5th European 5G Observatory Stakeholder Workshop
"5G in the Digital Decade"

Thursday 26 October 2023 (10:30-13:15 CET)

Venue: **online event**

Public Summary

List of acronyms

BEREC	Body of European Regulators for Electronic Communications
B2B	Business-to-business
CAM	Cellular Assisted Mobile
CEF	Connected Europe Facility
DG Connect	Directorate-General for Communications Networks, Content and Technology
EC	European Commission
ETNO	European Telecommunications Network Operators' Association
FWA	Fixed Wireless Access
GSMA	Global System for Mobile Communications
IEC	International Electrotechnical Commission
KPIs	Key Performance Indicators
MNOs	Mobile Network Operators
MWC	Mobile World Congress
RAN	Open Radio Access Network
PPP	Public Private Partnership
SA	Standalone
SNS	Smart Networks & Services
URLLC	Ultra-Reliable Low Latency Communications
6G-IA	Sixth generation of wireless cellular technology -Industry Association
5G	Fifth generation of wireless cellular technology
5GCroCo	Fifth Generation Cross-Border Control

Contents

1 Introduction and Opening remarks

The [workshop](#) was attended by 139 participants, including 17 moderators, presenters and panellists. It provided a comprehensive platform for industry experts and stakeholders to explore 5G deployment and monitoring strategies within the scope of the Digital Decade program.

Peter Stuckmann, Head of Unit Future Connectivity Systems at DG Connect, European Commission, delivered the **opening remarks**, underscoring the widespread adoption of the 5G Observatory by the Commission and external stakeholders, governments, and policymakers. Mr Stuckmann highlighted the importance of the next step following the 5G Action Plan, the [Digital Decade](#) framework, discussing the importance of the 5G Observatory scoreboard, spectrum status, coverage quality, and international developments compared to other regions as a main benchmarking of the progresses in the EU.

Noteworthy advancements in basic 5G were recognised, with an impressive 81% population coverage overall in the EU, subsequent to the commercial launch timeline which had been set for 2020 and largely met by operators. Mr. Stuckmann emphasised the substantial deployment of basic 5G employing low bands and 4G bands for spectrum sharing alongside the initial rollouts in the mid-band category. Anticipating enhanced data rates and reduced latency with advanced 5G, the EC suggested assessing mid-band usage and standalone capabilities as reliable proxies for measuring performance. Approximately 40% of the 5G spectrum utilised in related to the 3.6 GHz mid-band, which is the only band at the moment having long term performance capabilities.

Approximately 88% of the 5G pioneer spectrum is now assigned in the EU. However, the 26 GHz ecosystem is still largely untapped, resulting from the relatively lower demand existing at the moment. Mr Stuckmann highlighted the contrasting user experience trends, emphasising Europe's focus on industrial and B2B applications, while the United States and Asia seem to prioritise the high-end mobile broadband experience for retail consumers. Market trends and developing technologies such as 5G corridors, private networks, and open RAN were identified as crucial areas for the future, as highlighted in the responses to the [recent Commission consultation on future connectivity](#). In addition, the consultation emphasised the need to ensure resilient telecommunications, putting emphasis on security, as well as the need to established more forward-looking policies.

In summary, the EC consultation identified three main concerns related to facilitating a smooth transition of the telecommunications sector to novel business models:

1. **Technological Innovation and Regulatory Framework**: Networks are shifting towards software and cloud-based services. Regulatory frameworks should support investments and foster innovation. Emphasising the development of market and industrial policies is crucial for building resilience and autonomy.

2. **Scaling and Fragmentation Issues within the EU Market**: Dealing with fragmentation, especially for major service providers, is imperative. Facilitating cross-border operations, migrating to cloud-based systems, and integrating distributed and edge computing require a more unified market approach to enable a successful transition.

3. **Focus on Security and Resilience for Network Infrastructure**: Recognising networks as critical infrastructure underscores the need for stringent security measures to protect them.

2 Presentation of the state of 5G deployment in the EU

Following the introduction by the Commission, the consortium in charge of the 5G Observatory (represented by Richard Haas from PolicyTracker, followed by Saul Friedner from LS telcom, and Monica Pesce from VVA) presented on the state of 5G in the EU and key developments in other parts of the world, based on the recently published 5G Observatory bi-annual report.

Regarding the spectrum policy, all Member States have assigned at least one pioneer band, and the majority have assigned two bands (24 Member States). While significant progress has been made, the 26 GHz band remains less popular, with only 11 Member States having made assignments. In addition, the Observatory reported on notable recent spectrum awards, including those in Estonia, Romania, Ireland, Spain, Croatia, Sweden, and Poland. In October 2022, pioneer bands, including the 700 MHz, 3.6 GHz, and 26 GHz bands, were assigned up to 62%, whereas by October 2023, the assignment of these pioneer bands had increased to 71%.

The Commission's recent announcement of new 5G Key Performance Indicators (KPIs) in June 2023 was highlighted during the workshop. The main KPI measures the percentage of households receiving a 5G signal independently of the operator or service quality. The presenters emphasised the ongoing efforts by the Digital Decade Committee to enhance this metric in the future. Significant progress in 5G cross-border projects was noted, with 15 cross-border project winners announced in January 2023 as part of the first call of the Connected Europe Facility (CEF). The workshop also highlighted recent funding initiatives for public 5G/6G projects in various EU countries, e.g., France, Belgium, Lithuania, and Spain.

Insights on commercial advancements highlighted that the population covered by 5G by at least one operator ranged from 60% to 100% in most Member States. Operators were reported to be actively increasing coverage and investing in new technologies. Notable claims by major operators, including Vodafone, Telefonica Germany, and Deutsche Telekom, were mentioned, with 5G coverage percentages ranging from 84% to 95%. However, the presenters acknowledged the varying end-user experiences with 5G and the challenge of measuring network quality accurately, especially in the absence of reliable data on standalone 5G (SA 5G).

The major international 5G developments emphasise the growing interest in SA 5G and network slicing globally. Noteworthy initiatives by various operators and countries were discussed, such as T-Mobile's launch of a network slicing beta in August 2023 and Indian MNO Jio's plans to use network slicing for 5G fixed wireless access (FWA). The rapid growth of 5G in India, with over 300,000 base stations reported only a few months after a spectrum auction, was highlighted as a notable achievement.

The workshop provided encouraging statistics on 5G deployment and coverage within the EU, including the reported 81% 5G coverage of populated areas. Furthermore, 71% of pioneer bands were assigned on average in the EU27, with the deployment of 5G base stations showing a significant increase compared to existing 4G base stations in Member States.

The commitment to fostering cross-border collaboration and investment in 5G infrastructure development was emphasised, with an overview of seven ongoing 5G cross-border works and eight 5G cross-border studies presented during the workshop.

A comparison of 5G deployment in global markets is challenging due to varying levels of data publication by operators. The available data show that South Korea maintained its leading position, followed by China, Japan, and the EU, with the EU demonstrating substantial growth. South Korea also retained a higher number of 5G subscribers, solidifying its position as a frontrunner in the 5G landscape.

The presenters shared insights into the growing deployment of 5G private networks across EU countries, underscoring the demand for secure services in various sectors such as factories, large campuses, and ports. The workshop highlighted the role of major vendors and telecom operators, including Nokia, Ericsson, Vodafone, Deutsche Telekom, Telefonica, T-Mobile, A1 Austria, Proximus, Orange, TDC Net, and CityMesh, in deploying 5G private networks and supporting applications such as high-definition video links, low latency communications, and Industry 4.0 applications. The 5G Observatory team endeavour to obtain as much information on published private 5G network deployments as possible.

Based on various studies and reports, the workshop provided insights into the projected trajectory of 5G adoption in both Western and Central-Eastern Europe, outlining the expected growth in 5G subscriptions and market penetration by 2023 and beyond.

Regarding the 5G deployment forecasting progress towards 2025 presentation, Ericsson's Mobility Report of June 2023 revealed that 4G technology continued to dominate Western Europe, with a subscription penetration of 79% in 2022. However, there was significant growth in 5G subscriptions, reaching 69 million by the end of 2022 and expected to increase to 143 million by the end of 2023. The report projected that 5G subscription penetration would reach 88% by 2028. In Central and Eastern Europe, 4G subscriptions accounted for 73% of the market in 2022, with a projected slowdown until 2025, after which only 5G subscriptions were expected to grow.

The GSMA's Mobile Economy report for 2023 indicated that 5G technology was growing (11% of the European market in 2022 from 4% in 2021). It was projected to grow to 87% by 2030, with a reduced 4G market share of 13%. Overall mobile subscriber penetration was anticipated to marginally increase from 90% in 2022 to 92% by 2030, accompanied by a moderate rise in smartphone adoption from 81% in 2022 to 91% by 2030.

During the presentation, the industry's commitments to reducing emissions were emphasised, focusing on the role of 4G and 5G networks in the context of the targets set by the Green Deal. ETNO highlighted the importance of greening telecom networks through the transition toward next-generation networks, noting that the rollout of 4G and 5G networks was crucial for reducing energy usage. Decommissioning legacy networks, such as 2G and 3G, could significantly reduce energy consumption, with estimates suggesting a potential decrease of up to 40%. Furthermore, transitioning from legacy fixed networks to an all-fibre network could reduce operators' energy usage by up to 81%. Examples of network operators undertaking such transitions were provided, including A1 Telekom Austria, Deutsche Telekom, Telenor, Telefónica, Proximus, and KPN, among others.

The workshop underscored the commitments taken up by the industry to reduce emissions and highlighted the role of 5G in achieving the targets set by the Green Deal. Various initiatives and solutions introduced by major telecommunications companies, including Huawei, ZTE, and Ericsson, during the Mobile World Congress (MWC) in Barcelona in 2023 were discussed in the context of building more sustainable 5G networks.

The 19th biannual report can be found on the 5G observatory website here. An overview of 5G private networks featuring a searchable table (on the right) of major private network projects in the EU can be found here. A PowerPoint version of the latest scoreboard can be found here.

The full PowerPoint presentation by the 5G Observatory consortium is uploaded here.

3   5G trials & pilots in new application domains

Carles Anton Haro, in his capacity as a Board Member and Chair of the Trials Working Group of the Joint Undertaking Smart Network & Services, offered insights into the exploration of 5G trials and pilots in emerging application domains. The presentation discussed the lessons from the EU trial and pilot initiatives under the 5G Public Private Partnership (PPP) and the Joint Undertaking on 5G/6G Smart Networks and Services. Moreover, it assessed the viability of these projects for eventual commercial deployment.

Regarding the teleoperated driving 5GCroCo, the main focus was on achieving uninterrupted cross-border connectivity. The demonstration emphasised the need for fast handovers across different networks and countries, given the high use case demands, including high latency requirements and data collection for remote driving, such as lidar data. Bosch and Volkswagen were involved in the trials, and the conclusions highlighted the satisfactory fulfilment of the necessary conditions, with handovers between countries being almost imperceptible.

In the case of remote monitoring of workers in distribution substations, the aim was to enhance worker safety. A private 5G network was deployed, enabling real-time monitoring and triggering warnings if safety zones were breached or workers fell. The network's reliability, slice isolation, and overall performance were equivalent to that of a Wi-Fi network.

The future trajectory of the trials was outlined in three stages until 2030. Currently in phase 1, with a focus on 5G and 6G, several projects have been initiated, supported by significant funding. The discussion also touched upon the involvement of various actors and stakeholders in the trials and pilots, highlighting the importance of involving all value chain elements for successful deployments.

Notable takeaways included the critical need for involvement from the verticals at the earliest stages of development and the importance of understanding customer needs and overcoming challenges related to efficient infrastructure replacement. Slicing with SA 5G was identified as a fundamental enabler, particularly for railway verticals, enabling the creation of multiple layers for different uses.

The societal impact of 5G was deemed crucial, raising questions about investment in various verticals and the potential challenges associated with expenses and revenues in the context of new network deployments.

The focus remained on the need for real Ultra-Reliable Low Latency Communications (URLLC) and the potential applications of 5G in the energy sector, particularly in areas such as the automatic handling of energy site elements based on IEC 61850. Additionally, queries regarding the requirement for a SA 5G in the trials and pilots and the discrepancy related to MNOs' revenue sources were noted for further clarification.

Mr Anton Haro concluded with a list of key takeaways on 5G trials & pilots in new application domains. These takeaways highlighted the EU's robust and continuous investment in 5G-PPP Trials and Pilots during Horizon 2020 and the phased approach taken for 5G application in specific verticals and large-scale pilots across various sectors. The comprehensive coverage of multiple verticals, including automotive, transport & logistics, industry 4.0, public safety, e-health, media and entertainment, agriculture, and smart cities, was underscored, alongside the availability of diverse information sources like verticals' cartography and T&P brochures. Moreover, the significance of the ongoing large-scale Trials and Pilots under the 6G Smart Networks and Services Joint Undertaking was emphasised, alongside the invaluable lessons learned from early 5G deployments, which shed light on the pivotal role of verticals, key 5G technologies, and the far-reaching economic and societal impacts of 5G.

The full PowerPoint presentation by Mr Anton Haro can be found here.

4 Panel discussion – The evolving policy and market needs for 5G service deployment tracking and reporting

The moderator, Philippe Lefebvre of DG CONNECT, initiated the session, setting the stage for discussions on 5G service deployment monitoring and reporting. The panel included Sietse van der Gaast (BEREC), Edwin Fischer (Deutsche Telekom), Rosanna Ingravallo (Ericsson), Alexandre Bey (Airbus) and Ceri Howes (Open Signal).

The session focused on the future needs for monitoring 5G service deployment, both for policy-making and commercial purposes. Key topics included the annual monitoring cycle of the Digital Decade Programme and the significance of geographical mapping for assessing 5G service availability, such as Quality of Service, edge cloud reliability, and network slicing. Throughout the session, panellists provided valuable insights into these critical aspects.
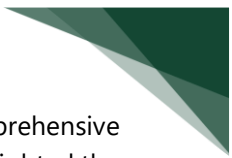
The session began with a comprehensive presentation on 5G deployment monitoring within the context of the Market & Society Needs 2030 and the Digital Decade Policy Programme. The policy cycle involves a sequential flow from these needs to the connectivity infrastructure requirements and finally to the Digital Decade targets. KPIs derived from this cycle contribute to the Network Deployment Monitoring and the Annual EC Report, guiding the State of the Digital Decade and EU Guidance trajectory to Member States. This further feeds into National Strategic Roadmaps, National reforms, and infrastructure investment planning, all while fostering ongoing engagement between the EU and Member States.

The current set of KPIs was summarised by Philippe Lefebvre, including both formal and informal metrics, such as the percentage of households served by 5G networks and the number of 5G base stations operating in various bands. Suggestions for potential future KPIs were presented, focusing on short-term goals like the percentage of households receiving mobile 5G service through minimum bandwidth and the deployment of 5G SA or 5G Core networks. Longer-term measures were also proposed, emphasising the need to evaluate 5G performance and Quality of Service from the end-user perspective through independent third-party assessments or operators' declarations.

Following the presentation, the panel discussed the current main deficiencies in the existing monitoring system, emphasising the gap in representing actual 5G performance as experienced by end users and the inadequate reflection of 5G deployment in private networks and vertical sectors. The lack of geographical mapping information for various use cases, including transport corridors, drone delivery, and public protection and disaster relief, was also highlighted as a critical concern. Discussions also revolved around the information that should be available to different user segments, such as business users, general consumers, public authorities, and specific use cases, for effective KPI reporting and monitoring of 5G network infrastructures.

Sietse van der Gaast, Co-chair of the Wireless Network Evolution Working Group at **BEREC**, contributed valuable insights into the challenges associated with defining and monitoring KPIs across different regions. He emphasised the need for standardised and consistent definitions to effectively capture the essence of 5G performance and ensure a comprehensive understanding across diverse stakeholders. His perspectives shed light on the challenges faced by national regulatory authorities and the need for cohesive methodologies to measure and monitor 5G performance effectively. The PowerPoint presentation by Mr van der Gaast can be found here.

Edwin Fischer, Vice Chair of 5G CAM WG at **Deutsche Telekom**, discussed the complexities of achieving 5G network maturity and the challenges associated with ensuring uniform deployment across diverse European regions. He underlined the importance of synchronisation among national networks and the need for cohesive cross-border strategies to facilitate the seamless integration of 5G capabilities. His perspective highlighted the multifaceted challenges of achieving a uniform 5G landscape across different regions and underscored the importance of strategic collaborations and synchronised efforts.

Rosanna Ingravallo, the Head of NW Performance & Evolution at **ERICSSON**, provided a comprehensive overview of the market trends driving the rapid deployment of 5G networks worldwide. She highlighted the growing data consumption patterns among 5G users and the need for a robust infrastructure to support the evolving demands of diverse industry sectors. Her insights underscored the crucial role of SA 5G infrastructure in driving digital transformation and the challenges faced by industry frontrunners in deploying efficient and effective 5G networks.

Alexandre Bey, the Product Manager for Connectivity at **Airbus**, highlighted the critical importance of hardware compliance and the need for collaborative efforts between public and private stakeholders. He emphasised the significance of streamlined regulatory frameworks to facilitate the integration of private networks with existing public infrastructure, ensuring a seamless and efficient operation. His input shed light on the intricate interplay between technological advancements and regulatory harmonisation, essential for successfully deploying 5G networks across different sectors.

Ceri Howes, the VP of Government and External Affairs at **Open Signal**, emphasised the need for a more comprehensive approach to 5G monitoring beyond traditional coverage-based metrics and covering end-user experience. She stressed the importance of capturing indoor connectivity metrics and providing a holistic understanding of 5G service availability. She emphasised the importance of consumer experiences and the significance of implementing robust data collection methodologies to ensure a reliable and accurate depiction of end-user experiences.

The workshop concluded with a comprehensive acknowledgement of the intricate challenges associated with 5G deployment and monitoring. The panellists highlighted the importance of fostering collaborative efforts and synchronised strategies to ensure the successful implementation and monitoring of 5G networks, ultimately contributing to realising the Digital Decade program's overarching objectives.

Annex - Agenda

10:30-10:50   **Opening remarks**
Peter Stuckmann, Head of Unit Future Connectivity Systems, DG Connect, European Commission

10:50-11:30   *Presentation of the State of 5G deployment in the EU*

- Richard Haas, PolicyTracker
- Manuel Rascado-Marti, LS telcom
- Monica Pesce, VVA

Presentation of the 5G market developments over the last twelve months by the consultants in charge of the 5G Observatory, including a comparative analysis of the deployment situation outside Europe.

11:30-11:50   **A report on 5G trials & pilots in new application domains**
Carles Anton Haro, Centre Tecnològic de Telecomunicacions de Catalunya, Joint Undertaking SNS Trials WG Chair

Presentation of the lessons learned from EU trials and pilot projects conducted in the context of the 5G Public Private Partnership and the Joint Undertaking on 5G/6G Smart Networks & Services, and assessment of potential for commercial deployment.

11:50-13:15   **Panel discussion – The evolving policy and market needs for 5G service deployment tracking and reporting**
Moderator: Philippe LEFEBVRE, Head of Sector, EC CONNECT
Panellists:

- Sietse van der Gaast, Co-chair of the Wireless Network Evolution Working Group, BEREC
- Edwin Fischer, Vice Chair of 5G CAM WG (Deployment) and Colead Task Force 5G SDA, 6G-IA/SNS, Deutsche Telekom
- Rosanna Ingravallo, Head of NW Performance & Evolution, ERICSSON
- Alexandre Bey, product Manager Connectivity for Digital Factories, Airbus
- Ceri Howes, VP Government and External Affairs, Open Signal

The session will discuss the future needs for 5G service deployment monitoring and reporting for both policy-making, especially in the context of the annual monitoring cycle of the Digital Decade Programme, as well as to address the emerging commercial needs for geographical mapping of 5G service availability (Quality of Service, reliability edge cloud, network slicing, etc.).

13:15   Closing remarks (European Commission)