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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

**Connectivity for a Competitive Digital Single Market - Towards a European Gigabit
Society**

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1. INTRODUCTION

Over the last decade EU electronic communications policy has been successful in delivering more competition, lower prices and more choice for businesses and consumers. However, consumers and businesses still face fragmentation of the electronic communications markets along the national borders and the current regulatory framework has not systematically favoured deployment by all market actors of very high-capacity networks.

Furthermore, significant changes have taken place within the electronic communications sector since the EU telecoms regulatory framework was last revised in 2009. Patterns of consumption and needs are radically changing, with voice telephony increasingly replaced by fixed and mobile Internet access, delivered to a range of connected devices (smartphones, tablets, computers, TV) and offering access to an ever-increasing array of digital services¹ which place ever-increasing demands on the networks over which they are provided. And even more is needed in the years to come as services and applications based on the Internet of Things, cloud computing and virtual and augmented reality develop and grow.

The full economic and social benefits of this digital transformation will only be achieved if Europe can ensure widespread deployment and take-up of very high capacity networks, in rural as well as urban areas and across all of society. One of the main aims of the European Commission's Digital Single Market Strategy of May 2015 was therefore to create the right environment and conditions for the deployment of advanced digital – very high-capacity – networks. Since the telecoms sector today is an enabler for the entire digital economy and society, Europe needs to act quickly to secure its future global competitiveness and prosperity.

In January 2016, the European Parliament² underlined the role of private investment in Internet connectivity networks for digital progress and the role of a stable regulatory framework in enabling all players to invest in all areas, including rural and remote ones. Likewise the European Council called in June 2016 for very high-capacity fixed and wireless broadband connectivity across Europe, as a precondition for future competitiveness, and for telecoms regulatory reform to incentivise major network investments while promoting effective competition and consumer rights³.

This Communication confirms the importance of Internet connectivity for the Digital Single Market and the need for Europe to deploy now the networks for its digital future. To this end, it sets out a vision for a European Gigabit society, where availability and take-up of very high capacity networks enable the widespread use of products, services and applications in the Digital Single Market. This vision is operationalised through three strategic objectives for 2025: for Europe's growth and jobs, Gigabit connectivity for places driving socio-economic developments; for Europe's competitiveness, 5G⁴ coverage for all urban areas and all major terrestrial transport paths; for Europe's cohesion, access for all European households to Internet connectivity offering at least 100 Mbps.

To help make this vision a reality, this Communication proposes a series of initiatives designed to establish the right conditions for the necessary investments to take place, primarily to be achieved by the market. These consist of a major reform of the regulatory

¹ For example social networks, mobile gaming, apps and video streaming, ongoing digitisation of economic activity and public services, IP-based voice and messaging applications and remote storage and retrieval of data for consumers and businesses.

² European Parliament resolution of 19 January 2016 on Towards a Digital Single Market Act (2015/2147(INI)).

³ European Council conclusions, 28 June 2016 (EUCO 26/16).

⁴ 5G refers to the next generation of network technologies offering prospects for new digital economic and business models.

framework for electronic communications, in the form of the accompanying legislative proposal for a European Electronic Communications Code (the Code)⁵ and BEREC Regulation, an Action Plan on 5G connectivity for Europe⁶ and further policy and financial measures, at Union, national and local levels, including a "Wi-Fi for Europe" initiative to promote widespread availability of Wi-Fi connections for citizens across the EU. The aim is to boost Europe's digital economy and competitiveness, encourage communities to be active participants in the Digital Single Market and to meet Europeans' growing connectivity needs.

2. NEED FOR HIGH-PERFORMANCE INTERNET CONNECTIVITY IN THE DIGITAL SINGLE MARKET

In 2010, the Digital Agenda for Europe defined objectives for connectivity by 2020: universal availability at 30 Mbps, to ensure territorial cohesion, and subscriptions at 100 Mbps by at least 50% of European households, to anticipate future competitiveness needs.

By mid-2015, fixed networks offering at least 30 Mbps were available to 71% of homes across the EU, up from 48% in 2011⁷. Almost half of EU homes were covered by networks capable of providing downlink speeds at 100 Mbps. Subscriptions at 100 Mbps+ are growing sharply, from a low base: 11% of all homes had such subscriptions by mid-2015. The growth trend is more pronounced in Member States with the highest 100 Mbps subscription rate, suggesting a virtuous take-up circle. However, there are still substantial differences between Member States, and between urban and rural areas, in both coverage and take-up.

While basic broadband⁸ is available to every European, mainly enabled by legacy infrastructures, this is no longer good enough for the ongoing digital transformation. Around half of Europeans own a smartphone, but cannot use its full potential because of major gaps in mobile data coverage and quality⁹.

Within the next 10 years, up to 50 billion objects, from homes to cars and watches, are expected to be connected worldwide – the great majority of them wirelessly¹⁰. Transformative solutions based on Internet connectivity - including cloud computing, Internet of Things, high performance computing and big data analytics – will transform business processes and influence social interactions. Next generation TV is likely to be a significant driver of bandwidth demand for households in the coming years. New digital applications - like virtual and augmented reality, increasingly connected and automated driving, remote surgery, artificial intelligence, precision farming – will require the speed, quality and responsiveness that can only be delivered by very high-capacity broadband networks.¹¹

⁵ Proposal for a Directive of the European Parliament and of the Council establishing the European Electronic Communications Code

⁶ Commission Communication "5G for Europe: An Action Plan".

⁷ Digital Economy and Society Index: the coverage of fixed basic Next Generation Access (NGA) technologies (with download speeds of at least 30 Mbps).

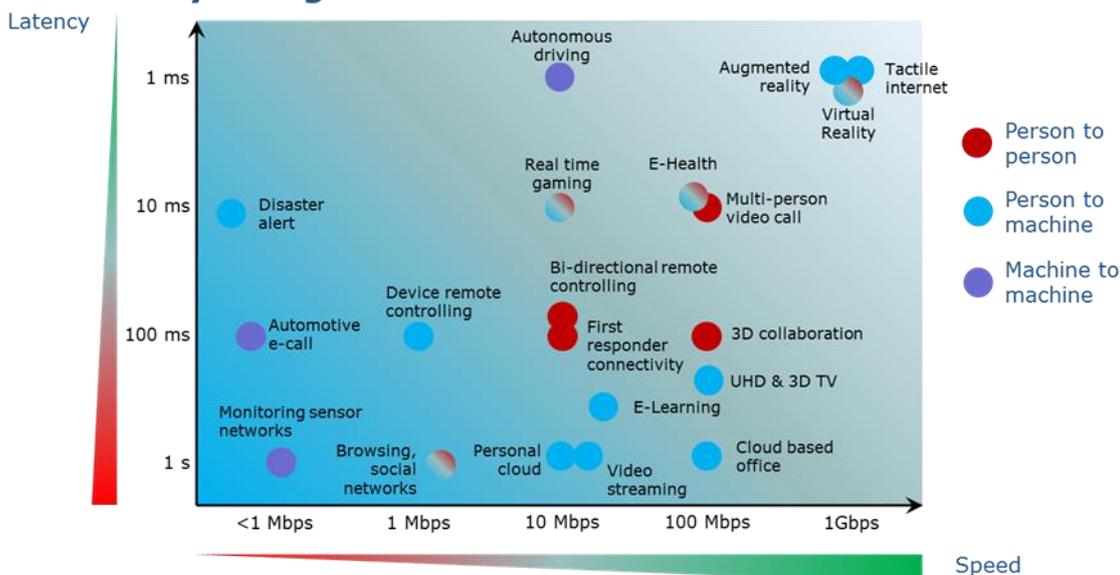
⁸ At a speed of at least 2Mbps.

⁹ GSM Association: http://www.gsmamobileeconomy.com/GSMA_Global_Mobile_Economy_Report_2015.pdf, p. 8 and 13.

¹⁰ Separate reports by Ericsson, Cisco, GSMA and Gartner foresee a massive increase in such connected objects. See section 2.2. of the accompanying Staff Working Document.

¹¹ "Very high-capacity network" means an electronic communications network which either consists wholly of optical fibre elements at least up to the distribution point at the serving location or which is capable of delivering under usual peak-time conditions similar network performance in terms of available down- and uplink bandwidth, resilience, error-related parameters, and latency and its variation. Network performance can be considered similar regardless of whether the end-user experience varies due to the inherently different characteristics of the medium by which the network ultimately connects with the network termination point.

Need for speed and latency for use of applications and services by a single user



Source: Commission analysis based on GSMA and EIB

The graph above illustrates the need for Internet connectivity speed and responsiveness for a single use of an application or a service. This need increases for multiple uses, which have become the norm since a single user often has simultaneous uses (e.g. watching TV and using social networks) and a single connection often serves multiple users simultaneously (e.g. for households with children, SMEs and organisations like schools and libraries).

Analysis of trends in technology and demand indicates that provision of many products, services and applications will only be sustainable where optical fibre networks are deployed up to a fixed or wireless access point close to the end user¹². Fibre cables are currently also the recommended medium for the link between the core network and the final sub-networks for 5G wireless access¹³.

The European Commission's public consultation on the needs for Internet speed and quality beyond 2020 and measures to fulfil these needs by 2025¹⁴ reveals clear expectations for the quality of service of fixed Internet connectivity to improve by 2025, especially regarding downlink speed¹⁵ (above 1 Gbps) and responsiveness (less than 10 milliseconds), and confirms the increasing importance of features other than download speed¹⁶ for both fixed and mobile connectivity. These expectations are increasingly being reflected in Member States' national broadband plans¹⁷.

¹² Optical fibre transmits signals at the speed of light, and has an efficiency range for delivering quality, symmetrical connections over dozens of kilometres. The most promising copper-enhancement technologies currently have an effective range of c. 250 metres, and rely on fibre in the rest of the network. Upgraded cable (HFC) networks, using the DOCSIS family of standards to enhance performance, rely on fibre at least as far as the so-called optical node.

¹³ Also known as "backhaul". See point 4.3 in the 5G Action Plan.

¹⁴ The public consultation took place from 11 September to 7 December 2015. A full synopsis report is available at <https://ec.europa.eu/digital-single-market/en/news/full-synopsis-report-public-consultation-needs-internet-speed-and-quality-beyond-2020>.

¹⁵ 59% of respondents think they will need fixed download speeds above 1 Gbps in 2025; only 8% think they will need download speeds below 100 Mbps in 2025.

¹⁶ A large number recalled the importance of upload speeds and symmetry.

¹⁷ Austria, Belgium, Denmark, Finland, France, Luxembourg, Slovenia, Sweden, see Figures 22 and 23 in the accompanying Staff Working Document.

The state of broadband connectivity in Europe and the current trends in its modernisation will not fulfil the growing needs for better and faster Internet, enabled by very high-capacity networks. They are needed for citizens and businesses to develop, deliver and enjoy online goods, applications and services across Europe. The success of e-commerce, the reliability of e-health applications, the user experience of video and audio content in gaming and streaming all depend on the quality of networks.

Very high-capacity networks are also necessary to maximise the growth potential of our European digital economy. Instantaneous transmission and high reliability will allow hundreds of machines to cooperate in real-time in industrial, professional or domestic settings. Ubiquity will allow cars to drive autonomously. Responsiveness and reliability are key factors enabling doctors to conduct surgery remotely and for cities to adapt energy consumption or traffic lights to reflect real-time needs. High upload/download speeds will allow businesses to hold high definition (HD) videoconferences with multiple participants in different locations or to work on common software in the cloud. Students will be able to follow courses provided by universities, located in other Member States.

Very high-capacity networks are needed to ensure territorial cohesion, for every citizen in every community across Europe to be part of and to benefit from the Digital Single Market.

For Europe's growth, jobs, competitiveness and cohesion, very high-capacity networks are becoming a necessity. In order to define more precisely what Europe's future Internet connectivity should look like, this Communication establishes a set of objectives for network deployment by 2025. They aim at building a Gigabit society, relying on very high-capacity networks, that will ensure the benefits of the Digital Single Market for all.

3. SETTING A VISION AND OBJECTIVES FOR FUTURE INTERNET CONNECTIVITY IN THE DSM

The targets set by the Digital Agenda for Europe show the benefits of establishing long-term objectives as they have progressively become a reference point for public policy, e.g. for the rules and guidelines concerning the European Structural and Investment (ESI) Funds, the Connecting Europe Facility (CEF) and State Aid for Broadband. Although non-binding, almost all of the Member States' National Broadband Plans have by now embraced those objectives¹⁸. Private sector investment plans and research and innovation efforts are often also aligned with the objectives.

While the 2010 connectivity objectives remain valid up to 2020 and have provided a stable policy outlook over ten years, matching the time horizon for infrastructure investments and the technological developments and future needs identified above, now calls for complementary longer term objectives. They will serve as a measurable and achievable benchmark for decision makers in the private and the public sector, building on and boosting existing network investments up to and beyond 2025.

3.1. Gigabit connectivity¹⁹

To optimise investment in new very high-capacity networks, it is important to calibrate priorities. Physical places or online hubs where people gather or visit to learn, to work and to

¹⁸ See section 3.2 of the accompanying Staff Working Document.

¹⁹ Gigabit connectivity is to be understood as cost-effective symmetrical Internet connectivity offering a downlink and an uplink of at least 1 Gbps.

access public services and where a single connection provides Internet to multiple users drive socio-economic developments. Such places are the backbone for growth, education, innovation and cohesion in Europe; in addition to businesses, they typically include schools and libraries, research centres, and various public services. In a digital world, they have to be at the cutting edge of Gigabit connectivity, to provide access to the best services and applications for European citizens.

Innovative ways of teaching and learning²⁰ need Gigabit connectivity to benefit from up-to-date learning materials, tools and techniques and equip students with digital skills. Already today, to take full advantage of the available educational services on-line, a school of 20 classes with 25 students each would need speeds of 700 Mbps for simultaneous use.

A growing number of businesses and industries, particularly digitally intensive enterprises²¹, will need Gigabit connectivity to create new applications and business models to produce, distribute and sell their goods and services more competitively. From manufacturing systems to ordering and delivery processes, from data storage and analytics to internal and external communications, their future competitiveness requires cost-effective access to such connectivity.

As public services are increasingly going online, public administrations need Gigabit connectivity to provide seamless services to many citizens and businesses in parallel. For transport hubs, Gigabit connectivity facilitates the use of intermodal transport based on innovative applications.

As a positive side effect, by offering citizens a chance to try and test the most advanced digital tools, including by offering access to the Internet via publicly available Wi-Fi connections, places like libraries, train stations or employment and training offices can also foster familiarity with and demand for Gigabit Internet access.

Providing Gigabit connectivity to such focal points – e.g. at least 200,000 schools and, 200,000 public authority buildings, as well as business parks where smaller enterprises cluster - will reach significant numbers of users while containing costs, and will have positive spill-over effects on the wider economy and society. It is likely to stimulate the extension of local fixed networks, which in turn will support improvements in 5G wireless coverage by providing greater backhaul capabilities. Both of these effects should lead to better commercial fixed and mobile offers for a greater number of smaller enterprises and households, while end users' exposure to competitive offers delivered over very high-capacity networks is likely to spur demand, thus improving the economic case for further investment²². Investments in Internet connectivity for these socio-economic drivers will therefore benefit a much bigger potential number of users in the European digital economy and society.

Strategic objective for 2025: Gigabit connectivity for all main socio-economic drivers such as schools, transport hubs and main providers of public services²³ as well as digitally intensive enterprises.

²⁰ Opening up Education: Innovative teaching and learning for all through new Technologies and Open Educational Resources, COM(2013) 654

²¹ Enterprises with a high level of integration of digital technologies, like electronic information sharing or social media

²² For evidence that in the telecom sector, demand responds to supply, and that limited downlink and uplink speeds may restrict the types of usage and applications that might otherwise emerge, see section 2.2 of the accompanying Staff Working Document.

²³ Covering: e.g. primary and secondary schools, train stations, ports and airports, local authority buildings, universities, research centres, doctors' surgeries, hospitals and stadiums.

3.2. High performance 5G connectivity

In addition to increasingly demanding connectivity for media applications, professional-grade communications in industrial and service sectors such as automotive, transport, manufacturing, health as well as next generation safety and emergency services will require a seamless, shared, fixed and wireless infrastructure which offers a range of customer-controlled levels of reliability and quality of service, tailored to specific business needs.

5G communications will build on 4G mobile data connectivity as well as on fixed networks – allowing currently separate infrastructures to integrate their services into high-quality, global, ubiquitous and programmable "virtual networks". It will require early exploitation of EU-harmonised radio spectrum, rapid availability of new spectrum like the 700 MHz band for rural coverage and indoor use in cities, and better coordination of spectrum assignment across Europe²⁴ to attain early leadership, as well as widespread fibre networks for very high capacity backhaul from masts and small cells.

The anticipated new services will share core infrastructure and a common 5G technology and will allow users and objects "on the move"²⁵ to remain fully connected at all times, in urban transport, along inter-city corridors, or even in the air (e.g. drones for logistics). Industrial zones, road corridors and train connections are expected to be key areas for the first phase of new applications²⁶. The viability of some of these new applications will require the availability of 5G services simultaneously in all Member States to enable service continuity across borders and sufficient economies of scale. Therefore, the Commission proposes below a common intermediate objective to support the common timetable for network deployment proposed in the 5G action plan.

A recent study²⁷ estimates that successful deployment of 5G could bring about EUR 113 billion per annum in benefits in four industries (automotive, healthcare, transport and utilities), with benefits widely spread over business, consumers and wider society. In addition, 5G deployment could support the creation of more than two million jobs in the EU.

Strategic objective for 2025: All urban areas²⁸ and all major terrestrial transport paths²⁹ to have uninterrupted 5G coverage.

Intermediate objective for 2020: 5G connectivity to be available as a fully-fledged commercial service in at least one major city in each Member State, building on commercial introduction in 2018.

3.3. Improved connectivity in rural areas

In most rural and remote areas Internet connectivity can play an essential role in preventing digital divide, isolation and depopulation by reducing the costs of delivery of both goods and services and partially compensating for remoteness. Businesses can reduce costs through video-conferencing, access to online administration, e-commerce, or data storage in the

²⁴ In line with the proposed Code.

²⁵ 5G will co-exist seamlessly with complementary technologies already being deployed, e.g. for short-range communication for vehicle-to-vehicle and vehicle-to-infrastructure (ITS-G5).

²⁶ For terrestrial transport paths, and depending on the considered transport service, account will be taken of ongoing investments in C-ITS technologies while ensuring coordination with relevant stakeholders, Action 4 of the 5G Action Plan

²⁷ Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe, SMART 2014/0008

²⁸ As per definition: http://ec.europa.eu/eurostat/statistics-explained/index.php/European_cities_%E2%80%93_the_EU-OECD_functional_urban_area_definition.

²⁹ Motorways, national roads and railways, in line with the definition of Trans-European Transport Networks.

cloud. Rural development and modern agriculture rely increasingly on online applications supporting tourism, sensor monitoring of crops and use of drones in trade and agriculture.

All European households, rural or urban, should have access to a minimum level of fixed or wireless connectivity. To be considered adequate in 2025, the connectivity will need to be of a much higher capacity than it is at present. Today, as Europe rolls out next generation fixed networks and 4G mobile, rural areas are lagging behind in both respects.

Covering the last 5% of homes and businesses remains the greatest challenge, but a cost-efficient upgrade path is possible based on wireless as well as fixed-line solutions. Building on the Digital Agenda for Europe 2020 targets, 100 Mbps connections should be made available to all households by 2025, with a further development path to higher capacity data provision. This objective is to be seen against a wider ambition that there should be access to mobile data connectivity throughout the territory, in all places where people live, work, travel and gather.

Strategic objective for 2025: All European households, rural or urban, will have access to Internet connectivity offering a downlink of at least 100 Mbps, upgradable to Gigabit speed.

4. DELIVERING GIGABIT INTERNET CONNECTIVITY FOR THE DSM

Reaching the above vision and objectives for 2025 is estimated to require an overall investment of c. EUR 500 billion over the coming decade, representing an additional EUR 155 billion over and above a simple continuation of the trend of current network investment and modernisation efforts of the connectivity providers³⁰.

The policy and legal framework for investment therefore needs to be adapted to provide the conditions within which this additional investment can take place in a cost-effective way.

4.1. A regulatory framework fit for connectivity

The 2002 EU Telecom regulatory framework focused on creating competitive markets, opening up bottlenecks and enabling access to key infrastructure. It has greatly facilitated market entry and ensured more competition, lower prices and better quality of service to consumers and businesses. While continuing to safeguard competition, end-user choice and the appropriate level of consumer protection, the rules for the next decade will simplify regulatory intervention where possible and do more to bring about stable and consistent conditions for investors, operators and service providers in the internal market. These rules will also provide stronger incentives for primarily market-funded roll-out of very high-capacity fixed and mobile networks by a variety of different actors, both incumbents and challengers, while facilitating take-up through continued competition and choice. This enlarged challenge and the strategic objectives set in this Communication are therefore reflected in the regulatory objectives proposed by the Commission in the Code.

To reflect the future Internet connectivity needs of the Digital Single Market, the proposed Code includes access to and take-up of very high capacity connectivity as a regulatory objective alongside the existing ones of promoting competition, contributing to the internal market and promoting the interests of citizens.

³⁰ Based on the study by Analysys Mason (SMART 2015/0068) and Commission estimates. See further the accompanying Staff Working Document, section 4.4.

Incentives for deployment and take-up of very high-capacity networks in competitive markets

To deliver appropriate incentives for investment in Internet connectivity, the proposed Code makes targeted changes to market regulation designed to enable adequate returns on new investments relative to risks, giving Europe-wide predictability to the international investment community, while leaving adequate scope for adaptation to localised network conditions.

Regulation will be more effective if it is based on in-depth local knowledge of an increasingly diverse network landscape, with a variety of different local, national and multi-national actors. Interventions will be tailored to geographic areas where market dominance persists and to the real prospects of network deployment by incumbent and alternative operators. Mapping will allow more joined-up policy, identifying private investment opportunities or public investment needs, or areas where local initiative can remove obstacles or promote demand. It will allow regulators to increase transparency about network deployment plans and to provide investors with more predictability and protection. This will be especially important in ensuring that less densely populated communities benefit from better Internet connectivity.

The proposed Code requires regulators to map network investment intentions, and enables public authorities to seek investors in under-served areas

Infrastructure-based competition is among the most effective ways of delivering new or upgraded Internet connectivity, in areas where population (or business) density can support more than one network. Investment in new very high-capacity networks also impact competitive dynamics by increasing possibilities for differentiation. Effective access to civil infrastructure such as ducts and poles held by undertakings with significant market power unleashes competitive and investment potential, and should be the first remedy considered for bottleneck problems. The need for other wholesale remedies to enable effective access-based competition should be weighed up in the light of any existing commercial agreements between operators and of the retail choices effectively available to end users. Thus, regulatory intervention will weigh no more heavily than necessary on operators' investment decisions, while ensuring competitive outcomes.

The proposed Code prioritises network access remedies that directly support competitive infrastructure deployment wherever feasible, and will reflect the retail choices already available to end users.

In areas where infrastructure-based competition may not be realistic, co-investment by rival operators allows pooling of costs, reduction of risks, overcoming of scale barriers by smaller operators and sustainable retail competition over time which is less dependent on regulation. Significant market power operators who are open to such co-investment in very high capacity networks should therefore be allowed to differentiate themselves from non-investing competitors; this can give all players an incentive to engage the necessary capital.

Business models based on selling wholesale network access to retail operators can reduce competition risks, attract "patient" capital which supports longer-term investment in very high-capacity networks and thus push out the dividing line between commercial and non-commercial deployment areas. This relatively new, but growing, business model deserves a clearer and simpler regulatory treatment in cases where such operators are found to have significant market power.

The proposed Code establishes predictable regulatory conditions to promote co-investment and wholesale-only business models, facilitating deployment of very high-capacity networks deeper into suburban and rural areas.

End-users in more challenging areas may be willing to invest upfront in very high-capacity fibre connections to their homes, either individually or as part of demand aggregation schemes. This financial commitment should be possible on the basis of a separate contract allowing for affordable long-term instalments, provided the end-user retains the right to switch service provider after a maximum of 24 months.

The proposed Code clarifies that long-term instalment payments for connections are consistent with end-user protection rules.

Spectrum rules for mobile connectivity and 5G

The EU was first to develop 4G wireless technology, but late in deploying it compared to other advanced regions. A delayed and fragmented assignment of the relevant spectrum by Member States has a direct negative impact on wireless network coverage and penetration overall in Europe. Such delays, if repeated, will endanger the successful introduction of 5G in Europe and the deployment of new innovative services.

In addition to faster processes to designate spectrum for electronic communications, with clear deadlines for when the spectrum is to be made available to the market, investors in the next generation of wireless broadband need more predictability and consistency regarding future licensing models and the key conditions for assigning or renewing national spectrum rights. These include a minimum licence duration to ensure returns on investment, greater scope for spectrum trading and leasing, and consistency and objectivity in market-shaping regulatory measures (reserve prices, auction design, spectrum blocks and caps, exceptional spectrum reservations or wholesale access obligations). On the other hand, operators should commit to use the spectrum assigned to them effectively.

The proposed Code establishes key principles for spectrum assignment in the Union, new Union-level instruments to establish assignment deadlines and licence periods (minimum 25 years), and a peer review among national regulators to ensure consistent assignment practices.

Coverage obligations in spectrum licences are an efficient tool to address gaps in wireless connectivity and to ensure high-quality coverage of the EU population and territory. While coverage obligations are already widely used, they need to be better tailored towards the 2025 objectives in this Communication, particularly regarding main transport paths and rural areas. Operators need to be able quickly to roll out denser networks based on small cells. Regulators need additional tools to address localised coverage gaps (white spots), such as facilitation of network sharing.

The proposed Code promotes a consistent approach to coverage obligations, to small-cell deployment and to network sharing, thereby stimulating 5G deployment and rural connectivity.

Shared use of spectrum, either on the basis of general authorisation or individual rights of use, can enable more efficient and intensive exploitation of this scarce resource. This is particularly relevant for the new, very short-range ("millimetre") spectrum bands foreseen for 5G communications. Users of radio spectrum under general authorisation merit greater regulatory protection from harmful in-band interference, obstacles to deploying Wi-Fi access points will be removed and end-user access to shared Wi-Fi connections will be easier.

The proposed Code facilitates spectrum sharing in 5G networks, and promotes end-user access to Wi-Fi-based connectivity.

Incentivising take-up through competitive markets, consumer choice and affordable tariffs

Very high-capacity networks only produce both a return on investment and wider economic benefits if they are taken up by citizens and businesses. While many different factors play a role, the rules need to ensure competitive markets and consumer choice. The proposed Code ensures *inter alia* that end-users can fully avail themselves of their switching rights, including when they contract for bundles of Internet access services or communications services and other goods or services (such as devices or content).

The proposed Code modernises end-user switching rights, including for bundles.

Even as the focus turns to deployment and take-up of very high-capacity connectivity, no one should be excluded from access to basic connectivity. While other policy instruments are more suited to promoting network roll-out in excluded areas, universal service should be used to ensure that members of vulnerable social groups can get access to affordable basic services if the market does not deliver.

The proposed Code ensures that vulnerable end-users have a right to an affordable connectivity contract.

Rules adapted to new communications services and to the internal market

Internet connectivity has enabled new forms of online communications services, with major benefits for end-users. Sectorial rules should not distort competition between traditional operators and new communications platforms, but should address the remaining end-user issues in a proportionate and non-discriminatory way on the basis of the relevant characteristics of the services concerned. Both service providers and end users should benefit on level terms from a truly internal market in services, with adequate protection in fields such as security. A level playing field should also ensure that network operators are not at a disadvantage when they also provide communications services.

The proposed Code secures a fair internal market through maximum harmonisation of the main sector-specific end-user rules, applicable as appropriate to different categories of services.

A governance model that ensures regulatory stability and coherence

An efficient governance system rests on the cooperation of strong and independent national regulators with adequate powers, working together with the Commission in a reinforced institutional structure (BEREC) with corresponding tasks, and more structured recourse to strategic expertise as regards spectrum policy (through the RSPG). The common goal should be to ensure that, building on the experience and expertise developed by BEREC and national regulators while implementing the current framework, the new Code is applied in a consistent, predictable and far-sighted way in the long-term interests of end-users, in a competitive internal market.

The Code proposes to establish a more efficient EU system of electronic communications regulators to ensure consistent implementation of the regulatory framework in order to develop the internal market.

4.2. 5G Action Plan

The Commission also proposes a 5G Action Plan to foster a coordinated approach for the deployment of 5G infrastructures which will play a major role in Europe's future Internet connectivity. It will open up entirely new opportunities to innovate, not only in the communications sector, but also throughout the whole economy and society. Establishing the new 5G infrastructure requires an appropriate degree of coordination between Member States and between relevant sectors to stimulate investments. The action plan aims to realise such coordination based on a number of targeted actions, largely of a voluntary nature. Together with the proposed Code, it should give Europe the tools to lead the 5G race for the benefit of its international competitiveness.

The Commission calls on the Member States to support the 5G action plan and will work with all stakeholders to ensure its effective implementation.

4.3. Public support to investment

Legislative and regulatory actions can remove barriers, enhance competitive incentives, provide greater predictability for investors and lower costs for network deployment. The Internet connectivity objectives for 2025 are set at a level intended to bring them largely within reach for commercial operators. However, public funding will be necessary to improve the business case for private promoters in the most difficult areas.

To date, funding from ESI Funds for broadband investment has largely taken the form of grants; the regulatory framework for the ESI Funds for 2014-2020 introduced a new possibility for use of financial instruments in this field, as underlined by the Communication on the Investment Plan for Europe, which called for a doubling in the use of financial instruments under these funds. The Connecting Europe Facility and the European Fund for Strategic Investment provide customised financial instruments to small and large broadband projects respectively or can be combined to support dedicated funds and platforms. Technical assistance can be delivered through the European Investment Advisory Hub.

Grant financing for broadband is often needed in the most remote areas, which may otherwise be unprofitable. However, a public contribution by way of financial instruments can attract additional long-term private investment by reducing the short-term risks for deployments in areas where the business case can be positive in the long term. By blending – i.e. combining both forms of public financing in areas with overall commercial potential for very high capacity networks - grants can be limited to the minimum necessary to build a business case in unprofitable sub-areas, while maximising private sector involvement across wider areas.

To make most of the public funding leverage effect of blended investments for very high capacity networks across Europe, Member States need to use an appropriate funding mix of grants and financial instruments and complementary actions between various EU and national financing programmes³¹.

The Connecting Europe Facility (CEF) is the EU instrument specifically dedicated to support trans-European networks. However, its current budget is only able to support a narrow sub-section of broadband projects, namely innovative projects, based on state-of-the-art technology and with a potential for replicability, and using only financial instruments. The

³¹ For more information on complementarities between ESIF and EFSI, see: http://ec.europa.eu/regional_policy/sources/thefunds/fin_inst/pdf/efsi_esif_compl_en.pdf

existing and future EU financing at all levels should be simplified and rendered more flexible to enable blending of financial instruments and grants. In the context of the multi-annual financial framework mid-term review³², the Commission is proposing measures to facilitate the combination of the ESI Funds with EFSI in all fields, including broadband.

In preparing the financial programming post-2020, the Commission will weigh up future financial support needs under the various EU investment programmes in light of the objectives for 2025.

The Commission calls on Member States to efficiently combine their public support via grants and financial instruments to achieve the long-term objectives set in this Communication.

The Commission, in cooperation with the European Investment Bank, will launch by the end of the year a Broadband Fund, building on CEF and EFSI, and is exploring an initiative on financing options for the activities related to the Digital Single Market strategy, including on blending various sources of funding for European Internet connectivity projects of common interest up to 2025.

In the context of the financial programming post 2020, the Commission will weigh up the need for adequate budgetary resources for efficient broadband financing in underserved areas under CEF, and the need to dedicate ESI funds support, possibly with an indicative share, to the digital transformation of European economy and society.

National public support to investment which is not on market terms falls under State Aid rules, as set out by Article 107(1) TFEU. The Broadband State Aid Guidelines enable public funding for the deployment of networks offering substantial improvements over existing networks (the principle of "step change" in terms of broadband availability). Risks of distortion of competition are addressed through requirements such as using the least distortive public financing mechanism and ensuring open access to state-funded infrastructure.

The Digital Agenda for Europe targets for 2020 are already reflected in the Guidelines: State Aid for a step change from basic broadband to basic NGA (offering typically from 30 Mbps and less than 100 Mbps) is deemed to counter market failure in the absence of commercial deployment for high capacity networks. The Guidelines also envisage further possible step changes, e.g. upgrades, through extension of fibre closer to the end user, to "ultra-fast" broadband of 100 Mbps or more, subject to verifying unmet demand in cases where existing or planned basic NGA network is already present.

In assessing national plans to support very high-capacity networks, the Commission will take into account the needs and objectives identified in this Communication and the underlying evidence of long-term demand for such networks that could be under-served by the market. Following the principle of well-targeted State intervention limited to the minimum necessary to correct market failures and to achieve objectives of European interest, the Commission favourably considers the use of blended financing across funding instruments and areas where this generates a step change to ultra-fast broadband networks. This can reduce the risk attached to investments in very high-capacity networks, thus lowering costs to the public while minimising any competitive distortions.

³² Investment Plan for Europe: European Fund for Strategic Investments to be extended following successful first year ([IP-16-1933](#)) and New guidelines on combining ESI Funds with the EFSI ([IP-16-329](#))

The Commission will reflect the foreseeable evolution of long-term demand when applying the "step change" approach of the Broadband State Aid Guidelines in conjunction with the strategic objectives set in this Communication, and will consider favourably efficient blended financing that contributes to lower the aid intensity and to reduce risks of distorting competition, as part of its assessment of State aid interventions.

4.4. Wi-Fi for Europe

Internet access via Wi-Fi easily connects multiple users, and many local authorities already give free Internet access in public spaces. The Commission wishes to support and encourage the provision of free Wi-Fi access to citizens in all public services (e.g. public administrations, schools, libraries, health centres, museums, public parks and squares) to better integrate communities in the Digital Single Market, to give users a taste of Gigabit society, to improve digital literacy and to complement the public services provided in those locations.

The Commission will set up a public Wi-Fi voucher scheme for public authorities to offer free Wi-Fi connections in the centres of community life.

4.5. Accompanying measures to support Internet connectivity and convergence

Meeting Europe's Internet connectivity objectives will also require pro-active national or regional policies, building on their National Broadband Plans³³. It is essential to increase planning transparency, strengthen multi-level governance and exchange best practices for the benefit of infrastructure providers, public authorities and connectivity users.

The Commission calls on Member States to review progress of their National Broadband Plans and update them by the end of 2017 with a time horizon of 2025, in line with the strategic objectives set in this Communication and the 5G Action Plan.

As the Connected Communities initiative³⁴, developed by the Commission in 2014, showed, there is a high level of interest from local and regional decision makers in increased cooperation between public and private connectivity actors, more technical assistance, and better communication of best practices and available tools. The mapping of present and prospective networks will also give to public authorities at all levels of government greater visibility on market failures and connectivity gaps, and an opportunity to take well targeted public initiatives. But success also requires their involvement in encouraging active participation by citizens in digital activities.

The Commission, in cooperation with the Committee of the Regions, will set up by the end of 2016 a participatory broadband platform to ensure a high level of engagement and cooperation between relevant public and private entities for broadband investment and progress in implementing national broadband plans.

In order to facilitate the effective delivery of ESI Funds allocated for broadband projects, the Commission proposed the establishment of an EU network of Broadband Competence

³³ The development of National Broadband Plans is reported on by the Commission in its Digital Progress Reports.

³⁴ For more information on the Connected Communities Initiative, see: <https://ec.europa.eu/digital-single-market/en/news/connected-communities-initiative>.

Offices (BCOs)³⁵. It aims at accelerating exchanges of best practices between Member States/regions and providing technical support on ways to invest effectively in broadband projects, whenever possible in combination with financial instruments.

The Commission calls on Member States and regions to establish and support the EU network of Broadband Competence Offices at regional/national level.

Limiting the cost of civil engineering works – which represents up to 80% of investment in broadband networks – could further facilitate broadband roll-out. Directive 2014/61/EC³⁶ (the Broadband Cost Reduction Directive) seeks to increase the sharing and re-use of existing physical infrastructure, across various sectors (energy, transport, etc.) and to facilitate synergies with public works; and mandates that all new or refurbished buildings be broadband-ready. Cross-utilities synergies and collaboration are sparking increased interest from other sectors and have already shown good results. The Commission urges the Member States to speed up the transposition and ensure the effective implementation of the Directive, so that the full potential of the measures, and in particular the cross-sector synergies, can be realised.

In line with the Broadband Cost Reduction Directive, the Commission will, by 1 July 2018, evaluate its implementation; assess the impact on the cost of EU-funded broadband projects and issue guidance on the promotion of best practices to further contribute to the long-term objectives set in this Communication.

5. CONCLUSION

Internet access is today as important as electricity was for the second industrial revolution, for the economy and for society. Very high-capacity Internet connectivity is essential to unleash the next wave of competitiveness and innovation and to allow Europe's businesses and citizens to harvest the full benefits of the Digital Single Market. This Communication and the accompanying measures are intended to provide Europe with the tools needed to bring this about.

The Commission encourages the Member States, in close cooperation with all relevant stakeholders, to engage in policy, regulatory and financial support for the vision of a European Gigabit society contained in this Communication and invites:

- The European Council and the European Parliament to endorse the strategic objectives for Internet connectivity in the Digital Single Market;
- The European Parliament and the Council to proceed swiftly with the legislative discussion on the accompanying proposal for a European Electronic Communications Code with a view to reaching political agreement by the end of 2017, and implementation in the Member States well before 2020.

The Commission will report on the progress of the initiatives presented in this Communication as part of its regular Digital Single Market reporting.

³⁵ For more information on the BCO initiative: <https://ec.europa.eu/digital-single-market/en/broadband-competence-offices>.

³⁶ Directive 2014/61/EU of the European Parliament and the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks.

ANNEX

Delivering High-Performance Internet Connectivity for the Digital Single Market

Initiative	Actions and Timeline
Regulatory framework measures	
Legislative Proposal establishing the European Electronic Communications Code	The European Parliament and the Council to proceed swiftly with the legislative discussions with a view to reaching political agreement by the end of 2017, and implementation in the Member States well before 2020.
Legislative Proposal establishing the Body of European Regulators for Electronic Communications	
Support and other Measures	
Strategic objectives for Internet connectivity	The European Council and the European Parliament to endorse by end of 2016 the strategic objectives for Internet connectivity in the Digital Single Market.
5G for Europe: Action Plan	Establishment of a common timetable and a set of enabling actions for the coordinated launch of 5G networks in Europe.
Broadband Fund, building on CEF and EFSI	The Commission, in cooperation with the European Investment Bank, to launch a Broadband Fund by end of 2016.
Financing options for the activities related to the DSM strategy	The Commission to explore an initiative on financing options, including on blending various sources of funding, for European Internet connectivity projects of common interest up to 2025.
Financial programming post 2020	The Commission to weigh up the need for adequate budgetary resources for efficient broadband financing in underserved areas under CEF, and the need to dedicate structural funds support, possibly with an indicative share, to the digital transformation of European economy and society.

Wi-Fi for Europe	The Commission to set up a Wi-Fi voucher scheme for public authorities to offer free Wi-Fi connections in the centres of community life.
National Broadband Plans	By end of 2017 Member States to review and update National Broadband Plans with a time horizon of 2025, in line with the strategic objectives set in this Communication and the 5G Action Plan
Participatory Broadband Platform	The Commission, in cooperation with the Committee of the Regions, to set up by end of 2016 a participatory broadband platform to ensure a high level of engagement and cooperation between public and private entities for broadband investment and progress in implementing national broadband plans.
EU network of Broadband Competence Offices at regional/national level.	Member States and regions to establish and support, by end of 2016, the EU network of Broadband Competence Offices at regional/national level.
Evaluation of the Broadband Cost Reduction Directive and guidance on the promotion of best practices	The Commission, by July 2018, to evaluate the implementation of the Broadband Cost Reduction Directive, assess the impact on the cost of EU-funded broadband projects and issue guidance on the promotion of best practices.
State aid	The Commission to reflect the foreseeable evolution of long-term demand when applying the "step change" approach of the Broadband State Aid Guidelines in conjunction with the strategic objectives set in this Communication, and to consider favourably efficient blended financing that contributes to lower the aid intensity and to reduce risks of distorting competition, as part of its assessment of State aid interventions.