

Very High Capacity and 5G Networks: from the EU code to the EU market

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In cooperation with



Summary Briefing

The workshop, held in CEPS premises in Brussels before ca 120 professionals and academics, was opened by welcomes and introductory remarks by **Stefano da Empoli** (president, I-com) and **Andrea Renda** (Head of Global Governance, Regulation, Innovation and the Digital Economy, CEPS), who synthetically described the telecoms markets liberalization process, and the evolution of the regulatory framework in Europe. According to Stefano and Andrea, competition enhancement and promotion of innovative investments have been the main objectives pursued by National regulatory Authorities (NRAs). Those could either work as completely synergic complements or somehow conflict and produce regulatory trade-offs, and indeed the regulatory and policy balance between competition and investment has changed over time. The 2018 EU Electronic Communications Code (EECC), indeed, comprises several new provisions aimed to directly facilitate



the deployment and take-up of very high capacity (VHC) fixed and mobile networks, including 5G as a crucial building block of the forthcoming digital society.

The first session of the workshop focused on **Investments for Very high Capacity Networks** and was chaired and introduced by **Antonio Manganelli** (Scientific coordinator, DEEP-IN Research Network). Antonio started his intervention describing the evolution of the balance between the different regulatory objectives, namely competition enhancement and investments promotion. Antonio believes the 2018 EU code to be an additional step of this evolutionary path, which has always taken substance by concretely defining network access regulatory remedies. Indeed, access regulation has been pivotal for the definition of priorities and objectives balance: starting from the ladder of investment (LoI) approach, based on the complementarity between short-term competition benefits and long-term investments benefits, to the new EU Code, which provides for a more efficient remuneration of risk, co-investments incentives and - in specific situations - a lighter regulation, yet maintaining high competition safeguards. The progressive policy shift from the Ladder of Investment approach was due to few crucial reasons: i.e., i) the LoI approach proved to be very effective only in the “short ladder” (pushing alternative competitors to the local loop unbundling, LLU or Sub-loop unbundling, SLU); ii) the emergence of NGANs/VHCNs implied paramount investments, much more geographically differentiated than in the last decades, thus re-expanding market areas and segments where infrastructure competition is not feasible/desirable; iii) not all the new relevant market dimensions were covered by the LoI, i.e., regulation is no longer focussing only on downstream competition (service-based vs facility-based competition), but also on upstream competition vs upstream cooperation, which will prove to be very relevant also for 5G networks and equipment. According to Antonio, this is the complex situation which the new code is supposed to tackle, and in which must be implemented at national and EU level. [Presentation here.](#)



Carlota Reyners Fontana (Head of Unit, Investment in High-Capacity Networks, DG CNETC - European Commission) presented an overview of the 2018 EU code and described its main provisions helping to shape the right environment for digital networks and services to flourish as part of the EU Digital Single Market. In particular, Carlota focused on the code's provisions that, on one side, facilitate the roll out of very high capacity networks through increased competition and predictability for investment and, on the other side, lay the groundwork for the deployment of 5G across Europe by more coordinated and efficient spectrum management.

As for access regulation, Carlota highlighted that the new code put a clear emphasis on access to civil engineering (Art. 72), such as masts, ducts and cabinets, in order to lower deployment costs and stimulate infrastructure-based competition. In this regard, the Code provides possibility for NRAs to impose access to civil engineering assets, as a stand-alone remedy (when it is owned by SMP operators). Moreover, she touched upon the new provisions dealing with co-investments in very high capacity network, which allows rival operators to share risk, while deregulating SMP operators under strict conditions. Another aspect of the new code that Carlota considered crucial is related to enhanced symmetric obligations, Art 61(3), which NRAs can impose in order to tackle network replicability issues, without compromising the SMP regime. Finally, Carlota talked about the lighter regulatory treatment reserved by the Code for SMP wholesale-only operators (Art. 80). As for spectrum management, Carlota focused on the assignment deadlines for 5G Pioneer Bands (Art. 54) and on the duration and renewal of rights (Art. 49 and 50), which aims to ensure investment predictability and stability. Furthermore, she emphasises the peer review process under art 35, which aims to provide consistency and predictability in authorisations as well as exchange of experience and best practices. Finally, she emphasises the provision regarding small area wireless access points (Small Cells) (Art.57), which are extremely important because they will massively and rapidly be needed and used by dense 5G networks. Carlota underlined in this regard that Commission Implementing Act will define by June 2020 the physical and technical characteristics, such as maximum size, weight, and where appropriate emission power of small-area wireless access points. [Presentation Here.](#)

Annegret Groebel (Head of International Office, BNETZA) focused her intervention on the new EECC provisions to facilitate VHCNs investments, starting from the new "connectivity" objective which will affect the final balance of all objectives including competition promotion. According to Annegret, some important questions are related to both efficiency and fairness, e.g., what impact will these provisions have on competition? On the different kinds of competition (upstream vs downstream)? And on final consumers? Annegret underlined how the new code provisions would somehow empower NRAs to pursue industrial policy objectives which is not what they have been established for. For example, SMP-Regulation (Art. 63 and following) stays in principle, but for certain situations NRAs shall abstain from imposing any regulatory obligation (so-called "regulatory forbearance"). Furthermore, Annegret underlined that overall NRAs competencies are strengthened and have an enlarged toolbox, which they can however use within very complicated procedures (e.g., the double lock veto in 2 cases). According to Annegret regulatory processes get more complicated reflecting the more complex landscape with different market players. In fact the revised framework takes account of market developments such as OTT's services by including these services into the definition of Electronic Communications Services (ECS) and make them subject to a number of (not all) obligations, with the aim to create a level playing field. [Presentation Here.](#)

Harald Gruber (Head of Digital Infrastructure Division, European Investment Bank) outlined the investment requirements to meet the targets of the Digital Agenda for Europe (DAE) and the European Gigabyte Society (EGS) and what are the financial challenges for companies to meet those EU and national policy objectives. According to Harald analysis, the additional investments required for the policy targets in EU amount to 384 bn €. Five countries make up 71% of the total investment need: France (24%), Italy (16%), Germany (14%), UK (11%), and Spain (7%). On the other side, 8 countries reached DAE targets in 2018, that is Malta, Cyprus, Luxembourg, Latvia, Denmark, Portugal, Belgium and the Netherlands. Harald then focused on the relationship between private and public investments and on the fact that there is a consistent investment gap, not covered by private investment, to reach the targets of the DAE and the EGS. According to Harald, expected private investments relevant for the DAE and EGS targets until 2025 amount to ca 130 bn € which cover (only) 33% of total investment needs, remaining ca. 254 bn € investment gap for public funding. Harald then drew some conclusions: firstly, gigabits Society targets for VHC networks are far beyond what market forces can deliver; secondly, investment gap needs to be fulfilled with a substantial degree of public support; thirdly, state aid can be used to mobilise private investment; fourthly, state aid guidelines for broadband need revision for VHC networks; fifthly, there is a high risk of failing to meet the Gigabit Society goals. [Presentation Here.](#)

Francesco Nonno (Head of Regulatory Affairs, Open Fiber) is of the opinion that the EECC is changing the traditional regulatory trade-off between competition and incentives to investments. Indeed, NRAs are entrusted to provide regulatory measures aimed at fostering investments in ultra-broadband infrastructures.

As for private investments, Francesco outlines the main questions relevant for a potential investor: What price level can be expected in the near future? What level of average cost is sustainable with this pricing? How much of existing infrastructures can be re-used? Which areas can be covered with this average cost and this expected level of re-usage? As for the FTTH business case, in Francesco’s opinion



the deployment of a “full fibre” network is quite costly, so NRAs will have to find a difficult balance between reducing market failure areas (allowing a fair return on investment) and guaranteeing that retail operators can compete with the incumbent. As for Private vs Public investment, Francesco emphasised as regulated prices act as an anchor price for VHC Networks, therefore NRAs’ choices have a relevant impact on investment and by itself cannot guarantee both the DEA AND EGS policy targets on one side and Universal Service on the other. That’s why national deployment of a “full-fibre” network requires a strong coordination among policy objectives and regulatory interventions. Finally, Francesco stressed that in his opinion incumbents have no incentives to accelerate

investment in VHC Networks, unless they are pushed by competitive pressure and that also in this regard the “Wholesale-only Model” seems beneficial to the VHC infrastructure deployment. [Presentation Here.](#)

Maarit Palovirta (Director of Regulatory Affairs, ETNO) emphasised that the all telecoms industry should now focusing on a good and timely implementation of EECC to create a favourable environment for investments. In particular, “good” implementation means an implementation that is technologically neutral; that is endorsing various business models and approaches; and creates alignments and synergies with other existing policy frameworks at national and EU level. That’s the way in ETNO’s view for maximising investments. Moreover, “timely” means that there is no time to be wasted, as the telecoms industry need to act already during the implementation period in order to realise the Gigabit Society goals. Nevertheless, Maarit believes that EECC is not enough to promote investments in VHCN, as demand generation through market dynamics, innovation and complementary policy frameworks are the key-enabling aspects. At present there are new competitive scenario: i) telecoms operators are now facing competition from non-traditional players; ii) investment per capita lower in Europe than in the USA and Japan; iii) spend per capita on telecoms services equally lower in Europe than in the USA and Japan. Overall, Maarit stressed that if a quick and extensive VHCNs roll-out is a strategic goal and interest for Europe, a coherent industrial vision for digitizing Europe is needed.

The second session of the workshop focused on **5G spectrum and infrastructures**, which are supposed to drive a significant market and industrial transformation in Europe and all over the world. Within this forward-looking context, policy makers and regulators are seeking to deliver measures to encourage long-term investments in 5G networks. On the other side, market players are trying to understand how to shape their business and investment strategies in order to respond to these fundamental transformations. These policy and industrial objectives are related to many different questions, which were introduced by **Antonio Manganelli** and **Lorenzo Pupillo** (Associate Senior Research Fellow, CEPS), in particular in relation to i) 2018 EECC regulatory provisions (e.g., how and to what extent do the new provisions help in smoothing the path to 5G deployment?); ii) spectrum policy (is there a general best-practice for spectrum licensing? And, specifically for small cells? What authorization model would be better for 5G deployment in mmWave bands?); iii) direct public intervention (how and to what extent can public financing fill investment gaps?); iv) and industry value chains (What will be the actual role of new players and/or alliances in the different 5G business models? What (vertical industries, or OTT) will be these new players? How will these changes affect profitability and investment strategies?)

Peter Stuckmann (Head of Unit, Future Connectivity Systems, DG CNET – European Commission) outlined what he thinks are the main 5G opportunities and challenges: i) “factories of the future”, e.g., time-critical process control, non-time critical factory automation; remote control; intra/inter-enterprise communication; connected goods; ii) energy grids, including access, backhaul and backbone; iii) automotive industry, e.g., automated driving; digitalisation of transport and logistic; information society on the road; iv) e-health, e.g., assets and intervention management in hospital; medical robotics; remote health monitoring; smarter medication; v) media and entertainment., ultra-high fidelity media; on-site live even experience; user and machine generated contents; immersive and integrated media; collaborative gaming.

Peter then described the main steps of the EU 5G Action plan, starting with early 5G launch in selected areas in 2018, passing through the commercial launch of services in at least one major city for each member state by 2020 and getting by 2025 to have 5G in all urban areas and main transport paths. Peter underlined that within this policy path, the EECC aims to promote investment and timely deployment of 5G networks and services by introducing i) harmonised principles and criteria for authorisation regimes and sharing conditions; ii) a reference framework on conditions and fees for rights of use and design of assignment processes; iii) a peer review to achieve internal market consistency on spectrum authorisation by building on country best practice; iv) promotion of spectrum trading and leasing; v) coordinated timing of 5G spectrum assignment; vi) common assignment deadline for 5G pioneer bands (i.e., December 2020); vii) sufficiently long duration of rights for 5G harmonised spectrum (i.e., 20 years of regulatory predictability); viii) facilitation of small cells deployment and RLAN access (i.e., removal of administrative obstacles and undue restrictions). Finally, Peter described the current situation as for the progress toward 5G market introduction: at the moment 10 member states published 5G roadmaps and 147 5G trials have been launched in the all 28 member states. As for the spectrum auction, 13.9% of the 5G pioneer spectrum bands have been assigned and are usable in 2020. [Presentation Here.](#)

Antonio Nicita (Commissioner in AGCOM and Professor of Economic Policy, University of Rome “La Sapienza”) focused on the relevance of standards and harmonisation in 5G ecosystem and on the crucial role of FRAND_SEP to foster innovation. Antonio gave a synthetic yet comprehensive overview about investments, standards and regulation necessary for the deployment of the 5G ecosystem. Antonio started his intervention from the current situation by outlining few “where-we-stand” key-words, that are i) harmonization; ii) assignments; iii) pilot and trials; iv) 4.5 G and new services; and v) new devices. Antonio then focused on some (potential) mistakes and risks



characterising the path toward 5G: firstly, he emphasised that “as the good old days” is not anymore an effective approach; secondly, he stressed the risk implied by fighting “on” standards rather than fighting “for” standards; thirdly, Antonio put emphasis on the horizontal/vertical boundaries uncertainties in the overall industry, including big data sharing and use; fourthly, Antonio stressed the complementary role of rivalry and cooperation in enhancing total (social and societal) value. Compared to the present situation, Antonio described his vision about 5G public policy, that is, a new horizontal/vertical (holistic) digital ecosystem; spectrum and Infrastructure sharing, including club use; open standardization and interoperability; cybersecurity. All these aspects will be leading toward what Antonio called 5G co-opetition, that is defining clear yet dynamic boundaries for

competition and cooperation, which will enhance ex-ante interaction and market definition and avoid ex-post litigation (opportunism, hold up). According to Antonio co-competition should be implemented by a light-handed regulatory approach comprising: a Fair, reasonable, and non-discriminatory (FRAND) access to Standard essential patents (SEPs); Spectrum & Infrastructure sharing; Horizontal/vertical standard and use; Best practices on 5G, B2B, B2C; Pro-competitive cybersecurity rules; Ne(x)t neutrality rules; and a 5G Agenda setting for services and outcomes. On the other side, public policy should explicitly and effectively tackle administrative burdens; partially re-investing 5G Auctions income, funding local (national and regional) projects aimed at reducing digital divide and supporting and enhancing users' demand. [Presentation Here.](#)

Luigi Arditò (Senior Director, Government Affairs, Qualcomm) focused on the leading role that Qualcomm have played on mobile innovation for over 30 years, namely nowadays when 5G is transforming industries by connecting virtually everything at the wireless edge. According to Luigi

5G will address the insatiable demand for mobile broadband, i.e., over 60x growth in mobile data traffic from 2013 to 2024. In 2024 Monthly global mobile data traffic will be around 1368 Gigabytes; 75% of mobile data traffic from multi-media creation & consumption; 25% of mobile data traffic will be carried by 5G networks (1.3x more than 4G/3G/2G traffic today). Afterwards, Luigi



described the 5G roadmap and ecosystem expansion: from today's 5G NR field trials to eMBB deployments in both mmWave and sub 6 GHz in 2020 and then to get to new 5G NR technologies to evolve and expand the 5G ecosystem in 2021/22. Luigi then stressed that an effective spectrum management is critical for 5G success, and that all spectrum types and bands must be used. In particular, licensed spectrum, exclusive use over 40 bands globally for LTE, remains the industry's top priority. New shared spectrum paradigms are important, e.g., 2.3 GHz Europe / 3.5 GHz USA; Shared use of unlicensed spectrum, e.g., 2.4 GHz / 5.9 7.1 GHz / 57 71 GHz global. Finally, Luigi believes that 5G NR mmWave is bringing new waves of opportunities: for outdoor deployments, it significantly elevates today's mobile experience and deployments predominantly driven by mobile operator (initially focusing on dense urban); whereas for indoor deployment, it is complementing existing wireless services provided by Wi-Fi and is bringing superior speeds and virtually unlimited capacity for enhanced experiences. Overall 5G NR mmWave is creating great additional value for the mobile ecosystem and therefore it is necessary a systemic approach to the mobile mmWave challenge: i) cutting edge R&D (Overcoming numerous challenges to make mmWave viable for mobile use cases); ii) prototyping while driving standards (validating mobile 5G NR mmWave

technologies, feedback loop to standards); iii) advanced network and system simulations (accurately predicting mmWave coverage, capacity, performance using real network models) ; iv) broad interoperability testing and trials, fully utilizing prototype systems and our leading global network experience) ; v) cutting edge modem and RFFE solutions (Announced the Qualcomm Snapdragon X50 5G modem family & QTM052 antenna module). Luigi ended his intervention by highlighting that 2019 is the year of 5G, as deployments are happening in all regions across the globe, and in a much faster fashion than 4G. [Presentation Here.](#)

Ralf Nigge (Head of EU Regulatory Policy, Deutsche Telekom) talked about the 5G spectrum auctions that took place in Europe in the last year. Ralf made a benchmarking analysis of the different awarding conditions. According to Ralf, a high heterogeneity of auction design risk to jeopardise Europe's 5G positioning. Furthermore, Ralf described the main characteristics of the auctions that have negatively affected the auction outcomes and finally market dynamics and 5G investments: i) high reserve prices; ii) asymmetric lot sizes; iii) reservation of band for verticals and new entrants causing artificial scarcity; iv) regional assignment creating fragmentation and need of an enhanced coordination; v) ex-post regulatory obligations posed on winners, such as obligations to give access to third parties, coverage and roaming obligations. The European best practice, according to Ralf, is the Finland case, where 3 block of 130 MHz each in 3,4-3,8 GHz were assigned, 700MHz assigned close to reserve price, with no obligations.

Tiziana Talevi (Head of Regulation, Fastweb) started her intervention by trying to shade some lights on the definition of VHCNs, namely trying to clarify whether Fixed Wireless Access (FWA) should be included in the scope. Tiziana emphasised the fact that the forthcoming BEREC Guidelines for VHCNs definition should be based on technological neutrality principles; in other words, the BEREC Guidelines should identify future-proof objectives and criteria based on quantitative parameters, and not on technical solutions, or on specific standards. Afterwards Tiziana stressed that 5G networks must qualify as VHCNs, since 5G parameters (i.e., latency, peak data rate, number of devices) will allow performances and quality fully comparable to FTTH networks. Finally Tiziana focused on Fastweb 5G trials and that their first step is exactly to deploy FWA which will enable connectivity up to 1 Gbps, thus representing a compelling alternative to FTTH. Tiziana, finally, underlines that infrastructure-based competition remains the real driver for NGANs' investments and that's why it is necessary a technologically neutral and future-proof criteria for VHCN definition in order to ensure sustainable and durable infrastructural competition. [Presentation Here.](#)