Summer 2025

EURESCOM message

The magazine for telecom insiders

CELTIC News 1/2025

CELTIC-NEXT

Critical Infrastructures

The Kennedy perspective

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Cover Theme

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Advancing EU-Japan Digital Collaboration with the INPACE "EU-Japan Digital Week 2025"

CELTIC-NEXT

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CELTIC-NEXT Autumn Call 2025 for Project Proposals – Deadline: 24 October 2025

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CELTIC-NEXT projects are collaborative private-public partnership R&D projects. All EUREKA member countries and associated countries can financially support them. More information on public funding and national contacts per country can be found on the CELTIC-NEXT Public Authorities Website. Please talk to your national contact early in the process.

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Preparing and submitting a CELTIC-NEXT project proposal is easy. Just register via the CELTIC-NEXT online proposal tool, fill in the Web forms, and upload your proposal in pdf.
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Benefits of participating in CELTIC-NEXT

- You are free to define your project proposal according to your own research interests and priorities.
- Your proposals are not bound by any call texts, as long as it is within the ICT/telecommunications area see: CELTIC-NEXT Scope and Research Areas.
- CELTIC-NEXT projects are close to the market and have a track record of exploiting their results soon after the end of the project.
- High-quality proposals have an excellent chance of receiving funding, with an average success rate higher than 50 %.
- The results of the evaluation will already be known in January 2026.

If you have any questions or need help, do not hesitate to contact us; we would be pleased to support you.

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Dear readers,

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Recently, a widespread blackout affecting Spain, Portugal, and parts of southern France has brought critical infrastructure and public services to a standstill, underscoring the vulnerability of interconnected systems. The recent blackout highlights the strategic importance of Europe's investment in a secure, interoperable communications infrastructure. Resilient systems must be designed and deployed to enable emergency services to transmit voice and data seamlessly and securely across national boundaries—ensuring coordinated response efforts, even when conventional networks are disrupted.

Critical infrastructure forms the backbone of modern society. It includes the essential systems and assets—such as energy, transportation, communications, and digital networks—that enable nations to function effectively and securely.

In an increasingly interconnected and digital world, the resilience and adaptability of critical infrastructure is more vital than ever. As emerging technologies like 6G, AI, and smart grids reshape our lives, ensuring that these foundational systems remain secure, sustainable, and reliable is not just a necessity—but a societal imperative as presented in the Kennedy's perspective.

The **EU Connectivity initiative, through the Connecting Europe Facility (CEF) – 5G for Transport Corridors** aims to establish high-speed, low-latency connectivity across national borders, enabling the next-generation of automated and connected vehicles across various modes of transport. This cross-border digital infrastructure is essential to advancing Europe's smart mobility agenda and enhancing the resilience in transport networks.

The recent research and innovation towards the needs of public safety has led to a higher priority to establish the **European Critical Communication System (EUCCS)** by 2030, which will be laid on LTE and 5G. Several programs and projects are presented in the article on Realising the Public Safety Vertical – The European Critical Communication System (EUCCS).

Modernization and protection of critical infrastructure is essential for enabling long-term growth, protecting communities, and enhancing global competitiveness. SUSTAIN-6G project is focused on integrating sustainability into the development of 6G communication technologies, it aims to align technological advancements with environmental goals enhancing the synergy between 6G and vertical use cases to minimize negative environmental impacts. In the article **Powering the Future: The Smart Grid transformation for a sustainable tomorrow**, the essential role of information and communication systems in Smart Grids is presented.

The use of large language models (LLMs) across sectors is growing, driving widespread adoption for next-generation services and digital ecosystems. At the core of this transformation lies data, now recognized as a strategic asset and a pillar of **critical infrastructure**. Its availability, integrity, and intelligent use are increasingly vital in building a **Secured Platform in the project PAROMA-MED**.

In the article **"From Under the Sea to Space: Critical Digital Infrastructures for Global Connectivity"** Program Manager Adam Kapovits from Eurescom shares his experience and perspective on the technologies for connectivity, Vulnerabilities and incidents and what needs to be changed in modern times in the global undersea connectivity infrastructure to improve resilience. Finally, he paints a picture on how satellite communication can be a solution to some of the problems.

Investing in the modernization and protection of critical infrastructure is essential for enabling long-term growth, protecting communities, and enhancing global competitiveness. By fostering collaboration between governments, industry leaders, and innovators, we can build infrastructure that not only withstands today's challenges but also supports a more resilient, inclusive, and technologically advanced future, not only for innovation and competitiveness, but also for ensuring the resilience and functionality of essential societal systems in an interconnected world.

Additionally, Eurescom co-ordinated and participated projects presented demostration at high profile event like Mobile World congress, reaffirming our dedication to driving advancements in next-generation communication technologies, with a focus on 6G by engaging in collaborative workshops, panel discussions, and strategic initiatives.

My editorial colleagues and I are confident that you will find valuable insights in this edition of *Eurescom's Message*. We warmly welcome your feedback on the current issue and invite your suggestions for topics to explore in future editions.

Happy reading!

EVENTS CALENDAR

10 – 13 June 2025
The 33rd Mediterranean Conference on Control and Automation
Tangier, Morocco
https://med2025.org/

1 – 3 July 2025
Berlin 6G Conference
Berlin, Germany
https://www.6g-plattform.de/berlin-6g-conference/

2 July 2025
Strategic Digital Dialogue: Aligning EU–Japan Research and Innovation Ecosystems
Enabling Technological Sovereignty and Innovation through Strategic Partnership
Osaka Expo 2025, Japan
https://inpacehub.eu/

21 – 22 October 2025
NEM Summit
Berlin, Germany
https://nem-initiative.org/

28 – 30 October 2025
INPACE Second Symposium
Singapore City, Singapore
https://inpacehub.eu/

22 – 23 October 2025
5G Techritory Forum
Riga, Latvia
https://www.5gtechritory.com/

6 – 7 November 2025
13th FOKUS FUSECO Forum
Berlin , Germany
https://www.fokus.fraunhofer.de/en/ngni/events/fuseco-forum_2025.html

8 – 12 December 2025
IEEE Global Communications Conference
Taipei, Taiwan
https://globecom2025.ieee-globecom.org/

SNAPSHOTS

From vision to collaboration: Experts share their insights on building strong European consortia during the UKTIN Horizon and International Engagement panel.

At the UKTIN International and Horizon Engagement Conference, held on December 4th at the Royal Academy of Engineering in London, industry leaders and policymakers explored how international collaboration can boost innovation and drive investment into the UK.

Further information

- The UKTIN International & Horizon Engagement Conference: *https://uktin.net/whats-happening/news/uktin-international-horizon-engagement-conference*

WiTaR members postcard 2025 Celebrating International Women's Rights Day with the Accelerate Action Movement.

On International Women's Day 2025, the Women in Telecommunications and Research (WiTaR) 6G-IA Working Group proudly joins the global movement to #AccelerateAction toward gender equality. While women are making impactful strides in shaping the future of telecommunications, including innovations in 6G, representation remains low.

Further information

- WiTaR webpage - *https://6g-ia.eu/witar/*
- International Women's Day - *https://www.internationalwomensday.com/Theme*

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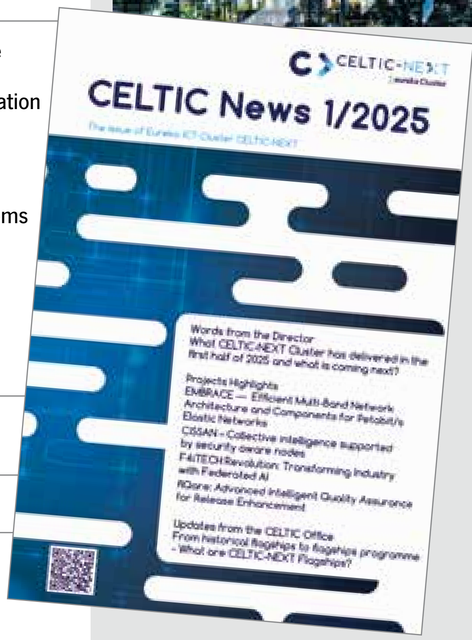

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The need for Critical Infrastructures

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As we grow up, the lucky ones are surrounded by critical infrastructures in the nicest sense. I mean that their parents and family are there to let them know right from wrong, bring them back into line when juvenile behaviour got a bit out of control and generally provide good societal membership guidance. Grandparents are probably the best for giving constructive criticism, sometimes quite direct, without getting involved in the ongoing parent-child power struggle.

Generally, you can add to your values as you grow and develop through education, life experience and surviving the rough parts of life, to become a good balanced member of society. At this point you should be providing the constructive critical support infrastructure to your friends, junior colleagues and offspring and so it goes on.

New Need for "Critical" Infrastructures

Part of the societal problem today is that the information age has enabled us to have access to so much news, entertainment, & live events from all around the world that we are having a hard time contextualizing it and keeping it all in perspective. When you see headlines about kidnappings and shootings every day it is easy to think that they are normal occurrences.

When your news sources deliberately exaggerate negative news to get "clicks", they are feeding our fears and contributing to a model where we think the world is a dangerous place. I saw headlines recently that car theft was 20% up in Germany. On checking there were about 15,000 cars stolen from a national fleet of 49 million cars. So statistically, your chances of getting your car stolen is not much greater than 1:3200. The point being that the headline made me worry a lot more than the actual figures.

The example is trivial, but recent global politics has shown it is now possible to fool some of the people for all of the time, and more dangerously to fool all of the people for some of the time. A lot of damage can be done in the that time. This is why we need help from our infrastructures to stop the flow of misinformation and teach people how to critically evaluate the data they receive.

My idea for Critical infrastructures?

My idea of Critical infrastructure is to use our future information highways to educate and support. Mark Twain wrote, "Travel is fatal to prejudice, bigotry, and narrow-mindedness, and many of our people need it sorely on these accounts. Broad, wholesome, charitable views of men and things cannot be acquired by vegetating in one little corner of the earth all one's lifetime."

I believe that our information network has the capability to allow people to learn, to experience new cultures, and to entertain themselves virtually. But it has to be secure and safe too. For this we need to ensure the information highway is kept safe by good people, with an altruistic interest in really helping the world. We somehow are repeating the history of the highways – first cars were not understood, then they had lots of freedom, then they got regulated for the common good.

Now we need to understand if we can teach AI to be the good policeman in the infrastructure.

EU Connectivity with the Connecting Europe Facility-Digital Programme

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5G Corridors in the European transport paths

Imagine travelling across European borders in a connected car, seamlessly switching between national networks without a single glitch in your navigation, streaming and other infotainment, or vehicle-to-everything (V2X) communication. No buffering, no dropouts—just smooth, intelligent mobility. Not only in cars, but also in trains, river and sea vessels and barges. That's the promise of the 5G for Transport Corridors topic under CEF Digital programme: high-speed, low-latency connectivity stretching across national frontiers to power the next generation of automated and connected vehicles in different transport modes.

A total of €93 million have been awarded for 25 projects in this area since the beginning of CEF Digital.

Two successful live demos from the first wave of CEF Digital-funded 5G Corridors have taken place: 5G SEAGULI [1] in April and 5G DELUX [1] . These projects focus on seamless, uninterrupted connectivity for connected cars, covering platooning and mission critical services experiences, as well as Public Land Mobile Network (PLMN) handover solutions for Voice over LTE (VOLTE) A third demo from the project 5G NETC [2] will take place in early June 2025.

As is the case for NETC, train connectivity is also a focus of some 5G Corridors projects. For example, 5G4RailScand [1], from the second wave of deployment projects, is exploring 5G applications' co-existence with the first deployments of passive infrastructure for Future Railway Communication Systems (FRMCS). The topic is also covering seamless 5G connectivity in river navigation, e.g. in the project 5G Estuary [1], where the objective is to enable innovative technologies for inland water transport, enhancing operational efficiency, and supporting the transition to smarter, automated, and sustainable shipping solutions.

As Europe accelerates toward a future of intelligent, interconnected mobility, 5G Corridors are laying the digital tracks, roads, and waterways that will power it. From highways to high-speed rail, from river routes to sea lanes, the seamless, ultra-fast connectivity enabled by CEF-Digital is more than a technical upgrade—it's a transformation. One where borders fade, innovation flows, and the transport of tomorrow becomes a reality today. Stay tuned—the journey is just getting started.

Ensuring access to a fixed gigabit network to all EU citizens

Access to backbone connectivity varies significantly across the EU, and in some regions, inadequate connectivity can hinder the development and performance of access networks. Fortunately, through the EU funding programme CEF-Digital, the topic of Digital Global Gateways [3] plays a crucial role in bridging these connectivity gaps by supporting infrastructure development in regions where market forces alone are insufficient.

Moreover, ensuring the robust quality and resilience of the networks within Europe and beyond is crucial for the EU's digital sovereignty, as it enables the EU to maintain control over its digital infrastructure and ensures the integrity of its data.

Considering growing cybersecurity threats and the risk of attacks on this critical infrastructure, the European Commission published a *"White Paper on how to master Europe's digital infrastructure needs?, a Recommendation"* [4] on the security and resilience of submarine cable infrastructures and an *"Action Plan on Cable Security" [5]* recognising the need to safeguard submarine cables in February 2024. In addition to strengthening national cybersecurity frameworks, the EU is fostering collaboration between Member States to improve coordination and ensure the protection of submarine cable infrastructure. The Commission has also established an Expert Group to guide these efforts, aiming to assess risks, improve information sharing, and enhance the maintenance and repair capacity of these essential cables.

The EU's comprehensive approach seeks to bolster the security and resilience of submarine cables, ensuring they remain protected against evolving threats while supporting the region's digital economy.

To date, CEF-Digital programme has awarded €420 million in grants to 51 backbone connectivity projects. The EU is currently co-funding marine surveys and cable deployment projects in regions such as the Arctic, the North and Baltic Seas, the Caribbean, the Atlantic Ocean, the Mediterranean Sea, as well as cables connecting the Canary Islands, the Azores and Madeira. The programme also co-funds terrestrial connectivity for instance in Finland and Poland, as well as a satellite teleport on the islands of Wallis and Futuna.

Further information

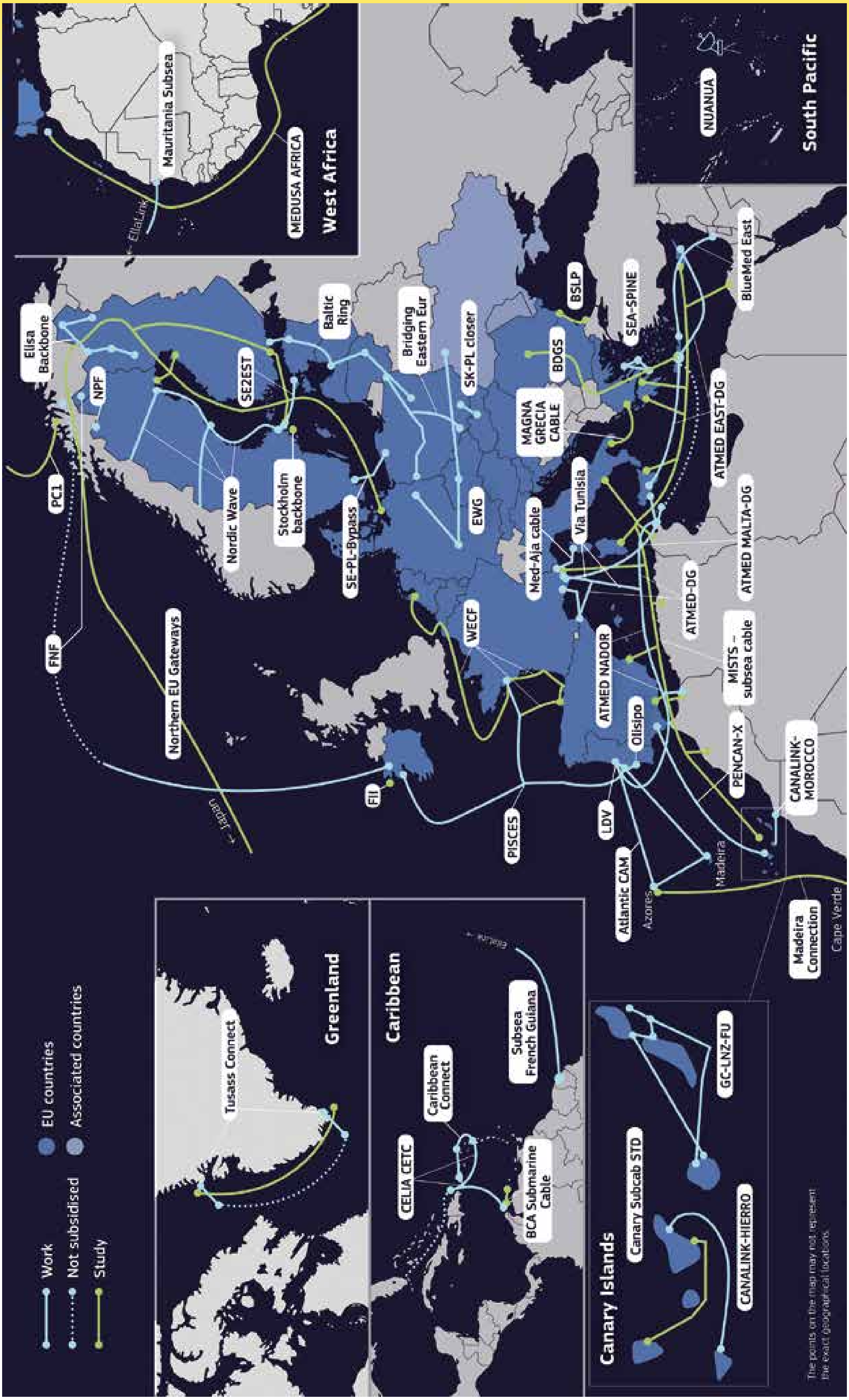
[1] Projects information:
https://guide.5gcorridors.eu/cef-digital-projects/

[2] 5G NECT Video:
https://www.youtube.com/watch?v=GKSiPFQACxg

[3] Digital Global Gateways:
https://hadea.ec.europa.eu/programmes/connecting-europe-facility/about/backbone-connectivity-digital-global-gateways_en

[4] White Paper on how to master Europe's digital infrastructure needs?, a Recommendation:
https://digital-strategy.ec.europa.eu/en/library/white-paper-how-master-europes-digital-infrastructure-needs

[5] Action Plan on Cable Security:
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52025JC0009



Projects co-funded by Connecting Europe Facility Digital in Backbone Networks.

Realising the Public Safety Vertical – The European Critical Communication System (EUCCS)

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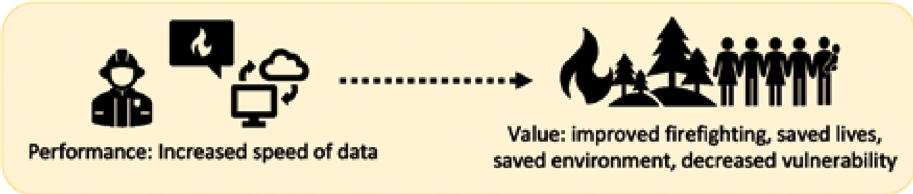
This article explains the outcome of recent research and innovation towards the needs of public safety which has lead to a high priority now driven by EU Policy. This works in the medium term to establish the European Critical Communication System (EUCCS) by 2030, which will be founded upon LTE and 5G. The opportunity is then open for research and innovation of smart networks and services today, to be adopted by EUCCS national hosts, towards 2035, 2040 and a continuous beyond.

Our safety and security first responders must have the best mobile communication services, better than bad actors, building our societal resilience against those who want to disrupt our European society.

The BroadX programme, laying the foundation for EUCCS policy

The following projects are lead by Public Safety Communication Europe (PSCE) Forum [1], partnered with Ministries and/or their delegated agency, responsible for public safety communication in their country. Currently 17+ governments are represented on a technical level, with experts from all EU and Schengen member states involved in the work towards preparing EU Regulation to establish EUCCS by 2030.

- BroadMap (2016-2017)[2]
  Project ID 700380
- BroadWay (2018-2023)[3]
  Project ID 786912
- EUCCS Preparation (BroadEU.Net) (2024+) [4] – DG Home Internal Security Fund
  - Stage 1 : ENLETS2.0 WP3 (2022-2024)
    Project ID 101055498
  - Stage 2 : BroadEU.Net_Stg2 (2023-2025)
    Project ID 101145863
  - Stage 3 : EUCCSPrep_Stg3 (2025-2026)
    Project ID 101228522



The EUCCS Preparation programme continues in a close-to-deployment pre-commercial mode. Joint procurement of 15 Ministries/agencies of 15 countries has contracted Airbus, Frequentis, Leonardo and Teltronic to deliver Mission Critical services for administration by a maximum of 12 countries, to trial technical aspects of interconnection between MCX services to allow responders from different countries to enable Operational Mobility.

The Operational Procedures team includes responders of all disciplines from across Europe to evaluate:

- Is this what we actually need?
- Does it work? Can we use it?
- Will EUCCS help us or hinder us?
- What Operational Procedures will we need?

6G4Society[5] and FIDAL SNS-JU projects

With public safety addressing a societal need, the 6G4Society supports this, with the consideration towards understanding key values that innovative technology addresses. The FIDAL project[6] carries our Field trials beyond 5G, in the context of two verticals Public safety and media. 3 advanced testbeds are located in Greece, Spain and Norway.

3 workshops have taken place 2022-2024 resulting in 2 papers that help steer the preparation towards EUCCS:

- What Connectivity to Improve PPDR?[7]
- What Security in Future Communication?[8]

SNS-JU Verticals – Technical Justification vs Need

The concept of vertical sector in 5G/6G research and standards draws a focus to understanding the needs of a particular market space in order to understand technical requirements. This then defines a reference point for technical research and innovation. In the 5G-PPP programme, the focus was on advancing technical Key Performance Indicators (KPI's). This made a distinct target for technical R&I but misses the impact towards vertical needs. This appears to continue onwards into the Horizon Europe Smart Networks and Services programme, but with a new consideration of Key Value Indicators (KVI's). Understanding Key Values helps to understand the qualitative, and non-economic, view of new technology advances of Smart Networks and Services; in this case towards the key value of e.g. safety in our society.

This image provides an example of a Key Value. The importance is to understand how the increased speed of data contributes to the Value. This can only be understood by involvement of different views from those who take part in different roles in firefighting and associated safety preserving roles. Its crucial to understand why this value is improved by an innovative system that can transfer data faster.

The technical work towards 5G, and now 6G, has run in parallel to the work to defining the need, and towards establishment of EUCCS.

Towards EUCCS

The Mission Critical Communication Expert group (MCCG), lead by EC DG Home, is currently preparing an Operational Plan to define actions for each member state towards their national deployment of Mission Critical services and interconnect towards establishment of EUCCS. This includes enhancement to ETSI and 3GPP standards, and for steps towards the adoption of new innovations beyond the initial establishment of EUCCS. This includes the requirement for a testbed to evaluate new innovations, before national and pan-European adoption can be funded and facilitated.

EUCCS Policy Context

The following identifies the policy towards establishment of EUCCS

- The European Commission DG Home, established the Mission critical Expert Group (MCCG)[9], May 2023.
- EUCCS was first publicly explained in the Digital Infrastructure White Paper, February 2024 - How to master Europe's digital infrastructure needs?[10]

- President von der Leyen’s Political Guidelines for the next European Commission 2024–2029[11], July 2024
- Mission Letter for Magnus Brunner[12], new Commissioner for Home Affairs, October 2024
- Sauli Niinnisto, ‘Safer Together: Strengthening Europe’s Civilian and Military Preparedness and Readiness’[13], November 2024.

Conclusion

This article introduces the EUCCS which will be established by 2030, which identifies the target for current and future innovation that will enhance response capabilities of public safety first responders. The foundational projects are identified together with the policy context.

The BroadWay trial in Malaga, Jul 2020. 50 responders from all disciplines from across Europe, working together to evaluate the value of the 3GPP Mission Critical Services towards the realisation of the Operational Mobility capability.

For further information, please contact the author.

References:

[1] Public Safety Communication Europe (PSCE). Available at: *https://www.psc-europe.eu*

[2] EUCCS BroadMap Project. Available at: *https://euccs.eu/broadmap/*

[3] EUCCS BroadWay Project. Available at: *https://euccs.eu/broadway/*

[4] European Critical Communication Society (EUCCS). Available at: *https://euccs.eu*

[5] 6G4Society Project. Available at: *https://6g4society.eu*

[6] FIDAL-HE Project (Future Internet for Disasters and Lifesaving). Available at: *https://fidal-he.eu*

[7] PSCE. (2023). "Connectivity for Public Safety Communications – Infographics." Available at: *https://www.psc-europe.eu/wp-content/uploads/2023/11/PSCE-Connectivity-infographics_V26.09.pdf*

[8] PSCE. (2024). "What Security in Future Communication?" Report. Available at: *https://www.psc-europe.eu/wp-content/uploads/2024/12/WHAT-SECURITY-IN-FUTURE-COMMUNICATION-4.pdf*

[9] European Commission. Expert Group on Broadband Communication Systems for Public Safety (E03526). Available at: *https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=3908*

[10] European Commission. (2023). White Paper: How to Master Europe's Digital Infrastructure Needs. Available at: *https://digital-strategy.ec.europa.eu/en/library/white-paper-how-master-europes-digital-infrastructure-needs*

[11] European Commission. "President-elect Ursula von der Leyen." Available at: *https://commission.europa.eu/about-european-commission/president-elect-ursula-von-der-leyen_en*

[12] European Commission. (2024). Mission Letter to Commissioner Brunner. Available at: *https://commission.europa.eu/document/download/ea79c47b-22f8-4390-a119-5115dc40fc3e_en?filename=Mission%20letter%20-%20BRUNNER.pdf*

[13] European Commission. (2024). Niinistö Report on Europe's Future Infrastructure Needs. Available at: *https://commission.europa.eu/document/download/5bb2881f-9e29-42f2-8b77-8739b19d047c_en?filename=2024_Niinisto-report_Book_VF.pdf*

Acknowledgement:

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BroadWay trial in Malaga, July 2022.

Powering the Future: The Smart Grid transformation for a sustainable tomorrow

The essential role of information and communication systems in Smart Grids

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Introduction

Critical infrastructures are vital to the functioning of a society and economy. These include sectors like energy (electricity, oil, gas), water supply, transportation, healthcare, communication, finance, food supply, and government services. If these infrastructures were disrupted or damaged, it could have severe consequences within society, impacting national security, public safety, and the economy. The protection of such infrastructures is becoming more important due to growing technological dependence, increasing threats (like cyberattacks and climate change), global interconnectivity, and the need to maintain economic and social stability.

In the energy sector, traditional power grids were primarily designed for one-way energy flow, delivering electricity from centralized power stations to consumers without mechanisms for feedback or interaction. This unidirectional system has limited real-time monitoring capabilities, relying on manual processes for system assessment and issue resolution. Communication within traditional grids is primarily serving operational control purposes. Control over the grid is centralized, with limited involvement from consumers in energy management decisions. Additionally, these grids are typically designed for centralized power generation, making it challenging to incorporate distributed energy sources such as solar panels, as well as wind energy plants and power storage solutions like batteries and electric vehicles. The infrastructure often lacks the adaptability to respond dynamically to changing energy demands or supply conditions.

The introduction of massive local production with renewable generation at the distribution level and the arrival of new usage with the electric vehicle and heat pumps revolutionize the way the grid needs to be handled.

Smart grids utilize digital technology to facilitate two-way communication between utilities and consumers, enabling dynamic energy management. This bidirectional flow allows consumers to adjust their energy usage based on real-time pricing and demand signals, promoting efficiency and cost savings. Smart grids are equipped with advanced sensors and monitoring systems that provide real-time data, enhancing the ability to detect and respond to system anomalies promptly. The enhanced communication infrastructure supports sophisticated data analytics, enabling proactive maintenance and optimization of grid operations. Control within smart grids is more distributed, empowering consumers to participate actively in energy decisions, such as adjusting consumption patterns or integrating renewable energy sources. The infrastructure's flexibility allows for the seamless integration of renewable energy sources, supporting a diverse and resilient energy mix. Smart grids also feature self-healing capabilities, automatically rerouting power to avoid affected areas during outages. This improves reliability, reduces downtime and consequently contributes to greater grid stability. Furthermore, robust cybersecurity measures are integral to smart grids, protecting against potential cyber threats and ensuring the integrity of grid operations.

The role of ICTs in the smart grid domain

Information and Communication Technology (ICT) is fundamental to the operation and advancement of smart grids, serving as the backbone that supports their enhanced efficiency, reliability, and sustainability. By integrating ICT, smart grids can effectively manage the complexities of modern energy systems.

One of the primary roles of ICT in smart grids is enabling real-time monitoring, communication and control. Advanced sensors and communication networks allow for continuous surveillance of grid operations, facilitating prompt detection and response to anomalies, which enhances grid stability and minimizes service disruptions.

Moreover, ICT plays a crucial role in data management and analytics within smart grids. The vast amounts of data generated by smart meters and sensors are processed through sophisticated ICT systems to forecast energy demand, optimize distribution, and identify potential issues before they escalate.

Enhanced interoperability is another significant benefit of ICT in smart grids. Smart grids consist of diverse systems and devices from multiple vendors. ICT ensures these components can communicate and function together seamlessly, achieved through standardized data models and communication protocols.

The integration of renewable energy sources is facilitated by ICT, which manages the variability of sources like solar and wind, ensuring a stable and reliable energy supply. This capability is essential for reducing greenhouse gas emissions and promoting sustainable energy practices.

ICT also supports demand response management by enabling real-time communication between utilities and consumers. This interaction allows for dynamic pricing and load balancing, where consumers adjust their energy usage based on price signals, contributing to grid stability and efficiency.

As critical infrastructure, smart grids require robust cybersecurity measures to protect against potential threats. ICT systems implement encryption, secure authentication, and continuous monitoring to safeguard grid operations, ensuring the integrity and reliability of the energy supply. It also requires ICT technologies that are resilient and long lasting since the timeline of Utilities projects are in tens of years.

Smart grids: Towards an ecosystem of heterogeneous energy sources © Siemens

Finally, ICT infrastructures provide scalability and flexibility, allowing smart grids to adapt to evolving technologies and increasing energy demands. This adaptability ensures long-term sustainability and resilience, accommodating future advancements in energy generation, distribution, and consumption.

ICT integration into smart grid domain and its implications on sustainability

While the integration of ICT in the domain and systems of smart grids enhance aspects of sustainability (e.g. facilitating the integration of renewables), ICT itself brings certain impacts on sustainability on its own. Achieving a harmonious balance among the societal, economical, and environmental impacts of ICT-integrated smart grids require a holistic approach that considers the interdependencies of these dimensions. Policymakers and stakeholders must prioritize equitable access to technology to ensure that the benefits of smart grids are widely distributed, thereby enhancing social equity. Economic incentives and regulatory frameworks should encourage investment in ICT infrastructure while promoting sustainable practices that do not compromise environmental integrity. This balance can be achieved by aligning the development and implementation of smart grid technologies with the broader goals of sustainable development, ensuring that advancements in ICT contribute positively across all sustainability pillars.

The role of Smart Grids in the SUSTAIN-6G project

SUSTAIN-6G is a project focused on integrating sustainability into the development of sixth-generation (6G) communication technologies. Its objectives encompass understanding stakeholder sustainability needs, defining comprehensive assessment methodologies, enhancing the synergy between 6G and vertical use cases to minimize negative environmental impacts, improving 6G technologies to bolster sustainability, validating and demonstrating sustainability impacts, and formulating guidelines and strategic roadmaps to steer 6G development towards sustainable practices. Within Sustain 6G three domains were selected, namely agriculture, health and smart grids. The goal is to analyse the impact and the interrelations between ICTs and these vertical domains.

The smart grid domain is explored through three interconnected use cases:

Joint Planning of 6G and Smart Grid Infrastructures: This foundational use case emphasizes the importance of designing and deploying 6G and smart grid infrastructures in tandem. Such coordinated planning ensures that both systems complement each other, maximizing mutual benefits and providing a robust foundation for advanced services and operational strategies in the subsequent use cases.

6G-Enabled Grid Balancing Services: Building upon the integrated infrastructure, this use case utilizes 6G's low-latency and high-bandwidth capabilities to manage distributed energy resources (DERs) and other grid assets in real-time. This orchestration facilitates participation in grid balancing and frequency response services, promoting a decentralized and efficient energy system by enabling small-scale DER owners to engage in wholesale electricity markets.

Resilient Grid Section Operation: Focusing on enhancing grid reliability, this use case leverages 6G communication capabilities for advanced coordination and control of grid sections. It involves real-time monitoring and adaptive reconfiguration to automatically detect and respond to faults, such as power outages or grid congestion, ensuring stability and continuity of service even during disruptions.

Collectively, these use cases form an integrative framework addressing the challenges of transitioning to a more efficient, resilient, and integrated energy system.

Conclusion

We are no more in the traditional power grids delivering electricity from centralized stations to consumers without real-time monitoring or consumer feedback. Smart grids, utilize digital technologies to enable two-way communication, allowing consumers to adjust energy usage based on real-time data, integrating renewable energy sources, and enhancing grid reliability through self-healing capabilities. Information and Communication Technology (ICT) plays an important role in smart grids, to facilitate real-time monitoring, data analytics, interoperability, and robust cybersecurity measures.

SUSTAIN-6G is a project focused on integrating sustainability into the development of 6G communication technologies, aiming to align technological advancements with environmental goals by assessing various stakeholders and domains requirements.

Co-funded by the European Union

6GSNS

This work is Co-funded by the European Union under Grant Agreement 101191936. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of all SUSTAIN-6G consortium parties nor those of the European Union or the SNS JU (granting authority). Neither the European Union nor the granting authority can be held responsible for them.

Secured Infrastructures with PAROMA-MED

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In recent years, with the advent of large language models (LLMs), we have witnessed a rapid evolution in how domain knowledge is leveraged to build more sophisticated and intelligent systems. Expectations have risen accordingly, driving a shift toward semantic web technologies, which are becoming de facto standards for new businesses and services. Today, data has emerged as an invaluable asset, more prominently than ever before.

This transformation has largely been fueled by freely available data on the web. Naturally, one might wonder: how much more could be achieved if knowledge creation could also flourish using highly protected, non-public data? Critical infrastructures are prime examples of such siloed domains, where finding a formula to enable the responsible use of these protected spaces is crucial.

The reasoning is straightforward: critical infrastructures comprise massive installations where resource usage often scales enormously. By their nature, they provide extensive benchmarks across various technologies, generating high-quality, unbiased, and representative feedback. This, in turn, can lead to the development of more accurate and better-targeted AI models. However, exposing the inner workings of such infrastructures introduces significant risks. Therefore, a new paradigm must be established—one that facilitates AI model development while ensuring maximum protection at every stage, from data discovery to training and subsequent model usage.

PAROMA-MED: A Secure Model for AI in Sensitive Domains

The PAROMA-MED project has pioneered a comprehensive protection framework in the medical domain, where patient data represent the most sensitive assets. Within the project's solutions, currently under evaluation, protective measures extend across the entire data lifecycle and processing workflows.

A fundamental principle of the project is that data always remain within the security perimeter of their originating domain. This does not diminish their utility, as Data Space methodologies allow for controlled discovery and advertisement within well-defined ecosystems, enforced by rigorous attestation mechanisms. These mechanisms rely on hardware-assisted Trusted Execution Environments (TEEs) to provide verifiable evidence of integrity and compliance with predefined ecosystem requirements. As a result, data retain their intrinsic value while maximizing their utility within a trusted network.

Furthermore, all data processing occurs strictly within the storage domains, eliminating unnecessary data transfers. By adopting "code-to-data" paradigms such as federated learning, data remains undisclosed at all times. Even trained models, once produced, follow the same stringent principles: they are protected, never exposed to uncontrolled access, and safeguarded against inference attacks. During inference tasks, the model is deployed alongside the data it processes, ensuring that applications interact with it through APIs rather than integrating it directly into their runtime environment.

PAROMA-MED
Privacy Aware and Privacy Preserving Distributed and Robust Machine Learning

Expanding the Model to Critical Infrastructures and Supply Chains

This approach to safeguarding sensitive domains can be extended to critical infrastructure ecosystems, enabling controlled data exposure while ensuring that underlying resources remain secure. It also holds promise for full-scale supply chains, industrial environments, and other sensitive infrastructures, facilitating knowledge creation without compromising security or privacy.

By prioritizing verifiable adherence to policies and regulations, heterogeneous domains can collaborate safely without the need to relax security constraints. End-to-end workflows can be executed with hardware-backed assurances of software integrity, enabling a new era of trusted, privacy-preserving AI applications across high-security domains.

Further information

- PAROMA-MED project website: *https://paroma-med.eu/*

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From Under the Sea to Space: Critical Digital Infrastructures for Global Connectivity

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Introduction – why global connectivity matters?

In today's extremely connected and specialised global world trade, business workflows and supply chains critically depend on global connectivity. Think about your last online purchase, financial transaction or interaction on social media, all of this goes through globally connected networks. Additionally, science and research – be it medical science, natural sciences like physics, or climate research – depend on the sharing and exchange of massive amount of data.

Currently, the cumulative volume of global data traffic is estimated to be 33 exabytes ($33*10^{18}$ bytes) per day [1].

This means that global connectivity is a critical part of today's global society and a cornerstone and anchor point of trust, the importance of which can't be overemphasized these days when old allies change and start to behave unreliably.

The technologies for connectivity

Most people use their mobile devices, handhelds to connect. This makes a deceiving perception that seamless and persistent connectivity is over the air wirelessly for most cases. Which is true, until the first so called mobile basestation or tower. From then on, invisible to the average user the connection is via fibre optic cables that connect the base stations to the core of the network and to large data centres where the data and services are hosted. In turn, these data centres are interconnected by large capacity optical cables with multiple fibres, each carrying multiple connections using different optical wavelengths. Globally, there are 570 undersea cables in service (and more than 80 planned) that connect those networks and data centres, creating a global fabric of interconnections [2]. This global network carries 99% of the data traffic and is owned by network operators and large service provider companies like Google, and makes up the by now critical digital superhighway.

Vulnerabilities and incidents

Let me cite here a picture of the global undersea cable network <Figure1>. As it can be seen, due to geographics, the global interconnectivity network is very concentrated at certain points. Cable routes follow very similar paths and so-called landing points of the cables are shared, or are very near to each other. Such areas, choke points can be easily identified on the global map even by untrained eyes. Most notably, such an area is the Red Sea – which also happens to be one of the busiest shipping routes of the world.
Recently, there were a number of reports in the news regarding various incidents concerning some of those undersea optical communication cables. Let us examine systematically the threats and technologies for this critical global connectivity infrastructure.

Natural disasters

Undersea optical cables are vulnerable to natural disasters, such as earthquakes and volcanic eruptions. One such incident was in 2006, when an earthquake South of Taiwan severed eight major cables at 18 points, effectively cutting all East-West communication at this point, so traffic

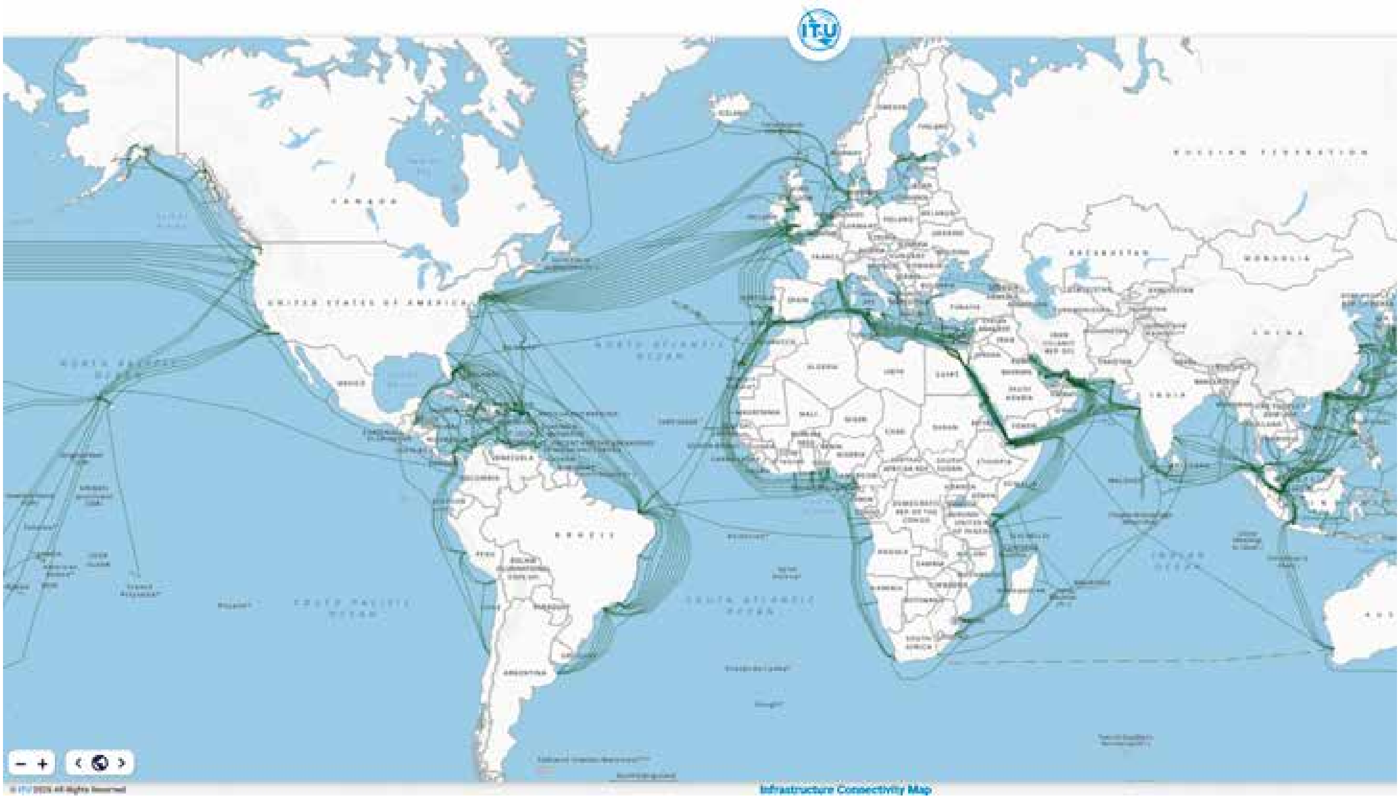

Figure 1: ITU global undersea cable network (© ITU)

had to be routed the other way around the globe to circumvent the disruption. Repairing those connections took nearly two months and involved 11 (!) ships.

A more recent incident is the volcanic eruption at Tonga. Many would remember the spectacular pictures in the news and the video from space about the massive eruption, which among other damage caused severed all connections to the outside world from Tonga.

Man made incidents

By far the most common accidents and damages to submarine cables are caused by fishing. Fishing trawlers pull nets and heavy gear – so called trawl doors – helping to keep the mouth of the net open either in midwater, but often directly at the bottom, effectively ploughing the seafloor (causing massive environmental damage).

Clearly, such gear can severe a communication cable, even if the cable is lightly buried in the seafloor. Therefore, fishing (as well as anchoring) is restricted in the vicinity of cables, but the enforcement is difficult, and human errors can occur [3][4].

Another, recent incident demonstrates a slightly different type of threat. Houthi forces attacked a ship on the Red Sea forcing the crew to drop anchor and abandon ship. The stricken ship dragging its anchor severed three cables carrying a large volume of traffic between Europe and Asia and thus caused a major disruption.

There has been several other incidents and disruptions reported in the news, most notably from the Baltic Sea. It might be that none of those can be fully ascertained as arson or sabotage, but the blowing up of the Nord Stream gaspipe in that region was clearly a deliberate attack on an underwater infrastructure.

Installing and repairing undersea communication cables

Laying undersea communication cables started more than 100 years ago. It involves loading a long section of the cable onto a special cable laying vessel, and deploying the cable on location.

This method of laying cables is essentially the same, as it was 100 years ago. Obviously, the cables have changed, the physical transport medium in the cables and the construction of the cables also changed, and most importantly, their data carrying capacity has improved several orders of magnitude.

What has not improved, or changed much less dramatically is that the process of deploying those cables is time consuming and relatively slow. Furthermore, the fleet of specialized vessels capable of laying cables is aging and relatively small [5]. According to the International Cable Protection Committee [6], there are only around 60 of those specialised cable ships in the world. This fleet is also ageing and not being renewed at a sufficient rate. Only eight of those 60 ships are younger than 18 years, with most between 20 and 30 years old, and 19 ships are over 30 years old. This ageing fleet also need more time out for being maintained and repaired – their availability is not ideal. Overall, ships are generally booked long time ahead for jobs, laying new cables and scheduling the repair of disruptions need to be tightly scheduled and managed [7]. Recently we see a trend of adding more specialized, smaller vessels that can’t install new cables on long routes, but can pick up damaged cables and repair them. Nevertheless, this picture remains rather grim and demonstrates how vulnerable the global undersea connectivity infrastructure is and constrained by the limited capacity available for fixing, repairing [8]. Let me cite here an example that demonstrates what the above means in practical terms. In case of the Tonga incident – already mentioned earlier –, with best effort and goodwill, the main international connection cable was repaired in less than one and half months, but the fixing of a smaller, internal cable between the islands took 18 (!) months.

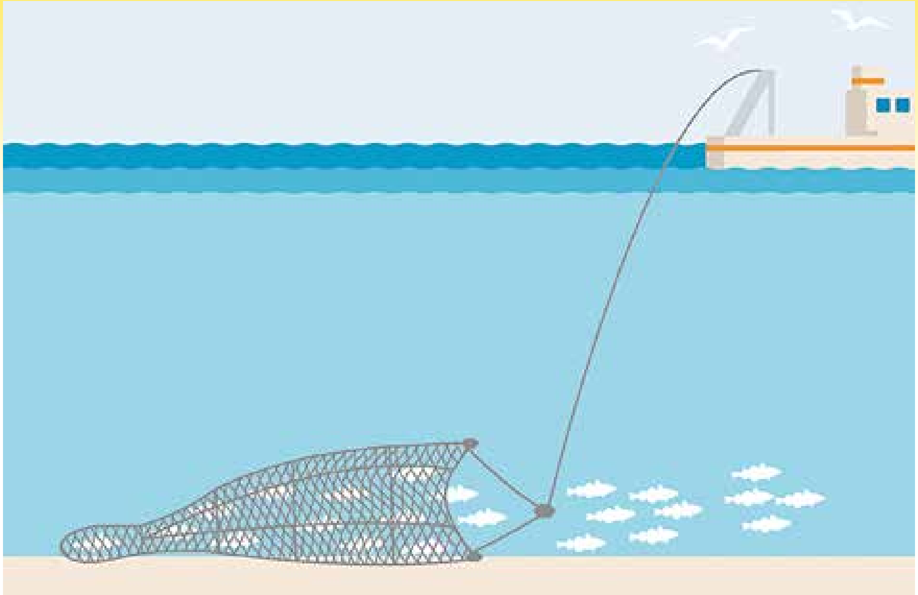

Figure 2: Trawling - Source: Marine Stewardship Council

Alarming capabilities to disrupt undersea communication infrastructures

An alarming recent publication reports about new deep-sea cable-cutting capabilities developed by China [9]. The uncrewed submersible vehicle by Chinese researchers can operate up to 4000 (!) m depths, and is equipped with a sufficiently high revolution (1600 rpm) diamond coated cutting blade that is effective against steel-reinforced armoured undersea cables. The device was developed by the China Ship Scientific Research Centre (CSSRC). Although originally developed for civilian salvage and seabed mining, the device’s dual-use potential raises serious concerns, as it looks to be an ideal tool, a weapon for systematically severing undersea communication cables. The threat is definitely real.

Improving the resilience of the infrastructure

In light of the very clear threats to the global connectivity infrastructure and the current geopolitical situation it is really imperative to improve the resilience of that infrastructure [10], and the way to achieve this is through further geographic diversification. One option investigated in recent years in the EU-Japan relation is the deployment of an undersea communication cable following the so far not explored and utilised arctic route. Climate change and advancement of technology make this a viable option, and it comes with one specific advantage. There is no fishing taking place in ice covered waters, hence the risk of the most common damaging activity is non-existent. (At the same time, in case of an incident repairs might need to wait until the Arctic summer, and even then, the assistance of an ice-breaker might be necessary.)

Space communications

In light of the persisting vulnerability of the global undersea infrastructure attention turned onto securing, or at least backing up connectivity for the most critical traffic via satellite communications. In recent years the global satellite constellation of StarLink demonstrated the potential and capabilities of non-terrestrial networks also to the general public. It has to be noted though that satellite communications can't provide the same capacity as undersea cables – it lags behind by 2-3 orders of magnitude in capacity. Nevertheless, being able to communicate, albeit in a restricted way is still far better than losing connection altogether. Regarding this aspect, the NATO pilot project HEIST (short for hybrid space-sub-

Figure 3: Orange Marine cable layer vessel - René Descartes (© ORANGE Marine)

marine architecture ensuring information security of telecommunications) is looking into first and foremost to ensure that when cables are damaged and fail operators can locate the position of the disruption precisely and quickly in order to initiate fast repair. Secondly, to become able to divert high-priority traffic to alternative routes, and specifically to satellites in orbit [11] .

The European satellite constellation IRIS2

Here, at this point it is important to highlight IRIS², the new EU Secure Satellite Constellation, an Infrastructure for Resilience, Interconnectivity and Security by Satellite [12]. The European Commission has signed the concession contract (effectively a public-private partnership agreement) for the IRIS² multi-orbital constellation of 290 satellites with the SpaceRISE consortium in December 2024, but the process has started much earlier. The SpaceRISE partnership will develop, deploy, and operate the European Union's new system, which represents a significant step towards Europe's sovereignty and secure connectivity. The constellation is planned to become operational by 2030.

Conclusions

In light of the many recent incidents reported regarding undersea cable cuts this paper reviewed the technologies and solutions used in global connectivity, their respective roles, and the threats that are pertinent specifically to the undersea communication cable systems. Regarding the threats our survey was constrained to the physical layer.
The EU continues to support submarine networks and connectivity infrastructure [13].

Acknowledgment and Disclaimer:

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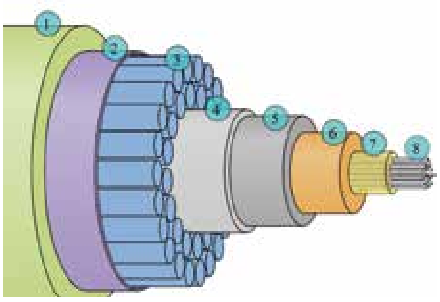

Figure 4: Submarine cable structure
Source: ***Oona Räisänen, Submarine Cable Cross-Section 3D Plain, Public Domain, accessed November 30, 2021, https://commons.wikimedia.org/wiki/File:Submarine_cable_cross-section_3D_plain.svg.***
Notes: ***(1) Polyethylene, (2) Mylar tape, (3) Stranded metal (steel) wires, (4) Aluminum water barrier, (5) Polycarbonate, (6) Copper or aluminum tube, (7) Petroleum jelly, and (8) Optical fibers***

The views expressed herein are solely by the author.

References:

[1] Sandvine. (2024). Global Internet Phenomena Report: Global internet usage continues to grow. AppLogic Networks. https://www.applogicnetworks.com/blog/sandvines-2024-global-internet-phenomena-report-global-internet-usage-continues-to-grow
[2] TeleGeography. (n.d.). How many submarine cables are there, anyway? https://blog.telegeography.com/how-many-submarine-cables-are-there-anyway
[3] BBC Earth. (2017, February 15). On trawling [Video]. YouTube. https://www.youtube.com/watch?v=F_M0z45TN3Q
[4] Marine Conservation Institute. (2018, May 2). On trawling [Video]. YouTube. https://www.youtube.com/watch?v=xiaXk2_EtCM
[5] Uptime Institute. (2023, August 16). The cable ship capacity crunch. Data Center Dynamics. https://www.datacenterdynamics.com/en/analysis/the-cable-ship-capacity-crunch/
[6] International Cable Protection Committee. (n.d.). Homepage. https://www.iscpc.org
[7] Wiggers, K. (2024, January 31). Deep undersea internet cables are fraying — and repair ships are overwhelmed. The Verge. https://www.theverge.com/c/24070570/internet-cables-undersea-deep-repair-ships
[8] NRK Troms og Finnmark. (2023, November 14). This is what the damaged Svalbard cable looked like when it came up from the depths. https://www.nrk.no/tromsogfinnmark/this-is-what-the-damaged-svalbard-cable-looked-like-when-it-came-up-from-the-depths-1.16895904
[9] Sahota, N. (2023, September 6). China's cable cutter could sever 95% of world communications. Interesting Engineering. https://interestingengineering.com/innovation/china-cable-cutter-sever-95-world-communications
[10] Congressional Research Service. (2022, March 1). Submarine cables: Critical infrastructure and U.S. policy. https://www.congress.gov/crs-product/R47237
[11] Amadeo, R. (2023, June 22). NATO prepares for threats to undersea internet cables. IEEE Spectrum. https://spectrum.ieee.org/undersea-internet-cables-nato
[12] European Commission. (n.d.). IRIS² – Secure connectivity. EU Defence Industry and Space. https://defence-industry-space.ec.europa.eu/eu-space/iris2-secure-connectivity_en
[13] European Commission. (2023, February 15). Additional €142 million to support submarine networks and connectivity infrastructure under CEF. https://digital-strategy.ec.europa.eu/en/news/additional-eu142-million-support-submarine-networks-and-connectivity-infrastructure-under

Advancing EU-Japan Digital Collaboration with the INPACE "EU-Japan Digital Week 2025"

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As the Indo-Pacific region and Europe deepen their technological integration, fostering strategic cooperation through trusted digital platforms becomes increasingly vital. To support building a momentum, the EU-Japan Digital Week 2025, held from 31 March to 7 April in Tokyo, brought together key stakeholders from both regions to advance shared priorities in areas such as 6G, Data Spaces, Smart Connectivity, and Trustworthy AI, reinforcing a joint commitment to collaborative digital transformation.

A Milestone for EU-Indo-Pacific Digital Engagement

Launched under Horizon Europe, INPACE (Indo-Pacific-European Hub for Digital Partnerships) is a Coordination and Support Action designed to implement and advance the EU's Digital Partnerships with key Indo-Pacific nations—Japan, Republic of Korea, and Singapore—and with India through the Trade and Technology Council (TTC). With a robust consortium of European and Asian stakeholders, INPACE aims to establish a sustainable, expert-driven hub that supports research, innovation, and policy collaboration in strategic technology domains.

The first INPACE International Symposium, held in Seoul, South Korea on 21–22 October 2024, set the tone for these ambitions. The event brought together policymakers, researchers, and industry leaders to address key challenges and explore cooperation opportunities in transformative digital technologies.

Spotlight on EU-Japan Digital Week 2025

The next major milestone was the EU-Japan Digital Week, which took place from 31 March to 7 April 2025 in Tokyo. Organised in the frame of the EU-Japan Digital Partnership and under the auspices of the European Delegation to Japan and the guidance of Peter Fatelnig, Minister Counsellor for Digital Economy Policy at the Delegation of the EU to Japan.

This high-level gathering convened stakeholders from across Europe, Japan, and the Indo-Pacific, highlighting collaborative work in areas such as:

- 6G Development
- Smart Connectivity and Edge Computing
- Data Spaces and Trusted Data Exchange
- Trustworthy Artificial Intelligence

A key focus of the event was to align digital policy objectives, foster innovation ecosystems, and explore how disruptive trends like generative AI are reshaping strategic agendas.

Workshop Highlights

The event featured a series of deep-dive workshops designed to strengthen collaboration between the European Union and Japan in strategic digital areas.

Monday, 31 March – Smart Connectivity and Computing

Organised by Dr. Giacomo Inches (Martel Innovate, Switzerland, in collaboration with NexusForum.EU project) and supported by Prof. Kiyoshi Murata (Meiji University), this workshop bridged the gap between the EU and Japan in the fields of cloud-edge computing and smart connectivity. Industry leaders, researchers, and policymakers discussed collaboration opportunities in open-source technologies, industrial verticals, and cross-cutting digital innovation topics.

Tuesday, 1 April – 6G Horizons: Synergies for a Connected Future

Co-organised by Adam Kapovits (Eurescom) and Prof. Akihiro Nakao (ASPIRE, Japan), this full-day workshop at the University of Tokyo fostered collaboration and partnership between the EU, Japan, and other Indo-Pacific countries in the field of 6G development. The session explored whether current R&D directions aligned with societal and business needs, particularly in the context of rapidly evolving technologies like generative AI.

Adam Kapovits (Eurescom) presenting during the Closed-door policy workshop: The EU-Japan Digital Partnership: Going Forward

Wednesday, 2 April – Closed-Door Policy Workshop: The EU–Japan Digital Partnership: Going Forward

Co-organised by Dr. Eva Pejsova (Centre for Security, Diplomacy and Strategy (CSDS)) and Dr. Kazuto Suzuki (Institute of Geoeconomics (IOG)), this exclusive session addressed high-level policy topics such as technological innovation, emerging technologies and security cooperation, domestic policy coordination, and approaches to global digital governance. Discussions aimed to align strategic objectives and identify opportunities for joint action considering critical digital connectivity infrastructures among others.

Wednesday, 2 April – Trusted Data Exchanges in Cities: From Standards to Pilots in a Changing World

Led by Dr. Franck Le Gall (EGM) in collaboration with Japanese and European experts, this workshop promoted the practical implementation of trusted data exchanges in urban environments. It focused on enabling technologies such as semantic interoperability, digital identities, and dataspaces to support smart, secure, and connected cities.

Discussions ongoing during the interactive Data Spaces: How to Make Business from Data in a Legal Fashion

Thursday, 3 April & Friday, 4 April – Data Spaces: How to Make Business from Data in a Legal Fashion

Organised by Dr. Antonis Ramfos (Athens Technology Center, Greece), this two-day workshop explored the role of data spaces in digital transformation. Topics included architectural models, legal frameworks, and interoperability challenges, along with presentations of successful business models and real-world case studies from both the EU and Japan.

Monday, 7 April – Critical Applications of AI in Industry, Healthcare and Other Sectors

This workshop focused on the development of AI systems for critical applications where high reliability is essential. Organised by Prof. Sebastian Engell (TU Dortmund and ENRICH Global), with co-organisers Prof. Iiro Harjunkoski (Aalto University and Hitachi Energy Europe) and Nobuo Nukaga (Hitachi R&D, Japan), the event brought together experts to share good practices and tackle real-world challenges. Discussions centred on ensuring the robustness, safety, and trustworthiness of AI used in areas like healthcare, industrial automation, and transportation—where failure can have serious consequences. Japanese interpretation was not available.

Eurescom's Role in the INPACE Project: Driving Strategy Collaboration to Strengthen EU-Japan Connections

Eurescom played an important role in the EU-Japan Digital Week 2025, underscoring its leadership within the INPACE project and its commitment to fostering cross-regional digital collaboration. Alessandro Bassi contributed to the "6G Horizons" workshop regarding the SNS JU SUSTAIN-6G , whilst Adam Kapovits co-organised the "6G Horizons" workshop and contributed to the closed-door policy discussion.

Eurescom brought its deep expertise in network and service innovation to the forefront of discussions on future digital infrastructures and trustworthy AI. As the lead of INPACE's Cluster 5 on Digital Technologies – Future Networks, Eurescom has been instrumental in facilitating expert engagement between European and Japanese stakeholders.

With a strong legacy in collaborative R&D and prior engagement in initiatives such as the ESA-NICT partnership, Eurescom serves as a vital bridge for Japan-EU technological cooperation. Through INPACE, Eurescom contributes to shaping the strategic agenda on future connectivity, digital trust, and innovation ecosystems by coordinating expert dialogues, supporting policy alignment, and promoting practical pilot initiatives that accelerate the digital transformation across Europe and Asia.

Looking Forward

The outcomes of the EU-Japan Digital Week 2025 will feed into ongoing policy dialogues and future cooperation initiatives under the EU's Digital Partnerships with Indo-Pacific countries. Building on this high-impact event, INPACE will continue to serve as a strategic enabler for advancing joint research, innovation, and policy action in trusted and transformative digital technologies.

Further information

- INPACE projec website: *https://inpacehub.eu/eu-japan-digitalweek-2025/*

MWC Barcelona 2025

Projects at a glance

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At Mobile World Congress (MWC) 2025 in Barcelona, the future of wireless technology and connectivity took center stage. Several pioneering projects under the Smart Networks and Services Joint Undertaking (SNS JU) made a significant impact, showcasing how Europe is shaping the next era of communication through innovation, collaboration, and groundbreaking research.

OPTI-6G Presence at MWC 2025 Through Consortium Partner RunEL

From March 3–6, 2025, the OPTI-6G Project made a strong debut at MWC Barcelona, represented by its consortium partner, RunEL. Co-founder Israel Koffman led the project's presence at Hall 8.0, Stand 8.0B31.7A, where industry leaders, researchers, and innovators gathered to explore the future of 6G networks.

RunEL Co-founder Israel Koffman provided a dynamic platform for presenting OPTI-6G

Key Highlights:

- 6G Innovation Showcase: Presentation of cutting-edge advancements in next-generation wireless networks.
- Industry Engagement: Building bridges with global leaders to shape future smart connectivity.
- Collaborative Research Insights: Sharing innovative approaches fueling 6G development.
- SNS JU Synergy: Engaging with over 80 projects defining the 6G landscape through SNS JU collaboration.

As part of a broader effort, OPTI-6G's participation strengthened Europe's leadership in future network technologies and highlighted the project's role in advancing the smart connectivity ecosystem.

CENTRIC at MWC 2025: Showcasing the Future of AI-Enabled Wireless Sensing

The CENTRIC project also made headlines at MWC 2025, where partners InterDigital and Keysight Technologies unveiled revolutionary AI-powered wireless sensing technologies.

Live Demonstrations at Hall 5C51 included:

- AR/VR Immersive Experiences: Enhanced by AI-driven sensing accuracy.
- Intruder Detection: For smart home and security system integration.
- eHealth Monitoring: Non-intrusive, real-time health tracking using RF signals.
- Autonomous Vehicle Integration: Smarter, safer transportation networks.

Using a radio frequency digital twin, the demo illustrated how AI can interpret channel state information (CSI) to detect human movement in complex environments – a major leap forward for wireless sensing.

This innovation stems from research within both CENTRIC and 6G-SANDBOX, two SNS JU-supported initiatives at the forefront of merging AI with next-generation networks. The CENTRIC showcase captured how AI-enhanced sensing will be pivotal for future 6G applications, offering a glimpse into the smarter, more adaptive networks of tomorrow.

SNS ICE Booth – Fostering Global 6G Collaboration

The SNS ICE (Smart Networks and Services International and European Cooperation Ecosystem) initiative had a strong presence at Booth No. 4 at MWC 2025.

“AI is set to transform the wireless industry, and our partnership through CENTRIC and 6G-SANDBOX enables us to explore groundbreaking applications and smarter connectivity solutions.” — Michael Dieudonné, R&D Manager at Keysight

Left to right: Carles Navarro Manchón (Keysight Technologies), Phillip Leithead (InterDigital, Inc), Philip Pietraski (InterDigital, Inc), Michael Dieudonne (Keysight Technologies) & Douglas Castor (InterDigital, Inc).

The SNS ICE project is dedicated to:

- Fostering European and international synergies in the evolving 6G ecosystem.
- Promoting SNS JU activities and achievements on a global stage.
- Establishing strategic dialogues with national initiatives, Horizon Europe partnerships, and global R&D clusters.
- Engaging vertical industries to accelerate adoption of tailored 6G applications.

Throughout its mission, SNS ICE has actively monitored global standardization efforts, organized influential workshops, and participated in key events like Techritory and EuCNC, ensuring that European research remains at the forefront of global 6G discussions.

At MWC 2025, visitors could meet the SNS ICE team, learn about Europe's growing leadership in next-generation networks, and engage in conversations shaping the future of global connectivity.

MWC Barcelona 2025 marked an important chapter for the European 6G research community. Projects like OPTI-6G, CENTRIC and SNS ICE exemplify Europe’s commitment to driving innovation, fostering collaboration, and building a smarter, more connected future.

Further information

- OPTI-6G project website: *https://opti-6g.sns-ju.eu/*
- CENTRIC project website: *https://centric-sns.eu/*
- SNS ICE CSA project website: *https://smart-networks.europa.eu/csa-s/#SNS-ICE*

Carles Anton-Haro (CTTC) at the SNS ICE booth at the MWC 2025

Eurescom supports Accelerating 5G/6G NTN Innovation

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Eurescom contributes to ESA workshop regarding the convergence of 5G communication and Earth Observation

The 5th ESA Workshop on Advanced Flexible Telecom Payloads was held at ESA's European Centre for Space Applications and Telecommunications (ECSAT) at the Harwell Science and Innovation Campus in the UK, between the 18 and 20 March 2025. Over 100 experts from across Europe participated at the workshop. Adam Kapovits from Eurescom has contributed to the workshop session on Flexible Payloads for 5G/6G NTNs with the results from the ESA project 5GEOSiS – 5G Earth Observation Server in Space, a 5G repurposable payload as a service, and received very positive feedbacks from the audience.

ESA NICT workshop held in Tokyo at the NICT Innovation Center on 31st March 2025

The European Space Agency and the National Institute of Information And Communications Technology Japan first signed a Letter of Intent (LoI) in 2018 regarding joint efforts and cooperation in the field of 5G satellite communications. Subsequently, the two sides supported their own industries launching investigations as technology path finders for global satellite communication networks convergence, integration into 5G and to validate use cases of common interest, such as natural disaster prevention and mitigation, global maritime transportation, and Internet of Things (IoT) to cover oceans and airspaces.

These activities were performed on the European side as part of the ESA SATis5 project (funded within ESA's Space for 5G/6G and Sustainable Connectivity portfolio) under the leadership of Eurescom GmbH and with the assistance of Fraunhofer FOKUS as technical manager, and together with the Japanese industrial team under the leadership of Japan Radio Co., Ltd, and with SKY Perfect JSAT Corporation and the University of Tokyo as partners.

Michael Dieudonne, Keysight Technologies, presenting 6G-ESA NICT workshop participants form the European and Japanese partners at the NICT Innovation Center in Tokyo, on 31st March.
From left to right: Yuma Abe, NICT, Natsuko Ouchi, SKY Perfect JSAT Corporation, Nobuyuki Setoguchi, SKY Perfect JSAT Corporation, Sachie Tsubokura, Japan Radio Co., Ltd, Atsumu Mishima, SKY Perfect JSAT Corporation, Marius Iulian Corici, Fraunhofer FOKUS, Shinichi Mizuno, Japan Radio Co., Ltd, Bjoern Riemer, Fraunhofer FOKUS, Adam Kapovits, Eurescom GmbH, Maria Guta, ESA, Prof Akihiro Nakao, The University of Tokyo, Kenji Kanai, The University of Tokyo, Amane Miura, NICT, Katsuyoshi Ishida, Japan Radio Co., Ltd, Kiyomi Yoshida, Japan Radio Co., Ltd, Keita Kaida, The University of Tokyo, Mayuko Tsuji, Japan Radio Co., Ltd, Yoji Oshima, The University of Tokyo.

On 31stMarch 2025 a half a day workshop was held between the European and Japanese teams when the experts from the two sides and from the funding agencies (ESA and NICT, respectively) met to discuss the key results of the trials that resulted from the collaboration, the lessons learnt and technical areas of interest for continuing the collaboration.

The collaboration was organised in phases. In the first phase industry partners worked on the interconnection of local 5G systems via satellite, as well as the management of long-distance networks between Europe and Japan.The teams achieved a network quality evaluation of satellite and 5G connection, working to understand the feasibility of satellite 5G networks via international long-distance communications, as well as the successful transmission of 4K Video and IoT Data.

In a second phase multi-orbit (geostationary (GEO) / low Earth orbit (LEO)) 5G transport solutions were investigated and validated, and the multi-5G-Core enhancements that are necessary and typical in international communications. These topics were introduced and are now being discussed in 3GPP Rel 19/20.

In this phase, the European team concentrated on links performance monitoring; dynamic path selection between GEO-LEO-Terrestrial networks; and data path management. Meanwhile, the Japanese team concentrated on network slicing, Quality of Service, active bandwidth control and application detection in switching GEO-LEO-Terrestrial link scenarios.

Technical achievements from European partners included experimenting and validating services in Public Protection and Disaster Relief (PPDR) fire-fighting scenarios with 5G temporary local networks interconnected via satellite, including User Equipped UAVs for video monitoring. Experimentation taking place in Berlin, Brandenburg area in Germany.

Additionally, the Japanese team showcased their experimentation and validation of PPDR use cases utilizing Non-Public 5G networks over satellite, such as 4K video footage viewed through Virtual Reality lenses, remote control of field-deployed robot via video transmission, and various applications for remote areas.

Overall, the European and Japanese Phase 2 trials confirmed the feasibility of real-time switching of multi-orbit satellite links, and the associated network components and applications sessions. Additionally, the Over the Air validation trials demonstrated the feasibility of seamless path switching.

Looking forward, both the European and Japanese side investigates how the collaboration could be continued and extended towards Beyond 5G and 6G Non-Terrestrial Networks (NTN).

Further information

- "Advanced Flexible Telecom Payloads Event" – Nikal Events. Available at: *https://nikal.eventsair.com/advanced-flexible-telecom-payloads/*
- "5GEOSIS – 5G Earth Observation Server in Space" – ESA Connectivity. Available at: *https://connectivity.esa.int/projects/5geosis-%E2%80%93-5g-earth-observation-server-space*

Recent publications

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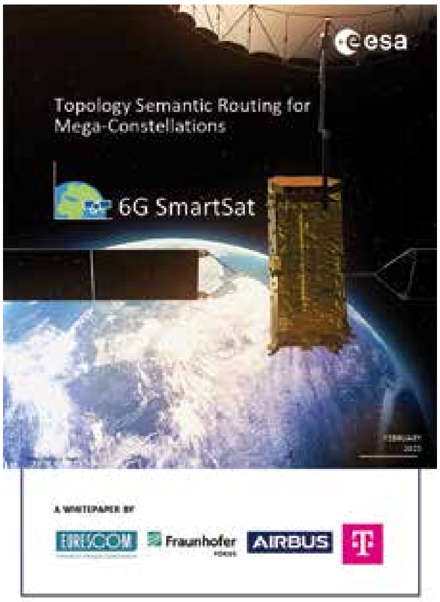
Projects and Working Groups in which Eurescom is actively contributing to, are at the forefront of key innovation milestones in 5G and 6G research. Recent publications showcase important advances across multiple areas: from the 6G SmartSat project's pioneering work on dynamic routing in satellite mega-constellations, to the 5G-IS study outlining architectures for future space-based infrastructures. Within the Smart Networks and Services Joint Undertaking (SNS JU), major contributions have been made on defining 6G KPIs, establishing AI and ML as key enablers for next-generation networks, and shaping the evolving 6G architecture. Through the 6G-IA initiatives, further insights have been developed on emerging business models and ecosystem strategies, while promoting diversity and inclusion in the ICT sector through the WiTaR Working Group.
Together, these publications reflect Eurescom's strong engagement in driving technological, architectural, business, and societal innovation toward a sustainable and inclusive 6G future.

6G SmartSat Wite Paper - Topology Semantic Routing for Mega-Constellations



Eurescom, as the prime coordinator of the 6G SmartSat ESA project, has released the white paper "Topology Semantic Routing for Mega-Constellations," developed with Fraunhofer FOKUS, Airbus Defence and Space, and Deutsche Telekom. The paper introduces Topology Semantic Routing (TSR), an innovative solution for the dynamic routing challenges faced by Non-Terrestrial Networks (NTN) in LEO and MEO mega-constellations, where traditional protocols like OSPF and BGP fall short. TSR offers adaptive, real-time routing with minimal satellite compute load, using local information and pre-computed paths to maintain network resilience and efficiency without extensive signalling. It integrates with centralized routing models, supporting seamless 5G TN-NTN convergence, and addresses trade-offs between signalling and memory use. Future validation with OpenLANES will enhance its commercial readiness, marking a major step toward advancing multi-sector 6G satellite network applications.

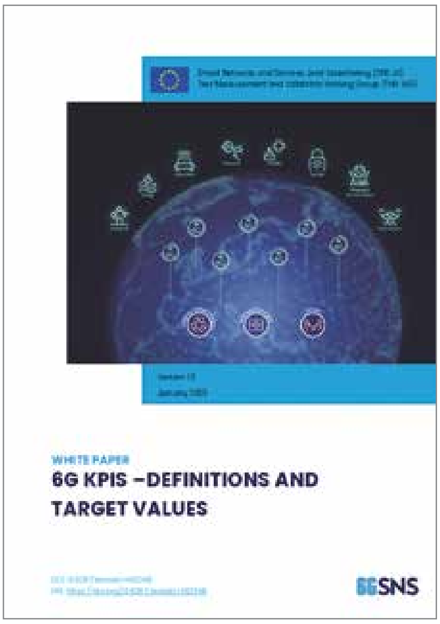
- Read the full white paper here: *https://connectivity.esa.int/sites/default/files/6G%20SmartSat%20Whitepaper%20-%20Topology%20Semantic%20Routing%20for%20Mega-Constellations-v1.pdf*

5G-IS White Paper - 5G Space-based Infrastructure

The 5G-IS ("5G System Infrastructure Study"), funded under ESA's ARTES programme, explores architecture design options and evaluation criteria for deploying a 5G space-based infrastructure (5GSBI), extending toward 6G, to complement terrestrial networks. A special focus was given to satellite connectivity solutions for automotive and road transportation sectors, identified as a key market. Advances in space technologies, such as new launch and propulsion methods, have improved performance and reduced costs, enabling low Earth orbit satellite mega-constellations with lower latency. These developments highlight the growing role of satellite communication in future 5G/6G infrastructures, a trend acknowledged by 3GPP, which has integrated non-terrestrial networks (NTN) into its standards from Release 17 onwards, with expanding support in upcoming releases.

- Read the full white paper here: *https://zenodo.org/records/14756152*

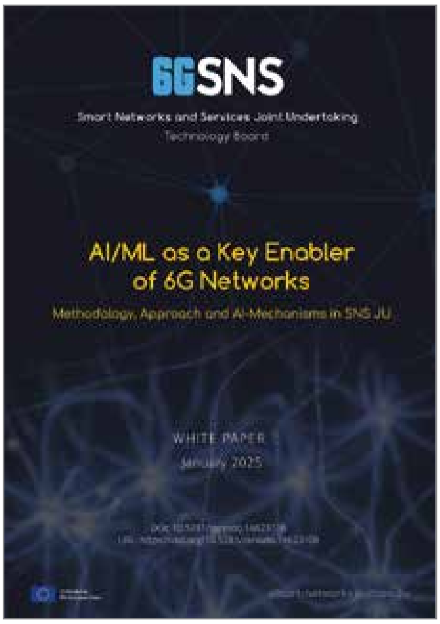
6G KPIs - Definitions and Target Values



The Test, Measurement, and KPIs Validation (TMV) Working Group (WG) of SNS JU focuses on developing and sharing best practices for 6G testing, monitoring, and analytics. The TMV WG aims to promote common methodologies across projects, support 6G trial Use Cases (UCs), and ensure a unified European vision for the 6G network lifecycle. A key objective is the definition and validation of performance KPIs. This white paper consolidates 6G KPIs from SNS JU projects, providing definitions, target values, and context to shape the 6G vision. Furthermore, the TMV WG promotes common collection procedures, validation methodologies, and analysis of KPI metrics. Various SNS JU projects provided the KPIs, which drive their technical developments.

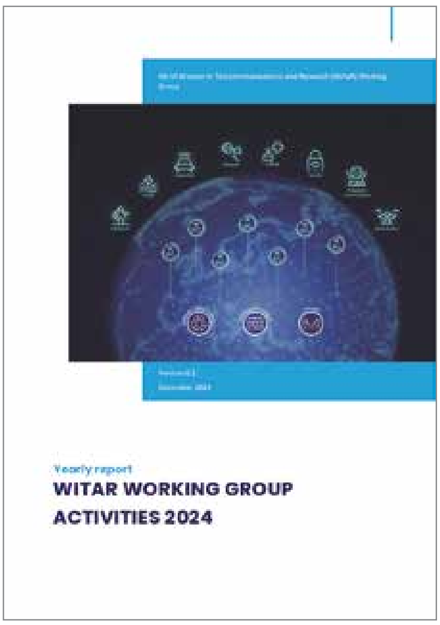
- Read the full white paper here: *https://smart-networks.europa.eu/wp-content/uploads/2025/03/white-paper-kpis_7_3_2025_with-disclaimer.pdf*

SNS JU Technical Board - AI/ML as a Key Enabler of 6G Networks



The Smart Networks and Services Joint Undertaking (SNS JU), under Horizon Europe, is advancing Europe's leadership in 6G by integrating AI and ML into future networks. A survey of 33 projects revealed 199 AI/ML-based mechanisms focused on RAN, resource management, diagnostics, and energy efficiency, mainly using supervised learning and deep learning methods. Projects rely on synthetic, real, and mixed datasets, with outputs targeting radio optimization, security, and resource management. Trends like Explainable AI (XAI) and privacy-preserving techniques such as federated learning are gaining importance. Through these efforts, SNS JU is laying the foundation for AI-native 6G networks while promoting ethical, sustainable innovation and reinforcing Europe's technological sovereignty.

- Read the full white paper here: *https://smart-networks.europa.eu/wp-content/uploads/2025/02/ai_ml_white-paper-sns_tb_v1.0.pdf*

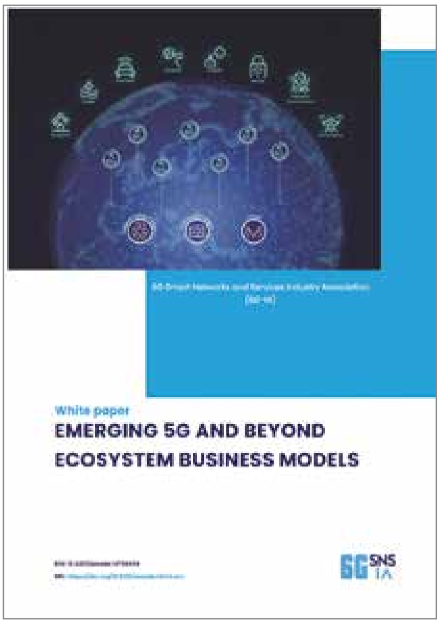


6G-IA Women in Telecommunications and Research (WiTaR) Working Group – Activity Reports 2024

The Women in Telecommunications and Research (WiTaR) Working Group is proud to present its 2024 Yearly Report. This report provides a snapshot of our efforts to promote the participation and advancement of women in telecommunications. Despite remarkable technological progress, the ICT industry still faces significant gender disparities, with women comprising less than 30% of the workforce globally and even lower representation in technical and leadership roles. These gaps limit diversity, hinder innovation, and reduce the sector's potential. In 2024, WiTaR worked tirelessly to address these challenges through fostering inclusive workplace cultures, supporting mentorship and leadership development, and driving diversity-forward initiatives. Our activities this year reflect our ongoing commitment to building a more equitable ICT ecosystem.

- Read the full white paper here: *https://6g-ia.eu/wp-content/uploads/2025/01/witar-yearly-report-2024.pdf*

6G-IA White Paper – Emerging 5G and Beyond Ecosystem Business Models



The telecommunications industry is adapting to new business dynamics introduced by 5G and preparing for similar challenges expected with 6G. Recognizing the importance of aligning technological advances with value creation, the 6G Industry Association (6G-IA) sub-working group Business Validation, Models, and Ecosystems (BVME-SG) has released a new white paper building on its previous work on 5G/B5G ecosystem business modeling. Using the Industry 4.0 vertical as an example, the paper applies a five-step framework to help stakeholders identify business opportunities and understand how ecosystem variations impact operations and strategy. It further explores the cost implications of ecosystem configurations, suggesting new methods for evaluating the technoeconomic viability of networks on a per-deployment and per-actor basis. Finally, the paper discusses the evolving roles within the 6G ecosystem, noting that, although 6G networks will be even more distributed and disaggregated than 5G, the same business modeling framework remains highly relevant for the transition.

- Read the full white paper here: *https://zenodo.org/records/14756405*

6G Architecture Working Group White Paper – Towards 6G Architecture: Key Concepts, Challenges, and Building Blocks

This white paper has been prepared by the 6G Architecture working group of the Smart Network and Services Joint Undertaking (SNS JU). It presents a comprehensive snapshot of the current architectural considerations explored by the SNS JU projects. It discusses the rationale for novel architectural components, the ongoing design efforts, and the future outlook for 6G. It analyses the blueprint for next-generation mobile networks, building on past experiences while integrating cutting-edge advancements. The structure follows the IMT-2030 framework, categorizing insights into the key usage scenarios and overarching architectural aspects.

- Read the full white paper here: *https://smart-networks.europa.eu/wp-content/uploads/2025/03/archwg-whitepaper-v1.3-for-public-consultation.pdf*

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