

WORK PROGRAMME
2020/2021



CONNECTING WITH TOMORROW

Introduction from the Director-General



Welcome to our Work Programme

In ETSI we are constantly exploring new ways to make the development of standards faster and more efficient. Our FORGE platform, for example, gives developers free access to open-source code produced by our members. And as we have already seen this year, the need for effective virtual collaboration between individuals and teams has never been keener. We need to maintain the pace of our activities, and we will do so despite the circumstances.

As our own modus operandi evolves, so does the scope of ETSI's standardization activities. This Work Programme highlights some of the technical areas attracting the attention of our members, including new networking protocols, 5th generation fixed networks and the security of Artificial Intelligence-based systems.

I encourage you to visit us online at etsi.org, where you'll find out more about the latest outputs and planned activities of our Technical Committees and Industry Specification Groups.

Luis Jorge Romero, ETSI Director-General

Meet the Standards People

ETSI produces globally applicable technical standards for ICT-enabled systems, applications and services that are widely deployed across all sectors of industry and society.

Recognized by the European Union as a European Standards Organization, our outputs provide globally applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, aeronautical, broadcast and Internet technologies. Our standards help ensure the free movement of goods within the single European market, allowing enterprises in the European Union to be more

competitive. Building on this heritage, the consistent excellence of our work and our open approach sees ETSI's influence extend beyond our European roots to the entire world.

Our diverse membership includes some of the world's leading companies from the manufacturing and service sectors, regulatory authorities and government ministries, as well as small and medium-sized enterprises and innovative start-ups, alongside universities, R&D organizations and societal interest groups.



From the Chairman of the ETSI Board 04



3GPP and 5G 05



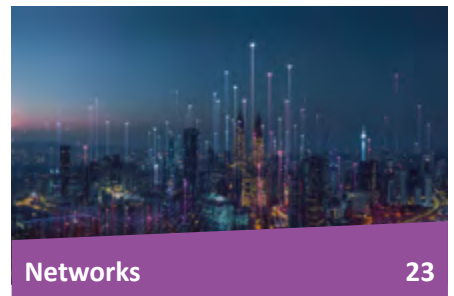
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Committees, Projects & other groups

Advisory, Technical, Research and Development (ATRD)	European Public Safety (EPS)	International Telecommunications Union (ITU)	Smart Grids (SG)
European Standardisation (ES)	European Standardisation (ES)	European Standardisation (ES)	European Standardisation (ES)
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FROM THE CHAIRMAN OF THE ETSI BOARD



This Work Programme demonstrates the continuing pace and diversity of our standardization activities. It also illustrates clearly where the interests of our broad membership lie, not least in areas such as 5G, the Internet of Things, cybersecurity and edge computing as well as the accelerating virtualization and automation of telecommunication networks.

Technical standardization is intrinsically a consensus-based process. Accordingly, much of our work in ETSI over the last three decades has centred on face-to-face meetings – some between a handful of members, and others involving hundreds of participants from dozens of countries.

In recent years, physical attendance has been increasingly augmented by remote participation using a variety of electronic tools. This virtualization has extended to our increasingly popular and well-attended series of interoperability events, where vendors and developers can stress-test new standards with their peers without ever leaving their premises.

At the start of 2020 we had little idea just how abruptly our own operational processes would shift. The devastating societal impact of the coronavirus has

imposed profound challenges on every organization. For ETSI it necessitated an immediate shift to total reliance on virtual meetings. This transition has been successful, due in large part to the resilience and application of our own in-house IT teams plus the enthusiastic support and solidarity of our members.

The hastened move to electronic working has brought with it further challenges and opportunities. A twenty-minute coffee break can play a crucial role in making a point to colleagues or quickly reaching agreement on an unresolved issue: virtual meetings do not offer quite the same platform for ‘personal’ dialogue. Rather than setting prescriptive rules to our membership, we have actively encouraged the Chairs of all our technical bodies to explore their own preferred ways of working so that our busy standardization schedule can continue with minimum disruption.

The beginning of this year saw a resumption in the citation of our Harmonised Standards in the Official Journal of the European Union, after a fifteen-month hiatus. We will continue to cooperate with the Commission on all levels to overcome the still growing systemic problems.

Dirk Weiler, Chairman of the ETSI Board



Everything mobile

We are a founding partner of the Third Generation Partnership Project (3GPP™), where ETSI and six other standardization organizations from around the world come together to develop specifications for advanced mobile communications technologies. The scope of 3GPP covers the complete system description for mobile telecommunications, including the radio access network, its core network and the service capabilities that provide for service differentiation.

Following 2019's on-schedule completion of 3GPP Release 15 - the formal conclusion of 'Phase 1' 5G standardization activities - 'Phase 2' activities in 2020 centre on the submission of Release 16 specifications as the core of 3GPP's technology proposal towards the ITU-R IMT-2020 process.

Our working groups are increasingly responsive to the needs of new players in the mobile ecosystem. Conceived around the pillars of enhanced mobile broadband, massive machine-type connectivity and ultra-reliable, low latency communications, the impact of 5G will extend far beyond conventional cellular applications. Accordingly the activities of all 3GPP working groups continue to reflect the new demands of newcomers to the 5G ecosystem, from smart cities, critical communications and industrial IoT users to broadcast and satellite providers. One sector already seeing significant progress in standardization activities is transportation, with use cases for vehicle-to-everything (V2X), future railways, maritime communications and unmanned aerial vehicles all driving our technical work.

Our current work meshes with a wider long-term vision of autonomous machines, safer transportation, futuristic healthcare and hundreds more use cases, many of them as yet unimagined. Far from being the end of specification work for 3GPP, this year's submission to ITU-R is itself the foundation stone of 5G's further evolution. This is illustrated in the future work plan for 3GPP Release 17, scheduled for delivery around mid-2021, that promises many significant enhancements that will accelerate the adoption of 5G networks as a critical enabler for the Internet of Things.

View the complete 3GPP work plan at 3gpp.org/specifications/work-plan

Release 16 considers 5G LAN; high precision positioning; 5G IoT; evolved ultra reliable and low latency communications; network controlled interactive services; communication services for critical medical applications; asset tracking; relays for energy efficiency and extensive coverage; application layer support for 5G factories; enhancements for cyber-physical control applications in vertical domains; support for multi-USIM devices; unmanned aerial systems providing connectivity-identification-tracking; minimization of service interruption; audio/visual service production; multimedia priority service phase 2; architectural enhancements for 5G multicast-broadcast services; service-based support for SMS in 5G Core; edge computing/applications in 5G Core; application architecture for enabling edge applications; and user plane function enhancements for the service-based architecture.



Established in 1998, The Third Generation Partnership Project (3gpp.org) brings ETSI together with six other regional standardization organizations in Asia and North America, plus market associations and several hundred individual companies. As one of the founding partners of 3GPP, ETSI plays a prominent role in the development of mobile communications. In the first quarter of 2020, of more than 680 Individual Members of 3GPP over 430 were via their membership of ETSI.



Devices and services: a spectrum of applications



ETSI creates standards that define many radio technologies and systems, including those used for mobile phones, broadcast radio and television, broadband networks, satellite communications, smart grids, short-range devices and cordless technology. We also provide standards used by regulatory authorities in Europe and elsewhere to manage the use of radio spectrum, and to ensure safe co-existence of systems competing for use of limited spectrum resources.

Harmonised Standards and the Radio Equipment Directive

ETSI's Harmonised European Standards are developed by our members in our technical committees, with much of the work being conducted in our committee for Electromagnetic compatibility and Radio spectrum Matters (TC ERM). This body is responsible for a range of radio products and electromagnetic compatibility (EMC) standards, as well as the overall co-ordination of radio spectrum matters.

Now in force across Europe, the Radio Equipment Directive 2014/53/EU (RED) has required the revision or replacement of ETSI's existing related Harmonised Standards and the development of new ones. In 2020 we maintain our close dialogue with the EC to optimize the efficiency of this new process and ensure its applicability to the EC's requirements.

In parallel with this, we continue to create new Harmonised Standards and technical specifications,



while making numerous updates to existing publications. The extensive scope of this work includes: Multiple Gigabit Wireless Systems (MGWS); Networked Short Range Devices (SRD), including SRDs using Nuclear Magnetic Resonance (NMR) technology; Radio equipment operating below 9 kHz; Robotic mowers; Wireless power transmission; Wideband transmission systems; Ultra Wide Band (UWB) systems including ground- and wall-probing radio determination; Level Probing Radar (LPR); tracking; keyless entry systems; generic UWB communications; Radiodetermination equipment; Wireless Industrial Applications (WIA); Ultra Low Power wireless medical capsule cameras; Metal sensors and Security scanners; Avalanche beacon equipment for buried people; Meteorological radar; Digital Mobile Radio (DMR) systems; and Mobile Service broadband radio for Public Protection and Disaster Relief.



In the area of digital TV and audio, our revisions to radio spectrum access standards span Digital Terrestrial TV transmitters and receivers; Digital Audio Broadcasting (DAB) and DRM transmitters; AM/FM broadcast sound receivers; and active antennas for broadcast reception. For professional content creators we are updating standards for wireless microphones/audio Programme Making and Special Events (PMSE) systems.

Our work on wideband transmission systems considers various standards relating to hearing aids, wireless microphones, Radio Frequency Identification (RFID), robotic mowers, networked based SRDs, Nuclear Magnetic Resonance (NMR), radiodetermination equipment and metal sensors.

A further specific focus of our activity relates to the use of UWB technology in various use cases. This includes Ground- and Wall-Probing Radio determination (GPR/WPR) devices, keyless entry, Tilted Level Probing Radar (LPR), Ground Based Synthetic Aperture Radar (GBSAR), material sensing devices for security scanning, ground humidity, condition sensor and vehicular sensors.

Based on the implications of the RED for UWB we have launched work on several new standards and reports. The scope of these deliverables includes Low Duty Cycle Mitigation and material characteristics above 100 GHz, as well as receiver and transmitter measurements.

In the medical area we are developing standards for Ultra Low Power Active Medical Membrane Implants and Peripherals, as well as Ultra Low Power Animal Implantable Devices and associated peripherals.

Our group on Digital Mobile Radio continues to revise technical specifications for DMR systems.

Our Aeronautics group addresses various standards and specifications covering Ground Based Synthetic Aperture Radar (GBSAR); Primary Surveillance Radar; Wide Area Multilateration (WAM); Advanced Surface Movement Guidance and Control System (A-SMGCS); Data Link Services (DLS); Airport Surface Data Link (AeroMACS); and VHF air-ground Digital Link (VDL).

Our Maritime group continues to update standards relating to marine radar; positioning systems and survival location devices; Digital Selective Calling (DSC); and inland waterways navigation radar.

In the area of road transportation, we are progressing studies on ITS receiver requirements and co-channel co-existence between ITS-G5 and LTE-V2X, together with a further study on receiver requirements for automotive and surveillance radar equipment. Other work considers Transport and Traffic Telematics (TTT) and Dedicated



Short Range Communication (DSRC). Meanwhile we continue to update our Harmonised Standards for Euroloop and Eurobalise train control systems.

ETSI's co-operation continues with the European Committee for Electrotechnical Standardization (CENELEC), notably in the area of smart/connected devices where electromagnetic compatibility (EMC) requirements for the base machine need to be reconciled with requirements for radio elements providing the connectivity. This affects, for example, smart domestic appliances and some industrial machinery. We continue to work actively with CENELEC to align processes and support a homogeneous single market in support of competition and innovation.

Efficient Use of Radio Spectrum

At ETSI we are responsible for a range of issues relating to radio spectrum usage. Our standards ensure that users can benefit from spectrum as widely and efficiently as possible. We assist the European Conference of Postal and Telecommunications Administrations (CEPT) in harmonizing the use of spectrum throughout the 48 countries of Europe, usually by providing a technical basis in System Reference documents (SRdocs) and by our Members' direct participation in CEPT Project Teams. This ensures that ETSI Harmonised Standards respect increasingly exacting spectrum sharing requirements.



Reconfigurable Radio Systems

The telecommunications industry faces a major challenge – a lack of spectrum to meet growing demand, particularly from the Internet and mobile communications. However, a significant amount of spectrum is allocated exclusively to organizations that do not take full advantage of it. For example, much is used only across certain areas or at specific times. If this under-used spectrum could be shared, it could free up spectrum resources to support the needs of our connected world, including the Internet of Things (IoT). Spectrum sharing will also play a key role in the development of 5G.

Reconfigurable Radio Systems (RRS) – intelligent radio devices which can characterize and act upon their environment – offer an opportunity to share unused spectrum among multiple services and radio networks.

In ETSI our Technical Committee on RRS is responsible for the standardization of these systems, including reconfigurable equipment architecture and Cognitive Radio. The committee also provides regular input to the European Commission Expert Group on Reconfigurable Radio Systems.

During 2020 we continue to revise our standards and specifications on Radio Equipment (RE) architecture, reconfiguration and dynamic re-certification related system requirements, including use cases for configurable equipment management. We are also revising our Radio Interface Engine (RIE) feasibility study to describe new use cases including location based enabling of the radio interface.

Work meanwhile continues on our multi-part specification on Licensed Shared Access (LSA). The value of this work has already been underlined by the Radiocommunications Agency Netherlands' decision to implement LSA based on specifications developed by TC RRS to negotiate spectrum access among multiple services. The Netherlands is now likely to be the first European country to deploy a permanent LSA service based on ETSI specifications in the 2,3 – 2,4 GHz frequency band.



Broadband Radio Access Networks

Our Broadband Radio Access Networks committee (TC BRAN) produces and maintains standards and specifications for current and future Broadband Wireless Access (BWA) and Radio Local Area Network (RLAN) technologies in different frequency ranges.

During 2020 new and updated Harmonised Standards remain an area of primary interest for the committee. These variously address: access to radio spectrum for 5 GHz RLANS; 60 GHz Multiple-Gigabit/s equipment;

White Space Devices (WSD) operating in the 470 - 790 MHz TV band; technical characteristics and measurements methods for wireless access systems including radio local area networks (WAS/RLANS) operating in 5 925 - 6 425 MHz band; and Wideband Data Transmission Systems for fixed networks in the 57 - 71 GHz band. We are also developing a Technical Report on mitigation techniques in the 5 725 – 5 850 MHz band to enable coexistence between wireless access systems, including radio local area networks (WAS/RLAN) and Road Transport and Traffic Telematics/smart tachographs and radars.



Satellite Systems

The applications of satellite communications technology range from direct-to-home TV and mobile links to location services and high-speed Internet access, especially for rural and outlying regions or onboard aircraft and ships.

Our Satellite Earth Stations and Systems technical committee (TC SES) is developing and revising standards covering all aspects of satellite earth station terminals, either fixed or on the move. We continue to ensure compliance of our Harmonised Standards with the Radio Equipment Directive as part of the ongoing consultation process with the EC. These variously cover Mobile Earth Stations (MES); Receive-Only Mobile Earth Stations (ROMES); Aircraft Earth Stations (AESs); fixed and in-motion Earth Stations communicating with

non-geostationary satellite systems (NEST); Land Mobile satellite Earth Stations (LMES); Maritime Mobile satellite Earth Stations (MMES); Earth Stations on Mobile Platforms (ESOMP) communicating with geostationary satellites; Satellite Earth Stations on board Vessels (ESVs); Vehicle-Mounted Earth Stations (VMES); Tracking Earth Stations on Trains (ESTs); and Very Small Aperture Terminal (VSAT) satellite earth stations.

Other ongoing areas of activity include specifications for Global Navigation Satellite System (GNSS) based location systems; and integration of satellite and/or High Altitude Platform Station (HAPS) systems into 5G.



Mobile Standards

Our Mobile Standards Group (TC MSG) works alongside MSG TFES – ETSI’s joint Task Force with TC ERM working on the IMT (International Mobile Telecommunications) system – to create regulatory standards supporting the deployment of GSM, UMTS, LTE, NB-IoT and 5G NR networks in Europe.

We develop Harmonised Standards covering essential requirements of the Radio Equipment Directive (RED) and related ETSI deliverables for GSM, IMT and evolved technologies. This activity includes extensive liaison with other bodies including 3GPP, 3GPP2, IEEE and the WiMAX Forum.

Other responsibilities of the group include response to mandates from the European Commission and other tasks in support of European regulation of related systems; and identifying European regulatory requirements on cellular systems to be included in Harmonised Standards.

In 2020 work continues on revisions to several standards that address access to radio spectrum – including the addition of support for 5G – in IMT cellular networks. These consider various aspects of user equipment, base stations and conformance testing.

We are updating our standard for spectrum access in Mobile Communication On Board Aircraft (MCOBA) systems to align with changes in regulation. We are also revising our Technical Specification (TS) on eCall HLAP (High Level Application Protocol) interoperability testing.

Millimetre Wave Transmission

The deployment of 4G, the future needs of 5G and the number of connections required for massive machine-type communications in the Internet of Things are making unprecedented demands on radio access networks and backhauling.

Millimetre wave bands (30 - 300 GHz) offer enormous amounts of under-utilized bandwidth – as well as more spectrum for radio transmission than lower bands, and

wider channel bandwidth, with fibre-like capacity. As a source of largely untapped spectrum resource, millimetre wave technologies are expected to be a major enabler of future mobile communications.

Our Industry Specification Group on millimetre Wave Transmission (ISG mWT) provides a platform for stakeholders to exchange technical information in the use of microwave and millimetre waves.



The increase in capacity needed for 5G backhaul, and the importance of microwave/millimetre wave as a backhaul medium, demand innovative ways to harness the use of spectrum for fixed services. As mobile networks evolve from 4G to 5G, a key challenge is providing increased capacity, with a consequent need for more spectrum and its more efficient use. Our analysis of spectrum, license schemes and network scenarios based on field proven experience of millimetre wave transmissions aims to release new spectrum, and to change spectrum licensing rules to make microwave and millimetre-wave wireless backhaul practical in the medium/long term for 5G operators.

This year we aim to publish a Group Specification on Wireless Transport Profile for Standard SDN Northbound Interfaces and Southbound Interfaces, defining a profile to be used in conjunction with IETF data models to simplify and promote interoperability of SDN solutions.

Other anticipated publications include a Group Report on fixed service frequency ranges above 174.8 GHz; and a further report on wireless backhaul/X-haul network



and services automation wireless backhaul SDN. We also plan to issue a White Paper on E-band (71-76 and 81-86 GHz) worldwide deployments and regulatory status.

Meanwhile the group is exploring how current mWT technology and its evolution can satisfy future applications – such as 5G and Fixed Wireless Access – in the timeframe beyond 2020. This considers new mobile and fixed access requirements in terms including topologies, data rates, latency and range.

Multi-Access Edge Computing

A key enabler for 5G, Multi-Access Edge Computing (MEC) places IT service and cloud computing capabilities at the edge of the access network. Shifting processing power away from remote data centres and closer to the end user, it enables an environment that is characterized by proximity and ultra-low latency, and provides exposure to real-time network and context information. Giving access to a tightly-controlled set of services via standardized Application Programming Interfaces (APIs), MEC lets operators open their networks to authorized third parties, allowing them to rapidly deploy innovative new applications and services for use by subscribers, enterprises and vertical segments.

MEC empowers numerous IoT and mission-critical vertical solutions, from interactive gaming and Virtual Reality to Intelligent Transport Systems and the industrial Internet. Advancing the transformation of the mobile broadband network into a programmable environment, MEC satisfies the demanding requirements of these and other applications (on emerging 5G as well as existing 3G/4G systems) in terms of expected throughput, latency, scalability and automation. It also offers additional privacy and security and ensures significant cost savings.

Our MEC Industry Specification Group is creating a standardized environment to allow seamless integration of applications from vendors, service providers and third parties across multi-vendor MEC platforms. Its main responsibility is to produce specifications and other deliverables that enable the hosting of third-party

applications in an interoperable MEC environment. All MEC APIs are freely available from the ETSI Forge (forge.etsi.org).

Following formal completion of the group's 'Phase 1' core work, ISG MEC continues to pursue its 'Phase 2' activities, driven by new market requirements and use cases such as automotive. Extending the applicability of MEC beyond 3GPP to other mobile access networks, Phase 2 also focuses on operational and implementation issues, addressing topics such as charging, regulatory compliance, support for mobility and support for containers. Work on integration with ETSI's ISG on Network Functions Virtualisation (NFV) is also planned for completion during Phase 2: collaboration between MEC and NFV groups is driving this activity forward.

To facilitate the creation of innovative applications and lower barriers to adoption, we offer support to developers as part of an outreach programme run by our MEC Deployment and Ecosystem Development (DECODE) Working Group. Formed to showcase and promote MEC, the objectives of DECODE are to increase operator adoption and interoperability as well as encouraging application developer engagement.

Further work this year considers MEC Phase 2 requirements and use cases; V2X interoperability in a multi-vendor, multi-network and multi-access environment; and MEC integration in 5G.





SECURITY

Building trust in our digital world



Our world has never been more connected. The Internet is critical to our everyday lives, and so too is its security. With growing dependence on networked digital systems comes an inevitable increase in the variety, scale and sophistication of threats and cyber-attacks targeting businesses, organisations and individuals. Standards have a key role to play in strengthening our cyber security, protecting the Internet and everyone who relies on it.

Cybersecurity

Security is particularly important to developments in networked digital systems such as the Internet of Things (IoT) and Industry 4.0. In addition, technologies such as virtualization and cloud computing bring with them specific security threats.

At the same time, sensitivity towards the privacy of individuals/organizations and their data is intensifying with media exposure of insecure practice by governments and businesses, and there has been a proliferation of legislation worldwide, driven by these growing security concerns. Balancing the twin demands of privacy and protection is a major challenge. Solutions must include a reliable and secure network infrastructure, but they also depend on trust on the part of users – both individuals and businesses – that privacy, confidentiality, secure identification, privacy-friendly security, the visibility of security and other concerns are properly addressed.



Security standardization, sometimes in support of legislative actions, has a key role to play in protecting the Internet and the communications and business it carries. Our Cyber Security committee (TC CYBER) is addressing many of these issues. Working with other stakeholders, the committee produces standards to meet strategic high-level needs with deep technical expertise, and co-ordinates the work of those committees within ETSI that deal with security aspects in their own technical areas.

TC CYBER works in close co-operation with numerous international, regional and national organizations and governments involved in cyber security, including the International Telecommunication Union (ITU) and the International Organization for Standardization (ISO). We also develop standards for security requirements that are not catered for elsewhere in ETSI, and offers security advice and guidance to users, manufacturers and network and infrastructure operators.

In 2020 we plan to publish updates to our standard on cybersecurity for consumer IoT (Internet of Things) devices. This is supported by a specification on cybersecurity assessment for consumer IoT products, including mandatory and recommended test scenarios plus guidance and examples to support implementation.

We will also publish further parts of our multi-part specification on the Middlebox Security Protocol, innovating to create next-generation proxies that are vital to cyber defence and managing networks, plus

an accompanying specification on critical security controls for middleboxes. This spans measures to detect, prevent, respond to and mitigate damage from cyber-attacks.

Other areas under study include mechanisms for privacy assurance and verification; identity management and discovery models for IoT devices; and an analysis of security threats to home gateway hardware. We also plan to publish our guide to Identity Based Cryptography that explains these new cryptographic methods while also describing use cases and implementation techniques.

We expect to complete a specification on external encodings for the Advanced Encryption Standard (AES) that aims to increase the resistance of white-box AES implementations against attacks based on differential computation and fault analysis. Meanwhile we are updating our specification on Attribute Based Encryption (ABE) schemes for Attribute Based Access Control to address conformance and interoperability testing aspects.





Smart Cards and the Secure Element

ETSI's Smart Card Platform committee (TC SCP) develops and maintains specifications for the Secure Element (SE) for its use in telecommunication systems including the Internet of Things (IoT) and Machine-to-Machine (M2M) applications. We also consider the interface, procedures and protocol specifications between the SE and other entities used in its management.

The committee develops 'agnostic' specifications that can find their way into other applications such as ID management, ticketing and ID cards with contactless interfaces used in financial services. All our specifications encompass not only requirements and technical solutions but also conformance testing for both the SE and the terminal.

The committee's work is based on input from both inside and outside ETSI. We therefore liaise with major external contributors and users such as GlobalPlatform, the GSM Association, 3GPP, 3GPP2, the NFC Forum, the OMA, the Global Certification Forum (GCF), oneM2M, the PCS Type Certification Review Board (PTCRB) and the SIMalliance. TC SCP also provides and maintains the application identity register for smart card applications on behalf of a number of these and other organizations.

TC SCP is the home of the universal integrated circuit card (UICC), which is the most widely deployed Secure Element with billions of pieces entering the market every year just as SIM cards. A new function for the UICC will be the use of the contactless interface of the UICC to support Ultra-Wide Band (UWB) technologies for secure applications hosted on the UICC. We expect to complete this work in summer 2020.

Meanwhile we are focused on further development of the next generation secure platform, the Smart Secure Platform (SSP). Addressing key market drivers of trust and privacy, SSP is a more flexible platform than the UICC; it can be adapted to multiple different products and markets, while maintaining a common set of features and some of the characteristics of the UICC platform. SSP offers an open platform for multiple applications, a choice of physical interfaces and form

factors to adapt to market needs, a new modern and flexible file system, and built-in capabilities to support multiple authentication methods such as biometrics.

Our work in 2020 accordingly addresses SSP requirements, technical specifications, specific solutions and interfaces, alongside test specifications that are being developed as part of our ETSI Testing Task Force (TTF). Of particular interest are the finalization of two new specifications, respectively covering the embedded SSP (eSSP) and technical realization of the removable SSP (rSSP).

Securing Artificial Intelligence

Artificial Intelligence impacts our lives every day, from local AI systems on mobile phones suggesting the next word in a sentence to large manufacturers using AI to optimize industrial processes. AI has the potential to revolutionize our interactions with technology and enrich security: but without high quality technical standards and good practices, it also has the potential to create new attacks and worsen existing security measures. Our Industry Specification Group on Securing Artificial Intelligence (ISG SAI) creates high quality technical standards to combat these challenges arising from the deployment of AI throughout multiple ICT-related industries.

The group's initial outputs are centred around five key topics. The first is a Problem Statement that defines and prioritizes potential AI threats. The recommendations contained in this specification will be used to define the scope and timescales for subsequent work.

Currently, there is no common understanding of what constitutes an attack on AI systems, nor how it might be created, hosted and propagated. A new ontology will define what is considered an AI threat across different industries and stakeholders, and how it differs from threats to traditional systems. Underpinning the group's future work, this ontology will define specific terms in the context of cyber and physical security, considering AI as both as an attacker and a defender of security.



Data is a critical component in the development of AI systems – and compromising its integrity has been demonstrated to be a viable attack vector against an AI system. A report on the data supply chain will summarize methods currently used to source data for training AI, along with a review of existing initiatives for developing data sharing protocols and analyse requirements for standards for ensuring integrity in the shared data, information and feedback.

We are producing guidelines for mitigation against threats introduced by adopting AI into systems. These guidelines will also address security capabilities, challenges, and limitations when adopting mitigation for AI-based systems in certain use cases.

A further study will identify methods and techniques for security testing of AI-based components. Guidelines for security testing of AI and AI-based components will consider different algorithms and address relevant threats from the group's threat ontology work.

Launched in February 2020, our Industry Specification Group on Encrypted Traffic Inspection (ISG ETI) has been established to describe the issues and establish essential requirements to allow for inspection of such encrypted traffic.

The purpose of the group is to develop insights on the likely evolution path of the 'encrypted by default' paradigm and its impact on both network resilience - for example the ability of management protocols to work and for semi- or fully autonomous network management strategies as discussed in groups such as ISG ENI and ISG ZSM to operate, and in the security domain where attackers may be able to take advantage of encryption to spread malicious code or content through networks.

Electronic Signatures

The primary responsibility of our Electronic Signatures and Infrastructures committee (TC ESI) is the development of generic standards, guides and reports relating to electronic signatures and related trust infrastructures. The committee's deliverables support Regulation (EU) No 910/2014, as well as general requirements of the international community to provide trust and confidence in electronic transactions among business partners.

In 2020 we are progressing several standardization related activities, including revisions to a number of European Standards. These variously address: Trust Service Provider (TSP) conformity assessment; procedures for creation and validation of Advanced Electronic Signatures (AdES); policy and security requirements for TSP issuing certificates; certificate profiles and CMS Advanced Electronic Signatures (CAAdES).

We are also developing or revising a large number of Technical Specifications. These include JSON Advanced Electronic Signatures (JAdES), Evidence Record Syntax (ERS) mechanisms in XML Advanced Electronic

NEW Encrypted Traffic Inspection Networks



A paradigm of 'encrypted by default' has been adopted by many network and service providers without taking due account of any threats to network resilience and security. The network management oversight that is accepted for non-encrypted traffic may be lost when an all-encrypted paradigm is adopted.



SECURITY

Signatures (XAdES), policy and security requirements for TSP service components supporting AdES digital signature augmentation schema for machine-readable cryptographic algorithm catalogues, signature policies, protocols for long-term preservation, protocols for remote digital signature creation, security requirements for signature creation signature validation.

We are also developing a report that addresses existing trust service infrastructures operating in different regions of the world, and their possible mutual recognition/global acceptance.

to support industry compliance to the requirements of national and international law. The role of TC LI in these partnerships is in the development and publication of control and handover interfaces, and of rules for the delivery of technology specific interception or retained data. In addition, TC LI liaises with other bodies – notably 3GPP, GSMA and ITU-T, as well as our own oneM2M/SmartM2M, CYBER, TCCE, NFV, MEC, ENI and NGP groups – to capture the requirements of users (law enforcement agencies) and translate these into requirements to be applied to technical specifications.

In 2020 we continue to create and update various standards, specifications and reports relating to LI and RD. New Technical Specifications include flexible and extensible data structures for Lawful Disclosure, and handover for messaging services over HTTP/XML. We are also revising a specification on Inter LEA Handover Interface (ILHI) to add Lawful Disclosure (LD) information exchange mechanisms.

Meanwhile we are developing three new Technical Reports. These respectively address LI network function security with a focus on virtualization; library and mapping aspects of LI/LD; and the interception and secure onward delivery of high-bandwidth user traffic using TCP or TLS.

Lawful Interception and Data Retention

Lawful Interception (LI) and Retained Data (RD) plays a crucial role in the growth and development of the Information Society, by helping law enforcement agencies (LEAs) to investigate terrorism and serious criminal activity. Bringing together the interests of governments and law enforcement agencies as well as mobile network operators and equipment vendors, our committee on Lawful Interception (TC LI) develops standards supporting common international requirements for LEAs, including the interception of content and retention/disclosure of electronic communications related data with supporting standards for warrantry and internal interfaces.

Working in partnership with other ETSI technical bodies, projects and partnerships, we develop standards

Security Algorithms

Our Security Algorithms Group of Experts (SAGE) responds to the needs of other ETSI committees for cryptographic algorithms as well as organizations with whom ETSI has a formal relationship e.g. other European standards bodies. In particular it specifies authentication, encryption and key agreement mechanisms for a range of different standardized technologies.

In recent years most of the group's work has been for mobile telephone standards – GSM™, GPRS, UMTS™, LTE™ and most recently 5G – all radio technologies specified by the Third Generation Partnership Project (3GPP™). Indeed, all the standardized algorithms in 3G, 4G and 5G mobile telecommunications and more recent 2G algorithms were specified by SAGE.



We continue to liaise with other ETSI technical committees – including TETRA (Terrestrial Trunked Radio) and DECT (Digital Enhanced Cordless Telecommunications) – regarding their own future requirements for new algorithms as part of a future-proof overall security architecture.

In response to a liaison statement from 3GPP SA3 originally issued in 2018, we continue development of new 256-bit algorithms that will offer greater resistance to possible future Quantum Computing attacks in 5G systems. These same 256-bit algorithms could also be potentially retrofitted to previous-generation mobile systems if required.

Distributed Ledgers

A foundation of today's decentralized technologies, distributed ledgers rely on 'blockchains' that use cryptographic techniques to link a growing list of data within and between organizations in an open system that's immune to modification.

Our ISG on Permissioned Distributed Ledgers (PDL) is exploring the challenges presented by the operation of permissioned (managed) distributed ledgers. It also addresses application scenarios, functional architecture and solutions for the operation of permissioned distributed ledgers, including interfaces/APIs/protocols and information/data models. During 2020 work progresses on four Group Reports.

Currently in development, our system architecture specifies the functional components of smart contracts, including their planning, coding and testing.

We are exploring potential application scenarios for the operation of PDLs, including provision models with special emphasis on 'as-a-service' paradigms, and PDL infrastructure governance aspects. The report also defines terms to be used in our future standardization work.

A further report analyses data processing requirements in terms of trust, security and effective conformity assessment: it also offers recommendations on how PDL can be used by organizations, operations, deployment, hardware, and software to be trusted.





SECURITY

We are also preparing a report on inter-ledger interoperability that describes the key elements required to exchange information between different ledgers, and to mutually use the information that has been exchanged.

Quantum-Safe Cryptography

Quantum computers already pose a major challenge to conventional cryptographic techniques. Previously secure encrypted information – such as bank account details, identity information and military security – will become potentially subject to discovery and misuse. Thus new ‘quantum safe’ cryptographic techniques have emerged in recent years to provide protection against these threats.

Incorporated into our cybersecurity committee, ETSI’s group on Quantum Safe Cryptography focuses on the practical implementation of quantum safe primitives, including performance considerations, implementation capabilities, protocols, benchmarking and practical architectural considerations for specific applications.

This year we plan to publish specifications on quantum-safe hybrid key exchange, addressing methods and architectures for combining quantum-safe key encapsulation method with classical key exchange methods. We also plan to publish a specification on quantum-safe signatures, as well as a comprehensive specification on migration techniques from existing security to quantum-safe security in deployed systems. Work is also ongoing in the area of state management for stateful hashes.

Quantum Key Distribution

Quantum Key Distribution (QKD) enables digital keys to be shared privately without relying on computational complexity. The security offered by QKD will not be vulnerable to future advances in algorithms, computational power or the emergence of a quantum computer.

With QKD, security keys are shared over optical fibre or free space links encoded on single photons or weak

pulses of light. Demonstrator networks are now being constructed in several locations around the world and standards are needed urgently to enable adoption of these new security technologies.

ETSI’s Industry Specification Group on QKD is addressing this need by developing standards for the quantum communications industry that will promote and shape the market.

In 2020 we expect to publish a number of new and updated Group Specifications. These variously address: QKD application interface (API); Protection Profile for QKD systems; security proofs; protection against Trojan horse attacks in one-way QKD systems; characterization of the optical output of QKD transmitter modules; and a control interface for SDN (Software Defined Networks). We are also developing a review of network architectures and report on QKD vocabulary and definitions.





CONNECTING THINGS

Bringing it all together



The exponential rise in connected devices is driving new user experiences, applications and sources of business value. This is the Internet of Things (IoT), drawing together technologies including Radio Frequency Identification (RFID), Machine-to-Machine (M2M) service platforms and wireless sensor networks. IoT use cases span smart cities, devices and grids, connected vehicles, eHealth, home automation and energy management, public safety, logistics, process control and more.

oneM2M

IoT and M2M (Machine-to-Machine) communications are the foundation for tomorrow's world of smart devices, appliances, homes and cities. oneM2M draws together the many diverse IoT-related business domains including industrial automation, smart grid, telematics, utilities, intelligent transportation, public safety and health. This cross-industry initiative is developing specifications that will enable users to build platforms that allow devices and services to be connected – regardless of the underlying technology used – thus enabling interoperability across IoT applications. In this way, oneM2M specifications can reduce complexity for application developers while reducing costs for service providers.

The publication of oneM2M Release 4 is expected in early 2021. Building on earlier releases, this latest iteration adds support for emerging developments in the IoT landscape. It notably features ontologies for smart



CONNECTING THINGS

city and public warning services, railway and vehicular applications – including 3GPP V2X interworking – as well as support for industrial domains. Release 4 will specify common services for provisioning and service pooling functions. Another example addresses automotive sector innovations and the need to support vehicle-to-vehicle and vehicle-to-roadside device communications.

Also within the scope of Release 4 are user security and data privacy considerations, support for fog/edge computing technologies, system optimization and testing.

ETSI and oneM2M



ETSI is one of the founding partners in oneM2M, the global standards initiative that covers requirements, architecture, Application Programming Interface (API) specifications, security for M2M communications are designed to be applied in many different industries and take account of input and requirements from any sector. oneM2M brings together eight of the world's preeminent ICT standards development organizations (SDOs), together with other industry fora or consortia and almost 200 member organizations.

Learn more at onem2m.org

Supporting Development of the IoT

We are already witnessing the impact of M2M (Machine-to-Machine) communications in a fast-emerging world of smart devices, appliances, homes and communities. As the main active technical body representing ETSI in the oneM2M Partnership Project, our Smart M2M Communications committee creates reports and specifications for M2M services and applications, with much of its work focusing on the IoT and smart cities.

Central to this is SAREF – our Smart Applications REference ontology that allows connected devices to exchange semantic information. During 2020 we aim to publish further extensions to SAREF addressing Automotive, eHealth/Ageing-well, Wearables and Water domains. We will also revise existing SAREF extensions covering Energy, Environment, Buildings, Smart Cities, Industry/Manufacturing and Smart Agriculture/Food domains.

Other areas of current interest include a feasibility study for Smart Lifts in IoT and the applicability of Artificial Intelligence (AI) in IoT.

Under the leadership of our Centre for Testing and Interoperability, SmartM2M contributes to and maintains a set of standardized conformance test specifications (Test Suite Structure and Test Purposes and Abstract Test Suite) for oneM2M architecture and core protocols.

Work progresses on the development of an open portal to improve interaction within the SAREF community of users and developers. This resource will allow stakeholders to share their specific requirements and give direct feedback on their use of ontologies.



Building Smart Cities

Tomorrow's smart cities and communities will be characterized by standardized services that enhance the appeal of these connected urban environments to residents, businesses, investors and tourists. Totally new and evolved applications will embrace health and social



care, building management and connected homes, energy efficiency, waste management, transportation, mobility and environmental issues.

We continue to address standardization requirements for smart cities and communities, with this work represented in several of our technical bodies – including SmartM2M, HF, OEU and ATTM – as well as in oneM2M.

In 2020 our Human Factors (HF) committee aims to complete a Technical Report examining the standards landscape relating to requirements of inhabitants and visitors to smart cities or communities.

Our Access, Terminals, Transmission and Multiplexing committee (TC ATTM) is developing standards to support the deployment and roll-out of sustainable multi-service smart city infrastructures. This year we are developing and updating specifications in areas such as broadband deployment and energy management including deployment of the Internet of Things (IoT) and use of Artificial Intelligence (AI); the use of lamp-posts for hosting sensing devices and 5G networking; and KPIs (Key Performance Indicators) for monitoring smart city ‘layers’ such as energy networks, water networks and health.

Context Information Management

From digitizing industrial processes to creating smart services for citizens, it’s essential to record data together with contextual information about its source, meaning and accuracy – and transfer these unambiguously to other systems.

ETSI’s Industry Specification Group on cross-cutting Context Information Management (ISG CIM) develops specifications for publishing, accessing and updating contextual information across domains from smart cities to agriculture, manufacturing and more.

In 2020 we anticipate publication of several deliverables. These include a suite of new and updated specifications and associated reports on our NGSI-LD Application Programming Interface (API) that enables near-real time

access and updates to information from many different sources, not restricted to IoT. Planned publications cover use cases, security and privacy, interworking and testing tools as well as updates to our NGSI-LD primer for developers.

The group maintains its collaboration within the ETSI community (notably SmartM2M, CYBER, ATTM SDMC and oneM2M). We also continue to engage with the EC CEF programme, several H2020 IoT/Smart Cities projects, the GSMA, W3C, ITU-T and OGC.

eHealth

eHealth considers the application of ICT across a wide range of health-related functions, including the development tools for healthcare professionals and patients as well as personalized systems for individuals and communities. eHealth promises to improve the quality of healthcare and foster independent living while reducing costs. However its successful implementation relies on society’s widespread digitization. Although an increasing number of patients can access services such as telecare and telemonitoring, the use of telemedicine is still limited. One challenge currently hindering the development of the ‘virtual’ clinic is a lack of interoperability. Standards therefore have a key role to play in assisting the development of new eHealth products and the growth of telemedicine.



Our ETSI Project on eHEALTH is responsible for coordinating ETSI’s activities in the eHealth domain, and identifying gaps where further standardization activities may be required.



CONNECTING THINGS

This year work progresses on developing an ETSI Standard on the requirements for recording eHealth events, specifically those from ICT-based eHealth devices and from health practitioners. The purpose of this standard is to specify a normative framework for ensuring events/transactions related to a patient are recorded accurately (by devices or health professionals) and made available with minimum delay to other health professionals. This framework is intended to be adopted by other ETSI groups contributing to eHealth including OEU, ERM, CIM, CYBER, SmartM2M and SmartBAN.

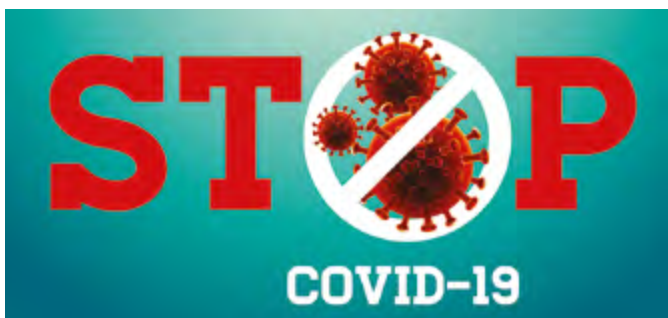
We are also updating our report that presents a range of typical use cases in the eHealth domain. The analysis covers aspects of link connectivity, network interconnectivity, semantic/syntactic interoperability and security.

NEW

ISG E4P (Europe for Privacy-Preserving Pandemic Protection)

In the context of tracing persons potentially infected with a transmittable virus such as SARS-CoV-2, the ISG E4P will develop a framework and consistent set of specifications for proximity tracing systems, to enable the development of applications and platforms, and to facilitate international interoperability.

Such a standardization framework will enable developers to build interoperable mobile apps for proximity detection and anonymous identification and will allow the development of interoperable systems to automatically trace and inform potentially infected users in addition to manual notification methods, whilst preserving users' privacy and complying with relevant Data Protection regulation.



Body Area Networks

As the use of wearables and connected body sensor devices grows rapidly, Wireless Body Area Networks (BAN) facilitate the sharing of data in environments such as smart homes, living environments, automotive and aerospace. In the specific areas of healthcare and medical monitoring, wireless connectivity between the data collection or control centre and the medical devices or sensing nodes requires a standardized communication interface and protocols. Key challenges include interoperability in heterogeneous use cases, power consumption, latency, security, robust operation and the ability to interact with embedded intelligence in smart environments.

In response to these requirements, our Smart BAN committee (TC SmartBAN) addresses the need for global standards to support the successful rollout of BAN technology. Working in co-operation with our SmartM2M committee, our primary goals are the development and maintenance of ETSI standards to support the implementation of Smart BAN technologies (Wireless BAN, Personal BAN, Personal Networks, etc) in a range of medical, health improvement, personal safety and wellbeing, sport and leisure applications.

The scope of TC SmartBAN includes communication media, and associated physical layer, network layer, security, QoS and lawful intercept, as well as provision for standardization of generic applications and services.

This year we are revising various specifications and reports. These variously cover: associate service model/ontology/enablers extensions; system level description and requirements for SmartBAN; Enhanced Ultra-Low Power Physical Layer; and the application of SmartBAN Medium Access Control (MAC) for various use cases.

In the area of implant communications we are evaluating the use of ultra-low power, ultra-wide band (UWB) technology for pill-type wireless medical devices.

Other topics currently under study include security, privacy and trust issues; and a performance comparison between SmartBAN and other short-range standards.



NETWORKS

Connecting with greater intelligence



Consumers, businesses and industrial users are increasingly dependent on reliable, feature-rich communications services that can be accessed anytime, anywhere and on any device. In response networks are becoming smarter and more agile. At ETSI we provide a comprehensive set of standards to increase the utility and efficiency of today's access networks – and tomorrow's.

Network Functions Virtualization

A key enabler for fulfilling the promise of 5G – and equally relevant to other telecoms network architectures – Network Functions Virtualization (NFV) consolidates heterogeneous hardware-based infrastructures onto a homogeneous infrastructure based on standard servers, switches and storage. By running network functions through software that can be introduced to various network locations as needed, NFV simplifies the roll-out of new services while reducing deployment and operational costs. Crucially, this virtualization allows networks to be more agile and responsive to the needs of the traffic and services running over them.

Facilitating network management automation, NFV is being increasingly adopted for network planning, deployment and evolution, where it has become an essential element of modern network design. NFV also delivers significant benefits to service users and



NETWORKS

providers, especially in the emerging area of next-generation networks.

With the support of hundreds of organizations worldwide, the goal of our Industry Specification Group (ISG) on NFV is to create specifications that can accommodate today's and tomorrow's network requirements. In parallel with maintenance and updates to NFV Releases 3 and 2, work continues in 2020 on Release 4 that considers recent technological advances such as cloudification, service-based architectures and novel fixed and mobile access network deployments. Simplifying container-based network deployment, Release 4 also aligns with current industry trends in network transformation.



Progress meanwhile continues on a number of new studies. These include a service-based architecture design for NFV; generic operations, administration and management (OAM) functions; and enablers for autonomous management in NFV-MANO (Management and Orchestration).

Further normative work focuses on enhanced support for container-based deployment of Virtualized Network Functions (VNFs) in the NFV framework, service interfaces for OS container management and orchestration, and requirements for the management and orchestration of container cluster nodes.

We continue our co-operation with other ETSI groups including ISG MEC and ISG ZSM, while maintaining links with 3GPP SA5, OASIS Tosca and ITU-T SG11, and with open source communities such as the Open Source NFV Management and Orchestration (OSM), the Open

Platform for NFV (OPNFV), OpenStack and the Open Networking Automation Platform (ONAP).



Our two-minute YouTube video 'ETSI, Home of NFV' presents a friendly introduction to the benefits of virtualization.

Open Source MANO

ETSI continues to actively explore synergies between the worlds of open source and standardization in its work on NFV. To enable accelerated standardization with a fast feedback loop to our NFV Industry Specification Group, our Open Source MANO group (ETSI OSG OSM) is developing a software reference implementation for the ETSI NFV MANO along with Slice Manager functionality, according to accepted open source working procedures over a software development platform hosted and managed by ETSI.

OSM is a community driven effort that aims to offer a production-quality Open Source MANO stack that meets the requirements of commercial NFV networks.

After the delivery of OSM Release SEVEN at the end of last year – which included seamless onboarding and orchestration of cloud-native and hybrid network services – work in 2020 is focused on high availability and production deployments through the ongoing development of Releases EIGHT and NINE.

Collaboration with other projects and bodies has remained a key aspect of our work. OSM maintains close links with our NFV, Multi-Access Edge Computing and Zero Touch Network and Service Management ISGs and other bodies dealing with 5G technologies.



Our popular OSM Hackfest events provide a platform for the IT development community to validate ETSI specifications through live demonstrations and practical challenges.

NEW Non-IP Networking

Mobile operators are increasingly challenged by the limitations of decades-old TCP/IP networking protocols. Security, quality of service and other aspects have triggered fixes and workarounds that have themselves incurred penalties in terms of greater cost, latency and power consumption.

In today's 5G world, network owners and service providers are exploring new technologies to serve their needs better than the ageing TCP/IP stack. Launched in March 2020, our Industry Specification Group on Non-IP Networking (ISG NIN) is dedicated to the specification of alternative networking protocols to support 5G applications, as well as being more efficient and easier to manage with lower capex/opex in current applications. The group's work will be initially applicable to private mobile networks such as factory automation. It is anticipated this will expand to embrace public systems, both in the core network and eventually radio elements.



The group's first outputs will include a report detailing the limitations of TCP/IP and how an alternative system could overcome those shortcomings, plus another showing how technology initially identified by our previous Next Generation Protocols Industry Specification Group (ISG NGP) can form the basis of a system that will support both new and existing protocols. ISG NIN will also work on creating a framework for testing the efficiency and effectiveness of the new protocols, including over radio.

Experiential Networked Intelligence

The introduction of technologies such as Software Defined Networking (SDN), Network Functions Virtualization (NFV) and network slicing means that networks are becoming more flexible, more powerful – and harder to manage efficiently.

The use of Artificial Intelligence (AI) techniques in the network supervisory and management system can help address some of the challenges of future network deployment and operation.

Our Industry Specification Group on Experiential Networked Intelligence (ISG ENI) develops standards that use AI mechanisms to assist in the management and orchestration of the network. ENI focuses on improving the operator experience, by adding closed-loop AI mechanisms based on context-aware, metadata-driven policies to more quickly recognize and incorporate new and changed knowledge, and hence to make actionable decisions.

By developing standards that use AI mechanisms to recognize new or changed knowledge – and thus make actionable decisions for operators – the work of ENI enables an efficient, intelligence-based deployment of SDN and NFV which will in turn assist the management and orchestration of the network. The group accordingly



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considers ENI related issues including architecture, AI, security and Proof of Concept (PoC) frameworks, while coordinating activities with other entities, both internal to ETSI and externally.

In 2020 we are updating various Group Specifications. These address: a Proof of Concepts (PoC) framework for ENI; an extension of use cases and scenarios that are enabled with enhanced experience through the use of network intelligence; a collection of new requirements on how intelligence is applied to the network and applications in different scenarios to improve experience of service provision and network operation; and a second release of a system architecture to enhance specification of the software functional architecture of ENI.

NEW

5th Generation Fixed Network

Fixed networks play an essential role alongside mobile networks in the evolution of exciting new communications services. In particular, fibre is one of the cornerstones of communication technologies, supporting fixed access as well as interconnection between other access networks.

Launched in February 2020, our new Industry Specification Group on 5th Generation Fixed Network (ISG F5G) is studying the evolution of fixed networks to match and enhance the benefits brought by mobile 5G. The group will identify necessary improvements with respect to previous solutions and define new characteristics of the 5th generation fixed network.



This opens up new opportunities by comprehensively applying fibre technology to various scenarios, transforming the fibre-to-the-home paradigm into 'fibre-to-everything-everywhere'.

For home scenarios, emerging services such as Cloud VR (virtual reality) and AR (augmented reality) video streaming or online gaming introduce the necessity for ultra-broadband, extremely low latency and zero packet loss. Business scenarios such as enterprise cloudification, leased line, or POL (Passive Optical LAN) require high reliability and high security. Other industry sectors have specific requirements on the deployment of fibre infrastructures including environmental conditions such as humidity, temperature or electromagnetic interference.

The group's first work items variously address the definition of fixed network generations; F5G use cases; the F5G technology and standards landscape; an end-to-end F5G architecture and F5G quality of experience.

Zero Touch Network Management

The automation of network and service management has become an urgent necessity to deliver 5G services with speed and agility, while ensuring the economic sustainability of a diverse set of services.

Maximizing the efficiency of end-to-end network operations requires increased automation of functions that are currently administered with direct human intervention from configuration and capacity management to fault management.

Driven by documented business scenarios, our ISG on Zero Touch Network and Service Management (ZSM) is examining requirements for tomorrow's 'zero touch' networks. The ultimate goal is the creation of totally autonomous networks where all operational processes and tasks including delivery, deployment, self-configuration, monitoring, assurance and



optimization can be executed without manual supervision.

ISG ZSM continues its regular exchange of information with other ETSI bodies (ENI, MEC, NFV) as well as with external SDOs and fora, including GSMA, 3GPP SA5 and ITU-T SG15. The group also pursues wider collaboration with open source communities, including the ONAP project, to ensure alignment and allow the integration of open-source software components in ZSM-based solutions.

Work continues in 2020 on a number of Group Specifications (GS). These discuss end-to-end management and orchestration of network slicing; inter management domain lifecycle management; and closed-loop solutions for automation of E2E service and network management use cases.

In addition we are progressing Group Reports that explore ZSM security aspects and closed-loop automation topics related to operations such as learning and cognitive capabilities.

The Transition to IPv6

Upgrading the Internet with the provision of additional public IP addresses is essential to maintain growth and admit new entrants. Developed by the Internet Engineering Task Force (IETF) to solve the problem of IPv4 address exhaustion, IPv6 provides enhanced features and enables new Internet services requiring end-to-end connectivity and security. It is also a key technology enabler for the Internet of Things (IoT). As mobile data traffic continues to increase significantly, major Internet Service Providers (ISPs) have started prioritising IPv6 traffic.

ETSI's Industry Specification Group on IPv6 Integration (ISG IP6) is addressing the transition from IPv4 to IPv6. The group brings together stakeholders worldwide to work on pre-standardization in a neutral environment, defining requirements and use cases, gathering support and creating awareness of the impact of IPv6. Our deliverables accordingly describe IPv6 best practices using real-world technical recommendations, including

inputs and success stories from ISPs, mobile operators and enterprise deployments.

In 2020 work continues on two Group Reports. One examines the integration of IPv6 in vehicular networking (V2X) applications, while the other explores cybersecurity aspects of IPv6 deployments.

Cable

Our Integrated Broadband Cable Telecommunication Networks committee (TC CABLE) develops standards that address the evolution of broadband cable network capabilities. We work with the global cable community to foster innovation and competitiveness, making technology available industry-wide based on voluntary standards. We contribute our expertise on cable technologies to other ETSI technical bodies. Our work also leverages close relationships with the Society of Cable Telecommunications Engineers (SCTE), CENELEC and ITU-T.

The committee's deliverables primarily relate to: terminals, including cable CPE devices and network terminating devices; network infrastructure including network topologies, HFC (hybrid fibre-coax) network distribution, data over cable systems and frequency management; and service, security, energy efficiency and sustainability aspects of broadband cable networks. In many of these areas we align with results from other work taking place. Liaison with other ETSI technical bodies with regard to integrated broadband cable telecommunication networks and services is thus an important part of our own activities.

In 2020 we are further developing our design KPIs for energy management in operational infrastructures, including ICT sites in the core network, edge facilities, cable access networks, and monitoring and operations support systems. Meanwhile two Technical Specifications are in development. One discusses network performance measurement methods for broadband data services, while the other explores performance characteristics of coaxial cables used for RF signal transmission in hybrid fibre-coax (HFC) telecommunication networks.



TRANSPORTATION

The way ahead



At ETSI we're driving to make transport networks safer and more reliable while reducing energy consumption. We develop standards to accelerate the introduction of Intelligent Transport Systems (ITS) services and applications, based on experience gained from early market deployments. We also address rail, aeronautical and maritime transportation, and the use of satellite communications standards for high speed Internet access on board aircraft, ships or in vehicles.

Intelligent Transport Systems

Road vehicles are rapidly becoming connected devices, interacting directly with each other – and with the road infrastructure via Co-operative Intelligent Transport Systems (C-ITS) that allow road users and traffic managers to share information and use it to co-ordinate their actions. These systems can improve traffic efficiency and road safety, helping drivers make better-informed decisions and adapt to prevailing road conditions.

Our ITS Technical Committee (TC ITS) develops global standards to support applications including road safety, traffic control, fleet management, location-based services, driver assistance, hazard warnings and assistance to emergency services. The scope of the committee's work thus includes communication media, and associated physical layer, transport layer, network layer, security, lawful intercept and the provision of generic web services. As well as developing standards related to the overall communication architecture,



management, security and conformance testing for ITS, we are also closely involved in radio spectrum requirements.

Topics under study in 2020 as planned Technical Specifications include Cooperative Perception Services; Manoeuvre Coordination Service; Vehicular Communications; Protected Zone Beacon Message; diagnosis, logging and status service; facilities and access layer aspects; security management; GeoNetworking; Multi-Channel Operation; Vulnerable Road Users (VRUs) basic service; and an ITS performance analysis framework.

Meanwhile we continue to progress testing aspects of ITS, including updates to existing conformance test specifications.

Technical Reports in development address topics including transport pollution management in C-ITS; platooning, manoeuvre coordination, misbehaviour detection, multi-channel operation, security and payment applications. We also aim to complete the pre-standardization study on the enhancements of the ITS architecture in order to accommodate multiple access layer technologies. Meanwhile we are revising existing reports on topics including ITS-AID registration and ITS use cases.



Radio spectrum for road transport services

In parallel with the work of TC ITS, our ERM committee (TC ERM) develops and updates standards for both Automatic Cruise Control (ACC) radar and anti-collision radar. In 2020 we continue to review receiver technical requirements, parameters and measurement procedures for automotive and surveillance radar equipment including anti-collision radar systems.

Aviation

The activities of our Aeronautics group are focused on three principal areas: the development and revision of Harmonised Standards – notably relating to communications, navigation and surveillance equipment – under the Radio Equipment Directive; the development of Community Specifications under the EASA basic regulation (EU) 2018/1139; and the evolution of DataLink – a key pillar in the Single European Sky and the SESAR (Single European Sky ATM Research) initiative.

In 2020 we are developing or updating a number of standards relating to use of radio spectrum for aeronautical applications. These variously consider sensor systems for air traffic control such as Primary Surveillance Radar, Secondary Surveillance Radar and ground and wide area Multilateration systems; meteorological radars; Advanced Surface Movement Guidance and Control System (A-SMGCS); AeroMACS; and VHF air-ground Digital Link (VDL) Mode 2.

Railways

Our Rail Telecommunications committee (TC RT) continues to maintain the GSM-R (GSM™ for railways) standard, enhancing it with new features specific to the railway environment, including data and voice communications at very high speeds.



TRANSPORTATION

Working closely with the rail industry in Europe and worldwide, we also maintain our close liaison with 3GPP to standardize the Future Railway Mobile Communication System (FRMCS), the successor to GSM-R. Here ETSI plays a major role in the production of technical system specifications. Ongoing challenges in this work include positioning aspects, train speed up to 500km/h and the integration of rail frequency spectra for the use of 3GPP radio technologies with a main focus on 5G NR.

In 2020 we aim to complete a Technical Specification on the use of IP for interconnection of GSM-R networks. We are also revising our specification on GPRS/EGPRS requirements for the European Train Control System (ETCS).

The second part of a new Technical Report on Next Generation Communication System considers New Radio (NR) radio performance simulations and evaluations in the rail environment. It is accompanied by a revision to our existing report on performance simulations relating to Long Term Evolution (LTE).

We are revising our report on FRMCS architecture. This includes mapping of applications and use cases to required system functions; and a gap analysis and mapping of FRMCS building blocks to 3GPP building blocks and possible network functions/elements.

Meanwhile we are revising our report on Urban Rail ITS and Road ITS applications in the 5,9 GHz band with a further study of main detection methods. In this area the committee continues to work in cooperation with TC ITS and TC ERM.

Maritime

Our Maritime group (ERM TGMARINE) continues to develop and update standards relating to wireless systems using radio spectrum. These variously address: communications systems including Digital Selective Calling (DSC) and broadband communication radiolink for ships and off-shore installations; navigation and radiolocation/positioning systems; coastal surveillance, vessel traffic and harbour radar systems; navigation radar for inland waterways; and emergency and distress services including VHF personal locator beacons, safety of life at sea (SOLAS) and non-SOLAS radio systems.

Our Industry Specification Group (ISG) on European Common Information Sharing Environment Service and Data Model (CDM) is developing a consistent set of technical specifications that allow data exchange among different legacy systems in a cooperative network, the European Common Information Sharing Environment (CISE). Through the standardization of EUCISE Data Model – and in particular through Common and Core Services – the group's work facilitates information exchange between user communities, member states, public authorities or EU agencies; it also promotes the European Maritime Security Strategy.

In 2020 work progresses on the group's first set of deliverables, spanning use cases, system requirements, architecture, service and data models for CDM.





Giving everyone a clearer picture

ETSI plays a leading role in the delivery of specifications for technologies that are used globally for radio, television and data broadcasting. These specifications cover services delivered via cable, satellite and terrestrial transmitters, as well as by the Internet and mobile communication systems, together with associated topics such as Ultra High Definition (UHD) and interactive television.

Broadcasting

Within ETSI our standardization of broadcast systems, programme transmission and reception equipment is managed by JTC Broadcast – the Joint Technical Committee that brings us together with the European Broadcasting Union (EBU) and the European Committee for Electrotechnical Standardization (CENELEC). As well as assessing work performed within other organizations, the committee considers broadcast systems (emission & reception) for television, radio, data and other services via satellite, cable and terrestrial transmitters.

This year we continue to deliver and maintain standards and technical specifications for relevant broadcast systems. In addition to our ‘traditional’ standardization activities covering DVB, DAB, DRM, and TV Anytime, we are focused on topics related to Ultra High Definition TV, including High Dynamic Range (HDR) systems for consumer electronics devices and Next Generation Audio, hybrid radio and Hybrid broadcast broadband TV.



CONTENT DELIVERY

We also aim to complete work on 5G broadcast systems for linear TV and radio services.



Spectrum for Broadcast and Content Creation

Our committee for Broadcast, as well as Programme-Making and Special Events (PMSE) equipment/services (ERM TG17), continues its work on developing and maintaining Harmonised Standards for a wide range of broadcast and content creation related technologies and applications.

The scope of our activities variously covers: digital terrestrial TV transmitters and broadcast receivers; amplifiers and active antennas for broadcast reception in domestic premises; DAB (Digital Audio Broadcasting) and DRM (Digital Radio Mondiale) transmitters; and broadcast sound receivers for DAB, DRM and AM/FM radio reception.

In the area of professional and semi-professional content creation we are examining the use of higher frequency bands for wireless video links used in programme production, as well as alternative spectrum arrangements for wireless microphone systems.

Augmented Reality

Augmented Reality (AR) mixes real-time spatially registered digital content with the real world to enable context-rich user experiences. ETSI's Industry

Specification Group on Augmented Reality Framework (ISG ARF) is defining a framework for the interoperability of Augmented Reality (AR) components, systems and services. This framework will define an overall functional architecture, identify key components and interfaces. Its development will allow components from different providers to interoperate through the defined interfaces. This will in turn avoid market fragmentation, break vertical silos and enable players in the ecosystem to offer parts of an overall AR solution.

Work focuses this year on identifying interoperability requirements and mapping existing standards onto our reference architecture for AR solutions. We also target publication of our specification of interoperability requirements for AR components, systems and services. Where no current standards can be identified, new specifications relating to APIs, interfaces and data models will be developed as appropriate within the ISG or in partnership with external groups. In addition, we are investigating open source development of parts of the AR framework to promote its adoption by vendors.

ISG ARF liaises with other technical and industry bodies to focus on complementary interests and promote the development of interoperable AR components and services. Ongoing partnerships include the AREA (Augmented Reality for Enterprise Alliance), ISO/IEC MPEG, 3GPP and GSMA as well as ETSI's MEC Industry Specification Group which have ongoing work items relevant to the group's activities.





BETTER LIVING WITH ICT

Cleaner, kinder, safer tech



While technology has transformed the way we keep in touch, we need to minimize its negative impact on individuals, society and our planet. At ETSI we're making products and services safer, simpler to use and more efficient. We are also committed to identifying energy efficiency solutions that mitigate the impact on climate change of the growing use of Information and Communications Technologies (ICT). The ultimate goal is to ensure that ICT improve the quality of life for all.

Enabling Energy Efficiency

Our Environmental Engineering Committee (TC EE) manages various engineering aspects of telecommunication equipment in different types of installation. These include climatic, thermal and other environmental conditions; physical requirements of equipment racks and cabinets; power supplies and grounding.

Cooperating with ETSI's Access, Terminals, Transmission and Multiplexing (TC ATTM) and Cable (TC CABLE) Committees, TC EE develops standards to support EC Mandate M/462 on efficient energy use in fixed and mobile information and communication networks. Much of our work supports European Commission (EC) policies, regulation and legislation on eco-design aspects, where we liaise with the European Committee for Electrotechnical Standardization (CENELEC) to develop relevant standards.



BETTER LIVING WITH ICT

In 2020 our activities remain centred on three key areas: measurement methods for the energy efficiency of ICT equipment (with a focus on 5G); standardization of eco-design and circular economy requirements, and energy-aware networking measurement methods.

This year our work variously covers new or updated standards relating to: power supply interfaces for ICT equipment; energy metrics and eco-design requirements for servers and data storage equipment; testing for telecommunications equipment in various environments; power feeding solutions and mobile network energy efficiency for 5G; and tests for energy efficiency of interconnecting office equipment. Meanwhile we are developing new specifications that address applications including innovative energy storage technologies, liquid cooling solutions for ICT equipment, and energy performance measurement methods for 5G base stations with dynamic traffic loads.

We are also continuing to revise environmental test standards to clarify the expected performance criteria following the application of the tests and to adapt the requirements with climate change aspects and with IEC standards.

Sustainable Networks

Our Industry Specification Group on Operational energy Efficiency for Users (ISG OEU) is working to minimize the power consumption and greenhouse gas emissions of infrastructure, utilities, equipment and software within ICT networks and sites such as data centres and central offices. This includes the measurement of energy consumption by IT servers, storage units, broadband fixed access and mobile access, with a view to developing global Key Performance Indicators (KPIs). Our work also embraces the management of end-of-life ICT equipment.

The group brings together ICT professionals from a cross-section of European industries, including the aeronautical and automotive sectors, banking, insurance and smart cities. ISG OEU works closely with our Access, Terminals, Transmission and Multiplexing (TC ATTM)

and Environmental Engineering (TC EE) committees. The group also benefits from involvement in its work of the European Commission (EC), specifically DG Growth and DG Communications Networks, Content and Technology (CNECT).

In 2020 work continues on a suite of new studies and reports. Topics under consideration include storage equipment and fire extinguishing systems in ICT sites, and general guidelines for study of green smart transportation in cities. In response to the global COVID-19 crisis, the group is also examining smart tools for pandemic monitoring in smart communities.



Usable ICT for All

A key enabler for the commercial success of new ICT products and services, the study of Human Factors (HF) applies scientific knowledge about the capacities and limitations of users to ensure products and services are safe, efficient and easy for everyone to use.

In ETSI we are pursuing these objectives through the activities of our Technical Committee on Human Factors (TC HF), where we help industry anticipate identify emerging user interaction technologies, identify issues that could cause problems for users in certain situations and explore solutions.



TC HF co-operates with other groups within ETSI and outside to assist in the production of standards and other deliverables in accordance with good Human Factors practice. Within ETSI the committee has a special responsibility for 'Design for All', considering users including young children, seniors and disabled people.

In 2020 we are developing four technical reports. These address RTT (Real-Time Text) multi-party conference VoIP calling; HF standardization for citizens and consumers in smart cities and communities; functional needs of people with cognitive disabilities using ICT products and services, including those based on emerging technologies; and Joint Agile Delivery end user aspects of system development and service deployment in future networks.

We also plan to publish two ETSI Guides. One covers usability aspects of data privacy for ICT users with accessibility needs. The other is a revision of our existing guide to user-centred terminology for existing and upcoming ICT devices, services and applications, extending the set of European languages covered.

Media Quality

Our Speech and Multimedia Transmission Quality committee (TC STQ) is responsible for standardization relating to terminals and networks for speech and media quality, end-to-end media transmission performance, Quality of Service (QoS) parameters for networks and services and Quality of Experience (QoE) descriptors and methods. Our deliverables support the development of equipment for use with current and future fixed and mobile network telecommunications service offerings. In addition, they facilitate the continuous quality assessment of these services. With our Working Group STQ Mobile, the committee works closely with 3GPP and collaborates with other standards organizations.

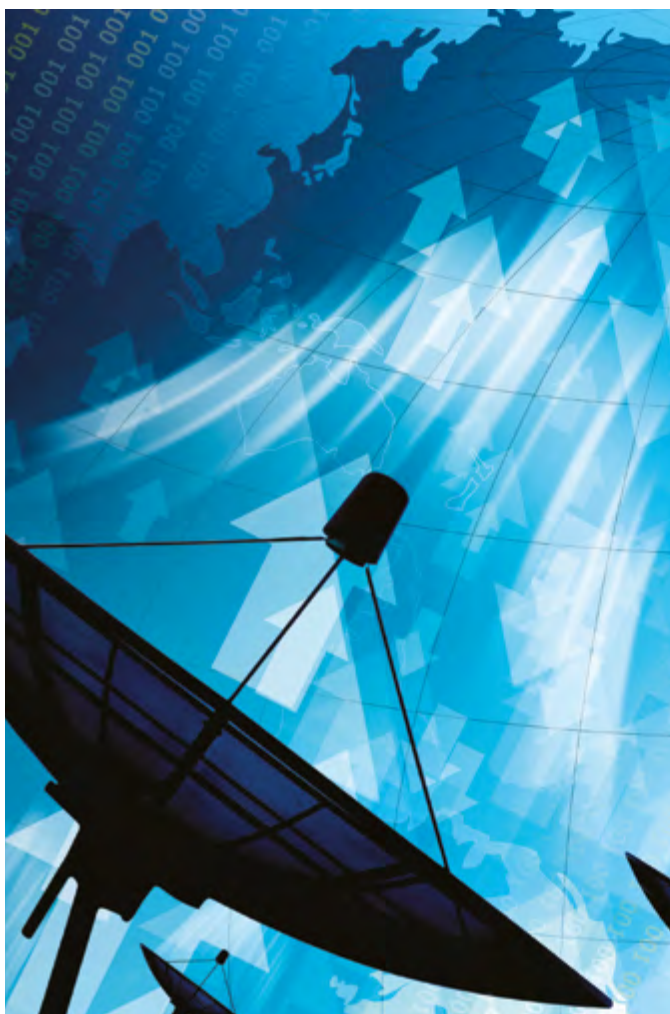
This year new work is planned for two specifications on methods for objective assessment of listening effort based on the results of subjective studies (both for normal hearing and hearing-impaired listeners), and on characterization methodology and requirement specifications for the LC3plus speech codec. We also





continue to revise numerous Technical Specifications. These include methods for evaluating performance of voice-controlled devices and functions; transmission requirements for wearable wireless wideband terminals; test measurements for echo control systems; telephony terminals for hearing impaired people; QoS aspects for popular services in mobile networks; transmission requirements for narrowband and wideband VoIP and wireless terminals (handset/headset and hands-free); and methods for reproducing reverberation for communication device measurements. We continue developing our standards on speech quality performance in the presence of background noise simulation.

We also plan to issue two Technical Reports: one gives guidelines for assessing statistical properties of benchmarking and scoring results; the other offers recommendations on QoS for emerging 5G use cases.



Safety

ETSI's Safety committee (TC SAFETY) monitors developments in electromagnetic fields (EMF), electrical safety and safety in cable television systems, where these impact the interests of ETSI members.

The role of SAFETY is quite distinct from other ETSI Technical Committees. While it does not normally write standards, the primary role of the committee is as an information exchange, collecting information from other bodies including CENELEC IEC, ITU, WHO and the EU for distribution to ETSI members.

TC SAFETY also works closely with other European and international standards organizations in order to establish, wherever possible, globally applicable standards for telecommunications equipment safety and to avoid the duplication of effort.

This year work is starting in CENELEC on a revision of the EMF standards which will impact most ETSI Radio Groups. Members are invited to join the TC Safety mailing list for information as it becomes available; ETSI members may input or comment via TC Safety to CENELEC.

We are also a participant in the EC Low Voltage Directive (2014/35/EC) Working Party to distribute relevant EC notifications.



Cord-free communications, today and tomorrow



ETSI's Digital Enhanced Cordless Telecommunications (DECT) specification is the leading standard around the world for digital cordless telecommunications. Over 1 billion devices have been installed worldwide: the system has been adopted in over 110 countries and more than 100 million new devices are sold every year. The number one cordless system in Europe and the USA, DECT products now account for more than 90% of the world's cordless market.

Enhancing DECT

Suited to voice (including PSTN and VoIP telephony), data and networking applications with a range up to 500 metres, DECT dominates the cordless residential market and the enterprise PABX (Private Automatic Branch eXchange) market.

DECT is now being enhanced to include Ultra Low Energy (ULE) – the new networking technology for residential and building applications driven primarily by low power requirements for battery-operated devices. With around 80% of data traffic generated by indoor systems, low-latency DECT ULE systems have the potential to be key contributors to the success of 5G and the Internet of Things – both in smart homes and in a range of vertical markets.

DECT ULE enjoys all the advantages of the DECT spectrum and technology as well as adhering to the technical parameters for the Internet of Things. As well



HOME AND OFFICE

as low power consumption, DECT ULE offers good Quality of Service (a unique feature compared with other low power wireless standards) and wider coverage than competing technologies. Although specifically designed for optimal coverage of homes and industrial premises, it can also be used in Personal Area Networks due to its low power consumption.



DECT ULE is not a minor adaptation of DECT but has been developed specifically for Machine-to-Machine communications. DECT ULE reuses the DECT physical layer, DECT spectrum and DECT channel structure, but there are significant differences in the MAC layer, security algorithms and channel selection. DECT ULE operates over license-exempt 'high-quality' spectrum (1 880 - 1 900 MHz) which provides a more reliable service than the industrial, scientific, and medical (ISM) radio band.

The target applications of DECT ULE in the first phase of its development were smart home and smart living applications such as home automation and energy control, remote switches, the control of smart appliances, smart metering and temperature controls, security, alarms and eHealth applications.

Our DECT Technical Committee maintains its focus on two main work areas, 'DECT Evolution' and DECT-2020, which will both support home automation, industrial automation, the creative and culture industry (e.g. audio production), eHealth and conferencing.

DECT Evolution is a shorter term activity, addressing new applications and markets for DECT and ULE, whilst primarily still utilizing existing silicon and RF implementations. One of the main application areas is high-end and professional audio systems, such as those used by the PMSE industry, where audio streaming with higher data rates and low latency is essential. The first phase of DECT Evolution was essentially completed in 2019 with the publication of updates to all parts of the DECT base standard.

DECT-2020, meanwhile, is a major new standardization activity, with the intention of meeting some of the requirements of Recommendation ITU-R M.2410, specifically Ultra-Reliable Low Latency Communications (URLLC) and Massive Machine-Type Communications (mMTC). State-of-the-art PHL design utilizing OFDM, MIMO and HARQ is used to allow much higher data rates, lower latency and reliability compared to legacy DECT.

DECT-2020 is part of a proposal from ETSI to ITU-R for a new IMT-2020 radio interface technology, and has passed Step 3 of the IMT-2020 process. During the year we expect to complete technical specification of an overall system description for DECT-2020.





PUBLIC SAFETY

Always in touch



Effective real-time communication is a critical factor in responding to and managing emergency situations, from minor road traffic accidents to large-scale public incidents, terrorism and natural disasters such as an earthquake or tsunami. At ETSI our standardization work supports public safety via secure, resilient public networks or platforms such as Professional Mobile Radio. The ubiquitous smartphone plays its own important role in public safety, allowing an emergency number such as 112 or 911 to be dialled directly, even when the keypad is locked or no SIM card is present. Our activities also embrace standards for maritime safety equipment, Personal Locator Beacons (PLBs) to alert emergency rescue services and mechanisms for road

safety through the use of Intelligent Transport Systems.

TETRA and Critical Communications

TETRA (Terrestrial Trunked Radio) is the leading technology choice for critical communications users. With a projected 5,3 million terminals in use by 2021 and an installed base growth rate of 6,1%, the use of TETRA in security as well as other business-critical markets such as the transportation, military, commercial and utilities sectors is forecast to grow strongly up to 2023.



PUBLIC SAFETY

TETRA is designed to address a specific set of communication requirements. These include very fast call access time, high reliability, high security, single and group calling capabilities, PTT (Push-To-Talk), and the possibility for direct peer-to-peer communications in situations such as natural disasters and emergencies when the supporting network is unavailable. Accordingly, much of the work of our TETRA and Critical Communications Evolution committee (TC TCCE) is driven by the requirements of Public Protection and Disaster Relief and other mission-critical services.



Designed as a narrowband system, TETRA cannot now support the growing demands of emergency services for additional mission-critical capabilities such as streaming high-quality video from the scene of an accident. Reflecting these evolving needs – and an opportunity to benefit from the economies of scale of the mobile broadband ecosystem – the community of TETRA users has asked the Third Generation Partnership Project (3GPP™) to determine how this functionality can be realized using LTE™ or 5G systems running over public network operators' licensed spectrum.

This evolution to the use of mission-critical broadband solutions depends heavily on the development of interworking solutions including a TETRA to broadband interface. In response to feedback from 3GPP, we continue to develop specifications covering the detailed interfaces between Mission-Critical broadband systems and TETRA, as well as the required security between the two systems. To optimize this standardization activity, existing standards for technologies such as LTE (and later 5G) will be enhanced by interfaces and applications that make them suitable for Mission-Critical applications.

In support of this work we cooperate closely with the 3GPP WG SA6 MCPTTC (Mission Critical Push to Talk) and with the TCCA (The Critical Communications Association).

This year we aim to complete additional new encryption algorithms to complement the existing set relating to TETRA. This reflects the needs of users to keep TETRA up to date through to the 2030s. Other specifications in development cover Voice and Data – including interworking between TETRA and broadband systems – plus security and conformance testing.

Emergency Calling and Alerting

Our Emergency Telecommunications Special Committee (SC EMTel) is focused on ensuring the interoperability and integration of applications for smartphones, next generation networks and IoT devices in the provision of emergency situations and in the context of the European Public Warning System (EU-ALERT).

In particular, much of our work is centred on Next Generation 112 services. This includes the architecture, core elements and corresponding technical interfaces for network-independent access to emergency services.



Already featured in many smartphones and implemented in some countries, Advanced Mobile Location (AML) uses Wi-Fi and GNSS (Global Navigation Satellite System) to locate the user's location



and send an alert message to the appropriate authorities when 112 is dialled in an emergency situation. Building on our published architecture for AML and Technical Specification for NG112 architecture, this year we aim to complete a specification describing use cases for interoperability testing of the architecture and core elements for independent access networks. These scenarios cover location based and policy-based emergency call routing, network or handset derived caller location (e.g. AML) as well as legacy, IP, enterprise/campus, and IMS based access networks.

Work meanwhile continues on the Lightweight Messaging Protocol for Emergency Service Accessibility. This defines a SIP SIMPLE based Instant Messaging for Emergency Service accessibility utilizing NG112 core services.

We also continue to explore new ways to contact the emergency services via, for example, social media, texting or sending video clips, taking into account new legislation in this field (European Electronic Communications Code).

5G and the IoT (Internet of Things) present significant possibilities to enhance the efficiency of mission-critical

communications in a range of public safety scenarios. For example, emergency alerts to relevant authorities could be triggered by fire sensors in buildings, flood warning sensors or wearable health monitors. We are thus updating two specifications, one that describes requirements for communications from authorities/organizations to individuals, groups or the general public in emergency situations, and the other on requirements for communication between authorities/organizations during emergencies, to accommodate communications involving IoT devices. This references work in 3GPP SA6 on MCX communication, and in TC SES / SatEC on reference scenarios for the deployment of emergency communications.

Updates meanwhile progress on our specification on the Pan-European Mobile Emergency Application (PEMEA). These are accompanied by development of a new specification on PEMEA ESInet integration and interworking.





In pursuit of quality

Interoperability is crucial in a multi-vendor, multi-network and multiservice environment, giving users far greater choice of products while allowing manufacturers to benefit from the economies of scale of a wider market. Interoperability is therefore a crucial factor in the success of modern technologies – especially in the introduction of new technologies. Products and standards evolve in parallel, requiring feedback in both directions. At ETSI our pre-standardization, validation and testing activities are a first-rate means for generating this feedback. They complement the creation of high-quality standards, enabling industry to deliver innovative, interoperable and cost-effective products and services.

Methods for Testing and Specification

Working closely with the Centre for Testing and Interoperability (CTI), our Methods for Testing and Specification committee (TC MTS) creates standards for testing and specification languages. The frameworks and methodologies we produce enable other ETSI committees to produce documents that are easy to understand and use, supporting the market success of numerous technologies.

In 2020 we continue to evolve and maintain our enormously successful testing language, TTCN-3, along with its tool conformance test suites.

Our Test Description Language (TDL) fills the gap between the simple expression of 'what needs to be tested' and the concrete coding of executable tests with existing test specification languages such as TTCN-3. TDL



continues to attract growing interest, with the TDL Open Source Project (TOP) providing a toolset for the TDL user community.

Ensuring Interoperability

Integrating validation and testing activities into the standards development process can contribute significantly to the production of interoperable standards and, ultimately, to the release of interoperable products based on those standards. Mutual feedback between the standardization process and the validation and testing activities helps to maximize the quality of both the implementations and the standards. Timely validation and testing can also reduce the overall development duration of a standard, leading to shorter time to market for interoperable products.

Our technical committees apply best working practices to ensure that our standards are well-specified and testable, and thus provide a solid basis for the implementation of robust and interoperable products. We also apply comprehensive validation of our standards through interoperability events, and we develop conformance test specifications to accompany a significant proportion of our standards.

Our Centre for Testing and Interoperability (CTI) supports ETSI's standardization groups in the use of best practices for the specification and validation of standards, the development of conformance and interoperability test specifications and the organization of developer events. In particular, CTI develops and manages the annual programme of ETSI's Testing Task Forces. Technologies that CTI currently covers include 5G mobile, safety and mission critical communications, intelligent transport, electronic signatures, network virtualization and the Internet of Things.

This year we maintain our focus on development of LTE/5G test specifications, keeping pace with 3GPP's own release schedule. Meanwhile our ongoing series of interoperability events and hackathons – many of them conducted remotely – allows us to engage with

developers who do not participate directly in our core standardization activities.

We also oversee early standardization Proofs of Concept (PoC) and coordinate open software development related to the standards. This ongoing work includes the development of test specifications for open APIs developed by our MEC and NVF Industry Specification Groups that are maintained at ETSI's FORGE code repository.



Collaboration with Open Source communities and foundations can help to accelerate the development of innovative new digital technologies by working across traditional borders. In 2020 we continue to explore the benefits of Open Source methodologies and frameworks in ETSI. As one notable example, CTI is expanding its use of Open Source-like software development approaches in the production of test specifications and platforms. We are also developing the Test Description Language (TDL) Open Source Project (TOP) to provide our committees, our Secretariat and external parties with an integrated Open Source toolset for TDL.

Plugtests™

ETSI's popular series of Plugtests™ events offers an opportunity for companies to interconnect prototype or production implementations of standards to test for interoperability and – where necessary – conformance to requirements. As such Plugtests™ provide a highly cost-effective and practical means of identifying inconsistencies in either a specific implementation or the standard itself.



TESTING AND INTEROPERABILITY

Some events may have conformance testing facilities available, and others may be formatted as hackathons or hackfests. They may be remote, distributed or single-site events, or a combination.

We conduct a busy schedule of remotely managed Plugtests™, hackfests and other interoperability events. Hands-on involvement of participants at remote locations is enabled via ETSI's Hub for Validation and Interoperability (HIVE), our shared online lab environment.

Test Specifications and Frameworks

Our Core Network and Interoperability Testing committee (TC INT) produces specifications to test interoperability, conformance, performance and security. Using an end-to-end (e2e) methodology that includes verification of both the control and user plane, our work enables network operators to test their network for services for both fixed and mobile customers.

We produce test purposes, test descriptions, and Testing and Test Control Notation version 3 (TTCN-3) test cases to enable interoperability testing of core network elements, covering single-network, interconnect and roaming scenarios. Use Cases and requirements

specified by ETSI for Automated and Autonomic Management and Control (self-management) of networks and services are tested via 'industry standards-anchored' Proof of Concepts (PoC) events.


The work of TC INT directly connects our methodology and specifications to the world of 5G. Our activities see us liaising closely with other bodies and work groups, including ETSI's Centre for Testing and Interoperability and STQ Technical Committee, 3GPP™, the GSM™ Association and ITU-T Study group 11.

Following 3GPP deliverables, we continue to develop and revise conformance test specifications that can be used in third party certification schemes.



Please visit etsi.org/events/upcoming-events?eventtype=interoperability-event for detailed information on upcoming events.

Where people meet fresh ideas



Every year we organize, host and support a busy schedule of workshops, seminars, summits, conferences and fora. Held at our own headquarters in Sophia Antipolis and further afield, these events bringing communities together, provide valuable opportunities to share news of our work and its progress, and stimulate new standardization activities. They also provide a platform for researchers to share their results and to identify next steps for standardization. They thus facilitate early consensus building and fertilize our ongoing technical work.

Our schedule of events for 2020-2021 has been impacted by the worldwide coronavirus crisis.

Check our website etsi.org/events for latest news on forthcoming events.

Webinars

While many face-to-face meetings have been postponed or cancelled due to the COVID-19 pandemic, ETSI has increased the number of its webinars on the ETSI BrightTalk channel, which now attracts more than 10,000 subscribers.

Offering regular updates on ETSI's work, our webinars feature expert contributions from our membership, as well as Chairs, Vice Chairs and officials involved in our 100 technical bodies.

Our webinars are free and include Q&A sessions. All live sessions are recorded, giving the opportunity to listen again.

Recent webinar topics include edge computing, experiential networked intelligence, network orchestration, zero-touch network and service management, OSM Release SEVEN, cybersecurity and consumer IoT security, trust services, the Radio Equipment Directive and EMC Directive, and the 5th generation fixed network.

Please visit us online at etsi.org/events/webinars to view upcoming and previous webinars.

OUR TECHNICAL BODIES

Committees, Projects & other groups

Access, Terminals, Transmission and Multiplexing (ATTM) 	Broadband Radio Access Networks (BRAN) 	EBU/CENELEC/ETSI on Broadcasting (BROADCAST) 	Smart Body Area Network (SmartBAN)
Integrated broadband CABLE telecommunication networks (CABLE) 	Cyber Security (CYBER) 	Digital Enhanced Cordless Telecommunications (DECT) 	TETRA and Critical Communications Evolution (TCCE)
Environmental Engineering (EE) 	eHEALTH (eHEALTH) 	Emergency Communications (EMTEL) 	Smart Card Platform (SCP)
EMC and Radio Spectrum Matters (ERM) 	Electronic Signatures and Infrastructures (ESI) 	Human Factors (HF) 	Smart M2M (SmartM2M)
Core Network and Interoperability Testing (INT) 	Intelligent Transport Systems (ITS) 	Lawful Interception (LI) 	User Group (USER)
Mobile Standards Group (MSG) 	Methods for Testing & Specification (MTS) 	Network Technologies (NTECH) 	Satellite Earth Stations & Systems (SES)
Reconfigurable Radio Systems (RRS) 	Railway telecommunications (RT) 	Safety (SAFETY) 	Speech and multimedia Transmission Quality (STQ)

ETSI Partnership Projects

Third Generation Partnership Project (3GPP) 	oneM2M (oneM2M)
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Industry Specification Groups

Augmented Reality Framework (ARF) 	european Common Information sharing environment service and Data Model (CDM) 	cross-cutting Context Information Management (CIM)
Europe for Privacy-Preserving Pandemic Protection (E4P) 	Experiential Networked Intelligence (ENI) 	Encrypted Traffic Inspection (ETI)
5th Generation Fixed Network (F5G) 	IPv6 integration (IP6) 	Multi-access Edge Computing (MEC)
millimetre Wave Transmission (mWT) 	Network Functions Virtualisation (NFV) 	Non-IP Networking (NIN)
Operational energy Efficiency for Users (OEU) 	Permissioned Distributed Ledger (PDL) 	Quantum Key Distribution (QKD)
Securing Artificial Intelligence (SAI) 	Zero touch network and Service Management (ZSM) 	

Open Source Group

OpenSource MANO (OSM)

Design Tomorrow's World

with The Standards People



Design Tomorrow's World with the Standards People

ETSI offers an open and inclusive environment to support the development and testing of globally applicable standards for ICT-enabled systems, applications and services across all sectors of industry and society.

ETSI provides the opportunities, resources and platforms for organizations to understand, shape, drive and collaborate on globally applicable standards.

ETSI standards facilitate interoperability, security, and competitive advantage across all sectors of industry and society. Our international membership includes universities, research bodies, associations and public authorities, as well as industrial companies of all sizes: a quarter of ETSI's members are small or medium-sized enterprises (SMEs).

We're a world renowned organization with a longstanding reputation for technical excellence. Our standards are produced by our members,

through active participation, co-operation and consensus in an atmosphere of openness and transparency, where all contribute as equals. We work in partnership with all relevant worldwide Standards Developing Organizations, particularly the other ESOs, as well as communities, fora and consortia. This ensures that our standards are aligned with those produced elsewhere and avoids the duplication of effort.

By joining ETSI, you can become part of one of the leading communities for the development of world-class ICT standards – and have your say in shaping the future of our industry.

**Find out more about the benefits
of ETSI membership at
etsi.org/membership**

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