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THE ETSI MAG

JULY 2021

THE INTERVIEW

Stephen Temple

GSM story 30 years later. *p.4-5*

TECH HIGHLIGHTS

A Security Token for GSM. *p.20-21*

IN THE SPOTLIGHT

Back to the future: GSM. *p.13-16*

BACK TO THE FUTURE: GSM

ETSI

Editorial

This edition pays tribute to the big bang that GSM brought about in ICT.

On 1 July 1991 the former Finnish prime minister Harri Holkeri made the world's first GSM call, calling the deputy mayor of the city of Tampere. That was 30 years ago.

This "back to the future" July edition pays tribute to the big bang that GSM brought in ICT. Of course, GSM was one of the first success stories of ETSI and one of the reasons why we were set up in the first place, but more importantly it was going to benefit the world's population, facilitating global access to mobile communications. With 2 billion GSM connections in 2006, and more than 5 billion unique mobile subscribers to date, GSM laid the foundations of the ICT landscape and its standards as we know today.*

To revisit part of the GSM story and understand how it shaped the future, we have asked the pioneers of these exciting times to give us their insights. In ***The Interview*** *Stephen Temple, who drafted the GSM MoU, recounts the story as he experienced it and outlines his view of the GSM legacy. Chris van Diepenbeek, Chair of the first committee for Radio Equipment and Systems, leads us on a journey to the CEPT. Klaus Vedder, Chair of our Smart Card Platform committee shares with us the start of a second ETSI success story, the SIM card, and its evolution, while Kevin Holley, the former ETSI Chair of the data services group within the GSM committee, reminds us of the SMS invention, yet another form of communication GSM enabled.*

In the ***Spotlight*** *section, I outline why without GSM, we would probably not be talking about 5G or 6G as we do today and how this mobile system set the foundations of the current international standardization principles and its ecosystem. Zemin Yang, the former Secretary General of China Communications Standards Association (CCSA), granted us an exclusive interview on how GSM shaped China's telecommunications and contributed to today's innovations. In our* ***New Member Interview****, Magister's CEO, Tommy Flink, bridges the gap between "earth" and "space" to enter the 6G era.*

But there's more for you to read - our cooperation agreement with O-RAN Alliance, the start of 3GPP and our 2021 new fellows to name a few.

When younger people around you talk about 5G, now you can tell them how it all started!

Enjoy reading!

Luis Jorge Romero,
Director-General ETSI

**Source: GSMA*

Enjoy! The ETSI Mag

Edited and published by ETSI
Quarterly edition

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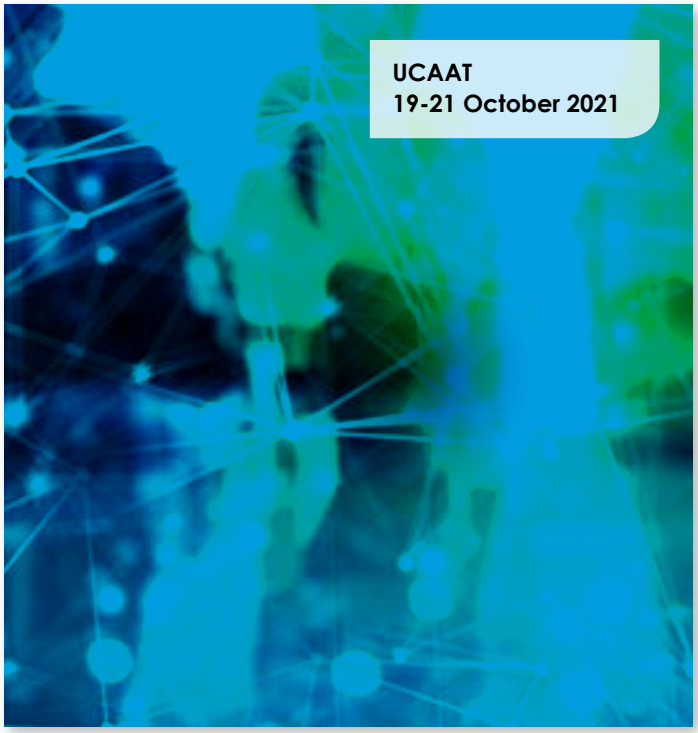


UCAAT 2021:
Testing at the edge

ETSI is pleased to announce the 8th edition of *UCAAT*, the User Conference on Advanced Automated Testing. This year's UCAAT will take place as a virtual event in October 2021. The event provides a platform for the testing community – including users, vendors, service providers and researchers from many different application domains – to share experiences and learn about the latest advances in the industrial use of test automation.

Test process automation has proven to increase productivity and product quality. As the COVID-19 pandemic has shifted and increased the demands on various IT systems and services in terms of interoperability, scalability, and adaptability, test automation is essential for delivering agile solutions in uncertain times. Sharing knowledge and learning from the experience of others helps everyone to become better prepared for future challenges.

UCAAT is dedicated to the practical engineering and application aspects of automated testing, including experiences from the use of new techniques for test automation, advanced test automation processes, and standardized testing languages and methodologies for test automation in different application domains, such as IT services, telecommunications, transportation, healthcare, finance and smart cities. Keep an eye on our website for latest news and agenda.

oneM2M new website

ETSI is a preeminent member of *oneM2M*. The global standards initiative that was launched in 2012 now brings together more than 200 players from many diverse business domains and has successfully been developing IoT standards to enable interoperable, secure, and simple-to-deploy services for the IoT ecosystem since then.

oneM2M has just released a revamped web site with a new layout and new functionalities. This oneM2M web site includes a brand new section called "Using oneM2M" which is specifically dedicated to developers and service providers and that makes it easier to learn how to build and deploy oneM2M standards for end-to-end IoT systems. The new oneM2M web site also tracks global deployments using oneM2M standards and includes interviews with industry leaders in its 'Executive Viewpoints' section. Check the new web site at www.oneM2M.org

3GPP new marker

Recently, the thoughts of the Technical Specifications Groups (TSG) in *3GPP* have turned to the prioritization process for the next two years, as Release 17 features move towards their scheduled completion by June 2022.

From Release 18 onwards, the Partners have agreed that a new 5G-Advanced logo will be shown on the cover sheet of Technical Reports and Specifications. The new release will further evolve features and use cases identified for 5G, justifying the creation of this mid-generation marker.

Recently, the RAN TSG held its Workshop on the new radio features for 5G-Advanced, ending on 2. Details of the outcome of that event are the focus of a recent news article at www.3gpp.org. In parallel, 3GPP TSG SA has made progress on their studies for Release 18 – which will also carry the new 5G-Advanced branding and they too will hold a Release 18 workshop, starting on 9 September.

In this exclusive interview, Stephen Temple reveals the exciting GSM story and its legacy thirty years later.

Stephen Temple

Stephen Temple was a DTI Official who wrote the GSM Memorandum of Understanding that committed European mobile operators to support the GSM standard and roll out GSM networks by 1991. He wrote the DTI Consultation Document *Phones on the Move*, that extended GSM's use to the 1800 MHz band for small hand portables and widely recognized as having triggered the transformation of the mobile phone into a mass-market consumer product. He led the UK's role in setting up ETSI and was elected as the first Chairman of its Technical Assembly. He has been involved in every generation of cellular mobile technology, created the concept of 5G pioneer frequency bands and recently edited the IET Guide *6G for Policy Makers*.

What was the main driver for the GSM project?

The main political driver for GSM was to find a solution to the great European problem of the time – fragmentation due to countries adopting different mobile technologies and different frequency bands. If somebody had wanted to drive across Europe and stay in contact, their car would have been so full of radio boxes that there would have been no room for any passengers. Even worse was the likelihood of being stopped at a border and told that foreign car phones were illegal.

The first analogue phone to fit in a shirt pocket (shown above) arrived in 1986, giving GSM a huge competitive mountain to climb upon its launch in 1991.

"The main political driver for GSM was to find a solution to the great European problem of the time: fragmentation."

It was 'the problem of the age' that GSM was required to solve rather than addressing any shortcomings of 1G technology. Indeed, several 1G analogue networks were quite good. The first analogue mobile phone to fit in a shirt pocket had arrived five years ahead of the launch of GSM in 1991. The market alone could not have got GSM off the ground against competition from rapidly advancing analogue cellular technology.

When politics gets mixed up with technology standards things usually take a turn for the worse. But in this case, it was 'good politics'. GSM had a strong ethical dimension of openness, balance of interests and everyone pulling together to expand the public good. I am reminded of this today when I hear some research leaders calling for 6G to address the great societal challenges of today's age.

What role did ETSI play in GSM's success?

The big driver for creating ETSI was to bring manufacturers into a balanced partnership with telecoms network operators in setting telecommunications standards. GSM was ETSI's first flagship project and test case for this super-national network and customer-supplier partnership. Success required the largely monopolistic network operators to change their mindset. They had to look beyond national advantage and align their technology goals and, in doing so, bring their industry supply chains into line with the shared goals. The success of GSM and every subsequent mobile generation flows from this alignment of network technology innovation goals by many 'customers and suppliers'. Such focus unleashes enormous economic forces. The involvement of manufacturers in GSM standard setting also occurred just in time. A high degree of professionalism was introduced that allowed ETSI to produce thousands of pages of GSM technical specifications to support the launch of GSM by 1991. That professionalism has endured.

"GSM was ETSI's first flagship project and test case for this super-national network and customer-supplier partnership."

How did GSM cooperation manage to endure when so much competition was unleashed with the launch of GSM?

It is true that the GSM spectrum was used to implement a competition-based mobile network market across Europe. Enormous thought went into drafting the GSM Memorandum of Understanding on where close cooperation was essential and where competition was paramount. Cooperation was to be total in the 'cake baking' phase and competition paramount in subsequently fighting for 'the largest slice of the cake'. This delineated 'pre-competitive' phase for mobile generations allowed a friendly coming-together of engineers from competing companies for collaborative research and standard setting. Such a thoughtful mix of cooperation and competition underpins today's phenomenally successful global mobile industry.

"The mix of cooperation and competition underpins today's phenomenally successful global mobile industry."

What other aspects of the GSM legacy do you still see today?

The main one is the timing and synchronization of mobile generations. The GSM Memorandum of Understanding synchronized the procurement cycles of a large number of mobile network operators. Then a very deliberate decision was taken by ETSI officials to frustrate any chance of the UMTS wideband technology arriving too early to become a competing standard. UMTS was a third-generation technology by design. Yes, it was ETSI that established the 'G' approach to mobile network technology advances. It was an inevitability that 4G would become a next-generation innovation, in spite of efforts to call it a long-term evolution. The marketing value of the 'G' label was just too good to ignore. 5G picked up on the pattern and was made a next-generation technology by design.

"The main legacy is the timing and synchronisation of mobile generations."

What has been lost from the GSM legacy?

A major GSM success was SMS messaging. A high degree of cooperation between mobile operators made this possible. This level of cooperation over 'new public services' fizzled out with 3G. It has left the mobile operators doing the heavy lifting for mobile infrastructure and the tech giants largely enjoying the fruits of new services. As a result, the 'G' business model is becoming ever more challenging.

Do you see this GSM legacy enduring?

As 5G has been such a roller coaster, people have asked – does the world need another 'G'? I have given this some thought. ETSI's creation of the 'G' approach for GSM invented a tool that addresses a particular class of competitive market 'innovation failure' for interoperable networks, where nothing can happen unless an entire industrial ecosystem acts together. But the question about the arrival of 6G is academic, as the momentum towards 6G appears unstoppable. What remains wide open for debate is its shared goals. The best traditions of ETSI's GSM legacy would be for ETSI to support the call for these shared 6G goals to have a global focus on addressing the great societal problem of today.

Dedication: To my three comrades-in-arms who were with me navigating the political choppy waters in the run-up to the 1991 GSM launch – Philippe Dupuis (France), Armin Silberhorne (Germany) and Renzo Failli (Italy), and to Thomas Haug (Sweden) who captained the GSM ship into calmer ETSI waters whilst all this was going on.

Welcome to our NEW members

Acconeer AB, Sweden

Based on research from Lund University, Acconeer has created a unique radar solution that brings new opportunities for human interaction with technology. The radar sensor is based on pulsed coherent radar technology and combines extremely low power consumption with high accuracy. The small size, only 5x5 mm, and low power consumption are ideal for compact battery-driven and mobile devices.

ACCS, United Kingdom

The Age Check Certification Scheme is an independent 3rd party certification scheme for providers of age restricted goods, content or services. The scheme can be utilised to provide full conformity assessment in accordance with all aspects of age restricted sales. Their scheme has developed an award-winning Android & iOS App, deployed to 18/19 year old test purchasers throughout the UK – enabling them to offer a fully configurable test purchasing services.

Arqit Ltd, United Kingdom

Arqit has invented a unique quantum encryption technology which makes the communications links of any networked device secure against current and future forms of cyber attack – even an attack from a quantum computer. Arqit's product, called QuantumCloud™ creates unbreakable software encryption keys which are easy and efficient to use remotely with no hardware or disruption to software required.

Broadbit, Slovakia

BroadBit is developing revolutionary new batteries using novel sodium-based chemistries to power the future green economy. They are commercializing the technology for next generation electric vehicles, portable electronics, starters and grid energy storage. Their batteries enable increased range/use time, longer lifetime, reduced cost, environmental friendliness and scalable to any production volume. They are also developing a battery capable of fully recharging in 5 mins.

CERTH, Greece

The Centre for Research and Technology-Hellas is listed among the TOP-20 E.U. research institutions. CERTH has important scientific and technological achievements in many areas including energy, environment, industry, mechatronics, information and communication, transportation & sustainable mobility, health, agro-biotechnology, smart farming, safety & security, as well as several cross-disciplinary scientific areas.

Consort Digital, India

Consort Digital provides solutions for Mission Critical users, highly mobile users such as rail, mass transit systems, mining assets and public safety as well solutions for instant communication including call prioritization. All their solutions support open standards and leading technologies. Services range from design, engineering, feasibility studies, installation and commissioning, integration and operation and maintenance.

DIGG, Sweden

The Agency for Digital Government is a new government authority, created to think creatively, address new challenges and identify new opportunities in Sweden. The task job is to support and promote – to benefit everyone. For example, DIGG is working to improve digital accessibility on all public websites and digital platforms. They also support digital post, digital identity, e-commerce and e-invoicing.

Eurofins Digital Testing, Belgium

Eurofins Digital Testing, and its division Eurofins Cyber Security, is a global leader in independent Quality Assurance, testing and cybersecurity for software systems and devices with operations in Belgium, Hong Kong, the Netherlands, Sweden, the UK and the USA. They help businesses in mediatech, fintech, energy, governmental and the other industries assure quality in their digital transformations towards Industry 4.0.

INCERT, Luxembourg

INCERT manages critical infrastructures used for issuing Luxembourg eTravel documents such as ePassports, eID cards and eResidence permits and their verification at the border control. They have improved their knowledge by representing the State of Luxembourg in international organisations like ICAO, ISO, European commission driving us always at the top of the trends and technologies.

LoRa Alliance, USA

The LoRa Alliance® is an open, non-profit association. Their members promote the LoRaWAN® protocol as the leading open global standard for secure, carrier-grade IoT LPWAN connectivity. With the technical flexibility to address a broad range of IoT applications, both static and mobile, and a certification program to guarantee interoperability, LoRaWAN® has already been deployed by major mobile network operators globally.

Magister Solutions Ltd, Finland

Magister Solutions specializes in communication network simulation and emulation tools and services for modelling real world telecom (satellite and terrestrial) in detail. By simulating communication networks they are creating undetected knowledge that fosters the mobile, satellite and emerging industry development. They deliver internationally recognized services starting from designing new radio resource management concepts and algorithms to high end software solutions used in the space industry.

octoScope, USA

octoScope is the market leader in isolated, repeatable and automated wireless personal testbeds. Their patented technology redefines the accuracy, stability, economics and value of over-the-air wireless testing. The octoBox testbeds are configurable for automated regression test sequences with a range of airlink conditions and interference scenarios. Their solutions are used by customers in the robotics, medical, mobile, WiFi, military and connected car markets.

OneWeb, United Kingdom

OneWeb is a global communications network powered by a constellation of 650 Low Earth Orbit (LEO) satellites, enabling high-speed, low latency connectivity for governments, businesses, and communities everywhere around the world. OneWeb's satellites, together with a network of global gateway stations and a range of User Terminals, will provide an affordable, fast, high bandwidth, low-latency communications service connected to the IoT, and a pathway to 5G.

PQSHIELD LTD, United Kingdom

Their world-class researchers and engineers are co-authors of multiple finalist algorithms within the NIST Post-Quantum Cryptography Standardisation Process, which aims to define standards for the next generation of public-key cryptography. Their technology enables them to transition from legacy systems, so they can leverage upcoming public-key cryptography standards across hardware, software and communication. And they ensure that compliance with international standards (FIPS, etc.) and commercial value is fast and frictionless.

Tampere university, Finland

Tampere University is one of the most multidisciplinary universities in Finland. Almost all internationally recognised fields of study are represented and their research groups and projects conduct multidisciplinary research across institutional boundaries. Technology and social sciences have come together in a unique way with research groups and projects conducting multidisciplinary research across institutional boundaries. Their international community includes students and staff from more than 80 countries.

WiTricity, USA

WiTricity was founded to commercialize a new technology for wireless electricity invented and patented two years earlier by a team of physicists from the Massachusetts Institute of Technology (MIT). The team proved the magnetic fields of two properly designed devices with closely matched resonant frequencies can couple into a single continuous magnetic field, enabling the transfer of power from one device to the other at high efficiency and over a distance range that is useful for real-world applications.

Tommi Flink, CEO of Magister Solution, tells us why SatCom network simulations help the telco ecosystem evolve into the next generations of telecommunications.

Magister has evolved with the market's requirements – what were the main milestones?

Since the company was founded in 2005, we have been developing network-level simulators that incorporate users, devices (terminals, base stations, controllers, core network), radio access technology and services. Simulators allow companies to benefit from detailed, realistic modelling for their wireless system behaviour, interactions and protocols without investing in prototypes or commercial systems. They proved very useful, e.g. for 3GPP standardization activities.

Tommi Flink

CEO and co-owner of *Magister Solutions*

Tommi Flink has more than 20 years of experience working in the ICT industry, many years of which were spent on financial industry products and services. Mr Flink received his MSc degree in computer sciences from the University of Jyväskylä in 2001. He believes that aspects such as a high level of usability and service-based delivery models will also become more and more important in B2B services, and at the same time emerging technologies like Artificial Intelligence and Blockchain will have a major impact on the world around us.

It is important for companies to develop their own area of expertise and the best possible way to create value for their partners and customers at Magister Solutions is to provide world-class SATCOM network simulations.

> "Network simulations enable the execution of reliable simulations without extensive development processes."

For about 10 years, we have been involved in several European Space Agency (ESA) activities, developing network simulators for the European SatCom industry. Then, in order to be able to provide more value to the industry and productize our extensive knowledge of system simulations, we went one step further and developed a service through which we are able to offer network simulations with built-in analytics, visualizations and scalable cloud computing. So instead of providing, for example, an open-source simulator delivered to ESA, which might not be used outside the project, we offer a new service, targeting the whole SatCom industry.

As an independent vendor, instead of building only customer-specific "black box" solutions, our goal is to productize our services for a wide range of customers. It enables the execution of reliable simulations without extensive development processes, even for the companies without a dedicated team and long history in such simulations.

Why was it important to develop this software as a service for the satellite industry? Didn't they already have simulators?

As you know, satellite communications are becoming more and more complex with, for example, the co-existence of multiple wireless technologies. It will also grow with the introduction of 5G Non-Terrestrial Networks (NTN) and new players entering the market like Amazon or Space X. Most satellite vendors and these newcomers play an active role in ETSI and 3GPP standardization, but they need the network simulation capabilities and simulation results as part of standards studies.

> "In the past, simulators have been very difficult to use."

In the past, simulators produced for customers directly or within the ESA project have been very difficult to use. In the mobile industry, large companies might have their own R&D teams or subcontractors. As we have built several validated simulators in the past, we have harnessed this experience to provide the SatCom industry with an alternative independent, vendor-neutral and user-friendly solution. And this expertise is used in the standardization world, in the RAN 3GPP group for instance, which is very important for us.

Standardization seems to be essential for your activities – is this related to the development of your 5G network/system simulator?

Yes, we think that 5G has the unique potential to become the first global standardized system for both terrestrial and satellite connectivity with multiple use cases such as high throughput connectivity to reach uncovered areas; mobile satellite services for maritime or avionic segments; and global IoT services.

So we are developing a 5G system simulator that will be used to study and evaluate different technical alternatives and concepts, focusing especially on NTN. Active participation in standardization work is just not possible without the ability to provide relevant simulation results, and standardization will help us build even better simulation services. Our involvement in 3GPP standardization work is also related to our EU Horizon 2020 R&D projects, which have as a target the successful standardization of 5G NTN as well as its potential enhancements in future 6G.

Besides R&D and standardization support, what else do you offer the industry?

In addition to standardization and R&D activities, the service can be used as a demonstrator for SatCom companies to show to their customers and operators. They are able to demonstrate the capabilities of their existing and even future features and networks. That's the benefit of simulators: you don't need to have the network when you are building the scenarios, have to evaluate what key metrics to follow, how many users you will have, how many or what kind of satellites you will use, and whether you will use 5G standards, DVB-S2 or otherwise.

And can your simulators also be useful for the emerging megaconstellation players such as Space X?

Indeed, there is a need to produce satellites within much shorter time frames, which makes more streamlined design and simulation processes necessary. A more efficient simulation workflow is also required due to the changes in the satellite industry with the introduction of megaconstellations. Our simulation services can be beneficial for companies like Space X or OneWeb, where we could model their satellite constellation networks in specific simulators.

We can build simulators modelling the bits and pieces of their constellation, starting with the number of satellites, the orbits of satellites, but especially the satellite connectivity, in other words the protocols that are used for communicating between the ground and the satellites. Our service helps our customers experiment and understand how many satellites are required, what orbits should be used, what air interface protocols should be used to optimize link performance, and what kind of advanced radio response management algorithms should be implemented into their systems so that they can optimize their network capacity.

> "Our simulation services can be beneficial for Space X or OneWeb."

So would you say you're already looking to bridge the gap between "earth" and "space" to enter the 6G era?

Definitely! Simulations are a great tool to make it happen.

After signing the cooperation agreement between ETSI and CCSA in April, Mr. Zemin Yang granted us an exclusive interview.

The first GSM network was launched in China in 1995, do you think it helped accelerate standardization activities in China?

The history of mobile communication network development – which represents vital infrastructure in human society – seems like a myth, following Moore's Law from the first generation of 2C to the fifth generation of 2B in only 40 years. During this process, the second generation of mobile communication technology, such as GSM, realized the digital revolution of mobile communication itself and raised the curtain for the rapid and dazzling development of broadband mobile Internet. The fundamental logic of this story might be that, for a mobile communication industry with almost unlimited business prospects, its limiting factors seem to be only radio spectrum and enabling technology. Therefore, it continues to attract high-intensity technological innovations and investment of capital.

Zemin Yang

Mr. Zemin Yang, Professor of Engineering, graduated from Beijing University of Posts and Telecommunications (BUPT) in 1982, and received a master's degree from the University of Surrey in 1991. He held several positions as Director General of RITT, President of CATR (China Academy of Telecommunication Research), and the Vice Chair of the Council, Secretary General of China Communications Standards Association (CCSA). His focus has been on communication and remote information processing, and he has many years of experience in communications network architecture design and ICT industrial policy research.

Almost synchronized with the development process of mobile communications is China's opening-up to the outside world and the shift to market-oriented economic system reform, which led to the rapid development of China's economy and the rapid release of the energy of China's huge single market. With the opening of the first GSM network in China in 1995, the bulk of the Chinese market chose GSM technology. GSM has achieved great success in China, and at the same time, it has aroused the active support and investment of Chinese industry in the follow-up mobile communication technology standard innovation activities, which is reflected in the increase in the contribution rate of Chinese enterprises to the core patents of 3GPP standards. CCSA, as one of the Organizational Partners of 3GPP, is deeply impressed by this.

> "GSM has achieved great success in China."

You have a long-standing relationship with ETSI, what is your role and your involvement with us?

My relationship with ETSI began when I met D.G. Karl-Heinz Rosenbrock, in the late 1990s when I was the director of RITT, the Communications Standards Institute of MPT China. His introduction to the organizational structure and working mechanism of ETSI was essential for us to envision the future work of CCSA at that time. And his motto as the manager of the standards organization taught me the word "compromise". I kept going to borrow "good ideas" from ETSI until the current age of D.G. Luis Jorge Romero, and I gained several from both of them. In return, I shared with my ETSI colleagues something likely from the CCSA side, e.g. the special workflow of our vertical industry members to develop their own standards for their IoT applications. IoT applications represented by 5G2B are a completely unfamiliar challenge to ICT enterprises all over the world. It will be of great value for standardization organizations in different regions for exchanging experiences and the lessons gained from their own practice.

> "ETSI plays an important role in the ecological environment of global standards."

In my opinion, the more profound significance of the cooperation between CCSA and ETSI is that the deep understanding and trust of the two organizations can help their members understand each other's members, industry and each other's countries, which may go beyond the scope of standardization activities themselves. Although the fundamental orientation of ETSI is to serve the cause of ICT technological innovation and standardization in Europe, because of its global openness, it plays a particularly important role in the ecological environment of global standards. For example, 3GPP has created great commercial success with 3G and 4G mobile communication technology and opened the 5G2B mobile communication technology era in just 20 years. I must say that the special role played by ETSI in 3GPP is obvious to all Organizational Partners.

Over your career in standardization, have you seen any benefits for your country from this worldwide cooperation?

I think there are many reasons for Chinese industry to welcome the broadest cooperation in the global standard-setting activities of the ICT industry. First of all, China's industry has been investing heavily in its efficient innovation system, and the resulting R & D results can directly contribute to future international common standards.

Secondly, the performance-to-price ratio of China's products is sufficiently competitive in the market. Of course, we hope that the common standards formed through the broadest international cooperation can assist the formation of the largest single market, and we do not want to see the market divided.

> "China's R & D results can directly contribute to international common standards."

From my understanding of CCSA member units, most Chinese enterprises welcome or even look forward to high-level competition. Fair competition between the best peers in the industry makes it possible to have a unified standard encompassing the best technical solutions, which is the fundamental source of standards for market acceptance and huge new value for end users, and the only way for ICT enterprises to succeed in their own businesses. In this regard, CCSA member companies are very confident in their abilities.

What are the key ICT technologies your standards research will focus on in the coming years?

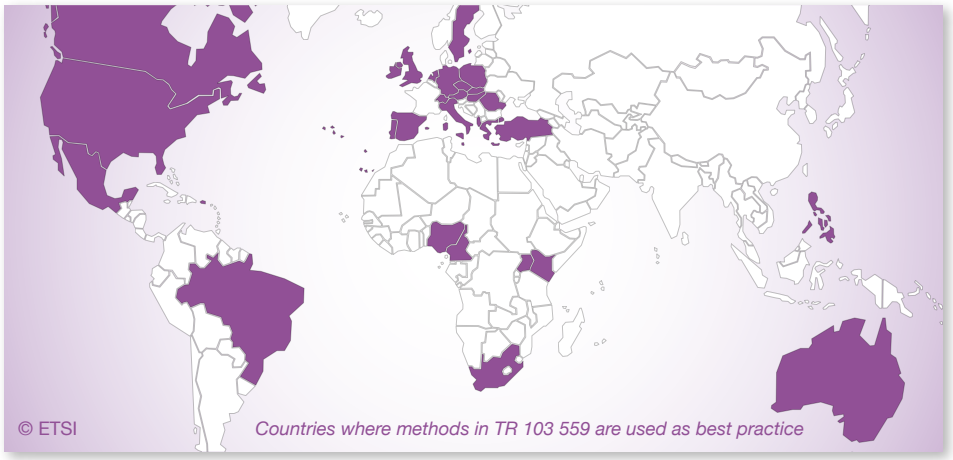
In the light of the commitment and mandate of CCSA to revolutionize industries through paving the way for the standardization of the digital economy, we are currently looking at several technological trends which were considered essential components to bring industry – as well as human society – to the next level of prosperity and sustainability.

These trends include 5G Advanced toolkits, which consist of the Ultra-Dense Networking, Re-configurable Intelligence Surface, Further Uplink Enhancements for Verticals, Mesh Networking, NR based Massive Connection, and intrinsic AI, which is certainly what the communication industry is pursuing by taking advantage of the outcomes of AI in information industry. Another trend is the exciting but challenging goal of Carbon Neutrality. For instance, Solar Powered Infrastructure, Advanced Cooling System or Energy Harvesting.

I would like to take this opportunity to express my sincere thanks to my ETSI colleagues who have worked with me happily and helped me.

Quality of experience:
a key requirement for end users

Aware of the importance of speech transmission requirements from the perspective of a user's quality of service, ETSI sets standards for handsfree, handset and headset VoIP terminals, in narrowband and wideband.



Countries where methods in TR 103 559 are used as best practice

Standards relating to terminals and networks for speech and media quality, end-to-end single media and multimedia transmission performance are essential for end users. The ETSI Technical Committee on Speech and multimedia Transmission Quality (*TC STQ*) successfully handles these standards. It also develops Quality of Service (QoS) parameters for networks and services and Quality of Experience (QoE) descriptors and methods. To ensure alignment with other standard-setting organizations and facilitate industry implementation, the group provides guidance and background information on effectively applying the standards and methods created.

As well as creating a large number of standards for speech transmission requirements, the committee has developed a specification offering guidance and detailing the methodology to objectively assess the listening effort required by a user during a voice call. The committee has also standardized subjective and objective methodologies for the qualification and performance requirements of the new ETSI speech codec for encoding and decoding digital speech signals, in cooperation with the DECT (Digital Enhanced Cordless Telecommunications) group.

Measuring 5G performance

To meet the requirements of mobile networks, the subgroup STQ Mobile focuses on QoS and QoE aspects for popular services in mobile networks, as well as parameters and test scenarios for assessing network capabilities in 5G performance measurements. STQ Mobile liaises with 3GPP and other standards organizations to support the development of methods and equipment used for characterizing existing and future network telecommunications services, both landline and mobile. Several of its standards and reports are the basis for ITU-T SG12's own work.

Successful global implementation

National mobile network benchmarking and scoring campaigns are of great importance to mobile network operators. ETSI has therefore developed *TR 103 559* to meet these requirements, with regard to the area and population to be covered, the collection and aggregation of test results, and the weighting of the various aspects tested. The report takes into account the rapid development of mobile technology and the consumer habits of users, as users' quality of experience changes over time, by parameterizing individual factors that contribute to the score.

The tests assess telephony, video streaming, data throughput and more interactive applications such as browsing, social media and messaging. The results collected from the various areas are individually and collectively weighted and summarized by an overall score.

For greater authority, the scoring methodology is based on a set of standardized market KPIs and provides governance and implementation principles as well as concrete realizations. TR 103 559 describes its scoring method with full transparency for the benefit of implementors, network providers and regulatory authorities, and has been applied on a global scale.

BACK TO THE FUTURE: GSM

A tribute to GSM:

30th Anniversary of GSM's first call

In celebrating its 30th Anniversary, the time has come to look back over GSM. Much of what we take for granted today is the result of this big bang in ICT history. Let's have a quick review of some of these principles that constitute our foundations today and guide our evolution in the future. Without GSM, we would probably not be talking about 5G or 6G as we do today. So "what has GSM ever done for us?"

Design principles set the groundwork

Whether you call them design principles, or fundamentals, or "constraints imposed by the conditions of the environment", the development of GSM followed a series of requirements that today constitute the basis of the design of our new systems, which nobody would challenge.

First, the system had to fit the requirements of many different countries. It needed to be a joint effort and decisions had to be taken based on consensus. Every interested party played a role in the definition and development of the system, starting with governments and administrations, which had to create the proper environment for the system to land and grow, but also the operators who would have to deploy and run the system and, lastly, the manufacturers that would need to develop it.

The conditions for all these stakeholders to work together had to be agreed upon. Cooperation and consensus building became undisputable principles.

Bearing in mind the stated requirements, the system to be developed had to be modular, fitting into a commonly agreed architecture where the key interfaces -which would eventually define how the system would be developed, built and operated- needed to be carefully specified. With this system, every single piece of the puzzle could fit with the rest, regardless of who had produced it. This meant that full networks could be built and further expanded using pieces from many different manufacturers, which would foster competition. And one of the important pieces here was the mobile terminal itself. Now, various manufacturers could produce handsets that would operate on all networks.

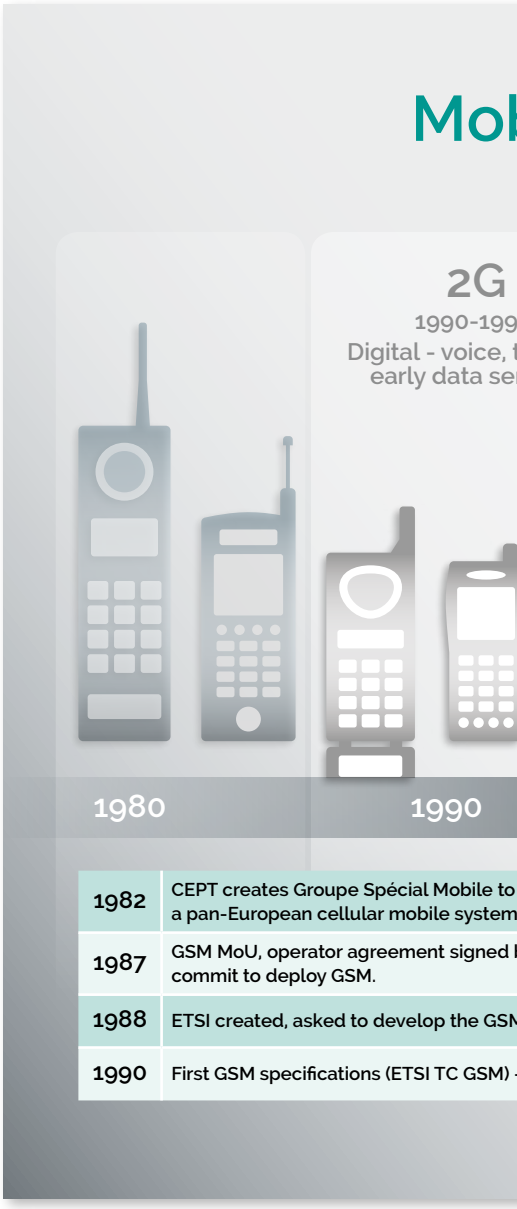
Interoperability became then a vital concept.

Another very relevant concept developed at this time was the split between the user identification and the terminal. The birth of the SIM card. The rights of a customer to use the network would be associated

> **Cooperation, consensus building and interoperability became undisputable principles.**

to a SIM card, under a standardized form factor, that would fit in all available mobile terminals. In this way, a user could easily swap terminals with no need to make changes in the operator's databases. This provoked huge new dynamics in the marketplace and a great variation in the availability of mobile terminals, which now develops devices from sensors to smartphones, to cars and beyond.

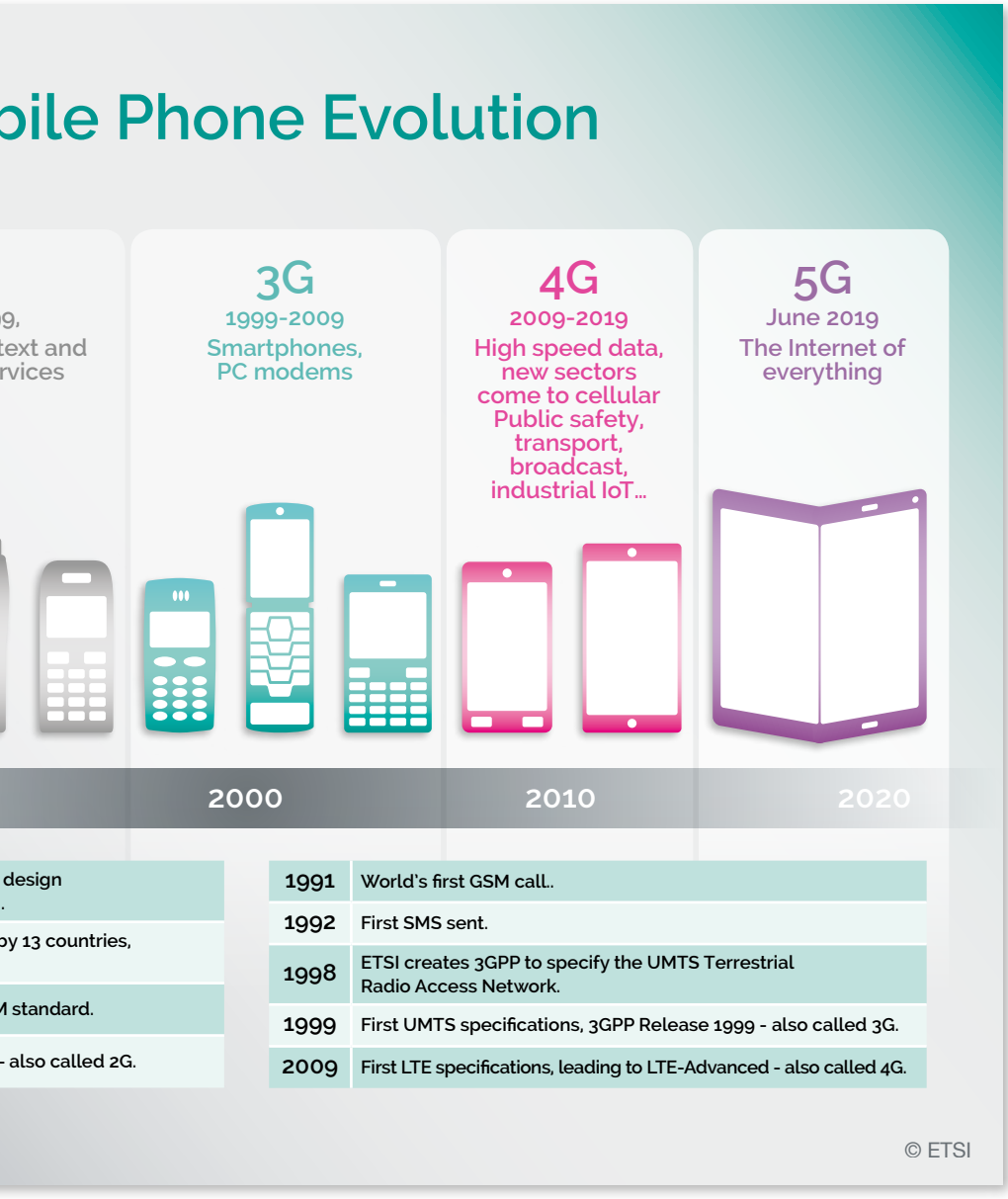
The split between the subscription and the terminal used turned out to be fundamental.



The split between the subscription and the terminal used turned out to be fundamental.

One of the biggest challenges of existing mobile telephony was fraud and security. It was easy to clone handsets, tamper with users' identities and listen to conversations over the air. In leveraging the SIM card -as well as through other means- GSM was designed with security in mind; making the cloning of SIM cards extremely complex (as it is not only the SIM card that supports the user's credentials) and cyphering the communications. When communications are cyphered and the identity of the users protected, law enforcement bodies must be enabled to intervene if required by the authorities. The means for lawful interception are also embedded in GSM.

We could say that the concept of "security by design" started to settle with GSM. The means to enable law enforcement agencies to perform their duties as required by the authorities were also developed.



Another important concept that started with GSM is that the system was designed to offer services beyond mobile telephony. At the time, voice was the main means of communication. With GSM, mobile data started to be enabled. But, most importantly, technology provided additional hooks to enable the creation of value-added services, like SMS, cell broadcast, etc. Not all of them worked from the start but making these technologies available allowed the market to devise new uses and business models.

Mass market along the way

Having designed a flexible, scalable, multi-vendor system that was embraced by EU member states from the beginning, GSM was able to achieve fantastic economies of scale from very early on, a phenomenon never before experienced in mobile telephony. But a few barriers still had to be broken to unleash the full potential of the technology.

First, the spectrum of use for this technology had to be harmonized. GSM was to be a pan-European system, adopted by all member states. It would have to enable a single system all throughout Europe. Borders would need to be removed, and terminal equipment should be able to cross them freely. Type approval of devices had to be homogenized across the different nations and was eventually replaced by a self-declaration of conformity from the manufacturers, which enabled much faster and cheaper access to market.

With all this, another advancement was to become fundamental. To make of it a truly pan-European system, customers from an operator in one country should be able to connect to the system beyond the boundaries of their own operator. International roaming was institutionalized: operators would set

International roaming was institutionalized.

Vintage mobiles, courtesy of Stephen Temple.

> Voice was no longer the only service bringing revenues.

the conditions so that customers from one operator would be able to receive service from another operator.

With the explosion in demand and the ease of swapping devices, service providers envisaged new ways of bringing more customers to their networks. Two initiatives are worth remembering: the subsidization of mobile terminals in exchange for long-term subscriptions and prepayment schemes. Both were fundamental in growing the subscriber base and bringing mobile services to most of the population, and both leveraged the technological capabilities that GSM provided.

Another aspect which is important to highlight is the changes to the business model, where voice was no longer the only service bringing in revenue. The quest for different value-added services and sources of income was starting -and has been expanding since. In this search, one lesson learned is that value could come from unexpected sources: manufacturers and service providers were no longer the "only source of wisdom". The mass market being addressed, this further pushed the need to seek additional sources of revenue by envisaging mobile connectivity solutions tailored to different sectors.

A growing ecosystem

GSM sparked a very profound change in the environment and the ways in which we behave. In the very early days of mobile telephony, pre-GSM, a mobile phone was a luxury device only available to the very wealthy. Its value was still to be proven.

With GSM and its evolution, being connected everywhere and at all times has become a basic need. Like water or electricity. People might leave home without their wallet, but never without their mobile. Our device contains all we need for our daily lives: it is not just a communication device but connects us to (and integrates us in) the society. Our files, our pictures, our videos, our entertainment, our games, our contacts, our payment means… everything is there. Going beyond mobile telephony itself, it is also a fundamental tool for many economic sectors' productivity.

> People may leave home without their wallet, never without their handset.

Our behaviour, our economy, our society at large is hugely influenced by what GSM started.

Furthermore, the way in which we now understand how our world of communication develops stands on the foundations that GSM set: global cooperation and high-quality standards that embrace the latest developments from research and the requirements from the market are key.

GSM was an achievement beyond the technology itself. The GSM standard allowed billions of people to access mobile services and communicate with each other. It was the starting seed for many new approaches which have enabled and given birth to various new initiatives and improvements. It provided the encouragement to try and fail (as the impact of the blow would be softened by everyone taking it) and the willingness to accept and embrace great ideas, no matter their origin. GSM sowed the seeds of our very rich and fast-growing ecosystem.

Yes but, apart from this, *"what has GSM ever done for us?"*

■ *Luis Jorge Romero, Director-General, ETSI.*

The invention of texting

In the mid-1980s, mobile phones were huge and battery hungry. People carried radiopagers so that they could switch off their phone to save battery. These radiopagers evolved to allow short text messages to be received so that customers would know why someone was trying to contact them.

While the first digital mobile radio system for Europe was being developed, the idea came from a Franco-German paper to integrate this kind of capability into the mobile phones themselves using digital signalling. This eliminated the need to carry a radiopager as phone battery consumption was improving significantly, and people could now leave their phones switched on.

This led to the detailed development in ETSI of the technical specification for SMS. Messages were collected in an SMS 'Service Centre', and delivery was attempted via the mobile network to wherever the device happened to be. There was a retry capability in case the device was out of coverage or switched off. And then there was the ability to generate a message from the device itself, even if nobody believed that this would be useful for the mass market as keying in a text message using a mobile phone keypad would be too arduous for most people.

The length of the short message was a key discussion point at the time. Alphanumeric pagers were limited to 90 characters, so it seemed plausible to aim to double that to 180 characters. Unfortunately, the signalling packets defined by the ITU Blue Book, after taking away the overhead, limited the length of the short message to 140 bytes. This was still felt to be a reasonable goal and, due to the clever idea of using 7 bits per character instead of 8, was increased to a 160-character limit. ETSI later allowed for longer messages, increasing the number further by splitting the text into several message packets.

In time, mobile phone manufacturers improved their interfaces so that keying in text messages became easier and operators – seeing the market uptake and its potential – began offering SMS at low cost or for free. Yet mobile networks were interconnected for voice but not for text. It took a couple of years for operators to develop the community by providing interconnectivity for SMS. This, together with lower cost subscriptions, further opened up the use of SMS for younger people, who soon developed the new youth led shorthand language. And so texting was born.

ETSI played a key role in the development of the standard for SMS but also in the development of young engineers with great knowledge of how the system worked and enthusiasm for the new medium.

Kevin Holley, BT, 3GPP lead delegate and former Chair of ETSI TC SMG WG 4 (Data Services).

To go further: *'The GSM Short Message Service' by Kevin Holley.*

The ETSI Fellowship programme rewards individuals who have made an outstanding personal contribution to ETSI, to building the work of ETSI, or to raising its reputation in specific sectors of standardization. Meet our 2021 new Fellows!

Dr. Gabrielle Owen

Coordinator Engineering for Spectrum Management, Radiocommunications Agency NL, Ministry of Economic Affairs and Climate.

Dr. Gabrielle Owen joined the ETSI Technical Committee Electromagnetic Compatibility and Radio Matters (TC ERM) in 2002 and was the Chair of TC ERM as well as the Operational Coordination Group R&TTE (OCG R&TTE), from 2005-2013. More than 400 deliverables were published during her chairmanship of TC ERM, including many Harmonized Standards under the European Directive for radio equipment and dozens of ETSI System Reference documents which were submitted to the CEPT/ECC Working Group Frequency Management to request the use of radio spectrum.

She strengthened internal cooperation between the ETSI radio groups as well as the external cooperation with CEPT/ECC. Gabrielle Owen became a member of the ETSI Board in 2017 and served as Vice Chair of the ETSI Board from September 2018 to December 2020.

Dr. Jamshid Khun-Jush

Vice President, Technical Standards, Qualcomm CDMA Technologies GmbH.

Since 1996, Jamshid has been a key member of several ETSI Technical Bodies, Projects and Task Groups for broadband and mobile radio access networks. As the chairman of ETSI TC BRAN physical layer group, he made key technical contributions in the late 1990s to the promotion of OFDM-technology for broadband wireless LANs and MANs.

Furthermore, he established a close cooperation between ETSI and IEEE 802 wireless working groups (.11 and .16) in his capacity as the ETSI BRAN chairman, and was the key driver behind the global harmonization of OFDM technologies for broadband wireless LANs and MANs.

From 2003 to 2010, Jamshid represented his company in 3GPP WG RAN4 and was a key contributor to the standardization of RF performance requirements for UMTS and LTE. At the same time, he was an active member of ETSI MSG TFES, where he contributed to the development of Harmonised European Norms (HENs) for UMTS, cdma2000 and LTE. As the ETSI JTFER chair, Jamshid led the ETSI activities respecting HENs for Reconfigurable Radio Systems as well as for the preparation of related System Reference Documents.

In addition to his ETSI Board membership since 2011, Jamshid has made considerable contributions to the development of HENs for Radio LANs in recent years as well as for Intelligent Transportation Systems and spectrum sharing techniques for such systems in 5.9 GHz.

Nurit Sprecher

Head of Management, Virtualization & Application Enablement Standardization, Nokia.

Nurit initiated and led the industry effort to set up the ETSI ISG MEC and successfully positioned the MEC technology as a key building block and enabler for 5G, IoT and mission-critical, vertical solutions. Nurit worked to establish strong collaboration across the industry to ensure the leverage of the MEC work. She has driven a powerful industry effort with members and officials of the ETSI MEC and 3GPP SA6 groups to create a synergic edge computing architecture, to avoid industry fragmentation and to accelerate time-to-market.

Playing an instrumental role in the creation of the ETSI ISG ZSM, she has worked to strengthen cooperation with the relevant standards bodies and open-source projects to promote alignment, leverage synergies and ensure that end-to-end AI-empowered automation can be efficiently achieved.

Nurit has spent many years working as an expert system architect and technologist, defining the carrier-grade network and service architecture evolution. She contributed to many projects carried out in IETF, ITU-T SG15, IEEE and BBF and has participated in core discussions on the Next Generation Network with Tier-1 carriers and several governments.

Nurit is a distinguished member of the Nokia technical committee.

Charles Brookson

Director, Zeata Security Ltd.

Charles Brookson OBE CEng FIET FRSA has been involved in Security since the late 1970s and has been promoting and participating in Security in ETSI from the start. He was involved in the early days of GSM and Chaired the Algorithm Expert Group and was involved in security CEPT and SMG10 security.

Within ETSI he helped set up TC SEC, and when it closed in 2002, helped set up TC LI and became Chairman of OCG Security to coordinate security within ETSI.

In 2006 he started the first ETSI Security Workshop, which still continues today, and helped produce the first Security White paper.

Charles initiated the Board process to launch TC CYBER in 2014, and was the first Chair for four years, and Vice Chair for a further two years.

He continues to participate in Security initiatives, meetings and Workshops.

Dr.-Ing. Hans Wilhelm Gierlich

Managing Director Telecom Division, HEAD acoustics GmbH, Germany.

Dr.-Ing. H. W. Gierlich started his professional career in 1983 at the Institute for Communication Engineering at RWTH, Aachen. In February 1988 he received a Ph. D. in electrical engineering. In 1989 he joined HEAD acoustics GmbH in Aachen as Vice President. From 1999 to 2014 he was head of the HEAD acoustics telecom division. Since 2014 he has been Managing Director at HEAD acoustics.

He is mainly involved in acoustics, speech signal processing and its perceptual effects, QOS & QOE topics, measurement technology and speech transmission quality.

He is active in ITU-T, ETSI, 3GPP, GCF, IEEE, TIA, CTIA, DKE and VDA. In ITU, he chaired the ITU-T focus group CarCom. He is Rapporteur for various questions in ITU-T SG12. He was rapporteur for a variety of work items in ETSI, he is vice chair of ETSI technical committee STQ and was chair of STQ from 2016 – 2020.

He has authored more than 150 scientific papers and holds five patents. He is member of ASA, IEEE, VDE and DEGA where he was chair of the “Speech Communication” committee.

Anthony Wiles

Former ETSI CTI Director.

Anthony joined the ETSI staff in 1995. His firm belief in the importance of the technical quality of ETSI standards and the need for state-of-the-art approaches to standards development and testing guided his whole career at the Institute.

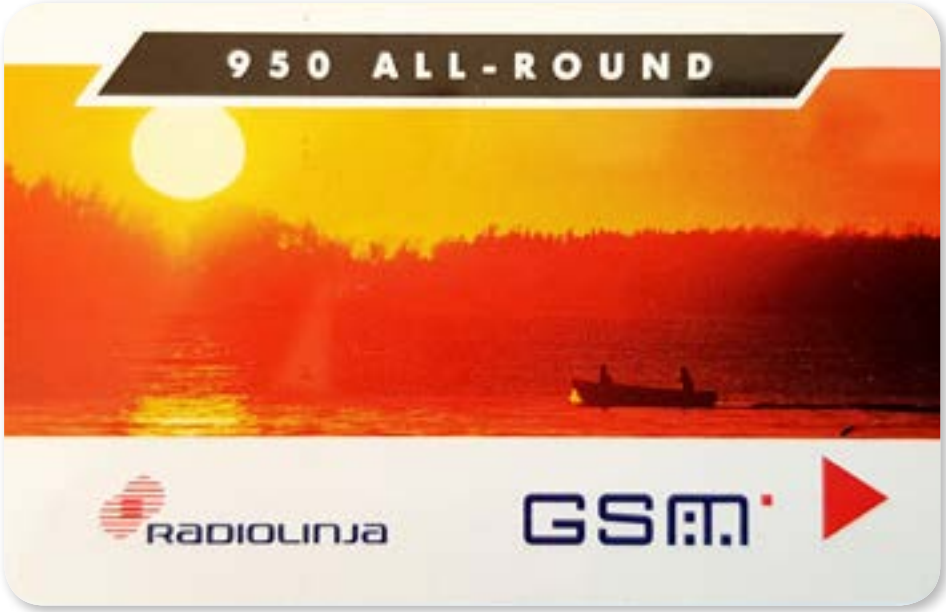
Anthony was deeply involved in the development of the widely used testing methodology ISO/IEC 9646. He was leader of the TC MTS Specialist Task Force that developed the test specification language TTCN-3, which became the cornerstone of 3GPP RAN5 UE conformance testing.

As Director of ETSI’s Centre for Testing and Interoperability, Anthony ensured the team adapted its support to widely diverse standards making activities, as demonstrated by the many ETSI groups that include interoperability testing (Plugtests™) as an integral step in their standards development.

His legacy is an ETSI Secretariat resource that is unique in the world of standardization.

A Security Token for GSM

The work on standardizing a security token for mobile equipment (or handsets) for the GSM system started in January 1988. The name of the token, the Subscriber Identity Module (or simply SIM), was there from the very beginning, though it was not quite correct as, in the end, it would only verify the identity of the subscription and only indirectly that of a subscriber. There were initially three proposals for a SIM: a fixed solution incorporated into the mobile equipment, a smart card the size of a credit card already used in an existing analogue network, and something called a Plug-in SIM.



First SIM card for first GSM call in Finland, Courtesy of Giesecke+Devrient.

The fixed solution

The fixed solution meant incorporating all the security into the mobile equipment. Network operators had their own specific authentication algorithms and keys unique to each subscription. A fixed solution would require a (standardized?) loading mechanism for the algorithm and keys, as well as a mechanism for replacing such an algorithm or the original key. Storing secret information like keys and algorithms somewhere in the memory or software of a mobile equipment was a major concern. How could the network operator be assured of the security of its secret information? A fixed solution was not considered feasible at the time, and it would have also constituted a trade barrier for mobile equipment.

A credit card type-but what size?

The idea of a credit card-type SIM was quite popular with some operators in the early days when mobile phones were the size of a brick. It was thought that subscribers might have a SIM but no phone, and this SIM could also serve as an (embossed) credit card.

Well, this never materialised and the dramatic reduction in handset size meant that it was the third format, the Plug-in SIM, that became the 'standard' type. It was the same as the credit card-type SIM except for its smaller size of 15 mm by 25 mm.

By repeatedly cutting away 'excessive' plastic, the third and fourth form factors – better known as the micro-SIM and Nano-SIM, respectively – emerged. With the latter, the miniaturization of the SIM card had reached its peak – it could not be made any smaller without making changes to the physical interface.

Evolution

Towards the very end of the last millennium, ETSI had started to work on a smart-card platform called the UICC.

The idea was to separate the basic functionality and security features from the applications so that different applications such as the SIM (and others, e.g. those used for payment or identity purposes), could reside side by side on the same platform.

© ETSI

When 3GPP was founded, an agreement was reached whereby the work on this smart-card platform already started by ETSI would stay with ETSI (TC Smart Card Platform was founded for this purpose) and only the specific application part, the SIM application, would move to 3GPP. During further development of the UICC, the idea of a fixed UICC (SIM) underwent something of a revival.

In 2010, *TC SCP* specified a solderable UICC for M2M purposes. Instead of being embedded into a piece of plastic, the chip containing the UICC was soldered onto a PCB.

The idea of a general-purpose embedded UICC (an eUICC) was proposed by TC SCP around the same time and was subsequently adopted by the GSMA as the basic concept for an eSIM.

The future is now: *Smart Secure Platform*

These days, TC SCP is still enhancing the UICC platform by, for instance, specifying the use of the UICC NFC interface for UWB applications. However, the main work performed by TC SCP is the specification of a new, Smart Secure Platform called SSP. This new development provides an open platform for multiple applications with various physical interfaces and form factors, a new flexible file system and built-in capabilities to support several authentication methods, as well as features such as the Toolkit or the contactless interface defined for the UICC. SSP is a highly secure, scalable – and therefore cost-efficient – solution optimized to address many requirements, from IoT applications to complex solutions. One of the five specifications already published deals with the Secure Element as part of a System on Chip (SoC) solution. A test specification for this has also been published.

One of the main reasons for the success of GSM was the availability of a secure token, the SIM (UICC), which made the development of handsets independent of operator specific needs in that respect. This together with a complete set of test specifications ensured interoperability thus providing a nearly global market. This is summarized in a slogan from the early days:

Every SIM in every handset in every network – worldwide.

■ *Klaus Vedder, ETSI TC SCP Chair.*

From GSM to 3GPP

ETSI standards go global!

GSM was a roaring success in Europe with roaming agreements firmly established and the common use of 900MHz and 1800MHz but that was not enough for ETSI….

The beginnings

In the mid-1990s the PCS1900 phenomenon became fully established in the United States, with 3 different technologies deployed, one being GSM, but using 1900MHz instead of 900 or 1800. Manufacturers started talking about putting all three bands into one phone – the so-called tri-band handsets that would enable roaming across Europe and the United States.

Yet this was not enough for ETSI and the GSM community, so they started talking to their counterparts in Japan and Korea to see whether further advances could be made in global harmonization. Japan and Korea had already deployed narrowband Code Division Multiple Access (CDMA) systems based on the systems first deployed in the US but they were missing the detailed roaming and international working capabilities of GSM and the phones were not interoperable with European systems.

3G foundations

The mobile industry was developing ideas around Future Public Land Mobile Telecommunications Systems or FPLMTS that would become the foundation for 3G, the ideal opportunity for a system and mobile phones with near-worldwide capacity. ETSI's SMG5 had started to prepare specifications that would improve the radio interface, giving much faster speeds than 2G but keeping the same core network with all the interconnectivity and roaming facilities already enjoyed across many countries. Far eastern countries who were used to CDMA wanted a new, wider band version to give higher speed. ETSI agreed to work on Wideband CDMA but it became clear that there was a political need for a new organization to promote collaborative working between regions.

3GPP was born

So, the idea of a Third Generation Partnership Project was born. ETSI would be the European Partner and would work together with its counterparts from the US, Japan and Korea.

Delegations from these regional standards making bodies met in Sophia Antipolis in December 1998 to set out the key parameters of the 3GPP. Decisions included that standards work would be based on the model already used by ETSI for GSM, and there would be four Technical Specifications Groups developing Radio, Core, Terminals and System Aspects. To ensure a regional balance, leaders of the groups were elected from across the original partners.

The target was to produce implementable standards within a year. All the partners worked very hard to achieve this Release 99, despite the organization being so new, with a final version approved in March 2000.

This was an incredible achievement initiated by ETSI, with engineers coming from different backgrounds to create a worldwide standard for anyone, anywhere, providing communications using voice, text and data. It offered the first mobile video calling technology and laid the foundations for the multimedia phenomenon that is used worldwide today on the vast majority of smartphones!.

■ *Kevin Holley, BT, 3GPP lead delegate.*

Sustainability Through IoT and Standardization

Six years after the United Nations formalized its Sustainable Development Goals, the topic of sustainability is firmly on the agenda of governments, corporations, and the general population. To meet this requirement, oneM2M launched a sustainability initiative.

IoT as an Enabler for Sustainability

The U.S. General Services Administration operates with a 'Strategically Sustainable' focus. In Europe, there have been calls for more sustainable and durable goods while China has major plans to "go green". Business leaders now view sustainability as a means of driving the new competitive advantage.

The growing proliferation of IoT devices and sensors represents a fundamental building block in reaching sustainability goals. There are, of course, other complementary technologies ranging from mobile network connectivity to advances in artificial intelligence and machine learning. However, what is required is a framework for interworking diverse IoT systems and technologies. Ideally, this would be based on an open and extensible standard that will promote economies of scale and adapt to new use-case requirements and future innovation.

Since 2012, oneM2M has undertaken important work on its horizontal architecture, which provides a framework for any-to-any interactions in scalable IoT systems. That means devices can communicate data to monitoring and decision-making applications, while system designers can mix and match components from different vendors.

oneM2M's horizontal architecture also provides a reusable way for different industry verticals and the developer community to build interoperable IoT systems. This is the foundation for collecting and sharing data at scale and to do so in an interoperable manner across compartmentalised silos and organizational boundaries.

oneM2M Sustainability Initiative

In response to strong member support, oneM2M recently launched a *sustainability initiative* with activities focused on three areas. The first focus area is to drive conversations and promote ideas that illustrate the impact of IoT on sustainability.

The second focus aims to help developers build IoT systems based on sustainability principles. These include interoperability, scalability, modularity, and re-use principles which are also fundamental to the oneM2M standard. The initiative emphasizes replicability to make it easy for users to borrow from oneM2M use cases and deployments that deliver on the sustainability agenda.

The third focus area relates to capabilities within the oneM2M technical specifications that help developers build sustainable features into their solutions. oneM2M provides a standard way to gather and send data without devices needing to be constantly on and polling the network, which is a boon for energy efficiency. oneM2M also addresses the deployment of IoT systems that combine new assets and legacy infrastructure. This preserves the value of installed systems that are still operational before their end-of-life cycle.

■ *Dale Seed, oneM2M Technical Plenary Vice Chair, Convida Wireless.*

A personal journey:
from CEPT to ETSI and back to CEPT

When I started as an engineer in a Spectrum Management Organization in 1977, I quickly became aware of the basic rules of those days: private use of radio was only allowed when necessary and for business purposes; the only relevant exception was amateur radio. The future would bring a lot of changes.

From CEPT to ETSI

At the end of the 70's, the state-owned PTTs (postal services and telecommunications) were privatized and spectrum management laid in the hands of member states. When the first cellular mobile systems were launched, it became clear that spectrum harmonization would be key. Therefore, in 1982 *CEPT* decided to create a pan-European mobile communication system and allocated the 900 MHz band to mobile services. The standardization work was carried out within a newly founded group called 'Groupe Spécial Mobile' (GSM). In June 1987, when the Commission of the European Communities issued its 'Green Paper' on the development of the common market for telecommunications services and equipment, CEPT took the initiative to create a European telecommunications standardization institute within its own organization, noting that it should not be an intergovernmental organization. In the end, ETSI was created in 1988 as an autonomous not-for-profit association and all standardization work on GSM was transferred to ETSI.

Radio spectrum management

Alongside its Working Group GSM, CEPT managed the WG Radio Equipment and Systems (RES).

About a year later, RES was transferred to ETSI to avoid endangering progress made in the work underway (now TC RES). I describe this transfer not as an unfortunate divorce but as 'Living Apart Together', as collaboration remains strong between both organizations.

CEPT created its European Radiocommunication Committee (ERC, now ECC). CEPT/ERC Decisions would replace the Recommendations where possible, with the objective being to increase the commitment of administrations. Early examples of CEPT/ERC Decisions included frequency bands for GSM, DECT, DSRR, TETRA and TFTS, which would become ETSI standards.

The European Commission steps in

Around 2000, the European Commission gave mandates to the CEPT Electronic Communications Committee (ECC) to develop Decisions as an input document for their EC Decisions with regard to the mandatory spectrum for EU Countries.

The EU harmonized spectrum was required to support related standards and vice versa. Since then ETSI TC RES and ERC Officials have met on a regular basis. In addition to GSM, a successful example of this collaboration was when CEPT, ETSI and the EU considered it crucial to have a spectrum available for a new generation of cordless telephones. As such, in 1987, CEPT founded a working group for a CEPT Recommendation on Cordless Telephones to be operated in the 1800 MHz band, which became the world-renowned ETSI DECT standard.

The ETSI TC RES, which I chaired from 1991 to 1997, soon had new standardization objectives and was split into 11 sub-technical committees and, later on, new Technical Committees, including TETRA and HiperLAN.

After working for ETSI's groups for 10 years, I returned to CEPT, and soon became Vice-Chairman of the ECC; in 2001 I was appointed to chair the ERC from 2001 to 2007. I could then continue to meet and collaborate with my ETSI colleagues to find the best way to standardize radio technologies.

■ *Chris van Diepenbeek.*

ETSI and O-RAN ALLIANCE cooperate to accelerate O-RAN adoption in Europe

An ever-increasing traffic demand and diverse applications needs require a new approach for the 5G era and beyond.

As an industry, we have been tremendously successful at building and operating massive, high-performance wireless networks based on global standards to deliver superb connectivity services to our customers. These network builds have traditionally relied on highly specialized radio access network (RAN) equipment with tightly integrated proprietary software. To cater for the ever-increasing traffic demand and diverse consumer and industrial applications requirements, a radically new approach is required for the 5G era and beyond.

A new approach for the 5G era

The solution is to make the mobile networks and the equipment that runs them more software-driven, open, virtualized, flexible, intelligent and energy efficient. The emergence of Open RAN therefore promises to unlock benefits from network programmability and automation for mobile operators, while stimulating a more vibrant RAN supplier ecosystem with faster innovation cycles to improve user experience.

In 2018, five operators, AT&T, China Mobile, Deutsche Telekom, Orange and NTT DOCOMO, came together to form the O-RAN ALLIANCE with the mission to re-shape the RAN industry towards more intelligent, open, virtualized and fully interoperable mobile networks.

The *O-RAN ALLIANCE* has since grown to become a global community of nearly 300 mobile operators, vendors and research institutions operating in the RAN industry. Today, there is very strong momentum behind Open RAN.

An open and intelligent virtualized RAN

The main body of O-RAN ALLIANCE's work is to generate an open architecture as the foundation for building virtualized RAN on open hardware and cloud, with embedded AI-powered radio control. It is made possible through standardized open network interfaces. 3GPP has been phenomenally successful in standards development. The O-RAN specifications fully support and are complementary to the 3GPP-based standards.

Similarly to 3GPP, the O-RAN ALLIANCE seeks to work with other leading global organizations to create a synergistic effort that will accelerate the development and adoption of Open RAN. ETSI has an outstanding global reputation as a Standards Development Organization and its work has contributed immensely to the digital landscape in Europe and beyond. A cooperation agreement between the O-RAN ALLIANCE and ETSI is therefore a very significant milestone on the Open RAN journey.

A common objective

We already share a wide cross-section of members and a common objective to perform and promote regional and international standardization. Through our cooperation, we can build on these foundations to align our mutual interests in the standardization process for interoperable Open RAN.

Open RAN will not emerge overnight. It will be deployed gradually with some interfaces and capabilities becoming available earlier than others. And there will be regional variations in the timing of Open RAN deployments. I am convinced that the coordinated efforts of the O-RAN ALLIANCE and ETSI will be an important catalyst for a vibrant Open RAN ecosystem contributing to a great digital future in Europe.

I look forward to working with you to make this happen.

■ *Dr. Alex Jinsung Choi, COO of the O-RAN ALLIANCE and SVP Strategy & Technology Innovation, DEUTSCHE TELEKOM AG.*

OSM Release TEN

ETSI OSM community has just launched a new release of its management and orchestration framework, OSM Release TEN

This new release, which coincides with the fifth anniversary of the ETSI OSM community, brings not only significant improvements in usability and stability derived from the learnings of latest OSM production deployments, but also new functionalities extending the capabilities of the system. These include brand-new support for Azure clouds, the possibility of distributing OSM's VNF Configuration and Abstraction module across multiple remote locations to secure special clouds and edge deployments. It also comprises more convenient means to use OSM's subscription API for NS and packages lifecycle events, and the ability of monitoring resource availability in different VIMs. These are just some of the new features that Release TEN is bringing to the OSM's user community.

Mitigation Strategy Report on Securing Artificial Intelligence

The ETSI SAI ISG has recently released *ETSI GR SAI 005*, a report which summarizes and analyses existing and potential mitigation against threats for AI-based systems. Setting a baseline for a common understanding of relevant AI cyber security threats and mitigations will be key for widespread deployment and acceptance of AI systems and applications. This report sheds light on the available methods for securing AI-based systems by mitigating known or potential security threats identified in the recent ENISA threat landscape publication and ETSI *GR SAI 004* Problem Statement Report. It also addresses security capabilities, challenges, and limitations when adopting mitigation for AI-based systems in certain potential use cases.

Procedures for trusted lists

The Technical Committee on Electronic Signatures and Infrastructures (TC ESI) has recently released ETSI TS 119 615. It specifies procedures for using and interpreting European Union Member States (EUMS) national trusted lists when validating EU qualified trust service outputs against them (e.g. validating EU qualified certificates, EU qualified time stamps, evidences created by qualified electronic registered delivery services, EU qualified validation reports on EU qualified electronic signatures or seals).

Trusted lists enable in practice any interested party to determine whether a trust service is or was operating in compliance with relevant requirements, currently or at a given time in the past (e.g. at the time the service was provided, or at the time at which a transaction reliant on that service took place).

EUMS Trusted Lists have a legal constitutive value. It is the single formal source to verify that a claimed EU qualified trust service provider and the claimed EU qualified trust service it provides are indeed granted an EU qualified status by the competent EUMS body.

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

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

September 2021

5G World, ExCeL
20-24 September, London and Virtual

ETSI is once again pleased to endorse and actively participate in 5G World, taking place as a hybrid event. Adrian Scrase, ETSI's CTO, will be among the speakers of the event.

MPLS SD & AI Net World Congress
28 September - 1 October, Virtual

ETSI is pleased to endorse this event. Emphasis will be given to network programming (programmability, functions on demand), 5G, SR and Self Healing networks (service assurance, closed loop automation, intent-based).

October 2021

NFV&MEC IOP Plugtests 2021
4-15 October, Virtual

In the context of the NFV Plugtests Programme, ETSI's Centre for Interoperability will provide NFV & MEC solution providers and open source projects an opportunity to discuss and self-evaluate online the level of conformance of their solutions, while they validate their implementation of NFV and MEC specifications and APIs.

Broadband World Forum
11-15 October, Amsterdam and Virtual

ETSI is pleased to endorse the Broadband World Forum. This event continues to be the go to- event for the broadband access community, driving broadband access, technologies and strategies. ETSI F5G ISG will host a session on the Partner Stage workshop at this event.

UCAAT
19-21 October, Virtual

Join us for the annual ETSI User Conference on Advanced Automated Testing (UCAAT). The event is dedicated to the practical engineering and application aspects of automated testing, including experiences from the use of new techniques for test automation, advanced test automation processes, and standardized testing languages and methodologies for test automation in different application domains, such as IT services, telecommunications, transportation, healthcare, finance, and smart cities.

ETSI SNAPSHOT

916 *members*

27% *SMEs*

+130 *technical groups*

536 *standards* March-May2021

697 *standards under development*

2.167 *standards' downloads* March-May2021

1.703 *eMeetings* March-May2021

60.557 *online participants* March-May2021

83 *partnerships*

17 *conferences & Plugtests* March-May2021

@ETSI Secretariat

126 *people*

17 *nationalities*

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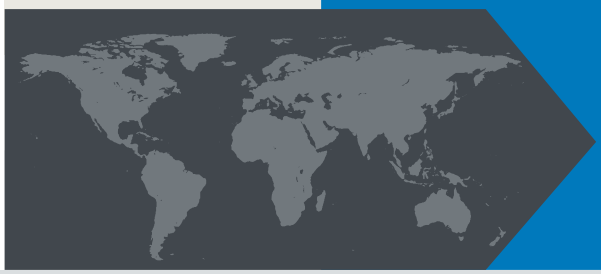

Members from 64 countries

About ETSI

ETSI provides members with an open and inclusive environment to support the development, ratification and testing of globally applicable standards for ICT systems and services across all sectors of industry and society. We are a not-for-profit body with more than 900 member organizations worldwide, drawn from over 60 countries and five continents. Members comprise a diversified pool of large and small private companies, research entities, academia, government and public organizations. ETSI is officially recognized by the EU as a European Standards Organization (ESO).

For more information please visit: *www.etsi.org*

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