oriented innovations by leveraging open interface specifications and open-source experimental platforms.

Highlights from Fundamental Research

As a research laboratory, EURECOM's Communication Systems Department addresses the fundamental scientific issues raised by the new challenges of evolving 5G and 6G networks. This concerns specifically the development of intelligent and autonomous methods for the allocation of spectrum resources. The resulting techniques aim to enable systems to be able to dynamically scale with the predicted explosion of radio services and terminals from personal Internet access devices, to connected sensors for the smart city, network-assisted automatic driving, and connected robots in factories and unmanned aerial vehicles. These new scenarios combine seemingly irreconcilable requirements, requiring high spectral efficiency, ultra-short response time and high energy, resource and cost efficiency. This requires a rethinking of the air interface procedures like coding and modulation, scheduling and feedback protocols for short-data transmission and spatio-temporal signal processing in base-station receivers to be able to cope with many contending traffic sources including those coming from machine-type devices. Other key areas include handling of large quantities of content in distributed networks. Firstly, the combined use of distributed caching and air-interface channel coding strategies to increase spectral efficiency and reduce computational requirements both in the networks and terminals. Secondly, methods for optimizing data communications through data-driven

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methods like machine learning are required both at the level of the network infrastructure and in the air-interface. Finally, a recent and fast emerging research trend considers methods for exploiting the semantics of data or their end goals in the communication protocols in order to increase efficiency and potentially reduce complexity of the end-to-end communication process whenever possible.

Systems Research and Prototyping

EURECOM maintains the state-of-the-art experimental facility Open5gLab to further knowledge on cloud-native approaches to radio communications infrastructure, including both the 3GPP core network and radio-access network elements. It leverages the software packages known as OpenAirInterface5g (OAI) and Mosaic5g as well as other open-source components to provide prototyping services to its own researchers in addition to industry and academic partners worldwide. Open5gLab is a means to disseminate expertise in 3GPP-based systems and explore systems-related aspects of innovations emanating from fundamental research and to stimulate interaction around open solutions for 3GPP technologies. It also allows for proof-of-concept deployments of evolving 3GPP technologies in order to collect measurements and perform interoperability experiments with pre-commercial and commercial equipment and software.

Interactions with ETSI and 3GPP

EURECOM actively participates in 3GPP and aims to transfer basic technologies in ICT and more specifically in communication systems to standards. To this end, a team dedicated to standardization activities, innovation and intellectual property works alongside EURECOM's researchers.

To get a head start and learn the ropes of 3GPP, EURECOM is collaborating with QUALCOMM, a major player in wireless communication standards, and the French intellectual property agency France Brevets.

One novel topic that is gaining traction in both ETSI and 3GPP is Reconfigurable Intelligent Surfaces (RIS). In fact, several companies proposed to study RIS as part of 3GPP Rel-18 and ETSI recently established the ISG RIS, which was launched end of September. EURECOM is uniquely positioned to integrate this technology into its OAI platform and contribute for instance by providing experimental measurement results.
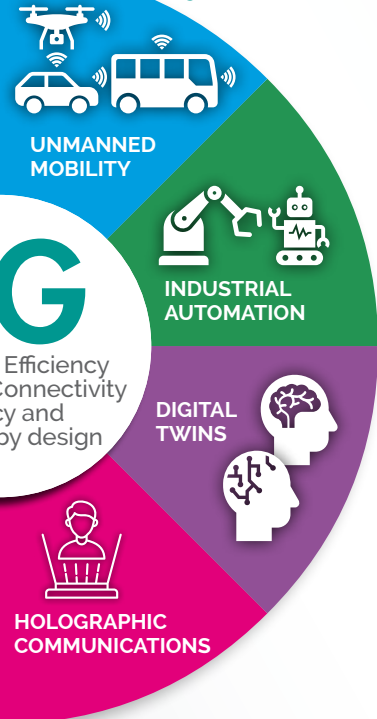
On the 3GPP side, EURECOM is actively participating in the on-going discussions on the contents of the upcoming Rel-18 work package. In particular, EURECOM leverages its expertise in channel coding for small data packets to contribute to the topic of coverage enhancements. Moving towards 6G, visible light communication (VLC) has been identified as a complementary technology to mmWave. VLC has the advantages that it integrates with existing lighting infrastructure, provides physical security and can be used in environments where electro-magnetic waves are unsafe. Another topic of interest is motivated by the "Tactile Internet", i.e. use cases that require very small data packets to be efficiently transmitted with very low latency and high reliability.

In the long term, EURECOM's standardization activity is not limited to communication systems but will potentially encompass other departments, such as digital security and data science, encouraging its researchers to think about the potential applications of their work to the relevant standards body

■ *Ulrich Finger, Professor and Director*
David Gesbert, Professor and Department Head
Raymond Knopp, Professor, Sebastian Wagner,
PhD, Lead Standards Engineer.

G USE CASES

UNMANNED MOBILITY

INDUSTRIAL AUTOMATION

DIGITAL TWINS

HOLOGRAPHIC COMMUNICATIONS

Efficiency Connectivity ty and by design

6G Building Block Technologies

- Pervasive AI / ML, Predictive AI
- Immersive VR /AR / XR
- High Performance Computing
- EDGE Intelligence powered by AI (machine learning, deep neural network…)
- Quantum Communications
- Blockchain/DLTs
- Optical Wireless Communications VLC/LiFi/OCC/FSOC
- Reconfigurable Intelligent Surfaces
- High frequency bands such as (sub) THz
- Cell-free massive MIMO
- Non-Terrestrial Networks: satellites, (GEO / MEO / LEO), CubeSats, HAPS, UAVs.

The OpenAirInterface
Software Alliance

An end-to-end deployment of a 5G network for laboratory testing and small-scale field deployments.

OSA

Established in 2014 by EURECOM, the OpenAirInterface Software Alliance (OSA) is a French non-profit organization ("Fonds de dotation"), funded by corporate and institutional sponsors. The OSA is the home of OpenAirInterface, a set of open source-code software packages implementing the 3GPP Cellular Radio Access Network (RAN) and Core Network (CN) procedures. The software includes significant contributions from a global community of developers in addition to the research staff of EURECOM and OSA engineers.

The OSA is responsible for the development roadmap, quality control and the promotion of the OAI software

packages, deployed by our academic and industrial community for varied use cases.

The Alliance's mission is to facilitate OpenAirInterface adoption.

5G RAN Project

The scope of the OAI 5G RAN project is to build the 5G protocol stack for both 3GPP gNB and UE allowing for end-to-end deployment of a 5G network for laboratory testing and small-scale field deployments. The software is made available under the 3GPP-friendly OAI Public License V1.1 and is interoperable with several laboratory and field-deployable radio-units. Specifically, OAI 5G RAN includes Non Stand-Alone (NSA) and Standalone (SA) Release 15 gNB and UE, RAN Intelligent Controller (RIC) interfaces and CI/CD framework allowing for testing.

A new component of the 5G RAN project in 2021-22 concerns adding interfaces to the OAI eNB/gNB software to allow for TTCN-based 3GPP conformance testing. This is carried out in collaboration with Sequans Communications and FireCell, a new French startup-company.

5G Core Network (5GC) Project

The 5GC project (2020-2022) provides a reference implementation of the 3GPP Release 16 Core Network Service-based Architecture. It is made available under the same OAI Public License V1.1.

The initial development for basic deployment of 5GC network functions in Docker containers was tested in terms of basic call flow and simulated traffic

using commercial and publicly available RAN testing software. Community-driven continuous integration of features is now added as updates to the existing network components (AMF, SMF and UPF) with addition of extra network components like UDM and AUSF deployed in the EURECOM open5gLab (RedHat OpenShift) cluster. The current implementation is now tested with commercial gNB and UE as well as with the OAI RAN solutions. The 5GC has been successfully deployed on several clusters in the OAI community worldwide.

MOSAIC5G Project Group

The newly created MOSAIC5G (M5G) PROJECT GROUP aims to transform radio access (RAN) and core networks (CN) into agile and open network-service delivery platforms. Such a platform allows for exploring new use cases of interest to different vertical industries. Mosaic5G introduces the world's first ecosystem of 5G R&D open source platforms, ranging from the centralized network control to the mobile edge network deployment.

Collaboration with ETSI

OSA has regular interactions with ETSI and organizes joint workshops in order to find synergies between open-source communities and the 3GPP standardization process. This will continue in the coming years and in particular for the onset of 6G.

■ *Professor Raymond Knopp, Eurecom, Florian Kaltenberger, professor, Eurecom.*

Release 17 on track

Key Release 17 features coming to maturity include the 5G System enablers for the new verticals.

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Sept. 2021
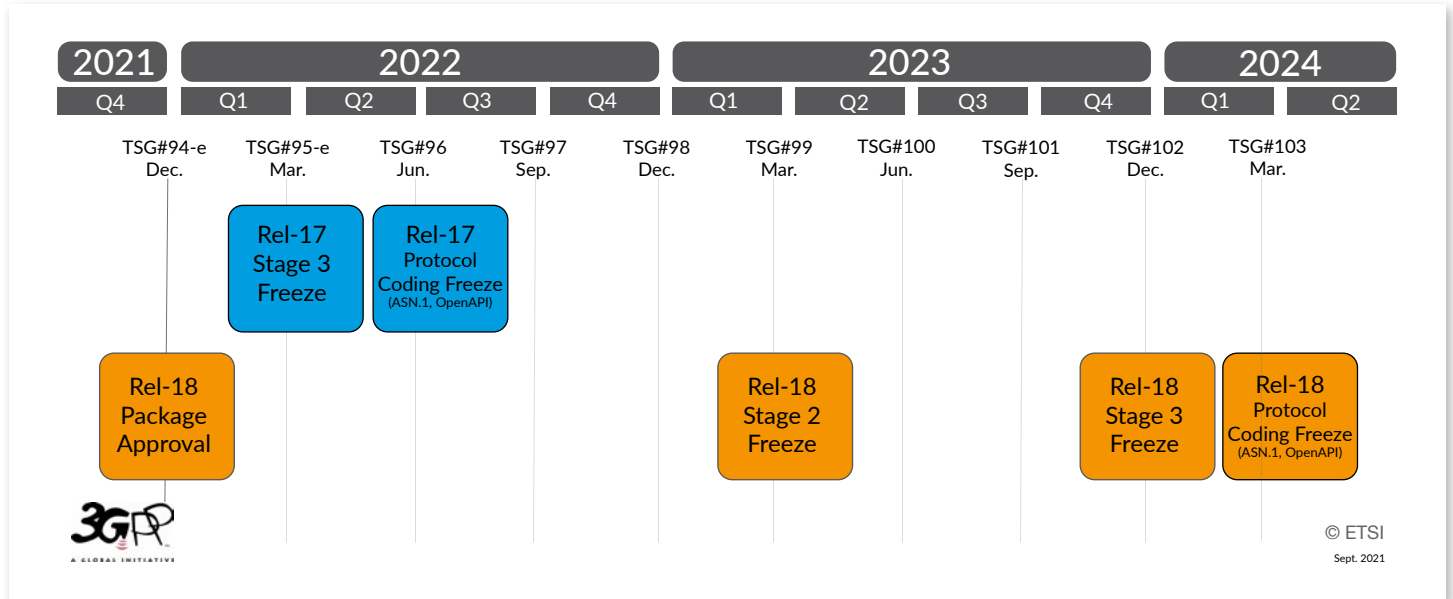
Staying focused

The experts in 3GPP are rightly proud of their ability to focus steadfastly in the now, a period of time built resolutely on the strong foundations of yesterday. That realism has shone through during recent Release 17 discussions, at the September Technical Specification Group (TSG) e-meetings, as TSG#93-e agreed that the freeze date for the Release's set of features will remain the core focus until the end of the first quarter of 2022.

Some key Release 17 features coming to maturity are the 5G System enablers for the new verticals – including industrial automation, time sensitive communication, ultra-reliable and low latency communication (URLLC), non-public networks, low complexity NR devices, cellular IoT support for the 5G system and for Vehicle-to-Everything (V2X) communication.

Release 18 will have its time very soon and decisions on its 'Package Approval', where priority items are decided on, will be made in December 2021. Although these discussions will catch the eye, it is Release 17 progress that is the main business of the moment. So-much-so that the Release 18 discussions at TSG#93-e were gravitating towards a slow start for the full-on Release 18 work in 2022, with the groups considering an extra quarter before the new release – which will develop the specifications for 5G-Advanced - takes centre stage.

Release 18 work looks likely to target further advances in mobile broadband, NR enhancements, expanded and improved positioning, network energy savings, enhancements for extended reality (XR), AI/ML, sidelink relays, non-terrestrial networks evolution, UAVs, network slicing enhancements and more security enhancements… All to be decided on and prioritized at the December Plenary.

Getting back on the road – no green light yet

The discussion around the conditions and timing for a return to physical meetings continues. The 3GPP leadership are studying the set of circumstances that would allow for full face-to-face meetings, monitoring the progress and degree of certainty around the World's recovery from the impact of COVID-19.

The enthusiasm to get back to face-to-face was ringing out through the TSG#93-e discussions, with broad consensus in the 3GPP groups that the continuation of e-meetings has caused a strain on the groups' work. It is true to say that many delegates are missing the benefits of being in the same room and the efficiencies of being on the same clock for the meeting and off-line sessions.

However, despite advanced discussions on the circumstances for the return to physical meetings, the decision was taken at TSG#93-e that all 3GPP meetings will continue to be held remotely until after the first quarter of 2022. The discussion on whether to return to physical meetings after Q1 2022 will be re-visited in December (at TSG#94-e).

As we wait for better news, e-meetings will continue to deliver the Reports and Specifications for the 3GPP system. They aren't the perfect solution, but remote WG and TSG meetings have proved to be very effective as necessity has continued to be the mother of invention.

■ *Kevin Flynn, Communication Professional 3GPP.*

Reconfigurable Intelligent Surfaces for Future Wireless Systems

RIS is a new type of system node using smart radio surface such as many small antennas or metamaterial elements which can be adapted to a specific radio channel environment. Transforming the wireless environment from a passive to an intelligent actor, RIS will create innovation opportunities, progressively impacting the evolution of wireless system architecture, access technologies, and networking protocols.

RIS, in a nutshell...

Reconfigurable Intelligent Surface (RIS), which also goes by several names such as Intelligent Reflecting Surface, Large Intelligent Surface, Smart Repeater, and Holographic Radio corresponds to an entirely new type of system node which utilizes smart radio surfaces.

Such surfaces may have reflection, refraction, and absorption properties through many small antennas or metamaterial elements which can be adapted to a specific radio channel environment by a system controller through a dedicated control signalling link for exchanging side information.

RIS can be implemented using mostly passive components without requiring high-cost active components such as power amplifiers, resulting in low implementation cost and energy consumption. This in turn results in ease and flexibility of deployment, with the possibility of RIS nodes taking any shape and being integrated onto objects (e.g., walls, buildings, lamp posts, etc.).

RISs are nearly passive and hence require low energy consumption and are unlikely to increase exposure to electromagnetic fields. These associated characteristics suggest RIS may be considered as a sustainable environmentally friendly technology solution.

Hence RIS is envisaged as a new enabling candidate future wireless technology for the control of radio signals between a transmitter and a receiver in a dynamic and goal-oriented way, turning the wireless environment into a service. This has motivated a host of potential new use cases aimed at i) enhancing various system key performance indicators such as capacity, coverage, positioning, sustainability, and security and ii) enabling new wireless technology applications such as further sensing, wireless power transfer and ambient backscattering capabilities.

An illustrative diagram of RIS is provided in Fig. 1, as a new system node dynamically configured by the system controller, turning the wireless environment from a passive to an intelligent actor such that the channel becomes programmable. This trend will challenge basic wireless system design paradigms, creating innovation opportunities which will progressively impact the evolution of wireless system architecture, access technologies, and networking protocols.

RIS in Early Research Phase

RIS has attracted a lot of attention in the research community globally, particularly in Europe.

There are already several European collaborative research and innovation projects working on this topic such as AIMM, ARIADNE, DAEMON, HEXA-X, and RISE-6G, to name a few. The members of these projects include a wide range of network operators, telecoms equipment vendors and research institutes.

RIS key takeaways

- RIS is a new type of system node leveraging smart radio surfaces to control radio signals in a dynamic and goal-oriented way

- RIS reconfiguration is handled by the network through a signalling link for exchanging relevant information

- RIS goes by several names including Reflective Intelligent Surface, Smart Repeater, and Holographic Radio

- RIS can improve systems KPIs such as coverage and enable new services such as sensing

- RIS can be made to operate at any part of the radio spectrum, from sub-6 GHz to THz

- RIS provides deployment flexibility for indoor and outdoor with possibility of surfaces taking any shape and be integrated onto objects

- RIS requires mostly passive components decreasing implementation and deployment costs over regular cells and relays

- RIS passivity can mean low energy consumption with potential to be an environmentally friendly solution

- RIS may leverage tools from the field of AI/ML to aid with the systems operation and optimization

- RIS is envisaged as a prominent candidate technology for future wireless systems
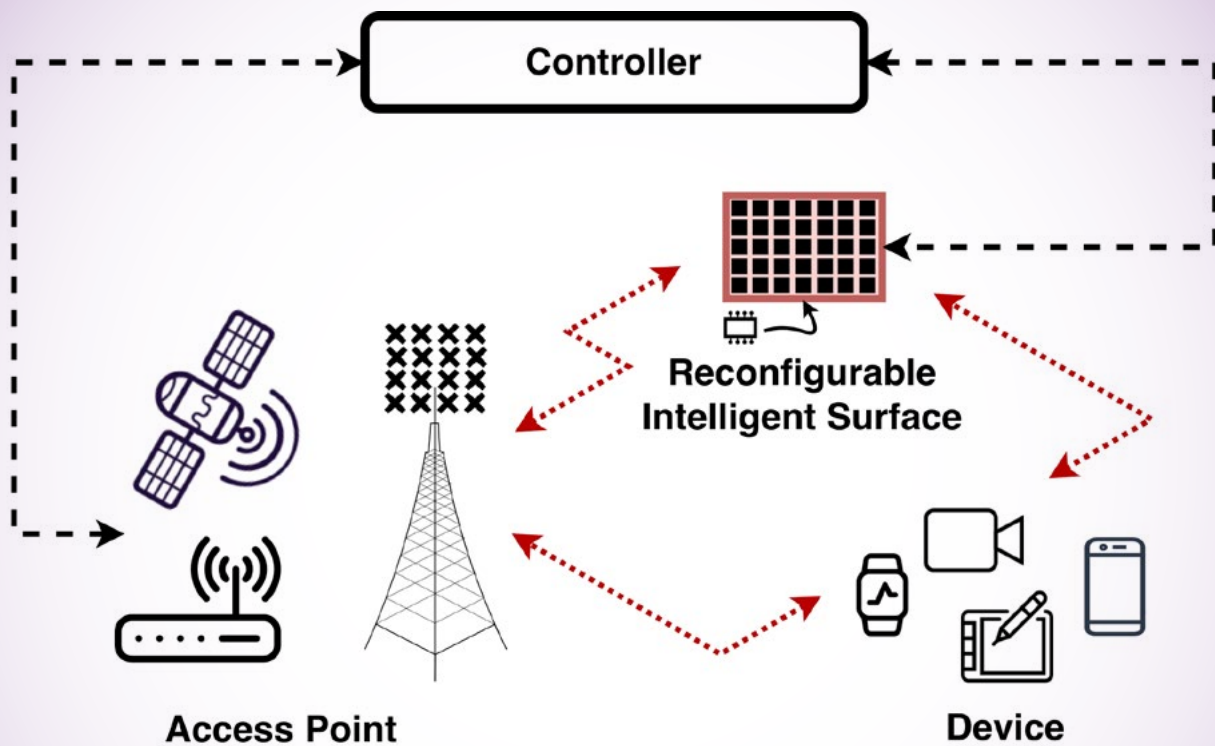
Figure 1. Illustrative diagram of RIS, a new type of system node with smart radio surface technology, where its response can be adapted to the status of the propagation environment through control signalling - ©ETSI

In addition, the Institute of Electrical and Electronics Engineers (IEEE) Communication Society has launched two special interest groups and one emerging technology initiative on RIS, namely: RISE SIG, REFLECTIONS SIG and RIS ETI.

There are also prototyping and testing results for RIS, including metasurface reflective arrays demonstrations, for example, by NTT DoCoMo, Orange, MIT, and University of Surrey.

RIS technology is supported as a key technology trend in the International Telecommunication Union Radiocommunication Sector (ITU-R) IMT-2030 Future Technology Trends report.

There have also been early attempts recently to bring RIS for exploratory studies in Standards Development Organizations including 3GPP (3rd Generation Partnership Project) and IEEE.

New Pre-Standards Group – ETSI ISG RIS

While extensive research efforts are ongoing on the topic, global standardization of RIS is still in its very early stages.

There are many technical challenges that need to be adequately addressed before RIS can be adopted into future standards, moving towards eventual commercialization of the technology.

Recently, an initiative to form a new ETSI Industry Specification Group (ISG) on Reconfigurable Intelligent Surfaces (ISG RIS) was approved by the ETSI Director-General. This initiative, led jointly by InterDigital Europe and CNRS along with other founding members such as British Telecommunications plc, CEA-LETI, CNIT, IMEC, NPL, NEC Europe Ltd, UK

DCMS, University of Oulu, University of Surrey, and ZTE Corporation, was formed to streamline pre-standards research efforts on RIS technology across various EU/UK collaborative projects. It was extended with relevant global initiatives, with a view to paving the way for future standardization of the technology.

ETSI ISG RIS, which started in September 2021 and will run for a duration of two years, will focus on pre-standards work including the defining of use cases, covering identified scenarios, and clearly documenting the relevant requirements.

The ISG activities and deliverables will be complementary to existing ETSI work and relationships with other ETSI bodies, and the wider industry will be established to avoid duplication, maximize synergies and act to ensure broad industry adoption of RIS, a key technology trend for future wireless systems.

■ *Dr Arman Shojaeifard, ETSI ISG RIS Chair.*

Standardization for Innovation

Standardization can be straightforward for single-issue problems. In the case of systems, standardization becomes a continuous process as new requirements arise. For standards-based IoT systems, oneM2M is tackling new issues via Release 4 and 5 plans.

Progress and Innovation

"If you think 'standardization' as the best you know today, but which is to be improved tomorrow – you get somewhere. But if you think of standards as confining, then progress stops". The American industrialist, Henry Ford made that observation in 1926. Its applicability to the automotive sector at that time is equally relevant to today's market for Internet of Things (IoT) technologies and systems.

IoT is moving beyond the stage of being a novel technology for monitoring high-value assets or business-critical operations. Now, industry alliances from automotive to industrial sectors are focusing on scalable approaches for innovative and repeatable IoT solutions in smart buildings, smart city, and smart home domains, among others. These initiatives build on an earlier phase of activities to engineer low-cost hardware and connectivity services. As a result, the availability of IoT data is spurring different industries to identify new opportunities and sources of value. Data sharing and privacy-enabling technologies are two new frontiers for IoT systems. They are a source of new requirements for interoperable, scalable, and more sophisticated IoT solutions.

A Complete Framework for IoT Standardization

Since 2012, over 200 participating organizations have attended oneM2M Technical Plenaries to define use-case requirements and to develop technical specifications. In parallel, oneM2M organizes several interoperability test events where solution providers can validate their oneM2M implementations and check for cross-vendor interoperability. Another benefit of testing is to identify ambiguities and omissions in the standard. This helps to improve technical specifications in subsequent releases, which is essentially what Release 2 of the standard achieved.

With new requirements and IoT application opportunities being identified, oneM2M continued its standardization work by issuing Release 3 and launching a roadmap for future topics. In parallel, oneM2M formalized a relationship with the Global Certification Forum to launch a certification scheme for oneM2M components and platforms.

oneM2M's Release 4/5 Plans

oneM2M's standards release cycle provides a framework to address new use cases and industry requirements. This also acts as a roadmap for implementation and commercialization purposes. oneM2M is currently finalizing a set of specifications for Release 4 of the standard while conducting parallel work on features to include in Release 5. Some of the new features under discussion include the topics of AI for Internet of Things (IoT) systems, tools for data licensing and, controls to guarantee adherence to privacy regulation such as GDPR and PIPA (Korea).

Participation in oneM2M is open to organizations across the world and provides a forum to exchange knowledge and discuss emerging trends that will drive future IoT innovation. Industry contributions are welcomed at the next technical plenary from November 29 to December 3.

■ *Roland Hechwartner, Deutsche Telekom and Chair of oneM2M Technical Plenary.*

Smart Networks and Services kicking off

Recent years and in particular the COVID-19 crisis have shown the potential that 5G networks have to provide. They offer the connectivity basis for the digital and green recovery in the short to mid-term, and have shown the need to build technology capacities for the following generation – 6G – in the long term.

The growth potential in economic activity enabled by 5G and later 6G networks and services has been estimated to be in the order of €3 trillion by 2030 . For such critical services, we need to ensure that 5G networks will be sufficiently secure.

6G systems will move us from Gigabit to Terabit capacities and sub-millisecond response times. This will enable new applications such as real-time automation or extended reality sensing ("Internet of Senses"), collecting data for a digital twin of the physical world.

Research and Innovation initiatives on 6G technologies are now starting around the world, with the first products and infrastructures expected for the end of this decade.

In Europe, a first set of 6G projects worth €60 million was launched under the 5G-PPP, with the Hexa-X flagship developing a first 6G system concept complemented by eight projects investigating specific technologies for 6G. These technologies will form the basis for a human-centric Next-Generation Internet (NGI) and address Sustainable Development Goals (SDGs).

All parts of the world are starting to be heavily engaged in 6G developments. There will be opportunities and challenges concerning new business models and players through software networks with architectures such as Open-Radio Access Networks and the convergence with new technologies in the area of cloud and edge computing, Artificial Intelligence, as well as components and devices beyond smartphones.

Firstly, success in 6G will depend on the extent regions will succeed in building a solid 5G infrastructure, on which 6G technology experiments and, later, 6G deployments can build.

Secondly, Europe will need to take a broader value chain approach, ranging from connectivity to components and devices beyond smartphones with the massive development of edge clouds and connected objects like cars or robots.

Global standardization and spectrum harmonization are important success factors for 6G technology. Both future users and suppliers need to shape key technology standards in the field of radio communications based on existing and future spectrum bands for wireless broadband, but also in next-generation network architecture to ensure the delivery of advanced service features, e.g. through the effective use of software technologies and open interfaces, while meeting energy-efficiency requirements.

The issues at stake call for a strategic research and innovation (R&I) roadmap for Europe and a Joint Undertaking co-led by industry and the Commission with close involvement of Member States.

Against this background, we are now creating a Joint Undertaking on Smart Networks and Services (SNS) to enable European players to build the technology capacities for 6G systems and develop lead markets for 5G infrastructure as a basis for the digital and green transformation. It will include a formal governance structure that will jointly define a consolidated European approach towards strategic R&I and deployment agendas.

I am looking forward to the creativity and ambition of the global standardization community to shape the new generation of communication technology throughout this decade.

Let's kick this off!

■ *Peter Stuckmann, Head of Unit, Future Connectivity Systems, European Commission.*

Homage to Pierre Laffitte,
founder of Sophia Antipolis

We were very sad to hear that Pierre Laffitte passed away on 7 July, at the age of 96. President and founder of the Sophia-Antipolis technopole, a scientist and politician, he has spent countless hours contributing to making Sophia Antipolis the largest technopole in Europe.

Born in Saint Paul de Vence, he graduated from the Ecole Polytechnique and Ecole des Mines. The idea of a cluster bringing together research centres, top universities, the CNRS, public and private organizations emerged in his mind in the 1960s. In 2019, Sophia-Antipolis celebrated its 50 years anniversary, paying tribute to their founder at the same time. Several executives from ETSI attended the event. Pierre Laffitte was indeed instrumental in ETSI being head-quartered in Valbonne.

ETSI is one of the 2,500 organizations and 38,000 employees working in this major technological hub, which is well known across the world. This is without any doubt thanks to the unfailing commitment of the passionate and visionary man that Pierre Laffitte was.

New ETSI guides for Chairs and Delegates

We have just issued new versions of our guides for ETSI Chairs and Delegates. They provide step-by-step guidance on the essential elements, most common practices and responsibilities that they will need to be aware of. They are available online at:
https://www.etsi.org/media-library/brochures-and-guides

ETSI Chair's Guide

ETSI Delegate's Guide
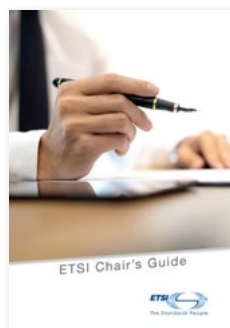
Welcome to
our new staff members

Andrijana Brekalo

Technical Officer,
Mobile Competence Centre.

Andrijana graduated from a Master of Science in telecommunications in Zagreb, Croatia, and started her career in Hrvatski Telekom and A1, part of Telekom Austria Group. In 2001, A1 missioned her to be a Technical Officer in ETSI, where she mainly supported 3GPP Core Network and Terminals working groups and successfully passed an MBA in General Management in Helsinki at the same time.

Her background in standardization and communication technologies were crucial when in 2010, she came back to A1 to join the Regulatory Affairs department. She helped A1 Croatia to comply with the EU regulatory framework in the exciting period where the country was applying for EU membership. Six years later, she joined Ericsson as a Business Analyst. Involved in innovation, her team was a finalist in an innovation contest in the domain of network design and optimisation where they presented a proof of concept for analysis of user experience based on data crowd sourcing. Andrijana supports 3GPP TSG Core Network and Terminals Working Group 1.

Matthieu Guerrini

Microsoft 365 Developer,
ITC.

Graduated from EDHEC business school, Matthieu started his career in the banking sector in 2007 in Paris. After a training period in BNP Paribas, he worked as a consultant and successfully improved IT processes for an SME handcrafting and manufacturing jewellery in Paris, helping increase profit and preventing lay off in the company.

In 2011, he came back to his hometown, Nice, where he worked in the CIC bank for 8 years, first as a Credit Analyst, then as a Business Relationship Manager for SMEs. As banks evolved over the years, shifting from customer oriented to sales-oriented businesses, he decided to change his professional focus.

He took a Master of Science in Digital Business Data Analysis and Data management at SKEMA, developing in parallel apps on Microsoft power platform at ATOS, his projects included a platform for scratch card games at Française des Jeux.

His Thesis analyses dark patterns, those interfaces that trick users into buying things they didn't mean to…

Laure Pourcin

Technical Officer, Standards
Development Centre.

Graduated from Ecole Polytechnique and Telecom Paris, Laure started her career in Orange group where she held International Business Development responsibilities in France, New York and in the Guangdong province, China. In China, she was involved in the exciting launch of GSM in the country in the late 90's through a joint venture between Orange and what would become China Unicom.

She pursued her career in Sema Group (later acquired by Schlumberger) as Global marketing VP in the telecom BU before moving to Atos Consulting for 10 years as a Principal first and later as the Partner in charge of the Strategy and Innovation Centre. There, she led consulting assignments for Fortune 500 companies on their digital transformation and developed new business opportunity assessment for disruptive innovation such as smart grids and connected cars. The creation of her own consulting company in 2012 in digital strategy and program management led her to move to offer Digital Marketing Services to SMEs. Laure plays the piano and enjoys open water swimming.

Webinar: **Accelerate the adoption of European Research and Standards**

If you missed this webinar, you can listen to the recorded session. The webinar describes the close links between "research ideas" and "standardization value". The two activities are intrinsically linked, and the enhanced collaboration between regulation, research and standards will make the transfer of research ideas into standards both faster and more impactful. The target audience includes all Researchers and Innovators working on ICT ideas inside companies, academic institutes, public and private research labs, with particular attention to academic researchers who are, or wish to be involved in EU research projects under Horizon Europe and other research funding platforms.

Video: **"MEC- Close to the user, at the EDGE!"**

Multi-access Edge Computing (MEC) offers application developers and content providers cloud-computing capabilities and an IT service environment at the edge of the network. We have developed a new video that explains in a fun and simple way what progress MEC brings and the benefits of taking part in the work of ISG MEC. The Multi-access Edge Computing (MEC) initiative is an ETSI Industry Specification Group (ISG) which purpose is to create a standardized, open environment which will allow the efficient and seamless integration of applications from vendors, service providers, and third parties across multi-vendor Multi-access Edge Computing platforms.

White Paper: **Driving Towards an F5G Gigabit Society**

This new ETSI White Paper titled Fibre Development Index: Driving Towards an F5G Gigabit Society explains the methodology used to define a fibre development index, provides migration path recommendations to countries with different fibre development, and highlights the importance of setting policies to underpin that twin (green and digital) transformation.

Fibre and fibre-based optical networks are the key technical enablers of our society's twin transitions (green and digital), providing sustainable and cost-effective communication with high bandwidth, stability, reliability, and improved latency. In addition, the fibre evolution enables sustainable economic growth through advanced services and applications for users, businesses, and industries.

White Paper: **OSM IN ACTION**

This white paper, written by OSM End User Advisory Group members, demonstrates that Open Source MANO (OSM) has all the features to cope with a diverse network environment and is ready to form part of a future NFV infrastructure based on a CI/CD DevOps paradigm. It can orchestrate a mobile evolved packet core composed of virtual, containerized and physical network functions, and deploy these network functions to private/public clouds and a Kubernetes cluster. It proposes a possible architecture and implementation for a CI/CD pipeline for NFV that integrates OSM as the MANO solution for deploying and configuring the network functions. Orchestration is one of the keys to cost-efficient network management.
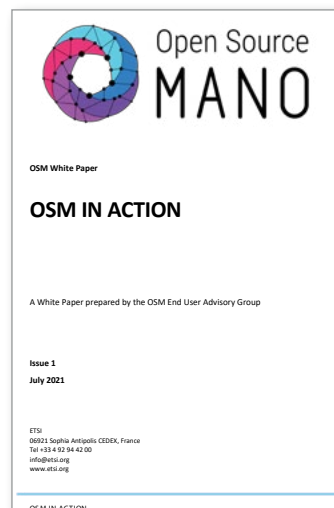
Join us from the comfort of your home or office
at upcoming virtual events that are either organized or supported by ETSI.

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

October 2021

Edge Computing World - MEC Hackathon 2021
12 October, Virtual

ETSI is pleased to be the official partner of THE EDGE COMPUTING WORLD who will be hosting our annual Hackathon on 12-14 October. Edge Computing World will be hosting the Hackathon information portal and will be the venue for final pitches and judging of the Hackathon entries during the Edge Developers Conference on 12 October.

November 2021

JAdES Remote Plugtests
8-28 November, Virtual

ETSI's CTI is organizing a remote Plugtests interoperability event based on the new Technical Specification JAdES (JSON Advanced Electronic Signature), ETSI TS 119 182-1. This event will run remotely, using a dedicated web portal available 24/7 for the full duration of the event.

6th MCX Plugtests
8-19 November, Hybrid

Organized with the support of the Critical Communications Association (TCCA) and the Union Internationale des Chemins de fer (UIC) this two-week Plugtests event will validate the interoperability of implementations using scenarios based on 3GPP Mission Critical Services in Release-16, including tests on FRMCS capabilities. This event will consist of both remote and on-site testing at University of Malaga, Spain.

Layer123 World Congress 2021
16-18 November, Virtual

Layer123 World Congress remains the epicenter of knowledge exchange for the industry to share real-life case studies proving the business case for the technological development, while retaining a very strong technical identity where new technologies and applications for SDN and NFV are explored and validated by the industry's leading practitioners and innovators.

OSM 12 Hackfest
22-26 November, Virtual

The OSM#12 Hackfest will enable the OSM developer and user communities to share, test and demonstrate OSM features under development for Release ELEVEN, planned for Q4 2021. New OSM community members will be able to acquire their own hands-on experience with OSM while they meet, discuss, and learn from experienced users and contributors in the project.

ETSI SNAPSHOT

926
members

27%
SMEs

+130
technical groups

340
standards
June-August 2021

679
standards
under development

5.692 M
standards' downloads
June-August 2021

1.201
eMeetings
June-August 2021

48.144
online participants
June-August 2021

83
partnerships

Members from **63** countries
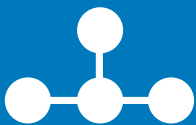
12
conferences
& Plugtests
June-August 2021

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Secretariat

127
people

16
nationalities

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650 Route des Lucioles
06560 Valbonne France
Tel: +33 (0)4 92 94 42 00
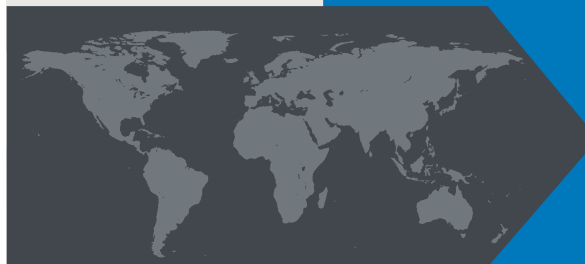
About ETSI

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 900 member organizations worldwide, drawn from over 60 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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