



ETSI
THE ETSI MAG

Radio, surfing the waves of the future.

THE INTERVIEW with Thomas Ewers, Director of the ECO ■ **NEW MEMBER INTERVIEW** with Michael D. Street, Chief, Data Science and Artificial Intelligence, NATO ■ **TECH HIGHLIGHTS**, Intelligent Transport Systems in the 60GHz band ■ **IN THE SPOTLIGHT**, Evolving radio communications for the next gen of mobile technology

October 2023

ETSI 
The Standards People

ETSI holds a prominent role in shaping radio standards across Europe and beyond.



ETSI occupies a distinct and influential position in developing radio-related standards for Europe and beyond. Our Harmonized standards under the Radio Equipment Directive play a pivotal role in ensuring the efficient and effective management of the radio spectrum. As for our System Reference Documents, they serve as the foundational framework for achieving spectrum harmonization within the EU and the broader CEPT region. With this in mind, and the World Radio Conference scheduled for November,

dedicating an edition of Enjoy! to the subject of radio was both timely and relevant.

In our [main interview](#), Thomas Ewers, the new Director of ECO (the CEPT European Communications Office), explains the why and how of our collaboration. In our [new member interview](#) Michael Street, Chief, Data Science and AI at NATO highlights how interoperability is crucial for their 31 members.

Various articles look into some of the radio technologies and use cases that shape our daily lives today: [6th Generation Mobile systems](#), [Intelligent Transport Systems](#) (ITS) (including radar), Future Rail Mobile Communications System, Urban Rail, [the 6 GHz band for a new WiFi](#), [UWB for mass-market consumer applications](#), [millimetre wave](#), [TeraHertz and reconfigurable intelligent surfaces](#) (to name but a few) all have to operate alongside other important services using spectrum efficiently without causing harmful interference.

Spectrum is scarce, spectrum is essential, find out how ETSI standards help building a dynamic and sustainable future.

Enjoy reading!



Luis Jorge Romero,
Director-General ETSI

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First ETSI Software Development Group

ETSI has recently launched its first **Software Development Group**, called OpenSlice. With this group, ETSI positions itself as a focal point for development and experimentation with network slicing. OpenSlice is creating an open-source, service-based Operations Support System (OSS) to deliver Network Slice as a Service in alignment with specifications from leading Standards Development Organizations, including 3GPP, TM Forum, and GSMA.

As part of ETSI's broader efforts in Future Networks, OpenSlice joins forces with Open Source MANO and TeraFlowSDN to enrich the suite of ETSI open source components. This comprehensive framework designed to facilitate experimentation, proofs-of-concept, integration, and testing, delivers valuable early and regular feedback to the standardization process.

ETSI: Empowering Tomorrow's Innovators!

Are you passionate about innovation and progress? Standardization is the cornerstone of technological advancement, ensuring seamless collaboration and global growth.

The **ETSI EaS material** aims to foster a deeper understanding of standardization principles and their impact across diverse industries. Being equipped with comprehensive knowledge, one is empowered to create cutting-edge solutions that go

beyond borders and revolutionize industries. Users of the material will gain invaluable insights into key concepts of standards and standardization, different elements of the ecosystem and how they interact, as well as the procedures required for the production of standardization documents.

Standards pave the way for safer, more efficient, sustainable products and services. By becoming an advocate for standardization, you contribute to a brighter future for our world.

Let's make a lasting impact and build a society where innovation thrives and uplifts us all, one standardized idea at a time!

For more information, contact: claire.desclercs@etsi.org

ETSI IoT conference: standards are key to achieving green and digital transformation

The new edition of the **ETSI IoT Conference**, IoT Technologies for Green and Digital Transformation, highlighted through use cases and demonstrations how IoT standards can be real enablers in achieving the green and digital transformation. The programme and the very stimulating presentations from our 54 international speakers are available on our [website](#).

The conference walked through the enabling technologies that are at the heart of the digital and green transformation and their maturity with respect to the standard offers. Semantic interoperability,

SAREF, a standard process to share and unify ontologies, multi-access edge computing, cybersecurity, environmental engineering and IoT data interoperability (via oneM2M standard) are just examples of the extensive support that standards

provide to IoT. AI and regulatory impacts and opportunities were also discussed in relation to the standards, in particular to Cybersecurity standards and the well-known ETSI EN 303 645 as a tool to test IoT cybersecurity.



We are
**working
with ETSI**
to **further
develop** the
European
telecoms
markets.

A close-up portrait of Thomas Ewers, a middle-aged man with short, graying hair, wearing black-rimmed glasses and a light-colored collared shirt under a dark jacket. He is looking directly at the camera with a neutral expression.

Thomas
Ewers

Director of the ECO, the CEPT European
Communications Office.

Thomas Ewers, originally from Germany, has been Director of the ECO since 1st April 2023. Having worked for more than 20 years at the Federal Network Agency, BNetzA, Thomas has extensive management and policy experience in the field of national and international spectrum management. To name but a few of his achievements, we can cite chairing the ECC, the CEPT Electronic Communications Committee for five years and representing Germany at the ITU working groups, as well as at World Radiocommunication Conferences. He is a well-known figure in the Radio Spectrum Policy Group and Radio Spectrum Committee. He was previously the Head of Department for technical regulation and standardization at BNetzA. He has a keen insight and understanding of the challenges faced by administrations, CEPT, the ECO and industry.

Which topics are we currently dealing with together?

CEPT has a long-standing history and plays a key role in the fields of telecommunications and posts. We are working with ETSI to further develop the European telecoms markets, and to ensure that European citizens have access to the most modern systems and services. Alongside this, observing and influencing global developments is an equally important role.

“ The density of spectrum use involves significant engagement with ETSI across multiple sectors.

Our collaboration ensures consistency of technical standards developed by ETSI and the regulatory work undertaken by CEPT. ETSI standardization activities trigger sharing and compatibility studies ensuring the adequate availability of spectrum resources. Equally, initiatives taken by the ECC are communicated to ETSI to enable the timely development or modification of standards. This collaboration continues throughout, ensuring we manage to meet the needs of all.

Ultimately, our goal is to ensure that the adequate and efficient provision of spectrum to all sectors goes together with the development of standards, to facilitate the emergence of new technologies for the benefit of European citizens. On this we recently organized a Workshop on 6G to discuss technological developments and to gain ideas on potential future work in CEPT, such as defining new regulatory approaches for 6G.

One topic is ECC's work aimed at improving receiver resilience to ensure the efficient use of spectrum, and to ease the identification of resources for new applications in times we're facing constant densifications in spectrum use. This involves significant engagement with ETSI across multiple sectors. Further challenges include coexistence and spectrum-sharing mechanisms for intelligent transport systems, cochlear implants, autonomous

maritime radio devices, security scanners, automotive radar, and UWB.

There's ongoing work on mobile within CEPT, can you tell us more?

Currently, we're reviewing options for sharing the 3.8-4.2 GHz band for low/medium-power networks, also as part of an EC Mandate. The aim is to provide additional spectrum for local use, such as private networks in manufacturing, while also ensuring the protection of existing users. Another topic is determining the potential risk of interference from mobile networks into aircraft radio altimeters operating above 4.2 GHz. The ongoing studies investigate mobile networks within 3.4-3.8 GHz, as well as the above-mentioned future low/medium-power networks. This topic attracted some attention in Europe following developments in the US over recent years. CEPT wants to determine whether there is any need for mitigation measures while ensuring a satisfactory outcome for all sides.

The future use of the 6 GHz band (6425-7125 MHz) is another major area we're focusing on, which may also be affected by the decisions of this year's World Radiocommunication Conference.

The World Radio Conference is coming up. What are the challenges at stake?

The ECC's Conference Preparatory Group (CPG) recently held its final meeting, concluding four years of technical studies and intense discussion to reach consensus on agreed CEPT positions. The agenda for the conference includes several proposals from CEPT, and Europe is now ready to promote our positions on mobile, satellite, transport, and science issues. In my opinion, inter-regional cooperation during the preparatory process is a major element, facilitating mutually acceptable solutions and creating a collaborative and cooperative atmosphere, and it is just as important as the conducting of technical studies within CEPT and ITU.

There are several challenging topics at the WRC. The future of the UHF band (470-960 MHz), considering the needs of its current usage, mainly for TV broadcasting, as

well as the increased demand for mobile spectrum, is just one. The conference will also consider the 6 GHz band (6425-7125 MHz) for the possible identification for IMT. This would enable harmonized mobile use of this band, however the needs of existing users must be considered, as well as other possible users, such as Radio LAN. CEPT will also contribute to enhancing the usage of existing spectrum allocations for satellites, and will look for additional spectrum opportunities, such as harmonization for earth stations in motion.

The ECO is intensively supporting the process by providing expert advice and facilitating and safeguarding efficient communications between the European delegations and providing support to the CPG-chair, and to the coordination team.

What did the ECC approve for the 116 number?

The 116 numbers allow EU citizens to access certain services of high social value, on a free-of-charge basis, in all EU Member States, through a single, recognizable telephone number, meaning that the services will have a pan-European identity. The use of such 116 numbers has recently been amended to introduce an additional

“ The ECC has approved the new 116 016 number for victims of violence against women.

reserved number, 116 016, for a new service — a helpline for victims of violence against women. The service enables victims to seek help and support, to be informed of their rights and how to exercise them, and for referral to the relevant organizations. To align its 116-related ECC Decisions and to reflect this new 116 service for the benefit of the citizens of our membership, the ECC has approved these amendments for public consultation, and we are actively working on the results.



Welcome to our New Members



Beijing Jiaotong University (BJTU)

 China

Beijing Jiaotong University (BJTU) delivers a comprehensive education system, with particular strengths in the fields of information, management, transportation, engineering, economics, and many more. It is supported by various government entities and China State Railway Group. BJTU is at the leading edge of scientific and technological development, particularly in the fields of rail transit and transportation.

Digidentity B.V.

 Netherlands

Digidentity has created a digital identity platform which is used to strengthen workflows, simplify processes, and increase efficiency on a global scale. Its digital ecosystem helps companies to take full advantage of digitalization, and it helps governments to build easy-to-use and secure infrastructure. Digidentity provides services such as identity proofing, authentication, and electronic signatures, amongst others.

Digital Catapult

 United Kingdom

Digital Catapult is the UK's authority on advanced digital technology. Digital Catapult brings together an expert, enterprising community of researchers, start-ups, and industry leaders, in the aim of accelerating industry adoption and driving growth. It is part of the Catapult Network which supports businesses in transforming great ideas into added-value products and services.

Embotech AG

 Switzerland

Embotech is a leading provider of decision-making software for autonomous driving systems for private grounds and smart factories. The company's embeddable software enables autonomous systems to make decisions by solving complex optimization problems in a matter of milliseconds, creating significant improvements in terms of safety, productivity, and energy efficiency.

E-Space SAS

 United States of America

E-Space is a global space company focused on creating bridges between Earth and space with the most sustainable low earth orbit (LEO) network. E-Space is focused on democratizing space and transforming industries by lowering the cost of space-based communications, raising the level of satellite system resiliency, and setting a new standard in sustainable space infrastructure.

Fogus

 Greece

Fogus Innovations & Services P.C. manages and integrates state-of-the-art technological advancements and cutting-edge research achievements, working towards an immersive ICT experience. Fogus delivers a wide range of services along with IT solutions, R&D expertise, training, and consulting, as well as project analysis and implementation.

Istanbul Medipol University

 Turkey

Istanbul Medipol University (IMU) is a private non-profit university which was established in 2009. IMU has 12 Research Centres, 71 undergraduate programmes across 13 schools, and three Graduate Schools. The university strives to achieve high-quality standards in both education and research.

IPLYtics GmbH

 Germany

IPLYtics GmbH has developed the big data solution IPLYtics Platform, an SaaS-based market intelligence tool that searches and analyzes technology and market landscapes for any industry. It integrates multiple data sources and intelligent search algorithms to provide a mapping of patents for technology standards and products.

Matison

 Croatia

Matison Lawful Interception provides a state-of-the-art lawful interception solution that helps ICT service providers comply with regulatory requirements. It enables the real-

time interception of communications for all ranges of services, across all environments. Its solution is implemented following ETSI and 3GPP standards, ensuring the highest level of compliance with regulatory requirements.

Network Rail

 United Kingdom

Network Rail is an independent public sector body that owns, operates, and develops most of Great Britain's railway infrastructure. Its clients are private train operating companies and freight operating companies providing train services on Network Rail's infrastructure.

NotarisID

 Netherlands

NotarisID offers identity services, tailored for the notarial profession and its clientele. As a trust service provider, NotarisID provides certificates that enable the electronic signing of documents. Notaries associated with NotarisID can verify and confirm identities through its solutions.

Ostfalia HAW

 Germany

Ostfalia University of Applied Sciences works closely with industry sectors aligned with its faculties. This diversity fosters interdisciplinary teamwork, particularly in fields such as Industry 4.0 and Digitization. Mechanical, electronics, IT, and automotive engineering faculties, contributing significantly to specialized technical knowledge in these domains.

PFA

 France

The Plateforme Française de l'Automobile (PFA) brings together 4,000 companies from the French automotive sector. It defines, implements, and develops the sector's strategy in regard to innovation, competition, and skills. Its governance is led by a Board of Directors, composed of a panel of manufacturers and a panel of equipment manufacturers and subcontractors.

QuantumNet

 China

CAS Quantum Network Co., Ltd. offers convergent services for Quantum

Technology and ICT. The company delivers integrated solutions centred around quantum technologies, including Quantum Cryptography Application, Quantum-safe Cloud Services, Quantum Enhanced Data Storage, amongst others. The company is an advocate of national and international standardization.

Rivada Space Networks GmbH

 Germany

Rivada Space Networks has established, and now operates, the first true "OuterNET": A global, low-latency, point-to-point connectivity network of LEO satellites. By connecting its satellites with lasers, Rivada Space Networks provides distributors and B2B customers with the ability to securely connect any two points on the globe, with low latency and a high bandwidth.

Scient Labs

 Japan

Scient Labs offers ITC consulting services and engineering solutions to minimize complexities and improve productivity. These services include network 5G, LTE, IoT, and Cloud Infra network consulting, integration support, telecom analysis, testing and RF testing, amongst others.

Stiftelsen Funka

 Sweden

Stiftelsen Funka helps disabled individuals by providing expert services to develop efficient and accessible ICT solutions. It applies a highly user-centric approach with testing through collaboration with end-users throughout the development process. Stiftelsen Funka is active in standardization and strategic consulting in many European member states, and regularly supports the European Commission.

SUTD

 Singapore

The Singapore University of Technology and Design (SUTD) was established in collaboration with the Massachusetts Institute of Technology (MIT). It aims to advance technical knowledge and innovation in response to the needs of society. SUTD also collaborates with Zhejiang University and Singapore

Management University, and it is distinguished by its academic programmes combining entrepreneurship, management, and design conception.

TRC

 Jordan

The Telecommunications Regulatory Commission (TRC) is one of the longest-standing regulatory bodies in Jordan. Its primary function is to regulate the ICT and postal sectors, and to drive growth in both sectors. TRC protects the interests of beneficiaries and monitors the implementation of service quality indicators.

UniBw M

 Germany

The University of the Bundeswehr Munich is a federal research university, founded in 1973 and affiliated with the German Ministry of Defence. It now offers academic education to both military officers and civilian students. The university is divided into 7 departments. UniBw M is well-established in various fields of research, especially aeronautical engineering, computer-driven cars, and information security.

V2ROADS

 Hungary

V2ROADS KFT provides software products for in-vehicle electronic devices and smart road infrastructure. Its products include V2X software for vehicle On-board Units (OBU), road-side units (RSU), and server (cloud) infrastructure. Together with its partners, V2ROADS delivers turnkey solutions, including both software and hardware.

Veridas

 Spain

Veridas Digital Authentication Solutions, S.L. provides identity technologies that simplify access for legitimate users, whilst blocking digital attacks and physical breaches. The core of Veridas' solution is a biometric algorithm that positively identifies people, either remotely or in person. Its solutions have been successfully tried and tested in today's most rigorous environments: Banks, retailers, government agencies, etc.

We deliver
complex,
interoperable
ICT projects
and services
for the **NATO**
Alliance.

A portrait of Michael D. Street, a middle-aged man with grey hair and a beard, smiling. He is wearing a dark suit jacket over a blue patterned shirt.

Michael D.
Street

**Chief, Data Science and Artificial Intelligence, NATO
Communications and Information Agency**

Michael Street founded and leads the Data Science and Artificial Intelligence Team at the NATO Communications and Information Agency (NCI Agency), applying innovative approaches and data science technology to extract value and insight from data for users across NATO. From 2013-2020 Michael also led the Agency's innovation activities; to identify, assess and introduce innovative and disruptive technologies. Prior to this, he held a number of technical roles in NATO, leading projects to deliver ICT innovation to users across NATO while also leading standards groups in ETSI and NATO. Before NATO, Michael worked in National government, academia and for a tech start-up. He holds an MBA in technology innovation and his PhD contributed to a NATO standard on intelligent radio systems. He is a Fellow of the Institution of Engineering and Technology.

In what way do you see a parallel between NATO and ETSI?

NATO and ETSI are both organizations where members are working together, because everybody recognizes that collaboration boosts efficiency, increases impact, enhances efficacy. For this, effective communication is essential.

NATO's activity stems from the member nation's ability to communicate and consult with one another, enabling nations to do so is at the heart of the NCI Agency's work.

With meetings and collaboration becoming increasingly digital, we rely on the kind of technologies that result from ETSI's work. ETSI standards facilitate interoperability and security across the industry. We, at the Agency, provide key digital solutions, capabilities and services that are critical to NATO's ability to fulfil its core tasks and foster interoperability among our member nations.

“ ETSI standards facilitate interoperability and security across the industry. ”

Why did you decide to join ETSI?

We are well aware of ETSI's contributions and efforts to develop standards in the 5G field. Since this is a disruptive technology we are exploring, this triggered our membership.

A key driver for our joining ETSI was the work conducted on 5G and future mobile telecoms, as high-capacity, low-latency, secure, and mobile communications are essential to matters of defence, public safety, corporate operations, and private lives. Therefore, having closer ties with the standardization of these services was an obvious step for us.

What can NATO bring to the standardization table?

Standardization helps us to achieve interoperability, allowing for more efficient use of resources and enhancing the Alliance's operational effectiveness.

At the NCI Agency, we support a very broad, highly demanding, and multinational user community. All of them using communication and information systems. To ensure interoperability among those

“ At the NCI Agency, we support a very broad, highly demanding, and multinational user community. ”

systems and enable our 31 member countries to communicate and work together seamlessly, we integrate technical services and procedures and standards in our protocols, data, technology and equipment.

So, this leads us to ETSI...

Yes, and a key aspect for us to join ETSI, was not only to help develop great standards but, most importantly, to implement them.

The NCI Agency is also a procurement agent. We know that ETSI standards are implemented by a wide range of companies and this gives us a large pool of suppliers we can purchase from. We know that products complying to a standard will be interoperable, so our purchasing becomes both easier and more competitive. But that only works if the standards meet our requirements, to do that we have to play a more active role when they are being defined.

How important is mobility for NATO?

Mobility, whether it's just people traveling or military units being mobile, is much more important today than ever before. This leads to a much greater focus on wireless communications. We have been using some ETSI standards for many years,

but the need for mobility and throughput will increase, as will the scenarios where we need this mobility. This means we are developing new waveforms for some of our scenarios, but we're also adopting more standards from the civilian world.

The need for mobility also impacts radio spectrum, so we are looking at approaches to make better use of this scarce resource. For example, using technologies such as Reconfigurable Radio Systems (where ETSI is standardizing) that allow much greater flexibility in the use of the radio spectrum than was possible before.

You're Head of Data Science and AI, what technologies are you currently looking at?

Technology is a key element of NATO's vision for 2030, to which we are contributing.

A key component of our mission is to deliver and harness cutting-edge technology to the Alliance. Today, many emerging and disrupting technologies are created in the civil domain before being adopted by the defence domain.

We are looking at a number of technologies, Artificial intelligence (AI), to quantum technology and the Internet of Things. Our role is to ensure NATO maintains its technological edge through innovation, being mindful of the challenges that those technologies might bring.

For example, in terms of AI, we are actively working to draw real value from AI in a safe, responsible, and secure way. At the same time, quantum technology and the Internet of Things are technology fields where the vast majority of development is conducted outside of the military domain. While we benefit from that, but also want to contribute to that development.

ETSI allows us to engage with a broader ecosystem, and to share our experience with other domains, such as public safety and the commercial markets.



Licence-exempt operation in the 6 GHz band

On 29 June 2023, ETSI published the first Harmonized Standard (HS) for 6 GHz Wireless Access System/Radio Local Area Network (WAS/RLAN) equipment. We provide insights into this new band.

Main applications

Licence-exempt bands permit households, businesses, and other users to operate their own wireless networks and services. Ranging from simple single-purpose devices like car keys to wireless-only office operation, licence-exempt technologies enable a plethora of applications. Undoubtedly, two of the most important licence-exempt bands are the 2.4 GHz and 5 GHz bands. These bands are home to various standards-based (for example, IEEE 802.11—“Wi-Fi,” Bluetooth, 3GPP Licensed Assisted Access LTE and New Radio Unlicensed, and IEEE 802.15.4—“Zigbee”) and proprietary (baby monitors, point-to-point links, wireless speakers etc.) WAS/RLAN and Internet of Things (IoT) applications. ABI Research¹ predicts that just this year, global Wi-Fi device sales will exceed 4 billion and Bluetooth devices sales will exceed 5.5 billion.

Licence-exempt data communication in the mid-band spectrum

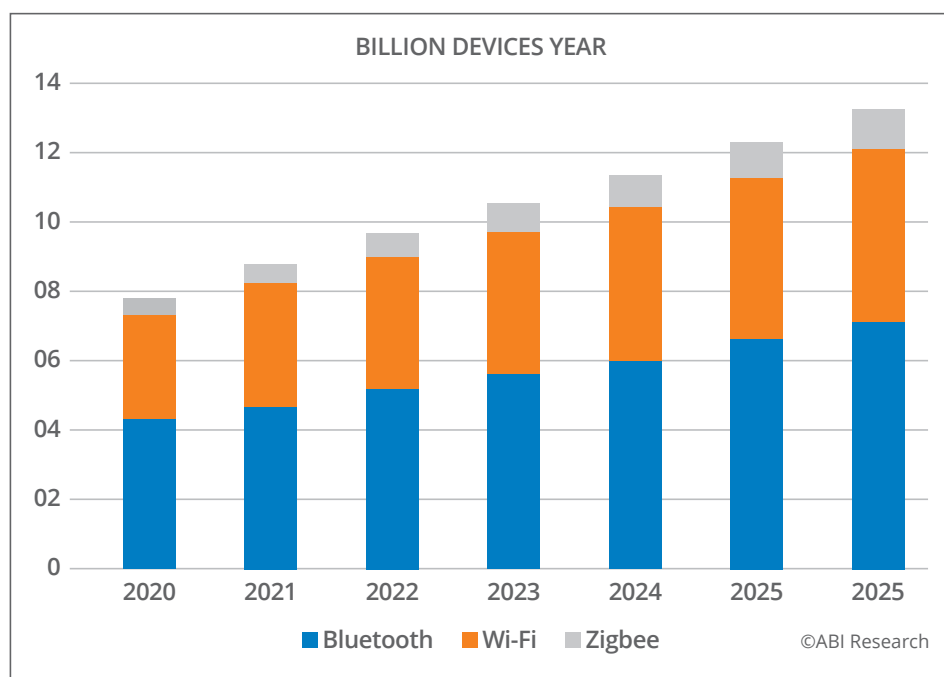
To comply with the essential requirements of article 3.2 of the European Union Directive 2014/53/EU, ETSI has revised various standards to help manufacturers update their WAS/RLAN devices. For transmit power up to 100 mW, compliance requirements for operation in the 2.4 GHz to 2.4835 GHz band are described in ETSI’s [EN 300 328](#), which addresses wideband transmission systems and data transmission. For the 5.15 GHz to 5.35 GHz and 5.47 GHz to 5.725 GHz bands, details can be found in ETSI’s [EN 301 893](#), the Harmonized Standard that covers 5 GHz WAS/RLAN. For products (including WAS/RLAN) using less than 10 mW transmit power in the 2.4 GHz band and less than 25 mW in the range of 5.725 GHz to

5.875 GHz (5.8 GHz band), manufacturers may choose to alternatively design their devices to comply with ETSI’s [EN 300 440](#), the standard addressing Short Range Devices. Thus, between 1 GHz and 10 GHz, up to 688 MHz of spectrum is available for licence-exempt WAS/RLAN or SRD operation.

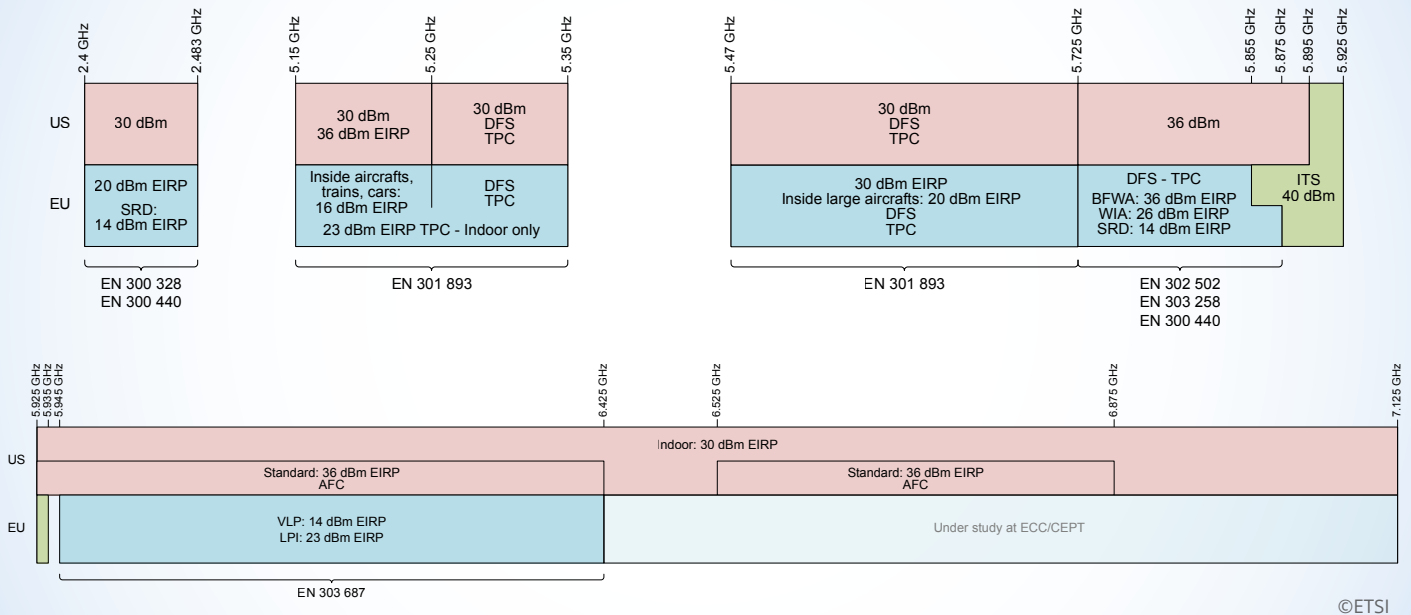
New usage demands new spectrum opportunities

Bitrate-demanding data services like online gaming, video streaming and conferencing, as well as cloud (backup) services, have driven the need for wider channels. So far, increasing channel sizes from 20 MHz to over 40 MHz and 80 MHz to 160 MHz have helped meet user demands. However, spectrum remains scarce and the wider the channel size, the more likely neighbouring WAS/RLANs need to share a single channel.

In search of new spectrum opportunities, ETSI Technical Committee Broadband Radio Access Networks (BRAN) began developing TR 103 524 in 2017. In October 2018, ETSI released the System Reference document (SRdoc) [TR 103 524](#) entitled “Wireless access systems including radio local area networks (WAS/RLANs) in the band 5925 MHz to 6725 MHz.” This Technical Report served as an initial input to studies conducted at the European Conference of Postal and Telecommunications Administrations’ (CEPT’s) Electronic Communications Committee (ECC). In publishing Decision (20)01⁽²⁾, the ECC concluded its studies on the identification of opportunities for licence-exempt operation in the 6 GHz band. In 2021, the European Commission (EC) decision EU 2021/1067 followed, largely echoing the ECC’s decision. The EC required EU member states to open the 6 GHz band for licence-exempt use starting on 1 December 2021 at the latest.



LICENCE-EXEMPT OPERATION IN THE 2.4 GHz, 5 GHz, AND 6 GHz IN THE U.S. AND THE EU



This figure provides a condensed comparison of licence-exempt operation in the 2.4 GHz, 5 GHz, and 6 GHz in the U.S. and the EU. The figure also indicates currently published ETSI standards that apply to these frequency ranges. The figure is limited to listing ETSI standards relevant to WAS/RLAN and related applications.

In anticipation of a positive outcome of the ECC's studies, ETSI TC BRAN began developing [EN 303 687](#). This Harmonized Standard for access to 6 GHz radio spectrum of WAS/RLAN was released in June 2023. The HS describes essential requirements for licence-exempt operation in the range 5945 GHz to 6425 GHz. Based on the EC and ECC decisions, it describes two device categories and multiple operation modes. It classifies devices transmitting with no more than 25 mW EIRP as Very Low Power (VLP). VLP devices may be used indoors and outdoors. If higher transmit powers are needed, they must not exceed 200 mW and devices are then limited to indoor operation. EN 303 687 categorizes these devices as Low Power Indoor (LPI).

Medium access mechanisms

Since no single entity controls or owns the right to use the licence-exempt spectrum, neighbouring licence-exempt devices typically do not coordinate their transmissions. To avoid having the

transmission of different devices overlap in time and mutually interfere, licence-exempt operation often uses distributed medium access schemes. EN 303 687 describes two such mechanisms that are similarly outlined in EN 301 893. So-called Frame Based Equipment (FBE) may attempt transmitting at regular intervals. Load Based Equipment (LBE) goes quiet for a random duration after each transmission. In either case, FBE and LBE devices sense the radio channel before each transmission. If they find it unoccupied, they may transmit.

Whereas LBE and FBE typically operate on one or more fixed channels on a 20 MHz raster, VLP additionally allows for Narrowband Frequency Hopping (NB FH) operation. As the name suggests, NB FH devices frequently change the channel they transmit on and their transmission's bandwidth is less than 20 MHz.

EN 303 687 defines requirements for WAS/RLAN applications in a whopping 480 MHz of precious mid-band spectrum. With its focus on relatively low transmit power

levels, the EU hit a sweet spot. Since VLP operation comes without site-specific restrictions, it allows for ubiquitous and easy use. This led various industry players to request the introduction of a VLP category in the U.S. as well. Whereas high power 6 GHz use remains under study at ECC/CEPT, VLP and LPI operations already unleash the biggest potentials of the new band for European WAS/RLAN users today.

References:

1. ABI Research, "Wireless Connectivity Technology Segmentation and Addressable Markets," 15 November 2021.
2. Electronic Communications Committee of the European Conference of Postal and Telecommunications Administrations, "ECC Decision(20)01—On the harmonised use of the frequency band 5945-6425 MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)," 20 November 2020.

Abbreviations:

- AFC: Automatic Frequency Coordination
- BFWA: Broadband Fixed Wireless Access
- DFS: Dynamic Frequency Selection
- EIRP: Equivalent Isotropically Radiated Power
- ITS: Intelligent Transportation Service
- SRD: Short Range Device
- TPC: Transmit Power Control
- WIA: Wireless Industrial Applications

Ultra-Wideband Technology: the ultimate trend for mass-market consumer applications

Over the last few years, we have observed a widespread adoption of UWB technology in mass-market consumer applications. Ultra-Wide Band standards are developed by the ETSI group in charge of UWB within the committee on EMC and radio spectrum matters.

Market trends

UWB has been thriving since 2007 in industrial applications, enabling numerous different location tracking and sensor applications, including smart factories and industry 4.0 implementations.

Other key applications include, since 2019, UWB-based functionalities for localization and tracking in most mobile phones. 2020 was a key transition where UWB started being integrated into consumer wearables like watches, fitness trackers and tags, and it has also moved into mass-market consumer home automation with inclusion in devices with virtual assistant functions (e.g. Apple HomePod) or home keyless access systems. At the same time, UWB has gained mass acceptance for automotive keyless entry systems to improve the functions and robustness against relay attacks.

The 2022 ECC rule update: a major step forward

This update of ECC Decision (06)04 enabled UWB fixed outdoor applications, a more flexible vehicular use and higher power for fixed indoor applications. Examples include secure wireless access applications such as automated door locks (access with your smart phone) and improved accuracy for detecting people in distress (after falling). It also enables better tracking between vehicles and vulnerable road

users, such as pedestrians or bikes. In industrial applications, UWB using the new regulations requires less infrastructure and improves accuracy in environments with many interference sources.

Gaining momentum in eHealth and Smart Home

In addition to the deployment in material investigation applications (e.g. wall scanners), we have noticed a significant increase in the medical field, with sensor applications for heartbeat and respiratory measurement, or in the private sector with systems for security such as intrusion detection, smart home (presence detection for heating or lighting control) and other surveillance applications.

Providing high accuracy

As UWB provides high accuracy and possibility for high integration, small sensors have been developed for high-

precision measurement and 3D imaging radars. With the ECC Decision (22)03, a regulation came into force in November 2022 for such sensors in the frequency range from 116 GHz to 260 GHz for professional and private use.

UWB technology offers a good opportunity to share spectrum with other radio services and could help to increase the efficient use of the spectrum. These options could allow administrations to provide additional spectrum to UWB, for example up to 10.6 GHz.

Due to the large bandwidth, UWB technology offers options for very high-precision measurement of physical parameters with robustness against narrowband interferers. The trade-off is that the increase in newer broadband mobile and wideband communication technologies will increase potential interference with UWB and spectrum sharing becomes more difficult. We expect that some current UWB ranges will become “unusable” in the future. For these reasons, UWB needs to be considered by administrations as an important technology in the upcoming discussions on spectrum rearrangement in the ranges <12 GHz and >95 GHz.



ETSI TC on EMC Radio Spectrum Matters, group in charge of UWB:

- Dr Michael Mahler, **Chair**.
- Tim Harrington, **Vice-Chair**.
- Dries Neiryck, **Secretary**.
- Michael Fischer, **former rapporteur 116-260GHz UWB regulation initiative in Europe**.

Evolving radio communications

Evolving radio communications for the next gen of mobile technology

The Chairs of three of our groups explain how millimetre wave, Terahertz and the exciting Reconfigurable Intelligent Surfaces can help getting ready for the next generation of mobile technology.

Millimetre wave, responding to the growing demand for wireless backhaul

Setting the scene

Along with the evolution into 5G and the emerging potential for 6G come challenges for enhancing backhaul to accommodate growing traffic volumes and new network capabilities. Wireless backhaul remains crucial, with GSMA predicting that over 55% of base station connections will rely on it by 2027.

Mobile wireless backhaul began in the 1990s, when MNOs first deployed 2G networks for voice services. Backhaul used a simple E1 TDM interface, transported via Point-to-Point microwave links in the centimeter-wave range. Upgrades to 3G, 4G, and 5G RANs led to a massive increase in backhaul capacity growing by three orders of magnitude from 2G to 5G.

To address this, MW technologies have evolved, shifting from centimeter-wave to millimeter-wave frequency bands (E-Band: 71 to 86 GHz) for broader channel bandwidth and reduced spectrum license costs.

ETSI's work: Rising to the challenge

Established in 2015, ISG mWT aimed to facilitate E-Band tech adoption, ensuring technology maturity, standard availability, and suitability for 5G wireless backhaul. Anticipating the arrival of 6G and taking into account the latest research and industry outcomes, ISG mWT focuses on modernizing microwave- and millimeter-wave backhaul for alignment.

This involves new technologies, such as innovative antennae, interference

mitigation, and the evaluation of backhaul based on wireless front-haul analysis. ISG mWT also explores frequencies beyond 90 GHz (W- and D-Band), aiming to consolidate these bands, support equipment standards, and explore the use of the spectrum above 175 GHz.

As a result, two ETSI Group Reports for W- and D-band were used by ECC SE19 for the publication of two ECC Recommendations.

Future activities

In liaison with the ETSI THz group and regarding W and D-Band, ISG mWT is continuing to review use cases, technology, and propagation models. The group explores network topologies using broad channel bandwidths from 250 MHz to 5 GHz, enabling speeds of up to 100 GB/s. Smaller antennae, given higher frequencies, allow for innovative radio link architectures, including LoS MIMO or phased arrays for Point-to-MultiPoint alignment, especially in urban settings.

ISG mWT plays a pivotal role in advancing wireless backhaul in response to evolving mobile network demands, from 2G to 5G, as well as preparations for 6G.

Further information on the ETSI ISG mWT is available on the website: <https://www.etsi.org/committee/1426-mwt>

THz: An interdisciplinary approach

Why THz?

In 6G, data rates of 100 Gbps and beyond, ranging up to 1 Tbps, are projected. This can be achieved either by significantly increasing the spectral efficiency to levels well beyond current 5G achievements, or by utilizing wider bandwidths of several



tens of gigahertz. However, the required spectrum lies beyond 100 GHz, in the THz frequency range. Nonetheless, such high carrier frequencies come with the trade-off of substantial path loss, requiring high antenna gains in order to mitigate it. While this entails high demands for antenna alignment, beam tracking, and device discovery, the shorter wavelengths allow for the designing of antennae with reduced form factors. Technological progress over recent years has led to numerous

demonstrations, showcasing THz communications' considerable potential. This has triggered an increasing interest in considering THz as a component of 6G.

ETSI's role

While it will take some time for 3GPP to address this frequency range, ETSI is seizing the opportunity to use this time to work on pre-standardization on topics, as there is always a lot of time-based pressure once the actual standardization process has started. ETSI established the ISG THz in 2022, focusing on defining use cases, identifying frequency bands, and developing channel models. Given that RF hardware impairment is becoming more pronounced than in the spectrum currently used, a specific work item has been dedicated to modelling hardware impairments.

Future prospects and challenges

Even after ongoing work items have been concluded, additional challenges are always emerging, and ETSI ISG THz is in a perfect position to contribute. Enabling THz communications requires an interdisciplinary approach, combining aspects of RF transceiver hardware, antennae, propagation, signal processing, and baseband design. Furthermore, Reconfigurable Intelligent Surfaces (RIS) and Joint Communication and Sensing concepts are under discussion for this frequency range. Finally, the spectrum beyond 275 GHz is anticipated for use by other stakeholders, requiring and enabling a shift in spectrum management, moving towards more agile and flexible procedures.

Further information on the ETSI ISG THz is available on the website: <https://www.etsi.org/committee/2124-thz>

Reconfigurable Intelligent Surface: Low-cost and energy efficient

What is RIS?

Reconfigurable Intelligent Surface (RIS) is an emerging topological node targeting future wireless systems, including 6G. RIS refers to a planar surface

comprising a large number of scattering elements (known as unit-cells) that can be dynamically tuned to control the wireless signals impinging on the surface. RIS can be implemented using mostly passive components, without requiring any radiofrequency (RF) or baseband processing. It therefore provides a more flexible, low-cost and energy-efficient solution than conventional approaches, such as cells, relays, and repeaters.

ETSI's role: Streamlining RIS research

ETSI's ISG RIS was officially launched in September 2021 for an initial two-year run, in order to give ETSI members the opportunity to coordinate and streamline their pre-standards research efforts regarding RIS across various EU/UK collaborative projects. These projects were extended with relevant global initiatives, paving the way for the future standardization of the technology.

In the first phase of the ISG, the group focused on defining use cases and deployment scenarios, covering technological challenges, RIS channel models, evaluation frameworks, and clearly documenting the relevant requirements. The findings from phase one of ETSI ISG RIS have been published in three different reports. **GR RIS 001** addresses use cases, deployment scenarios and requirements, **GR RIS 002** deals with the technological challenges, architecture, and impact on standardization and **GR RIS 003** with communication models, channel models, channel estimation and evaluation methodology.

Next steps

ETSI ISG RIS' run time has been recently extended for an additional two-year period. The group will continue with its pre-standards research through additional informative work, such as implementation and practical considerations, along with normative work, such as initial specification framework and providing technical requirements.

Further information on the ETSI ISG RIS is available on the website: <https://www.etsi.org/committee/1966-ris>

- Renato Lombardi, **Chair of ISG mWT.**
- Thomas Kürner, **Chair of ISG THz.**
- Arman Shojaefard, **Chair of ISG RIS.**



MEC for Drones Panel: Unlocking 5G Edge Value for the Drone Industry

The emerging drone industry is undergoing significant growth and innovation, providing services to a wide range of industries and applications.



5G edge for drones

The integration of 5G technology with drones opens up new possibilities and revolutionizes the capabilities of drones in terms of connectivity, remote operation, collaboration between drones, etc. Furthermore, the 5G edge brings significant value to the drone industry by enabling low latency and reliability, providing scalable and efficient processing capabilities of data from their onboard sensors and cameras, ensuring data privacy and security and improving autonomy in drones that allows them to make faster and more intelligent decisions locally – without relying on continuous communication with a central server. This is particularly essential for critical real-time decisions. It also allows drones to react faster to changing environmental conditions and events.

Use cases

The MEC for Drones panel held on June 26 2023 was an important venue to

discuss and reaffirm the contribution of the 5G edge and its potential exposed capabilities to the overall performance, autonomy and efficiency of drones, enabling them to operate in a wide range of applications. It was fascinating to hear from representatives of Citymesh, Unmanned Life, Flyvercity, Robotican, and D-Flight about innovative services and solutions that they offer. These included:

- Safety Drones that provide real-time situational awareness
- A Software platform for deploying, controlling and orchestrating fleets of different types of robotic devices
- A software platform that helps scale up the number of safe, high-density flights
- A Rooster drone that can stream real-time video from inaccessible areas and dangerous facilities
- Air traffic management for Unmanned Aerial Systems in accordance with the EU regulation

Nokia's Network as Code (NaC) demonstration showed how drone-based monitoring and inspections applications can easily program the networks for their needs.

What are the key takeaways from the panel?

5G and edge cloud have huge potential to bring significant value and open up new possibilities for the drone industry, enabling it to operate in a wide range of applications. ETSI MEC offers cloud-computing capabilities at the edge of the network. MEC enables the exposure of edge capabilities and context information that can be leveraged to optimize the network and service operation and proactively maintain application quality.

It is recommended that ETSI MEC be instrumental in establishing a collaboration framework with the Aerial Connectivity Joint Activity (ACJA) initiative to align the drone industry's requirements and needs from the network edge. Furthermore, ETSI MEC can provide an environment for PoCs and hackathons to demonstrate the technology's viability for the drone industry and channel the learnings back into its specification work.

At the same time, ETSI MEC can continue to enrich its APIs for vertical industries based on the panel's insightful discussions.

For details and the presentations, see the ETSI website [there](#):

<https://tinyurl.com/zuz4mbsc>

■ Nurit Sprecher, *Technical Expert ETSI MEC ISG*.

Intelligent Transport Systems in the 60GHz band

In 2019, the European spectrum regulators within CEPT allocated the 63.72 GHz to 65.88 GHz band for Intelligent Transport Systems (ITS), under ECC Decision (09)01 enabling advanced ITS applications.

Millimeter-wave band for ITS

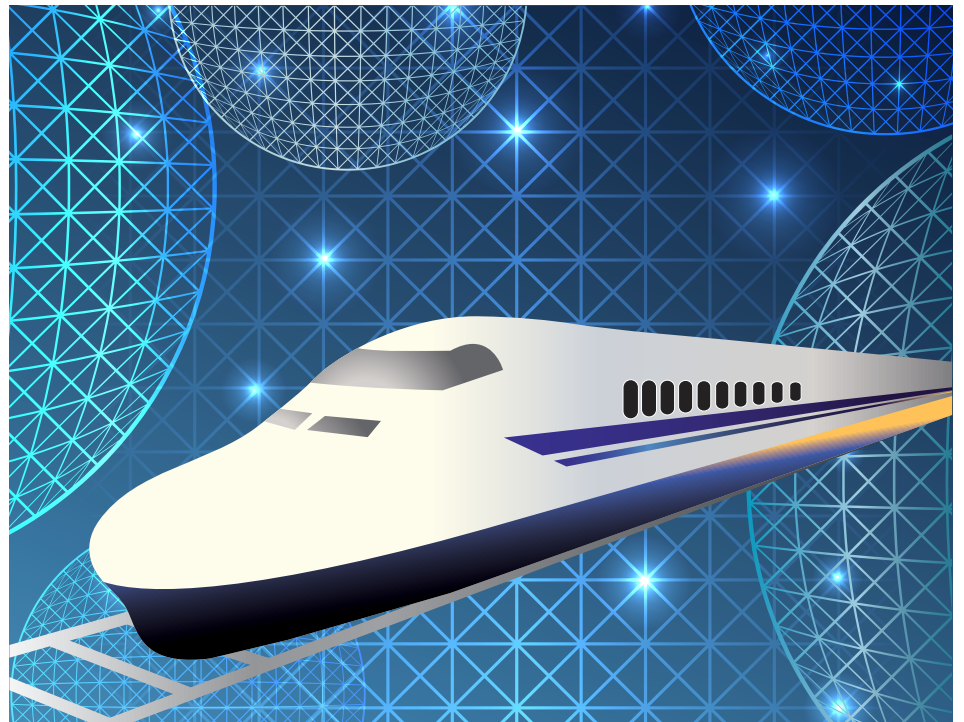
This regulatory framework for the operation of ITS applications within the mmWave band was incorporated into the EC Short Range Device decision 2019/1345, and thus established EU-wide harmonization. It defines a set of usage conditions for ITS applications based on a channelization compatible with the existing Multiple Gigabit Wireless Systems within the band, giving ITS applications operating within the specific mmWave ITS band some advantages over other mobile allocations.

To facilitate the use of the band for a broad range of new ITS applications in the road and rail sectors, ETSI TC ERM TG37 has started developing a harmonized standard (EN 302 686) which specifies the technical conditions for the market entry of mmWave ITS equipment in a technology-agnostic way. This harmonized standard is expected to be published in the first half of 2024.

Developing the European offer

A first in the world, the allocation within the 60 GHz spectrum band for the use of ITS provides the European industry with a unique opportunity not only to develop but also to deploy these systems, to improve road and rail safety, and customer experiences in travel. Existing technical standards, such as IEEE802.11bd or ISO 21216, as well as standards under investigation, like the 3GPP study item on Side Link in FR2 (mmWave) in Release 18, can rely on this spectrum regulation and the related harmonized standard from ETSI.

Several research activities around mmWave ITS are underway around the



globe. The European 63.72-65.88 GHz frequency ITS band is considered to constitute an important target band for these research activities and can motivate further development towards advanced ITS applications.

The main applications within the mmWave band are related to raw data sharing and very close proximity communications. Within this context, a use in platooning operations for the transfer of high-resolution video streams and radar data can be envisaged.

The Gigabit train vision

In the rail sector, virtual coupling and highly reliable control and communication links between various train parts have already been investigated, and the outcomes

of these investigations could lead to significant improvements. In addition, trackside-to-train communication links operating within the 60 GHz band can be used for the realization of the Gigabit train vision, enriching the user experience for train passengers in travel. In quasi-static scenarios, the high-speed download of high-resolution local map data can be supported. In all cases, the high available bandwidth can significantly improve positioning capabilities.

The harmonized standard ETSI EN302 686, which is currently under development, will provide the required basis for the timely introduction of all these services into the European market, paving the way for further deployment on a global scale.

■ Friedbert Berens, *Technical Expert in ETSI technical committee ITS.*

UK Future Open Networks Research Challenge

In 2022, the UK Department for Science, Innovation and Technology (DSIT) announced the Future Open Networks Research Challenge (FONRC), in a call for industry and academia to develop future-facing open and interoperable solutions to diversify the UK's telecom supply chain. The FONRC aims to:

- Conduct research which will shape future technology roadmaps with openness and interoperability embedded by default.
- Help to reinforce the UK's influence in SDOs.
- Strengthen the UK's telecoms R&D ecosystem and telecoms capability.

- Engage with the DSIT, UK Research and Innovation (UKRI), Engineering & Physical Sciences Research Council (EPSRC), UK Telecoms Innovation Network (UKTIN), SONIC Labs, UK Telecommunications Laboratory (UKTL), and other relevant government initiatives, and actively contribute to the UK's evolving future networks, and 6G vision.

The FONRC enables universities to work with large RAN vendors and other telecoms organizations to conduct R&D, in order to promote and foster the openness and interoperability of future network architectures. These technologies should be commercially attractive to large vendors, MNOs and investors, and they

should promote diversification in future network architectures.

Three projects were chosen to take part in the Challenge:

- REASON (Realising Enabling Architectures and Solutions for Open Networks) led by the University of Bristol.
- TUDOR (Towards Ubiquitous 3D Open Resilient Network) led by the University of Surrey.
- YO-RAN (York Open RAN) led by the University of York.

The FONRC will run until 2025.

TUDOR: Towards Ubiquitous 3D Open Resilient Network

What is TUDOR?

TUDOR is a FONRC project aiming to develop solutions for an energy-efficient open telecommunications system which is capable of providing economically viable widespread geographic coverage, contributing to the UK strategy of diversification within the telecom vendors ecosystem. TUDOR will research and develop open network components, and will ensure their seamless interoperability with the wider network environment, applying them across heterogeneous networks in 5G and beyond – including terrestrial, airborne (e.g., HAPS), and satellite networks, which we call the 3D Open Network.

The TUDOR project will address the following development principles:

- Open disaggregation
- Standards-based compliance

- Demonstrated interoperability
- Implementation neutrality

The established approach to Open RAN will be extended to core and transport networks, including the service platform, allowing new vendors and infrastructure providers to deliver flexible and secure network services in a multi-vendor environment. Deep integration between terrestrial, airborne and satellite networks will extend reliable broadband services across all geographical regions.

The technical work under TUDOR is structured around 6 main Work Packages described below:

Overall TUDOR Solution Architecture

The overall solution architecture will guide the project's work towards common system requirements and design

principles, combining it into an architecture that meets the needs of both 5G evolution and future 6G. End-to-end ensures aspects of security, resilience, energy efficiency, and techno-economic studies will also be carried out.

Intelligent 3D RAN and Open Spectrum Architecture

Providing both high performance and ubiquitous coverage increases the demand for efficient spectrum utilization. The roles of spectrum sensing and AI-supported spectrum co-existence, sharing and management will be explored, bearing in mind the requirements of seamless integration and mobility between space and terrestrial. Deterministic networking techniques for addressing requirements beyond data rate, such as time-critical applications, will also be developed.

Distributed Cloud-Native Architecture for 3D Networks

The key to disaggregated open networks is the development of a multi-provider, distributed, secure, and resilient computational environment in order to house and execute network functions, applications and services. 3D networking provides increased opportunities and scope for flexibility in network construction, along with increased challenges in routing and service-function chaining. Appropriate architecture, APIs and protocols will be developed to tackle these challenges.

Semantic Communications and Sensing in 3D Open Networks

Data availability is key to enabling AI techniques and can also be used to deliver a wide range of services to users more efficiently. One unexploited source of context data is the communications system itself. By co-designing communications and sensing in an integrated manner, we aim to unlock the potential of data and exploit it through new semantic communication

techniques. Specific security issues around sensing, context and semantic communications will also be addressed under this Work Package.

Automated Management and Orchestration in 3D Open Networks

Managing and orchestrating 3D networks will require an evolution of the solutions currently in use. Based on the principles of Intent-based networking, we will develop AI-driven and close-control loop mechanisms which will be tested in custom digital twin emulation modes, addressing the existing RIC and TUDOR developments.

Use Cases, System Integration and Testing

TUDOR solutions will be tested and demonstrated, showcasing both technical capabilities and interoperability. End-to-end Use Cases, testing scenarios, and KPIs are being defined not only in conjunction with project partners, but also with the external telecommunications industry and vertical industries. These will be tested and demonstrated through a large-scale end-to-end prototype platform developed as part of the project.

These Work Packages are supported by Work Packages covering Standardization and IP, and Project Management.

With a view to developing the UK knowledge base and workforce, TUDOR is partnering with external stakeholders, including ETSI, to deliver expert training on standardization and IPR across the project consortium.

The consortium, led by the University of Surrey 5G/6G Innovation Centre, brings together researchers from universities, vendors, MNOs, network/software developers and system integrators, from both the space and terrestrial sectors, with strong representation of the existing telecommunications ecosystem and new players in the field. It is also engaging with telecoms and vertical industry representatives, as well as government initiatives from outside of the project. We are grateful for the support of the UK Department for Science, Innovation and Technology.

■ Maximilian Barker, **UK Department for Science, Innovation and Technology.**

■ Bernard Hunt, **5G/6GIC, University of Surrey.**



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Universal, resilient, reliable, deterministic, secure network

Agile open reconfigurable platform

Semantic Communication

Sensing

3GPP Radio Groups MEETT

All five Radio Access Network (RAN) groups gathered in sun drenched South-West France last month (August 21 – 25), with ample supplies of water and air-conditioning on tap - as temperatures touched 40°C outside the giant MEETT congress centre, located in the Toulouse airport district.

The TSG RAN Working Group week mainly focused on technical progress on 3GPP Release 18, started in early 2022 and now reaching maturity. Some of the headline projects in the Rel-18 have been MIMO evolution for downlink and uplink, Enhanced NR mobility, mobile IAB & smart repeaters, NR Duplex operation, AI & ML, Extended Reality using NR, Reduced Capacity NR, UAVs, Expanded Sidelink, Positioning and satellites for 5G.



being suspended at 7 pm to allow delegates to participate in a 2KM fun run. Following the advice of the first-aider's on site, the run was largely made into a 'fun walk' due to the stubbornly high temperatures on the day.

Thanks to coffee break collections at the meeting and the sales of a special 3GPP / Simon de Cyrene charity T-shirt, delegates raised over €8000 for a housing project that is providing enhanced living for handicapped adults and their carers.

completed their leadership elections, for Chair and Vice-Chairs for the next two years. Elections were also held in RAN2, RAN3 and RAN4 for either Chair or Vice-Chair positions.

In total, over 1500 delegates attended the August RAN WG meetings in Toulouse. Staff from ETSI provided IT and meeting support. Around the important specification work and elections, time was also spent in organizing successful charity and social gatherings, which are an agreeable byproduct of getting 3GPP back to full scale physical meetings.

Another focus of the RAN WGs in Release 18 has been on the balance of some important, but sometimes competing, areas of work:

- Mobile Broadband progress*
VERSUS
Further expansion into 'vertical' sectors
- Early commercial needs from NR*
VERSUS
Longer term 5G vision
- New & Enhanced devices*
VERSUS
Network Evolution

As 3GPP Release 18 draws close to completion, with many WG RAN1 led projects completed and the RAN2/3/4 led work progressing at pace, the groups are now planning for the next package of features for the next release. Their deliberations will allow Release 19 priorities to be advanced at the 3GPP Plenary meetings in September (TSGs#101) and in December 2023 (TSGs#102). From early 2024, Release 19 work will be the main focus of 3GPP groups.

At the Toulouse Working Group meetings there were other distractions for the experts. On Tuesday evening a charity event was enabled by meeting activity

New RAN WG leadership

During the week the WG RAN5 community celebrated their 100th meeting. They also

■ Kevin Flynn, **3GPP Marketing & Communication**



APIs for IoT

oneM2M's API addresses device- and network or cloud-side requirements.

By enabling interactions between applications and network elements, telecommunications service providers can tap into new revenue streams from their assets. Customers benefit from making more intensive use of communications networks while network operators can improve customer interactions via self-service Apps.

GSMA and TM Forum Application Programming Interfaces (APIs) are key enablers for such Apps. Another API initiative, **CAMARA**, seeks to improve cellular network access and adapt connectivity to use case needs. These **API frameworks** focus on consumers and their operational support requirements. When it comes to the IoT, however, the landscape is different.

Differing IoT Characteristics

IoT devices might be deployed in batches and in greater volumes compared to single consumer smartphones. IoT devices also tend to be constrained in terms of processing power and storage memory. This can result in the need to offload processing activities onto service layer platforms or network functions. IoT devices also need to interact with the application software that operates on top of cellular modules.

The IoT technology stack is also more fragmented. Smartphones rely on operating systems, such as Android and iOS, which are the primary interfaces between Apps and the underlying network connectivity layer. Android and iOS provide "quasi standardized" APIs towards device-side connectivity. They are complemented by network-side APIs, from TM Forum and others. The lack of a dominant IoT operating system means that their equivalents, especially on the device side, are still missing.



Additional Characteristics of APIs for IoT

While connectivity is similar for IoT and smartphone devices, there are major differences in how they are deployed and used. As many IoT devices operate in untended locations, a wise design assumption is that there is no human in the loop.

Technology fragmentation is another industry feature. Many IoT deployments involve multiple device types. A factory might contain vibration sensors on machines, location sensors on high-value tools and particulate sensors for environmental monitoring. Similarly, lighting and traffic speed are two of many smart city sensor types. These might be categorized by supplier, by the district in which they reside or by the operating departments that manage them.

One API for devices networks

The management of identities, location, and security policies for single and groups of IoT devices are examples of common service functions. If developers can use a single API to access a **toolkit of functions**, there are significant application development benefits.

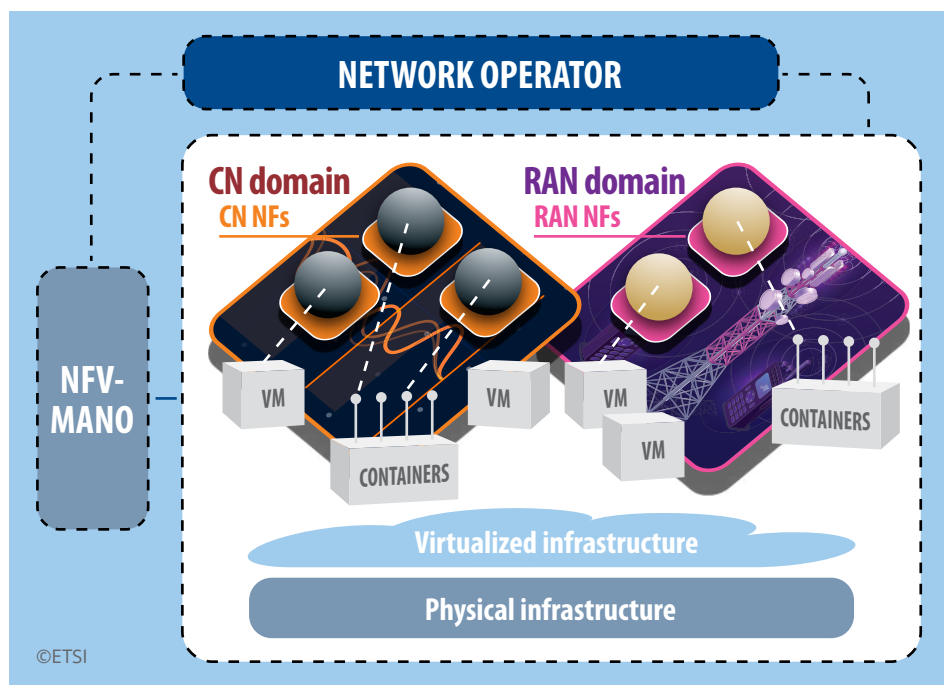
oneM2M's open standard for IoT systems provides exactly those APIs. It does so on both the device- and the network- or cloud-side. This lowers the adoption hurdle for developers wishing to access service functions.

oneM2M also provides interfaces to 3GPP standardized network capability functions via the T8 Network Exposure Function APIs. These can be viewed as the IoT complement to what the GSMA/CAMARA and TM Forum provide for consumer applications.

■ Andreas Neubacher, **Head of IoT Standardization, Deutsche Telekom, member of ETSI, 3GPP and oneM2M**

ETSI NFV and RAN virtualization

ETSI's pioneering work on the softwarization of the mobile network revolutionized the telecom industry. However, today, a multi-vendor Telco cloud based on virtualization and cloudification is a necessity for operators. ETSI NFV is working on it.



progress made by ETSI NFV's Release 4 regarding the full support for containerized deployments, in May 2023, the ISG published the [ETSI GR NFV-IFA 046 report](#). This GR profiles the NFV framework against O-RAN use cases and solutions, and it explores several key issues, which are analyzed considering an NFV-MANO-based vRAN orchestration and management. Recommendations for enhancements to the NFV framework and its functionality are also provided.

The outcomes of the GR were presented at a joint workshop hosted by ETSI NFV and O-RAN Alliance, which took place in Osaka, Japan, in June 2023.

As vRAN remains one of the hot topics in the ETSI ISG NFV, future normative work based on industry requirements will follow.

Collaboratively building the Telco Cloud

ETSI NFV aims to unlock the business potential of the future Telco cloud, and plans to use its best endeavors to collaborate and foster interactions with other SDOs (like 3GPP and O-RAN Alliance), along with open-source projects and communities (such as Nephio, CNCF, and OpenStack) to promote the development of an interoperable vRAN ecosystem. Good examples of relevant topics are described in [ETSI GR NFV-IFA 046](#), such as "VNF descriptors and packaging". Additional topics, such as energy savings and efficiency, intent management, and Platform-as-a-Service (PaaS) services can also be anticipated as future areas of common research and standardization activity, working towards building stable, sustainable, flexible, and reliable Telco clouds.

- Yoshihiro Nakajima, **Chair ETSI NFV**.
- Kostas Katsalis, **Vice Chair ETSI NFV IFAWG**.
- Joan Triay, **NFV member**.

ETSI NFV: Virtualization and cloudification of Telecom networks

The ETSI NFV ISG work enabled greater levels of automation for network function (NF) deployment and management, through a unified Cloud infrastructure. While NFV standardization has always been generic, so as to cover any kind of network virtualization, initial focus of NFV was more set on the core network (CN). However, a multi-vendor Telco cloud supporting all network domains is now a necessity for telecom operators, in order to maintain sustainable businesses.

"How can the RAN be virtualized as part of an integrated Telco cloud?". To answer this question, ETSI NFV initiated relevant studies as part of Release 5, under the umbrella of the "NFV for RAN" Feature, which has the main objective of providing

further support for the management and orchestration of vRAN.

Challenges encountered in virtualizing the RAN

5G CN virtualization offers the foundation on top of which the NFV concept can be built and demonstrated, as studied in the [ETSI GR NFV-IFA 037](#). Nevertheless, additional challenges must be considered for vRAN, such as managing computer-intensive operations with acceleration; supporting near-real-time control and time-sensitive communications; and managing multiple segments in a hyper-distributed (i.e., many small distributed edge and regional cloud sites) and disaggregated RAN (i.e., radio unit (RU), distributed unit (DU) and centralized unit (CU) NFs).

Considering the relevance of O-RAN Alliance's work in the RAN domain standardization, and based on the recent

New White Papers



MEC support for Edge Native Design

MEC (Multi-access Edge Computing) is a promising technology that offers improved data latency and privacy by bringing applications closer to end-users. **This White Paper** explores the Edge Native approach as an evolution of Cloud Native, defining “Edge Native” and what it means for edge developers when building their applications, and explains how ETSI supports the Edge Native design paradigm.

Fast mobile network modernization

High penetration of the data transport network is key to fully benefit from services enabled by 4G/5G networks. The key brick of a data transport network is optical fiber, which needs to be complemented by radio systems, known as wireless backhauling systems (WBH). **This White Paper** explores the limitations of WBH solutions in certain regions, outlining strategies to ensure that they are a valid complement to fiber.

MEC in IoT

This White Paper highlights the benefits of Multi-access Edge Computing (MEC) and the oneM2M IoT standard platform, and discusses how combining both architectures can enhance IoT systems deployed at the edge. It also emphasizes the importance of interoperability and provides a framework for integrating oneM2M into MEC, aiming to promote coherent standard solutions that facilitate the adoption of edge computing and IoT technologies.

Modular software radio configuration

This White Paper is a revision of ETSI WP38, published in 2020, that adds details of the new Radio Application Package (RAP), defined in ETSI TS 103 850 V1.1.1., and that introduces a detailed container for providing new Radio Applications for target radio equipment. This White Paper explains how ETSI's software reconfiguration solution aligns with 5G and beyond application needs.

Spectrum sharing for local private networks

This White Paper was developed by ETSI and The Wireless Innovation Forum (WinnForum) as a joint effort to promote spectrum sharing approaches for specific use cases. It provides a status analysis of dynamic spectrum sharing use cases and frameworks, including the associated evaluation elements and opportunities to adopt these frameworks.



Evolving NFV towards the next decade

Network functions virtualization (NFV) has been the catalyst of a radical change, prompting the transition from hardware network appliances to a era of software-based virtualized network functions. A decade after ETSI NFV ISG's inception, and after major investments and network deployments, **this White Paper** examines the challenges, trends, and potential directions.

New feature in IPR database application

An important class of un-normalized patent numbers concerns the unpublished ones, that are temporarily attributed upon patent filing. It is common for declarants to submit their ETSI IPR declarations before the patent authorities have validated the corresponding patent publication numbers. Once the respective patents have been reviewed and approved, they are attributed a number different from that used in the earlier submitted declaration. Up to now, updating a declaration with the final patent number was not allowed for declarants. In June 2023, we published a new “do it yourself” (DIY) feature in the IPR application that allows the submitter, or another authorized user, to access their ISLD declaration and update the formerly unpublished patents (i.e., the user is allowed to either normalize or abandon them).



Call for Nominations for ETSI Fellowship Awards

Nominations for new ETSI fellows are open until 22 December, 2023. This award recognizes an outstanding contribution to ETSI and is awarded to individuals whose dedication is well known.

ETSI members must submit their nominations in writing and clearly justify why the nominated candidate deserves an ETSI Fellowship. The ETSI Fellowship Awards will be announced at the spring General Assembly.

More information at <https://www.etsi.org/membership/fellows>



Welcome to our new staff members



Dimitra
Papageorgopoulos

Technical Officer

Dimitra is from Athens, Greece. After taking a Master's degree in Electronic Engineering at the International Hellenic University, she worked as a Quality Assurance/Quality Control Engineer in natural gas pipeline construction projects (medium pressure) in Northern Greece. In 2003 she joined the Hellenic Telecommunications and Post Commission, where she was responsible for regulatory policy and technical issues regarding Directive 1999/5/EC (RRTE Directive). She represented Greece in the ADCO RTTE groups and issued a surveillance guideline for the Greek RTTE Market. Before and during the Athens Olympic Games in 2004, she was responsible for the coordination of broadcasters, to avoid interference. Dimitra moved to France in 2012.



Fernanda Aveiro
Goncalves

Membership Care Administrator

Fernanda is from the region of Alentejo, in Portugal. After taking a degree in business management in her home country, Fernanda moved to England, where she worked in the hotel industry for a few years.

The 2000s saw Fernanda move to the South of France, where she dedicated two decades of her career to non-profit organizations, gaining valuable experience that is now beneficial in her position at ETSI.

In 2013, Fernanda further enriched her knowledge by taking a Master's degree in marketing.



Sylvie
Rosso

Travel Administrator

Sylvie is from the Alpes-Maritimes region. She took a university degree in English and the history of art and a BTS in tourism, equivalent to a BTEC Higher National Diploma. Sylvie has always worked in the business travel sector. Her career has taken her to renowned organizations like American Express and Digital Equipment, where she always served corporate travellers.

Prior to working for ETSI, Sylvie managed VIP services at Travel Concept, a trusted travel agency that ETSI has relied on for many years. This meant that she already knew her co-worker Sylvie Adragna and had a deep understanding of ETSI's work culture.



In memory of Victoria

It is with a heavy heart that we announce the sudden passing of our dear colleague, Victoria Gray. Victoria's commitment to ETSI spanned more than two decades, during which she played various roles in different teams. Victoria was more than a colleague: she was a friend to us all, and her presence will be greatly missed. Our thoughts go out to her family, especially her two young children, her friends, and everyone who had the privilege of knowing her.



ETSI OSM Release FOURTEEN Unleashes Next-Level Service Assurance

ETSI OSM is delighted to announce the Long-Term-Support (LTS) release of **ETSI OSM - Release FOURTEEN**. This release provides two years of continuous support with bug fixes and security patches, and includes significant improvements in many key areas. Embrace the cutting-edge service assurance architecture, based on Apache Airflow and Prometheus, enabling closed loops for auto-scaling and alert handling from Network Functions.

Enhanced security, usability, and platform management and new capabilities for network service deployment are some of the features of this Release.

Release FOURTEEN represents a significant milestone for ETSI OSM. The community continues to drive innovation in the telecommunications industry, delivering powerful open-source solutions for orchestration and management of virtualized network functions.

Upgrade to FOURTEEN now and lead the way with ETSI OSM's innovative open-source solutions for network function orchestration and management, developed during **OSM#15 Hackfest** in Castelldefels, June 2023.

New ETSI Reports: Securing AI for Transparency and Trust

The ETSI Securing AI group (ISG SAI) has issued three critical Reports to help sustain a secure AI landscape. The **ETSI GR SAI 007** standard emphasizes **explainability and transparency** in AI processing in order to expose biases and provide accountability. The AI **computing platform security** architecture **ETSI GR SAI 009** safeguards critical assets during runtime and storage.

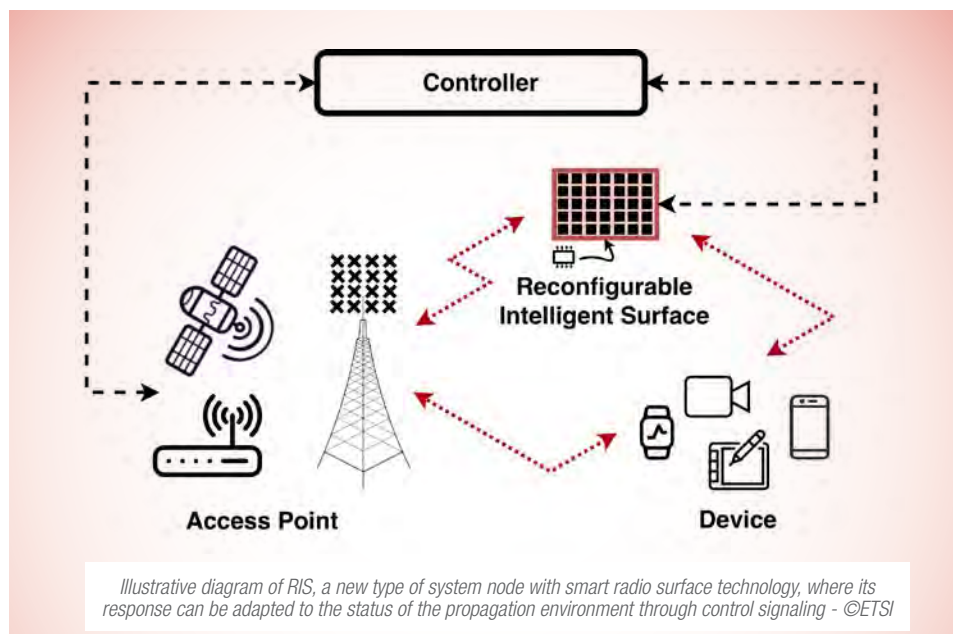
The **ETSI GR SAI 013** Proofs of Concepts framework promotes collaboration and improves awareness of AI security problems. By addressing transparency, safeguarding AI assets, and emphasizing practical features, ETSI ISG SAI enhances AI security and increases trust in AI technology.

First use cases for Reconfigurable Intelligent Surface

ETSI presents its first report on Reconfigurable Intelligent Surface **ETSI GR RIS-001**. As RIS dynamically controls radio waves between transmitters and receivers, a new era of wireless communication begins. The report highlights 11 cutting-

edge use cases, ranging from enhanced capabilities to superior sensing, positioning and security, to enable interoperability with existing and upcoming wireless technologies and networks.

RIS's cost-effective, eco-friendly deployment solution for 5G-Adv and future 6G systems will revolutionize your wireless world. RIS holds the key to a sustainable, AI-enabled wireless future with its adaptive, seamless integration into numerous objects.



Join us at upcoming events

Organized by ETSI

▶ [8th MCX Plugtests™](#)

📍 Malaga, Spain

📅 9-13 October

The goal of this MCX Plugtests event is to validate the interoperability of a variety of implementations using various scenarios based on 3GPP Mission Critical Services. Flexible group communications, MCDATA IP Connectivity, and complex emergency call handling will all be tested. This Plugtests event will be extended to test Mission Critical Services over a 5G test network. The event will specifically focus on inter-system communications including Off-Network, IWF, and Inter-MCX scenarios.

▶ [TeraflowSDN Hackfest #3](#)

📍 Barcelona, Spain

📅 16-18 October

This edition of the event will be dedicated to the use of P4 in TeraFlowSDN, starting with an overview of TeraFlowSDN and white box management with P4, followed by a step-by-step walkthrough of an end-to-end P4 based demo, finishing with interactive sessions led by key members of the TeraFlowSDN community. Participants will be able to build their own hands-on experience of P4 forwarding with TeraFlowSDN. Hands-on sessions will be followed by the Ecosystem Day held on 18th October 2023.

▶ [10th UCAAT \(User Conference on Advanced Automated Testing\)](#)

📍 Timisoara, Romania

📅 14-16 November

The complexity of modern software and telecommunication systems is constantly increasing. The intersection with AI and machine-learning technologies means that users are encountering unprecedented experiences in all areas. Collaboration between development and testing teams working on maximizing the benefits of automated testing can lead to better results and communication, along with a shared understanding of testing goals and processes. This is why UCAAT 2023 will discuss all aspects of optimizing the value of automated testing for software enabled systems.

▶ [ETSI Security Conference](#)

📍 ETSI, Sophia Antipolis, France

📅 16-19 October

The 2023 edition of ETSI's annual flagship event on Cybersecurity will focus on Security Research and Global Security Standards in action. Amongst the technology areas discussed, dedicated sessions will cover Zero Trust, Supply Chain, IoT, Quantum Computing, 5G/6G, and Artificial Intelligence. Experts will also share their experiences on broader aspects, such as attracting the next generation of Cybersecurity standardization professionals and supporting SMEs.

▶ [LTA Signature Augmentation and Validation Plugtests 2023](#)

📍 Online

📅 23 October - 24 November

The event will focus on Electronic Signature Validation. The aim of the Plugtests event is to verify the interoperability of digital signature augmentation to LTA (Long-Term Archive) level, and to validate the capacities of the LTA-level signatures of the participants, in order to help them detect any potential issues which may lead to different augmentation and/or validation results.

▶ [ETSI is also supporting some industry events, and will actively participate in:](#)

📅 [2023 OCP Global Summit](#)
17-19 October – San Jose, CA - USA

📅 [AI-Native Telco Summit](#)
18-19 October – Online

📅 [NetworkX](#)
24-26 October – Paris, France


📅 [The Great Telco Debate](#)
7 December – London, UK

Find out more and register
on our website at
<https://www.etsi.org/events>

 **935**
members

 **467**
standards
June-August 2023

 **27%**
SMEs

 **703**
standards
under development

 **+130**
technical groups

 **5 M**
standards' downloads
June-August 2023

 **15**
conferences
& Plugtests
June-August 2023

 **4.265**
unique participants
June-August 2023

 **450**
meetings
June-August 2023

 **105**
partnerships

 **Members from**
63 countries

About ETSI

ETSI provides members with an open and inclusive environment to support the development, ratification and testing of globally applicable standards for ICT systems and services across all sectors of industry and society. We are a not-for-profit body with about 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).

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