HELLENIC TELECOMMUNICATIONS & POST COMMISSION

The European 5G Conference 2024

Brussels, 30 & 31 January, 2024

Session 10: Rural 5G connectivity – ensuring that nobody is left behind

Prof. Konstantinos Masselos

EETT President & BEREC Vice Chair 2024 (Outgoing Chair)

The availability of broadband internet access service is today a crucial enabler for participation in the digital economy and society. Digital divides have grown in significance, widening pre-existing inequalities and becoming a key factor of social exclusion. Hence new digital inequalities have become more evident as well as the clear realization of the importance of reducing regional inequalities and improving social cohesion. For this reason, closing digital gaps has become one of the top political priorities in Europe.

In this direction, and specifically as regards connectivity according to the European Declaration on Digital Rights and Principles "**everyone, everywhere in the EU**, should have access to affordable and high-speed digital connectivity."

In line with the European Commission's communication of 30 June 2021 entitled 'A long-term Vision for the EU's Rural Areas – Towards stronger, connected, resilient and prosperous rural areas by 2040', reliable, fast and secure connectivity for everybody and everywhere in the Union, including in rural and remote areas, such as islands and mountainous and sparsely-populated regions, as well as the outermost regions, the European Union has defined in the Digital Decade Policy Program two very ambitious objectives with regards to the development of connectivity infrastructure towards 2030: "**all** end users at a fixed location should be covered by a gigabit network up to the network termination point, and **all** populated areas should be covered by next-generation wireless high-speed networks with performance at least equivalent to that of 5G, in accordance with the principle of technological neutrality;".

Where are we today with regards to these connectivity objectives? According to the EC's Report on the state of the Digital Decade 2023 (Digital Decade Cardinal Points), fixed very high-capacity networks (VHCN) covered 73% of EU homes in 2022 from 19.5% in 2014, (following a slight increase of 3 percentage points compared to the previous year - 2021) while coverage with 5G networks reached 81% of populated areas.

Broadband coverage of rural areas remains challenging, as 9% of households are not covered by any fixed network, and 55% are not served by any fixed VHCN technology. In rural areas, VHCNs growth was stable and substantial, from 4% to 41% from 2014 to 2022. (FTTP is mainly responsible for this improvement).

Rural coverage of 5G reached 51% of populated areas in 2022 (81% overall), up from 33% in the previous year, while rural coverage using the 3.4-3.8 GHz is low - 10% (41% overall). The expansion of 5G so far has mainly

relied on the utilization of dynamic spectrum sharing (DSS), which employs non-5G pioneer bands, such as 1.8 GHz or 2.1 GHz, enabling demand-based sharing between 4G and 5G. Available forecasts predict that by 2024, 100% of populated areas in the EU will be covered by 5G networks overall.

However, further significant investments will be needed in 5G in the following directions:

- Primarily in the radio access network (i.e. building new base stations, interconnecting existing and new base stations) to improve the quality of service provided under peak time conditions also through the use of medium (C-band) and high bands (mmWave). A key challenge will be to ensure that the deployed networks support key industry sectors and critical applications that benefit consumers and businesses in all sectors.
- To accelerate the deployment of 5G stand-alone networks that allow higher throughput, lower latency and improved coverage and enable data- and bandwidth-intensive services (video streaming, AR/VR, immersive media).
- To close the large gap between total and rural 5G/VHCN coverage and address the regional disparities in digital opportunities.

It must be noted that investment challenges affect more households in the more cost-intensive suburban, semi-rural and rural areas, and remote regions (where the marginal cost of connecting a household substantially increases).

Studies estimating the investment needs to reach connectivity objectives of 2030 have been published. According to a study from WIK published in 2023, reaching the Digital Decade targets for gigabit fixed connectivity and 5G may require a total investment of up to EUR 148 billion, if fixed and mobile networks are deployed independently and a “full 5G” (offering European citizens and businesses the full capabilities that can be offered by 5G mobile networks) is deployed. A further EUR 26-79 billion in investment may be required to ensure full coverage of transport paths including roads, railways, and waterways, bringing the required total investment to more than EUR 200 billion. As 2030 approaches, the more intensive, industrial use of connectivity for internet 4.0 scenarios, and the increasing security requirements, are likely to push the investment needs even higher. Some studies also suggest that additional investments (and subsidies) may be required to support 5G use cases in more rural areas such as smart agriculture and advanced healthcare applications.

At this point it is interesting to discuss the potential contribution of 5G in our fixed connectivity objective. Even though FTTH is believed to be, the best option, if we really want our ‘2030 - Gigabit for all’ vision to have a chance for success, Fixed Wireless Access technologies need to be added in the access mix too.

Fixed Wireless Access can pick-up, where FTTH/FTTP is prohibitively expensive, either via 5G modems going stationary, or via millimeter wave radio operating over unlicensed bands. In the broader Fixed Wireless Access sense, Satellite broadband networks, including those provided by Low Earth Orbit satellites with optimized latencies, may provide yet another, very promising option. I believe that our technology neutral gigabit connectivity objective can be achieved in the most cost-efficient way using hybrid technology solutions.

In WIK’s study it is estimated that around €114bln in investment will be required to achieve the fixed Gigabit coverage goal using Fibre-to-the-Premise (FTTP), of which around €40bln would be needed in public funding. The total investment needed to meet this goal could be reduced to around €108bln including €29bln in subsidies if the most rural households (in areas with a population density of less than 30 inhabitants per square km) are served using 5G Fixed Wireless Access (FWA) connections.

Policy and regulatory action is required to address investment challenges and ensure that ambitious connectivity objectives are achieved. We need to create a friendly environment to attract investments, to promote the optimization of deployment costs (in particular civil engineering costs) and also to address the demand side in order to make networks accessible to consumers and financially viable/sustainable in the long term. After all the deployment of networks is not an objective per se – networks are the platform for the digital transformation of the citizens and the businesses.

Let's consider few ideas in this direction for the deployment of 5G networks:

1. The implementation of "development friendly" spectrum award processes/auctions should be a priority. The successful deployment of 5G networks requires that the necessary spectrum resources are assigned under investment friendly conditions, low administrative or regulatory burden and access to financing. Experience so far proves:
   - The earlier spectrum is made available for 5G, the better the coverage achieved
   - The more 5G spectrum is awarded, the greater is the 5G population coverage
   - More competitive auctions and mobile markets facilitate more investment in 5G rollout.
   - Lower consumer prices are an indication of a faster 5G network rollout.
   - The option to use legacy spectrum (e.g., with DSS) may mitigate against high auction prices but may also act as a barrier to "full 5G" rollout.
2. Active and passive network sharing, spectrum sharing or leasing (the trend is growing globally following the US example – we see it also in Europe in Germany, France and Italy), co-building/co-sharing, the set up of joint ventures to share risks and costs and selling towers to tower companies (to turn CapEx into OpEx) are some interesting options we see applied today. The European Electronic Communications Code already provides an effective framework to facilitate network sharing, which has fostered the emergence in the EU of new models such as "neutral hosts" and independent infrastructure players. 5G is likely to bring network sharing to the next level by the introduction of "network slicing" and increasing possibilities to implement multi-tenant connectivity solutions based on network virtualisation and edge cloud functionalities.
3. Regulatory frameworks such as the new GIA may also accelerate rapid 5G deployment by ensuring new possibility to access public physical infrastructure, such as public buildings' rooftops and non-network elements (e.g., street furniture, traffic lights, etc) as well as including the independent TowerCos in its scope.
4. The promotion of the model of private wholesale only providers and the application of differentiation in access regulation between rural and urban areas could also have a positive impact on investment requirements and investment incentives.

In parallel to regulatory interventions, public funding is necessary to complement private investment where needed, to adequately address market failures in compliance with the applicable State aid rules.

To close the digital divide in rural and remote areas, the EU significantly supports investments. Around 16 billion euros Recovery and Resilience Facility (RRF) reforms and investments have been approved to roll out digital connectivity networks in the next four years, especially in rural regions. Moreover, the EU will also leverage connectivity investments through the new Cohesion Funds (ERDF EUR 2.4 billion), the European agricultural fund for rural development, InvestEU and EIB loans, and, last but not least, through Connecting Europe Facility

(CEF) Digital. CEF Digital will grant 2 billion euros over 7 years for high-performance connectivity infrastructures, with the aim of leveraging between 3 and 6 billion euros targeted investments in line with the 2030 digital connectivity targets.

In addition, the Connecting Europe Broadband Fund (CEBF), an equity fund of 555 million euros, of which about 30% are from private investors is currently investing in state-of-the-art networks in predominantly greenfield areas (grey or white areas, typically semi-dense or rural areas) across the EU.

Furthermore, the Commission supports the implementation of the new Union's Secure Connectivity Programme 2023-2027 IRIS (Infrastructure for Resilience, Interconnectivity and Security by Satellite) with a budget of EUR 2.4 billion of the total cost of about 6 billion euros, which also includes satellite broadband coverage in rural areas. While not contributing directly to the achievement of the Digital Decade targets, satellites could provide resilient and flexible connectivity allowing Europe to always remain connected, including in the event of large-scale cyber-attacks.

There are also interesting initiatives in EU Member States. For example, in June 2023, Spain's Ministry of Economic Affairs and Digital Transformation announced that it would make available 500 million euros in funding for rural 5G development in the country. The project is designed to provide citizens with equal connectivity regardless of where they live and targets towns with fewer than 10,000 inhabitants.

At the same time, the EC has updated its State-aid toolbox and in particular endorsed amendments to the General Block Exemption Regulation (GBER), which have the potential to facilitate, simplify and speed up public support for the EU's digital transitions, facilitating investments in digital technologies and connectivity. This includes new possibilities for testing digital innovation hubs and experimentation facilities, ambitious connectivity projects for the deployment of fixed broadband networks, mobile networks such as 5G networks, as well as backhaul networks, to bring high quality infrastructure to areas suffering from insufficient broadband coverage, in particular in rural and remote areas. The revised GBER also exempts from notification certain aid measures in the form of a vouchers for consumers to facilitate teleworking, online education, training services or for SMEs, provided that certain conditions are fulfilled.

It is still interesting to see **how EU compares in terms of public investments to other regions in the world**. Public investment in the US has recently reached 90 billion USDs only in the context of the Infrastructure Investment and Jobs Act and American Rescue Plan. To compare, in the EU, whilst unprecedented funds have been made available to support progress towards the 2030 connectivity targets, these amount to just over 23 billion euros in grants available, under EU Programmes for the 2021-2027 programming period, including around 16 billion euros under the RRF.

As a last point I would like to note that additionally, and equally importantly to the 5G infrastructure, we also need to address the demand side (which traditionally attracts less attention). The European Union Strategy defines infrastructures as a means to the goals of promoting citizens digital skills, digital business and digital governance and not as a goal of its own. We also need real 5G applications. We need 5G in transportations, in logistics, in tourism, in industrial applications. We need 'revenues' from 5G in our economies. We need 5G to enable the manufacturing and offering of more competitive products and services. We need the 'economically contributing part' of the technology in our economies and not only the consumption related one.