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**a Directive of the European Parliament and of the Council establishing the European
Electronic Communications Code (Recast) and
a Regulation of the European Parliament and of the Council establishing the Body of
European Regulators for Electronic Communications**

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INTRODUCTION

When the current framework for regulation of electronic communications in the EU came into force in its original version in 2002¹, liberalisation was recent, former monopolist operators had still very high market shares in traditional telephony services, while the evolution of internet and broadband was still at an early stage and the telecom sector largely relied on copper networks to offer its services. A key objective of the 2002 framework, consisting of (i) sector-specific economic regulation based on the principles of EU competition law and (ii) rules safeguarding end-user interests, was to promote competition via regulated access to incumbents' networks and market entry as a means to make markets contestable, to achieve efficient market outcomes and, in particular, to maximise consumer benefits.

While the general competition objectives were maintained in the 2009 revisions to the EU Framework, more emphasis was placed on fostering efficient investment and innovation and a specific reference was also made to fostering infrastructure-based competition to deploy Next Generation Access networks (NGA). The 2009 review also aimed at furthering the internal market by reinforcing the institutional set-up and strengthened a number of end-user rights. In 2010 the Digital Agenda for Europe introduced non-binding targets of universal access to connectivity at 30 Mbps by 2020 to ensure territorial cohesion in Europe and a penetration target of 100 Mbps (50% of subscriptions in Europe by 2020) to anticipate future competitiveness needs.

Since then, the electronic communications sector has significantly evolved and its role as an enabler of the online economy has grown. Market structures have evolved, with monopolistic market power becoming increasingly limited, and at the same time electronic communications and the telecoms sector in particular have now acquired a vital importance for most sectors of the overall economy². Consumers and businesses are increasingly relying on data and internet access services instead of traditional telephone and other communication services. This evolution has, on the one hand, brought formerly unknown types of market players to compete with traditional telecom operators (e.g. service providers offering a wide variety of applications and services, including communications services, over the internet, so called **over-the-top** -players (OTTs)) and, on the other hand, it has increased the demand for high-quality fixed and wireless connectivity with the rise in the number and popularity of online content services, such as cloud computing, the **Internet of Things** (IoT), **Machine-to-Machine** communication (M2M) etc. Electronic communications networks have evolved as well. The main changes include: (i) the ongoing transition to an all-IP environment,(ii) the possibilities provided by new and enhanced underlying network infrastructures, which can support the practically unlimited transmission capacity offered by fibre optical networks, (iii) the convergence of fixed and mobile networks towards seamless service offers to the end-users regardless of location or device used and (iv)the expected introduction of innovative technical network management approaches, in particular **Software Defined Networks** (SDN) and **Network Function Virtualisation** (NFV). These usage and operational changes have exposed the current rules to new challenges which are likely to increase in importance in the medium and long term, and cannot therefore be excluded from the scope of the present impact assessment.

The review of the regulatory framework for electronic communications needs to be seen in light of the priority of the Juncker Commission to create a connected Digital Single Market (DSM)³. The **DSM strategy**⁴ recognised the importance of the paradigm shifts that the digital sector is

¹ The current Framework consists of a suite of Directives covering the Framework for regulation (and its objectives), rules concerning the authorisation of electronic communications network and service providers, ex ante regulation of access and interconnection, universal service and user rights.

² See details in section 2

³ See: https://ec.europa.eu/priorities/publications/president-junckers-political-guidelines_en

⁴ A Digital Single Market Strategy for Europe COM(2015) 192 final

exposed to and stated that individuals and businesses should be able to seamlessly access and exercise online activities under conditions of fair competition.

According to the Commission Communication, the **DSM Strategy** will be built on three pillars⁵. The second pillar specifically focuses on the review of the telecoms framework and states that *"The Commission will present proposals in 2016 for an ambitious overhaul of the telecoms regulatory framework focusing on (i) a consistent single market approach to spectrum policy and management (ii) delivering the conditions for a true single market by tackling regulatory fragmentation to allow economies of scale for efficient network operators and service providers and effective protection of consumers, (iii) ensuring a level playing field for market players and consistent application of the rules, (iv) incentivising investment in high speed broadband networks (including a review of the Universal Service Directive) and (v) a more effective regulatory institutional framework"*.

The prerequisite to achieve this goal is to ensure access to unconstrained connectivity based on ubiquitous, very-high-capacity fixed and mobile broadband infrastructures. The increase in data consumption and the process of aggregation and conversion between increasing (wireless) data usages into fixed networks will require the provision of **Giga-Bit connectivity** ever closer to the end-user. In order to achieve this, the review will **focus on investments in Very High Capacity networks** through direct market incentives, in order to maximise the benefits for the European digital economy and society. Such a necessary prioritisation requires the endorsement of Giga-Bit connectivity needs and ambitions to be achieved by 2025 (i.e. building on existing targets for 2020), as a measurable and achievable focus point within the broader connectivity ambition for the European digital economy and society.

The proposal for the review of the regulatory framework for electronic communications is accompanied by the 'European Gigabit Society Communication'⁶, which sets forth specific objectives to be achieved by 2025, namely (i) Gigabit connectivity to a set of focal points (schools, medium-sized and large enterprises, transport hubs, main providers of public services), (ii) 5G coverage for all urban areas and all major terrestrial transport paths, and (iii) an upgradable connectivity of at least 100Mbps downlink for all European households. It proposes a set of complementary initiatives to help attain these objectives, to be primarily achieved by the market with the requisite policy, regulatory and financial support at the EU, national and local levels. In particular, the review and the accompanying legislative proposal is the key instrument for facilitating the market to achieve the set objectives.

The 'European Gigabit Society Communication' is also complemented by the '5G Action Plan'⁷. Timely deployment of 5G is considered a strategic opportunity for Europe and a key asset for global competitiveness. The Action plan aims at a swift and coordinated introduction of 5G in Europe, in view of reaping all its anticipated benefits. While the revised framework for electronic communications is expected to already support improved conditions for the deployment and take up of 5G, the Action Plan proposes complementary and targeted operational measures, aimed at leveraging the anticipation effect on industry and investors

⁵ According to the Commission Communication, the **Digital Single Market Strategy** will be built on three pillars:

- **Better access for consumers and businesses to online goods and services across Europe** – this requires the rapid removal of key differences between the online and offline worlds to break down barriers to cross-border online activity.
- **Creating the right conditions for digital networks and services to flourish** – this requires high-speed, secure and trustworthy infrastructures and content services, supported by the right regulatory conditions for innovation, investment, fair competition and a level playing field.
- **Maximising the growth potential of our European Digital Economy** – this requires investment in ICT infrastructures and technologies such as Cloud computing and Big Data, and research and innovation to boost industrial competitiveness as well as better public services, inclusiveness and skills.

⁶ Commission Communication 'Connectivity for a European Gigabit Society: Laying the Foundations for a competitive Digital Single Market'

⁷ Commission Communication '5G for Europe: An Action Plan'

generated by the proposed new framework. It calls for cooperation among stakeholders, including Member States, in order to establish a coordinated calendar, plan trials, identify and allocate the necessary spectrum bands, etc.

The emphasis on connectivity as a new objective of the framework should not of course downplay the other existing objectives such as competition, internal market and end-user protection which will remain valid and on which the framework has delivered to various extents, as analysed in the REFIT exercise carried out in parallel with this IA report.

1 WHAT IS THE PROBLEM AND WHY IS IT A PROBLEM?

1.1 What was concluded from the evaluation/fitness check of the existing regulatory framework?

In the context of the REFIT programme, the current regulatory framework has been evaluated not only in terms of achievement of the original goals, but also in view of potential simplification and reduction of the regulatory burden. The main findings can be summarised as follows (see specific Staff Working Document on the subject).

Relevance: the analysis showed that the specific objectives of the framework - promoting competition, realising the single market and protecting consumers' interest – remain as valid as before, with an increased relevance for the single market objective. Connectivity has emerged as the underlying driving force for the digital society and economy, underpinned by technological changes and evolving consumer and market demands. There is therefore a widely recognised need to consider adjusting the current policy and regulatory tools to further support the deployment of infrastructure and take-up of corresponding services in line with future needs in view of the structural evolution of the sector, its importance within the larger economy, and the political commitment of the Juncker Commission to deliver the DSM.

Most regulatory areas remain as relevant (if not more) than in 2009 – in particular spectrum regulation and access regulation. While the relevance of certain specific components of the universal service regulation is being put into question, the concept of a safety net ensuring that all citizens are included in a fully developed digital society is gaining relevance. Similarly, while the specific provisions under the consumer protection objective might have to be adjusted in view of technological market or legislative changes, the basic needs to which the provisions respond remain unchanged and their specific objectives remain relevant.

Effectiveness: while the specific objectives of the framework (competition, single market and consumer protection) have remained unchanged by the 2009 review, the specific aims of this last reform include aligning spectrum management with market demands to realise its full potential to contribute to innovative and affordable services making access regulation more predictable, while adding some emphasis on network investment and ensuring better consumer rights.

The regulatory framework has had an impact on the **competitiveness** of the sector, which in turn has delivered overall significant consumer benefits, in particular basic broadband, lower prices, and increased choice. The contribution of the framework - mainly through access and spectrum regulation, but also with the support of market entry provisions – to deliver competition is undeniable and widely recognised even if sometimes difficult to measure. As regards the contribution of the framework to the **Single Market objective**, the results are rather modest. Regulatory consistency has been achieved only to a limited extent, affecting the operations of cross-border providers and reducing predictability for all operators and their investors. More importantly, the cooperation and consistency tools available led to a situation where best regulatory solutions have not always been followed, with impact on consumer outcomes. Finally, the achievements of the framework in **promoting consumer interest** are significant, in tackling certain sector-specific consumer protection issues and in ensuring a safety net so that all citizens can benefit from electronic communications services. However it is also clear that not all consumer interest rules are still fit for purpose, in the context of technological, market, and

legislative developments, and that simplification can be achieved. At the same time, consumer surveys continue to report a relative dissatisfaction, which requires attention.

In terms of specific regulation areas, **access regulation** delivered competition, though more at service level than at network level. While investments in VHC networks have advanced, they have not taken place across all Member States at the pace envisaged by the public policy agendas and more importantly at the pace to meet the future connectivity needs for a fully-fledged DSM. Access regulation has also become more predictable, thanks to the reinforced EU-level consistency check, which however does not adequately cover remedies, with the effect that significant regulatory inconsistency remains on the single market.

While progress were made in the field of **spectrum** (e.g. the release of a significant amount of spectrum for wireless broadband as well as achievements in the field of technical harmonisation, which were praised in the public consultation by Member States and operators), they were more limited than wished in the last review. In particular the impact of the current spectrum regulation on competition and single market outcomes - with direct consequences for consumers in terms of availability of innovative and affordable services - is put into question by the current evaluation, with the example of the delayed 4G deployment in most parts of the EU. Indeed, the majority of respondents (spanning from telecom and non-telecom associations to virtual mobile operators, converged operators and vendors) in the public consultation considered that the lack of coordination of selection methods and assignment conditions has impaired the development of electronic communications services. Operators have also criticized the ineffectiveness in addressing interference issues and ensuring usage efficiency.

The **regulation of numbers** proved generally unproblematic at national level. However, the provisions have not been particularly supportive to the single market in particular given that there is emerging demand for using numbers outside the country where they have been assigned (extraterritorial use of numbers) and for which the current framework does not provide clear rules. .

While **universal service** rules were effective, reviewing its specific components appears necessary. Similarly, in order for the **consumer protection rules** to remain effective, they need to be revised to remove redundancies, where identified, with horizontal rules and to safeguard end-user interest in light of market and technology developments (e.g. increasing use of communications services provided over internet access, so called Over-the-Top communications services . As far as network and service security rules are concerned, their adoption has contributed to an improved situation in the EU, but their impact remains unequal across the MS, not least due to the respective scope and definitions of national implementing provisions.

Efficiency: The framework often allows ample flexibility to national regulatory authorities (NRAs) to adapt their decisions to national circumstances, and the actual administrative costs and burdens depend to a large extent on the solutions adopted in each Member States. This flexibility allows for cost optimisation for and by national administrations. At the level of operators, costs and burdens are not evenly spread across the stakeholders. Access regulation is considered burdensome by incumbent operators, yet nothing more than what is necessary to reach the competition objective by alternative operators

Most operators refer to consumer protection rules as being over burdensome especially in view of the differing implementation across Member States and of the overlapping horizontal legislation. While this suggest a need for simplification and reduction of burden in specific areas, consumer organisations recall the value of certain sector-specific rules and of the discretion left to Member States to complement minimum harmonisation in a fast moving sector.

Several areas were identified for reducing administrative burden while preserving the effectiveness of the provisions. The level of complexity of access regulation is considered in most cases necessary to ensure that regulation affecting operators directly is fit for purpose and

not unnecessarily burdensome on operators. This is in particular the case of "stable" markets, where simplified procedures can be envisaged without affecting the quality of the regulation (e.g. the case of the termination markets). In a similar vein, it can be questioned, based on the actual implementation experience, whether the very short cycles of market reviews are truly necessary. Achieving more regulatory consistency in areas such as spectrum or authorisation requirements might in addition reduce the administrative burden of businesses operating across several Member States.

EU added value: the framework has played a role in the broader development of national regulatory regimes and market developments that favour a pro-competitive offer of electronic communications services across Europe. It has contributed to major positive outcomes for consumers and businesses, across and within Member States. Moreover, it has levelled up national regulation in the area of electronic communications, including in areas which were previously not even tackled by some Member States, such as consumer protection, where there are, however, too many overlapping or varying provisions and simplification can be achieved.

Coherence: not many coherence issues were identified during the evaluation work. Generally speaking, the various instruments making up the regulatory framework for electronic communications have reinforced each other in the pursuit of its objectives. As an illustration, provisions on authorisation enable pro-competitive market entry. Access regulation and spectrum management contribute to positive outcomes for consumers, to the point where commercial offers render regulated universal services redundant or obsolete in certain instances. Some issues of internal inconsistencies have been identified.

Two external consistency issues require however attention in the review process namely the coherence between regulations aimed at incentivising competitive network rollout and the EU financing and state aid rules in the field, as well as the potential overlaps between sector specific and horizontal consumer interest legislation. Provided that detailed analysis of the exact scope of the provision in place concludes that sector specific rules have become redundant, those particular provisions can be withdrawn, leaving sector specific rules only to address those areas where such rules are still warranted, in line with the REFIT principles.

The evaluation has identified several areas where simplification is possible and the **administrative burden** could be reduced without compromising – in some cases even improving - the effectiveness of the provisions: e.g. longer ex ante market regulation cycles, universal services adjustments, streamlining certain overlapping consumer protection provisions. This aspects is more widely analysed in Section 1.2.3 and in section 4.9.3 where the preferred policy option is analysed from the perspective of meeting the objective of simplification and administrative burden reduction.

1.2 What is the problem? What is the size of the problem?

As anticipated by the DSM strategy, the traditional telecom sector is under increasing pressure to (i) serve increasing user demand for data connectivity, (ii) anticipate future demand and socio-economic needs and (iii) react to new internet-based competitors. These aspects are important since investments in networks are becoming instrumental for productivity gains not only in the telecom sector, but especially in several downstream sectors (transport, health etc.) and for the functioning and growth of the entire European economy, as shown by the macro-economic modelling described in Annex 5⁸. In this regard, the Commission has identified **three interrelated problems** that need to be addressed:

⁸ Short-term demand uncertainty may (and does) manifest itself, but it does not reduce the needs for ultimate migration to very high capacity networks in the future.

- The obstacles to **unconstrained connectivity** based on ubiquitous, **Very High Capacity (VHC)**⁹ fixed and mobile broadband infrastructures serving the Digital Single Market, attested by: the low coverage and take up, especially for VHC networks; unsatisfactory connectivity offers across the EU for businesses; and a lack of timely and appropriate spectrum management.

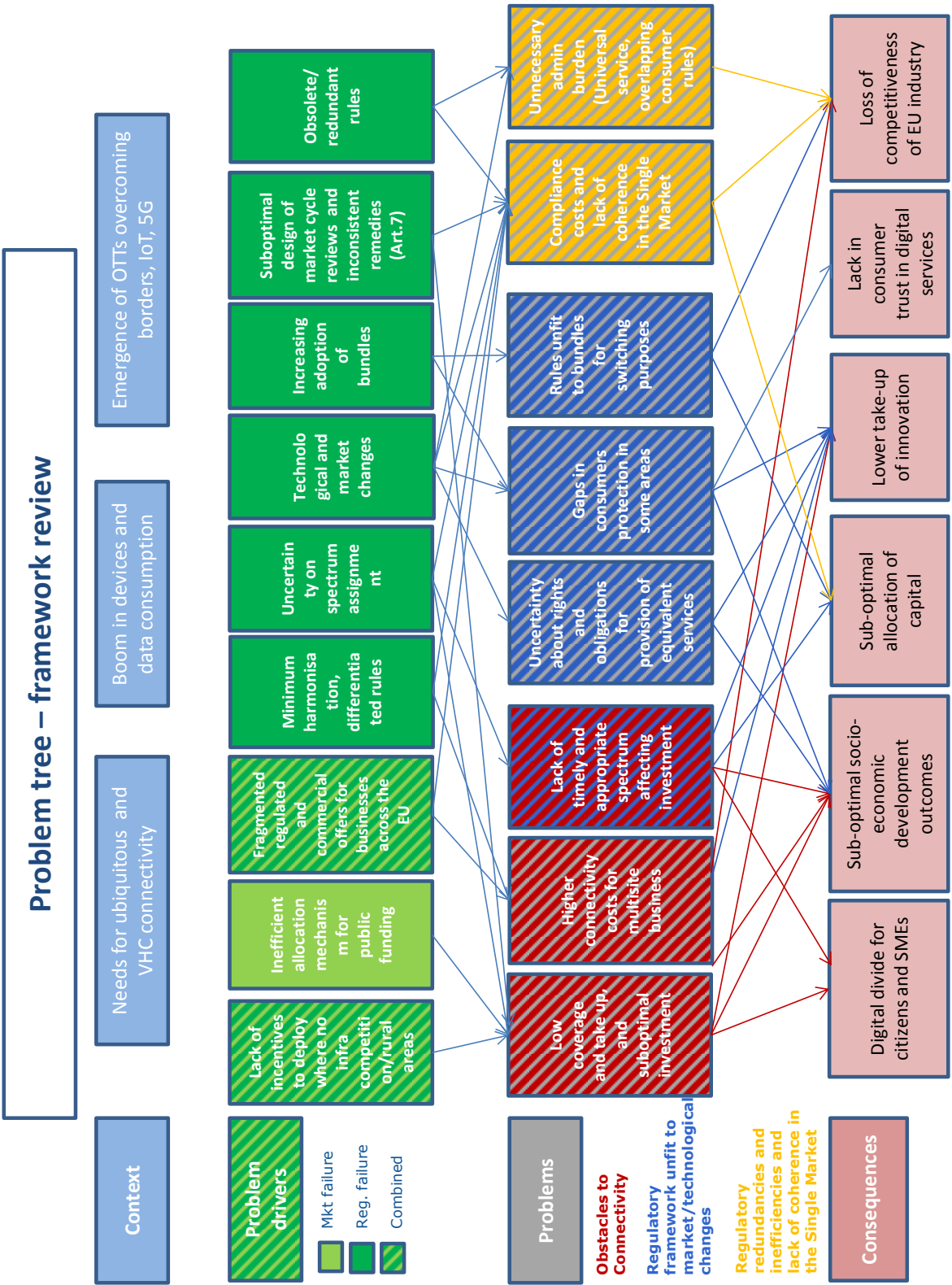
- A regulatory framework not fit for **rapid market and technological changes**, reflected by: discrepancies between rights and obligations for the provision of equivalent services; gaps in consumer protection in some areas; and persisting barriers to switching, in a market increasingly characterised by the bundling of offers.

- **Regulatory redundancy, inefficiencies and lack of coherence** in the Single Market; unnecessary administrative burden and high compliance costs.

Figure 1 illustrates the problems underpinning the review of the electronic communications framework and describes the problem drivers, (with market and regulatory failures further elaborated in section 1.3 and annex 10), the problems themselves (presented below) and the consequences of those problems in a no change scenario (described in section 1.5). As shown by the colours in the picture, problems are interrelated and tend to have similar drivers or consequences.

Figure 1- Problem tree

⁹ **VHC** should guarantee **best-in-class performance** in terms of speed (that should be significantly above 100 Mbps and able to reach 1 Gbps when considering both upload and download capacity), **latency, package loss and jitter**. This definition is therefore more ambitious than the definition of NGA that includes all technological solutions able to deliver more than 30Mbps download.



1.2.1 Obstacles to unconstrained connectivity

This section analyses the obstacles to unconstrained connectivity in the EU. These factors prevent the achievement of ubiquitous and performing fixed and mobile broadband infrastructure that is a necessary component for global competitiveness and lies at the heart of the DSM strategy. When considering the problems of suboptimal investment and the need for connectivity it is important to take into account that **albeit networks are often national or local in nature** (and will in some cases get even more local in the future with the proliferation of small fibre operators as it has already happened in Sweden) the problem of **suboptimal investment is a European problem**, as even local networks are financed from international and cross-border capital markets; furthermore, the deployment throughout Europe of networks with similar (high) connectivity characteristics is vital for the development and widespread take-up at European scale of the sorts of consumer and industrial applications and services on which the DSM will thrive. So despite the often local nature of the networks, connectivity and investment have a clear internal market dimension and the review should strive to induce policies which are more favourable to investment without jeopardising the existing objectives.

The causes of suboptimal investment are explored in more detail in section 1.2.1.1, below while the size of the investment gap and the inadequacy of public sector financing to take on even the current deployment challenge and to meet the current DAE target is explored in more detail in a dedicated annex 14. The same annex also includes international comparisons on connectivity and the EU dimension of the connectivity problem.

1.2.1.1 Low coverage and take up and the reasons for suboptimal investment,

As recognised in the evaluation report in section 7.1.1.¹⁰, the level of investment has been suboptimal. As of July 2015, only 71% of Europeans have access to NGA networks (above 30 Mbps), and the figure is as low as 28% in rural areas¹¹. The take-up rate of NGA was around 30% of the overall subscriptions in 2015

The **trend of the take-up rate for NGA networks** shows that Europeans are rapidly replacing their basic broadband connections with NGA: while in 2013 the only 15% of European subscribed to NGA above 30Mbps, the same figure was 21% in 2014 and 30% in 2015 (see annex 6 for more detailed statistics). Figure 13 shows how demand for 100 Mbps turns into take-up in countries where networks are widely available.

The Impact Assessment support study has estimated that the EU is very likely to miss the target of 50% take-up of 100 Mbps networks by 2020¹², according to current trends¹³. The main findings are reported in annex 14 and in figure 87 included therein. The same study shows that basic NGA at 30 Mbps is not enough to meet the near future connectivity needs (see also annex 9).

Causes of suboptimal investments

¹⁰ " investment has been uneven across the EU and clear gaps have begun to emerge between and within different countries in the path to upgrading broadband networks to provide ultrafast speeds and meet increasingly demanding quality parameters.

¹¹ Source: Digital Agenda Scoreboard, <https://ec.europa.eu/digital-single-market/en/connectivity>

¹² The Europe 2020 Strategy has underlined the importance of broadband deployment to promote social inclusion and competitiveness in the EU. It restated the objective to bring basic broadband to all Europeans by 2013 and seeks to ensure that, by 2020, (i) all Europeans have access to much higher internet speeds of above 30 Mbps and (ii) 50% or more of European households subscribe to internet connections above 100 Mbps. See:

[http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0245R\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0245R(01)&from=EN)

¹³ See SMART 2015/0002, section 3.1.

There are a number of causes for investment in connectivity being suboptimal. These causes can be regrouped in two main sets: (i) causes that are of a macroeconomic or socio-economic nature and therefore **exogenous to the regulatory framework** that is the object of this review (e.g. the financial crisis took a toll on telecom companies' CAPEX as well) and (ii) some are of a regulatory nature (level of uncertainty due to price regulation; deterrent effect to incumbent first movers because non-discriminatory access requirements mean they cannot differentiate on the basis of their investments, whereas competitive pressure on them is often insufficient to force investment, especially in less dense areas; access-based alternative operators often have insufficient scale to invest alone) and therefore can be considered as **endogenous to the framework**. The corollary of the previous statement is that the **proposals that will be presented in the forthcoming sections can only affect to a given extent the level of investment**, although they will be significantly beneficial to investment and will make an important contribution by reducing risk the operators face and increasing their expected return on investment.

Investment is not suboptimal everywhere, as clearly evidenced by the different degrees of coverage in Europe (see figure 42 below). The evaluation identified in section 6.2. that:

- Telecom network **CAPEX** in Europe was 43 bn EUR in 2013. CAPEX figures have remained relatively stable over the last four years despite the fact that in the same period NGA coverage increased from 29% to 68%. Mobile CAPEX spending represented 59% of total spending¹⁴.
- Capital expenditure/revenue ratio is a better measure of assessment of capital expenditure. In a context of declining revenues in the sector, there has been an increase in this ratio, from 11.7% in 2009 to 14% in 2013. In other words, telecom operators increased the proportion of their investment through the period.

In terms of **endogenous factors**, investment may have been restrained by the fact that average revenue per users went down in Europe for a number of years. According to a study quoted in the evaluation (Section 6.2.), Average Revenue Per User (ARPU) of the top seven mobile operators in the EU would have gone down 34.8% between 2006 and 2013, with a 5% decrease in investment.¹⁵

This does not mean that investment and competition are at odds with each other. Under the current regulatory framework, as shown in the evaluation report (see in particular section 7.2.3.1) investment has been uneven across the EU and **divergences have begun to emerge between and within different countries in the path to upgrading broadband networks to provide ultrafast speeds and meet increasingly demanding quality parameters**.

Some of the countries in Eastern Europe which had relatively lower standard broadband coverage have relatively high coverage of FTTH, as do countries that have pushed for infrastructure competition such as Spain, Portugal and Sweden, while certain countries with high NGA coverage overall including Belgium, the UK and Germany, have very limited deployment of FTTH. This reveals a second 'gap' amongst EU countries whereby the quality of NGA infrastructures varies depending on whether an 'upgrade' of existing networks or FTTH deployment strategy was pursued. Basically in some countries operators are deploying NGA but not VHC networks. The result is that the Digital Agenda Target of 50% of 100 Mbps is at risk of not being met (see figure 83).

Of course, infrastructure competition will not be possible everywhere, but regulation should promote it when possible. In this respect, the support study SMART 2015/0002 suggests in its analysis of business and regulatory models suggests that the geographical dimension of the deployment problem may be addressed by a combined approach:

¹⁴ Digital Agenda Scoreboard 2015

¹⁵ Mazars - Etude Télécom mai 2015

1. The problem in dense urban areas is to encourage feasible infrastructure investment and foster competition;
2. The problem in less dense (but economically viable, i.e. that can guarantee return on investment in the long term) zones, is to encourage first movers without losing the effects of competition by ensuring wholesale access on lines favouring future investment;
3. The problem in rural and ‘challenge areas’ which are not traditionally economically viable is attract new business models that have a different risk/return profile and give support when needed.

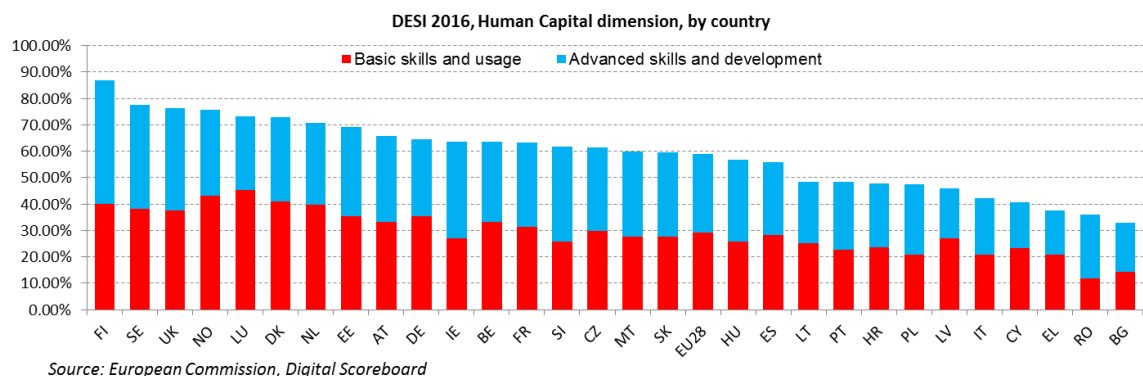
Different requirements are likely to be needed for business access, as the market can involve different scale economies and customer distribution (as well as different operators) than the residential mass-market.

In terms of **exogenous factors**, beyond the macroeconomic (GDP, country risk etc.) investment may in some instances be sub-optimal (or in less performing technologies) due to the expected lower take up.

Demand and low take-up can also certainly condition investment. As explored in the access study, (SMART 2015/002) that states *"Take-up may also be restricted in cases where there is low demand for high speeds. Indeed, low take-up even in the presence of fast infrastructures is cited by several stakeholders (NB mostly incumbents) as a key problem in the market today"*. However, the forecast run by IDATE in the same study have shown the insufficiency of networks to meet future demand, so in the medium run this may be a problem, as demand keeps booming and infrastructure cannot be upgraded in the short term. This is also part of the reason why a European Gigabit Society strategy is needed, since **a policy and non-binding strategy can be better suited than regulation at taking into account demand-side aspects** (e.g. promotion of connectivity for schools, in order to integrate connected learning tools with education). The importance of demand is another reason to maintain the important role of competition in the regulatory mix, as competition on very high capacity networks should not only ensure that prices are attractive to end users, and not too distant from those for traditional copper networks, but also that there is more commercial innovation in building demand.

The level of e-skills is certainly affecting demand for NGA services as illustrated by Figure 2 below.

Figure 2 – eSkills in the EU, DESI 2016



The **public consultation** showed that in relation to different treatment of legacy copper networks (whether pure copper access networks or upgraded FttC networks with copper sub-loops) to incentivise upgrades, operators invoked the principle of technological neutrality and leaving the market to decide how to best meet demand. However, a number of contributors consider that copper-based solutions will not represent a credible alternative in the long term.

Investors in FTTH solutions and some **access seekers** call for a recognition that the risk involved in rolling out fibre to the premises is higher than upgrading copper, so that regulatory incentives, if any, should not include FttC solutions. **Regulators** also argue that any risks specific to a particular new investment network project should be considered if wholesale tariffs are subject to regulation, in order to allow the operator a reasonable rate of return on adequate capital employed (ROCE) and return on investment (ROI).

On a more critical note, there was some discussion in the Expert Group¹⁶ on 30 May 2016 over what the review of the framework should aim towards as regards objectives for connectivity overall and whether or not there should be an emphasis on very high speeds potentially delivered via fibre connections (See Annex 13 for more details). It was noted by some experts that FTTH may not be necessary to fulfil many of today's needs at household level; even when considering multiscreen 4K TV content (see also the access study, SMART 2015/0002); while the longer-term needs of a significant proportion of the population are likely to be much greater. It follows that, from a short term perspective, **the added value of VHC may not currently be so high in the eyes of consumers, with consequential effects on their willingness to pay for it at least in the short term.**

While these causes can and will be partially addressed in the review, it is also important to acknowledge that a certain amount of public funding will remain necessary to improve the business case for operators and promoters in the most difficult areas. Public funding dedicated to high speed broadband networks is available, including EU funding in amounts which have been increasing throughout the multi-annual financial frameworks¹⁷. The current levels of public funding remain however largely insufficient to meet the challenge presented above.

1.2.1.2 Low coverage and take up in mobile

As regards mobile, **4G coverage** of households is almost universal in some Member States, but it is still substantially below that of 3G (HSPA). Although the user experience for mobile communications is very much determined by territorial coverage, LTE deployments have focused mainly on urban areas, as only 36% of rural homes at EU level are covered against a total coverage of 86% (see annex 6, figure 46 for Member States information).

The technical availability of mobile signals (i.e. LTE/4G coverage available in a territory) does not necessarily mean that the quality of service (including user experience) is optimal¹⁸. Truly ubiquitous coverage (i.e. everywhere) and capacity (i.e. peak speed up to 10Gbps) is a necessary condition for the success of 5G. 5G networks will not only provide very high peak downlink speeds in ultra-dense environments but also provide mobile broadband services to a range of vertical industries, notably, for automotive, healthcare, transport and utilities. These vertical

¹⁶ On 30 May 2016, WIK-Consult GmbH, Ecorys Brussels N.V. and VVA Europe organised a high-level academic expert panel to support the Commission in the preparation of the Impact Assessment for the Review of the electronic communications framework. The purpose of the expert panel was to provide feedback on the provisional conclusions reached by the consultants concerning the impact of planned changes to the e-communications framework. Prior to the meeting, the experts were provided with a programme for discussion, slide presentation and draft 'overview' of the consultant's research findings.

¹⁷ The allocation of European Structural and Investment Funds for high speed broadband networks experienced a sharp increase from €2.7 billion in 2007-2013 to around €6.4 billion for 2014-2020 (about €5 billion ERDF and an estimated €1.4 billion EAFRD). The Connecting Europe Facility (CEF) in the digital area is endowed with a limited budget of EUR 150 million to support deployment of state-of-the-art broadband infrastructure, based on the provision of financial instruments via the European Investment Bank (EIB). The broadband component of CEF is expected to mobilise around €1 billion. Finally, the European Fund for Strategic Investment (EFSI) does not have sectorial earmarking hence it is difficult to anticipate how much broadband infrastructure investment will be facilitated by it.

¹⁸ The user quality of experience is affected by many other factors, namely the quality of user device (some smart phones are better than others), user movement (when using phones in a train or car which is moving fast), user contractual data plan, network congestion (it is different at 8am or 3pm) or network configuration (depending on the operator).

industries will require sufficient capacity and reliability and other application-related parameters (e.g. latency) to meet their robust performance requirements.

Although 5G will coexist with other legacy infrastructures (2G and 3G) as well as with upgraded 4G networks, capital-intensive 5G networks architectures will require high capacity connection to base stations and, thus, involve a greater number of base stations as well as denser networks that will increase the backhaul¹⁹ traffic. 5G connectivity will increase mobile data traffic, through 3 main scenarios²⁰, i) enhanced mobile broadband (eMBB), ii) massive M2M communications and/or iii) ultra-reliable low-latency communications. These will pose challenges for backhaul links²¹ due to the fact that, on the one hand, network architectures become much denser by means of, e.g., small cell deployment, and a significantly higher number of backhaul links will be required. On the other, since the capacity of individual cells increases thanks to advances in technology, the corresponding backhaul links also require more capacity to manage data coming from technologically advanced cells. Indeed, with regard to facilitating deployment of denser networks, many respondents in the public consultation pointed to obstacles to the roll-out of small area access points needed for mobile services²². A development that is critical to estimating the costs of future connectivity of 5G is the increased prevalence of small cells. Although these are already being deployed for 4G services to increase capacity of networks, the very high data and bandwidth requirements of 5G will require a much larger number of small cells. *The 5G Manifesto for a timely deployment of 5G in Europe*²³, endorsed by key industry and telecom players, underlines the need for improved regulatory conditions of spectrum in terms of local installation of cells to facilitate the construction of denser networks. Along these lines, many market actors and public authorities consider that a general authorisation regime for small cells would foster innovation and competition both for services and end-devices.

¹⁹ In a mobile network, the last link to connect various forms of base stations with either the core network or the backbone network is referred to as backhaul. While optical fibre links are often the default solution, wireless backhaul links also play an important role for cost reasons or due to difficulties to connect the location of some base stations by optical fibre.

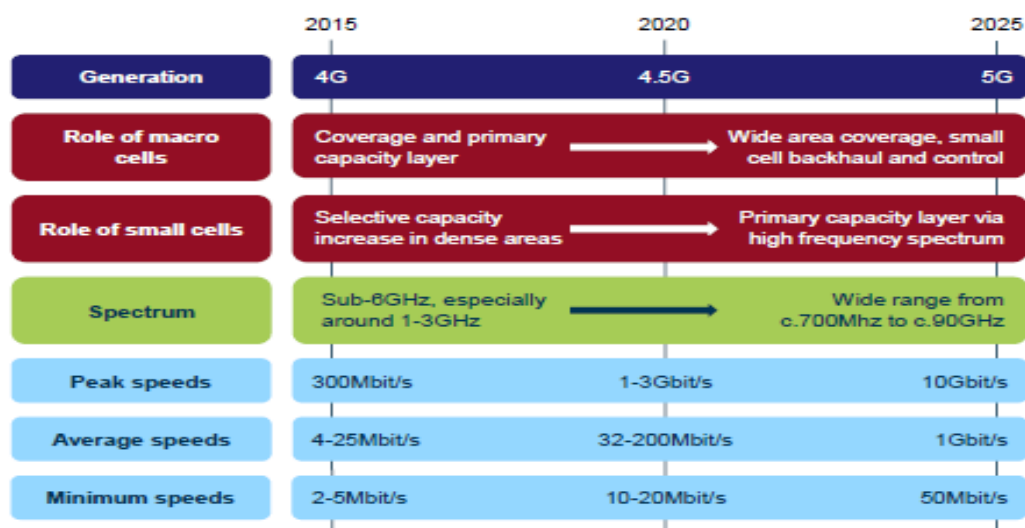
²⁰ The ITU defines 5G as encompassing (i) Enhanced Mobile Broadband: Higher performance targets across the board; relative to 4G including indoor/hotspot and enhanced mobile broadband everywhere; (ii) Massive Machine Type Communications: Massive numbers of connected devices with a huge diversity of connectivity requirements ranging low power/small data to high power/big data; and (iii) Ultra Reliable & Low Latency Communications: Native support for use cases having highly divergent requirements including mission critical applications, tactile internet experiences and self-driving cars.

²¹ [The RSPG report on \(wireless\) backhaul](#) predicts by 2020 capacity requirements for the backhaul link of already one to a few Gbit/s per base station in dense urban areas, while only several hundred Mbit/s second are considered necessary for rural areas and small cells. At the same time, the range of wireless backhaul is expected to be short between 200 meters to 1 km in urban areas and even shorter for small cells, while it could be up to 15km in rural areas. However, since peak data rates are expected to increase 10-50 times and user data rates 10-100 times with the introduction of 5G, this will result in significantly higher peak data rates of roughly 10-50 Gbit/s for backhaul links. As a consequence, the need to connect base stations directly with fibre backhaul or to at least bring a fibre connection very close will increase significantly.

²² Such as lengthy permit process, high administrative fees for back-haul provision, inappropriate fee structure, lack of harmonisation of management of electromagnetic fields' emission..

²³ <https://ec.europa.eu/digital-single-market/en/news/commissioner-oettinger-welcomes-5g-manifesto>

Figure 3 - Summary of future wireless evolution



Source: Analysis Mason, 2016

Despite the fact that the specificities of the future 5G architecture are still unknown today and standards still need to be defined, a Commission study uses a standalone small-cell deployment scenario as a cost proxy and estimates 5G deployment costs in the order of magnitude of **120 billion EUR for 95% of EU28 population coverage**²⁴. Hereby the costs for only the wireless infrastructure amounts to 38 billion EUR, while the 81 billion EUR for fibre infrastructure used for front/backhaul in this standalone scenario could be reduced due to synergies with fibre rollout for other purposes²⁵. In order to provide full coverage of transport links, their model predicts an additional 104 billion EUR, the wireless infrastructure accounting for 64 billion EUR without any further synergies possible for fibre rollout in the corresponding scenario.

1.2.1.3 Lack of timely and appropriate spectrum affecting investment

The lack of sufficient connectivity to meet future demand and to allow development of services, is especially notable in wireless connectivity networks that rely on access to spectrum²⁶. Demand for spectrum is growing significantly driven by both existing and new services and applications.

²⁴ According to the study SMART 2015/0068 on 'Costing the New Potential Connectivity Needs', a wide deployment of small cells is commensurate with the aims of 5G in terms of peak mobile speeds and other target parameters and thus serves as a cost proxy. The figure of 120 billion EUR corresponds to 95% of EU28 population coverage. The figure is subject to a large number of assumptions (e.g., the unit cost of a small cell falls to 1000 EUR, only 50% of small cells require fronthaul connections via fiber and the wireless infrastructure is shared) and varies in the model from 75 billion EUR for a smaller proportion of cells using fiber fronthaul connections to 194 billion EUR without a shared wireless infrastructure. A second DG CONNECT study on 'Identification and quantification of key socio-economic data to support strategic planning for 5G in Europe' SMART 2014/008, estimates that in 2020 the total costs of enhanced mobile broadband 5G networks deployment will be approximately 56 billion EUR in EU28 Member States. The estimation is based on a high level linear extrapolation of the costs per subscriber of 2G, 3G and 4G deployment in Europe. These costs do not include key technological components of 5G type networks (i.e. backhaul and small cells) and does not consider the wide set of very challenging 5G requirements. It largely corresponds to a scenario of the above study SMART 2015/0068 in which only macro cells are upgraded at the cost of 63 billion EUR.

²⁵ In case of fiber rollout to big Socio-Economic Drivers and Professionals (SEDPs) and in combination with the fiber necessary for macro cell coverage, the costs for fiber in this scenario would be reduced to 52 billion EUR.

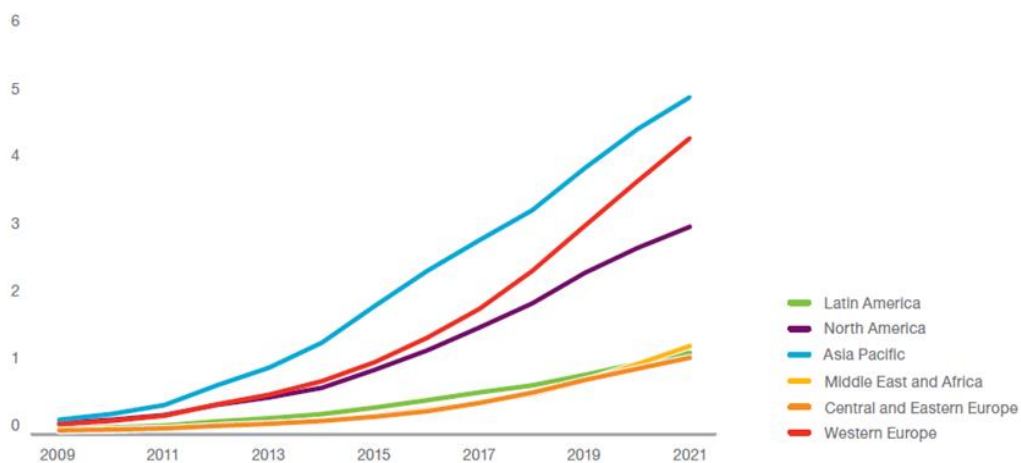
²⁶ The section dedicated to the efficiency of spectrum regulation in the Evaluation SWD further discusses the contribution of spectrum management as currently arranged in the EU to competition and investment on the single market.

It is estimated that up to 56 GHz²⁷ will be needed to meet the demand of 5G users and applications (e.g. the connected car, health related services, smart cities).

Mobile data traffic in Western Europe (and the US) is expected to grow 6-fold from 2015 until 2020, which represents a higher growth compared to South-Korea (x5) and Japan (x4). Indeed, mobile data traffic will grow twice faster than fixed IP traffic from 2015 to 2020.

In terms of traffic, the average smartphone user in Western Europe will generate **4.6 GB of mobile data traffic per month in 2020, up by 353% from 2015**. In terms of devices, laptop users will generate 4.4 GB and tablet users more than 6 GB (see Annex 6). IoT devices²⁸ are expected to surpass mobile phones as the largest category of connected devices in 2 years²⁹. Between 2015 and 2021³⁰ **IoT connections will increase at a compounded annual growth rate (CAGR) of 23%**, over that time, Western Europe will add the most connections, led by growth within the connected car 5G vertical.

Figure 4 – IoT connected devices: cellular and non-cellular in billions



Source: Ericsson Mobility Report, June 2016³¹

Timely award of sufficient spectrum (i.e. 5G pioneer bands below 6GHz such as 700MHz, 3.4-3.8 GHz, 4.2GHz and new higher frequency millimetre bands) is critical to the launch of 5G – its architecture will require a radio-frequency bandwidth of at least 100MHz³² to be accommodated for enhanced broadband 5G services and, in parallel, involve more base stations (including small cells) for radio access and denser connectivity to backhaul 5G increasing traffic.

Forecasted data for mobile broadband traffic confirm this trend of potential increase of wireless traffic, the growing need of wireless connectivity is due not only to wireless broadband but also M2M communications enabled by 5G networks. While M2M modules currently generate 3% of total mobile data traffic in Western Europe, by 2020, this figure will go up to 11.6%, while M2M modules will represent more than half of the total connected mobile devices. The US and Japan

²⁷ According to the SMART 2014/0018 'Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe' this number corresponds only to the extreme scenario of full exclusive spectrum (no-sharing) for automotive cars. In case of 50% sharing this number is 35 GHz.

²⁸ IoT includes connected cars, machines, utility meters, remote metering and consumer electronics

²⁹ Ericsson Mobility Report June 2016.

³⁰ 28 billion connected devices billion are forecast by 2021, of which close to 16 billion will be related to IoT

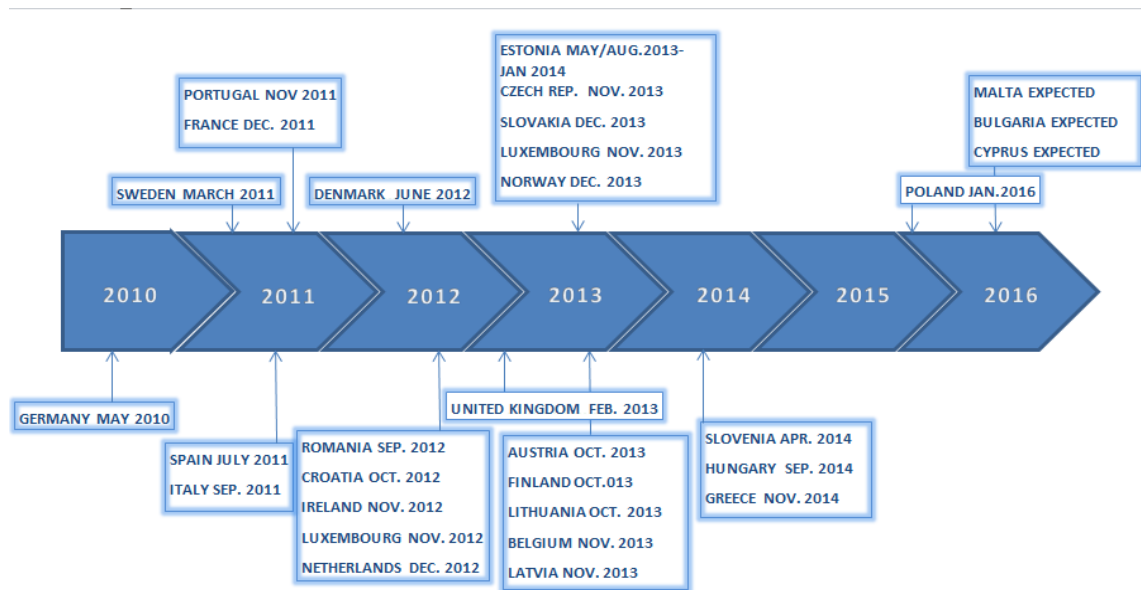
³¹ <https://www.ericsson.com/res/docs/2016/ericsson-mobility-report-2016.pdf>

³² Every generation upgrade of mobile technology requires wider radio-frequency channels. First generation worked in 25kHz channel, second generation GSM in 200kHz, 3G mobiles in 5Mhz channel and 4G mobiles in up to 20MHz.

will show similar figures, while in South Korea both traffic and number of M2M devices will be significantly higher proportionally³³.

In order to meet these connectivity requirements timely access to spectrum needs to be assured. In some Member States, there have been significant delays in making necessary spectrum resources (i.e. bands technically harmonized at the EU level) available to market operators, the main reason being the lack of consistency in spectrum governance across the EU (see Annex 2). Taking 4G licences in the 800MHz band as an example, the figure below depicts the difference in timing of spectrum availability across the EU countries which stretched over 5 years with some countries still in the process of awarding 800MHz licenses, despite the envisaged deadline in the Radio Spectrum Policy Program already having expired in January 2013.

Figure 5 - Timing of 800MHz spectrum awards



Source: Commission Services

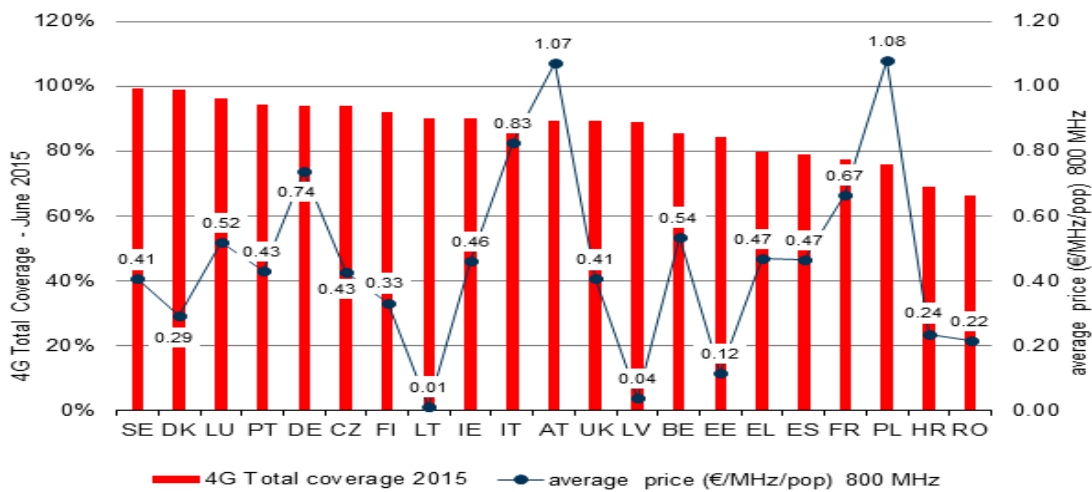
The result of the slow coming into service of spectrum resources is that it affects possibilities and incentives for operators to invest in the development of their networks (see Annex 2 on Public Consultation). The results of the Public Consultation showed that although the current technical harmonisation is seen to be working relatively well, there is criticism on the current institutional system's capability to bring spectrum resources to the market in a coordinated and timely manner.

Similarly, the differences in fees and auction prices paid across MS that, in addition, create discrepancies between markets and operators and contribute to the fragmentation of the European mobile market. In some cases, the auction processes (especially those with high reserve prices) appear to be driven by fiscal considerations rather than the objective of optimal use of the spectrum resource for connectivity. Thus, short term considerations (i.e. delicate national budgetary situations) play against long-term economic investment considerations needed to promote network roll-out. As illustrated in Figure 6, the LTE coverage in some EU Member States (AT or IT) is negatively correlated to the average price paid³⁴ for the 800MHz in EUR/MHz/pop, whereas in other Member States (SE, DK or FI) the correlation is positive. The more capital is required to acquire a licence the less capital is available for investment in the network, and the lower the coverage.

³³ See annex 6 for detailed data.

³⁴ In an auction, the price paid is driven by the value to mobile operators,.

Figure 6 - Average price paid in the 800MHz (€/MHz/pop) and LTE (4G) Coverage in EU MS.



Source: Commission Services

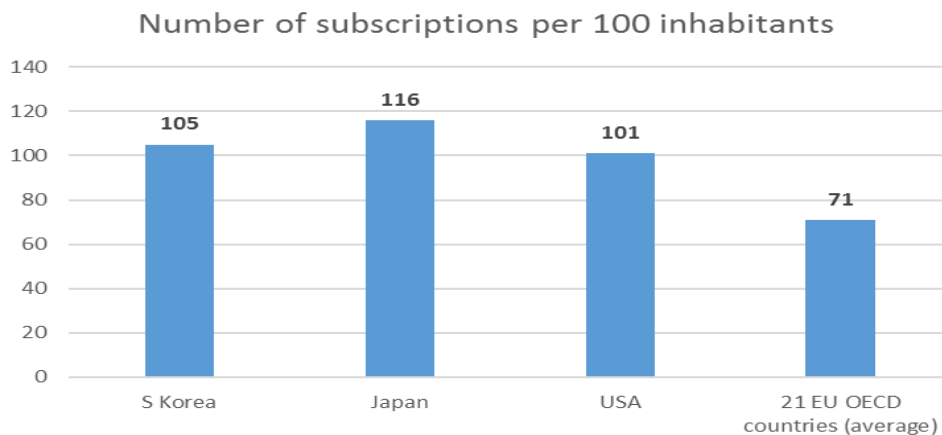
Consequently, the coverage of 4G services in the EU has been slow; it started to develop late and with great differences across national markets. However, it reached 86% in 2015 up from 27% in 2012. While LTE - 4G coverage, which allows users to profit from ubiquitous mobile internet services of up to 30Mbps, is almost universal in some countries (the Netherlands, Sweden, Portugal) reaching only 60% in others (Croatia, Romania). These differences amongst Member States are even more marked when looking at rural LTE coverage which continued to vary from close to 100% in Denmark, the Netherlands and Sweden to no coverage in Bulgaria, Cyprus and Malta in mid-2015; the EU average is 36% (see Annex 6).

Compared with other regions of the world, Europe lags behind in the roll-out (85.6% of households at EU level by 2015) and take-up of 4G/LTE. Leading markets for 4G (Japan, South Korea, Canada and the USA) have substantially higher connection rates than in the EU.³⁵ Whilst Japan is leading the way with regards to mobile broadband (take-up and coverage). Japan is closely followed by the Nordic countries (Finland, Sweden and Denmark) and Estonia. Australia is the 6th best performer, followed by Korea and the United States³⁶.

³⁵ However, the degree and quality of coverage is variable in the US as well. A recent (2016) study by Imperial college concluded that "From a public policy perspective the results reinforce the belief that ,although governments are eager to mitigate the digital divide in terms of access to the Internet, there appears to be a mobile divide between individuals and households in urban or affluent areas and those in rural or lower-income areas. See: http://ac.els-cdn.com/S0308596116000410/1-s2.0-S0308596116000410-main.pdf?_tid=cad0768e-180a-11e6-bb74-00000aab0f01&acdnat=1463034711_b683de50d0e533237591e737924da244

³⁶ Source: I-DESI: <https://ec.europa.eu/digital-single-market/news-redirect/31457>

Figure 7 - OECD wireless broadband take-up (subscriptions/100people)



Source: OECD

Operators' incentives to invest in network deployment especially in the more capital-intensive future 5G networks are influenced by factors such as the lack of predictability of spectrum availability or broad synchronisation of spectrum release and licence durations relative to the required investments cycles. Consistently with the above analysis, *the 5G Manifesto* with European industry endorsement seeks sufficient spectrum bands to be licensed on time if 2020 target launch date for 5G is to be met³⁷. It also emphasises *that* the spectrum aspects of the DSM - namely, harmonisation and predictability of spectrum policy across Member States (including spectrum availability, licensing procedures and costs, licence terms, and liberalisation and renewal of existing spectrum) – are essential to encourage more investment into the mobile sector, particularly in 5G networks.

As indicated in the evaluation (section 7.2.3.2.), the harmonisation approach of the current framework has not achieved sufficient convergence of the actual conditions attached to individual licences or of the underlying motivations to impose such conditions, thereby creating regulatory uncertainty and possibly impacting effective access and use of spectrum and market investment incentives.

1.2.1.4 Unsatisfactory connectivity offers across the Union for businesses

The DSM strategy also focusses on business and SMEs. Business customers typically require higher quality of service levels than residential customers, and may also require higher performance levels as regards certain technical characteristics.

A survey conducted for SMART 2014/0023³⁸ confirmed that business customers value symmetrical speeds, low contention, short latency, and unlimited data volumes that can only be guaranteed by fixed VHC connections. They also require short provisioning and fault repair times, and service level guarantees. Mobile broadband is not considered a substitute as it does not sufficiently meet the higher expectations of business customers with regard to these aspects.

However it has also to be said that interviews conducted for the support study suggest that the technical requirements of business customers may over time converge with the growing ones of

³⁷ European operators are targeting the launch of 5G in at least one city in each of the 28 European Member States by 2020

³⁸ See: <https://ec.europa.eu/digital-single-market/en/news/investigation-access-and-interoperability-standards-promotion-internal-market-electronic>

residential customers. The widening use of telework practices could boost the need for symmetric gigabit connectivity and therefore the need for VHC networks to be made available to ever more end users. This could in theory also enable business users to benefit from any infrastructure-based competition or co-investment in mass-market FTTH networks. Whereas large companies tend to solve the connectivity problem through ad-hoc leased lines, SMEs are often struggling to meet their connectivity requirements. Moreover, the wider diffusion of the collaborative economy and the increasing number of micro enterprises that operate in it also fosters higher connectivity requirements.

Multi-national businesses require not only the availability of connections in dispersed locations, but also uniform conditions for provisioning, repair and quality guarantees. In a 2013 study “Business communications, economic growth and the competitive challenge”, WIK estimated the cost of non-creation of a single market enabling the seamless provision of business communications services in Europe at €90bln per annum over time in terms of non-realized efficiency and productivity gains.³⁹

The lack of availability of harmonised conditions for business accessing connectivity across borders has its roots in the national focus of the institutional regulatory set up and of the rules intended to address cross-border market failures, such as the lack of availability of a business grade product for which demand exists. Although rules for cross-border harmonisation exist, they require relatively complex and often non-binding procedures to deliver consistent outcomes. This has failed to provide the consistency demanded by multi-national business users operating across the single market.⁴⁰

The evaluation (section 7.2.2.) and the public consultation evidenced how cross-border providers deplore the lack of consistent access products (in particular when it comes to the wholesale inputs needed to serve the high end business market), the multiplicity and great diversity of market entry provisions (e.g. authorisations, rights of ways) and, in solving disputes across borders, etc.

The lack of available business connectivity products on a cross-border basis is one of the reason why the framework contribution to the **Single Market objective**, was rated more critically than the other objectives with most stakeholders⁴¹ considering that this is the least accomplished objective of the framework, referring to the lack of regulatory consistency and to the persisting barriers to operating across borders.

1.2.2 A regulatory framework not fit to rapid market and technological changes

This section deals with the problems brought about by the significant market and technological developments that have taken place since the last review, changing the way citizens and businesses communicate, and bringing the need to adapt current rules to these changes.

1.2.2.1 Uncertainty about rights and obligations for provision of equivalent services

The evaluation report noted that Over-the-Top players (OTTs) are not subject to sector-specific rights and obligations, even when their services are used by the end-users to cover the same or similar communications needs as the traditional electronic communications services. Many

³⁹ The gains are associated with a welfare gain from lower prices, efficiency gains from an improvement in ICT processes and productivity gains through a reorganisation of business processes.

⁴⁰ 64% of respondents considered that the access-related provisions have made a moderate or significant contribution to the internal market (of which most consider the contribution has been moderate), while 29% consider it has made little or no contribution.

⁴¹ Roughly 46% of the respondents to the public consultation consider the single market objective achieved (of which 39% only "moderately" achieved), while the competition objective is considered achieved by 59% of the respondents (of which 32% consider that it was "significantly achieved") and the citizen interest objective is considered achieved by 54% of the respondents.

stakeholders (BEREC, several Member States, most operator associations, most incumbents, some cable players, all user associations and some broadcasters) referred in the public consultation to the need to review the current definition of ECS, owing to the increasing uncertainty on the scope of the definition of ECS related to "conveyance of signals", the inconsistent regulatory obligations for similar services and the convergence of communications services.

New online players -often global- have emerged offering communication services which many users perceive as comparable to traditional electronic communications services such as voice telephony and SMS. These so called Over-The-Top-players (OTTs) provide their services in the form of applications running over the internet access service and are in general not subject to the current EU telecom rules. Some of such OTT communications services make use of telephone numbers and can for this reason be considered to fall under the framework⁴², but the point is contested and *de facto* the rules of the framework have not been applied to them. Traditional electronic communications services, however, clearly fall under the scope of the EU Regulatory Framework, since they incontestably fulfil the definition of "Electronic Communications Services" (ECS), a legal term contained in the Framework Directive (Art. 2(c)). Under the interpretation offered by the European Court of Justice, ECS covers communication services of providers that bear the responsibility for the conveyance of signals over the underlying electronic communications network vis-à-vis end-users.⁴³ Being responsible implies that the service provider must have a certain degree of control over the conveyance of signals. Operators of traditional electronic communications services usually also own and run (parts of) the underlying network, which consequently puts them into a "controlling" position. Conversely, providers of OTT communications services usually do not own or operate any network infrastructure and cannot in principle fully control the signal in the same way, as this is carried over the internet access service on a 'best-effort' basis (unless they negotiate a managed service with network operators). These differences have led national regulatory authorities to adopt diverging interpretations on the consideration of OTT communications services as "Electronic Communications Services" (ECS)⁴⁴. The generic OTT label hides different types of communications services which may e.g. offer the option to use the E.164 numbering system (e.g. Skype out) in order to interconnect with traditional telecom service providers. In order to be able to technically make use of numbers, such OTT operators need to e.g. conclude wholesale termination agreements with traditional ECS operators in order to terminate a call. So by being able to offer OTT communications services which - from a user perspective - can "interact" with phone numbers, such OTT operators factually market their services as being equivalent to and cheaper than traditional telecommunication services and end users can come to rely upon them having equivalent functionalities. Other OTT communications services may not give the possibility to use numbers, yet they nevertheless provide communications services that consumers may in certain situations also see as functionally substitutable to traditional services.

Such disruptive innovations, while very convenient and financially beneficial to end users, bring the need to analyse their impact on existing competition conditions and possible distortive effects stemming from differentiated regulatory treatment, as well as the adequacy of existing regulation in a changed environment.

Providers of traditional communication services, which mainly provide both networks and services, including internet access services and some specific services, have to comply with sector-specific obligations related to e.g. contractual rights, transparency, quality of service, contributions to universal service funds, access to emergency services ("112") and caller location information. Pure OTTs, on their side, are subject to horizontal legislation only and not to these sector-specific obligations, even when their services are used by the end-users to cover the same

⁴² See ERG Common Position on VoIP adopted in December 2007

⁴³ Case C-475/12, *UPC v. Nemzeti Média*, judgment of 30 April 2014, par. 43.

⁴⁴ BEREC, Report on OTT services, BoR (16) 35,

http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5751-berec-report-on-ott-services.

Differences in national case law are also observed, as described in annex 10 (problem drivers).

or similar communications needs. Moreover, traditional providers are often subject to sector-specific administrative charges and taxes. Finally, they have to comply with specific data protection obligations under the ePrivacy Directive, beyond the Data Protection Regulation⁴⁵, which applies also to OTTs.

At the same time, the EU regulatory framework offers providers of traditional communication services certain rights which could be considered as an advantage in comparison to OTTs, such as e.g. access to the (international) E.164 numbering plan. Such access to the numbering regime provides a global reach through phone numbers and the interconnection agreements between traditional telecom providers ensure a global network effect for telephony and SMS.

The differentiated regulatory treatment outlined above creates uncertainty about rights and obligations for provision of equivalent services that needs to be addressed by the review. Firstly, the question arises to what type of communications services the framework should extend. Secondly, what sector-specific end-user protection rules are still warranted or have become obsolete. Thirdly, whether underlying public interest such as e.g. security and privacy would require extension of some of the sector-specific rules to OTTs.

1.2.2.2 Gaps in consumer protection in some areas.

Sector-specific end user protection rules complement general consumer protection and aim at a high level of consumer protection in the electronic communications sector. These sector-specific rules cover in particular areas such as contractual information, transparency, quality of service, contract duration, switching, privacy and security, and access to emergency numbers. The functioning of the provisions concerned is discussed in more detail in various sections of the evaluation SWD⁴⁶.

Many providers of electronic communications networks and services, a few broadcasters, vendors and OTTs consider however that certain sector-specific end-user rights' provisions are not relevant anymore and should be repealed, mainly in the area of those contract rules which are covered by various other Directives. European and national consumer associations, on their side, have not identified any provision to be repealed, and would prefer to keep current sector-specific end-user in order to supplement the framework and general consumer protection rules which do not address sector-specific issues.

Although the rapid adoption of alternative OTTs communications services that are not subject to these sector specific rules suggests that end-users generally feel confident in using these services without sector-specific protection, there may be areas where the users of these new services are exposed to the same risks that sectorial rules were designed to address, for instance regarding security and confidentiality of communications or transparency and contractual information. This brings the need to assess to what extent the rules on consumer protection which would still seem to be necessary should be extended to all or some new market players. This was confirmed in the public consultation where, despite the fact that most stakeholders (Member States, telecom operators and their associations, broadcasters, vendors and OTT providers) argued that the current framework has contributed to effectively achieving the goal of ensuring a high level of consumer protection across the EU, many of them also considered that the current regulatory framework has failed to deliver consumer protection with respect to emerging services based on new technological developments and outside (or not clearly within) the remit of the sector-specific rules. In particular, most responding Member States support specific requirements to be applied to all communications services irrespective of the provider ("traditional" telecom operators or "new" OTTs) in order to avoid risks of (a) insufficient customer protection, (b) a lack of clarity, and (c) confusion among consumers who might mistakenly believe that their

⁴⁵ REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

⁴⁶ See in particular sections 7.2.3.3, 7.2.3.9, 7.2.3.11, and 7.2.3.12 of the Evaluation SWD.

communication is protected by sector-specific rules. Consumer representatives supported this view, calling for an extension of existing rights for communications services. The majority of communications service providers, including OTTs, would prefer that end-user rights rely on horizontal regulation (consumer and data protection), together with competition law tools, with a minimum set of rules applying to all players.

Concerns about security of communications have risen in parallel with the adoption of new services in the economy and society as a whole. In 2014 a total of 137 "major incidents" (in terms of either duration or percentage of users affected) were reported, affecting in comparable percentages fixed telephony, mobile telephony, fixed Internet and mobile Internet. Although there are no comparable figures, security incidents have also been reported for alternative OTTs communications services. Over half of respondents to the public consultation considered that current rules have been effective in achieving their objectives and more than a third considered it important to involve the complete Internet value chain under the security rules. This would help to increase consumers' trust in the use of communications services regardless of the underlying technology. End-users of OTT messaging services are currently less protected because there are no security duties applicable to OTT communications that are comparable to those applying to telecoms services. OTT communications services are not considered as digital services under Article 3(11d) and Annex III of the NIS Directive, nor are they covered by the current Articles 13a and 13b Framework Directive. If security is considered as an important value, it is reasonable to consider whether it should apply in a similar way to all comparable communications services.

Another important requirement is confidentiality of communications which currently applies to electronic communications services only. The exact delineation of the services subject to any confidentiality obligations, and the scope of such obligations, is a matter for the review of the e-privacy Directive which may build on the definitions developed in this review.

Current adoption of new communications services has not led to any particular needs thus far in the area of interconnection and interoperability. The variety of available means of communications, ease in switching between various OTT communications services (because of multi homing, for instance) have ensured *de facto* end-to-end connectivity for end users via various communications services (in addition to traditional numbers-based telephony and messaging) and consumer choice. However, in view of the increasing importance of communications platforms which benefit from network effects, it appears opportune to have tools available in case healthy functioning of markets or innovation is threatened, in particular if network effects would impede entry and innovation in the market and limit consumer choice in the use of different services. Alternatively, a significant fragmentation in the services employed, combined with a possible marginalisation of the interconnection/interoperability ecosystem based on public numbering plans, could frustrate the objective of end-to-end connectivity of the entire population. Either such scenario would in turn hamper the creation of a fully functioning single market for communications services. The public consultation showed divergent views on this issue, with mobile operators and certain incumbents calling for a phasing out of the ex-ante regime in place, arguing that the IP-based delivery of voice services is modifying market circumstances. MVNOs have an opposing view on the matter, on the ground that terminating networks will always remain a bottleneck. OTTs consider that interconnection rules are needed to avoid discrimination.

Rules regarding contracts and switching are complementary to competition: they ensure that consumers derive maximum benefits from a competitive market: from making the right purchase, to ease of switching to other providers when desired. These rules have thus enhanced competition on prices, quality and service innovation and have fostered innovative commercial offers. Regarding contract information, the majority (86%) of the respondents to the public consultation consider that the same level of protection vis-à-vis contracts should apply to all communication services, including those offered by OTT providers.

Good and reliable quality of service is of particular importance for the internet access service, through which many communications services are made available to consumers. This is reflected in the increasing attention that consumers pay to factors other than price when subscribing to an internet access service. In particular, data show that after price, the two factors that consumers consider for their purchase decision are the maximum download and upload speed of the service and the maximum amount of data that can be used.

Similarly, an increasing number of consumers perceive that the possibility to keep their phone number when switching provider is an important facility that they would like to use for other components of the communication services, such as e-mails, contents, photos and content stored online by the communication service provider.

The public consultation indeed supported these findings, with consumer protection bodies and Member States in favour of keeping sector-specific end-user rights applicable to communication services, while alternative telecom operators suggested that full harmonisation is needed for contractual information, transparency measures, contract duration, switching, and bundles.

Telecom operators associations, most incumbents, several alternative players and most cable operators think there is no need for additional sector specific consumer protection rules and that any potential issues should be dealt with horizontally. However, these stakeholders acknowledge that there may be several issues that need attention. Some of these would include bundling of contracts and their impact on switching (see section 1.2.2.3 below). All these changes to the market place raise questions about notably the scope of application of the regulatory framework as well as the type of regulatory intervention prescribed by the latter to ensure consumer protection in some areas.

1.2.2.3 Rules unfit to bundles for switching purposes

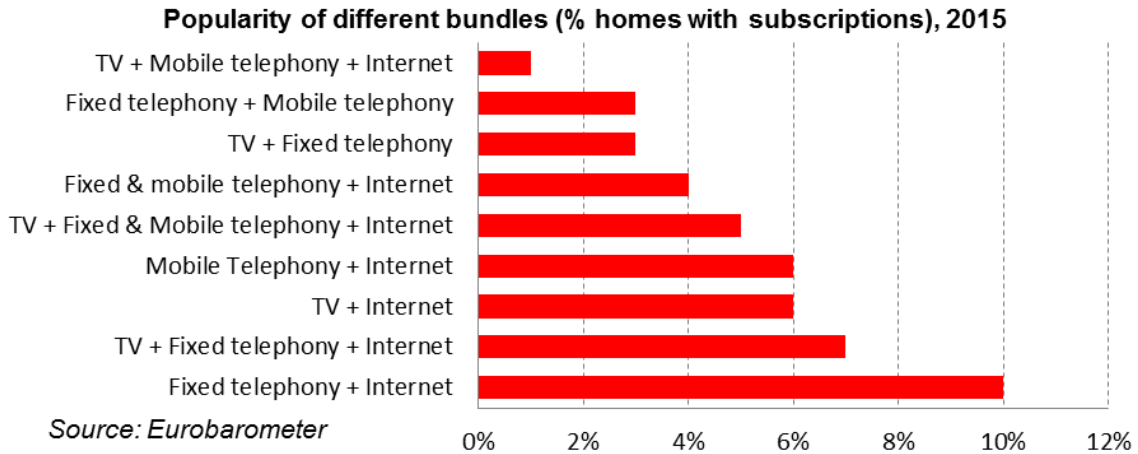
Technology developments have fostered the convergence of different technologies and services enabling the delivery of seamless services to end-users in the form of bundles. The rapid adoption of bundles in the EU⁴⁷ has brought significant benefits to users in terms of convenience and price; however, it has also affected market structure and market conduct and created new transparency, comparability and switching problems for consumers, which poses longer term risks for competition on prices and quality of service.

A bundle refers to a package of several different services sold together as a single plan: landline calling, Internet access, mobile services, pay-tv. A bundle can also include products, most frequently a terminal device. The aim for vendors is to increase average revenue per user (ARPU) by increasing the number of subscriptions sold to customers, and to secure customer loyalty. Mobile customer churn rates decrease when their mobile plan is bundled with a fixed Internet access and pay-tv plan.

50% of all EU households purchase bundled communications services in 2015, up from 38% in 2010. The most popular bundle is Fixed telephony + Internet followed by the triple play Fixed telephony + Internet + TV. Internet access (either fixed or mobile) is present in 80% of all service bundles, fixed telephony in 64%, TV in 54% and mobile telephony in 46%.

⁴⁷ See section 6.10.7 on the increasing adoption of bundles

Figure 8 – Bundles in the EU in 2015



Bundles have both benefits and disadvantages for consumers. By integrating several services in a single offer, with unified billing and customer care service, they can be more convenient and less expensive for consumers. A 2011 Eurobarometer survey on e-communications measured that 68% of households with a bundle considered that bundles are more convenient because there is only one invoice and 52% of them found that bundles are cheaper, while households without a bundle at the time invoked as the main reason for not having a bundle the fact that they provide packaged service they don't really need.

Yet bundles can also make transparency and price comparison more difficult and potentially lead to lock-in effects, since bundles make it more difficult for consumers to switch providers of certain services within the bundle. This problem is clearly identified in the evaluation report, which indicates that this market has the largest proportion of consumers among the surveyed markets who say they tried to switch provider but faced obstacles while attempting (7%). From those customers who wanted to switch their internet service provider (42% of participants), 15.1% found it easy, 7.2% switched but found it difficult, 2.4% tried and gave up, and 3.6% did not even attempt to switch as they thought it might be too difficult⁴⁸.

Regarding transparency and price comparison, as shown in the evaluation report (see section 7.23.9.), the latest data available show that although more than two thirds (68%) agree that it is easy to compare the services and prices of bundled offers of other providers, 24% of consumers do not yet think it is easy to do so and also note that there has not been any improvement in this area since the previous survey.

Respondents in Italy (88%), Greece (84%) and Bulgaria (82%) are the most likely to agree that it is easy to compare, while the most critical countries are Denmark, where far fewer (31%) agree this comparison is easy, followed by Luxembourg (57%) and the Netherlands (59%). Easiness of comparison and take-up of bundles are not directly correlated, since adoption rates in the latter group of countries is above the EU average, with 87% of households in the Netherlands subscribing to a bundles of services. Yet data show a relative correlation between easiness of comparison and actual switching of bundle service provider for some countries, with Greece (80%) and Italy (70%) on top, while Luxembourg (40%) has one of the lowest rates in switching.

A majority of respondents to the public consultation, including several Member States, almost half of the NRAs, mobile and certain fixed operators and the European consumer association advocate that the scope of current rules on switching needs to be adjusted due to bundles.

⁴⁸ Section 7.2.3.9 of the Evaluation SWD. Flash Eurobarometer 243 *Consumers views on switching service providers*. November 2015.

Bundles are a cause of concern and the TV service should not hinder switching of broadband services. Consumers' view, shared by many others, is that consumers should be able to terminate any individual service within a bundle (equipment linked to one service should not lock-in consumers to other services), and renewal of one service should not be used to renew the entire bundle.

On the opposite side to this view are a few Member States, operators' associations and a large number of fixed operators, which think that additional rules would represent a disproportionate burden on telecom operators, as OTTs are currently not obliged to offer unbundled services. Moreover, they argue that the market is competitive, there is no evidence of harm (on the contrary, consumers value bundles), and competition rules together with horizontal consumer protection should suffice.

Besides the three major problems described above (different rules for equivalent services, gaps in consumer protection and rules unfitted to bundles for switching purposes), technology and market changes have also prompted the need to consider the advisability of adapting other sets of rules.

For instance, must-carry obligations on providers of electronic communications networks for the transmission of specified radio and television broadcast channels could be examined in view of the increasing use of OTT services for accessing audio-visual content, as well as the prevalence of catch-up or other video-on-demand services accompanying traditional broadcast channels and broadcast distribution platforms. OTT services are not covered by 'must-carry' obligations. While there is a majority view in the public consultation that transmission obligations imposed on electronic network operators ('must-carry' rules) and rules related to electronic programme guides should be adapted to new market and technological realities, there is sharp disagreement how such adaptation should be conceived. Extension of current rules is supported by most broadcasters whereas most telecom operators are in favour of reducing the scope of the rules.

Another area where adjustments may be necessary is numbering. While the evaluation showed no significant problems with the implementation at national level, it made it clear that changes may be needed to cope with future competition issues in the machine-to-machine market, e.g., connected cars, logistics, etc. with particular view to their increasing cross border aspects. M2M growth rates are expected to be many times higher than those of the pure voice communications, changing the pattern and intensity of demand for numbering resources. The public consultation showed consensus that to cope with the numbering needs of M2M in the future, a clear framework for extra-territorial use of numbers is necessary to ensure sufficient numbering resources. As rules regarding extraterritorial usage are not governed by the regulatory framework, they may differ per Member State, entailing a risk of regulatory fragmentation. In this respect, existing coordination efforts in CEPT to prevent regulatory fragmentation may not prove sufficient to comply with the requirements of the Single Market. More specifically, administrative limitations of extraterritorial use may raise concerns with regard to compliance with EU Law notably with the requirements of Article 56 TFEU concerning the freedom to provide services.

At present, the scope of entities that can be beneficiaries of assignment of numbers vary per Member State and is often limited to specific categories of electronic communications service providers. In this respect, the current beneficiaries, e.g. most mobile network operators, expressed concerns over implementation and security issues, such as fraud, exhaustion of national numbers, and interoperability and end-to-end connectivity aspects. Mainly respondents beyond the telecom sector noted the increasing cross border aspects and the need to adapt to market changes.

Rules on access to emergency services are a very important issue too, as indicated in the evaluation report. In the public consultation, the telecom industry highlighted the importance of reliable access to emergency services that, in view of the technical standards and legal

arrangements in place, can be provided only through ECS today. However, they argue that access to 112 obligations should be imposed on OTTs as well, if technically feasible. A large number of stakeholders consider that, although it would not be technically feasible to subject all OTT services to the obligation of providing access to emergency services, all the voice services perceived by the users as substitutive to the current PSTN voice service and which also give access to E.164 numbers should be subject to the same obligations regarding the access to emergency services.

Finally, obligations related to Universal Service may no longer be in line with current levels of availability and use of communications networks and services, as evidenced by the evaluation of the regulatory framework.

1.2.3 Regulatory redundancies and inefficiencies and lack of coherence in the Single Market

This section analyses the regulatory set up and regulation areas where objectives can be achieved in more efficient ways. This problem is clearly identified in the evaluation report⁴⁹.

1.2.3.1 Unnecessary administrative burden

The better regulation principle is about regulating only when necessary and in a proportionate manner. **The evaluation has identified several areas** where the administrative burden could be reduced without compromising – in some cases even improving - the effectiveness of the provisions.

Access regulation is an area where a certain level of simplification could take place in terms of process, intervention triggers or the relevance of access products for safeguarding competition, without compromising however the results achieved. The current regulatory framework implies a considerable amount of intervention intensity at both Member States and EU level, given, for example, the need to carry out and consult on **market analyses every 3 years** as well as the complexity of regulating ex ante the terms of provision of a significant number of different access products based on such analyses, in particular as several access products may be required for each regulated market. Moreover, the procedures as such could be simplified for certain very stable markets such as the markets for call termination, without compromising the outcomes.

Evaluation findings indicated that there is room for reducing the regulatory burden on national administrations/institutions and operators, or redirecting efforts to priority tasks, while at the same time increasing the predictability and the stability of the framework. Based on the actual implementation experience, it appears that the current cycles of market reviews are unnecessarily short and that lengthening them would increase the regulatory certainty and reduce the administrative burden for NRAs, the Commission, as well as for market participants. There are also a potential to avoid duplication of processes for the specification of new wholesale remedies, and simplify the imposition of remedies in the medium term through the introduction of standardised wholesale remedies in cases where such remedies would be appropriate, for example in relation to business access for which there is significant trans-national demand). Compliance burden could be reduced with limiting the interventions only when it is needed to address retail market failures.

Areas where much is to be gained from streamlining include the **universal service rules** that can be revised in view of their effectiveness and of the decreasing relevance of some of the elements.

There is a clear simplification and reduction of administrative burden potential highlighted by the evaluation, indicating the possible **removal of some redundant universal service obligation components** as public payphones, comprehensive directories and directory enquiry services.

⁴⁹ For a more extensive analysis of administrative burden and potential redundancies, please refer to the Efficiency and Coherence sections of the Evaluation SWD as well as to the REFIT conclusions.

Those are causing costs on top of the administrative burden for the NRAs from the process leading to the imposition of obligations. For example, as indicated in the evaluation report, the estimated maintenance of **payphones** in the EU costs annually over 1 bn euro – a large amount that needs to be critically considered in the light of rather infrequent use of the facility.⁵⁰ Usage and costs of the provision of **comprehensive directory and directory enquiry services** are difficult to estimate. However, the available data suggest that the relation between the cost and demand is such that commercial provision by the market would suffice, in particular for online directories and enquiry services.⁵¹ The evaluation also indicated that directories are satisfactorily provided by the markets and demonstrated the non-use of 88% across the EU28 regarding public payphones⁵². [Evaluation p. 35] and highlighted the potential to narrow the **scope of universal service availability** and possible administrative burden reduction through ending of the current sectorial sharing mechanism possibility for financing.

The table below summarises the current state of play of universal service obligations in the Member States. Orange indicates that a universal service provider (USP) was designated in the past, but that the USO has been withdrawn in the year indicated in the applicable field. Around 42% of obligations related to public payphones, comprehensive directory and directory enquiry services were lifted between 2006 and 2012⁵³.

Table 1- State of Play on USO providers in the EU 28

Table 1 Current state of play for the designation of a universal service provider for each universal service component in EU28 Member States²⁰

	Access to a network at a fixed location, and PATS	Comprehensive directory	Comprehensive directory enquiry service	Public payphone
Austria			2006	
Belgium		2013	2013	2013
Bulgaria				
Croatia				
Cyprus		E-directory only ²¹	2011	2011
Czech Rep.		2006	2006	
Denmark				
Estonia	2011	2011	2011	2011
Finland				
France		2014 ²²	2012	2014
Germany				
Greece				
Hungary			Underway ²³	Underway
Ireland				
Italy		2012	2012	
Latvia		E-directory only		2014
Lithuania				
Luxembourg				
Malta				
Netherlands		2015 ²⁴	2015	2008
Poland	2011	2011	2011	2011
Portugal				
Romania	2011	2011	2011	
Slovakia	For disabled only ²⁵	2012	For disabled only ²⁶	2012
Slovenia				
Spain			2012	
Sweden				
UK				

⁵⁰ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 42-43. Payphones use has been dropping consistently over the last few years. Only 8% of population used payphones in 2014, and according to the data of 2008-2009 only 1% of emergency calls was made from payphones (7% for cross-border emergencies).

⁵¹ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 38-42.

⁵² Special Eurobarometer Report 414,2014, p.153. However, it should be noted that unlike public pay phones, mobile telephony is not regulated for accessibility. To tackle such issues and in order to improve the functioning of the internal market for accessible products and services by removing barriers created by divergent legislation, the Commission proposed the European Accessibility Act, which will facilitate the work of companies and will bring benefits for disabled and older people in the EU.

⁵³ It indicates whether a service provider has been designated to provide a universal service obligation (USO) for each component of the universal service in the Member State. Green indicates that at least one operator is currently designated to provide the component of the universal service. Orange indicates that a universal service provider (USP) was designated in the past, but that the USO has been withdrawn in the year indicated in the applicable field. Red indicates that no universal service operator has ever been designated in the Member State.

Source: SMART 2014/0011

Another target area will be the removal of certain **consumer protection measures** which are adequately addressed through horizontal legislation.

The evaluation report indicates that simplification may be achieved among others by analysing the necessity of overlapping provisions, which may lead to reducing the sector specific rules to those areas where they are still warranted, or of provisions which developments may have made redundant or irrelevant, such as for instance certain sector-specific consumer protection rules or some universal service components. In the public consultation providers argued that at present there is a problem of regulatory redundancy in certain areas because of overlapping general consumer protection rules and telecom sector specific rules for consumer protection, as well as duplication of authorities dealing with consumer dispute settlement and sanctions and that this overlap leads to over-regulation, too detailed provisions, and inconsistency of rules.

The latest development of general consumer protection rules such as the Consumer Rights Directive, the Regulation on online dispute resolution or the Directive for alternative dispute resolution has resulted in partly overlapping legal frameworks, which could in some cases lead to duplication of procedures, over-regulation, too detailed provisions or inconsistency of rules. For example some contract provisions in Article 20 Universal Service Directive are overlapping with information requirements in contracts in the Consumer Rights Directive covering aspects such as characteristics of services, identity of trader, tariffs or contract duration; additionally general contract rules are also set out in the Services Directive. In the same vein, out-of-court complaint and redress mechanisms are provided for under Article 34 Universal Service Directive, while a recourse to similar mechanisms is provided by the legislation on Alternative and Online Dispute Resolution (Directive 2013/11/EU on consumer ADR ("ADR Directive") and Regulation (EU) No 524/2013 on consumer ODR ("ODR Regulation"). The ADR Directive enables EU consumers to resolve their disputes concerning contractual obligations stemming from sales contracts or service contracts with EU traders, including electronic communications service providers, through the intervention of ADR entities respecting binding quality requirements. Under the ODR Regulation the EC launched in February 2016 an EU-wide online platform (ODR platform) that facilitates the online resolution of contractual disputes between EU consumers and traders over purchases made online. Online traders and online marketplaces are required to provide a link to the EU ODR platform on their website.

Table 2 - Overlap between key provisions of the USD and horizontal rules

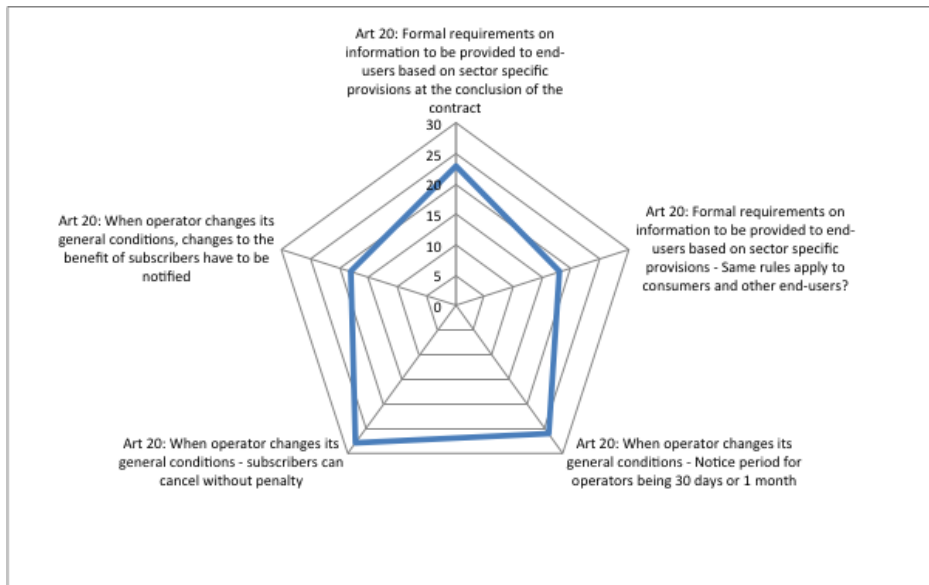
	Applicable to ECS?	Similar protection rules	Other protection rules
Consumer Rights DIR (2011)	v	v	v
Misleading Advertising DIR (2006)	v		v
DIR on Services (2006)	x	v	v
Unfair Commercial Practices DIR (2005)	v	(v)	v
Unfair Contract Terms DIR (1993)	v	(v)	v
ODR Regulation (2013)	v		v
ADR DIR (2013)	v	v	

Source: SMART 2015/003

The evaluation report noted however that the exact scope and protection level of each set of rules must be analysed in detail before any conclusions are drawn – in particular in view of making sure that the level of protection offered to consumers remains adequate and whether sector-specific rules are still warranted. In particular, even in the case of protection rules with similar purposes and similar measures (e.g. transparency or dispute settlement) their exact scope and

redress mechanisms might differ. In any case, a clear need appears to address the (small) inconsistencies identified (e.g. penalties, terminology, circular references, etc.).

Figure 9 - Homogenous provisions on contract with specified terms (Art 20 USD)

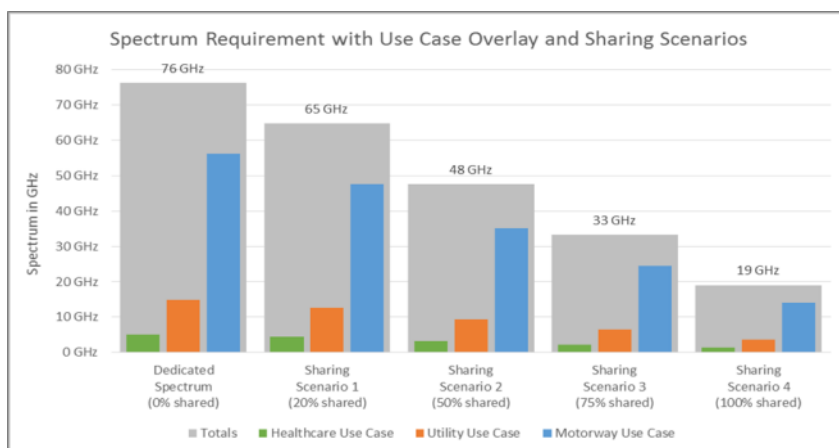


Source: SMART 2015/003

In the field of **wireless communications** a greater use of general authorisations in some instances could also contribute to simplification, especially for new short-range bands (so-called millimetre bands) envisaged for 5G well above 6 GHz, while enabling users/innovators to gain access to spectrum in a quick, open and non-costly manner. In the public consultation, market actors and public authorities share the view that a general authorisation regime would foster innovation and competition both for services and end-devices. Shared access to spectrum is likely to play an increasingly important role in meeting this growing demand (see section 1.2.1.3), thus there will be an increased need for flexible access to some spectrum bands (e.g. new Millimetre Wave spectrum) and a consistent approach in Europe which grants users regulatory certainty. Indeed, most public and commercial respondents are calling for flexible or shared access to spectrum to meet future demand, in particular for 5G, preferably on a voluntary basis. Vendors and operators insist on the contrary on exclusive or licensed shared access for quality purposes. Broadcasters raise interference issues and thus urge for careful selection of compatible sharing usages.

Greater and more intense spectrum sharing is becoming possible because of more sophisticated technologies and new authorization approaches. Successful deployment of 5G requires a consistent spectrum sharing model across the EU. The figure below shows the impact that spectrum sharing has on the need for additional spectrum in three 5G use cases, i.e. motorway, healthcare, transport and utilities (see also Annex 11).

Figure 10 - Spectrum sharing per different 5G use case



The deployment of 5G networks may raise the need for fewer and simpler rules to create the right conditions for necessary investment in fixed and wireless infrastructure (backhauls to be '5G ready') to enable cross-border services. The increased reliance of mobile technologies on fixed fibre backhaul (see annex 14) to achieve greater speeds and reliability also underlines the importance of strategies which address fibre deployment and spectrum availability in tandem. Along this line, most of public and commercial respondents to the Public Consultation called for a flexible and shared access to spectrum, preferably on a voluntary basis, in order to meet the future demand.

In terms of coherence and lack of effective coordination, the current **governance structure** of access regulation is based on a relatively complex system of Recommendations, ex ante checks and balances. Even in cases where common approaches are agreed between the Commission and BEREC, the system does not achieve full consistency, because of the lack of effective coordination mechanisms for regulatory remedies and lack of binding powers⁵⁴.

For instance regarding Mobile termination rates, despite a Commission recommendation, backed by BEREC, certain NRAs still do not apply the recommended costing methodology, or have adhered only after very long delays. This leads to an unjustified discriminatory treatment of consumers in different Member States and to a transfer of resources between providers in different Member States.

As regards consistency of market regulation, just over half of the respondents to the Public Consultation answered that the Art.7/7a process had been "significantly" or "moderately" effective in achieving regulatory consistency, while a combined 35% were of the opinion that this process had only little or no effect on consistency. However even if the main arguments brought forward were that the Art.7 procedure has none the less contributed greatly to more consistency and contributes to a steady development of the Single Market many respondents who were generally positive suggested that the Commission's role vis-à-vis remedies (under Art.7a) should be strengthened, either by a veto-power, or by a so-called double-lock veto (where BEREC and the Commission agree). With regard to spectrum, despite the fact that the current framework⁵⁵ allows the Commission to issue a Recommendation on the harmonised application of spectrum provisions, the governance mechanism in place is not sufficient to facilitate a consistent approach and common EU policy objectives can't be enforced resulting in the problems identified under section 1.2.1.1 above and the problem drivers analysis in Annex 10. In the public consultation, while several respondents noted delays in the availability of spectrum and fragmentation between conditions of use in different Member States and called for a stronger role of the Commission, others disagreed and stressed the national character of spectrum policy.

The existing spectrum governance structures focus on the harmonisation of technical parameters but do not ensure sufficient consistency of the timing of effective use of spectrum once allocated. Moreover, spectrum is assigned with varying conditions reflecting different (national) priorities and regarding the objectives of the regulatory framework. This leads to disparate conditions where a national border bisects otherwise similar areas. The absence of consistent EU-wide objectives and criteria for spectrum assignment, as well as for the conditions applicable to individual rights of use, creates barriers to entry at national level, hinders competition and reduces predictability for investors across Europe.

⁵⁴ Unlike in the process of defining relevant national markets and identifying SMP by NRAs (Article 7), the Commission is not able to use a veto power with regard to remedies under the article 7a procedure. More general binding decisions on remedies might still be possible under Article 19 of the Framework Directive, but may only be implemented two years after a Recommendation on the same subject and following a lengthy process involving BEREC and COCOM. Cf. case studies smart 2015/0002.

⁵⁵ Article 19 of the Framework Directive

In the public consultation the views of the operators and of the regulatory community diverged. While operators were in favour of more harmonisation of spectrum assignment procedures, the regulatory community encompassing both BEREC and RSPG was of the view that the EU already benefits from substantial coordination and harmonisation processes, and no further EU-level coordination procedures are necessary. There was nevertheless openness to a peer-review mechanism as regards spectrum assignment. While Member States reject the need for full harmonisation they are open to a more common approach to spectrum management, and some could accept a peer review of national assignment plans as well as a certain level of harmonisation or approximation of conditions and selection processes.

Access to spectrum could also be simplified by placing greater emphasis on general authorisations wherever possible as opposed to individual licenses. More generally speaking, achieving more regulatory consistency in areas such as spectrum or authorisation requirements might in addition reduce the administrative burden of businesses operating across several Member States, while at the same time supporting the objectives of the framework.

1.2.3.2 Compliance costs

Inconsistent regulation across Member States in similar competitive situations and access scenarios makes it burdensome and costly for market players relying on regulated access products to offer services in multiple countries and thus creates artificial barriers to market integration. Similarly, the lack of harmonised wholesale access products makes it difficult for operators to offer services on cross-border basis. This aspect is of particular concern for business end-users, which, despite benefiting from access regimes under the current regulatory framework, encounter - due to uneven regulation across Member States for which no objective justification may exist - difficulties to obtain fit-for-purpose telecom offers covering all services and countries of operation, and for multi-national telecom providers, which seek to replicate business models in multiple markets. Today, most large businesses, be they multinational/multi-site companies or large businesses rely on a sufficient homogeneity of inputs, and may not be able to contract connectivity inputs enabling them to sell on geographically integrated markets themselves. This leads to higher costs, higher concentration in smaller markets and, ultimately, higher prices and lower quality for end-users⁵⁶.

As regards the administrative costs of the market analysis process including the costs of three yearly review cycles, stakeholders consider⁵⁷ that those are relatively less significant.⁵⁸ if compared with the indirect impacts on competition and investment, and the economic costs of fragmentation impeding the single market. However, if review cycles – and indeed remedies – are shorter than needed, an important cost that is created beyond administrative costs, is increased uncertainty concerning the nature and strength of regulation, which can undermine investor confidence in both regulated operators and alternative operators that may be the beneficiaries of regulation.

For service providers that offer services cross border, or the same service in several Member States, the lack of harmonisation of end-user protection rules increases compliance costs and complicates processes, preventing service providers benefitting from economies of scale.

Telecom operators found it difficult to provide robust calculations of all compliance costs and only a few examples are available. For instance, one (large European) operator explained that its annual costs for complying with Quality of Service rules (standards and reporting) are about 14

⁵⁶ For more details see: WIK (2013) Business Communications, Economic Growth and the Competitive Challenge http://www.wik.org/index.php?id=meldungendetails&tx_ttnews%5BbackPid%5D=85&tx_ttnews%5Bpointer%5D=11&tx_ttnews%5Btt_news%5D=1495&cHash=30344c3cd7aefcd5fef7bec7b60b8b

⁵⁷ Interviews conducted in context of SMART 2015/0002

⁵⁸ The cost of undertaking market analyses for 7 markets on a 3 yearly basis have been estimated at €1.9m per NRA per year – see Ecorys 2013 Future electronic communications market subject to ex ante regulation

million EUR per Member State⁵⁹. Other operators indicated that the annual costs for complying with contractual rights (including rules on contract duration, termination & withdrawal) and transparency obligations add up to about 70 million EUR per Member State. However available evidence is not sufficient to provide a robust estimate on compliance costs at EU level.

1.2.3.3 Lack of coherence in the Single Market

As shown by the evaluation, the framework's contribution to the development of the single market objective is perceived as relatively modest. **Regulatory consistency** has been achieved only to a limited extent, affecting the operations of cross-border providers and reducing predictability for all operators and their investors. More importantly, the cooperation and consistency tools available have led to a situation where best regulatory solutions have not always been followed, with impacts on end-user outcomes. EU-level consistency checks contribute to the predictability of access regulation throughout the EU, however their influence is significantly restricted as regards draft regulatory remedies. Similarly, the lack of consistency in spectrum management has had negative consequences for end-users such as the delayed 4G deployment in most parts of the EU.

This view is shared by stakeholders. Despite some advances in areas such as interoperability and in the cooperation between NRAs, most stakeholders⁶⁰ consider that this is the least accomplished objective of the framework, referring to the lack of regulatory consistency and to the persisting barriers to operating across borders. In particular, cross-border providers deplore the lack of consistent access products (in particular when it comes to the wholesale inputs needed to serve the high end business market), the lack of harmonisation related to the actual access to spectrum by market players, the multiplicity and great diversity of market entry provisions (e.g. authorisations, rights of ways) and the very different implementing rules across the EU designed in view of consumer protection. Furthermore, the experience of implementing the framework has revealed clear difficulties in obtaining consistent access regulation and market entry conditions, in securing end-to-end trans-EU connectivity, in solving cross-border spectrum interference issues in some cases, in solving disputes across borders, etc.

Findings from the evaluation in the area of access, spectrum regulation and consumer protection illustrate how the lack of coherent regulatory approaches is impacting the single market.

While **access regulation**⁶¹ has generally delivered more consistency in areas where the Commission was given greater competences, for example of determining market definition and designating operator with Significant Market Power (SMP), greater discrepancies can be observed with regard to the imposed remedies which cannot all be sufficiently explained by varying national circumstances. This translates into divergent approaches towards the regulation of fibre networks, symmetric regulation (ex ante access regulation which is not based on SMP), pricing methodologies, the imposition of Virtual Unbundled Local Access (VULA) remedies, etc. Those diverging regulatory practices in the individual national markets can have a profound effect on cross-border trade and, thus, on the development of a Single Market in electronic communications and may seriously distort competition across the EU by "levelling" the EU-wide playing-field. Diverging practices also affect predictability and the attractiveness of the telecom sector to institutional investors who are willing to invest in a common European market; even relatively smaller operators and project companies interested in network roll-out tend to rely on a pan-European or even global capital market in order to obtain funding.

⁵⁹ Ibid

⁶⁰ Roughly 46% of the respondents to the public consultation consider the single market objective achieved (of which 39% only "moderately" achieved), while the competition objective is considered achieved by 59% of the respondents (of which 32% consider that it was "significantly achieved") and the citizen interest objective is considered achieved by 54% of the respondents.

⁶¹ Section 7.2.3.1 of the evaluation staff working document

BEREC's role in supporting consistent outcomes has received mixed feedback. BEREC's current institutional set-up results in it often opting for greater flexibility or the lowest common denominator instead of focusing on a more harmonised approach for the single market.

Similarly, as regards the **spectrum regulation** area⁶², while technical harmonisation and coordination have worked relatively effectively to ensure the availability of spectrum resources across the EU, in particular in relation for wireless broadband, the provisions concerning spectrum management have not sufficiently or consistently supported the single market objective.

The lack of Member State initiatives supporting spectrum usage opportunities across borders, going beyond technical harmonisation aspects that could bolster new business models in electronic communications may also reflect institutional limitations. The framework currently does not foresee any decision-making mechanism at EU level to buttress and provide legal certainty to such initiatives which would foster the internal market. More generally, and despite some positive contributions, the development of mechanisms in favour of the Internal Market has until recently received little attention in the work of the RSPG notwithstanding its competence to support measures 'necessary for the establishment and functioning of the internal market'⁶³.

By not achieving sufficient convergence of the actual conditions attached to individual licences or of the underlying motivations to impose such conditions, the framework has failed to eliminate regulatory uncertainty and possibly impacted effective access and use of spectrum and market investment incentives. This lack of consistency has had negative consequences for end-users, such as the delayed 4G deployments in most parts of the EU.

Another issue is also the lack of coherence in the single market as regards a high degree of heterogeneity in the **implementation and governance of consumer protection** as a result of different national legislation brought about by the current minimum harmonisation approach. Indeed, as indicated in the evaluation report, a large majority of operators (25 operators and 10 associations of electronic communications providers) which reacted to the public consultation believe that the provisions are administratively or operationally burdensome when providing services in several Member States, because of the minimum harmonisation nature of the consumer protection provisions in the regulatory framework, which lead to a different level of protection across Member States. The various implementation models, often supplemented by additional national consumer protection requirements, also result in varying compliance costs for cross border providers. This tends to result in lower predictability for businesses and higher compliance costs as explained in more detail in SMART 2015/0005. For example, some Member States define specifications of contract terms for all types of users, while in other Member States these provisions do not apply to business users. In about half of the Member States, operators are obliged to publish information on fixed/mobile broadband and mobile voice; also differences exist in terms of requirements on contract duration and termination, and some Member States have adopted detailed rules regarding consumer protection safeguards in case of unilateral changes on contract conditions. There are differences too in the application of out-of-court dispute resolution.

⁶² Section 7.2.3.2 of the evaluation staff working document

⁶³ Art. 2(1) of Commission Decision 2002/622/EC of 26 July 2002 establishing a Radio Spectrum Policy Group, OJ L 198, 27.7.2002, p. 49, as amended by Commission Decision 2009/978/EU, OJ L 336, 18.12.2009, p. 50.

1.3 What are the main drivers?

The present section summarises the main problem drivers identified and illustrated in Figure 1, on the basis of market and regulatory failures highlighted in the evaluation, the public consultation and the support studies to this impact assessment. In line with the Better Regulation Guidelines⁶⁴ the drivers are based on our understanding of the underlying factors and behaviours underpinning the problems stated. In addition to that, it should however be clear that several external factors have contributed to the problems described above, such as: the larger economic context in the EU; the evolution of demand patterns of companies and citizens for buying services; comparative cost advantages of producing electronic communications services, competitive dynamics and company strategies unrelated to regulation; and the availability of public and private funding. The problem drivers identified are:

1. The lack of incentives to deploy new networks (NGA and VHC) in the absence of infrastructure competition or in rural areas, explaining the slow pace of the gradual transition from copper-based networks towards fibre-based networks. The driver also investigates how certain elements of the current framework may lead to suboptimal behaviours by operators.
2. Inefficient allocation mechanism for public funding; this driver concerns the way public funds have been allocated (selection of the model of investment, structure/size of procurement calls, mix of grants vs. financial instruments, etc.) and how the lack of detailed and reliable mapping of existing infrastructures, of quality of services and about credible forthcoming investment in the next three years may lead to suboptimal and inconsistent outcomes across Member States.
3. Fragmented regulated and commercial offers for businesses across the EU; this driver covers the reasons for inconsistently regulated access inputs, in particular those serving business customers on a cross-border basis, and with regard to non-harmonised end-user protection requirements.
4. Minimum harmonisation, differentiated rules; this driver covers the lack of consistency of telecoms regulation which could be partially due to the current institutional set-up and the way the institutional players interact.
5. Uncertainty on spectrum assignment due to differentiated rules; this driver concerns the factors that hamper spectrum availability and deployment of mobile networks as a result of weak coordination mechanisms. As noted in the public consultation by the operators, different Member State choices regarding spectrum assignment conditions decrease investment predictability. This concerns in particular different timing of assignments, different conditions for licence duration and renewal, flexibility to trade, lease or share, technology and service neutrality limits, refarming conditions, technical performance, use-it-or-lose-it clauses and interference mitigation obligations.
6. Technological and market changes; this driver is about the reasons why the current definition of electronic communications services brings increasing uncertainty as many OTTs which do not provide conveyance of signals are entering the communications market, due to the latest technological developments;
7. Increasing adoption of bundles; this driver concerns the policy dilemma posed by bundles that trigger economies of scale and scope, and advantages for consumers, but at the same time make transparency, comparability and switching more difficult for them.
8. Suboptimal design of market review cycles and inconsistent remedies under current rules (art.7) This driver covers the insufficient legal certainty and regulatory predictability regarding access obligations on NGA networks due to short market review cycles, lack of sufficient focus on retail markets and the difficulty of enforcing consistency on the basis of non-binding recommendations, impacting network roll-out.

⁶⁴ See: http://ec.europa.eu/smart-regulation/guidelines/toc_guide_en.htm

9. Obsolete and redundant rules; this driver is about the regulatory inefficiencies that could be identified in the current regulatory setting, and which are generating unnecessary compliance costs or administrative burdens.

See Annex 10 for a more detailed analysis of the drivers underpinning the problem definition.

1.4 Who is affected by the problem, in what ways, and to what extent?

As connectivity underpins the DSM, a failure to achieve adequate connectivity is likely to have wide repercussions on jobs and growth in the digital economy and beyond given that industry is increasingly becoming digitalised⁶⁵. Any lack of VHC connectivity is expected to impact negatively on SMEs and micro businesses as well as citizens, by limiting the opportunity to reduce mobility needs (teleworking, teleconferencing) and to reap the full benefits of all the new applications that the collaborative economy is creating. It is worth recalling that micro and small companies will create the bulk of the new jobs under the DSM. The modelling exercise accompanying the support study to this IA (see Section 4.11 and Annex 5) confirms in general terms the positive contribution of connectivity to job creation in an incremental and in an all-fibre scenario. Overall, if all the preferred options are pursued as a result of the review of the electronic communications framework, we expect expanded market-driven investment and consumption and a cumulative effect **on growth of 1.45% and on employment of 0.18% in 2025**, assuming that the reforms are implemented by 2020. A step change of 0.8% in labour productivity is also envisaged during the period 2020-2025.

Assuming a baseline with an average annual EU growth of 2% and average annual increase in employment of 0.3%, the cumulative impacts on economic activity and on job creation in nominal terms from implementing the set of preferred options presented in section 4 could amount respectively to EUR 910 bn. and to 1.304 million additional jobs by 2025.

These forecasts are based on a relatively conservative scenario in terms of expected roll-out of fibre networks (the so-called "accelerated fibre scenario"), which is described in more detail in section 4.11.2.

Turning to the direct impacts, those most affected by the problems in fostering NGA deployment include **citizens and small businesses in rural areas**, and citizens and small businesses in countries or areas without effective infrastructure-based competition, which receive poorer quality services than those in countries and areas which are well-served with infrastructure-based competition. In areas where infrastructure-based competition is not effective, end-users may also experience delays in upgrades to higher speeds and a lack of competitive high speed offers if wholesale access on NGA and VHC networks is not effectively and efficiently implemented.

Affordable broadband has become of crucial importance to society and to the wider economy. Broadband provides the basis for participation in the digital economy and society through essential online Internet services. There is a risk of social exclusion from not being able to use this type of services because of having no or an insufficient broadband connection. **Universal Service Obligations (USO)** allow today data communications at data rates that are only sufficient to permit functional Internet access⁶⁶ at a fixed location, that are nearly universally available and used by citizens across all Member States (MS)⁶⁷. Despite declining hardware costs for computers and tablets, some users are still not able to afford a broadband package. On

⁶⁵ See the recent Digitising European Industry package launched by the Commission.

⁶⁶ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011

⁶⁷ According to the DESI index, the standard fixed broadband coverage in the EU stands at 97% of homes in 2015, with an average take-up rate of 72%. This demonstrates a gap between the EU households that have broadband available and those households that actually have a broadband connection. Furthermore, there are still differences between MS when examining availability and affordability of fixed broadband across urban and rural averages.

average in EU28, 24% of households without a broadband access (2014), believed that subscription costs are too high to subscribe⁶⁸.

Among those most affected by the lack of consistent application of the framework **are multi-site and multi-nationally-operating businesses** which struggle to obtain coherent connectivity offers across the EU.

Telecoms operators are also significantly impacted by the problems described, notably due to the fact that they are the traditional subjects of sector regulation that now need to compete in a more complex and fluid market setting against players outside of the sector (namely, internet-based service providers and content distributors). Unclear or overly onerous regulation affects profitability and access to capital and may impede incumbents from investing in upgrading infrastructure. Overly onerous regulation or a lack of effective measures to reduce the cost of deploying fibre could also distort the buy or build decisions of (entrant) telecom operators in areas where infrastructure competition is viable, while a lack of effective access regulation in cases where it is necessary (e.g. where infrastructure duplication is not economically viable, even in the long term) could cause former entrants to exit markets or regions entirely, not justified by underlying economics or welfare considerations. Inconsistent application of the framework may also affect the ability of operators to operate efficiently across borders and build scale across Europe.

Telecoms operators also have to comply with **sector-specific obligations** related to e.g. contractual rights, transparency, quality of service, contributions to universal service funds, access to emergency services ("112") and caller location information that may in some instances have become redundant due to technology and market evolution or to overlaps with horizontal consumer protection rules, which may entail unnecessary administrative and compliance costs. Heterogeneous implementation of consumer rules based on minimum harmonisation may raise the costs of cross-border offerings or of expanding into other markets.

Equipment manufacturers depend on an investment-friendly environment to develop and sell equipment to modernise and upgrade telecom networks. As an example the public consultation showed how vendors seek a common definition of small-area wireless access points and the harmonisation of technical characteristics about their design, deployment and operation. **Content and applications providers**, as well as handset manufacturers, may also be held back from launching and developing advanced services in Europe in the absence of adequate connectivity.

The fact that rules on communications services are ill-adapted to technology and market changes also affects **new players in the current value chain** and in the future of the IoT. These players may experience some uncertainty about whether or not they fall within the scope of the framework and this may hinder future planning and investments.

Consumers are of course sensitive to the level of pricing. The present framework has delivered lower retail prices in Europe compared to the US for mobile data offers, while in the case of bundles of mobile voice and data plans, prices are cheaper for lower usage baskets and more expensive for high-end packages⁶⁹ (see Annex 6 for more details). SMART 2015/0002 investigates in more depth the impact that prices have on demand and the impact that different regulatory models can have on retail prices. Consumers are also affected by the problems as the level of protection when using new communications services is different than when using traditional services. This applies in particular to areas such as confidentiality of communications and security, where sector-specific protection seems to be needed regardless of the mode of the provision of the service, but may also in the future cover areas such as interoperability and access to emergency services.

⁶⁸ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011

⁶⁹ See: SMART 2014/0049 - Mobile Broadband prices (February 2015) <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-february-2015>

For a detailed analysis of stakeholders views, see Annex 2 on stakeholders' consultation. This information is also complemented further by Annex 4 and Annex 13 analysing which stakeholders are affected by the initiative and the proposed preferred options and in what way.

1.5 **Baseline: How would the problem evolve, all things being equal?**

This section presents in a succinct way the baseline for this IA exploring how the problem would evolve, other things being equal. Annex 14 explores in more detail and provides more evidence on the baseline. A more detailed description of the state of play for each of the policy areas addressed by the review is included under the description of Option 1 (baseline) in Section 4. The evaluation has shown that the existing framework has delivered more competition, better prices and choice for consumers, and spurred operators to invest in upgrading their networks at least in some areas. Today virtually all EU citizens have access to basic broadband networks (97% fixed broadband connections according to the DESI index 2016⁷⁰) and increasing numbers of citizens and businesses have access to networks (Next Generation Access – NGA-connectivity) allowing at least 30 Mbps download speed (70.9% NGA general coverage⁷¹ in EU according to DESI 2016 – see annex 6 for more data). Only some countries, such as Malta, Lithuania, Belgium and the Netherlands, already enjoy nearly comprehensive coverage of NGA networks, in most of those cases probably mainly thanks to the competitive impulse provided by legacy cable networks, which could be upgraded at relatively low cost⁷². NGA coverage in countries which lack extensive cable has been slow to develop in many cases (Italy or Greece being emblematic). Moreover, a large part of the NGA coverage beyond the cable footprint in many countries (UK or Germany, for instance) has been achieved through only partial upgrades of the legacy copper loop (FTTC), rather than full upgrades (FTTH/B). As investigated in study SMART 2015/0002, the former approach may not be sufficient to cope with the data consumptions under the most ambitious scenario forecast.

A key development since the framework was originally conceived is that legacy telephone and cable (coaxial) networks, including the copper 'local loops', are in the process of being upgraded with fibre and other solutions which improve broadband performance.

In terms of demand, these enhancements are needed to enable customers to enjoy better quality in online services including online video and cloud applications, as well as enabling multi-screen viewing, which is becoming increasingly prevalent in European households with the proliferation of devices as illustrated in Figure 11 below.

⁷⁰ The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. For more information about the DESI please refer to <http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard>

⁷¹ NGA broadband coverage/availability (as a % of households) with Next Generation Access including the following technologies: FTTH, FTTB, Cable Docsis 3.0, VDSL and other superfast broadband (at least 30 Mbps download)

⁷² Several studies highlight the role played by cable in stimulating NGA deployments including SMART 2015/0002, WIK-Consult (2015) for Ofcom 'Competition and Investment: analysing the drivers of superfast broadband', and the EP (2013) study 'Entertainment X.0 to boost broadband deployment'

Figure 11 - Europe IP Traffic and Service Adoption Drivers

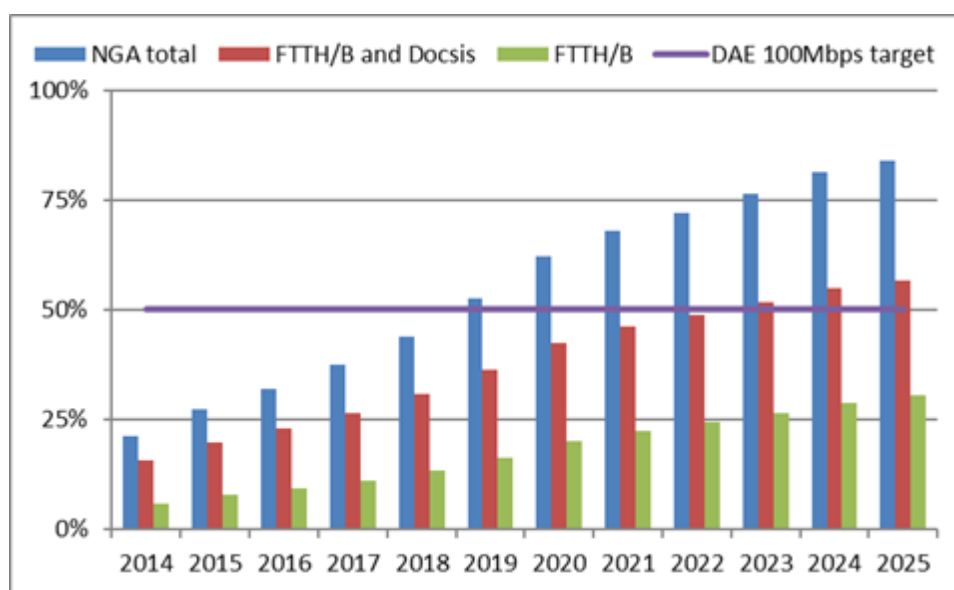


Source: Cisco VNI Global IP Traffic forecast 2014-2019 – Europe includes Western Europe + CEE, excluding Russia

According to CISCO, Global IP traffic will increase threefold over the next 5 years. Overall, IP traffic will grow at a compound annual growth rate (CAGR) of 21 percent from 2013 to 2018⁷³. The widespread adoption of cloud services, the number of connected devices (IoT), the booming M2M industry, contribute to further increase the traffic load on communications networks. In particular, as businesses and consumers exchange their data with the cloud, this will also lead to a **modified demand pattern for upload traffic**. Hence, while most of the traffic will still be in download, demand for upload will increase, as well as the need for lower latency for applications such as cloud computing and e-health, parameters included in the VHC concept.

In terms of supply of NGA in commercially viable areas, forecasts from IDATE based on market intelligence (see figure below) suggest that upgrades to NGA and VHC networks will continue, but at a relatively gradual pace. Across the EU, if FTTC/VDSL is excluded (as this technology is less likely than the other technologies considered to be offered at speeds of 100Mbit/s and above), only 42% of households would subscribe to high speed technologies in 2020.

Figure 12 - Projected take-up of NGA by technology (to 2025)



⁷³ Source: CISCO VNI index, see: <http://www.cisco.com/c/en/us/solutions/service-provider/visual-networking-index-vni/index.html>

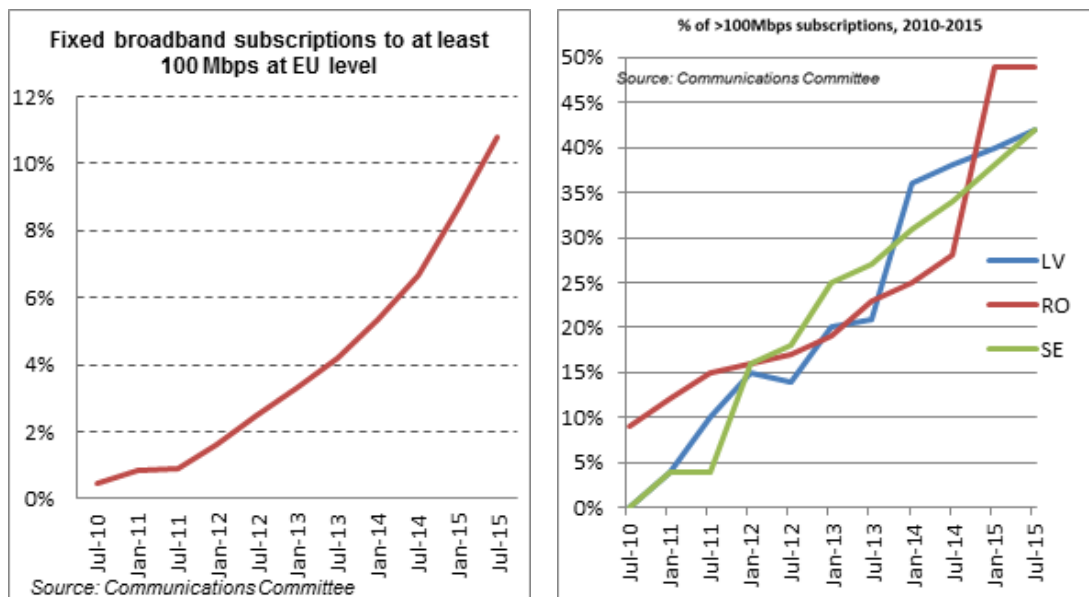
Source: IDATE, SMART 2015/0002

In terms of specific countries, IDATE projections suggest that by 2020 (see annex 14, figure 83), even under very optimistic assumptions (assuming FTTC/vDSL delivers 100Mbit/s in practice), many countries may miss the DAE target of 50% households taking up at least a 100 Mbps connection, and that within the 16 affected countries the target will be missed by around 27m households.

There is evidence suggesting that in the telecom sector **demand responds to supply**,⁷⁴ and that restricted download and upload speeds may limit the types of usage and applications that might otherwise emerge. In Sweden, following an early boost by the central government, one out of every two municipalities is involved in fibre to the business and fibre to the home deployments. This has led to very high take-up: as of July 2015, 68% of the broadband connections in Sweden are NGA⁷⁵, achieved predominantly through FTTH and FTTB connections. Where FTTH is widespread, the availability of fibre makes extending fibre to base stations far more feasible and efficient. This is well illustrated by the example of 4G in Stockholm where the world's first 4G deployment took place helped by the virtually 100% fibre coverage.⁷⁶

As business and household services and applications depending on high quality connection are becoming more popular, subscriptions to offers of 100 Mbps or more are growing sharply, albeit from a low base; this growth trend is in fact more pronounced in the Member States with the highest 100 Mbps subscription rate, suggesting both important emulation effects on demand and increasing supply of attractive services which exploit such higher capacity connectivity.

Figure 13 - Fixed broadband subscriptions to at least 100 Mbps, EU and selected MS.



If bandwidth needs are calculated on the basis of what might be required to run certain

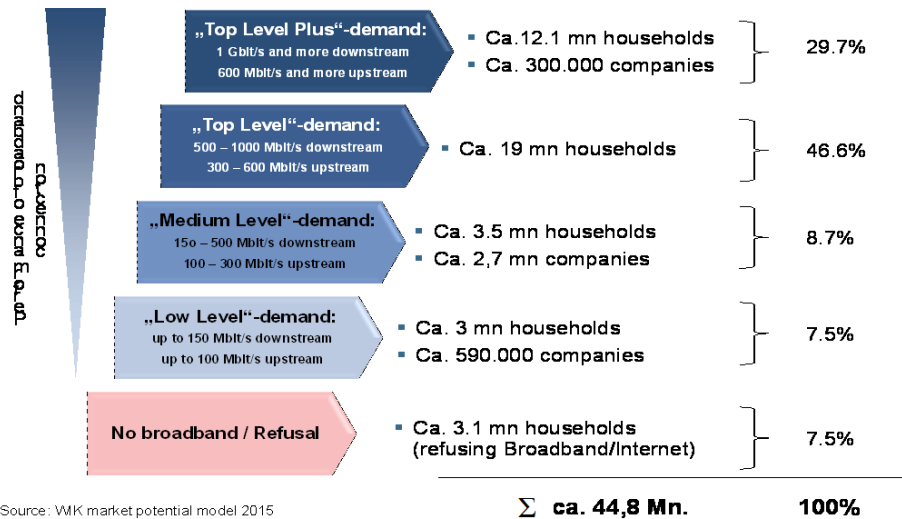
⁷⁴ Data from the UK regulator Ofcom for example suggests that download bandwidth consumption for NGA (FTTC and FTTP) networks was around two times higher than bandwidth consumption for non-NGA networks, with significantly higher use of upload capacity. This evidence of higher usage being associated with the availability of NGA is supported by the case study of Palaiseau in France, which has been the subject of a pilot trial for the switch-off of Orange copper customers and migration to FTTH networks. In this case it was observed that the average Internet traffic of Orange's broadband customers as well as their consumption of video-on-demand was multiplied by a factor of three. Importantly, this trial also resulted in fibre clients' usage of upload bandwidth being increased 8 times, due to changes in Internet usage and an increased usage of cloud-based services.

⁷⁵ See annex 6.

⁷⁶ Source: Vodafone's call for the Gigabit Society, Dec. 2015

applications, a case study of the German market providing a forecast for 2025 suggests that an average user might require 150-500Mbit/s downstream with more than 100Mbit/s up, while high-end users including those running small or home offices might require 1Gbit/s in download and more than 600 Mbps in upload (see SMART 2015/0005). This bandwidth would be used not only for multi-screen ultra HD video, but also for applications such as cloud and e-health as well as for home working and small business needs.

Figure 14 - Model of market potential – Germany 2025



As shown in Figure 14 data rates required by the most demanding users could reach 1 Gbit/s or more on the downstream link by 2025, while a significant proportion of households and offices could demand download speeds of 500-1000Mbit/s and 300-600Mbit/s upstream by 2025. This scenario therefore sets the upper bounds for potential users (including business user) demands in the medium term – though it is worth noting that even a less ambitious scenario will need the fibre rollout to reach far deeper into most of the present networks.

On the subject of inconsistency in the implementation of the framework, there is evidence that without further direction at EU level, this problem is likely to persist and may worsen, in part because when new technologies and services emerge they lack the harmonisation that was historically required through EU legislation, and may not achieve adequate levels of harmonisation through voluntary standardisation alone. Concerns over the impact of fragmentation on business users, in particular multi-national ones, provide an example of the enduring nature of these problems and difficulties in using current tools to address them. Concerning future generations of wholesale access products for residential customers and small business, the experience of a new product designed as a partial replacement for Local Loop Unbundling on NGA networks, such as ‘VULA’ (Virtual Unbundled Local Access) or a WDM (Wavelength Division Multiplexing) based access product provides a warning that without efforts to apply a European ‘standard’ any future technological upgrades in fixed access networks are likely to result in duplicate efforts to develop new wholesale access solutions and divergent implementations at national level.

Furthermore, in the absence of more consistent and effective intervention in the area of spectrum, Member States will keep a large discretionary power to organise spectrum assignments and there would still be no possibility to adopt binding measures (other than by distinct co-legislative initiatives) to eliminate fragmentation and introduce more consistency in the selection and spectrum assignment process, or to coordinate some of its main elements. Looking at future challenges of the introduction of capital intense **5G networks** (planned for the early 2020s), there might be a potential risk that they could not be properly addressed at the EU

level. The economic benefits of successful, fast and coordinated deployment of 5G across the EU are very significant and they have been estimated at 146bn EUR per year and the creation of 2.39m jobs⁷⁷.

Overall it can be stated that **a no change scenario would lead to a persisting digital divide for citizens and SMEs, sub-optimal economic development outcomes, sub-optimal allocation of capital, lack of consumer trust in digital services, lower take up of innovation and loss of competitiveness of EU industry** (see annex 14 for more details).

Promotion of the **interests of end-users**, including the provision of a safety-net through the universal service obligations, is another principal objective of the regulatory framework, as it ensures that consumers can participate in the digital society and fully reap the benefits of a competitive market. Overall the framework has been successful in safeguarding consumer protection, even when this is not fully translated in increased consumer satisfaction. Given the increasing role of connectivity and electronic communications services in today's European economy, it is important to continue protecting end users' interest.

National rules have ensured transparency of information on services and prices by providers, including in some cases the provision of online tools comparing prices and services; rules on contract duration have been transposed so that the initial commitment period does not exceed 24 months, while also ensuring that providers offer users the possibility to subscribe to a contract with a maximum duration of 12 months (some Member States have opted for considerably shorter periods, such as a 6-month general maximum period); some Member States have adopted detailed rules regarding consumer protection safeguards in case of unilateral changes to contract conditions.

Despite the above, consumers still refer to issues related to **transparency and quality of service**, in particular with regards to the internet access service. This problem is especially acute when access to the internet service is bundled with other communications service, resulting in 24% of consumers not finding easy to compare prices of bundles, while evidence shows that an increasing number of consumers on most Member States opt for this service delivery mode. This trend would not change in a status quo scenario and consumer perceptions of problems of transparency and quality of service are likely to get worse due to the higher take up of bundles, in a baseline scenario

The potential for Member States to mandate **must carry obligations** aim at ensuring that channels of high public interest are broadcast by electronic communications providers, while avoiding unreasonable burden on the latter. While Member States have made wide use of their competences in this domain, the effectiveness of the rules has evolved as viewers increasingly use OTT services on smart TVs and smartphones/tablets and traditional TV channels represent a declining (while still dominant) share of audio-visual consumption patterns. At the same time, the mission of public service broadcasters increasingly extends into the online world and includes non-linear audio-visual services.

As explained in the problem definition, only providers of traditional communication services have to comply with sector specific rules safeguarding end-user's interests. Providers of communications service over the internet (OTTs) are not subject to these sector-specific rights and obligations, even when their services are used by the end-users to cover the same or similar communications needs as the traditional electronic communications services.

Must carry regulations were introduced to give privileges to general interest channels, with the view of fostering media pluralism and freedom, as well as safeguarding fair competition between channel providers. They owe their existence to concerns that privately owned distribution

⁷⁷ SMART 2014/0008, Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe

networks may prefer to provide commercially successful channels, rather than transmitting sufficient general interest channels, if left unchecked.

Significant changes or further evolution of the problem are not foreseeable with regards to services and end-user protection, absent further intervention at EU level. Uncertainty about the scope of sector specific rights and obligations and gaps in consumer protection would persist, which would in turn lead to a further fragmentation of the internal market and impede adoption of new services.

Rules on **universal service** aim at providing a safety net ensuring that the most vulnerable in society as well as those in more remote areas can receive basic services. In the absence of intervention at EU level, Member States would likely take increasingly different approaches in universal service obligations by unilaterally removing outdated services from the scope. Consistency and coherence of the universal service regime across Member States would reduce without a common approach towards the inclusion of broadband in the universal service scope. The sectorial financing mechanism would continue being a possibility for financing. The costs of financing the universal service obligation in the Member States could significantly diverge, depending on possible national approaches.

In the absence of more consistent and effective intervention, Member States will keep a large discretionary power to organise spectrum assignments and there would still be no possibility to adopt binding measures (other than by distinct co-legislative initiatives) to eliminate fragmentation and introduce more consistency in the selection and spectrum assignment process, or to coordinate some of its main elements. Looking towards future challenges which could not be addressed the most immediate and significant new technological development is **the introduction of 5G** (planned for the early 2020s).

The economic benefits of successful, fast and coordinated deployment of 5G across the EU are very significant and they have been estimated at 146bn EUR per year and the creation of 2.39m jobs⁷⁸.

A failure to achieve a single market in electronic communications can in itself impose considerable costs. To give an idea of magnitude (see annex 14 for more details) a 2011 study conducted for the EC – steps towards a truly Internal Market for e-communications⁷⁹, concluded that increased standardisation could provide annual gains of 0.3%-0.45% GDP (€35bln-€55bln) and cautioned that failing to reach standardised solutions would affect future pan-European roll-out as well as the development of premium over-the-top-services. The study also examined the impact of harmonised ‘best practice’ and concluded that a fully-harmonised European approach could provide gains of 0.22% and 0.44% of GDP (€27bln - 55bln) by delivering lower prices, higher quality and greater investments.

1.6 Why should the EU act?

The DSM strategy states that the Digital Single Market must be built on reliable, trustworthy, high-speed, affordable networks and services that safeguard consumers' fundamental rights to privacy and personal data protection while also encouraging innovation. The strategy foresees that the review should strive through common action to deliver benefits for end-users (citizens and businesses) as well as to promote high-performance connectivity fostering the socio-economic development of Europe and its communications industry. The European Council on 28 June 2016 also endorsed in its conclusions the importance of telecom and connectivity as a backbone for the digital single market, calling for "*swift and determined progress*" to "*ensuring*

⁷⁸ SMART 2014/0008, Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe

⁷⁹Ecorys/TNO/TU Delft (2011) ‘Steps towards a truly internal market for electronic communications’ <https://ec.europa.eu/digital-agenda/en/news/steps-towards-truly-internal-market>

very high-capacity fixed and wireless broadband connectivity across Europe, which is a precondition for future competitiveness.

In parallel the European Commission launched on 19 April 2016 the "**Digitising European Industry**" initiative under the DSM package that establishes a clear link between connectivity and a the need to ensure that Europe is ready for the emerging challenges of digital products and services in areas such as: **5G⁸⁰, cloud computing, Internet of Things (IoT), data technologies and cybersecurity⁸¹**. All-fibre networks seem to be in a better position to handle these challenges than copper-enhanced networks, although technological evolution such as DOCSIS 3.1 for cable networks may alleviate many of the latter's constraints⁸². Annex 7 on Competitiveness and Innovation further explains how the review of the electronic communications framework could support the development and use of the 'Internet of Things' (IoT)⁸³ and digitalization of industry. In turn, IoT implies an increased role for communication services in (and increased dependency on connectivity by) various industries, including automotive, agriculture, health, transport, etc. Thus, policies which unlock the full potential of IoT and the digitization of industry trigger a "disruptive growth path".⁸⁴

The review of the telecom framework supporting availability of VHC connectivity networks is therefore complementary to the "**Digitising European Industry**" initiative since it drives the development of value-adding services in the Internal Market that would rely on networks, while the non-availability of VHC connectivity forces providers to adapt services or launch them elsewhere.

Electronic communications is a strategic sector, which directly contributes €168.62bn of European value added and 1.06 million jobs (around 1.3% of GDP and 0.47% of total employment in 2012), with a labour productivity per person of more than 144 thousand euros (the highest rate within the ICT sector), according to a JRC study⁸⁵. The sector supports a wide range of other high-tech manufacturing and digital services (the ICT sector constitutes 4% GDP and 2.76% of EU jobs, with a labour productivity rate 44.45% higher than total labour productivity) as well as the economy as a whole.⁸⁶

The risk, as explained in the support study to this IA (see SMART 2015/0005) is that the current pace of infrastructure deployment may result in the coming years in constrained connectivity negatively affecting EU citizens', businesses' and public authorities' capacity to produce, share and benefit from innovative digital products and services. Moreover, the competitiveness of the wider economy, not least of multinational companies based in the EU, is affected as VHC communications services and networks are not even provided consistently to the business sectors across Europe. As electronic communications networks become increasingly critical infrastructures, market players should be able to expand, cumulating and increasing existing demand and by way of that unleashing growth potential inherent in a DSM. While wholesale markets for access to networks will, for reasons of lack of substitution and localness of service provision, frequently remain either local, regional or at best national, other communication service providers should not be subject to cross border barriers to further EU market integration. In the absence of either structural or strategic barriers to overcoming market boundaries, it is the

⁸⁰ It is expected that 5G will comprise three elements i) enhanced mobile broadband communications; ii) massive machine-to-machine communications (M2M); and iii) ultra-reliable and low-latency communications.

⁸¹ See: <https://ec.europa.eu/digital-single-market/en/digitising-european-industry>

⁸² See SMART 2015/0002

⁸³ BEREC (2016) and McKinsey (2015) identify a number of key enablers that contribute to unlocking the full potential of the IoT. Key enablers are optimal fixed and mobile connectivity (realised through policy measures with regards to access, spectrum and numbering), regulatory security for new players in the IoT value chain (which is realised by clarifying the scope of the RF) as well as end-users confidence about security, privacy and confidentiality.

⁸⁴ See: "Information Technologies and Labour Market Disruptions - A Cross-Atlantic Dialogue" background document by the "interdisciplinary, cross-sector roundtable organised by the European Commission (DG Enterprise and Industry and DG Communication Networks, Content and Technology) in cooperation with The Conference Board and Cornell University ILR School" 3/11/2014, p. 11

⁸⁵ <http://is.jrc.ec.europa.eu/pages/ISG/PREDICT/documents/PREDICT2015.pdf>

⁸⁶ There is a wide range of literature linking broadband diffusion to GDP growth

legal and artificial barriers which hinder exploiting the growth potential of larger, border-crossing communications markets in the EU. These barriers stem both from access regulation and divergent end-user protection rules across Europe.

2 DOES THE EU HAVE THE RIGHT TO ACT?

The legal basis for the review of the Regulatory Framework remains **Article 114 of the EC Treaty**. This Article confers on the EU legislature discretion, depending on the general context and the specific circumstances of the matter to be harmonised, as regards the harmonisation technique most appropriate for achieving the desired result, in particular in fields which are characterised by complex technical features.

In general, the subsidiarity issues have been addressed as regards the existing framework. Given that this is the review of an existing package, the below analysis concentrates on: the new objective of ubiquitous and unconstrained connectivity, the enhanced role of BEREC as an EU agency and the harmonisation of spectrum-related issues, rules on services.

Ubiquitous and unconstrained connectivity

Lack of ubiquitous, **VHC connectivity** hinders the single market from tapping into a significant part of its human capital, and affects territorial cohesion, and has a negative impact on the ability of businesses to produce efficiently and to provide innovative and competitive services. Connectivity can play an essential socio-economic role to prevent isolation and depopulation, and link peripheral regions with the central regions of the Union⁸⁷. Effective connectivity could reduce the costs of delivery of both goods and services, public and private, and partially compensate for remoteness ensuring the participation of people and businesses in these areas in the DSM. Furthermore connectivity is an enabler not only for EU enterprises to compete with other parts of the globe, but also for public services, including schools, to offer first class services to EU citizens.

Enhanced role of BEREC as an EU agency

The EU has a need to act to address inconsistencies linked with the **institutional set up** under the existing framework. Whilst market fragmentation is not solely to blame on the regulatory set-up in the EU, it has become apparent over the past years, that the lack of consistency of telecoms regulation is – to a degree at least – the result of the institutional set-up and the way the various institutional players (i.e. mainly the NRAs, BEREC and the Commission) interact and can influence the regulatory outcome.

Vesting BEREC with certain pre-normative and decision making powers in the area of ex ante market regulation will enhance legal certainty and contribute to regulatory consistency. Stable and coherent regulation is of utmost importance to create the right incentives for operators to invest in capital intensive efficient and future proof infrastructure. **Regulatory certainty** over a sufficient period of time and reassurance about the consistency of regulatory approaches throughout the single market could unleash the investment potential not only of the large multinational operators and large investment funds, but also of smaller operators and investors at national or local level, which must often rely on multinational sources of capital which attach a lot of value to regulatory predictability. Furthermore, absence of EU rules in this area would on the one hand bring fragmentation impeding the development of a DSM and on the other administrative burden jeopardising the efficient development of such services. This is particularly true for services such as M2M, which should be provided in such a way as to be able to seamlessly cross national boundaries. In addition for the **business sector**, there are still national barriers to the provision of **business communications services** on a cross-border basis

and this represents a significant missed opportunity for the functioning and the development of the Single Market⁸⁸.

Harmonisation of spectrum related issues

Spectrum, as other resources such as numbers and to some extent land, belongs to the Member States or at least fall under their jurisdiction, and their management and assignment needs to take into account national particularities and needs. Nevertheless, there is a need for a more convergent and consistent EU regulation for market entry to eliminate the obstacles that appear due to divergent conditions for the assignment of individual rights of use of spectrum, numbers or land. A consistent EU level regulation is necessary to (i) enable providers to expand their services to other Member States; (ii) create a sufficient market scale effect allowing front running Member States to benefit from it by providing the EU as DSM a sufficient attractively; (iii) give access to state of the art wireless capacities and services for EU citizens and businesses to benefit from the digital environment, innovative services and applications and be able to commercially develop and underpin the benefits of the digital economy that is constantly evolving towards the "mobile" economy, where spectrum policy has an important role⁸⁹; (iv) allow countries which are lagging behind to catch up and participate into the DSM, thereby also allowing more advanced Member States to further increase citizens' and commercial exchanges within such countries; and, (v) treat all spectrum users in a coherent way throughout the Union. Lastly, in order for the EU to lead on new and enhanced services, such as 5G, it needs to offer equipment manufacturers and providers of communication services sufficient scale not only in terms of technical harmonisation, but most importantly of a market developing in a broadly aligned fashion, for services and devices to develop under stable and harmonised rules.

Services

In **services**, competition between local providers of electronic communications services that bundle network access with services and global providers of services over the top of the networks reinforces the right of the EU to act to ensure a level playing field. Action should also be undertaken at EU level to reduce fragmentation of **consumer protection rules**, which on the one hand raises the administrative cost for cross-border providers of services and hinders the development of innovative services and on the other hand result to an uneven and sub-optimal level of consumer protection across the Union.

Under the **subsidiarity principle**, the main purpose of which is to bring decision-making within the Union as close to the citizen as possible, the Union is entitled to act if a problem cannot be adequately settled by the Member States acting on their own. If the action of the Union does not offer prospects for a more effective solution, the national authorities are expected to act individually. Therefore, it is crucial to verify whether action by the Union would provide added value, compared to individual actions by Member States.

2.1 Why could Member States not achieve the objectives of the proposed action sufficiently by themselves?

Ubiquitous and unconstrained connectivity

The situation of Member States with regard to connectivity differs quite significantly. There are very important discrepancies, which may not be explained solely from the different landscape, population, GDP or purchasing power, but are the result of different policy choices made today and in the past. Absence of EU action to pursue ubiquitous and unconstrained connectivity as a separate objective of the framework would only perpetuate this patchwork with negative effects on the single market and consumer interests.

In the public consultation, connectivity was perceived as a necessary condition to achieve the Digital Single Market, with many respondents pointing to the need for policy measures at EU level and adjustments to the current policy and regulatory tools, as these are provided in the current regulatory framework, to support the deployment of infrastructure in line with future needs.

Enhanced role of BEREC as an EU agency

The relative success of BEREC in promoting regulatory consistency and its failure in imposing a single-market oriented solution when NRAs do not adhere to its analysis advocate for the need to enhance its role and competences. The development of common and consistent approaches, the sharing of regulatory knowledge and resources can achieve better regulatory results at lower cost for the whole EU. This is particularly clear for areas of regulation with a cross-border dimension, such as the provision of services to businesses, or spectrum. It is also true for markets which are interconnected, such as the electronic communications markets. Regulatory discrepancies in the treatment of interconnected markets may lead to a transfer of resources between national markets, as we have seen with the discrepancy in the regulation of termination markets and thus hinder the development of new and innovative products. While a certain degree of flexibility must be maintained to adapt implementation to local circumstances, national regulators performing regulatory tasks in relation to different types of markets will only be able to achieve their objectives in the most effective way by co-operating between each other and with the EC to devise the best solutions to similar problems. An approach based on the common regulatory wisdom of the EU's regulatory community is therefore more likely to be robust and effective than a range of purely national solutions.

Harmonisation of spectrum related issues

Spectrum issues cannot be addressed by individual Member States on their own, nor by a small number of countries acting together, because they relate directly to cross-border coordination of national spectrum assignment and management activities across the Union. While spectrum is a national resource, its assignment is necessary for market entry, i.e. of exercising an activity in the digital single market. Absent rules at EU level, it may not be ensured that Member States will take sufficiently into account not only the national specificities of their markets, but also the connectivity needs, and the consistency requirements of the digital single market.

2.2 What would be the added-value of action at EU-level?

The technological developments and the ambitious Digital Single Market strategy have strengthened the case for joint action at EU level. The EU depends on effective and widespread connectivity across all its Member States. Moreover, as essential services such as banking and interactions with local and national Governments move online, connectivity is today vital for social and economic inclusion and the advent of 5G will further foster this role.

Besides bridging current gaps in **end-user protection in certain areas** such as security and achieving effective outcomes for consumers, consistent approaches to the regulation of electronic communications within the single market (including mechanisms to ensure effective competition) are important in ensuring a level playing field amongst operators and avoiding arbitrage whereby ‘national champions’ could be protected within their home market and leverage such advantages when entering neighbouring markets.

There is also a strong case for action to address inconsistencies in markets which have a clear cross-border aspect. One such case is **business access**, where a standardisation of product characteristics and service levels is important in supporting the delivery of seamless services to corporations across the single market.

With regard to the institutional set-up, while the current set-up may have contributed to more benefits than a system involving Member States acting alone, opportunities to create more added value may have been missed due to the challenges in achieving consistency that are inherent in a regime which relies on soft law. This is particularly true for decisions affecting cross-border services (including call termination and business access), but also applies for services such as very high speed broadband, which have a significant impact on the digital single market as well as on the wider economy and society.

The same rationale is valid for **addressing lack of consistency in spectrum assignments across the EU**: differences in methods and conditions for spectrum use across Member States impede the development of a true single market. Unjustified divergences between Member States should be levelled out and comparable coordinated assignment conditions and awards developed. An EU action drawing on national best practices and experience will ensure that spectrum is put to optimal and efficient use as well as provide the regulatory predictability needed to incentivise network investments to meet the connectivity needs.

In terms of stakeholder perception, there was a quite **clear preference amongst the respondents to the public consultation (see annex 2) for continuing action at EU level** (nearly 89%). The public consultation confirmed that further harmonisation would be welcome on aspects such as spectrum management, market access, consumer protection, authorisations, or privacy and security. The respondents highlighted a risk of fragmentation due to national implementing measures and of incoherence with other regulation and competition law.

In the European Council (June 2016)⁹⁰, there was a general recognition of the importance of enhanced connectivity as a regulatory objective, and of the need to create right conditions for stimulating new business opportunities by better coordinating spectrum assignment modalities. The reticence on the part of Member States is mainly focused on spectrum governance – while a significant number of them agree with the need for coordination of spectrum policy objectives and, in particular, acknowledged the potential for greater synergies between national authorities including an enhanced role for the Radio Spectrum Policy Group (RSPG), the vast majority insists in maintaining responsibilities for spectrum policy at national level, notably with regard to spectrum assignment procedures and licence conditions to take account of national circumstances and suggested that the spectrum coordination instruments currently available under the framework were sufficient.

Measures at EU level are also needed to tackle the underlying causes of the problem, by enabling any operator, whatever its size or scope of activities, to benefit from harmonised procedures, stable and consistent regulation allowing for credible assessments about the return on capital invested in enhanced networks. Such measures will ensure regulatory predictability and legal certainty necessary to undertake investments in capital-intensive broadband networks and bridge the digital divide, thereby allowing consumers to enjoy new services.

⁹⁰ European Council Conclusions June 2016 <http://data.consilium.europa.eu/doc/document/ST-26-2016-INIT/en/pdf>

3 WHAT SHOULD BE ACHIEVED?

The set of objectives and the intervention logic linked to the review of the regulatory framework have to be inscribed in the wider context of the DSM strategy⁹¹ and the **Political Guidelines for the current European Commission – A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change** which set up the policy objectives of the Juncker commission.

The European Council on 28 June 2016 also endorsed in its conclusions the importance of telecom and connectivity as a backbone for the digital single market, calling for "*swift and determined progress*" to "*ensuring very high-capacity fixed and wireless broadband connectivity across Europe, which is a precondition for future competitiveness. The review of the telecoms regulatory framework should aim to incentivise major network investments while promoting effective competition and consumer rights*"; The June 2016 European Council conclusions are also calling for a timely release of the 700 MHz band so as to help ensure Europe's leadership in the roll-out of 5G networks.

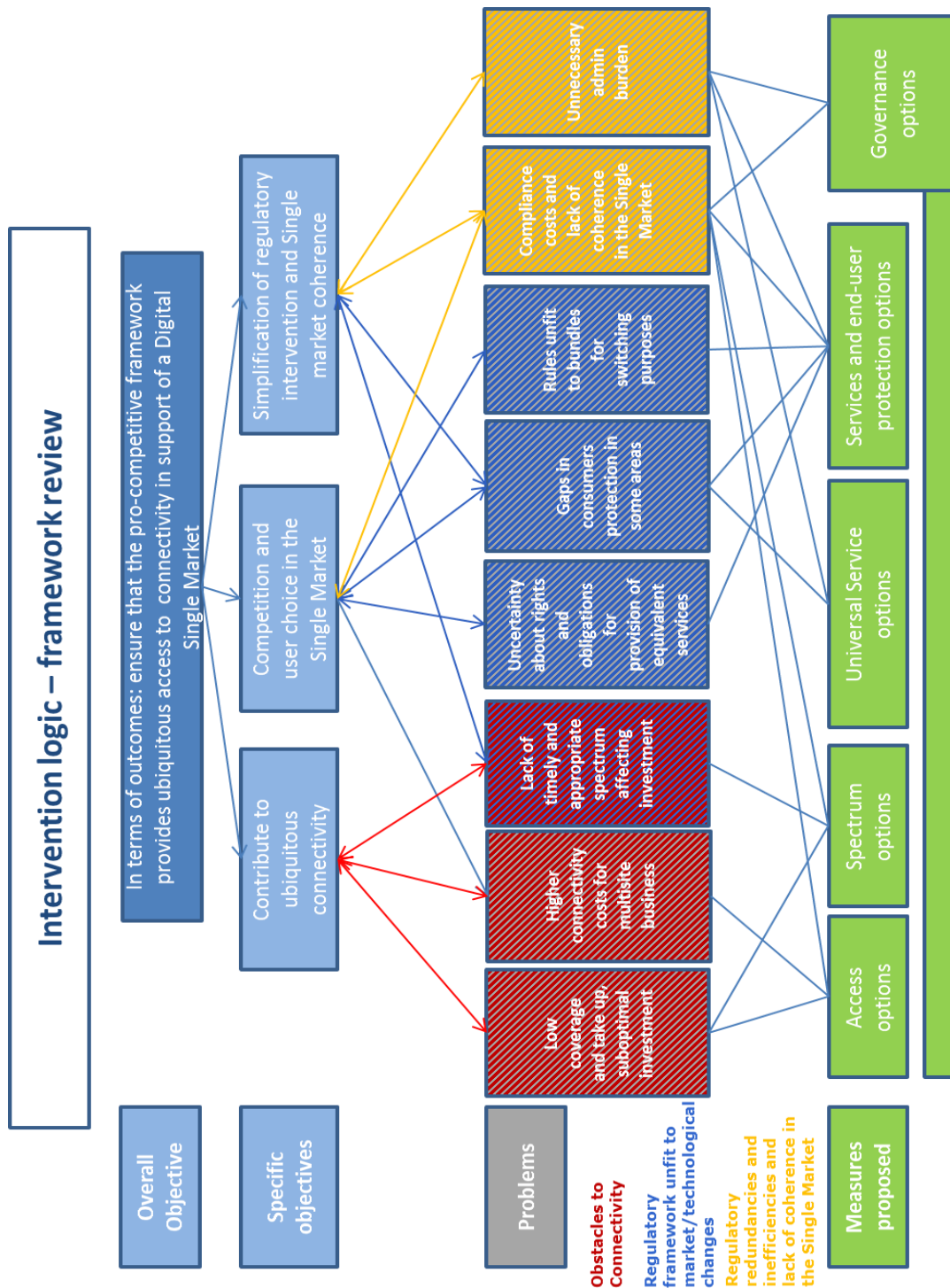
The following diagram illustrates the intervention logic inspiring the review of the framework, providing the necessary links between the drivers and the problems identified in section 1 and the policy options presented in section 4 below.

The diagram below presents the overall objective for the review, the specific objectives that will contribute to the overall objective, including the various policy areas concerned and the link with the problems that are presented in section 1. The eight main problems identified are organised under three categories: (i) Obstacles to unconstrained connectivity, (ii) A regulatory framework not fit to rapid market and technological changes (iii) regulatory redundancies and inefficiencies and lack of coherence in the Single Market.

Additional graphs presenting the link between each specific objective and related problems, problem drivers and solutions are presented in section 3.2.

Figure 15 - Intervention logic diagram

⁹¹ See: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015DC0192&from=EN>



3.1 What are the general policy objectives?

The **current regulatory framework** is built on three main objectives as defined in Article 8 of the Framework Directive: **promotion of competition, of the internal market, and of end-users' interests** (understood largely in terms of legal rights: to universal service, privacy, protection of end-users and vulnerable groups). Based on these main objectives, the framework then sets out a number of sub-principles - such as promoting regulatory predictability, promoting efficient investment and innovation, regulating markets only where there is no effective and

sustainable competition - which regulators should take into account when pursuing the primary objectives⁹².

The current review is a component of the DSM strategy launched in May 2015⁹³. Its objectives will have to be translated into implementable regulatory objectives in the framework. **The current three primary objectives** under art. 8 FWD as well as the regulatory principles relative to investment and innovation **will remain valid and relevant**. However, the telecoms sector is generating more and more spillovers to the rest of the economy, becoming the foundation of modern, innovative economic systems and as well as of certain societal services, such as e-transport, e-government, e-health care, e-learning, etc. This can only be possible if appropriate networks are rolled out at a sufficient scale and if VHC **connectivity** becomes accessible and affordable to all citizens and businesses.

Connectivity was broadly recognised in the public consultation as the underlying driving force for the digital society and economy, underpinned by technological changes and evolving consumer and market demands. It appears necessary that the **current objectives should be flanked by a novel connectivity objective**, spelled out as:

*"Access and take-up by all European citizens and businesses of **very high-capacity connectivity**, both fixed and mobile, and interpersonal communications services, on the basis of affordable price and choice, enabled by effective and fair competition, by efficient investment with adequate returns, by innovation, by common rules and predictable regulatory approaches **in the internal market** and by the necessary sector-specific rules to **safeguard the interests of citizens**.*

This new objective will be **additional** to the objectives already included in art. 8 of FWD **promotion of competition, of the internal market, and of citizen interests**, which should be read **as a whole** in line with the policy strategies and ambitions recalled in section 1, and in section 3.2. on coherence of the objectives, in particular with the connectivity strategy which is articulated around three set of specific ambitions, as assessed in annex 9:

- a. Gigabit connectivity for socio-economic drivers
- b. Ubiquitous mobile connectivity
- c. Improved connectivity in rural areas

However it is important to clarify that unlike the provisions of the regulatory framework, the provisions included in the Gigabit society strategy **will be of a non-binding nature**. The strategy will reinforce the link between the objective of the regulatory framework and the overall political targets of the Commission in terms of connectivity as explicated in the communication accompanying the legal proposal, and can provide guidance for interpreting the regulatory objectives proposed in the revised legislative framework as well as in other areas of public intervention (state aid, structural and investment fund interventions, national broadband plans) and a benchmark for private decision-making on long-term investments.

3.2 What are the more specific objectives?

Three specific objectives for the review of the regulatory framework have been identified by the Commission services, in line with findings of the support study to this IA⁹⁴, the public consultation and the workshops and meetings carried out in 2015-2016 and the Fitness Check. The evaluation has showed that among the three existing objectives of the **regulatory framework the internal market is the one that has been achieved to a lesser extent as explained in section 1.1**. As the **single market objective** is inherently linked with each of the

⁹² As confirmed by the Fitness Check, the objectives spelled out above remain valid and are not to be confused with the objectives of the review, presented in the diagram which refers to this review exercise.

⁹³ See: <https://ec.europa.eu/digital-single-market/digital-single-market>

⁹⁴ See SMART 2015/0005

specific objectives identified for this impact assessment it is not included as a separate stand-alone objective but constitutes an integral and essential dimension of each of the specific objectives presented below.

For each specific objective, the link with the problems identified in section 1.2 is provided, as well as the link to the main measures that are included under the options for the policy areas identified in section 4. The methodological link between problems, objectives and measures has to be interpreted in a relative way, as the regulatory measures that fall under the scope of the framework review are certainly not sufficient on their own to guarantee the full achievement of the objectives: as explained in section 1.2.1.1, some significant exogenous factors of non-regulatory nature concur to the problems identified. The measures proposed will contribute to address these problems providing the fittest regulatory framework, but cannot be considered as sufficient to solve them.

3.2.1 Contribute to ubiquitous very high capacity connectivity in the single market

This objective is **addressing the following problems** identified in section 1.2: low coverage and correspondingly limited take up of very high capacity connectivity and the reasons for suboptimal investment in the Single Market, lack of timely and appropriate spectrum affecting investments in the Single Market, unsatisfactory connectivity offers across the Union for businesses, regulatory redundancies and inefficiencies and lack of coherence in the Single Market.

This objective is **linked to the policy options** identified in the access, spectrum, Universal Service Obligations (USO) and governance areas by the **following measures and solutions proposed**:

- Boost VHC network roll-out through increased emphasis on infrastructure competition when possible, co-investment, infrastructure models (wholesale-only), cost reduction measures, on the basis of adequate returns on investment; (see access options)
- Address business needs in terms of cross—border connectivity (see access options)
- Ensure sufficient incentives for operators to deploy VHC infrastructure (where infrastructure competition insufficient), another aspect is to provide greater certainty for those committing to invest in challenge areas; (see access options)
- Ensure faster time to market for spectrum resources, so that spectrum can speedily be made available to the next generation 5G technology on terms which favour investment and predictability; (see spectrum options)
- Modernise USO scope to take account of market and technological developments and bring it into line with current citizen needs;(see universal service options)

The **single market dimension** is specifically addressed by the intent to:

- Promote EU-wide access products for cross-border services to business users in the single market (see access options)
- Promote a consistent EU spectrum management and timely deployment of 5G throughout the EU. (see spectrum options)
- Ensure common means of determining and mapping end user connectivity including also quality of service (see access and spectrum options)
- Ensure a governance structure that can enable and foster connectivity, including new tasks for NRAs, in the area of mapping, spectrum and effective EU coordination mechanisms on spectrum and regulatory remedies (see governance options on access and spectrum).

The following graph links the problems and the drivers related to this specific objective and includes some of the proposed solutions. Section 4.9 provides a more detailed explanation of the

link between the measures proposed in the preferred options and the specific objectives, describing how the former concur to achieve the latter.

Annex 10 (section 6.10.1) further details how certain elements of the current regulatory framework could be improved to foster deployment of VHC networks.

1. Intervention logic: measures to contribute to ubiquitous connectivity

Problem	Drivers	Objective	Operational Objectives	Solutions	
Low coverage and take up in very high capacity networks	Insufficient incentives to invest (insufficient infrastructure competition, unviable business case) Inefficient allocation mechanism for public funding	Contribute to ubiquitous connectivity	support deployment of dense 5G networks support deployment of VHC networks ensure competition on price ensure competition on quality Inclusion of affordable broadband under USO in MS	Promotion of infrastructure competition in VHC, co-investment and increased investor certainty; strengthened oversight on regulatory remedies Modernise USO rules Focus on broadband affordability	Access & USO
Lack of timely and appropriate spectrum affecting investments	Regulatory uncertainty on spectrum assignment Minimum harmonisation, differentiated rules		Faster time to market of spectrum resources increase consistency in some aspects of MS spectrum management	Binding assignment criteria, provisions on small cells and wi-fi, more efficient spectrum usage	Spectrum
Lack of coherent connectivity offers for business across the EU	Fragmented regulation of wholesale business access		ensure competition on quality ensure consumer choice	Common specification for wholesale business access	Access

3.2.2 Competition and user choice in the single market:

This **objective is addressing the following problems** identified in section 1.2: Low coverage and correspondingly limited take-up, uncertainty about rights and obligations for provision of equivalent services; gaps in consumer protection; rules unfit to bundles for consumer protection; unnecessary administrative burden and lack of coherence in the Single Market.

This objective is **linked to the policy options identified** under all policy areas by the **following measures and solutions proposed**:

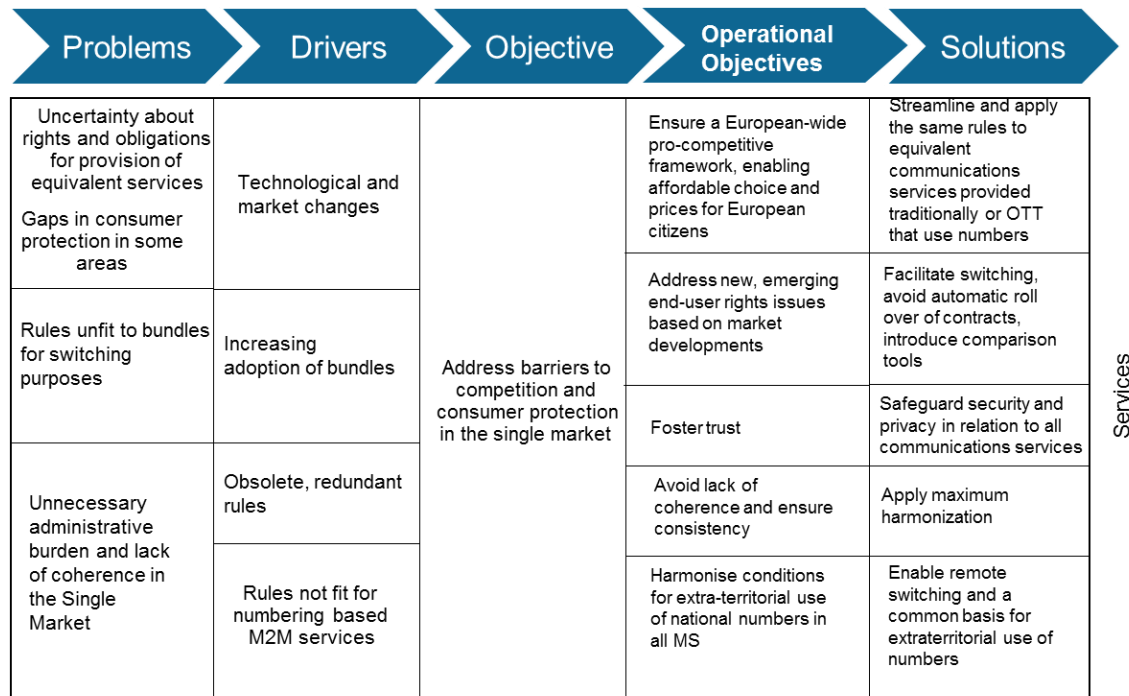
- Ensure a European-wide pro-competitive regulatory framework for networks, internet access services and communication services, creating a regulatory level playing field and enabling affordable choice and prices for European citizens in electronic communications services; (see access, universal service and services/end-users, governance options);
- Ensure affordability of connectivity under a modernised set of USO rules in line with current citizen needs;(see universal service options)
- Address new, emerging end-user rights issues based on market developments (e.g. facilitating switching or addressing issues with bundled services) (see services/end-users options);
- Promote trust in the use of new communications services (see services/end-users options);
- Avoid any lack of consistency and ensure that consumer protection measures are coherent and do not present a barrier to the single market (e.g. removing outdated or overlapping legislation) (see USO and services/end-users options);
- Ensure that obligations imposed on ECN operators remain efficient and proportionate when viewers' preferences change with regard to audio-visual content consumption. (see

- services/end-users options)
- Ensure that the necessary harmonisation procedures are established in order to ensure competition and user choice (see access and governance options)

The **single market dimension** is specifically addressed by the intent to:

- Full harmonisation of end-users rights in the single market (see services/end-users options)
- Harmonise conditions for extra-territorial use of national numbers in all Member States (see numbering and governance options)
- Foster trust in services by ensuring the setting up of an EU-wide protection regime for end-users of all communications services in terms of security and (potentially) confidentiality (see services /end-users options)

The following graph links the problems and the drivers related to this specific objective and include some of the proposed solutions. Section 4.9 provides a more detailed explanation of the link between the measures proposed in the preferred options and the specific objectives, describing how the former concur to achieve the latter.



3.2.3 Simplification of the regulatory intervention and single market coherence:

This objective is **addressing the following problems identified** in section 1.2: Unnecessary administrative burden & lack of coherence in the Single market; compliance costs.

This objective is **linked to the policy options** in all policy areas by the **following measures and solutions proposed**:

- Reduce administrative burden by shortening current cycles of market reviews, and increasing the regulatory certainty (see access options)
- Modernise the current set of sector specific end-user protection rules aiming at achieving full harmonisation to the extent possible, remove provisions that overlap with horizontal consumer protection legislation and identify those which should appropriately also apply to equivalent communications services regardless of the mode of provision in order to promote

end-user interest and consumer welfare. The aim is to review the scope and the scale of the rules, which rules are needed for which actors, as well as which is the competent authority to apply them; (see services/end-user options)

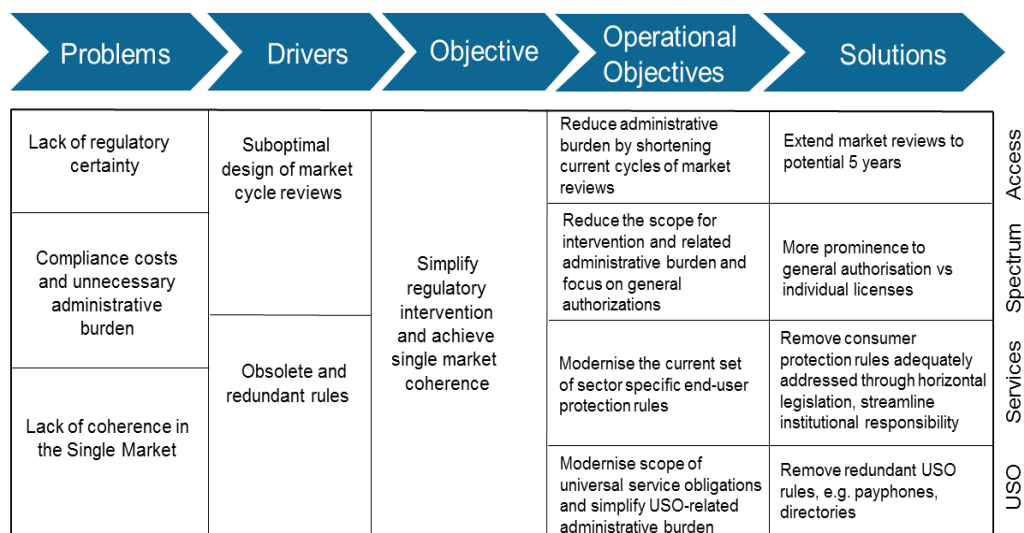
- Reduce the scope for intervention and related administrative burden by allowing NRAs to take action only when retail market failures are detected to address access seekers' problems, and requiring account to be taken of commercial access agreements and co-investment agreements. (see governance access options)
- Focus on general authorizations instead of individual licencing in the single market, ensure minimum duration for individual spectrum licences and greater coordination of spectrum availability and assignment conditions (see spectrum options)
- Modernise USO scope to take account of market and technological developments and bring it into line with current customer needs. (see universal service options)
- Simplification and reduction of universal service-related administrative burden through ending the current sectorial sharing mechanism possibility for financing. (see universal service options)
- Ensure that the relevant functions are attributed to the different actors (NRAs, BEREC, RSPG, Commission...) and that the structure of BEREC is simplified in order to have a streamlined and efficient governance set-up (see governance options)

The **single market dimension** is specifically addressed by the intent to:

- Greater consistency in spectrum assignment processes, which at the moment tend to generate complexity for operators wanting to use spectrum in various Member States, and can also cause interference in border areas; (see spectrum options)
- Avoid duplicate processes for the specification of new wholesale remedies by the introduction of standardised wholesale remedies for example in relation to business access; (see access options)
- Enhance the single market dimension of spectrum by fostering the creation of a pan European secondary market for spectrum that will allow a more efficient and dynamic use of spectrum. (see spectrum options)
- Harmonize a minimum set of competences for independent national regulatory authorities essential for market shaping aligned with BEREC tasks focused on the cross-border dimension; (see governance options)

The following graph links the problems and the drivers related to this specific objective and includes some of the proposed solutions. Section 4.9 provides a more detailed explanation of the link between the measures proposed in the preferred options and the specific objectives, describing how the former concur to achieve the latter.

3. Intervention logic: measures to simplify regulatory intervention and ensure single market coherence



In line with the better regulation guidelines of the EC, **operational objectives** will be developed in section 4.9 only for the preferred option in each of the policy areas considered.

3.3 How do they link to the problem? How do the objectives relate to each other, i.e. are there any synergies or trade-offs?

The different specific objectives spelled out above are closely connected.

3.3.1 Synergies between objectives

Main synergies between contributing to ubiquitous VHC connectivity and competition and user choice in the single market. Competition is highly synergetic to connectivity: competition drives investment and therefore contributes to the connectivity objective. The measures proposed under the options in the access and spectrum area are all relying (albeit to a different extent) on the role that competition can play in fostering investment and hence connectivity. Regulation can act as a significant trigger to competition (either focused on access, on infrastructure competition, or on the promotion of co-investment), which has important implications for enhanced connectivity. This is true for basic broadband as well as for NGA and VHC networks. The barriers identified in the sector of business communication services and high costs generated for business users call for a more prominent role for competition to play in the telecom sector. User choice is also highly synergetic to ubiquitous connectivity: measures in the area of access (support for challenge areas), spectrum (the current lack of timely and appropriate spectrum release had repercussions on delayed deployment of networks as well as the 4G handset developed for the European market) and USO⁹⁵ make sure that users can choose irrespective of their location. User choice is also ensured by affordability of tariffs that could also be ensured by USO.

Main synergies between contributing to ubiquitous connectivity and simplification of the regulatory intervention and single market coherence. The synergies between those two specific objectives can be observed in the area of access regulation and USO with reference to the compliance and adaptation costs that measures in the current framework have generated. Some measures to reduce compliance cost are proposed in section 4.3. Governance aspects are also important with regard to the spectrum problems and the solutions that will be envisaged in the policy options in this respect. The proposed measures aim at addressing overregulation. This

⁹⁵ USO regimes are linked to connections at fixed location. However there should be no constraints on the technical means by which the connection is provided.

would lead to more streamlined set of rules which in turn contributes to the connectivity objective, and may attract smaller operators in local areas.

Main synergies between competition and user choice in the single market. The synergies between those two specific objectives are evident when assessing the technological and market changes that have affected the telecom sector in the last years. A more competitive market delivers greater choice for consumers; it incentivizes the operators to innovate to satisfy consumers' needs. A good example can be given by the emergence of bundles which are rapidly changing the competitive dynamic in the telecom sector, bringing down costs for consumers, but also making switching more cumbersome for end-users.

3.3.2 Trade-offs between objectives

Potential trade-offs between contributing to ubiquitous VHC connectivity and competition and user choice in the single market. Access-based competition is and has been an effective driver of investment in certain areas, so investment and therefore connectivity should not be seen as opposed to competition. Potential trade-off could emerge between those specific objectives in case connectivity is pursued at the expense of competition. The access regulation proposal that will be developed below will be consistent with the principles laid down in art. 8 FWD, including competition and will not modify the SMP regime currently in force nor will they provide so-called "regulatory holidays" that would benefit in an uneven market certain market players. Finally, a too ambitious USO definition in terms of speed, availability or affordability could endanger the competition dynamic between market players and impose excessive or publicly funded benefits on the operators identified as USO provider. This potential trade-off has been taken into account when designing the USO options presented below in section 4.3, in particular by focusing the proposed USO regime on addressing affordability rather than availability of connectivity.

Potential trade-offs between contributing to ubiquitous VHC connectivity and simplification of the regulatory intervention and single market coherence. The main trade-off that can be envisaged between those two objectives could occur in case of wide de-regulation that would remove ex-ante market regulation from those markets that can still be considered as bottlenecks for the provision of telecom services, likely weakening investment pressure as well as service competition, market entry possibilities in the single market and ultimately consumer benefits. In order to avoid such a trade-off a number of options that have been considered in first instance due to their potential effects in terms of simplification, have been discarded such as the full de-regulation of telecom networks in the area of access or the termination of the USO regime. More details on these policy options can be found in section 4.3. On the other hand the pursuit of ubiquitous VHC connectivity may bring too intrusive legislation in terms of technology and business decisions that could potentially reshape the industry. Policy options that were susceptible to determine such an outcome such as mandatory structural separation or mandatory copper switch-off (access regulation) have been discarded. A potential trade-off still remains when changing the market review cycles to 5 years, but it is mitigated by a number of safeguards (see section 4.1.1).

Potential trade-offs between competition and user choice in the single market and simplification of the regulatory intervention and single market coherence. The potential trade-offs that can be foreseen among these objectives mainly relate to the balance to be struck when regulating new services. For instance an extreme interpretation of the level playing field concept may lead to the imposition of the regulatory framework rules to all Over the Top services, irrespective of the degree of substitution existing with the current ECS providers or of the scale of their operations. This would probably hamper innovation and not benefit competition, so that this option has not been considered.

3.4 Are these objectives consistent with other EU policies and with the Charter for fundamental rights?

3.4.1 Coherence with other EU policies

The coherence between the objectives above and the following EU policies has been screened:

1. Digital Single Market: As already mentioned in the introduction section, the set of objectives presented for the review of the telecom sector is consistent with the overall **Juncker Commission's political guidelines** to achieve a connected single market and the **DSM strategy**, whose main points concerning telecom were reported in section 1. More specifically, the 'European Gigabit Society Communication'⁹⁶, which proposes specific connectivity objectives to be achieved by 2025, in addition to various complementary measures, is backed largely by the measures envisaged in the current legislative review. In particular, the revised regulatory framework is expected to create better incentives for deployment and take-up of very high capacity networks, to adjust spectrum rules so as to better support mobile connectivity and to incentivise take-up through competitive markets, consumer choice and affordable tariffs. In addition, the '5G Action Plan'⁹⁷, which sets forth a set of measures aimed at a swift and coordinated introduction of 5G in Europe, relies also to a large extent on the measures envisaged in the review of the framework, in particular the revision of the spectrum rules, the consistent treatment of dominant operators and a common approach to consumer protection rules. Of course, the review of the telecoms framework will be highly synergetic with the other initiative included in the DSM strategy, such as preventing unjustified geo-blocking, modernising the European copyright framework, affordable cross-border parcel delivery services, reducing VAT-related burdens etc.

2. Competition law and state aid regime: The Regulatory Framework is based on the principles of EU Competition Law. It has followed since 2002 a deregulatory trend as markets develop and this is maintained with the current review. As a consequence, wholesale markets which are deregulated because there is no longer SMP or because competition at retail level is fierce, remain subject to general competition law. This principle will be maintained when pursuing the set of objectives for this review. Competition will continue being the driving force fostering investment in VHC networks. **State aid** policy will also continue to be a key aspect of ensuring access to performing infrastructure in areas with no business case. The new connectivity ambitions to be developed in line with the DSM strategy and the Gigabit society will go well beyond the current Digital Agenda for Europe targets and are likely to require networks of better quality able to grant a superior Quality of Service to users, measured at reference points in the network. The concept of VHC on which 2025 policy ambitions are being developed goes beyond the current State Aid categories; however this tension in terms of coherence appears manageable in the short term, and in the context of the review of telecom framework which deals with market drivers of investment. On the other hand coherence should increase if NRAs have a greater role in State Aid by carrying out mapping and can sanction misleading, erroneous or incomplete information provided by operators.

3. Cohesion policy and European Structural and Investment Funds (ESIF) are an important tool to fill the connectivity gaps in market failure areas and should be allocated in a way that allows maximising the resources available⁹⁸. The review of the telecom frameworks and its objectives should take this into account by providing appropriate conditions for private investment the review will enable public funds to be focused where they are most needed and by

⁹⁶Commission Communication "Connectivity for a European Gigabit Society: Laying the Foundations for a competitive Digital Single Market"

⁹⁷ Commission Communication "5G for Europe: An Action Plan"

⁹⁸ Compared with the previous programming period (2007-2013), the European Structural and Investment Funds (ESI Funds) have stepped up efforts in the areas of ICT and digital networks roll-out. Overall, the ESI Funds are expected to programme around EUR 14.5 billion to "Enhancing access to and use and quality of ICT". The allocation of ESI funds for high speed broadband networks experienced a sharp increase from EUR 2.7 billion in 2007-2013 to around EUR 6.4 billion for 2014-2020 (about EUR 5 billion ERDF and an estimated EUR 1.5 billion EAFRD).

fostering joint investment when structural funds are used. Also ESIF funds could be used to fund – at least in some countries - part of the measures proposed under a number of options, such as the mapping activities that NRAs may have to carry out. Infrastructure, demand, investment intentions and services mapping by NRAs⁹⁹ will create synergies with mapping activities taking place at the regional level¹⁰⁰ and be complementary with the action by DG AGRI, DG REGIO and DG CONNECT which are already helping Member States to become familiar with the issue through the establishment of Broadband Competence Offices at National or Regional level.

4. General consumer policy. As explained above, one objective of this review is to streamline current sector specific rules on consumer protection so as to avoid any unnecessary overlap with horizontal consumer protections when these ensure an adequate level of protection for end users of ECS.

5. Audio Visual Media services policy: In accordance with art 1(3) of the Framework Directive any objectives and finally provisions (existing and new/revised) are "...without prejudice to measures taken at Community or national level, in accordance with Community law, to pursue general interest objectives, in particular relating to content regulation and audio-visual policy." In accordance with recital (5) of the Framework Directive "the separation between the regulation of transmission and the regulation of content does not prejudice the taking into account of the links existing between them, in particular in order to guarantee media pluralism, cultural diversity and consumer protection." This means that whatever the objectives of the framework are, the promotion of general interest content by Member States would have to be ensured in the areas of must carry and would also be relevant for EPG provisions and in the field of spectrum management. The burden imposed on ECN operators can be relevant for their investment decisions. Also, audio-visual content is a driver of demand for connectivity; therefore the scope for regulatory intervention in the area of audio visual media services policy can also have an impact on demand for connectivity. Accordingly, the impacts identified in this assessment will inform the Commission, but there are limitations to the legislative choices available to the Commission in the areas of must carry, EPG regulation and spectrum management,—which originate in the need to preserve the general interest objectives mentioned above.

3.4.2 *Coherence with the Charter for fundamental rights*

As regards possible impacts on fundamental rights, as guaranteed by the Charter of Fundamental Rights, the proposed measures aim at achieving higher levels of connectivity with a modernised set of end-user protection rules. This will in turn ensure non-discriminatory access to any contents and services, including public services, and help promote freedom of expression and of business, and enable Member States to comply with the Charter at a much lower cost in the future.

4 OPTIONS, IMPACTS AND COMPARISON OF OPTIONS BY POLICY AREA

The policy options presented for the review are divided into five different sets, covering the following areas (i) access, (ii) spectrum, (iii) universal service obligation, (iv) services and end-user protection, (v) institutional governance.

This section is organised by policy area, due to the wide heterogeneity of the provisions under the scope of the current framework and to make sure that a reasonable level of analysis can be reached:

⁹⁹ NRAs could be appointed as Single Information Points under the Broadband Cost Reduction Directive (2014/61/EU), thus enabling synergies.

¹⁰⁰ See for instance the result of SMART 2012/0022 which gives an overview of the mapping initiatives in the EU and finds out that many of the national mapping initiatives are already carried out by the NRAs

<https://ec.europa.eu/digital-single-market/en/news/mapping-broadband-and-infrastructure-study-smart-20120022>

We first present the policy options. Some aspects falling within more than one policy areas could be considered as horizontal (such as authorization) but are not considered for a stand-alone set of options because no modification to the current framework has been proposed or modifications are embedded in other areas. Given the sometimes technical complexity of the options presented, **Annex 8 includes a graphical description of the main measures associated with the options presented in this section.** Each set of options for the areas mentioned above is endowed with a no change/baseline scenario, which will be used as the benchmark against which the alternative options should be compared, in line with the provisions in the Better Regulation Guidelines while many of the areas have a non-regulatory option. In the following sections the options considered in the various areas are shortly presented. More detail on the options can be found in SMART 2015/0005. **Discarded options** are also mentioned.

We then determine the impacts of the policy options in relation with the objectives stated in the intervention logic included in chapter 3. The novel objective of the review is to facilitate unconstrained connectivity for all in the Digital Single Market. This objective can be operationalized in three specific objectives, presented in section 3.2.

Within each policy area, each specific objective translates into even more specific measures that we have assessed using both qualitative and quantitative elements, including KPIs. Also some options are designed to have a greater impact on one specific objective rather than the other, which will be reflected in the analysis. In addition, each option is evaluated in relation to the potential economic, social and environmental impacts it might have. The criteria against which each option is assessed are:

What impact does the option have on achieving investment connectivity and innovation in the context of the Digital Single Market Strategic objective to be considered in the context of economic, social and environmental analysis for:

To what extent does the option contribute to ensuring a European-wide pro-competitive regulatory framework for networks and communication services, together with affordable choice and protection for end users?

How does the option contribute to reduced regulatory redundancies, inefficiencies impinging the development of the electronic communications sector? What is the option impact on administrative costs? Can it be effectively implemented? Are the impacts likely to change over time? Does it reduce the barriers for scaling up in Europe?

Finally, we present the comparison of the options identified in the light of the impacts determined. The options are assessed against the three core criteria:

1. Effectiveness: we consider the extent to which the options will address the identified problems and deliver the desired objectives
2. Efficiency: we consider the likely time taken to achieve outcomes and the associated cost of policy options for regulators and stakeholders
3. Coherence: we consider the degree to which the policy options provide stability in relation to current mechanisms as well as internal coherence with approaches taken to other topics. We also consider whether the measures are coherent in relation to external measures such as competition law, the TSM Regulation and the Cost Reduction Directive

We also discuss the degree to which different strategies at EU level provide additional value added in comparison with Member States acting individually. For the sake of brevity, we present only the main findings of the comparison exercise, while a more detailed analysis can be found in chapters 1 to 5 of the support study to this IA, SMART 2015/0005. A **preferred option** for each policy area is clearly stated at the end of each section.

4.1 Access regulation

4.1.1 Options

This section presents the access regulation policy options. All access options below, apart from option 4, build on the current regulatory approach applying competition law principles for market definition, designation of operators with Significant Market Power and for the imposition of regulatory remedies. Therefore the soft law instruments which the Framework has mandated the Commission to adopt and which constitute an integral part of the current regulatory framework, including the Recommendation on Relevant Product and Service Markets and Guideline for Market Analysis and the Assessment of Significant Market Power, remain relevant and will need to be updated, as appropriate, under these three options.

Option 1 – Baseline scenario (status quo)

This option is based on the EU policies in place and reflects possible developments of these in the absence of new EU-level action.

Under the baseline scenario the main tool by which NRAs promote competition under the framework will continue to be the system of ex ante regulation, under which NRAs conduct market analyses at regular intervals and apply appropriate remedies (such as access obligations and charge controls) on operators found to have significant market power (SMP). Following the 2009 review of the framework, some adaptations were made to NRA's tools and objectives to reflect the need to foster 'next generation' fast broadband access. Emphasis was placed on the need for NRAs to 'promote efficient investment and innovation in new and enhanced infrastructures',¹⁰¹ and NRAs were given the additional option of mandating facility sharing in the final (terminating) segment of the network.¹⁰² The 2009 review also introduced the potential for NRAs to mandate 'functional separation' of SMP operators in cases where other remedies had failed, although this remedy has not yet been used.

The flexibility given to NRAs in the 2002 Framework required the introduction of co-ordination mechanisms. The main features were:

- The requirement for the Commission to issue a Recommendation on Relevant Markets susceptible to ex ante regulation – which has become an important harmonising and deregulatory tool
- The introduction of a system of ex post checks on market analysis and SMP designation by the Commission through the article 7 process.
- The potential for the Commission to issue Recommendations on the application of the Framework subject to consultation with the Communications Committee (a committee composed of member state representatives)

In the 2009 revisions, these co-ordination mechanisms were further strengthened through the extension of the article 7 process to remedies (which however fell short of enabling a Commission veto) and the (thus far unused) potential for the Commission to issue Decisions (subject to comitology) if Recommendations were not followed. The important role played by NRAs collectively in these mechanisms also drove the creation of BEREC as a formal EU body, replacing the ERG¹⁰³.

¹⁰¹ Article 8(5)d Framework Directive

¹⁰² Article 12 Framework Directive

¹⁰³ In 2007, the Commission proposed to establish a new EU agency (EECMA) encompassing telecoms regulatory functions and taking over the functions at the time of the European Network Security Agency (ENISA). The proposal was substantially modified during the negotiations which resulted in the establishment of the BEREC Office as an EU agency responsible for providing support to BEREC but without regulatory functions itself and without any network and information security tasks.

Under this option the framework would continue to have a strong emphasis on market entry through wholesale access and competing infrastructures.

This option implies a continued focus on market analysis and the regulation of operators with Significant Market Power (SMP) to foster competition and investment. Regulation would be applied through a three-yearly cycle of ex ante market reviews, and with appropriate remedies selected from amongst those listed in the Access Directive. Price-controlled regulated access to the wholly owned networks of vertically integrated incumbents, largely based on physical access to copper assets and increasingly on virtual access to upgraded fibre-copper FttC/vectored assets, would remain the main paradigm but with many local variations. The option of applying symmetric obligations under article 12 of the Framework (and if relevant article 5 of the Access Directive) would also remain.

NRAs would maintain significant flexibility in applying the framework to reflect national circumstances. Consistency would continue to be supported through the use of non-binding Recommendations (for the most part), monitored by means of the article 7 process. There would in this context be no binding Commission decisions possible for remedies. BEREC's governance and remit would remain as present.

Option 2 - Continuity and simplification

This option foresees only relatively limited adjustments to the current rules on the basis of the experience of the implementation of the framework in recent years and of the REFIT exercise, with the important aim of increasing stability and simplifying the overall regulatory approach.

This option includes measures to provide more regulatory stability through **longer market review periods up to five years**, with the possibility to interrupt it earlier in case of significant market developments as is already possible. Further this option entails that NRAs would focus more on the **competitive situation at retail level** when conducting their market analysis and identifying the need for regulatory intervention at wholesale level, as is already indicated in the Recommendation on Relevant Markets (i.e. an apparent SMP position at one wholesale level need not result in regulation if in fact such wholesale input does not appear necessary to resolve a competition / end-user problem at retail level). It also includes **the codification of the "three criteria test"**¹⁰⁴, which is currently in the Recommendation on Relevant Markets, to ensure proportionate market intervention.

This option could also include a clarification of the relationship between the SMP market analysis process and **symmetric obligations for access to civil infrastructure**. Such clarification could ensure that any symmetric duct and pole access obligations stemming from implementation of the 2014 Cost Reduction Directive¹⁰⁵, as well as facility sharing obligations mandated under article 12 of the Framework Directive are considered by NRAs when conducting market reviews. It could also be clarified that access to civil engineering can in principle be imposed through SMP regulation as a stand-alone remedy and not just as an ancillary remedy to local access.

¹⁰⁴ The three criteria are cumulative and, therefore, must be applied in conjunction. According to the Recommendation, "*The first criterion is the presence of high and non-transitory barriers to entry. These may be of a structural, legal or regulatory nature. However, given the dynamic character and functioning of electronic communications markets, possibilities to overcome barriers to entry within the relevant time horizon should also be taken into consideration when carrying out a prospective analysis to identify the relevant markets for possible ex ante regulation. Therefore the second criterion admits only those markets whose structure does not tend towards effective competition within the relevant time horizon. The application of this criterion involves examining the state of competition behind the barriers to entry. The third criterion is that application of competition law alone would not adequately address the market failure(s) concerned.*"

¹⁰⁵ Subject to the rule that obligations imposed in application of the Framework prevail over those imposed in application of the Cost Reduction Directive.

The requirement for transition periods after regulation is withdrawn could be clarified. Finally, since **voluntary functional or structural separation** have not been used since their introduction in the framework in 2009, a revised framework could clarify the procedure foreseen in the Framework for the *ad-hoc* market analysis to be carried out in case of separation, as well as a new clearer mechanism involving commitments for any such voluntary separation projects.

As option 2 builds on the status quo, but does not impact the current balance between flexibility and harmonisation, the **governance structure** as regards BEREC and the article 7 process would also remain largely unchanged under option 2. Nevertheless, there could be some minimum harmonisation of NRA powers and the independence & regulatory capacity requirements could be enhanced to address certain shortcomings of the current system.

The responses to the public consultation overwhelmingly affirm the important role that civil engineering plays in the roll-out of NGA. Some **Member States** and a number of **infrastructure owners** don't see the need to further intervene to ensure access to civil engineering falling within the scope of the Cost Reduction Directive (2014/61/EU). However, **alternative operators** highlight the importance of detailed SMP obligations, beyond the general obligations in that directive. Furthermore, **incumbent operators** call for effective symmetrical access to in-house wiring.

There was broad alignment between **regulators, Member States** and many others that longer review periods (compared to the current mandatory three years) would be beneficial, particularly in stable markets such as for example termination rates. On the one hand, **access seekers** reject the idea that retail market considerations should be the focus of wholesale regulation, an idea that is strongly supported, on the other hand, by **network owners**, who consider that continued wholesale regulation is not justified if retail markets are competitive.

Option 3 – NGA+ Focusing regulation on high-quality connectivity

This option considers that while the key principles of the framework remain valid, significant adjustments are necessary to provide necessary incentives for both incumbents and competitors to make economically viable investments or co-investments in future networks that are in principle capable of providing VHC connectivity to every citizen and business in Europe. These measures would help addressing the endogenous regulatory factors exposed in section 1.2.1.1, but do not automatically guarantee any level of investment which is influenced by other socio-economic factors mentioned in that section. These measures aspire towards providing VHC connectivity, corresponding to Europeans' future connectivity needs and thus bridging the digital divide, taking into account that risks for operators are generally higher when CAPEX increases. The measures will therefore aim at extending the reach of commercially viable areas. As the demand side cannot be predicted it is not possible to calculate by how much commercially viable areas will be extended, while their extension will in turn shrink the need for public support. As discussed in annex 14, the public funds currently available are not sufficient to reach even the current Digital Agenda targets. This is proposed to be done by focusing on promoting the transition to VHC networks and promoting greater territorial coverage through the measures mentioned below.

(i) First, NRAs would have the **obligation to conduct a geographical survey of network deployments** on their national territory, on a forward looking basis and taking into account investment plans of operators. The survey would cover existing infrastructure, investment forecast and quality of service aspects from existing networks. This would improve the geographical granularity of market analyses, and make it easier to conduct sub-national market analyses. The results of the investment planning survey would constitute a basis for establishing "digital exclusion areas" where very high capacity networks or upgraded legacy networks to at least 100 Mbit/s download speed are not expected, and for calling on operators to declare their intention to deploy.

NRAs will be able to sanction operators that provide misleading information concerning their plans in those "digital exclusion areas", unless a reasonable explanation is provided. NRAs will be empowered to take **action** against such misrepresentations. NRAs will be requested to publish the main outcomes, to share the results with public authorities responsible for allocation of public funding or for drawing up national broadband plans, for determining the extent of universal service obligations or for defining coverage obligations attached to rights of use of spectrum.

In the public consultation, a clear majority of respondents considered that NRAs should have a role in mapping areas of investment deficit or infrastructure presence because they are vested with the necessary powers to access relevant information and have the necessary expertise, as well as independence. Some respondents (among which incumbents) are opposed to such a role and contested as a matter of principle any public interference with investment. There is strong support to a revision of the framework to better accommodate the role of NRAs regarding public funded broadband projects, notably i) identification of target areas, ii) setting access price and access obligations, iii) ensuring better consistency between obligations imposed under state aid intervention and ex-ante regulation and iv) resolution of disputes. A few respondents propose that the role of NRAs regarding mapping of infrastructures or setting target areas must be limited to provide technical assistance to the relevant competent authorities or to being consulted.

On the same subject the **Expert Group** (see annex 13 for more details) considered that mapping provisions are important to clearly describe the size of these problems: the magnitude of white, grey and black areas is generally not known and changes continuously due to ongoing deployments of infrastructure. A clear and reliable survey would show what the options to improve existing infrastructure are, reducing one important market failure which is the presence of sunk costs, giving rise to economies of scale and market power. Regions differ in the scalability of investments and this problem may be more pressing in white areas than in black areas.

(ii) **reinforcing and adjusting the existing SMP rules** for supporting deployment of VHC networks where competitive safeguards are provided including **co-investment** to reward those who invest first in very-high capacity networks, without compromising competition and therefore provided competitive safeguards are present, as well as creating new alternative regulatory incentives. This would be done by:

1. Codifying in legislation the principles of the 2013 non-discrimination and costing recommendation¹⁰⁶, namely non-discriminatory access, flexible pricing in presence of certain competitive constraints and copper-price stability, application of an Economic Replicability Test in lieu of direct price controls to ensure sustainable competition.
2. The power for NRAs to impose symmetrical obligations, as already foreseen in Article 12 of the Framework Directive and Article 5 of the Access Directive would be clarified and strengthened, while still being limited to non-replicable assets, and subject to the Article 7 process.
3. The market review process would formally encompass consideration of symmetrical obligations alongside asymmetric obligations (Articles 12, 14 and 16 FWD and Article 5 AD as modified) as well as measures that may result from the application of the 2014 Cost Reduction Directive. Hence, NRAs would start with the consideration of symmetric obligations (limited strictly to non-replicable assets). If SMP is no longer found, these measures could also contribute to safeguarding competitive markets together with appropriate transitional measures.
4. The market analysis would also take account of the impact of such obligations alongside all competitive pressures observed in the market, including the market effects of existing co-investment projects, commercial access agreements and wholesale only networks.

¹⁰⁶See: <https://ec.europa.eu/digital-single-market/en/news/commission-recommendation-consistent-non-discrimination-obligations-and-costing-methodologies>

5. If there are significant changes in the market situation, NRAs could conduct mid-market reviews in order to take account of any significant market developments in this regard.
6. NRAs would be required to choose the most proportionate and effective SMP remedy or combination of remedies where necessary, with initial priority to a stand-alone access remedy to civil engineering (e.g. duct access).
7. NRAs will also be encouraged not to impose access obligations on network upgrades by the SMP operator which are open to reasonable and sustainable co-investment offers, if the upgrade represents a significant improvement compared to available networks in terms of their performance, speed, quality and reach as well as a significant investment effort . NRAs would maintain regulated access on the SMP network to a product which offers comparable performance to that offered before the network was upgraded.
8. NRAs would be empowered to monitor incumbents' voluntary copper switch-off processes to ensure appropriate and smooth transition for access seekers while promoting migration to NGA and VHC networks.
9. Wholesale-only models of historic and new SMP operators will be further promoted by clarifying their potential right to a lighter touch regulatory regime, unless there is evidence of market failures that require further intervention.
10. Further reduction of regulatory burden could be achieved in termination markets by providing greater guidance on setting cost models and then devising a single Union-wide model for a harmonised rate calculation. BEREC would provide the technical input thus achieving great simplicity and transparency and very low maintenance cost for the individual NRA.

For this set of measures, the **public consultation** showed that regarding measures aimed at facilitating the roll-out of high-speed networks in the most challenging areas, responses were cautious with regards to first mover specific protections (to operators that are willing to roll out next generation networks in challenge areas). **Access seekers** and **consumer associations** warned about the risk of re-monopolisation, whereas **network owners** challenged the proposition that a risk of strategic overbuild can be defined and distinguished from competition. Some **Member States** highlighted the need for local responses to sub-national competitive and investment challenges, indicating openness to consider approaches to incentivise first movers on a geographical basis, subject to suitable safeguards being built in. In supporting first mover incentives, most stakeholders agreed that any first mover advantage should be subject to safeguards against re-monopolisation.

Network owners call for their discretion to decide whether and how to continue to use copper assets (full copper loop or sub-loop), whereas **access seekers** request guarantees that physical access to copper networks will continue to be guaranteed. While a majority of respondents, including **regulators**, would not agree to mandating the switch-off of copper networks where fibre is present, they still see a role for regulators to manage the transition where switching off copper makes economic sense, with **copper networks owners** advocating minimal intervention, and others rather invoking public intervention to preserve competition (e.g. transitional migration regime).

With regard to **co-investment models**, many stakeholders can see the advantages of co-investment for increasing the reach of NGA networks, for example, in less densely populated areas. Their views however differ on the related regulatory regime. While **incumbents** favour co-investments on commercially negotiated terms, **access seekers** call for strict conditionality to ensure fairness and openness of the co-investment.

(iii) Allowing for the conclusion of **longer contracts for provision of infrastructure** for the payment by instalments of the higher connection costs required to connect remote households and to support 'demand aggregation' models for consumers in those areas. The user would pay by instalment the infrastructure, but consumer rights on services will not be affected: **the maximum contract duration for provision of the service would remain unchanged** thereby preserving the possibility for customers to switch service provider. If consumers want to switch

service provider before the cost of the infrastructure has been fully repaid, they can, and the remainder of the infrastructure cost can either be paid off at switching or they can continue paying to the infrastructure provider.

(iv) defining common criteria for a **standardised EU-wide access product** to facilitate the provision of cross-border services to business users¹⁰⁷. This would address concerns about fragmentation impeding the provision of business services cross-border and delaying the specification of wholesale products required to address problems which are common to several Member States. There would be a provision in the framework which enables common product and service specifications to be set in cases where the lack of such specifications impedes the single market.

In the public consultation, in relation to the simplification of access products and focussing on key access points, **network owners** responded in favour of a drastic simplification to a single access product (if at all necessary), whereas **access seekers** insist on the importance of different access products to compete at the retail level.

Option 4 – Significant reduction of sector-specific regulation

This option envisages a significant reduction of the reach of sector-specific access regulation, via a **sunset clause for ex ante regulation** at least in areas where two or more infrastructures are present, thereby a transition from ex-ante telecoms-specific regulation to a setting where NRAs would only supervise the market as necessary, and the telecoms sector would otherwise be subject to *ex-post* competition law control.

A certain role for NRAs would remain. Preference would be given for commercially negotiated agreements between access providers and access seekers, without the need to conduct regular market analyses and pre-approve reference offers as is the case under the current framework. However, there would remain the possibility for NRAs to intervene in a **dispute resolution setting**, potentially across market segments and geographical areas, but particularly where only one broadband infrastructure is present. The powers of the NRAs would include the possibility of ordering the supply of wholesale services, but this would be in the form of a single access product, aimed to remedy the specific access problem identified in the dispute. The phased withdrawal of the market analysis process under this option would also imply a **reduced remit for BEREC**. The article 7 process would no longer be needed and could be withdrawn.

4.1.2 Discarded options

This section outlines the options which have been discarded. A more detailed analysis can be found in Annex 3 on discarded options as well as the IA support studies.

- Full deregulation of telecoms networks
- Regulation of non-collusive oligopolies on the basis of a unilateral effects test similar to the one used under the European Merger control regulation¹⁰⁸
- Mandatory structural separation of former monopolies
- Mandatory copper switch off
- Rely fully on the mechanisms established for general ICT standardisation and remove special competences for the Commission to recommend and ultimately mandate ECNS standards

¹⁰⁷ While imposition of such an access product would be subject to SMP analysis, it could also serve as a benchmark product for commercial wholesale provision in deregulated markets.

¹⁰⁸ See more detail on oligopolies in annex 3

4.1.3 Impacts

This section presents the likely impacts from the options identified in section 4.1.1. It should be noted that a significant proportion of stakeholders – and nearly all respondents from amongst alternative telecom operators and regional fibre investors (although not incumbent operators) – consider that the existing access provisions remain relevant.¹⁰⁹ A longer description of the impacts from each option area can be found in SMART 2015/0005, while impacts on specific categories of stakeholders are included in annex 13 and Annex 4 for the preferred option.

4.1.3.1 Option 1: Baseline scenario (status quo)

Option 1 involves a continuation of the existing regime.

Economic impacts

The economic impacts of the baseline include notably gaps in the capabilities of networks impacting the delivery to affected households and businesses of applications such as cloud computing and other services which require high and/or symmetric bandwidth (such as next generation TV, video conferencing, e-Education, e-Health and remote monitoring applications). In turn, weak links in connectivity within the EU may have broader impacts on Europe's attractiveness as a centre for innovation and business development in ICT. In this context, it is notable that Japan and South Korea have well-developed ICT industries, which may have been supported by the early drive for very high speed connectivity in these countries¹¹⁰.

As 4G and 5G mobile networks are increasingly **reliant on fibre backhaul** in order to meet requirements for 'low latency' needed for applications such as connected cars, a failure to upgrade fixed infrastructure could have implications for mobile applications as well as fixed. The economic impact of this option can be associated with the **opportunity cost of failing to ensure that Europe keeps pace with the infrastructure deployments** needed to make use of advanced services, including 5G.¹¹¹ Based on econometric analysis and macro-economic modelling prepared for this study, achieving average speeds expected in an all-fibre scenario by 2025 could raise EU GDP by 2% compared with the status quo and by 0.7% in an incremental high speed scenario. See section 4.11 presenting the results of the macroeconomic modelling for more details

The total costs of the institutional set-up applying to access including estimated impacts on stakeholders are shown in the table below¹¹². A standard hourly rate is assumed for professionals¹¹³ and a 40% mark-up is applied to account for overhead.¹¹⁴

The estimated costs for the BEREC Office are similar to those available in its published annual accounts, which show that the costs of operating BEREC were €4,04m in 2014, and were estimated at €4,02m in 2015 and €4.25m in 2016. The Agency operated with around 15 temporary agents, 8 contract agents and 4 seconded national experts over this period – a total of 27 staff. However, it should be noted that not all of BEREC's work is related to access

¹⁰⁹ Question 8 of the Commission's online consultation

¹¹⁰ For example, in Japan, where very fast broadband coverage had reached 90% by 2012, the ICT market accounted for around 8.9% of all industries and for 7.1% of total employment. In contrast, EU coverage in the EU was around 53%, ICT employment in the EU represented just 4% of GDP and 2.7% of total EU employment in 2011.

¹¹¹ An estimate of user bandwidth requirements based on specific application needs illustrated in SMART 2015/0005.

¹¹² The costs for the Commission and BEREC Office are based on staff and overhead cost data supplied by the Commission, with an additional overhead mark-up for BEREC of €30,000 per person to reflect its small scale. The costs for NRAs are estimated on the basis of a standard cost model which draws on responses to questionnaires submitted by the Commission, BEREC and 21 individual NRAs.

¹¹³ ISCO2

¹¹⁴ This mark-up is used by the Dutch authorities in the context of standard cost models and was used in the Ecorys 2013 study for the EC against which we cross-check our results

regulation (an estimate of 60% has been made based on data from BEREC concerning the split of activities), and the substantive work of BEREC is undertaken by representatives from the NRAs themselves and is therefore included within NRAs budget.

The estimate of the cost to operators is based on data collected on the costs of the market analysis process in the context of Ecorys' 2013 study for the EC concerning future electronic communications markets subject to ex ante regulation.

Table 3 - Estimated costs of the current institutional set-up for access

Body	Annual cost	Assumptions
Commission	€2.4m	20FTEs (art 7 unit)
BEREC Office	€2.4m	60% of BEREC activity associated with access regulation
NRAs	€65.4m	25FTE on average per NRA to handle market analysis and dispute resolution
Operators	€190m	Drawn from Ecorys (2013) costs of market analysis system

Source: WIK calculations, Ecorys (2013)

On the basis of these estimations, **the total cost for the institutional set-up for access regulation is approximately €70m**. This estimate is higher than the cost estimate of €50m for 27 NRAs reflected in the study by Ecorys et al for the European Commission in support of the 2014 Recommendation on Relevant Markets,¹¹⁵ but this may be explained by the fact that the costs of dispute resolution and BEREC contributions from NRAs are incorporated within our calculations.

Concerning the direct costs to regulated operators of complying with the existing framework, these can also according to interview reports run into several millions of euros for larger operators and especially those subject to regulation. The Ecorys study for the European Commission on Relevant Markets estimated the total regulatory burden on all operators at approximately €216m per year, which they suggested might fall to around €190m following the reduction in the numbers of markets in the list (which was the outcome of the procedure).

Combined with the institutional cost, this would lead to **a total cost of the access regulation regime of around €260m per year**.

Social and environmental impacts

Social impacts include the continued digital divide and its impact in terms of employment and social cohesion, an effect which may be magnified by the more demanding technological landscape. In addition, a lack of connectivity may drive migration away from rural areas, and contribute to the disenfranchisement of communities which do not have sufficient bandwidth to access public services, healthcare and education, for which being online is increasingly important or even essential.

A number of studies suggest that increased high bandwidth connectivity has a positive effect on employment and migration – and thereby a lack of connectivity could also be seen as holding back rural and other populations which lack these benefits¹¹⁶. When considering Green House

¹¹⁵ Ecorys (2013) Chapter 13

¹¹⁶ See more details in SMART 2015/0005

Gas emissions per subscriber and per Gigabit, the research concluded that an all-FTTH scenario would result in 88% less greenhouse gas emissions from fixed networks in Europe than the status quo. The emissions estimates were based on electricity consumption associated with the different technologies and therefore would also have operational cost implications for operators and implications on price for consumers. Emissions per Gigabit associated with VDSL2 and – particularly HFC were substantially higher than those associated with all-FTTH networks.

4.1.3.2 Option 2: continuity and simplification

Since the existing framework has support from a number of stakeholder groups,¹¹⁷ another option may be to retain it largely unchanged, but with certain amendments required to update it and address any inconsistencies or lack of clarity.

Economic impacts

This option includes certain measures which are likely to reduce administrative costs. The requirement for regulation only to address retail market failures and the extension of market review timeframes are likely to reduce the compliance burden on NRAs (and the EC article 7 team) as well as for market participants. Estimates from Ecorys (2013) suggested that removing 2 markets from the original 7 markets listed in the 2007 Relevant Market Recommendation might result in savings on the market analysis process of 10-15% (a saving of up to €7.5m). This could be viewed as an equivalent change to extending the frequency of reviews from every 3 to every 5 years, bearing in mind that NRAs would also need to place further resources on more precise mapping within each market analysis. The consolidation of existing Member States mapping activities into NRAs will avoid duplication of effort, increase reliability of the data and, in certain cases, even reduce the overall mapping cost in Member States where multiple mapping activities are currently carried out. Moreover, the introduction of retail analysis may prove burdensome for some NRAs and add to the existing administrative burden.

It is also possible that limiting regulation to areas of true market failure and providing a longer term horizon for regulatory solutions may increase certainty for investors in VHC networks as well as permitting greater freedom to innovate (such as increased flexibility over pricing). This may have some positive impacts on deployment and usage of VHC networks thereby improving economic outcomes compared with the status quo. However, the scale of these effects is difficult to estimate precisely, and it is unlikely that these conditions alone (in the absence of more specific measures aimed at supporting deployment) would substantially increase VHC networks' investment compared with the status quo.

As regards **indirect effects**, there is a risk that provisions concerning wholesale-only models may foster separation and therefore increase reliance on regulated wholesale access to the detriment of potential developments in infrastructure-based competition¹¹⁸ thereby impeding incentives in fast infrastructure investment.¹¹⁹ On the other hand, it would reassure investors regarding the regulatory approach to local fibre networks whose market power at the local level may be found to be significant. If a single wholesale-only fibre network is deployed, infrastructure competition is also likely to be of lesser relevance in attaining the various

¹¹⁷ Stakeholder groups supporting the access-related provisions of the existing framework in its current form (subject only to incremental improvements) include BEREC (co-ordinating the collective views of NRAs, alternative telecom operators and cable providers)

¹¹⁸ It is notable for example that there is limited infrastructure-based competition in the UK beyond the pre-existing copper and cable infrastructure. BT introduced functional separation (under pressure from the UK regulatory authority Ofcom), in 2005. It is possible that this approach reduced incentives for infrastructure-based competition..

¹¹⁹ Case studies from SMART 2015/0002 suggest that structural separation/wholesale only models can support the business case for fibre by aggregating demand from several service providers. This strategy has been adopted in particular by regional and municipal investors such as Stokab and Reggefiber to support a fibre business case. However, the study also finds that separation may not itself drive technological upgrades..

objectives of the Framework. Separation or wholesale only models may result in increased service competition, which may boost broadband take-up through reduced retail prices and service innovation.¹²⁰ Moreover the risk of impacting infrastructure competition could be mitigated if separation is incentivised in areas or circumstances where infrastructure-based competition is unlikely to arise.¹²¹

This option does not specifically tackle *through legislative means*, the central issues of: (i) Gaps in the availability of VHC infrastructure; and (ii) fragmentation impeding consistent service and competition for business users

Instead, it leaves these issues to be addressed – if at all – through soft law instruments such as Recommendations, at least in the first instance.¹²² As an example, 7 years following the adoption of the 2009 Recommendation on termination rates, there are still instances of non-implementation of its core recommendations,¹²³ despite the Commission’s active intervention through the article 7 process¹²⁴ and BEREC’s support for the Commission’s position. More examples can be found in SMART 2015/0005.

Social and environmental impacts

Social and environmental impacts under this option would be similar than those under option 1.

4.1.3.3 Option 3: NGA+: Focusing regulation on VHC connectivity

Option 3 builds on option 2 by seeking to further elaborate principles and procedures for the promotion of fast broadband and cross-border business access within the legislation itself. In the sub-section below we present the main economic, social and environmental impacts linked to this option. More detail and supporting evidence can be found in SMART 2015/0005.

Economic Impacts

The economic impacts of this option stem mainly from the expansion of VHC broadband and knock-on effects of improved broadband infrastructure and services on the wider economy. The econometric analysis run in the study supporting this IA Report has found a link between increased average broadband speeds and total factor productivity across a number of sectors¹²⁵. The analysis suggests that the estimated speed and quality increase associated with achievement of all-FTTH across the EU by 2025 would result in GDP levels 2% higher than the status quo by 2025, or an increase of 0.76% over the status quo in a more realistic scenario in which 62% of broadband connections are based on FTTH/B by 2025.

The findings confirm what literature suggests: over and beyond the economic benefits deriving from standard broadband,¹²⁶ VHC networks may bring benefits in terms of increased

¹²⁰ Econometric assessments conducted in the context of SMART 2015/0002 and annexed to this report found that NGA take-up was linked to lower NGA prices which were in turn associated with increased access-based competition

¹²¹ Costs for the deployment of NGA increase in less densely populated areas, reducing the prospects for network replicability. See discussion in SMART 2015/0002 as well as WIK (2008) economics of NGA

¹²² Article 19 FWD permits Decisions to be adopted in specific circumstances – if Recommendations on the same subject have been adopted, but proved ineffective in achieving consistent outcomes after a 2 year period

¹²³ Most notably in MS like Germany, which have to date pursued a different cost methodology than that advocated in the Recommendation and have maintained this position despite the agreement of BEREC to the EC position

¹²⁴ Termination rates have been the subject of a majority of ‘serious doubts’ cases (at least 24 since 2011).

¹²⁵ See SMART 2015 0002

¹²⁶ Waverman (2009) finds that a 1% increase in broadband penetration in high and medium income countries leads to 0.13% growth in productivity

employment and productivity,¹²⁷ contributing to GDP growth. For example, Forzati and Mattsson (2013)¹²⁸ examine the impact of fibre investment by Stokab in Stockholm during 20 years up to 2012 and estimate the benefit of Stokab to amount to 16 billion SEK (around €1.7bln). Meanwhile, in a 2015 study,¹²⁹ The Analysis Group estimated that gigabit broadband communities in the US exhibited a per-capita GDP approximately 1.1% higher than the 41 similar communities with little to no availability of gigabit services.

Greater fibre availability alongside provisions to ensure consistency in wholesale product and service offerings designed for business, could also support the expansion and productivity gains by multi-national corporations in Europe. A 2013 study by WIK¹³⁰ estimated that the economic benefits of e-enabling multi-site and multi-national corporations inter alia through consistent best practice regulatory practices could add €90bln to European GDP after a 10 year build up.¹³¹

The experience from the implementation of the regulatory framework in Portugal, Spain and France suggests that pursuing a regulatory strategy which does not impose "standard" access obligations on newly deployed VHC networks under the conditions that they are accompanied by strong measures to enable alternative operators to 'climb the ladder of investment' towards infrastructure-based competition in FTTH/B, (such as a reasonable possibility to co-invest in such networks, duct access, and the maintenance of access obligations to the networks at the performance level prior to upgrade), may trigger wider availability of FTTH/B across the national territory.

The measures described above will foster infrastructure competition and to bring it to areas where in the absence of effective provisions on duct/pole access it would have not worked, generating a more even competitive field between incumbents and competitors as can be seen from Figure 16. The analysis of the underlying causes of suboptimal investment in section 1.2.1.1 has however shown that regulatory solutions do not automatically solve the investment problem as some of the factors affecting investment are of a macroeconomic or socio-economic nature.

The Swedish experience is quite telling in this respect, as wholesale-only models have helped expanding the NGA footprint by focusing on infrastructure investment models with longer returns on capital, attracting investors that need lower but constant returns over longer asset duration. This is also coherent with other EU initiatives, such as CEF/EFSI de-risking of investment projects via financial instruments, which can be easily applied to financing of infrastructure projects such as VHC networks. In the Swedish experience, demand aggregation is also fostered by the possibility of "up-front payment", which is mimicked by the proposed measure on instalment payments, suitable for rural areas where many residents own their properties.

It should be also noted that coverage of very high bandwidth connectivity in Portugal and Spain has also extended beyond very dense urban areas and is projected by IDATE on the basis of operator announcements to reach 95% or above in these countries by 2020.¹³² Indeed, reports suggest that Portugal Telecom could achieve copper switch-off by 2020,¹³³ while Telefonica was

¹²⁷ Canada, Singer et al (2015) investigate the effect of FTTP rollout on employment on the basis of the deployment experiences in 39 regions between 2009 - 2014. They estimate that fibre deployment to 100% of a region is associated with an increase in employment of about 2.9% - even if the region had already before a broadband infrastructure. See also Katz et al (2010) and Liebenauer et al (2009)

¹²⁸ Forzati, M., and Mattson, C. (2013), STOKAB, A Socio-economic analysis, report acr055698, Stockholm.

¹²⁹ Analysis Group (2015), Early Evidence Suggests Gigabit Broadband Drives GDP, available at http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/gigabit_broadband_sosa.pdf.

¹³⁰ WIK (2013) Business communications, economic growth and the competitive challenge

¹³¹ The study estimated that 65% of the benefits could derive from productivity gains through reorganisation of business processes, while another 34% would be caused by efficiency gains through improved ICT processes. The remaining 1% comes from welfare gains through lower prices for business communications services.

¹³² SMART 2015/0002

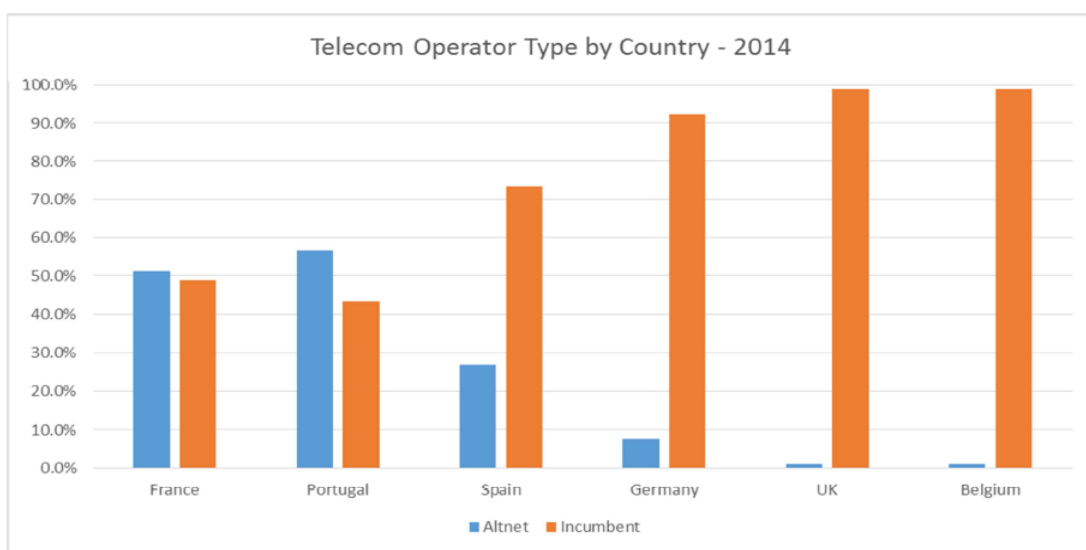
¹³³ Total Telecom: Portugal Telecom selling off its copper <http://www.totaltele.com/view.aspx?ID=493077>

predicted to achieve coverage of 16.2m households by end 2016 amounting to coverage of more than 80% of the households in Spain.¹³⁴

According to a recent paper by Shortall and Cave,¹³⁵ the regulatory strategy employed in France, Portugal and Spain, which could be described as a strong version of the conventional ‘ladder of investment’ theory, combined with symmetric regulation of in-building wiring, is also associated with an appreciably more even **split of homes supplied** between the incumbent, on one hand, and alternative telecom operators, on the other, than is the case in Germany UK, or Belgium, where entrants have been more reliant on mainly active access to incumbent infrastructure. In this sense this approach may lead to a more sustainable form of competition over time than approaches which place greater reliance on access to existing infrastructure of the incumbent.

Figure 16 - Incumbent and entrant network access infrastructure 2014

FIGURE 2: TELECOM NETWORK OPERATOR - TYPE ACROSS COUNTRIES IN 2014



Source: Shortall and Cave 2015

Responses to the public consultation by stakeholders also support the need for action on NGA by policy-makers. Specifically a high proportion of respondents of all kinds believe that duct access will play an important role in enabling the deployment of new infrastructure,¹³⁶ while there is also widespread agreement from respondents within the telecom sector that current rules in the Framework and Access Directives and in the Cost Reduction Directive are insufficient to ensure that operators have access to buildings and in-building wiring for the deployment of fibre,¹³⁷ although it should be noted that to date only one Member State (Italy) has transposed the Cost Reduction Directive, and therefore it is possible that this perception may change following wider transposition by mid-2016.

There are however some potential challenges and costs associated with this model. Pursuing approaches such as those taken in France, Spain and Portugal may involve more effort at least in the initial stages by NRAs in mapping the availability of ducts and the overlap of network infrastructure, as well as in operationalizing the duct access remedy. In the context of interviews

¹³⁴ <http://advanced-television.com/2016/02/24/telefonicas-20-cut-in-ftth-investments/>

¹³⁵ Shortall and Cave, Communications & Strategies No 98 Q2 2015. Please note that the graph refers to infrastructure and does not represent market shares at retail level.

¹³⁶ Q38 Public consultation

¹³⁷ Q41 Public consultation

conducted for this study, ARCEP observed that the effort required to establish its regime for mapping, duct access and the implementation of regulated co-investment involved was as shown in the following table. Further cost would have been incurred by the regulated SMP operator (Orange) and by all telecom providers engaged in the co-investment process. These administrative costs however are significantly less than the benefits and are expected to reduce over time as the regime (which involves long-term IRUs of 20 years+) stabilizes.

Table 4 – Mapping efforts at ARCEP (indicative)

Process	Time	FTE
Modelling to distinguish dense vs less dense areas (infrastructure viability mapping)	6 months-1 year	2-3
Operationalization of duct access	4 years	1-2
Establishment and operation of symmetric regime (for in-building wiring and terminating segments including decisions, dispute resolution)	Ongoing	3-4 (initial) 2 ongoing

Another challenge is that a model which favours infrastructure-based competition for VHC networks may not be easy to export in the short term in all countries, especially where there are fewer competitors with a sufficient scale to ensure critical mass. In cases such as these, traditional access-based regulation may continue to play a greater role. Where this is the case, proposals within option 3 to allow lighter regulatory scrutiny under certain conditions such as reasonable co-investment offers for the VHC infrastructures may nevertheless provide a regulatory stimulus for investment by the regulated SMP operator and alternative operators, and may assist the latter in accessing capital. This medium to long term incentive may provide a stimulus for investment in VHC infrastructure, although the effects may not be always significant.¹³⁸

This option can be bolstered by measures concerning co investment and wholesale only models which should be encouraged, especially in rural/underserved areas. If public funding such as ESIF is used for the local loop, wholesale only models could ensure a positive pro-competitive outcome.

On **mapping of infrastructure**, networks and quality of services, the current cost of collecting data from operators varies across Member States as it is linked to the depth of datasets required, and to other factors – such as the operating method (e.g. one-off/case-by-case surveys, automated data transfer, etc.). The proposals included under this option will therefore entail a rationalisation of the broadband data collection in Europe concentrating this capacity within the NRAs. In some cases, when some other bodies carry out such data collection, they will have to transfer this competence to the NRA. In other words, the main cost will be an *organisational* cost borne in the short term – it may involve adjustment costs for the teams working on some of the mapping initiatives – but in the long run, it will be compensated by the fact by having only one national interlocutor as data recipient (i.e. the NRA), which is a major simplification for the data providers (i.e. Telecom operators).

An inventory of mapping initiatives (including Quality of Service and Quality of Experience inferred from infrastructure mapping) by *TÜV Rheinland* gives evidence of this widespread

¹³⁸ Econometric analysis in the context of SMART 2015/0002 suggests that infrastructure competition for example as embodied by cable coverage is a core driver of NGA coverage. However, as seen in countries such as the UK, Germany and Belgium (which lack additional infrastructure-based competitive stimulus beyond cable) it may not be sufficient to incentivise the deployment of VHC infrastructure.

practice with more than 80 mapping initiatives carried out at national level without counting the multiple initiatives often carried out at regional and sometime at lower level to support specific projects ¹³⁹. As depicted in the figure below, all Member States are mapping Quality of Service in some fashion.

Figure 17 - Mapping initiatives in EU28.

Country	Service Mapping*		Infrastructure Mapping	Demand Mapping	Investment Mapping
	Focus on Quality of Service	Focus on Quality of Experience			
Austria	Ministry	NRA			
Belgium	NRA				
Bulgaria	Ministry	NRA	Ministry and NRA		
Cyprus	NRA	NRA	NRA		
Croatia	NRA	NRA	NRA		NRA
Czech Republic	NRA	NRA			
Denmark	NRA	NRA			
Estonia	NRA		NRA		
Finland	NRA	NRA			
France	Ministry	NRA	NRA		
Germany	Ministry	NRA	NRA		Ministry
Greece	NRA	NRA			
Hungary	Ministry and NRA		NRA		
Ireland	Ministry				
Italy	Ministry	NRA			
Latvia	NRA	NRA	Ministry		
Lithuania	NRA	NRA	NRA		
Luxembourg	Ministry				
Malta	NRA	NRA			
Netherlands	Ministry		NRA		
Poland	NRA	NRA	NRA		NRA
Portugal	NRA	NRA	NRA		
Romania	NRA	NRA			
Slovakia	NRA	NRA	NRA		NRA
Slovenia	NRA	NRA	NRA		
Spain	NRA	NRA			
Sweden	NRA				
UK	NRA	NRA			

Colour code

¹³⁹ Ongoing study SMART 2015

	Service Mapping*		Infrastructure Mapping	Demand Mapping	Investment Mapping
Country	Focus on Quality of Service	Focus on Quality of Experience			
	Existing initiatives	mapping			
	Planned initiatives	mapping			

*Note: The table depicts if there is at least one initiative in the respective country; there is no count of initiatives. Service mapping refers to initiatives collecting data on the quality of service (i.e. theoretical network performance and marketed speeds) and on the quality of experience (i.e. the line qualification and the connectivity experienced by the user).

Source: TÜV Rheinland, 2016.

On simplifying the setting of termination rates, several stakeholders who agree that termination rates should be regulated up to and beyond 2020 still prefer a simplification of the rate setting¹⁴⁰. The setting of a **Euro-termination rate** could eventually replace the setting of termination rates at national level currently based on the modelling of the cost of an efficient operator in the Member State concerned. Such Euro-rate would be linked to the finding of SMP in the respective Member State.

A single Euro-rate has the advantage of great simplicity and transparency and very low maintenance cost for the individual NRA, but could result in less accuracy of the resulting cost oriented rate. For this reason BEREC would have to be closely involved in developing it and updating it regularly, on the basis of data gathered from national regulators and operators. NRAs would no longer have to litigate its parameters in national courts, thus alleviating compliance costs for these mature markets. A mechanism to accommodate for significant divergences would have to be identified.

Social and environmental impacts

Option 3 also includes measures which may foster sharing of ducts and co-investment in cables – thereby limiting environmental impacts and the cost of digging. There are also measures which could facilitate the deployment of VHC broadband to areas which may be poorly served today – so-called ‘challenge’ areas, which could bring social as well as economic benefits to these areas. The potentially longer duration of instalment contracts for the provision of infrastructure is a possibility foreseen for the economic convenience of end users, and will not modify consumers' rights to switch service providers, thus no social impact could be quantified.

On a more general point on social impact on consumers, it has to be noted that under option 3 competition is safeguarded by way of maintaining the current SMP regime; alternative operators would have more realistic chances of obtaining strategic autonomy via co-investment, while access to dominant operators' network at the performance level prior the network upgrade will

¹⁴⁰ The respondents to the public consultation of the framework review which *strongly agree* or *agree* that termination rates should be subject to *ex ante* rules include the Maltese and Lithuanian ministries, the French and Bulgarian NRAs, ECTA and ETNO, and certain cable, mobile and fixed operators (mainly alternative). They indicated that even in transition to all IP, the current regime will remain relevant, however could be simplified by avoiding the burdensome Article 7 procedure. Simplification could be done through automatically imposing either symmetric interconnection prices (ETNO), or harmonized rates set at a genuine cost-level (MVNO Europe)/common EU price cap (Telecom Italia), or by introducing a harmonized cost model (BG NRA).

be in all circumstances safeguarded. Consumers should be better off under this scenario since they have the choice they previously had, while having the possibility to benefit from higher quality connections if the measures proposed to enhance connectivity are put in place.

A study by Forzati and Mattson (2012)¹⁴¹ suggests that high-speed broadband may stem the flow of populations away from rural areas and support employment in these areas. Specifically a 10% increase in the proportion of the population living within 353 metres from a fibre connected premise corresponds to a positive change in the population after three years of 0.25% in terms of increased inflow or decreased outflow. They also found that the migration effect as well as (to a lesser degree) the availability of fibre, contributed to increased employment in rural areas.

A 2013 study by Xiong¹⁴² based on the experience in Sweden also highlights the environmental benefits of FTTH. Specifically, he observes that FTTH uses around 20% less electricity compared with a VDSL2 network serving the same number of subscribers and suggests that 1m users connected to an FTTH network could save 1m tons of carbon-dioxide emissions through reduced car usage per household.

In a model developed by PWC and Motorola,¹⁴³ the relative environmental impact of different FTTH deployment phases was assessed. The study's authors concluded that the environmental impact of a typical FTTH network would be positive within less than 15 years on average.¹⁴⁴ Moreover they noted that the main contributor to environmental impacts is associated with the laying of fibre in ducts. Accordingly they conclude that facility sharing could reduce these impacts significantly.

4.1.3.4 Option 4: Significant reduction of sector-specific regulation

Economic Impacts

The New Zealand example of using dispute resolution-led processes under ex ante sectorial legislation suggests that this is an inefficient means of enabling competition. It is notable that this approach may have contributed to high prices and low take-up for broadband in New Zealand in the early deployment phase compared with countries such as those in Europe, Japan and initially the US, which pursued unbundling policies. See SMART 2015/0002 for more details. In policy terms, adopting a New Zealand strategy in Europe might reduce competition with detrimental impacts on consumer welfare and broadband take-up – especially in areas which lack pre-existing cable competition which would in turn harm Europe's wider competitiveness.

Commercial agreements have been concluded between the incumbent and one or more access-seekers for NGA wholesale access in countries such as Portugal (co-investment with Vodafone), Germany and the Netherlands (long-term wholesale access to FTTC/VDSL network).¹⁴⁵ However, the fact that agreement was reached in the context of the ex-ante market process may have provided explicit or tacit incentives for the incumbent to reach agreement. In Portugal, the potential for the NRA to mandate wholesale access to PT's network under the SMP regime (alongside competitive pressure from the extensive cable network) is likely to have incentivised

¹⁴¹ Forzati, M., Mattson, C., and Aal-E-Raza, S. (2012), Early effects of FTTH/FTTx on employment and population evolution, Proceedings of the 11th Conference of Telecommunication, Media and Internet Techno-Economics (CTTE), Athens.

¹⁴² Xiong (2013) Socio-economic impact of Fiber to the Home in Sweden http://people.kth.se/~maguire/DEGREE-PROJECT-REPORTS/130226-Ziyi_Xiong-with-cover.pdf

¹⁴³ http://www.bbcmag.com/2008issues/april08/BBP_Apr08_ParisEuroStudy.pdf

¹⁴⁴ On the basis of assumptions that telemedicine could be used to certain consultations, that FTTH would enable 10% of the working population to telework 3 days per week, while 20% of the elderly population could benefit from home assistance

¹⁴⁵ See case studies in WIK (2016) Regulatory approaches to risky bottleneck assets http://stakeholders.ofcom.org.uk/binaries/telecoms/policy/digital-comms-review/WIK_regulatory_approaches_to_risky_bottleneck_assets.pdf

the incumbent to make an arrangement with Vodafone. In the Netherlands, the NRA explicitly stated that in the absence of agreement, it would prohibit the deployment of vectoring and set charge controls for FTTC/VDSL access based on cost.¹⁴⁶ Therefore the ex-ante regulatory regime and associated powers for NRAs seem to have played a crucial role in fostering commercial agreements in these cases.

Social and environmental impacts

This option relies on ‘light touch’ regulation to provide incentives for infrastructure-based providers to extend the reach of their VHC networks to **rural areas**, thereby providing social as well as economic benefits to customers that today are typically less well served and helping to extend rural coverage. For example, the US, which operates one of the most light touch approaches within the OECD for broadband regulation, has rural coverage at 25Mbit/s or above at 47% according to a 2015 FCC report.¹⁴⁷ This compares well with Europe’s coverage rate for speed of above 30Mbit/s in 2014 of 25%¹⁴⁸ However, under the US regime, the degree of choice in high speed offers is limited, retail prices for high-speed broadband have been high and take-up of high speed offers has been low¹⁴⁹. This raises doubts as regards whether a light touch approach would address rural needs in a socially optimal way.

Alternative investors such as municipalities which may not have a purely commercial motivation might be more incentivised to **consider social welfare** and to offer open networks enabling competition in rural areas.¹⁵⁰

Concerning **environmental impacts**, this option is more likely (than option 3) to lead to incremental upgrades of the incumbent copper network through FTTC/VDSL, vectoring and G.fast alongside incremental upgrades of cable, than the installation of FTTH, which is often deployed as a result of disruptive influences from alternative operators and investors.¹⁵¹ There may be environmental advantages in the short term to avoiding the replacement of all parts of the copper and cable network with fibre. However, in the medium term these are likely to be outweighed by the greater per Gbit/s energy requirements of xDSL and HFC technologies compared with those associated with FTTH, and the initial environmental disadvantages associated with FTTH can also be mitigated through re-use of existing ducts, where these are available.

4.1.4 Comparison of options

4.1.4.1 Effectiveness

The status quo and continuity and simplification options (options 1 and 2)

The main problems identified relate to gaps in NGA and VHC broadband and fragmentation in the supply of wholesale services impacting cross-border business users as well as cross-border suppliers.

¹⁴⁶ See Case study on NL WIK (2016) Risky assets: an international comparison and interview conducted with ACM in that context http://stakeholders.ofcom.org.uk/binaries/telecoms/policy/digital-comms-review/WIK_regulatory_approaches_to_risky_bottleneck_assets.pdf

¹⁴⁷ FCC 2015 Broadband Progress Report. Cable coverage at 25Mbit/s reaches more than 80% households in the US

¹⁴⁸ https://www.broadbandmapping.eu/wp-content/uploads/2015/07/Broadband-Coverage-in-Europe_final-report_2014.pdf

¹⁴⁹ The US enjoy however a large Universal Service Fund. As of mid 2015, 12.2 million Americans are supported by the Low-Income window of the Fund and 1.6 million Americans are covered by the High Cost window for rural areas. The provision is for services up to 3 Mbps.

https://apps.fcc.gov/edocs_public/attachmatch/DOC-337019A1.pdf

¹⁵⁰ See Case studies in SMART 2015/0002

¹⁵¹ SMART 2015/0002 identified through a number of case studies that FTTH deployment is common triggered by disruptive investors such as Iliad in France, Reggefiber in NL, municipalities in Sweden. Countries lacking significant disruptive operators such as the UK, Germany and Belgium have typically tended to pursue an upgrade of existing infrastructure as opposed to FTTH deployment

Taking into account the identified problems and the gap between European and other countries' broadband performance, such as Japan which adopted a straightforward high speed broadband strategy—maintaining the status quo is unlikely to redress the situation. Projections for future developments to 2025, (see figure 83) based on operator announcements and expectations concerning state aid, suggest the gap will persist. Moreover, business users consider¹⁵² that it is unlikely that fragmentation affecting cross-border use and supply will be resolved under a continuation of the status quo. Option 2 provides some improvements on the status quo, but does not address these concerns directly. It therefore achieves some benefits in terms of increased certainty, clarity and streamlining, but is unlikely to be significantly more effective than the status quo as regards the main problems affecting the market.

NGA+: Focusing regulation on VHC connectivity

In contrast with the options which largely maintain the existing system, option 3 attempts to address the core ubiquitous connectivity challenge through a set of measures improving infrastructure mapping,¹⁵³ targeting regulation to foster infrastructure competition and co-investment models and providing a harmonised approach towards wholesale products used for business access. The measure would address mapping of existing networks, future investment and quality of service with a view to make data accessible to relevant authorities planning deployment of networks and make it public in a GIS format at the appropriate level of resolution to the wider public. The effectiveness on the provisions on mapping is enhanced by the fact that all Member States have by now established broadband mapping initiatives in different forms. In a number of cases, similar initiatives also take place at regional or at municipal and project level with a high risk of inconsistent and sometimes unreliable results. An inventory of QoS mapping initiatives (including QoS inferred from infrastructure mapping) by *TÜV Rheinland* gives evidence of this widespread practice with more than 80 mapping initiatives carried out at national level without counting the multiple initiatives often carried out at regional and sometime at lower level to support specific projects¹⁵⁴.

It builds on successful regulatory approaches mentioned in section 4.1.3. The approach proposed towards fast broadband deployment draws on successful regulatory strategies pursued in France, Spain and Portugal. Outcomes in these countries¹⁵⁵ suggest that this approach may be effective in triggering the deployment of FTTH/B, as well as supporting sustainable infrastructure competition (or co-investment) in certain areas that may permit SMP regulation to be rolled back. It is notable that overall coverage of very high speed broadband in Spain and Portugal (through FTTH/B or Docsis 3.0 and successors) is also projected on the basis of operator announcements to be high,¹⁵⁶ despite relatively modest broadband state aid financing in these countries.¹⁵⁷

The proposed standardisation of core wholesale remedies for business access draws lessons from previous successful harmonisation strategies which were applied to legacy technologies

¹⁵² Interview INTUG SMART 2015/0002

¹⁵³ Respondents to the public consultation Q26 mostly considered that there are adequate tools in the current framework to enable NRAs to conduct mapping exercises. However, they are not obliged to do so, and this practice is not yet widespread

¹⁵⁴ Ongoing study SMART 2015

¹⁵⁵ See Shortall and Cave Communications & Strategies (2015), SMART 2015/0002 – see interim slide presentation at http://www.wik.org/fileadmin/Konferenzbeitraege/2016/Public_Workshop_April/Public_Workshop_slide_presentatio_n.pdf, and WIK (2015) Competition and Investment: an analysis of the drivers of superfast broadband

¹⁵⁶ IDATE projects coverage of 94% in Portugal and 91% in Spain by 2025.

¹⁵⁷ State aid per household (2003-2013) was recorded at €49 in Spain and €26 in Portugal based on data from DG Competition see figure 19 WIK (2015) Competition and Investment http://www.wik.org/fileadmin/Studien/2015/Competition_and_investment_superfast_broadband.pdf

(traditional leased lines and local loop unbundling), but now require updating in the light of technological developments.¹⁵⁸

Moreover, the focus on civil engineering and the improved network infrastructure mapping are likely to support further deployments from regional and municipal investors, and contribute to achieving the objective of wider coverage of VHC technologies.¹⁵⁹

As to commercial agreements, the terms negotiated by SMP operators are likely to depend on the access terms which would otherwise be mandated by the regulator. The prospect of regulation in the event of failure of commercial negotiations, or of ineffective implementation of such agreements, should be maintained in order to ensure that such arrangements are sustainable in the medium term.

Greater coverage of VHC networks should lead to take-up of these networks as shown in the support studies to this IA report (SMART 2015/0005 and SMART 2015/0002). However, this solution might not fully address issues with a lack of demand. The merger proceedings that followed the adoption of NRA policies to foster FTTH investment in France, Spain and Portugal (resulting in three significant players in each market)¹⁶⁰ suggest that infrastructure-based competition may lead to more concentrated markets than today, which might have a countervailing effect on take-up where and if prices would be appreciably higher (although an analysis of fast broadband pricing¹⁶¹ suggests that this risk has not materialised to date in Spain, France and Portugal). Moreover, fostering co-investment in smaller size deployments could help alleviate the risk of unnecessary consolidation.

This option will help addressing business access through a mechanism to harmonise specifications and service levels, thereby applying standards to new business access technologies in a similar way as was applied to traditional technologies to positive effect.¹⁶² Similar best practice harmonisation measures on wholesale access products could also be used to support competition and cross-border supply in residential services.

It should also be recalled that the conditions for leased line access as well as their specifications were also originally closely harmonised at EU level through the 1992 Leased Line Directive¹⁶³ and EU-wide standards. This harmonisation supported the expansion of the Internet during that period.¹⁶⁴ Common definitions also simplified the analysis of leased line markets and imposition, in cases where SMP was found, of leased line remedies in the EU. Further discussion on the impact of common standards as well as service levels for business access is included in

¹⁵⁸ There is extensive analysis on this subject in SMART 2014/0023. There was also support for this approach in the context of the EP 2013 study *How to Build a Ubiquitous EU Digital Society*. Although in a fully functioning market, there is a risk of standardisation impeding product innovation, this risk is considered less in the context of wholesale products which are not generally defined on a commercial basis but rather on the basis of regulatory requirements from the NRA. The participation of all NRAs as well as operators in the definition of a common product specification should also serve to foster an exchange of best practice leading to improved EU specification in comparison with what might be expected from specifications occurring at a national level in isolation. Moreover, consistency of itself could be considered to present advantages in comparison with fragmented national solutions in the context of offers used for provision to multi-national businesses.

¹⁵⁹ Such strategies appear to have had positive effect for example in the case of France – see case studies in SMART 2015/0002

¹⁶⁰ For example, in Spain ONO/Vodafone and Orange/Jazztel mergers, in Portugal Optimus/ZON and in France Numericable/SFR

¹⁶¹ Elaborated in SMART 2015/0002

¹⁶² See discussion in SMART 2014/0023. There was also support for this approach in the context of the EP 2013 study *How to Build a Ubiquitous EU Digital Society*

¹⁶³ ONP Directive on leased lines (Council Directive 92/44/EEC)

¹⁶⁴ FCC data shows an expansion in the number of leased lines (64kbit/s equivalents) between the US and other OECD countries (mainly in Europe) from 28,080 in 1995 to 185,972 in 1997 – a compound annual growth rate of 157% - see table 2 OECD report “Building Infrastructure Capacity for electronic commerce” DSTI/ICCP/TISP(99)4/FINAL

the 2015 study “Access and Interoperability standards for the promotion of the internal market for electronic communications.”

Reducing the scope of regulation

Option 4 aims to address the identified problems by limiting the scope of access regulation on the basis that access regulation may undermine VHC networks' deployment and may not lead entrants to 'climb the ladder of investment'. A strategy of mandating the easing of ex ante regulation before moving to competition law, would be consistent with this aim. However, case studies as well as quantitative analysis conducted for SMART 2015/0002 cast some doubt on whether this approach would in practice address the identified problems.

- Under this strategy, there is a high risk that infrastructure competition may not emerge, while service-based competition may diminish. Tom Wheeler, Chairman of the US telecom authority, the FCC, noted in a 2014 speech that most Americans did not have a competitive choice of offers above 25Mbit/s.¹⁶⁵ Minimum horizontal measures for duct access under the Cost Reduction Directive would still apply, but these too rely on dispute resolution and access obligations could not be as tightly regulated as those introduced on SMP operators under the EU framework for electronic communications.
- As noted above in section 4.1.3 a strategy of dispute-resolution under ex ante telecom legislation was pursued in New Zealand in the period from 2000, but was discontinued on the basis that it led to low take-up and high prices for broadband.
- It is possible that a light touch approach resulting in consolidation might enable operators to raise prices and revenues, and indeed broadband tariffs in the US, which pursues a light touch approach to access regulation, are generally high in comparison with those in Europe¹⁶⁶. This should increase operators' *ability* to invest. However, as previously discussed, they may lack the *incentive* to invest if this strategy fails to further boost disruptive infrastructure-based competition, which has been clearly identified in many studies as a key driver of investment.¹⁶⁷
- While higher prices and ARPUs may generate incentives for new players to enter the market, market scale at entry may be difficult.

Overall therefore, we conclude that this strategy is unlikely to be effective in meeting the stated objectives of ensuring affordable ubiquitous connectivity to all citizens in Europe and the provision of cross-border business services. An approach based on dispute resolution rather than ex ante market regulation is likely to be particularly disadvantageous to operators which may not have large scale in any single market, but seek to serve customers across multiple regions and countries across the EU. It may result in a prioritisation of mass-market remedies to the detriment of wholesale services designed for the business market.

4.1.4.2 Efficiency

Status quo and 'continuity' options

The **direct costs** associated with maintaining the status quo include the cost to NRAs of operating the market analysis process, and the cost to stakeholders (and especially regulated operators) of compliance. The mechanisms currently used to ensure consistency, including the article 7 consultation process, also incur costs to the European Commission, NRAs and in relation to the operation of the BEREC Office. However, it should be noted that telecom operators and their trade associations observed in the course of interviews for this study and

¹⁶⁵ <http://arstechnica.com/business/2014/09/most-of-the-us-has-no-broadband-competition-at-25mbps-fcc-chair-says/>

¹⁶⁶ More generally, econometric analysis for SMART 2015/0002 finds that more concentrated markets may be associated with higher ARPUs

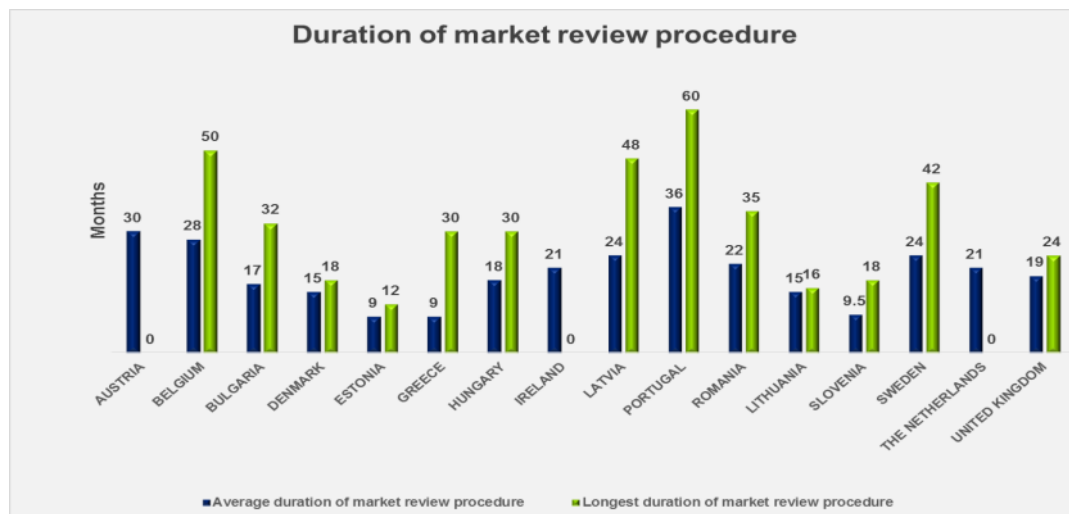
¹⁶⁷ SMART 2015/0002, WIK (2015) competition and investment, EP (2013) 'How to build a Ubiquitous digital society' – and literature reviewed in the context of SMART 2015/0002

SMART 2015/0002 that they consider the indirect costs (in the case of SMP operators) or benefits (in the case of operators making use of regulated access) significantly exceed the direct costs, given the overall scale of the sector and its impact on the European economy. In this context, the direct costs per se are not considered to present the main ‘problem’ as regards regulation of the electronic communications sector.

Indirect costs of ‘overregulation’ cited by operators¹⁶⁸ subject to SMP regulation include the opportunity cost of reduced investment in high speed broadband infrastructure and the consequent impacts **on the quality of service to consumers**. However, there are different views amongst the industry and analysts as regards the existence and scale of these costs as reported in the public consultation. This cost may be mitigated by the proposal in the ‘continuity and simplification option’ to require NRAs to first identify a market failure at retail level before intervening. Another cost which stakeholders and some NRAs have identified with the current set-up is the uncertainty created by short review cycles and remedies which are reviewed (and prices revised) on a frequent basis. This problem will be addressed under the ‘simplification’ option, and should reduce procedural costs as well as increasing regulatory certainty.

Looking at the timeframes to reach decisions, the typical time taken to conduct a market review ranges from 9 months to 3 years, while this can in some cases last as much as 5 years (as reported in Portugal). NRAs handle the process differently, but in some countries the market analysis process can involve several rounds of consultation, and lengthy documentation, and delays can occur if there are significant changes in market circumstances (such as mergers or commercial agreements) during the course of the review. A further brief period is added for EU consultation under the article 7 process, but this is short (amounting to only one month in the absence of serious doubts) compared with the market analysis process as a whole. In markets which are subject to change, it may be necessary to conduct this kind of in-depth analysis in order to properly take into account national circumstances. However, for market definitions, SMP designations or remedies which are not subject to significant change, the market analysis process may be a source of inefficiency. It is also clear – especially for more complex markets requiring lengthy reviews – that a requirement for a three-yearly review may give little time to reflect on the consequences of previous market regulation.

Figure 18 - Duration of market review procedure Source: Deloitte based on NRA survey



Another core aspect of the existing framework which has been identified as complex and inefficient in the context of EP (2013) ‘How to build a ubiquitous EU Digital Society’ and SMART 2014/0024 is the process of ensuring consistency. Although the Commission can take binding negative decisions as regards market definition and SMP (under the article 7 process),

¹⁶⁸ In the context of interviews and consultation responses

the main tools through which consistency on remedies is achieved under the framework today are non-binding Recommendations.

Such Recommendations can take 2-3 years to conclude, and as discussed in SMART 2015/0002, as well as in the implementation reports published annually by the Commission, may require an extensive period of enforcement via the article 7 process and still not achieve full consistency. The clearest example of this is mobile termination rates which are not yet consistently calculated in all Member States seven years following the adoption of the EC Recommendation and despite the support for the Recommendation from BEREC within the article 7 process¹⁶⁹. Product specifications¹⁷⁰ and terms for business access, which is not subject to a recent Recommendation, vary even more widely, as can be seen in the following charts comparing pricing and provisioning times¹⁷¹.

Figure 19 - Ethernet leased line 5km local access pricing benchmarks (Source: WIK based on Reference Offers as of October 2014)

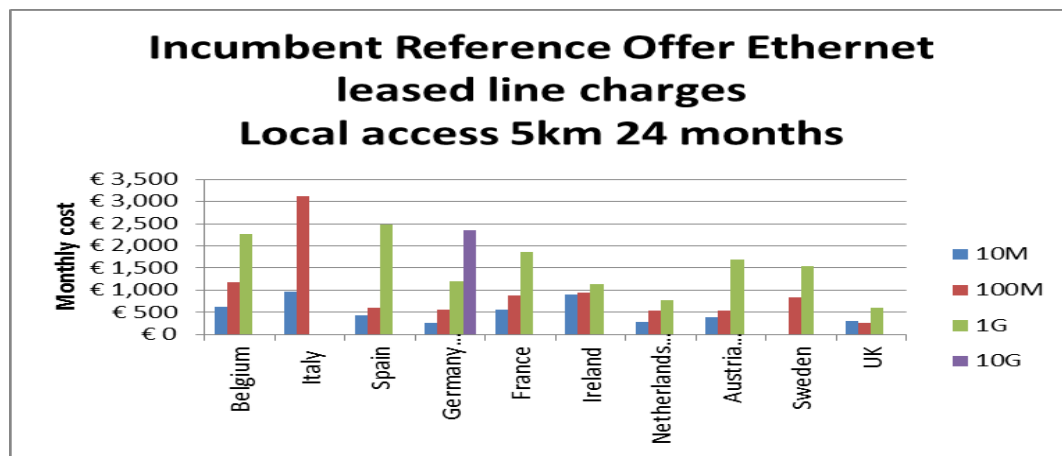
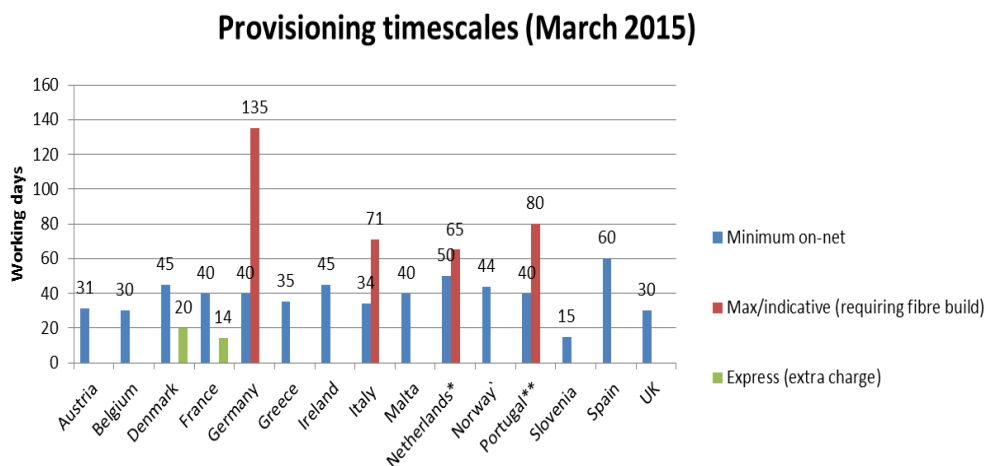


Figure 20 - Ethernet leased lines: on-net provisioning timescales within the SLA



In cases where consistency is merely desirable but not essential, the advantages of flexibility offered through non-binding guidance may outweigh the imperfectly consistent outcomes.

¹⁶⁹ Article 19 FWD permits Decisions to be adopted in specific circumstances – if Recommendations on the same subject have been adopted, but proved ineffective in achieving consistent outcomes after a 2 year period

¹⁷⁰ Ethernet leased line product specifications have been relatively fully harmonised. However, SMART 2014/0023 revealed variations in the availability and specification of business-grade Ethernet bitstream which is increasingly being used to serve the needs of smaller sites and businesses.

¹⁷¹ See further discussion in SMART 2014/0023

However, where consistency would clearly serve to improve Europe's position in relation to economically important objectives such as fast broadband and/or would have a significant impact on competition, consumer welfare and the single market, the existing set-up appears inefficient, especially when compared with specific legislation such as that on LLU (in 2000) and Roaming, which were concluded within short periods¹⁷² and achieved more consistent outcomes which were beneficial to end-users in a relatively short space of time.

NGA+: Focusing regulation on VHC connectivity

Because this option adapts the market analysis process to foster VHC broadband deployment rather than relying on existing rules complemented with non-binding guidelines, it should be more efficient at achieving results than the status quo or 'continuity and simplification', other things being equal.

There are likely to be increased costs involved for NRAs which have not yet put in place procedures to map the availability of standard and NGA infrastructure and assess viability of replication, as well as for operationalising duct access¹⁷³.

However, setting core principles in legislation as well as the preference to incentivise commercial arrangements including co-investment and long-term agreements could potentially reduce the need for detailed SMP obligations and associated enforcement. As such it should help to simplify both the market analysis process and review through the article 7 process. On the other hand more pressure may be put on processes of general application such as infringement proceedings at the EU level where necessary, dispute resolution and litigation. Further guidance either in the form of soft law or delegated instruments may also be needed on certain aspects of the revised legislation, such as more detailed guidance on infrastructure mapping or the identification of transnational trends. These tasks could either be handled by the EC, with BEREC continuing to act in a mainly advisory role, or by BEREC. The relative merits and costs associated with these approaches are further considered in chapter 5 of SMART 2015/0005.

A further area in which this option is likely to increase efficiency is the proposal to support standardised specifications and service levels for wholesale products used for business access, and potentially provide for the standardisation of other wholesale products widely used across the EU. SMART 2014/0024 suggests that such an approach could reduce time to market and limit the burden on NRAs and operators seeking agreement at national level, compared with the current approach in which similar wholesale products addressing technological adaptations are developed in parallel in different countries. This approach should contribute to regaining the efficiencies of previous standardised wholesale products such as LLU. Again however, this approach may have implications for the remit and resourcing of BEREC.

Reduction in sector-specific regulation

Because it involves significantly less regulatory intervention, this option is likely to reduce costs for NRAs which are currently associated with market analysis process. It may also render unnecessary many of the core tasks currently undertaken through the article 7 review process and BEREC.

However, this option places further emphasis on dispute resolution, which from the experience of New Zealand may require additional resources and time than a general market review. In this

¹⁷² The LLU Regulation was agreed within 6 months following its proposal by the Commission.

¹⁷³ For example, as shown in SMART 2015/0005, the cost of assessing the viability of infrastructure deployment and competition in the case of France was around €280,000 while operationalising duct access cost around €1.4m over an 8 year period. Establishing the regime for symmetric regulation and associated dispute resolution cost a further €2.6m.

context, BEREC estimated during an interview conducted for this study that this scenario might raise costs for NRAs compared with the status quo, and increase court proceedings.

There may also be significant indirect costs associated with a likely reduction in competition, including increased retail prices and consequent reduced demand. It should be noted in this context that econometric analysis conducted in the context of SMART 2015/0002 found that NGA take-up (as a proportion of households) is linked to NGA prices, which in turn are associated with the degree of access-based competition. Charges for high speed broadband in the US, which has operated a policy of regulatory forbearance, are high in comparison with EU charges.¹⁷⁴

There may be increased costs to other related sectors such as applications and services and greater need for enforcement action elsewhere, if a reduction in competition results in discriminatory behaviour by telecommunications firms to the advantage of their tied service and content providers. Finally, spill over effects from the telecom sector on other sectors (see macro-economic analysis) may result in a negative impact on jobs and growth.

4.1.4.3 Coherence

Internal coherence

The status quo maintains coherence with past strategies in EU regulation of the electronic communications sector. As such it may provide some stability and predictability for investors.

However, the current Directives include some points which may not be internally coherent. In particular, the linkage between symmetric and asymmetric obligations is not specified, and the Commission is not formally involved under Art. 7 in reviewing symmetric obligations under article 12 of the Framework Directive, even though these might become more significant in a fibre environment. The current framework also contains a number of provisions that have remained unused, including the possibility for cross-border dispute resolution and the consideration of leverage between neighbouring markets.

The continuity and simplification option may clarify the association between symmetric and asymmetric obligations, but does not address the remit of the article 7 review. It also does not provide a workable mechanism to ensure consistency for markets with a retail cross-border aspect.

The NGA+ option provides coherence in the consideration of symmetric and asymmetric obligations within a single market analysis process. In turn, this enlarged market review could also be subject to the article 7 consultation process thereby ensuring consistent treatment. It also includes provision for standardised remedies for business access. However, it is likely to result in some disruption in markets where entrants have previously relied on wholesale access, but might now be incentivised to invest or co-invest in their own access infrastructure. New provisions, including the need to take account of commercial arrangements and co-investment, may also require interpretation and involve disputes before appeal bodies.

The deregulatory option is consistent with the overall aim of reducing sector-specific regulation, but would create significant market disruption and uncertainty, as the market analysis process would be replaced with dispute resolution.

External coherence

¹⁷⁴ See SMART 2015/0002 as well as WIK (2015) Competition and Investment

The status quo may be incoherent in some respects with external legislation. Specifically, the role of NRAs as regards broadband state aid is unclear and can vary amongst Member States. This may lead to inconsistencies in the analyses concerning the potential for VHC deployment and infrastructure-based competition. The allocation of structural funds to broadband, in focusing on cost, may also fail to appropriately target funds towards performant technologies.

Although the Regulatory Framework prevails if provisions exist concerning facility sharing under the Framework, there may also be some uncertainty as regards how potential or actual facility sharing under the Cost Reduction Directive should be considered in the context of the market review process and in what circumstances it would be appropriate to apply additional sector specific SMP or symmetric regulatory obligations to foster facility sharing.

The continuity and simplification option may address some lack of clarity around how symmetric measures including those under the Cost Reduction Directive might be considered within the market review process. However, it does not specifically address the roles of NRAs concerning broadband state aid.

In requiring NRAs to undertake a current and prospective mapping exercise, the NGA+ option provides linkages between the role of NRAs in fostering competition (in contestable areas) and their potential role in identifying ‘challenge’ areas and gathering expressions of interest in this regard. In turn, this should provide a natural connection between the regulatory remit of NRAs and their engagement in the process of allocating state aid. The deregulatory option is externally coherent in that, in rolling back sector specific legislation to a significant degree, it leaves more scope to horizontal antitrust law and state aid.

4.1.4.4 Impact on stakeholders

The impact on stakeholders from the preferred option is assessed in more details in annex 4. The impact on stakeholders, consumers and SMEs would benefit most from the increased availability and quality of high speed broadband under the ‘fibre-ready’ NGA+ option (option 3). They would also enjoy similar levels of competition in standard broadband and a greater degree of choice in high speed broadband. Multi-national corporations would benefit from a greater degree of consistency and competition in cross-border business offerings. On the other hand both residential and business end-users would be least well served under the deregulatory option (option 4), as they would likely face reduced competition, higher prices and greater fragmentation in offerings. As regards the status quo and ‘continuity and simplification’ scenarios, consumers and SMEs would continue to have differing levels of choice and quality depending on their location, while multinational corporations would continue to be negatively impacted by fragmentation impeding coherent offers across the single market. OTT providers which rely on the widespread availability of high-quality retail internet access over which to offer services would be impacted in a similar manner to end-users.

Electronic communications operators would be differently impacted depending on whether they are currently subject to SMP regulation or are beneficiaries of such. Incumbent operators would benefit most from a significant deregulation of wholesale access (option 4), while entrants would be negatively impacted by this scenario. Conversely in the status quo or ‘continuity’ scenario, incumbents would continue to be subject to sometimes intrusive access regulation, while entrants would benefit from continued access, although they would be vulnerable to disruption in access due to technological upgrades by the incumbent, changes in regulation or regulated pricing. The fibre-ready NGA+ scenario (option 3) presents challenges and opportunities for both incumbents and entrants. The regulatory approach advocated would be likely to require more up-front investment on the part of entrants, triggering the need for incumbents also to invest in response. However, it should also result in more sustainable forms of competition (i.e. less dependent on periodic regulatory decisions), control over retail offerings and long-term certainty. This option, with its greater focus on deployment and infrastructure competition, is also likely to be favourable to regional fibre investors. Cable operators may also benefit indirectly from reduced

regulation on incumbents in dense areas (enabling greater flexibility) and the potential to expand their network reach.

Equipment manufacturers have been negatively impacted by the patchy network investment arising from the status quo. Options 3 and 4 might result in greater investment, but by different actors within the electronic communications sector – with option 4 benefiting existing infrastructure providers looking to upgrade their networks (incumbent and cable) while option 3 would tend to foster investment by a wider range of operators in FTTH/B networks. The impact of these options on equipment manufacturers may depend on their technological solutions and customer base.

NRAs would benefit most from the option for continuity and simplification (option 2), under which they would retain the existing degree of flexibility in regulatory decision-making, but benefit from reduced burdens in relation to market reviews. NRAs would lose a degree of flexibility under option 3, but some may at the same time benefit from greater empowerment (for example as regards data gathering) and an expansion in their remit to support the identification of areas requiring state aid.

The effects are synthesized by Table 5 below

Table 5 – Effects on stakeholders from access options

	Option 1: Status quo	Option 2: Continuity and simplification	Option 3: Fibre-ready	Option 4: Reduction in scope of regulation
Consumers	Mixed – some may be well-served but existing gaps may remain	As option 1	Substantial benefits arising from higher broadband quality of service due to increased deployment and competition in very high speed broadband. Some market consolidation also possible, which may have positive as well as negative impacts on innovation and price	Negative – significant reductions in competition could be expected impacting pricing and service quality, although some further investment might be made
SMEs	Mixed – some may be well-served but existing gaps may remain	As option 1	Substantial benefits arising from higher broadband quality of service due to increased deployment and competition in very high speed broadband.	Negative – significant reductions in competition could be expected impacting pricing and service quality, although some further investment might be made
Larger and multi-national businesses	Negative – fragmentation would continue	As option 1	Benefits from greater fibre availability (also	Highly negative – significant reductions in

	to impact cross-border connectivity		reaching smaller sites, homeworkers) and consistent wholesale specifications, if SMP approach maintained for business access	competition and further cross-border fragmentation
Incumbents	Negative – existing regulatory burden and constraints would remain	Some benefits compared with status quo – more certainty, higher burden of proof for intervention, but may also facilitate functional separation	Mixed. Some benefits – potential lifting of sectorial regulation, but also tighter regulation of ducts, pressure to invest	Highly positive – significant reduction in regulatory burden and constraints and lessening of competition
Entrants	Mixed – continuation of access regulation positive, but no emphasis on supporting more sustainable competition. Therefore, practical application varies by country. Entrants vulnerable to technological and regulatory change.	Some benefits compared with status quo – more certainty, greater potential for functional separation, but also higher burden of proof for intervention – may reduce regulation	Benefits for larger scale players able to invest and co-invest. Negative for smaller entrants relying on wholesale access	Highly negative – may undermine business viability
Alternative fibre investors	Neutral for existing players, but no additional support for further investment	As option 1	Positive – greater access to civil infrastructure, support for rural investments	Neutral if not reliant on incumbent SLU/duct access. Otherwise negative
Cable operators	Stability considered highly positive, although continued wholesale price regulation could undermine revenues	Benefits compared with status quo – more stability, higher burden of proof for intervention	Mixed - Some benefits from potential lifting of wholesale price regulation, but also greater infrastructure competition and pressure to invest	Positive – reduced competition
Content and application providers	Mixed – existing bandwidth gaps would remain, but competition would continue	As option 1	Positive – greater bandwidth availability, but risk in some markets of consolidation	Negative – likely to impede take-up of higher speed offers, and concentrate the

	to support take-up and protect vs discriminatory conduct		impacting competitive safeguards	market, raising risk of discriminatory conduct
Equipment manufacturers	Neutral to negative – no specific stimulus for investment by industry	Neutral to negative – no specific stimulus for investment by industry	Mixed – depending on business model/customer-base	Mixed – depending on business model/customer-base
NRAs	Mostly positive – retain existing flexibility. But several NRAs have raised concern over burden of 3 yearly review requirement + some NRAs raise concerns over independence and resourcing)	Positive – NRAs would benefit from continued flexibility, but with reduced market analysis administrative requirements and increased potential to implement functional separation. Under this option their resources and remit would also be strengthened	Mixed – NRAs would have more prescriptive requirements. Those not already pursuing mapping analysis and the operationalization of duct access may require additional resources to do so in the short term – although the admin burden may reduce longer term	Negative – NRAs would lose an important tool for the promotion of competition, while potentially facing an increased burden in dispute resolution
BEREC	Neutral	Positive – remit would be expanded and NRAs' competences would be aligned with BEREC's	This option would entail the strengthening of BEREC Governance as well as additional responsibilities. Although BEREC's competence and influence would be expanded, NRAs would have less direct control over its Governance.	Highly negative. BEREC would lose a significant portion of its current remit (concerning market analysis).

4.1.4.5 EU value added

The status quo and continuity and simplification options (Options 1 and 2) do not change the balance of responsibilities between the EU and Member States. Equally, because there is no further transfer of responsibility compared with the status quo, option 2 does not increase the benefits achievable through EU-level action compared with the status quo. Option 4 would significantly limit the available options for ex ante intervention in the electronic communications sector at a national level. As such, it imposes a significant degree of centralised control, even if the decisions (through dispute resolution) would be taken at national level. By applying a common approach that is likely to under-estimate the regulatory requirement, it is likely to result in less effective outcomes than Member States acting alone. Option 3 (NGA+) adds specific requirements to the existing market analysis process in order to make it suitable for VHC networks. As such it reduces somewhat the current degree of flexibility. However, as it supports

a level of harmonisation based on established best practice cases and in line with many aspects raised in the public consultation, it is likely to result in greater positive effects than Member States acting alone.

4.1.4.6 Summary table comparing access options

Table 6 – A comparison of options - access

	Effectiveness (wrt ubiquitous connectivity)					Efficiency and cost reduction	Coherence			EU value add	
	Ultra-fast coverage	Ultrafast take-up	Universal availability	Competition (infra/service)	Business access		Disruption from status quo (stability)	Internal coherence	External coherence	Subsidiarity	Proportionality (impact compared with MS acting alone)
Option 1: status quo	0	0	0	0	0	0	0	0	0	0	0
Option 2: streamlining	+	+	0	++	0	(+)	++	+	+	0	0
Option 3: NGA focus	++	++	+	++/-	++	+	-	++	+	-	++
Option 4: Dispute resolution	+	-	(+)	+/-	--	-	--	++	+	--	--

4.1.5 The preferred option

The Commission considers that option 3 best fulfils the overall and specific policy objectives of the review of the telecom framework as presented in section 3. In particular, the set of measures under this option would *inter alia*: (i) help meeting the ubiquitous VHC connectivity objective through the facilitation of co-investment and commercial agreements, and wholesale only models, which are expected to help increasing the footprint of VHC networks; (ii) it would safeguard competition through the maintaining of SMP rules on the basis of more granular mapping, flanked by the clarification of symmetric rules; (iii) improve the efficiency and predictability of regulation by lengthening the market review cycle and focussing regulation where it is really needed by prioritising retail level problems. The single market coherence would also be boosted by the development of EU-wide access products for business end-users.

Due to its effect in boosting connectivity, we estimate that **option 3 would result in a 0.54% increase in GDP compared with the status quo by 2025**. These estimations are further elaborated in section 4.11 and in annex 5 (section 6.5.6). By supporting deployment in rural areas, this option would also contribute social benefits. Various studies have shown that greater connectivity is associated with **reduced migration in rural areas as well as increased employment more widely**.¹⁷⁵ Finally, there is evidence that the deployment of all FTTH/B infrastructure, which would be fostered through this option, could lead to environmental benefits resulting in **88% less greenhouse gas per Gigabit (due to reduced electricity consumption) compared with the status quo**.¹⁷⁶

4.2 Spectrum

4.2.1 Options

Option 1 No change Baseline scenario

This option is based on the EU policies in place and reflects possible developments of these in the absence of new EU-level action.

The 2002 framework, developed at a time when mobile telephony was still in the growth phase (and mobile data virtually unknown) gave significant flexibility to Member States in the management of radio frequencies and procedures for the transfer of rights, subject to general principles set out in the legislation. Two bodies were established at the same time to support the co-ordination of spectrum policy: (1) the Radio Spectrum Decision of 2002 established the Radio Spectrum Committee (RSC)¹⁷⁷, which has responsibility for technical measures required to implement the broader Radio Spectrum Policy, and (2) the Radio Spectrum Policy Group (RSPG) established under Commission Decision 2002/622/EC consisting of Member State and Commission representatives was established as an advisory group to the Commission. The RSPG issues opinions and reports on Radio Spectrum Policy at the request of the Commission and more recently under an expanded remit also the European Parliament or the Council.

The 2009 revision to the electronic communications framework provided significant new guidance on spectrum management, as mobile communications were gaining prominence and spectrum was more and more seen as essential input to compete on the electronic communications market. Most importantly, it also paved the way for the 2012 Radio Spectrum Policy Programme (RSPP), which now serves as a roadmap for the development of the internal market for a wide range of wireless technologies and services (i.e. not just for electronic communications), taking into account both Europe 2020 and the Digital Agenda for Europe. However, contrary to what happens to access regulation and its 'Article 7', the new provisions on spectrum management did not include measures for the EU-level assessment of draft national measures in particular the assignment of rights of use of spectrum.

This option would keep in place the current possibility of technical harmonisation of spectrum at allocation level based on the Radio Spectrum Decision, as well as the very general provisions regarding policy objectives and regulatory principles, on strategic planning and coordination of spectrum policy, on management of spectrum including technology and service neutrality. Member States will keep a large discretionary power to organise spectrum assignment in general.

¹⁷⁵ Forzati, M., Mattson, C., and Aal-E-Raza, S. (2012), Early effects of FTTH/FTTx on employment and population evolution, Proceedings of the 11th Conference of Telecommunication, Media and Internet Techno-Economics (CTTE), Athens. Singer, H., Caves K. and Koyfman A. (2015) Economists Incorporated: The Empirical Link Between Fibre-to-the-Premises Deployment and Employment: A case study in Canada, Annex to the Petition to Vary TRP 2015-326, Bell Canada. Katz, R., Vaterlaus, S., Zenhäusern, P. and Suter, S. (2010), The Impact of Broadband on Jobs and the German Economy, *Review of European Economic Policy*, 45 (1).

¹⁷⁶ Aleksix and Lovric 2014 Energy Consumption and Environment Implications of Wired Access Networks

¹⁷⁷ See <https://ec.europa.eu/digital-agenda/radio-spectrum-committee-rsc>

There would still be no possibility to adopt binding measures (other than by distinct co-legislative initiatives) to eliminate fragmentation and introduce more consistency in the selection and spectrum assignment process, or to coordinate some of its main elements as envisaged in options 2, 3, and 4. Greater harmonisation would be potentially possible based on Commission non-binding recommendations pursuant to Article 19 of the Framework Directive

Option 2 - Non-binding rules for enhancing consistency of spectrum management in the EU

This option will incrementally adapt the framework to the on-going and expected developments in terms of ubiquitous connectivity and 5G deployment and therefore to gradually introduce more consistency in some aspects of Member States' spectrum management by (i) defining spectrum-related objectives and principles in the framework, (ii) proposing a Commission Article 19 Recommendation on some aspects of spectrum assignment, (iii) including a voluntary pluri-national auction procedure and clarifying the possible related common conditions and (iv) proposing measures to support deployment of very dense networks of small cells and access to Wi-Fi networks. This option consists of the following specific measures:

(i) Introducing more **specific spectrum-related objectives and principles** in the framework, including bringing together those in RSPP and in the current directives, to guide Member States when managing spectrum at national level, this would include general principles of transparency, defining criteria to determine the amount and type of spectrum to be assigned; general principles regarding timing for accessing spectrum across the EU and linking assignment deadlines to allocation deadlines as well as regarding license duration; general principles applicable to licence fees to ensure optimal use of spectrum and avoid resulting prices which may stifle investment and service development; objectives and principles on the levels of territorial coverage to be achieved, such as full territorial coverage as a component of spectrum efficiency; principles fostering sharing of spectrum and infrastructure and spectrum trading and leasing in EU secondary spectrum markets; strengthening the objective of promoting an efficient use of spectrum through the revocation of existing rights in case of non-use or non-compliance with license conditions and by setting minimum technology performance levels; creating appropriate incentives to free spectrum by existing users; and improving the protection of unlicensed band users. Half of the respondents to the Public Consultation agreed that the current regulatory regime has moderately achieved the aims of providing a single market for operators with sufficient transparency and regulatory predictability as well as ensuring effective and efficient use of spectrum. While public authorities could envisage limited coordination through common deadlines for making a band available or the common definition of certain general principles, many economic actors seek greater harmonisation of award methods and procedures (need and timing of spectrum release and selections, general principles and objectives, transparency, ex-ante competition assessment, refarming conditions, timing of advanced information to market participants, measures to promote use efficiency, spectrum packaging) so as to enhance legal certainty, support investments, promote competition, provide more clarity to manufacturers and support economies of scale. Equipment vendors supported harmonisation for predictability, but warned that timetables alignment should not delay early movers.

(ii) Accompanying these objectives with a separate non-binding **Commission Recommendation** based on Article 19 Framework Directive which would set out criteria for defining the timing of awards and renewals, common criteria for awards process and design, award fees and payment conditions and defining the most relevant assignment conditions for investment decisions and fostering the single market, such as licence duration, means to define and achieve coverage obligations, auction fees, trading, leasing and sharing conditions, refarming, spectrum efficiency-related technical requirements, market-shaping measures such as spectrum caps, spectrum reservation or wholesale obligations based on Article 5 RSPP. This Recommendation would be initiated immediately after the adoption of the review proposal, building on the RSPG Report on efficient awards adopted in February 2016 or even adopted at the same time.

(iii) Including a **voluntary pan-EU or multi-countries assignment procedure** in the framework which provides Member States¹⁷⁸ with the possibility to jointly organise a spectrum auction where national or pluri-national licences are granted in line with a common timetable and conditions.

(iv) **Introducing provisions on deployment of small cells** to reduce costs of deployment of very dense networks and access to Wi-Fi to meet the exponential demand for ubiquitous connectivity while providing the IoT industry with low cost spectrum¹⁷⁹. Many public authorities and private respondents to the Public Consultation supported the deployment of commercial/municipal Wi-Fi networks in public premises.

(v) Introducing **a coordination mechanism** to ensure consistent spectrum cross-border coordination outcomes, to enhance the current RSPG good offices work.

Option 3 –Binding and enforceable rules for enhancing coordination of spectrum management in the EU with greater focus to adapt spectrum rules to the future 5G challenges

This option would include all proposed measures in option 2, items (i), (iii) and (iv). However, the spectrum-related objectives and principles in the framework are in this option accompanied by (i) legally enforceable instruments (in lieu of a Recommendation) and (ii) a peer review mechanism, allowing BEREC, Commission and Member States to review individual Member States' planned national assignment procedures. Moreover, this option will set out greater emphasis on the investment environment for dense 5G networks as well as on ensuring greater consistency with regard to Member States' measures affecting the competitive market conditions and economic regulation.

This option also proposes to enhance the advisory status of RSPG. This option envisages the following specific measures:

(i) Give more prominence to general authorisations vs. individual licenses to ensure that national authorities deliver the most appropriate future licensing models (notably in 5G context). This will allow more flexibility in accessing spectrum and to facilitate a hybrid combination of license-exempt (through general authorisations) and licensed spectrum (individual licenses). To do so, increased protection of unlicensed use of spectrum vs. individual exclusive licenses in the band and in respect of out-of-band interference is needed.

(ii) Introducing, on top of the general objectives and principles in the framework legislation, some substantive provisions and the possibility for the Commission to complement these via **binding guidance criteria set out in implementing decisions** regarding the most relevant elements of spectrum assignment processes. Such set of measures would aim at enhancing consistency in spectrum management in the EU in areas such as the coordination of assignment timing (deadlines) and regarding the most relevant assignment conditions for investment decisions and fostering the single market such as a) methods for determining coverage obligations, including major transport infrastructures in the EU, as well as powers to impose mobile network sharing where needed to contribute to cover the most challenging areas where replication is impracticable and end-users risk being deprived of connectivity; b) more prominently promote sharing (including licensed shared access) as well as creating the right conditions for spectrum trading and leasing in secondary spectrum markets through the introduction of licences duration of at least 25 years, and; and c) injecting greater consistency with regard to market-shaping measures such as e.g. spectrum blocks, spectrum caps, spectrum reservation or wholesale obligations based on Article 5 RSPP. Conversely, it could also include

¹⁷⁸ For example, neighbouring countries or regions with similar market structures.

¹⁷⁹ These provisions were originally proposed in the proposal for a regulation laying down measures concerning the European single market for electronic communications and to achieve a Connected Continent, and amending Directives 2002/20/EC, 2002/21/EC and 2002/22/EC and Regulations (EC) No 1211/2009 and (EU) No 531/2012

some flexibility for Member States to allow alternative uses of harmonised spectrum subject to certain conditions where there is no market demand for the harmonised use of the spectrum and provided that the foreseen harmonised use is generally not pre-empted if market demand appears. Most operators agree on the need for more consistent binding assignment conditions to increase investment predictability, and, in particular, to support and ensure objective, transparent and non-discriminatory treatment of operators. These consistent binding conditions would also enable transparency and alignment of timing and conditions of licence renewals (including longer licence duration and use-it-or-lose-it clauses), flexibility to trade, lease or share, technology and service neutrality limits, refarming conditions, technical performance and interference mitigation before assignment decisions are taken.

(iii) Establishing a peer-review mechanism within the EU body of competent national regulators on NRAs' draft national measures concerning the economic and regulatory market shaping measures of spectrum assignments. This mechanism would foster common interpretation and implementation across the EU of those elements of spectrum assignment which most impact business decisions and network deployment. Such mechanism would require NRAs to notify to BEREC -in parallel to the national consultation- such measures for review and issuance of a non-binding opinion.

(iv) This option entails reviewing the current institutional set-up for BEREC (and the competences of its component NRAs), while reflecting RSPG's enhanced advisory role in the framework by systematically seeking RSPG advice prior to the adoption of Commission implementing measures in the spectrum area (excluding technical harmonisation measures), so that the relevant bodies provide better support and follow a more strategic and EU-oriented approach when advising the Commission and Member States on spectrum management (see section 4.5.1).

Option 4- EU harmonisation of spectrum management and establishment of an EU regulator

This option builds on option 3 but establishes more far reaching measures essentially in the mechanisms to enforce EU spectrum policy. This option envisages:

(i) Establishing an EU regulator in charge of EU-level spectrum issues amongst other competences;

(ii) Creating an implementing and enforcement mechanism which would give powers to the EU regulator to review (possibly via a system of notifications) and veto any national assignment plan that deviates from internal market rules and common EU assignment criteria without valid justification related to specific national circumstances. Alternatively, the power to veto national measures could be entrusted to the Commission, with the assistance of the analysis and recommendation by the EU regulator (close to the solution of the quasi-binding powers of the EU financial services authorities).

(iii) Giving the Commission and the EU regulator implementing powers to create a pan-EU or pluri-national assignment procedure for specific bands and to establish its conditions of use. (see option 4 on Institutional governance).

(iv) Giving the Commission implementing powers to set out criteria for the classification of regions throughout the EU by similar characteristics (in terms of density, geography, network deployment, etc.) and for determining the most appropriate obligations or assignment conditions per class of regions.

4.2.2 Discarded options

This section outlines the options which have been discarded. A more detailed analysis can be found in Annex 3 on discarded options as well as the IA support studies.

- Full harmonisation
- Creation of a single EU spectrum license that sets out pan-European rights of use of spectrum
- Grant delegated powers to the Commission to further define harmonised conditions for assignment of spectrum

Member States reject full harmonisation but are open to a more common approach to spectrum management and at least some could accept a peer review of national assignment plans as well as a certain level of coordination of conditions and selection processes, in particular as regards timing.

4.2.3 *Impacts*

4.2.3.1 Option 1 – Baseline

In option 1 no regulatory intervention to address the problem defined above will be taken.

Economic Impact

This option is by its very nature varied and unpredictable, the lack of coordinated EU action means it is not possible to pre-determine which Member States will take which decision within which deadline, thus making the variables of the cost and benefit analysis too wide to determine an estimate per country. However, it is clear that under this scenario, some EU countries will miss their DAE targets, and that insufficient provisions will be made to enable the EU to overcome difficulties faced in the introduction of 5G that is expected to take place from 2020 with commercial availability between 2020-2025. Although under the current framework there is certain scope for ad-hoc technical harmonisation that is relevant for 5G deployment, the existing spectrum management tools at the EU level neither provide sufficient regulatory certainty (i.e. timely spectrum availability and relevant authorisation conditions) nor create the necessary conditions for investment and innovation.

The largest part of the opportunity cost would fall on those countries that are least advanced in terms of LTE coverage and market penetration. Taking the population coverage figures reported in the DESI this includes for instance Bulgaria, Slovakia, Romania, Poland and France, all of which have coverage figures below 80%. In comparison, impacts of this option on Member States such as Denmark, Sweden, the Netherlands and Slovenia would be much less pronounced given their current situation. A DG ECFIN study estimates the impact of spectrum reform in attaining the DAE targets at 0.3-0.4% of EU GDP¹⁸⁰. In the absence of such reform under Option 1, this translates to an opportunity cost of between **EUR 41 and EUR 55bm per year**.

In terms of future 5G deployment, this option will not create the right conditions for an innovative and competitive ecosystem that would underpin full benefits of 5G technologies in the EU.

Social and environmental impacts

There are four main social impacts that need to be taken into account in all the options:

- Failure to release the potential for employment associated with reaching the DAE targets in all EU Member States and with successful (i.e. fast and coordinated) deployment of 5G services (see also Option 3 and 4)
- Increasing divergences in terms of mobile ubiquitous connectivity in those areas that lag behind in the deployment of 4G and the introduction of 5G services. As a consequence, we would be likely to see a worsening of the digital divide, with some areas (e.g. large

¹⁸⁰ Dimitri Lorenzani, Janos Varga, The Economic Impact of Digital Structural Reforms. See: http://ec.europa.eu/economy_finance/publications/economic_paper/2014/ecp529_en.htm

cities in some Member States) benefiting from at least a limited deployment of 5G services while the majority of European would not.

- Reduction in road accidents and increase in online shopping as a result of 5G. Collectively, these are estimated as a potential €12bn per annum from 2025 in a scenario where 5G is fully deployed (i.e. Option 4)
- Loss of potential in the vertical industries that would benefit most from deployment of 5G with repercussions for users of those industries (e.g. in e-health, transport, utilities and automotive sectors). For instance, this could mean lower social inclusion and greater health inequalities.

The environmental impacts that need to be considered include the potential loss of efficiencies associated with the introduction of 5G e.g. in terms of smart cities, efficiencies in transport and automotive and in energy usage (e.g. smart meters). A Commission study on the costs and benefits of 5G¹⁸¹ has estimated total environmental benefits in the four verticals most likely to benefit from 5G deployment at 50bn per annum across the EU. These environmental benefits would need to be set against potential environmental costs caused by the need for a greater number of masts, small cells, etc. Nevertheless, according to the same study, 5G deployment is estimated to lead to a significant environmental net benefit.

Under option 1, do nothing, these net social and environmental benefits would not materialise or they would not materialise as quickly as under the other options. Each year of delay in full deployment of 5G would carry a potential environmental and social opportunity cost of at least EUR 60bn with it (based only on the quantified estimates in study SMART 2014/0008).

Under this option Member States would retain a large margin of discretion in spectrum management. This will consequently lead to:

i) a continued divergence in the timing of assignments between early movers and late movers which will lead to continued issues regarding deployment of new services across the Single market, especially in border regions. Given this disincentive to act quickly, delays in spectrum assignments are likely to persist;

ii) the current spectrum rules of the framework including assignment mechanisms and license conditions (refarming) would not gain in clarity and predictability. Spectrum conditions for assignment will continue to vary significantly across countries (e.g. license duration, fees, usage conditions, etc.). Licence durations differ greatly among the Member States, ranging from 15 year license (DE) to indefinite (UK) depriving EU secondary spectrum markets to flourish.

iii) There would still be no real attempts to avoid revenue maximisation being the main objective of national treasuries when setting spectrum fees.

iv) a continued fragmentation of the Single Market which in turn will mean that equipment manufacturers and network operators will not benefit from greater regulatory certainty that a coordinated approach to spectrum conditions would bring. There is, thus, a risk that the 4G scenario (Europe to lag behind the US and other regions on network and equipment investment) would be repeated with further significant opportunity costs. Estimates of 5G deployment show that these costs could be even more substantial given the potential benefits of a coordinated approach to 5G at European level.

¹⁸¹ Commission Study on the 'Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe' SMART 2014/008

4.2.3.2 Option 2 – Non-binding EU guidance for enhancing consistency of spectrum management in the EU

This option is unlikely to lead to very significant short-term changes in the way spectrum is managed, it has the potential to "step-by-step" encourage consistency. It does not grant any new powers to the Commission and the proposed general principles can be implemented by Member States with a great margin of discretion.

Economic Impacts

The introduction of more specific spectrum-related objectives and principles will create Member States peer pressure to allow a timely access to spectrum of innovative 5G services across the EU – in particular, if a minimum territorial coverage (including major transport infrastructure) is achieved, it will facilitate the deployment of 5G verticals like connected cars. Furthermore, when general principles applicable to licence fees are set in place, revenue maximization in auctions will no longer be at the core of auction design. Thus, operators will have more capital available for investing in high-performance networks to meet the ubiquitous connectivity needs.

Although option 2 creates a frame that promotes best practices, its non-binding nature will not ensure consistency of radio spectrum management in the Union, such a cautious approach will not have positive impact on the market (including the promotion of EU secondary spectrum markets) and, as it is the case of baseline scenario, fails to achieve a single market approach to spectrum policy and management as spelled out as an objective in the DSM.

There is broad consensus among policymakers, industry and scholars that greater coordination of spectrum assignments and management is necessary. A recent European Parliament report states: “Stronger coordination of spectrum management is likely to foster innovation, allowing the creation of economies of scale at the European level when harmonised spectrum is assigned and the simultaneous use and reduction of uncertainties to speed up the investments in 4G networks.”¹⁸² Greater coordination on spectrum is also endorsed in the European Council Conclusions (June 2016)¹⁸³ that recognized the need to create right conditions for stimulating new business opportunities by better coordinating spectrum assignment modalities. On greater harmonisation of coverage obligations, Parliament did express support to harmonisation in relation to coverage obligations in the Union during the discussion of the proposal for a regulation of the European Parliament and of the Council laying down measures concerning the European single market for electronic communications and to achieve a Connected Continent (TSM proposal).

This is echoed by main operators and other stakeholders in *The Manifesto for a timely deployment of 5G in Europe*¹⁸⁴ and a GSMA report which finds that “a key component of the strategy [...] includes proposals for coordinated EU-wide conditions for spectrum policy management. [...] various factors - including the timing and design of spectrum auctions; the cost, the duration and the terms of licences - all have a major impact on the availability, cost, quality and reach of mobile broadband services”¹⁸⁵.

In addition, academic research such as Bohlin, Caves and Eisenach (2014) concurs that “the performance of EU mobile wireless markets would be improved and the consumer welfare increased by reducing fragmentation among suppliers, thereby allowing them to capture economies of scale and scope; and, by removing barriers and increasing incentives for investment and innovation, thereby speeding the deployment of next generation wireless

¹⁸² European Parliament, Reforming EU telecoms rules to create a Digital Union, 2016

¹⁸³ <http://data.consilium.europa.eu/doc/document/ST-26-2016-INIT/en/pdf>

¹⁸⁴ <https://ec.europa.eu/digital-single-market/en/news/commissioner-oettinger-welcomes-5g-manifesto>

¹⁸⁵ GSMA, socio-economic benefits of greater spectrum policy harmonisation across Europe, November 2015

broadband infrastructures and accelerating the growth of the mobile wireless ecosystem”¹⁸⁶. In addition,

Social and environmental impacts

The potential environmental and social impacts of this option are the same as those described under Option 1. If this option does not lead to voluntary take-up among Member States, the impacts would be an opportunity cost of at least EUR 60bn per year as of 2025, as a result of 5G opportunity cost. At the same time, this option provides Member States with flexibility regarding how to assign spectrum and under what conditions.

In conclusion, if all Member States voluntarily take-up the Recommendation, this would lead to benefits that are very similar to those under option 3 (see quantification below). In such a scenario, it is likely that costs would be somewhat lower than under option 3 due to the greater level of flexibility afforded to Member States under this option which would allow them to tailor specific elements of timing of assignments and conditions of usage to their national / local needs. Although a Recommendation lacks the legal certainty of a binding measure, this instrument, if swiftly adopted could influence important spectrum assignment auctions, such as those for the 700 MHz band which will be assigned for wireless broadband by 2020, in almost all Member States. The Review, which is currently under preparation, is unlikely to be implemented until shortly before 2020.

Conversely, if none of the Member States take up the voluntary measures, then this option does not address the problems described in this section and it does not differ significantly from the baseline scenario of option 1. Such an outcome would not contribute to reducing fragmentation across the Single Market, nor would it lead to greater certainty for operators in terms of the timing and usage conditions of spectrum in future, thus leading to minimal economic impacts overall.

4.2.3.3 Option 3 – Binding and enforceable rules for enhancing coordination of spectrum management in the EU with greater focus on adapting spectrum rules to future 5G challenges

The main difference between option 2 and option 3 is the introduction of a peer review process to improve coordination and the use of a binding instrument instead of a Recommendation – a binding measure would introduce an obligation for all Member States to comply and would therefore provide greater certainty to market operators.

Economic impacts

This option will have a number of positive impacts. First, long-term licence durations of at least 25 years proposed in this option will increase stability and certainty of investments as well as innovation requirements. In addition, long-term licence duration will create the right conditions for secondary spectrum markets to flourish in the EU. The potential benefits of spectrum markets for increasing the efficiency of spectrum allocations is widely acknowledged as spectrum markets allow a more efficient and dynamic use of spectrum. Allocations of spectrum to different applications by regulatory interventions are typically static, i.e. the international negotiations required for spectrum regulation¹⁸⁷ apply for many years. Hence changes in traffic demands, potential applications, user preferences, and available technologies over time and locations could lead to inefficient use of spectrum resources. The secondary market for spectrum

¹⁸⁶ Bohlin, Caves and Eisenach (2014), Mobile Wireless Performance in the EU and the US: Implications for Policy, Communications and Strategies, no. 93, 1st Q. 2014, p. 35. This research was supported by the GSMA.

¹⁸⁷ The World Radiocommunications Conference (WRC), the International Telecommunications Union (ITU) conference which revises the binding Radio Regulations at least every 3 years.

allows a dynamic allocation of spectrum resources by adapting to these variations over time- and geographic-scales. Thus, new technologies and services have more easily access to spectrum.

Second, setting in place a framework for tailored coverage obligations (that will also include main transport infrastructures) to be defined by Member States will create the right conditions to meet the ubiquitous connectivity needs of the DSM to the extent feasible through 5G wireless. Consistency of assignments and usage conditions will be improved and costs would be reduced compared with traditional assignments. The aim of this option would be to increase coordination and speed of assignments¹⁸⁸ – though it would not go as far as option 4 in terms of centralising spectrum governance at EU level.

Thirdly, it will promote a flexible and efficient use of spectrum to respond to future 5G challenges. A move to a licensing model more extensively based on general authorisations especially for higher spectrum bands, if accompanied by cross-border harmonisation, would mean that operators could have the same spectrum all over Europe, with similar conditions. Such a system would rapidly speed time to market, as there would be no decisions needed (either at national or EU level) on who gets what spectrum, access to spectrum will be faster for operators. When answering to the Public Consultation, many market actors and public authorities considered that a general authorisation regime would foster innovation and competition both for services and end-devices.

Finally, the binding peer review process of economic and regulatory elements concerning market shaping aspects of spectrum assignments will also inject greater consistency in the EU single market, in particular, with regard to spectrum assignment conditions. This would mean in practice that prior to granting, renewing or amending individual rights to spectrum, NRAs will have to inform BEREC and the Commission on the market elements of such a measure. BEREC will issue to the NRAs, together with a copy to the Commission, a public opinion on the draft measure assessing the impacts to the internal market on the suitability to bring about timely connectivity investments.

The cost of accessing spectrum, relative to the economic gain it facilitates on the part of right holders, is likely to diminish through more coherent and replicable assignment processes¹⁸⁹, and will in any case become more predictable for operational planning by wireless connectivity providers. In addition, the shift in emphasis towards general authorisations will provide cost-free access to some spectrum, partly off-set by stricter interference management criteria in technical standards. The spectrum bands that have been subject to auctions in the past are however likely to remain so.

Greater consistency on spectrum assignments will ensure Europe's leadership in a synchronized roll-out of 5G networks and cross-border 5G services which is endorsed by leading telecom operators, IT vendors and industrial groups in *The Manifesto for a timely deployment of 5G in Europe*¹⁹⁰. In total it is estimated **that benefits of €146.5 billion per annum** will arise from the introduction of 5G capabilities. €95.9 billion will arise from first order benefits in the four verticals i.e. Automotive, healthcare, transport and utilities. Benefits are distributed across the four sectors between strategic (€32 bn) and operational (€12 bn) benefits arising to organisations within the verticals. Relatively high levels of benefits were also recognised for the consumers of goods and services (€24 bn) from the verticals. Third party benefits (€27 bn) reach a similar

¹⁸⁸ As explained in section 1.1.1. the example of 4G shows that there is a link between the timing of spectrum awards, market penetration and ultimately economic growth.

¹⁸⁹ This does not rule out an increase in national revenues from spectrum, linked to the higher value attributed by market operators to this public asset made available to them on terms that give them greater investment certainty over longer periods, and under conditions aligned to the need to enhance very-high capacity network deployment and wide take-up.

¹⁹⁰ <https://ec.europa.eu/digital-single-market/en/news/commissioner-oettinger-welcomes-5g-manifesto>

level of magnitude but they primarily come from one source, the impact of telematics information for third parties in the automotive vertical.

Table 7 – Benefits for verticals

Verticals Benefits	Automotive (€ mn)	Healthcare (€ mn)	Transport (€ mn)	Utilities (€ mn)	Total (€ mn)
Strategic	25,800	1,100	5,100	775	32,770
Operational	1,800	4,150	3,200	2,700	11,850
Consumer	20,900	207	-	3,000	24,110
Third Party	27,100	72	-	-	27,170
Total	75,600	5,530	8,300	6,470	95,900

Source: Study on the Identification and quantification of key socio-economic data for 5G in Europe SMART 2014/008

One of the key benefits (€10.5 bn) identified in rural areas is the ability of 5G to address the digital divide and overcome difficulties in providing ubiquitous broadband connectivity in more rural areas where current fixed networks struggle to provide adequate service. 63 per cent of the total vertical and environmental benefits of €146.5 bn per annum in 2025 are forecast to arise for businesses and 37 per cent will be provided for consumers and society.

However, the downside of this proposal will be the time frame of the EU policy-making process. Given the Commission proposals on the telecom review will likely be adopted by 2018, it will not be able to influence the assignment of the 700 MHz in a considerable number of Member States but that of only the second round of other important assignments of spectrum for wireless broadband, such as the 900 MHz, 1800 MHz and the 2 GHz (LTE bands renewals), as well as of new bands, with probably quite different characteristics, identified for 5G. Furthermore the peer review on market shaping elements of national plans for spectrum awards could lengthen the process in case the initial opinion triggers further discussions between participating authorities, or between the responsible national authority and its domestic stakeholders.

Social and environmental impacts

As for option 1 and 2, the environmental and social impacts need to be expressed in terms of potential opportunity costs compared with an ideal scenario of fast and successful 5G deployment as estimated in the study on the costs and benefits of 5G SMART 2014/0008. Under this option, 5G is deployed comprehensively and expeditiously in the Union and this would mean that all social and environmental benefits would materialise as of 2025 as estimated in the above study. This would lead to a total quantifiable impact of EUR 60bn per annum as of 2025 in the Union.

4.2.3.4 Option 4 - EU harmonisation of spectrum management and establishment of an EU regulator

This option will unify spectrum policy in the EU. Operators will easily develop their activities throughout the Union within an EU predictable framework. Under this option spectrum management will slowly move from a national (MS) to a supranational entity, the European Union in some bands (ECS bands).

Economic impacts

This option would lead to centralised decision-making which would likely be faster than the current governance arrangements or the more tightly coordinated procedures proposed under option 3. In addition, the introduction of a pan-European assignment procedure would create a

“true” single market for spectrum resources that cuts across national boundaries. Such an option would be most likely to allow the European Union to make fast and coordinated spectrum decisions. Such a centralised procedure would mean that the EU has at its disposal the governance instruments to be as responsive as possible to spectrum needs in relation to 4G and – more importantly - for the future introduction of 5G across the EU, which is estimated to give rise to benefits of 146bn EUR per year (as described in option 3)¹⁹¹.

However, under this option Member States will not be able to assign spectrum in the way they consider most appropriate according to their national context and spectrum demand. This would create some socio-economic distortions as the needs of the variety of spectrum users and customers are different from country to country. There would be a risk that a pan-European procedure impedes faster Member States to move forward and potentially sterilizes a number of (national) spectrum bands for innovative services.

Although option 4 would not remove spectrum as a constraint to the development of different sectors, it is, however, the option that comes closest to providing the EU with the governance tools required to address spectrum constraints. In addition, this option will provide a centralised governance framework and set up an EU regulator that will also have competences on spectrum management. The impacts of option 4 of the institutional governance are included in section 4.5.3.

Social and environmental impact

Under this option, like for option 3, 5G is deployed comprehensively and expeditiously in the Union and this would mean that all social and environmental benefits would materialise as of 2025 as estimated in SMART 2014/008. This would lead to a total quantifiable impact of EUR 60bn per annum as of 2025.

4.2.4 Comparison of options

4.2.4.1 Effectiveness

The effectiveness of non-binding measures under option 2 would depend to a large extent on the willingness of individual Member States to adopt the relevant guidance. Evidence from existing attempts to offer ‘best practice guidance’ in certain spectrum management activities suggest that given diverging interests, take up of such guidance might not be very high, thus undermining the effectiveness of this option.

Option 3 is most flexible in its design because it combines both voluntary and binding measures. Thus, this option 3 would be able to focus on the “quick wins” that would enable the Union to prepare the ground for the deployment of 5G and to deliver the DAE while leaving more controversial / less essential aspects for non-binding instruments. In addition this option would allow sufficient flexibility to generate the economies of scale and legal certainty required for operators who need to invest in mobile networks and infrastructure while at the same time offering sufficient protection to other spectrum users (including broadcasters¹⁹², unlicensed users, etc.) and could be implemented in a timescale that is necessary to support the introduction of 5G.

Option 4 is ultimately most effective in terms of synchronising awards and coordinating license conditions. However, this may come at the expense of efficiency due to loss of flexibility to adapt to local conditions. In addition, any impacts would likely only come into effect after a very

¹⁹¹DG CONNECT study on 'Identification and quantification of key socio-economic data to support strategic planning for 5G in Europe' SMART 2014/0008

¹⁹² Any EU action should comply with the ITU Radio Regulations and the Geneva Agreement of 2006 (GE06) which protects digital terrestrial television in cross-border territories and could thus geographically constrain mobile broadband deployment. In addition, the [RSPG opinion on long-term strategy for the future use of the UHF band](#) protects broadcasting services in the sub-700MHz band until 2030.

long time, given the need for substantial adaptation in terms of governance processes and for a long negotiation to develop the required legislation. This would in turn jeopardise the main aim of the intervention: i.e. facilitating preparation for the development of 5G (expected for 2020).

4.2.4.2 Efficiency

Option 4 is least efficient because it will require substantial reform of current governance processes and a long time to implement, especially given the likely reluctance of many Member States and among stakeholders. Option 3 will also require significant governance reform though the extent of this will depend on the range of aspects that would fall under a binding legislative instrument. Individual measures could be implemented more efficiently, speeding up the introduction of the most important factors. The creation of a peer review mechanism which could issue non-binding advice on economic and regulatory market shaping measures of spectrum assignments to individual MS and/or NRAs would be an efficient way to pool national resources and ensure that national authorities remain committed to common goals. Finally, option 2 would not entail any significant regulatory or enforcement costs nor would it lead to major changes in terms of spectrum governance.

4.2.4.3 Coherence

All options are coherent with broader EU policy objectives including the DAE, the development of the DSM and the upcoming development and roll-out of 5G in Europe. In addition, the options are internally coherent with clear links to the objectives of the review. Option 3 and 4 propose binding and centralised (only for option 4) regulatory instruments which could lead to the greatest level of internal coherence. Option 2 leaves greater flexibility to individual Member States and would therefore lead to a greater level of divergence and a lower level of coherence in terms of outcomes in line with the objectives of the review.

4.2.4.4 Impact on stakeholders

As regards the impact on stakeholders, MNOs (including SMEs), equipment manufacturers and consumers or business end-users would benefit most from the preferred option (option 3). This option would lead to more coordinated spectrum assignments and faster deployment of services. Spectrum is a key enabler of the Digital Single market which benefits cross-border operators and manufacturers of equipment that can operate at the same time, across the EU. SMEs would benefit mostly as a result of reductions in the cost of access to spectrum due to a greater emphasis on general authorisations as opposed to individual licenses (licensed)¹⁹³. End-users (consumers and businesses) would benefit from earlier availability of innovative new services including deployment of new technology such as 5G, in particular in countries which would otherwise have delayed deployment of 5G services.

Option 2 would lead to greater uncertainty than Option 3 because it is based on voluntary guidance rather than a binding instrument. As a result, the eventual impact of this option on different stakeholders would depend on the extent to which the various provisions in the option are taken up in different Member States. In practice, take-up would be unlikely to be even across the Single Market, thus eliminating some of the positive impacts of scale for equipment manufacturers and for MNOs. Lack of certainty about take-up would mean that investment in new services / deployment of new technology is lower than under option 3, thus leading to a more mixed picture for end-users (businesses and consumers). SMEs would not benefit from reduced access costs to spectrum since there would not be a greater emphasis on general authorisations. However, SMAs – especially in smaller countries with fewer resources – would benefit from additional European guidance.

¹⁹³ The value of access to unlicensed spectrum for new, innovative spectrum usage has been proven recently in the area of IoT. Actually, in available unlicensed bands, several networks based on various technologies have been rolled out – amongst others – by SMEs to provide connectivity for IoT applications and allowing other SMEs to implement smart city applications.

Option 1 – baseline would not address the problems identified in this report and therefore leads to negative impacts for all stakeholders. SMAs and other spectrum users other than MNOs would not be affected by this option. Finally, option 4 would lead to positive impacts that are similar to option 3 with the main difference lying in the significantly longer implementation delay which would mean benefits materialise only after 2020. This delay would be of particular significant for end-users (consumers and businesses) and for MNOs. For SMAs, this option is less attractive because it transfers significant powers to the European level and thereby reduces the ability of national SMAs to adapt spectrum assignments and conditions to local needs.

Effects on stakeholders are summarised in the table below:

Table 8: Effects on stakeholders – spectrum options

	Option 1: Status quo	Option 2: voluntary	Option 3: binding	Option 4: EU regulator
End-users (consumers and business)	Negative – late and uncoordinated deployment of 5G and lack of action on recent 700 MHz auctions means businesses are unable to develop new services (e.g. in transport, automotive, healthcare, utilities etc.) and consumers (including businesses) don't benefit from innovative services	Mixed – while this option could be in place fast, there is a high risk that voluntary measures would not be taken-up by many MS, leaving the same results as under option 1	Positive – this option delivers a coordinated approach to spectrum assignment and usage across the EU including for 5G (though it may come too late to influence 700 MHz assignments in some Member States)	Mixed – while this option sets up a governance structure to address the problem, the complexity of negotiating this set-up means it will come too late to influence 700 MHz auctions and will delay 5G deployment
SMEs	Negative – the impacts would not differ from those for other end-users	Mixed – the impacts would not differ from those for other end-users	Positive - the impacts would not differ from those of other end-users. Swift implementation of 5G would create opportunities for innovation and entrepreneurship which would	Mixed - the impacts would not differ from those of other end-users. Swift implementation of 5G would create opportunities for innovation and entrepreneurship which would

			benefit SMEs in particular. General authorisations could provide greater opportunities for SMEs to gain access to spectrum which (as regards the main ECS bands) is now only accessible to large companies with the financial power to purchase exclusive rights (e.g. MNOs, etc.)	benefit SMEs in particular
MNOs	Negative – this option risks repeating the 4G scenario where Europe lagged behind other regions for 5G with insufficient investment	Mixed – while this option could be in place fast, there is a high risk that voluntary measures would not be taken-up by many MS, leaving the same results as under option 1	Positive – this option delivers a coordinated approach to spectrum assignment and usage across the EU including for 5G (though it may come too late to influence 700 MHz assignments in a number of Member States)	Mixed – while this option sets up a governance structure to address the problem, the complexity of negotiating might delay 5G deployment
Other spectrum users (e.g. broadcasters, PMSE, etc.)	Nil – this option would continue the current set-up which engenders significant local variability, continued erosion of spectrum for some users and uncertainty about future spectrum availability	Nil - This option would likely not differ significantly from option 1	Uncertain - This option provides a greater level of regulatory certainty and consistency across MS, impacts on other spectrum users would depend on specific decisions taken by but the peer review mechanism could ensure that local needs of different spectrum users continue to be fully taken into account.	Uncertain - This option provides the greatest level of regulatory certainty – impacts on other spectrum users would depend on specific decisions taken by the EU regulator. There would be less scope for adaptation to local needs under this option.

Equipment manufacturers	Negative – this option repeats the 4G scenario (late & uncoordinated assignments) for 5G and therefore fails to provide legal certainty and it fails to capitalise on the size of the Single Market	Negative – this option risks repeating the 4G scenario for 5G and therefore fails to provide legal certainty and it fails to capitalise on the size of the Single Market	Positive – this option provides greater regulatory certainty and consistency to manufacturers providing them with incentives to invest now in order to serve the Single Market	Positive – this option provides greater regulatory certainty and consistency to manufacturers providing them with incentives to invest now in order to serve the Single Market
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4.2.4.5 EU added value

As it has been discussed above, Member States acting individually cannot capitalise the full potential of spectrum resource – the deployment of 5G will require a coordinated approach to ensure sufficient and adequate spectrum is made available on appropriate terms across the EU.

At the same time, the ability of Member States to adapt their spectrum decisions to the local and national context remains important. Hence, while binding instruments may be required in some instances (e.g. timing of assignments and certain usage conditions), it is not clear that this should be the case for all aspects of spectrum governance. Indeed, care should be taken that centralisation of decision-making is proportionate and limited to those areas with a clear cross-border element. For instance a fully centralized spectrum management in the EU, as foreseen in option 4 may be disproportionate given the very nature of spectrum as a natural national asset – the issue can perhaps be addressed sufficiently at a Member State level without requiring full harmonisation of spectrum management at EU level.

4.2.4.6 Summary table comparing spectrum options

	Effectiveness				Efficiency	Coherence			EU added value	
	Ultra-fast coverage	Ultra-fast take-up	Universal availability	Business Access	Cost complexity and enforceability	Disruption	Internal	External	Subsidiarity	Proportionality
O1	0	0	0	0	0	0	0	0	0	0
Status quo										

O2 non-binding	0/+	0/+	0/+	0/+	0	0/+	0	0	+	+
O3 binding	++	++	+	++	++	+	+	+	++	++
O4 EU regulator	++	++	+	++	+	++	++	+	--	--

4.2.5 The preferred option

The Commission considers that option 3 on spectrum best fulfils the overall and specific policy objectives of the review of the telecom framework as presented in section 3.

This option does involve some reduction in the current degree of national flexibility with regard to spectrum assignments. The pay-off for this loss of flexibility is faster spectrum assignments (especially in countries that are currently not among the fastest) and more consistent obligations and usage conditions across the Single Market to support network deployment. In parallel, greater consistency of assignments, particularly on long-term licence conditions of at least 25 years, will foster spectrum trading and leasing and pave the way for the establishment of an EU secondary spectrum market. These effects would not be achieved effectively with a non-binding instrument which would rely on Member States to take-up voluntary guidelines. Furthermore, a peer review mechanism will lead to further alignment in market shaping elements of spectrum assignments while maintaining national margin of assessment or detailed implementation aspects.

This option leads to a coordinated approach to spectrum management that allows a timely deployment of 5G in the Union while enabling the integration between technological innovation and access to ubiquitous and VHC networks. In total it is estimated that benefits of **€146.5 billion per annum** will arise from the introduction of 5G capabilities. €95.9 billion will arise from first order benefits in the four 5G verticals i.e. Automotive, healthcare, transport and utilities.

4.3 Universal Service

4.3.1 Options

Option 1 - No change

This option is based on the Universal Service policies in place covered by the Directive on Universal Service and Users' Rights and reflects possible developments of these in the absence of new EU-level action.

The aim of universal service is currently to provide a safety net ensuring that the most vulnerable in society as well as those in more remote areas could receive basic electronic communications services. At the time of the introduction of the USD in 2002, public pay phones and physical directories were still in widespread use and the need to have access to telephony services at a fixed location was considered a vital objective, alongside the more forward-looking concern that users needed access to a connection that permitted a non-broadband 'functional Internet access'. The Universal Service provisions cover connectivity and services, as well as the affordability of tariffs and accessibility for disabled users. They permit financing of any 'net cost' of USO either through a levy on operators or through public funds.

In the context of this option, the current situation would remain unchanged. The Member States will likely take increasingly different approaches in the universal service obligation by unilaterally removing outdated services from the scope on the national level. The consistency

and coherence of the universal service regime across the Member States will dwindle without a common approach towards the inclusion of broadband in the universal service scope. The sectorial financing mechanism will continue to be a possibility for financing. The costs of financing the universal service obligation in the Member States would likely remain the same, depending on possible national approaches.

The majority of **Member States and regulators** agree that universal service has been effective and efficient in safeguarding end users from the risk of social exclusion, while **most of the operators** see little or no impact and efficiency at all.

Option 2 - Minimum adaption to trends

Only Public Access Telephony Services (PATS) and the provision of functional Internet access, are mandatory at EU level and can be financed from a universal service funding mechanism supported by the sector. However, Member States will still have the flexibility to add old legacy universal services (directories/directory enquiries and public pay phones) at national level. If a Member State decides that other services shall be universally available in its territory, it can do so financed from the state budget under observance of State aid rules.

In the public consultation, most market actors, **Member States and consumer organisations** submit that obligations related to disabled end-users should be incorporated in horizontal law. Respondents stress that any obligations should apply equally to all market players. Through the broader implementation of the provisions of Article 23a of the Universal Service Directive, a wider choice of services and tariffs for disabled users could be achieved.

Option 3 - Incremental adaptation to trends with the focus on broadband affordability

This option focuses the scope of universal service obligation at EU level on affordability of voice communications and basic broadband. As in option 2, Member States have the flexibility to keep the old legacy universal services within the scope of their national obligation, but this is not anymore mandated at EU level. At the EU level, broadband would be defined by referring to a functional internet access connection defined on the basis of a minimum list of on-line services (web-browsing, eGovernment, VoIP etc.) that should be accessible. Affordability for the services would be at least at a fixed location, thus allowing Member States the possibility to include affordability measures by mobile.

Broadband being a basic infrastructure, it provides benefits for the society and economy as a whole. Affordability measures would be specified at national level and could include special tariff options, direct consumer support or a combination of both. Availability will be primarily promoted by other policy tools (incentives to private investment, state aid, spectrum-related coverage obligations, etc.). Only in exceptional circumstances, after demonstration of market failure and after using other public policy tools, Member States would still have the flexibility to include the availability (i.e. deployment) of basic broadband in the universal service scope.

This option also requires a revision of financing mechanisms. Taking into account a broader range of beneficiaries (beyond the telecom sector) of universal broadband, sectorial funding needs to be reassessed. Furthermore, sectorial funding represents an administrative and financial burden for stakeholders causing market distortions and uncertainty. Taking the above into account, financing through general budget is the more equitable and least distortive way of funding the provision of universal service. Member States would be free at national level to maintain or add services, funded from the public budget.

The public consultation showed that the vast majority of **operators** consider that the review should be the opportunity to redefine or completely reconsider the universal service regime (including its financing), with many claiming that it has become obsolete. **Member States** mostly claim the need to maintain a universal service scheme, with flexibility at Member State level on funding and on broadband. With regard to the inclusion of **broadband within the scope**

of universal service, while most **operators and their associations** have no doubts about the positive impact of broadband on social and economic life, they claim that USO is not the right instrument to foster broadband deployment. In any case, if broadband were to be included in the US regime, it would have to be revised substantially. Respondents supporting both in and out options (mostly **Member States and regulators**) submit that Member States should retain the flexibility to make the choice at national level. Most **operators and their associations, several Member States and regulators** consider that broadband under universal service bears high risks of market distortions and cost inefficiencies. In particular, industry funding is considered too distortive.

Option 4 - Significant adaptation to trends and connectivity objectives

This option is similar to option 3, but includes both affordability of broadband at least at a fixed location and availability (in terms of coverage obligation) of broadband at a fixed location, and it would also exclude PATS (from both affordability and availability measures)¹⁹⁴. The exclusion of PATS is possible due to widespread availability and affordability of mobile voice and the tendency to fixed-mobile substitution. It can be also complemented by special accessibility measures (i.e. for disabled users), adopted in addition to the horizontal accessibility measures and applicable to all providers (not just the designated universal service provider). Alternative financing mechanisms would be introduced as under option 3. In the public consultation, **most market actors and regulators** agree that universal service is not the right instrument to foster very high-capacity connectivity for public places and therefore should not be linked to connectivity objectives.

4.3.2 Discarded options

This section outlines the options which have been discarded. A more detailed analysis can be found in Annex 3 on discarded options as well as the IA support studies.

- Connectivity to a network at all locations
- Terminate the universal service regime
- Provision of very high-capacity broadband networks in public areas and places of specific public interest as an addition to Options 3 and 4
- Changing the national financing regime in addition to other financing options under options 3-4
- Changing the financing regime in addition to other financing options under Options 3-4 by setting national user levies

4.3.3 Impacts

Universal service policy should specifically seek to support access to affordable connectivity, especially for vulnerable end-users, at a quality which reflects market and technological developments and enables societal and economic inclusion. Another key aim is to streamline and simplify the system (including associated financing arrangements) in order to reduce costs and inefficiencies and ensure the burden is fairly shared.

4.3.3.1 Option 1 No changes

Economic, social and environmental impacts

Lack of adequate changes to the universal service scope might contribute to hamper the competitiveness of the electronic communications industry, possibly affecting the development

¹⁹⁴ Public Access Telephony Services

of online markets and the full adoption of services by the weakest parts of the population. Persisting digital divide will increase (risk of) inequality in participation in the Information Society and social exclusion.

The current cost of the universal service provision can be considered relatively modest as a significant number of the services is provided by the market and in some countries no universal service providers were designated (Germany, Luxembourg and Sweden).¹⁹⁵ To date, in about a half of Member States universal service providers have requested compensation for an unfair burden¹⁹⁶, and in countries where the net cost of the universal service provision has been calculated, it has been lower than estimated by the provider in advance and decreasing over years.¹⁹⁷ For instance, in Spain where the net cost has been calculated since 2003, it has been steadily dropping, from 120,4 mln euro in 2003 to 19,5 mln euro in 2013 (the last year when the numbers are available) – despite the expansion of functional Internet access to include 1Mbps broadband.¹⁹⁸ Yet, general assessment and comparison of the net cost across all Member States is difficult because it varies greatly from country to country due to differences in the universal service scope at the national level and size of the territory. The Member States' net cost ranges from under 0,5 mln euro to over 30 mln euro a year¹⁹⁹. Stakeholders have also criticized the overall administrative burden that arises from the current universal service regime for NRAs and for operators in the electronic communications sector.

4.3.3.2 Option 2 Minimum adaptation to trends

The scenario where pay phones, directory and directory enquiry services are excluded from the Union-level universal service scope affects not only electronic communications providers and end-users, but also Member States and NRAs.

Economic, social and environmental impacts

The light adaptation of the universal service scope to technological and market trends is unlikely to improve the prognosis presented in the baseline scenario, because the suggested changes do not strike at the heart of the problems, namely the taking into account the increased connectivity and development of NGA networks and risks of digital divide, the relationship between ECS and OTT providers, lack of legal certainty and coherence. The exclusion of certain services such as pay phones, directory and directory enquiry services will reduce the costs incurred by the USO operators and NRAs in calculating the amounts due for the imposition of the USO status. The social impact of excluding legacy services (public pay phones, directory and directory enquiry services) from the universal service scope is likely to be small, since these needs are already served effectively by other means, such as mobile communications, online directories and various search facilities, as explained in the problem definition. Furthermore, the use of public pay phones in the EU is very low. Environmental benefits will manifest themselves only in those Member States that introduce broadband speeds in the functional Internet access at the national level and, thus, will be able to improve energy efficiency and reduce pollution and carbon emissions. The scale effects of such improvements will be limited.

¹⁹⁵ See Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 23-25.

¹⁹⁶ However, another reason for a low number of requests for compensation is the complexity of the compensation procedure and uncertainty about the actual payment.

¹⁹⁷ See country reports in Commission Staff Working Document to the Report on the Implementation of the EU regulatory framework for electronic communications, SWD(2015) 126 of 19.06.2015.

¹⁹⁸ See the press release of the Spanish regulator CNMC of 16.03.2016:

<http://www.cnmc.es/CNMC/Prensa/TabId/254/ArtMID/6629/ArticleID/1689/El-coste-neto-del-servicio-universal-de-telecomunicaciones-en-2013-ascendi243-a-195-millones-de-euros.aspx>.

¹⁹⁹ On basis of country reports in Commission Staff Working Document "Implementation of the EU regulatory framework for electronic communications – 2015. SWD(2015) 126.

4.3.3.3 Option 3 Incremental adaptation to trends focusing on broadband affordability

This option is likely to have positive implications for a part of end-users as it is aimed at the extension of the use of broadband access to a number of enhanced services and information and, therefore, to reduce the number of citizens without a broadband connection. This option relies on the consideration that basic broadband (>256 kbps, and in reality at least 2 Mbps, through a mix of technologies) is currently available to all European citizens as mentioned in section 1.

Economic, social and environmental impacts

Promotion of broadband affordability within the framework of universal service policy is likely to improve vulnerable citizens' access to a number of essential e-services (eGovernment, VoIP, ebanking etc.), to enhance their exercise of fundamental rights and participation in the Information Society. The socio-economic analysis²⁰⁰ shows that those on low incomes, elderly, those that are less mobile or less able to leave home due to carer responsibilities are more prone to social exclusion. Broadband connection enables faster access to services, offers opportunity of instant communication with friends and family and access to information that are available around the clock and at lower costs as it does not incur travel expenses. These online activities develop or improve sense of community, reduce isolation of individuals and communities and support efforts to enhance equality and digital inclusion, which ultimately address social exclusion problems.²⁰¹

Broadband provides economic and financial benefits on individual and societal levels. For individuals, a broadband connection offers new possibilities for improving (or receiving) education and professional skills, thus improving his/her chances of employment and self-employment. Households with a broadband connection enjoy financial savings due to the opportunity to shop online, pay bills, taxes and use other services.²⁰² Also growth and competitiveness of the industries benefitting from broadband will increase due to ICT-related efficiency and productivity resulting both from ICT and a more skilled workforce.²⁰³ National affordability measures of direct consumer support will work as demand-support measures and may stimulate broadband market development. The changes to the financing mechanism will lead to less distortions of the competition between ECS and OTT providers.

Extending the affordability for the services to at least at a fixed location, would allow Member States the possibility to include affordability measures by mobile. This approach on affordability is supported by the fact that mobile phone ownership is much higher than fixed line telephone access with 93 % of households in the EU having access to a mobile phone²⁰⁴ and that wireless technologies can already provide connectivity at virtually all locations relatively efficiently. The data shows that fixed voice telephony is not a preferred communication service, and the availability and affordability of mobile phones can provide a more adequate basis to combat social exclusion, also due to special designs for disabled users.²⁰⁵

The **cost of the provision of broadband affordability** depends on the exact definition of the connection, but is likely to be low due the narrow and precise universal service scope. When calculated as the cost of social tariffs, it is less than social tariffs for current universal service and is from min. 147.2 mln euro to max. 436.2 mln euro per year (at the 2014 price level).²⁰⁶ The overall cost of specifically attributing certain universal service implementation responsibilities to

²⁰⁰ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 56-57.

²⁰¹ Analysys Mason and Tech4i2 (2013). Socio-economic impact of bandwidth. SMART 2010/0033, pp. 49-51.

²⁰² Analysys Mason and Tech4i2 (2013). Socio-economic impact of bandwidth. SMART 2010/0033, pp. 52-54.

²⁰³ Analysys Mason and Tech4i2 (2013). Socio-economic impact of bandwidth. SMART 2010/0033, pp. 38-42.

²⁰⁴ Special Eurobarometer 438. Report. E-Communications and the Digital Single Market. May 2016, p. 45.

²⁰⁵ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 89 – 90 and 36-38.

²⁰⁶ The calculation methodology and data can be found in Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, Annex, pp. 121-123.

NRAs is likely to be neutral. Many NRAs already have significant responsibility over policy and/or technical aspects of USO.

The increased use of broadband facilitated by this option is likely to have positive implications on reduction of greenhouse gas emissions, air pollution and waste²⁰⁷. By fostering the adoption of digital services, eCommerce, teleworking and other activities that generate less pollutants, increase energy efficiency of necessary real-life activities and reduce transportation needs, broadband contributes to the creation of sustainable, energy-productive and low-carbon economy.²⁰⁸ A study of five EU Member States by the Global e-Sustainability Initiative (GeSI) found that broadband-enabled typical household activities result in **a reduction of 39 mln tonnes of annual carbon dioxide emissions**.²⁰⁹

4.3.3.4 Option 4 Significant adaptation to trends and connectivity objectives

Economic, social and environmental impacts

While impacts of this option for social inclusion, participation and reduction of digital divide are significant, it has serious economic drawbacks. The total costs of providing fixed wired (xDSL, cable and FTTx) broadband connections (excluding affordability costs) of 4 Mbps to all households in the territory, has been estimated to be 6.8 billion euro for EU-27 in 2015²¹⁰. While costs for some of the Member States with very high penetration and subscription levels (Malta and the Netherlands) are negligible, Member States with large territory, difficult terrain and extensive rural areas will have to bear a disproportionately high cost (for instance, it has been estimated that Poland needs 1.3 billion euro).²¹¹

The provision of universal service is without constraints on the technical means and it is obvious that mobile wireless and satellites are viable alternative or complementary technologies and the required investments would likely be less²¹². Furthermore, if access has to be requested it is probable that not all unconnected households will make the request; this could considerably reduce deployment costs²¹³.

Further drawbacks of using the universal service instrument for broadband deployment refer to the high risk of market and competition distortions and cost deficiencies. Using universal service funds to deploy broadband may discourage private investments resulting in crowding-out effects and, potentially, delaying expansion of VHC networks. If sectorial funding is used, financial transfers between competitors may strengthen the dominant position of the designated universal service providers, especially the vertically integrated ones. This will not only damage competition in the market, but also distort price levels and negatively impact affordability of services.²¹⁴ It is therefore advisable to use other policy tools instead of universal service,

²⁰⁷ Matthews, H.S., Hendrickson, C.T. and Soh, D. (2001) Environmental Implications of e-Commerce and Logistics. DOI: [10.1109/ISEE.2001.924525](https://doi.org/10.1109/ISEE.2001.924525). Available at: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=924525.

²⁰⁸ See findings of the study by Global e-Sustainability Initiative and Boston Consulting Group (2012). GeSI SMARTer 2020: The role of ICT in driving a sustainable future: http://gesi.org/assets/js/lib/tiny_mce/jscripts/tiny_mce/plugins/ajaxfilemanager/uploaded/SMARTer%202020%20-%20The%20Role%20of%20ICT%20in%20Driving%20a%20Sustainable%20Future%20-%20December%202012.pdf

²⁰⁹ See GeSI, Yankee Group and American Council for Energy-Efficient Economy (2012). Measuring the energy reduction of selected broadband-enabled activities within households: <http://gesi.org/files/Reports/Measuring%20the%20Energy%20Reduction%20Impact%20of%20Selected%20Broadband-Enabled%20Activities%20within%20Households.pdf>.

²¹⁰ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011

²¹¹ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 72-73.

²¹² However, these technologies can be affected by issues like data caps, the shared nature of a wireless channel, weather-dependence and, in the case of satellite, signal latency and end-user equipment costs. For more information on general wireless connection scenarios in the EU, see Analysys Mason (2016)

Costing the new potential connectivity needs.

²¹³ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 80 (Assessment of different modalities of how broadband should be provided within the Universal Service Regime)

²¹⁴ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, p. 75.

focusing on incentivising commercial investment, coupled with targeted state aid, where market failures persist, and using pro-competitive and technologically neutral project models in specific areas.

Environmental impacts of this option are similar to Policy Option 3. The positive implications will increase with a greater amount of people adopting broadband and making use of teleworking and telecommuting, which are responsible for the largest energy savings and reduction of carbon emissions.²¹⁵

4.3.4 Comparison of options

4.3.4.1 Effectiveness

Neither Option 1 nor Option 2 can be considered to be sufficiently effective to achieve the objectives of universal service policy because they do not prevent social exclusion and inequality avoiding the necessary change in scope needed to offer a minimum of communications services reflecting technological and market developments.

Options 3 and 4 suggest modernisation of the universal service scope that takes into account the ongoing connectivity trends and shall provide an improved access to and use of the broadband connection as an important asset of participation in social and economic life. Options 3 and 4 also foresee an appropriate adjustment of the financing mechanism that would allow for a fair distribution of costs and benefits of broadband for all stakeholders. By comparison to Option 4, Option 3 provides for a greater flexibility at the national level.

4.3.4.2 Efficiency

Option 3 is the most cost effective as the calculated cost lies below the cost of social tariffs for telephone subscription (1,07% v 1,95% of disposable income respectfully²¹⁶). The cost of social tariffs if affordable broadband connection were included in the universal service scope is estimated to be between 147 mln euro and 436 mln euro per annum for EU-27. This is at a similar level to social telephony tariffs currently offered under national universal service schemes.²¹⁷ If combined with public funding, Option 3 offers an optimal combination of low cost and equitable distribution of their financing.

The current financing of universal service obligations is either through public funding, through financing with contributions from the providers of electronic communications networks and services (sectorial funding mechanism) or a combination of both public and sectorial funding. For the Member States that use sectorial funding, the removing of sectorial contributions would mean adding the net costs of universal service to the public budget. However, the mandatory services at EU level would only cover affordability while the current scope also includes availability. Furthermore, the exclusion of redundant services at the EU level may reduce the financial burden. The net costs of providing affordable broadband would be an addition to the public budget that should be assessed in the wider context of allowing participation in the digital economy and society.

Option 4 is the most expensive one. It is estimated that already in 2015 the cost of connecting (fixed wired technologies²¹⁸) all unconnected households in EU-27 amounted to at least 6.8 bn

²¹⁵ See GeSI, Yankee Group and American Council for Energy-Efficient Economy (2012). Measuring the energy reduction of selected broadband-enabled activities within households: <http://gesi.org/files/Reports/Measuring%20the%20Energy%20Reduction%20Impact%20of%20Selected%20Broadband-Enabled%20Activities%20within%20Households.pdf> .

²¹⁶ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, Annex, p.120.

²¹⁷ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 87-91.

²¹⁸ Other technologies, such as mobile wireless and satellite, are good complements and could influence the cost calculations.

euro for 4 Mbps broadband connection (primary basket²¹⁹). The cost increases considerably with higher speed connection²²⁰:

- Basket 2 (4.6 Mbps): 9.6 bn euro
- Basket 3 (8.3 Mbps): 15.6 bn euro
- Basket 4 (21 Mbps): 46.9 bn euro

Extrapolated to the connectivity needs of 2020, the investment necessary to overcome the broadband inclusion gap to access the four baskets of online services in EU27 Member States results in²²¹:

- Basket 1 (9.6 Mbps): 13.7 bn euro
- Basket 2: (11.9 Mbps): 17.1 bn euro
- Basket 3: (21.5 Mbps): 32.5 bn euro
- Basket 4: (54.5 Mbps): 143.8 bn euro,

with the financial burden falling disproportionately on the population of scarcely populated Member States with large territory and difficult terrain.

The amount of funding can be adjusted by limiting the provision of broadband only to those households that reasonably request broadband access and to primary location, as currently required by the Universal Service Directive (see Recital 8 and Article 4 (1) USD). For such 'on request' households the investment needed in 2020 is estimated at:²²²

- Basket 1 (9.6 Mbps): 7.5 bn euro (difference – 6.2 bn euro)
- Basket 2: (11.9 Mbps): 9.4 bn euro (difference – 7.7 bn euro)
- Basket 3: (21.5 Mbps): 17.8 bn euro (difference – 14.6 bn euro)
- Basket 4: (54.5 Mbps): 79 bn euro (difference – 64.7 bn euro)

Furthermore, the provision of universal service is without constraints on the technical means and it is obvious that mobile wireless and satellites are viable alternative or complementary technologies and the required investments would likely be less, but subject to certain limitations²²³.

Options 1 and 2 – although exhibiting the falling net cost of the universal service provision – represent a financial burden for the electronic communications industry. As indicated in Section 4.3.3, maintenance of payphones in the EU is estimated annually at 1 billion euro, which is a large cost considering the very infrequent use of the facility. Usage and cost of the provision of comprehensive directory and directory enquiry services is difficult to estimate, but the available data suggest that commercial provision by the market is viable and sufficient.²²⁴

²¹⁹ In the study "Review of the scope of universal service, SMART 2014/0011" a methodology focusing on four baskets of online services was developed. The primary basket was comprised of online services, which provide social and digital inclusion, used by the majority of consumers. Three additional baskets of online services were developed, which did not meet the requirement for use by the majority of consumers required by Annex V of the Universal Service Directive.

²²⁰ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, p.p. 72-73.

²²¹ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, p. 74.

²²² Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 80-81.

²²³ For more information on general wireless connection scenarios in the EU, see Analysys Mason (2016) Costing the new potential connectivity needs.

²²⁴ Tech4i2 et al. (2016) Review of the scope of universal service, SMART 2014/0011, pp. 38-42.

4.3.4.3 Coherence

By comparison to Options 1 and 2, Options 3 and 4 are more strongly aligned with other policies of the EU in the field of the Information Society and the EU Charter of Fundamental Rights due to the significant revision of the scope. Broadband has developed into a basic platform for information and communication services and activities, and ensuring access to and use of it will facilitate full participation of the citizens in the social and economic life of the society. Broadband-based services and applications offer innovative possibilities for communication that may improve social and economic opportunities of people with disabilities and elderly people and support their independence and integration.

Options 3 and 4 are more coherent with competition and investment policies as they improve the level playing field for ECS and OTT providers by reforming the financing arrangements for universal service and enhancing legal certainty.

Option 4, however, may collide with other policies fostering broadband deployment and with State aid rules because it foresees an instrument of far-reaching public support of broadband availability. By contrast, Option 3 suggests such possibility of flexibility for Member States to include the availability element only in exceptional circumstances, after demonstration of market failure and after using other more appropriate public funding tools such as state aid measures on broadband deployment, spectrum coverage conditions, regulatory incentives for investment, e.g. it might be reserved for more isolated cases, not easily captured by state aid schemes, or in the final uncovered percentile of population under spectrum coverage conditions.

4.3.4.4 Impact on stakeholders

See also table presented in Annex 12 specifying in detail impacts on stakeholders for each policy option.

While Options 1 and 2 seem to be most neutral in their impact on stakeholders, they fail to address the core problems that the universal service regime is supposed to solve, i.e. provision of a safety net for disadvantaged users in order to reduce the risk of social exclusion and digital divide. Additionally, the sectorial funding mechanism of universal service that is currently used by the majority of Member States creates economic burdens, and legal uncertainty with regard to compensation, especially for new entrants. By contrast, Options 3 and 4 modernise both the universal service scope and funding and score better in addressing the challenges described. At the same time, Options 3 and 4 are sufficiently flexible and leave Member States enough room to adjust the universal service scope to their national circumstances. The reformed financing alleviates financial and administrative burden for all types of providers and operators. However, inclusion of available broadband in the universal service scope (Option 4) is likely to have an adverse effect on alternative providers and new entrants by comparison to the incumbents because it might crowd out investments, distort competition and price levels and strengthen the market position of incumbents.

4.3.4.5 Summary table comparing Universal Service options

Table 9 - A comparison of options for universal service

	Effectiveness					Efficiency	Coherence			EU value add
	VHC coverage	VHC take-up	Universal availability	Competition (infra/service)	Fosters cross-border services/entry		Cost/complexity / enforceability	Disruption from status quo (stability)	Internal coherence	
Option 1: status quo	0	0	0	0	0	0	0	0	0	0
Option 2: Light adjustment	0	0	0	0	0	0		-		-
Option 3: broadband and affordability	0	0	+	+	+	+		+	+	+
Option 4: Broadband and availability	+	+	+	-	+	-		+	-	+

4.3.5 The preferred option

The Commission considers that option 3 on Universal Service Obligation is the best option to achieve the overall and specific objectives of the review of the telecom framework as presented in section 3.

No macroeconomic effects could be quantified through modelling for this policy area.

4.4 Services and end-user protection

4.4.1 Options

Options under this header will be structured around the following topics: services; must carry and obligations applying to electronic programme guides (EPG obligations) and numbering.

4.4.1.1 Services:

Option 1 – Baseline scenario

Under the current framework the service policy is primarily aimed at protecting consumer interests including disadvantaged and disabled end-users. Consumer protection obligations are covered by the Directive on Universal Service and Users' Rights, including provisions on:

- A. Obligations to facilitate switching including 1 day number portability obligations
- B. Sectorial contractual obligations, including conditions on contract contents, contract duration and contract termination
- C. Provisions concerning transparency on tariffs and other conditions
- D. Ensuring equivalence in access and choice for disabled end-users
- E. Provisions concerning transparency on Quality of Service and potential minimum QoS requirements

The types of services covered by these provisions include all electronic communications services' (ECS) commonly provided over networks including telephone calls, messaging and Internet access services. Electronic communications services are also subject to obligations concerning security and integrity,²²⁵ while privacy is covered by a separate Directive,²²⁶ which is subject to a separate review.²²⁷ General legislation e.g. on consumer protection also applies to all ECS.

Under this option no change will be introduced to the regulatory framework relating to services, thus this scenario reflects possible developments in the absence of new EU-level action.

Option 2 – Streamlining of current provisions and addressing certain new challenges without modifying the scope of the Regulatory Framework

Option 2 would review the substantive provisions applicable to ECS providers while keeping the current scope of the framework, mainly based on the definition of ECS, including the notion of "conveyance of signals". Only telecom operators would remain subject to obligations and enjoy the rights provided by the regulatory framework as it is the case today.

Provisions which have become obsolete due to new legal, market and technological developments would be repealed. This includes the sector-specific provisions of the regulatory framework which overlap with general EU consumer law, for instance general consumer law rules on information requirements in contracts included in the Consumer Rights Directive. However, as general consumer law requirements would still be complemented with provisions that are sector specific the reduction of overlapping between sector specific and consumer protection legislation is likely to be rather limited, as in many cases it seems indispensable to keep certain sector specific provisions.

Provisions not covered by horizontal Union legislation will be maintained where they are still needed, repealed where no longer needed or adapted to respond to new challenges. This would for instance cover issues such as an adaptation of the rules to the increasing importance of bundled offers and possible barriers to switching: current rules have been very effective in empowering consumers to benefit from competition between voice telephony service providers and they should be adapted to the new context in order to continue fostering competition and consumers' choice. Other adaptations would include better readability of contracts and the possibility to impose an obligation on operators to provide consumption monitoring tools. In addition, this option would extend the already existing mandate to the Commission to impose technical implementing measures with the possibility to adopt delegated acts necessary to ensure the compatibility, interoperability, quality, reliability and continuity of emergency communications in the Union with regards to caller location, call routing to the Public Safety

225 Article 13a Framework Directive

226 Directive 2002/58/EC as amended by Directive 2006/24/EC and Directive 2009/136/EC

227 See <https://ec.europa.eu/digital-single-market/en/news/public-consultation-evaluation-and-review-privacy-directive>

Answering Point (PSAP) and access for disabled end-users. Only such an approach can ensure cross border deployment and functioning of technical solutions.

As indicated in the problem definition, many stakeholders (BEREC, several Member States, most operator associations, most incumbents, some cable players, all user associations and some broadcasters) referred in the public consultation to the need to review the current definition of ECS, owing to the increasing uncertainty on the scope of the definition of ECS related to "conveyance of signals", the inconsistent regulatory obligations for similar services and the convergence of communications services. Only a minority of stakeholders opposed to a review of the definition, arguing that the concept of ECS has proven itself and that changes could create regulatory, legal and investment uncertainty.

Option 3 – Internet Access Service (IAS) only

This option would limit the application of sector-specific legislation to *internet access services* (IAS) only, adapted to the increasing importance of bundled offers, whereas communications services that run on top of IAS would not be subject to such legislation. It is based on the idea that in an environment migrating towards all-IP, most communications services will be data-based. Hence, the IAS is likely to become the end-users' main gateway to access the internet and most communications services, resulting in a high unilateral dependency on the end-user side, which would justify the application of sector-specific rules to IAS.

It would rely on the definition of IAS in Article 2(2) of the Telecoms Single Market Regulation. This option includes the streamlining exercise of Option 2, which would identify only those rights and obligations (including end-user protection rules) which are relevant for IAS: Some sector-specific rules (e.g. on contract duration or switching) would be maintained while others, which are relevant for IAS and essential to end-users, such as rules on transparency, will be adapted to market and regulatory developments. It would include a non-discrimination provision guaranteeing the freedom of end-users to use public electronic communications networks or services provided by an undertaking established in another Member State and prohibiting discrimination based on nationality or the place of residence of the end-user. This option could be accompanied by full harmonisation.

Communication services provided either traditionally, such as voice telephony, or on top of IAS, would not be subject to sector-specific legislation.

This option will put a special emphasis on broadening end-user rights for IAS only. For example, rights to have a facilitated switching process led by the receiving operator, the obligation to inform the end-user in due time, so that the end-user has sufficient time to oppose to an automatic roll-over, or the introduction of comparison tools and websites to ensure better transparency and comparability of tariffs and quality of service parameters.

With a few exceptions, stakeholders did not show support to a reduction of sector specific regulation to internet access service only, the main reason being that in a transition phase towards a full Internet-based model there should not be any inconsistencies nor different regulations and levels of consumer protection applying to different services that consumers perceive as substitutable in order to ensure a level playing field. Only some telecom operators advocated for such a possibility, but they considered that regulation should keep some consumer protection features such as number portability, emergency calls, confidentiality, safety and security obligations, transparency or cost control.

Option 4 – IAS and regulatory obligations for electronic communications services mainly linked to the use of numbering resources

This option builds on option 3 as described above. Additionally, it proposes, on top of the regulation of IAS (as IAS remains a critical access point for end-users to access other online services), to apply a limited set of sector-specific rules to communications services, provided either traditionally, such as voice telephony, or on top of IAS. The concept of interpersonal communications services would include any functionally substitutable services used for interpersonal communications, in other words services that enable direct interactive communication

between two or a determined number of natural persons (including those acting on behalf of legal persons, but excluding M2M services) irrespective of the technology used for their provision.

As regards regulatory obligations (i.e. the application of a minimum subset of communications-specific rules, as identified in the streamlining exercise described in option 2) applicable to interpersonal communications services, most of them would be linked to the use of public numbering resources ("use" being understood as provision of numbers to the service's own subscribers, or provision of a service that enables communication with other providers' subscribers via such numbers) – confirming an approach that has been identified by regulators²²⁸ since at least the last review of the framework but which is widely contested by the relevant service providers and has not been widely applied in practice. The scope of access to emergency services would be redefined using the concept of number-based interpersonal communication services, however, the difficulties in assuring quality of service of such calls would be recognised. Rules that would apply to number-based interpersonal communications services cover inter alia contract duration, transparency, information on quality of service, number portability led by the gaining provider, provision of information to oppose automatic roll over of contracts, consumption monitoring tools, comparison tools for both prices and quality of service or switching rules for bundles to avoid lock-in effects.

However, there are certain areas where public policy interests may require applying regulatory obligations to all newly defined interpersonal communications services, i.e. also to those that are provided over the IAS but do not use numbering resources. These are at least the following areas: security and confidentiality of communications²²⁹ (the exact confidentiality obligations would be subject to further conclusions of the review of the e-privacy Directive).

This option could be accompanied by full harmonisation with limited exceptions, e.g. on maximum contract duration, making it easier for communications services to comply with the legislation.

Finally, for reasons of proportionality, this option does not immediately apply to OTT communications services obligations in the areas of interoperability and emergency services; but, as such obligations may become necessary in the future, it provides a mechanism giving the possibility to intervene, if so needed, in these two areas.

In the public consultation a clear majority of respondents were of the opinion that all functionally substitutable communications services should fall under a new, technology neutral common definition, but had significantly varying positions on the types of obligations that should apply to services falling within such a definition. Consumer organisations in particular expressed support for specific rules with regard to voice services for end-users, highlighting the importance of service availability and of voice quality as a distinctive characteristic. Only a minority of stakeholders, including OTTs, opposed this approach. Many respondents claimed that the definition should be independent from remuneration modalities (i.e. free / data driven) and that the condition that service are provided "for remuneration" should not only cover monetary but also direct or indirect remuneration (e.g. commercialisation of data).

A large number of stakeholders consider that all the voice services perceived by the users as substitutive to the current PSTN voice service (same look & feel) and also give access to E.164 numbers should be subject to the same obligations regarding the access to emergency services. In the same vein some NRAs support an obligation on communication services (including OTTs) that give access to numbers in the numbering plan. Legal clarity is requested by these NRAs and some operators regarding access to emergency services by all communication providers (OTTs included) that offer access to an E164 number.

Option 5 – Functional approach to communications services

This option builds on option 3 and would establish a two-tiered approach as in option 4 with the difference that, under this option, regulatory obligations would not be linked to the use of numbers exclusively but would apply to all interpersonal communication services. The definition of communication services would be based on a functional and technology-neutral approach that

²²⁸ ERG Common Position on VoIP, December 2007

²²⁹ SMART 2013/0019: 33% of respondents to the survey have concerns about privacy and claim this is a reason for not using OTT services.

would comprise all services with communication features, including new services to emerge. A minimum subset of communications-specific rules, as identified in the streamlining exercise described in option 2, would apply to all functionally substitutable communication services (both OTT and ex-ECS), for example to ensure protection against specific communications-related risks (confidentiality and security) and to facilitate switching with portability rules, including portability of user generated content. The obligation to give access to emergency services would be extended to all these interpersonal communication services wherever technically feasible. It would also include interconnection and interoperability obligations subject, however, to reasonableness considerations relative to technical feasibility, significance of take-up of a given service as well as cost considerations. This option could be accompanied by full harmonisation. As in option 4, a clear majority of respondents were of the opinion that all functionally substitutable communications services should fall under a new, technology neutral common definition, but there were significantly varying positions on the types of obligations that should apply to services falling within such a definition.

4.4.1.2 *Must carry and electronic programme guides (EPG) obligations*²³⁰

Option 1 – Maintain Member States' possibility to impose must carry and EPG obligations

Must carry and EPG obligations aim at ensuring that TV and radio channels of high public interest are broadcast by electronic communications providers, while avoiding unreasonable burden on the latter.

Under the current Regulatory Framework must carry rules: A) allow Member States to promote general interest content; B) Ensure that provisions are proportionate and notably do not disproportionately “crowd out” channels from commercial broadcasters or from other Member States; C) Ensure that the provision of broadcast transmission services by electronic communications networks operators can be a sustainable commercial activity on liberalised markets

The provisions in the Regulatory Framework regarding electronic programme guides allow: A) to promote fair competition (notably prevent EPGs affiliated with commercial platforms/broadcasters from discriminatory treatment against other platforms/broadcasters, including against providers of general interest channels); B) to facilitate access and orientation.

This option would keep the current must carry²³¹ and EPG rules in place. While there is a majority view from stakeholders that transmission obligations imposed on electronic network operators (must carry rules) and rules related to electronic programme guides should be adapted to new market and technological realities, there is sharp disagreement as to how such adaptation should be conceived. Extension of the current rules is supported by some Member States and most broadcasters, whereas most telecom operators are in favour of reducing the scope of the rules. Accordingly, keeping existing must carry and EPG provisions in place can provide a certain degree of balance between these conflicting stakeholder positions.

The scope of current obligations is limited by the requirement that a significant number of end-users use the electronic communications network(s) concerned as their principal means to receive TV and radio²³² broadcast channels and that Member States review the obligations in regular intervals. It would be clarified that the transmission obligations may include data

²³⁰ For an evaluation of the current must carry and findability provisions, please refer also to the corresponding sections of the Evaluation SWD, in particular 7.2.3.13 and 7.3.2.13.

²³¹ For the obligations currently in place see pp.23 of the study "Access to TV platforms: must carry rules, and access to free-DTT" by the European Audiovisual Observatory, December 2015, available at [http://www.obs.coe.int/documents/205595/264629/Must+Carry+Report+\(Dec.+2015\)/bb229779-3fb2-488d-9c0e-d91e7d94b24d](http://www.obs.coe.int/documents/205595/264629/Must+Carry+Report+(Dec.+2015)/bb229779-3fb2-488d-9c0e-d91e7d94b24d) Individual country reports are on pp. 53.

²³² Radio is an important part of the cultural landscape in Europe and accordingly an important element of the digital single market.

complementary to radio and TV channels which supports connected TV services and EPGs²³³. In addition, the newly adapted net neutrality rules would apply. Current obligations on EPGs would also remain in place.

Option 2 – Phase out must carry obligations

This option envisages an obligatory phase-out of 'must-carry' obligations by 2020-2025. This could be combined with the possibility for national and/or regional derogations where needed. This option assumes a certain pace of broadband roll-out capable of supporting online TV distribution. National and/or regional derogations could be granted where and for as long as ubiquitous broadband coverage has not been achieved.

Telecom operators are in favour of reducing the scope of the rules, other stakeholders did not show support to this option. Some cable and telecom operators call for complete removal of must carry obligations or at least to limit them to the main/most essential general interest channels.

Option 3 – Extend must carry obligations

This option considers extending the scope of must carry obligations which Member States may impose with respect to on-demand services and subject to the network's functionalities. Such extended must carry obligations would apply to any platforms that provide a significant, share²³⁴ of TV and radio channels (including on-demand services) viewed in a Member State, regardless of whether they are transmitted directly via electronic communications networks or via specialised services provided over electronic communications networks.

The option to extend rules is supported by some Member States and most broadcasters. Telecom operators are opposed.

Numbering²³⁵

Option 1 – No change in the EU framework on numbering

Telephone numbers play an important role in the proper functioning of the telephone network, both fixed and mobile, notably in routing, management and identification. The use of numbers is coordinated by the ITU at the global level²³⁶ and implemented by national governments in the national numbering plans²³⁷.

The current regulatory framework requires Member States to ensure that adequate numbers and numbering ranges are provided for all publicly available electronic communications services, via objective, transparent and non-discriminatory procedures. The management of numbers at the national level is typically assigned to a government entity or agency, usually the National

²³³ This would allow Member States ensuring that signalling sent alongside broadcast signals and intended to ensure synchronisation of the linear broadcast channels with OTT services is not blocked. This would entail that red button services (providing additional programme information on demand) as offered by public and commercial broadcasters in several Member States would not be blocked by ECNs.

²³⁴ As defined by Member States.

²³⁵ For an evaluation of the current numbering provisions (and corresponding problems), please refer also to the corresponding sections of the Evaluation SWD, in particular 7.2.3.3 and 7.3.3.3.

²³⁶ International Telecommunications Union – Telecommunications Sector (ITU-T), which is originated as a treaty organisation of member states operating under the auspices of the United Nations. Today, it brings together 139 countries, 800 private-sector entities and academic institutions

²³⁷ ITU-T's Recommendation E.164 defines the structure and functionality of the telephone numbering plans and is followed by national governments in the actual assignment of blocks of national numbers to operators, who assign a particular number to an end-user. Recommendation E.212 defines the International Mobile Subscription Identity (IMSI) used within mobile networks, . The IMSI is used in addition to an E.164 (mobile) telephone number and . It enables international roaming. For governance purposes, at regional level, regional organisations, such as the CEPT (European Conference of Postal and Telecommunications Administrations) in Europe, coordinate the interests of stakeholders at that level. CEPT further coordinates cross border issues among and its 48 Member Countries, that also encompass EU Member States. CEPT can make Recommendations and Decisions but they are not legally binding.

Regulatory Authority. The Ministry responsible for telecommunications policy typically retains the governance responsibility.

In addition, the Authorisation Directive lays down requirements on the assignment of numbers and the conditions for the right of use. Annex C to the Authorisation Directive provides for an exhaustive list of conditions which may be attached to the right of use for numbers.

Article 10 of the Framework Directive includes provisions requiring Member States to support the harmonisation of specific numbers or numbering ranges within the Community where it promotes both the functioning of the internal market and the development of pan-European services, and vests the Commission with the task to adopt implementing measures. Article 27 USD lays down technical provisions on international telephone access codes and on the European Telephone Numbering Space (ETNS), which has been dismantled in 2009 by the withdrawal of the number by ITU.

Option 1 foresees a baseline scenario where no change is introduced to the current Regulatory Framework. This baseline option would by definition not entail measures to cope with developments in the area of numbering (notably, the dismantling of ETNS), that would require adaptation of existing rules.

In the absence of further harmonisation or a Pan-European numbering range, Member States can freely establish the conditions for the use of their numbering resources, and create new national E.164 (telephony) number ranges as well as new E212 (mobile IMSI) ranges for M2M services and define individually or in a coordinated manner specific regulatory requirements for these new ranges to address shortage of existing numbering resources. Member States could also decide to relax national number assignment criteria and assign numbers to M2M providers in order to address the competition issue that non-electronic communications service providers are deprived of numbering resources in some of the Member States. This option however does not provide solutions to regulatory fragmentation, and would not take into account requirements of the Single Market.

Option 2 – No change in the EU framework on numbering with repeal of redundant rules

This option would entail no new elements to the regulatory framework. Only Article 27 USD on European telephony access codes would be repealed due to the dismantling of ETNS, and the remaining provision on international access code would be moved to the existing Article 10 FWD. The competences and freedoms of Member States would remain as described in Option 1, and no European solutions would be developed for the challenges posed by M2M development and cross border services on the Single Market.

Option 3 – Adapting the EU framework on numbering to address the competition issue on the M2M market

Under this option the EU framework would be adapted to allow the assignment of numbers by NRAs to non-MNOs, such as large M2M providers (as an explicit option for NRAs without imposing any obligation on NRAs to do so). This would be particularly relevant for E.212 (mobile IMSI) numbers, that are in some Member States reserved to MNOs exclusively. In this respect, current holders of numbers, in particular MNOs, highlighted implementation and security issues such as risk of fraud, partial exhaustion of national numbering resources, and problems concerning interoperability and end-to-end connectivity.

Concerning extra-territorial use of national numbers, NRAs would have to determine a range of non-geographic numbers for the provision of ECS other than interpersonal communications services throughout the territory of the Union. In addition the NRA granting rights of extraterritorial use for numbers would have to attach conditions ensuring that consumer protection and number-related rules of those Member States where the numbers are used, are respected. The public consultation showed that there is a clear consensus that to cope with the numbering needs of M2M in the future, clear rules for extra-territorial use of numbers are necessary to ensure sufficient numbering resources.

Finally, the framework would include a mechanism for introducing common EU-level numbering spaces in the future, in case extra-territorial use is not sufficient to meet the increasing demand. While the public consultation did not reveal a manifest support for a new European numbering initiative, the rapid developments in the area of M2M could bring fundamental changes to numbering regulation, which would be anticipated by such an enabling provision.

4.4.2 *Discarded options*

This section outlines the options which have been discarded. A more detailed analysis can be found in Annex 3 on discarded options as well as the IA support studies.

4.4.2.1 *Services*

- No sector-specific regulation for services in the future

4.4.2.2 *Numbering*

- Adapting the EU framework on numbering to address the competition issue on the M2M market, and directly creating (E.164 and E.212) European numbering ranges to promote a single market for M2M.

4.4.2.3 *Must carry and findability (EPG)*

- Extending the scope of must carry obligations to OTT services
- Extending the scope of EPG obligations and introducing regulatory safeguards to improve findability

4.4.3 *Impacts*

4.4.3.1 *Services*

4.4.3.1.1 Option 1 – Baseline scenario

Option 1 involves a continuation of the existing regime. The current scope of the framework would be maintained, implying that the currently prevailing uncertainty on rights and obligations for the provision of equivalent services remains. Also current gaps with regards to consumer protection would persist. Moreover, this option would not address technology and market changes including emerging risks in the field of consumer protection related to the use of bundles.

Economic impacts

Discrepancies on rights and obligations of the rules may hinder confidence in future activities by communications service providers. Furthermore, it may also create new barriers for the internal market as it opens the door to different interpretations by Member States and lead to new issues of different regulatory treatment of similar services, depending on the degree of vertical integration of the providers.

Telecom operators operating in multiple countries will remain subject to heterogeneous compliance and consumer protection costs. This may impede telecom operators from expanding across borders. In relation to obsolete or redundant consumer protection provisions, telecom operators will remain subject to unnecessary administrative and compliance costs.

Annual economic growth is expected to advance as forecasted in the base scenario used in the supporting study of this document, i.e. 1.7% for the period 2021 to 2025.

Social and environmental impacts

The degree of protection with regards to security and privacy remains unchanged, and a significant number of consumers will remain confused as to the degree of legal protection of security and privacy when using a particular electronic communications service²³⁸. This hinders them in making informed decisions and leaves them without clear sector-specific legal protection, when using communications services of OTT providers. Certain new end-user challenges would go unaddressed, such as problems when switching multi-play bundles. The growing reliance of end-users on OTT communication services may effectively reduce accessibility of emergency services. The lack of accuracy of caller location in case of emergency communication hinders effective access to emergency service while EU wide interoperable accessibility solutions for disabled end-users are still not deployed. The net environmental impact will be neutral.

4.4.3.1.2 Option 2 – Streamlining of current provisions and addressing certain new challenges without modifying the scope of the Regulatory Framework

Option 2 envisages a streamlining exercise of the sector-specific rights and obligations but no change to the current definition of electronic communications services (ECS). It will also address new challenges based on recent commercial and technical developments in the telecommunications markets.

Economic impacts

A significant impact on the objective of providing a European-wide pro-competitive regulatory framework for communications services is not expected. Compared to the baseline scenario, possible competitive distortions remain unchanged. Possible benefits for operators offered by the growing popularity of multi-play bundles and their associated lock-in effects would be mitigated as a result of new measures facilitating switching. These measures could have a chilling effect on pro-competitive bundles, potentially depriving consumers of some benefits of built-in discounts relative to stand-alone products or services.

The streamlining exercise would reduce some of the problems with regulatory heterogeneity, however, it would only very slightly reduce the problem of unequal treatment for ECS and OTT providers as it would lift some overlapping obligations and compliance costs for ECS and removed obsolete rules. However, there would remain a risk of (growing) regulatory heterogeneity resulting from current minimum harmonisation and doubts about the scope of the regulatory framework. New players would experience no change with regards to uncertainty about whether or not they fall within the scope of the framework.

Macro-economic growth will advance as forecasted in the base scenario with a very minimal upward correction.

Improvement in the accuracy of caller location, access for disabled end-users and the performance of Public Safety Answering Points would incur cost in the networks and Public Safety Answering Points but these would largely be offset by the benefits arising from the effectiveness of the emergency intervention (safeguarding public health and welfare).

Social and environmental impacts

Impacts on employment in the sector as well as macro-economic employment are negligible compared to the baseline option.

²³⁸ SMART 2013/0019: 33% of respondents to the survey do have concerns about privacy and claim this is a reason for not using OTT services

The degree of protection of end users with regards to security and privacy of communications would remain unchanged. Although there is still a risk that end-users could experience problems when switching multi-play bundles, the new consumer protection rules in this respect, applying key ECNS protections such as those on contract maximum duration and contract termination to all components of a bundle, will likely have positive consequences for future affordability and quality of communications services. More accurate caller location will be reflected in timely and effective emergency relief resulting in the mitigation of adverse effects of emergency situations to health and property. Accessibility solutions in emergency communications would ensure integration, safety and mobility of disabled-end-users.

4.4.3.1.3 Option 3 – Internet Access Service (IAS) only

Option 3 would reduce the scope of sector-specific rules to the internet access service (IAS), but leaves outside the scope any communication services (either traditional or provided on top of the IAS).

Economic impacts

Traditional telecommunications services such as voice and SMS are no longer subject to interconnection, interoperability and number portability obligations. This would in principle reduce many compliance and enforcement costs, but could create new ones related to IAS monitoring and reporting, and could as well create several competition issues. The possibility to implement this option should also be examined in view of international commitments (e.g. GATS) with regards to interconnection of public telecommunications services which would not be covered by this option, e.g. voice telephony services.

First, end-users would experience considerably higher switching costs related to the inability to port numbers which remain in widespread use. Second, new level playing field problems could arise since large telecom operators could push smaller operators out of the market by denying interconnection. This would not only have concentrating effects on the retail markets for voice and SMS but, via bundling, also for IAS and broadcasting services. It would lead to less competition between telecom operators and have an upward effect on fixed and mobile profit margins. The latter effect is (partially) countered by additional end-user measures facilitating the switching process and limiting automatic roll-over of contracts, as well as by comparison tools.

From an internal market perspective, the costs for telecom operators of operating in multiple countries would be reduced. It would also reduce uncertainty about the risk of regulatory heterogeneity resulting from current doubts about the scope of the regulatory framework. However, lower levels of competition in national telecom markets could be detrimental for the Internal Market as it implies rising (strategic rather than regulatory) barriers to enter national markets. All in all, option 3 will likely lead to less competition and at macro-economic level the impact may be neutral compared to the baseline as described under option 1.

Social and environmental impacts

Depending on the net effect on telecom revenues and profitability, some positive effects could be expected in terms of employment creation in the sector but these could be offset by synergies and economies of scale brought about by the likely market consolidation process. Given the role of the sector as an enabling input for the whole economy, a reduction in the efficiency of its functioning may have a negative impact on macro-economic employment.

The potential gains for consumers brought about by additional measures aiming at prohibiting discrimination based on nationality or the place of residence of the end-user and making easier to switch between providers of bundles could be countered by the likely market concentration. Option 3 will have a negative impact in terms of security and privacy protection regarding telecom services. The impacts in terms of affordability and/or quality are unclear.

4.4.3.1.4 Option 4 – IAS as in option 3 and regulatory obligations linked to the use of numbering resources

Besides the regulation of the IAS, this option would link the authorisation requirement for communications services (other than internet access service) and subsequent regulatory obligations to the use of numbers, while safeguarding other end-user and public policy interest (security, privacy) as described in 4.4.1.1.

Economic impacts

This approach would bring some clarification on the scope of application of the framework and make regulatory obligations legally binding for voice, text and other communication services that make use of numbering. It is not possible to estimate the annual costs associated with number-related obligations imposed on respective OTTs. However, the fact that OTT communication services like e.g. Skype Out / Skype In and Viber Out / Viber In would be clearly subject to the above set of obligations and associated costs is expected to have little impact on competition in the market. All OTTs would be subject to similar obligations with respect to confidentiality (and potentially privacy, subject to the ePrivacy Directive review) and this may imply that some of the current OTT business models may need to evolve. In terms of access to emergency services, once a standardised technical solution is available for routing OTT emergency communications, its implementation would ensure broader access to emergency services, hence larger scope for safeguarding life, health and property.

Enforcement and compliance costs would slightly go down with the streamlining of rules. The administrative burden may increase for OTT providers that use numbering resources as they will now be clearly subject to certain sector-specific regulatory requirements which have hitherto not been systematically applied to them by Member State authorities. In addition, all OTTs (regardless of the technology used) will see an increased administrative burden in relation to the rules on security. In this regard, it is important to note that providers of electronic communications networks and services have been subject to security obligations for years and compliance costs have not been identified as an issue. As technological and market developments now imply that in order to safeguard end-user and public policy interests certain security obligations, albeit lighter in practice than those imposed on interconnected networks, should cover also all interpersonal communications service providers it cannot be expected on the basis of the past experience that the costs would be unreasonable compared to the benefits.

The impact assessment²³⁹ accompanying the Directive of the security of network and information systems (NIS Directive) assessed NIS risk management compliance costs and costs related to the notification requirement. On the notification, the report noted²⁴⁰ that on basis of notification reports in some Member States under the current Article 13a (Security and integrity provision of the Framework Directive) the time needed for a business in case it would need to notify a breach is expected to be negligible.

The question as to what extent rules of the current rules of ePrivacy Directive should be extended to all communications service providers and the subsequent cost implications will be assessed as part of review of that Directive.²⁴¹

The current rules on consumer protection would in most cases be streamlined (for example, contractual information and transparency) and only in a few cases additional obligations would be introduced. These additional obligations would address new challenges, for example, better

²³⁹ Commission Staff Working Document. Impact Assessment. *Accompanying the document* Proposal for a Directive of the European Parliament and of the Council Concerning measures to ensure a high level of network and information security across the Union. SWD(2013) 32.

²⁴⁰ SWD (2013) 32, p. 92.

²⁴¹ See <https://ec.europa.eu/digital-single-market/en/news/public-consultation-evaluation-and-review-eprivacy-directive>

readability of contracts, provision of consumption control tools, enhanced provisions on price and quality comparison tools, switching rules for the increasing number of bundles to avoid lock-in effects and prohibiting discrimination based on nationality or the country of residence. The resulting end-user benefits are assessed to outweigh possible additional costs. Offering end-users a facility to timely monitor their usage of services is not assessed as burdensome to providers (including OTTs using numbers) who, in most cases, already closely allow to follow the consumption of their services for billing or monitoring purposes. The equivalence in access for disabled users may not necessarily mean increased regulatory intervention if the market itself ensures equivalence. The clarification of provisions regarding bundled offers would not involve new compliance costs as such, but may in some cases result in the evolution of the terms of current offers.

From a macro perspective, option 4 contributes to realising efficiency gains with lower transactional and compliance costs (fewer duplicate compliance efforts or data requests), a more equal regulatory treatment (particularly with regards to security and privacy), a reduction of regulatory risk as a result of more regulatory clarity and more confidence among end-users. The regulatory reform contributes to fostering the Internal Market. This increased efficiency effect may add 0.15 percentage points to the annual GDP growth. Annual macro-economic growth is estimated to be higher (1.85%) than the base scenario (1.70%) in the period 2021 to 2025.

Social and environmental impacts

Compared to the baseline, the direct impact on sectorial employment is likely to be negligible. However, due to macro-economic efficiency gains, the positive macro-economic impact on jobs and wages may be considerable.

End-users which value privacy, confidentiality and/or security are more likely to participate in popular and innovative communication networks²⁴². Also, where this is (or may become) technologically feasible, end-users may use various communication services to contact emergency services subject to availability of standardised solutions. The suggested additional measures focussing on potential lock-in problems related to bundling and the prohibition of discrimination based on nationality or the place of residence of the end-user may support end-users' freedom of choice. A reduced risk to lock-in enhances competition among telecom providers to the benefit of affordability and/or quality.

4.4.3.1.5 Option 5 – Functional approach to communications services

Option 5 differs from option 4 in that, besides regulating the IAS as in option 3, all obligations apply equally to all newly defined communication services which are functionally substitutable and hence in a degree of competition, independent of whether they make use of numbering resources or not. Obligations to interconnect and to be interoperable are based entirely on an assessment of reasonableness considerations relative to technical feasibility, significance of take-up of a given service as well as cost considerations.

Economic impacts

The most direct impact of this option is that the current uncertainty about rights and obligations for the provision of equivalent services would disappear, subject only to reasonableness considerations in respect of interoperability. This would automatically create some more compliance and enforcement and possible legal appeals costs for public authorities as well as OTTs, which may be individually subject to interoperability and interconnection obligations

²⁴² See SMART 20013/0019: 33% of respondents to a survey conducted for that study do have concerns about privacy and that this forms a reason for not using OTT services.

based on an assessment of reasonability - a criterion which leaves room for uncertainty on the part of OTT services, which could also impact innovation.²⁴³

Social and environmental impacts

As in option 4, the impact on sectorial employment is likely negligible as far as sectorial employment is related to revenues. However, due to the contributions to macro-economic efficiency gains, the macro-economic impact on jobs and wages is considerable and positive for both skilled as well as unskilled labour. Similar to option 4, suggested measures on potential bundling-related lock-in problems and supporting switching will enhance end-users' freedom of choice, with a positive effect on affordability and/or quality for end-users. Moreover, as in option 4, end-users which value privacy, confidentiality and/or security are more likely to participate in popular and innovative communication networks. This option would increase the end-users' possibilities to establish emergency communications (for instance through multi-modal IP Multimedia subsystem) including by voice, video, instant messaging and likely increase the operational effectiveness of the emergency communications system, however subject to significant investments in upgrading of the PSAPs.

4.4.3.2 Must carry and EPG obligations

4.4.3.2.1 Option 1 – Maintain Member States' possibility to impose must carry and EPG obligations

Economic impacts

The direct economic impact (costs of implementation, compliance, and enforcement of must carry and EPG obligations) of option 1 is negligible. Online viewing behaviour will continue to grow and larger PSBs will have little difficulty in finding a prominent place in app stores as well as on equipment installed at consumer premises or hand-held equipment. Regional and local PSB will have more difficulty in this respect. Cooperation with larger PSBs to carry niche content in their apps (possibly imposed by national governments) is a likely solution. In addition, niche content providers can develop alternative routes to gain exposure via social media strategies.

The marginal costs of broadcasting a single channel are currently relatively low. But these costs automatically grow in relative terms as the shift from linear to online evolves, because fixed costs would have to be shared over a decreasing number of viewers. As such, the problem of proportionality of current obligations may grow but this can be addressed by ensuring that regular mandatory reviews of existing obligations are conducted at national level. Other stakeholders (end-users, PSBs, OTTs) will remain largely unaffected.

The marginal costs of transmitting data alongside single radio and TV channels enabling connected radio and TV services is negligible. A clarification that such transmission can be covered by must carry obligations could contribute to improving the predictability of the conditions for the introduction and further development of connected radio and TV services by public and commercial broadcasters benefitting from must carry obligations.

Social and environmental impacts

The diversity of content to which end users can have access will increase to the extent that Member State ensure broadcasters benefitting from must carry obligations can also provide red button services.

²⁴³ See SMART 2013/0019 which points out that imposing interconnection and interoperability obligations on OTT business models may hamper innovativeness.

4.4.3.2.2 Option 2 – Phase out must carry obligations

Economic impacts

Compared to the baseline, this option assumes a particular pace in the shift from linear to online. This assumption is highly uncertain and differs (greatly) between Member States. The impact on the business models of both large and small PSBs may be detrimental in some Member States. Similarly, because the shift from linear to online follows a different pace for different Member States, the proportionality problem for ECNs differs between Member States. Even in Member States where there are currently no MC obligations (such as the UK), the impact of this option may not be zero. The mere possibility for the UK to impose must carry obligations may put some degree of discipline on network operators to voluntarily carry general interest channels. In Member States where MC obligations currently exist, but where online viewing behaviour increases rapidly (like in the Netherlands), the impact of phasing out MC obligations may be more limited. However, in those Member States where MC obligations currently exist and watching via OTT platforms increases only at a slow pace (like Germany and France), the negative impact on PSBs would be more significant. ECNs may receive increased feed-in fees²⁴⁴ up to a maximum of 20 million EUR for a typical ECN operator in a large MS²⁴⁵, which may benefit end-users in terms of lower subscription fees for the network. In any case, for the EU market as a whole, the impact on the business models of notably small PSBs may be detrimental. It follows that an orchestrated phase out may for some Member States be disproportionate from the perspective of the public interest.

Social and environmental impacts

Compared to the baseline, there is a risk that the impact on the diversity of content which can be accessed by end users may be negative for some Member States. PSBs may experience less exposure to the public, while end-users experience more difficulty in accessing content of public interest. OTTs will remain unaffected.

4.4.3.2.3 Option 3 – Extend must carry obligations

Economic impacts

The economic impact of this option on larger and smaller PSBs is negligible and may have some impact on the operations of ECNs. Extending a must carry obligation would impose an additional burden on IPTV and cable TV platforms to the extent that the on-demand content concerned is not already currently and voluntarily provided via these platforms. IPTV and cable TV platforms currently already customise their on-demand content offered to local preferences. Option 3 may lead to different treatment of IPTV and cable TV platforms by different Member States. The extent to which this option impacts on stakeholders may therefore be considered low.

Social and environmental impacts

Compared to the baseline, the positive impact on the diversity of accessible and findable content remains limited and has relatively low impact on large PSBs or on the variety of their content offered to (i.e. choice for) end-users. Given the abundance of online content, extending must carry obligations to on demand content provided on IPTV and cable TV platforms could make it easier for some smaller PSBs to build a significant audience. However, such obligations do not appear to be necessary, see section 4.4.4.2.1 on effectiveness.

²⁴⁴ Except for ECNs in Member States for which temporary derogations may apply and must carry obligation would remain temporarily in place because broadband coverage and capacity would not yet be sufficient for widespread OTT viewing of TV and radio channels.

²⁴⁵ SMART 2015/003, section 1.6.1

4.4.3.3 Numbering

4.4.3.3.1 Option 1 – No change in the EU framework on numbering

In global industry sectors such as the automotive sector, M2M communication becomes increasingly important to control high-quality consumer and capital goods. While in 2014 about 7% of global mobile terminals are used for M2M communication, this is expected to rise to 28% in 2019. Thus a considerable increase in devices, operators and services is expected.

In order to address the growing demand, and the competition issue of potential lock-in of M2M service providers with an initial mobile operator, Member States could decide to relax national number assignment criteria and assign numbers to M2M providers. In this case, mobile network codes (MNC, a portion of the E.212 IMSI) could represent a bottleneck. As two digit MNCs are assigned in most European countries, a maximum of 100 MNCs per country or per mobile country code (MCC) can be assigned. Such approach would thus result in a possible shortage of national E.212 numbers. To address the MNC shortage, Member States would have to assign a shared E.212 number range (operator prefixes) to several M2M providers, or/and to adopt a mixed use of 2- and 3-digit numbering ranges, and in excessive cases, to claim additional international country codes for E.212 numbers. The borderless (extra-territorial) use of national numbers would be difficult, if not impossible, to satisfy with this option, in the light of existing tendencies in numbering regulation (see e.g. relevant CEPT Recommendation). It is to be noted that ITU resources may provide an additional solution to many operators, but may not be suitable for smaller operators due to extensive costs, compared to fees of many of the Member States.

Economic impacts

Option 1 may result in aggravated fragmentation of the regulatory landscape in Europe. Moreover, in those Member States where MNCs remain reserved for M(V)NOS, M2M service providers would remain locked-in in at least the short term. Even after an eSIM standard has been adopted by the market, IoT service providers may remain locked-in; at least until their already installed SIM dependent machines become suitable for replacement following full depreciation. This period may possibly last longer as "over-the air-provisioning" (OTA) may continue to be hindered by the limitations of the current Article 30 of the USD in facilitating a change of providers, that was conceived for a market where the replacement of SIMs would not mean a considerable barrier.

Bottlenecks in the IoT value chain as well as limitations to cross-border use may inhibit innovations in IoT services by inter alia electricity providers, car manufacturers and producers of medical equipment and bring an upward effect on prices for IoT services.

From an administrative perspective, the base scenario would entail a number of management complexities (e.g. to implement shared national E.212 number ranges) and substantial implementation costs (creating new national E.164 ranges and/or new E.212 codes), translating into higher transaction/administrative costs.

Macro-economic overall gains from enabling the IoT have been estimated at 0.42%-points to 1.15%-points additional annual GDP growth. However, enabling the IoT involves other challenges besides those related to connectivity (e.g. in the area of standardisation and security and privacy). As such, it is difficult to isolate the impact on overall GDP of not solving the challenges related to numbering.

Social and environmental impacts

Some jobs and skills may become redundant due to automation, while the value of other jobs and skills will increase. McKinsey (2015) notes that "in general, manual work will come under increasing pressure from IoT and smart machines, but IoT will open up some new employment opportunities, too. Workers will be needed to install and maintain the physical elements of IoT

systems—sensors, cameras, transponders, and so on. Other workers will be needed to design, develop, sell, and support IoT systems.”

Similar to overall GDP gains from IoT, it is not possible to isolate the impact of dealing with numbering related challenges on employment from dealing with other challenges to enabling the IoT. Environmental impacts are difficult to estimate. For the purpose of this review we assume the net impact to be neutral.

4.4.3.3.2 Option 2 – No change in the EU framework on numbering with repeal of redundant rules

Option 2 has no impact in comparison to option 1 besides the fact that the Framework is cleaned from obsolete articles.

4.4.3.3.3 Option 3 – Adapting the EU framework on numbering to address the competition issue on the M2M market

The problem of IoT service provider lock-in is addressed in a coordinated manner as well as the use of extraterritorial use of numbers. Potential risks for circumventing local (in particular consumer protection) requirements when providing cross border services are addressed by reinforcing enforcement cooperation are addressed.

Economic impacts

While Member States will start assigning MNCs to non-M(V)NOs, option 3 results in a less fragmented regulatory landscape in Europe. Independently of when an eSIM standard is adopted, IoT service providers will run less chances of becoming locked-in. Moreover, once eSIM has been adopted, the possibility for OTA will further facilitate the switching possibilities for IoT service providers.

Bottlenecks in the IoT value chain (e.g. related to lock-in, cross-border use) are efficiently addressed, having a downward effect on prices for IoT services as compared to the baseline. There is greater development and adoption of IoT applications by inter alia electricity providers, car manufacturers and producers of medical equipment. All in all, it follows that there are potential positive impacts for the competitiveness of the EU as a whole.

With regards to administrative costs, option 3 helps to reduce a number of management complexities and implementation costs related to network and functional testing, billing verification and updates, as operators could cover their overall demand with a less diverse numbering resource. At the same time, the currently proposed bilateral arrangements for extraterritorial use between NRA's responsible for numbering assignment may be replaced by a more harmonised governance structure that is much less burdensome in both procedure (time) and cost. This may require a possible extension of the activities (and costs) of BEREC as well as costs related to coordination with CEPT, which may still be much lower than the costs of the currently proposed multiple bilateral agreements between NRAs and telecom providers.

The macro-economic impacts associated with unlocking the full potential of the IoT, although difficult to isolate, are estimated 0.42% to 1.15% of additional annual GDP growth.

Social and environmental impacts

IoT users will experience lower prices for IoT services and a faster adoption / integration of IoT services by/in existing products and services. NRAs will also not experience increased administrative / transaction costs associated with complexity of management issues or the increased of extraterritorial use of numbers.

4.4.4 *Comparison of options*

4.4.4.1 Services

4.4.4.1.1 Effectiveness

The effect of a reduction in administrative burden for ECS providers in option 2 is (slightly) undone by the suggested additional obligations regarding bundled offers. This option will only slightly reduce the gaps in consumer protection and not change the existing uncertainty about the scope and heterogeneous implementation of the framework and their associated regulatory risks for all stakeholders, not different from the base line. In terms of consumer's freedom of choice and their ability to benefit from innovative services, quality and lower rates, option 2 reduces sector specific protection measures only when consumers remain protected by either current horizontal rules or new market realities. As such, streamlining will have no impact in terms of consumer protection in the context of using telecom or OTT services. Measures to address new emerging risks regarding the use of multi-play bundles have a potential positive impact on consumer protection. Issues with regard to security and privacy remain. Since this option is based on minimum harmonisation, the degree of reducing regulatory heterogeneity depends on whether Member States will add obligations to those prescribed by the Framework. In addition, the mandate of the Commission to increase the effectiveness of access to emergency services would be clarified with regard to caller location, PSAP performance and access for disabled end-users.

Option 3 builds on option 2 and further reduces the administrative costs for ECS providers, for instance on switching or contract duration rules, as only the Internet Access Service would be subject to sector-specific legislation. There would, however, be no more sector-specific end-user protection for other ECS (e.g. telephony), provided either traditionally or over the Internet Access Service. This option would eliminate the uncertainty about rights and obligations and ensure regulatory harmonisation, but it would have a negative impact for small telecom operators and result in lower competition in traditional services.

Option 4 notably reduces the unequal regulatory treatment of telecom and the most directly comparable OTT services and reduces gaps in consumer protection, which may in turn foster the adoption of these services by consumers who are today concerned by the possible risks associated to security, privacy and access to emergency services. The scope of the rules is clear which reduces associated regulatory risks. Accompanied by full harmonisation, this option takes the benefits of option 3 without its disadvantages.

Compared to option 4, option 5 eliminates the different regulatory treatment of telecom and OTT services as it equally applies all obligations to all types of communication services. Consumers would be less concerned about confidentiality and security or access to emergency services. However, such regulatory extension involves some level of uncertainty in relation to the applicability of interconnection and interoperability obligations or technical feasibility of access to emergency services which may ultimately reduce the effectiveness of this option: it could limit innovativeness of current and new service providers, in particular with regards to hybrid communications services and new business models that may emerge in connection with machine-to-machine communications.

4.4.4.1.2 Efficiency

Efficiency will be mainly measured in terms of enforcement and compliance costs.

Option 1 entails direct costs associated with maintaining the status quo, including the cost of complying with redundant sector specific rules and unnecessary duplication of costs driven by regulatory heterogeneity when operating in multiple countries. There is considerable overlap between the rules in which Member States differ and the rules that are potentially redundant. An estimate of these costs is not available.

Option 2 brings some room for savings in unnecessary administrative costs such as duplication of costs associated with multi-country operations. Improvement in the accuracy of caller location, access for disabled end-users and performance of Public Safety Answering Points would incur costs in the networks and Public Safety Answering Points but would be largely offset by the benefits arising from the effectiveness of the emergency intervention (safeguarding public health and welfare).

The reduction in administrative costs under option 3 may be larger because more rules are abolished. The reduction in enforcement and compliance costs will partially be undone by the additional obligations regarding the Internet Access Service services.

Under option 4, the savings in administrative burden for telecom operators from streamlining is partly undone by an increase in administrative burden for IAS as in option 3. Many of the savings would contribute to reducing the duplication of costs associated with multi-country operations, while the increases in IAS-related obligations would not lead to unnecessary duplication of costs under the assumption of full harmonisation. The administrative burden may increase for OTT providers that use numbering resources as they will now be subject to more regulation. Moreover, all will experience an increased administrative burden in relation to rules on security and privacy. In addition, depending on the solution that is chosen for access to emergency services from OTTs to numbers in the PSTN network, interconnection and routing cost could be incurred.

Under option 5 the room for administrative relief for telecom operators is similar to option 4. The increase in administrative burden for OTTs is larger compared to option 4 as all OTTs will be subject to the same regulation as telecom providers and all obligations will be related to all clients and not only those that make use of the functionality to interconnect with services under the numbering regime.

As explained, obligations to interconnect and interoperate will only be imposed if this is reasonable subject to limitations of technical feasibility as well as cost. The reasonability clause leaves room for uncertainty and costs associated with implementation, enforcement and possible legal appeals.

4.4.4.1.3 Coherence

Coherence is evaluated in terms of 1) deviation (or disruption) of the status quo, 2) internal consistency with other directives, regulations and objectives of the framework, and 3) external consistency with the wider EU objectives and horizontal directives and rules fostering these objectives.

Option 2 is not a fundamental deviation from the status quo: no fundamental changes are proposed in the framework and the scope remains the same. The internal coherence with other rules in the framework is not affected. Coherence with horizontal rules will increase as there will no longer be differences between sector specific and horizontal rules that target the same objectives. Moreover, circular references between sector specific and horizontal rules will be dropped. In terms of the improvement of caller location and Public Safety Answering Performance, the regulatory approach in the telecom legislation to access to emergency services would seek to ensure the same level of efficiency and effectiveness as the eCall EU legislation²⁴⁶ does for in-vehicle emergency call systems.

²⁴⁶ Commission delegated regulation (EU) No 305/2013 of 26 November 2012 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall.

Option 3 is a significant disruption from the status quo. It would require a full revision of other directives, regulations and objectives of the framework since only the IAS would be regulated, leaving all communications services subject only to horizontal consumer protection rules.

Option 4 is a deviation from the status quo. The scope of the rules is enlarged to include OTTs that use numbering resources, and other OTTs will be subject to a limited set of rules, specifically with respect to security and privacy regulation which may force them to evolve their business models. Internal coherence is stronger under option 4 as the framework now has dedicated rules fostering the roll-out as well as the take-up of connectivity services, and dedicated rules that safeguard competition and end-user protection in the domain of communication services. As such, the entire framework would show a better fit with market developments in which services are more and more detached from underlying (access) networks. External coherence is served similar to 2.

Option 5 is a further deviation from the status quo. As under option 4, internal coherence is larger: dedicated rules fostering the roll-out as well as the take-up of connectivity services, and dedicated rules that safeguard competition and end-user protection in the domain of communication services. Option 5, however, scores less than option 4 on internal as well as external coherence as the extension of all sector-specific rules to OTT communication services seems incompatible with the better regulation objective and with EU innovation policy.

4.4.4.1.4 Impact on stakeholders

Impact on consumers

Under options 1 and 2, people with a preference for privacy, confidentiality and/or security are deterred from participating in popular and innovative communication networks. This issue would increase under option 3 as end-users that are currently discouraged from using OTT services because of concerns about privacy, risk being left without a more private alternative (i.e. traditional telephony and SMS) that contains less unsolicited disturbances. Under options 4 and 5, people with preference for privacy, confidentiality and/or security experience fewer barriers to participate in modern communication networks.

Under option 1 there is a looming risk to lock-in with multi-play bundles. This may likely have negative consequences for future affordability and quality of the communications services. Options 2, 4 and 5 introduce specific measures to reduce these risks. Under option 3, measures to reduce lock-in with multi-play service providers may be offset by relaxing obligations for interconnection and subsequent concentration of the market.

Under options 1 and 2 access to emergency services is de facto reduced as consumer preferences for communication are gradually migrating to new OTT platforms that are currently exempt from the obligation to provide access to emergency services. Under option 3, the situation worsens as traditional telecom services would no longer be obliged to provide access to emergency services. Under options 4 and 5 (some) OTT services will be obliged to provide access to emergency services (where this is technologically feasible, and with appropriate caveats to end-users as regards quality of service). Under option 4, however, this obligation applies only to a limited number of OTTs that seek interconnection with the numbering regime.

Under options 3, 4 and 5 consumers will be able to use public electronic communications networks or services regardless of their nationality or place of residence.

Impact on telecom operators

Options 1 and 2 maintain the unequal regulatory treatment of telecom operators, vis-à-vis OTTs. Option 3 would considerably reduce the asymmetric regulatory treatment as the reduction of the scope of the regulatory framework would give telecom operators more room to experiment with

other revenue models (e.g. advertisement based). Options 4 and 5 would also reduce the regulatory asymmetry, but would not have any effect on operators' incentives to experiment with alternative revenue models since the options involve clarifying/extending the scope of the adapted regulatory framework.

Option 1 maintains currently redundant sector specific rules in place and hence maintains the current level of administrative burden experienced by telecom operators. Option 2 aims to reduce the administrative burden as much as possible by getting rid of sector specific rules that have become redundant either because of overlap with horizontal rules, or because of changing market conditions. Option 3 would further reduce the administrative burden by getting rid of all obligations regarding communication services, but this effect would be mitigated by the introduction of a number of new obligations (and associated administrative burden) for operators that offer IASs. From option 2 to options 4 and 5, the reduction in obligations for telecom operators when offering communication services remains the same, but the number of obligations when offering IASs would go up. Additional measures that impact on OTTs do not directly impact on telecommunication operators.

With respect to the Internal Market, the current costs of multi-country operations caused by regulatory heterogeneity remain as high as they are now under option 1. The streamlining exercise under options 2, 4 and 5 reduces the dimensions for regulatory heterogeneity that are faced by telecom operators. Similarly, regulatory heterogeneity is reduced under option 3, but the Internal Market will now be hindered by strategic barriers (caused by the absence of interconnection obligations), rather than regulatory barriers.

Impact on OTTs

OTTs face hardly any administrative and compliance costs under option 1, 2, and 3 since they are not subject (or in the case of those using numbers: not clearly subject) to most of the framework's obligations. Option 4 would impose additional administrative burden on a limited number of OTTs that interconnect with the numbering regime. In addition, all OTTs (regardless of the technology used) will experience an increased administrative burden in relation to complying with rules on security and privacy. Under option 5, the administrative burden for OTTs increases further as now all OTTs would be subjected to all rules in the framework. Furthermore, Option 5 introduces for OTTs an obligation to interconnect subject to "reasonable limitations of technical feasibility as well as cost limitations". This obligation gives rise to uncertainty and risks for innovation.

Impact on start-ups and SMEs

Because of the unclear scope of the regulatory framework under options 1 and 2, start-ups and SMEs trying to gain a foothold in new digital value chains (e.g. the IoT value chain) experience regulatory risk which lowers confidence in future planning and investments. Under options 3, 4, and 5 the scope of the RF is clear and takes away this cause for regulatory risk.

Impact on NRAs

The impact for NRAs relates mostly to enforcement costs. Under option 1, these remain at the current level. Option 2 will not have a major impact on enforcement costs. Abolishing overlapping rules would not bring any predictable savings; either because they are currently already enforced by competent authorities, because member states may decide to give responsibility for enforcing horizontal rules to the NRA, or because new responsibilities for NRAs may emerge in the form of providing technical assistance to competent authorities when they were to deal with sector specific issues. Under option 3, (compared to option 2) there is a risk of more need for ex-post interventions in which NRAs may need to support Competition Authorities. Moreover, while a number of activities related to monitoring transparency and quality of service of electronic communications services can be abolished, a number of these

activities need to be re-introduced to enforce similar type of obligations imposed on internet access service. Under options 4 and 5 (compared to option 3), NRAs will need to devote more resources to regulating OTTs as well. Moreover, under option 5, the obligation to interconnect subject to “reasonable limitations of technical feasibility as well as cost limitations” gives rise to enforcement/implementation costs.

	Option 1: Status quo	Option 2:	Option 3:	Option 4:	Option 5:
Consumers	A) Security and privacy issues remain. B) Looming risk to lock-in with multi-play bundles C) As OTT usage increases, there is an effective reduction of access to emergency numbers	A) 0 B) Lower risk C) 0	A) More issues B) Unclear (iii) C) -	A) Fewer issues B) Lower risk C) +	A) Fewer issues B) Lower risk C) +
Telco's	D) Unequal regulatory treatment vis-à-vis OTTs remains. E) Compliance costs F) duplication of costs when operating in multiple countries	D) 0 E) go down F) down (ii)	D) ++ E) down less than in option 2 (i) F) market entry i.s.o. regulatory barriers (iv)	D) + E) go down less than in option 3 (i) F) same as 2	D) ++ E) same as 4 (i) F) same as 2
OTTs	G) no compliance cost except some legal cases as to the scope of the RF	G) 0	G) reduced	G) new compliance costs	G1) New compliance costs G2) regulatory risk (vii) G3) impede innovations(vii)
IoT Start-ups and SMEs	I) Low confidence in future planning and investments due to unclear scope of RF	I) 0	I) More clarity but more market risks (v)	I) clarity about scope	I) clarity about scope
NRAs	L) Enforcement costs	K) 0 (i)	K) go up	K) 0 (i)	K) go up (vii)

- (i) Reduction in compliance costs due to cancelling redundant rules are significant. Reduction of enforcement costs by NRAs are zero. From option 2 to 3 the number of obligations for ECS reduce, but new obligations for ECN arise. From 2 to 4 and 5, the reduction in obligations for ECS remain the same, but the number of obligations for ECN go up. Additional measures that impact on OTTs do not impact on Telco's
- (ii) Streamlining reduces the dimensions for regulatory heterogeneity. While lack of clarity about the scope of the RF may lead to evolution of interpretations by MS and create new heterogeneity of rules, this would not affect Telco's but rather OTTs and IoT.
- (iii) Measures to reduce lock-in with multi-play service providers may be offset by relaxing obligations for interconnection and subsequent concentration of the market.
- (iv) Relaxing obligations to interconnect may allow for the creation of market entry barriers as National Markets concentrate.
- (v) IoT start-ups will have less uncertainty about rights and obligations and experience less duplication of costs when operating in multiple countries, however, Option 3 may introduce competition issues for number-based m2m service providers vis-à-vis large operators
- (vi) Risk of more need for ex-post interventions in which NRAs may need to support CAs
- (vii) Interconnection subject to "reasonable limitations of technical feasibility as well as cost limitations" gives rise to enforcement/implementation costs, uncertainty and risks for innovation

4.4.4.1.5 EU added value

The question addressed here is how does each option respond to the need for EU action?

Option 1 and 2 leave a lack of clarity about the scope of the regulatory framework and implicitly invite Member States to deal with the problem that similar services are subject to different rules. This may raise new issues regarding cross border service provision. Options 3, 4, and 5 bring clarity about the scope of the Regulatory Framework such that the need to take action at national level no longer exists. EU action in this case reduces the risk of new forms of regulatory heterogeneity. Option 3, however, creates potential new competition issues that require actions by national authorities with a real chance that they do not respond with similar remedies and thereby potentially contributing to new forms of regulatory heterogeneity and barriers for cross-border service delivery. Option 4 has the advantages of option 3 in terms of clarity about the scope of the rules but avoids the possibility of heterogeneous application at national level. Option 5, while bringing clarity, is likely to be disproportionate and fails to ensure the necessary level of regulatory certainty that the framework is meant to bring.

4.4.4.1.6 Summary table comparing services options

Table 10 - Comparison of options - Services

	Effectiveness				Efficiency	Coherence			EU value add
	Streamlining	Competition and innovation	Consumer protection	Fosters cross-border services /entry		Disruption from status quo (stability)	Internal coherence	External coherence	
Option 1:	0	0	0	0	0	0	0	0	0

Status quo									
Option 2: streamline only	+	+	+	?	++++	0	0	+	0
Option 3: IAS only	+	+/-	-	+/-	+++	---	-	-	?
Option 4: IAS + CS + E.164	+	++	+++	++	+++	-	++	+	+
Option 5: IAS + CS	+	++	++	+	+	--	+	+/-	+

4.4.4.2 Must carry and EPG obligations

4.4.4.2.1 Effectiveness

Social and environmental effects of the options are set out in the previous section.

In addition, option 1 has no impact in terms of diversity of content offered and would provide some degree of balance between the benefits with regard to general interest objectives and the cost imposed on ECNs.

Option 2 would remove the burden imposed on ECNs over time (i.e. by 2020-2025) but would create disproportionate risks to the achievement of general interest objectives as some small PSBs would have less access to essential broadcasting networks.

Option 3 would risk imposing disproportionate burdens on IPTV and cable TV platforms while harm could be caused at the same time to general interest objectives by inappropriate and disproportionate intervention. The proposal amending the Audio-visual Media Services Directive explicitly refers to the competence of Member States to ensure discoverability of content of general interest under national legislation. Accordingly it is not necessary to rely on must carry obligations to pursue the same regulatory objective.

It follows that, taking into account also the social effects, option one scores best on effectiveness.

4.4.4.2.2 Efficiency

Genuine economic effects of the options are set out in the previous section. In addition, under option 1, the costs of implementing, enforcing, and complying with must carry and EPG obligations are negligible for ECNs and NRAs: operational activities involved are limited and do not differ from regular operations (such as customer relations, legal advice, etc.). It follows that option 2 would hardly lead to lower costs. Under option 3, extending must carry obligations to

on-demand content provided by IPTV and cable TV platforms would cause additional costs for implementation, enforcement and compliance. Accordingly, taking into account also the genuine economic effects, option 1 scores best in terms of efficiency.

4.4.4.2.3 Coherence

Option 1 is not a radical change from the current provision. There is limited positive impact on Single Market coherence as must carry obligations define a maximum scope for regulatory intervention by Member States and therefore determine the maximum degree of possible diversity between Member States. Similar coherence is not currently provided in the OTT area nor for presentational aspects of EPGs. For EPG access which can be imposed by NRAs, BEREC and art 7 procedures are available to ensure coherence²⁴⁷.

For most Member States option 2 is a radical change from the current provisions. Maximum internal market coherence is achieved as removal of must carry obligations would by definition result in full coherence. However, option 2 may be incoherent with the Commission Communication on a European agenda for culture in a globalizing world²⁴⁸, subsequently endorsed by Member States²⁴⁹, according to which the promotion of cultural diversity represents one of the main objectives that should guide EU action in the field of culture. These negative impacts on internal coherence are considered to be more significant than the positive impacts on single market coherence, as even without must carry obligations conditions in national broadcasting markets across the EU will remain substantially different in terms of market size, transmission networks used and user preferences for content (depending i.a. on language and social-cultural identities).

Option 3 is also a radical change from the current provisions. As under option 1 there is limited positive impact on Single Market coherence as must carry obligations define a maximum scope for regulatory intervention by Member States and therefore determine the maximum degree of possible diversity between Member States. However, with regards to internal consistency, option 3 scores negatively. While must carry obligations are currently imposed on ECNs, the extension of must carry obligations to on demand content provided on IPTV and cable TV platforms would be incoherent with the split between the rules that apply to ECN and those that apply to audiovisual media content (see the penultimate paragraph of section 4.4.4.2.1). Again, the negative impacts on internal coherence are considered to dominate the limited positive effects on Single market coherence. Accordingly, option 1 scores best on coherence.

4.4.4.2.4 Impact on stakeholders

Consumers

Under option 1, consumers enjoy a certain degree of pluralism in the form of content of public interest adjusted to local preferences. Option 2 would in some Member States (where must carry obligations currently apply) experience less pluralism in return for (slightly) lower prices for ECN services as ECN providers may pass on part of the increased feed-in revenues to consumers. Option 3 would have no impact on pluralism or prices as it would not contribute to a more effective digitisation strategy for public service broadcasters.

Electronic Communications Network providers

Under options 1 and 3 ECN providers that are subject to must carry and EPG obligations miss out on feed-in fees. Under option 2, ECN providers would generate higher feed-in revenues.

²⁴⁷ For the details of the consolidation process under art 7 of the Framework Directive please refer to section 1.2.3.1

²⁴⁸ COM(2007) 242 final

²⁴⁹ Resolution of the Council of 16 November 2007 on a European Agenda for Culture, (2007/C 287/01)

Public Service Broadcasters

Under options 1 and 3 public service broadcasters experience low barriers for broadcasting due to no/low feed-in fees. Under option 2, public service broadcasters would likely have to pay higher feed-in fees, causing some public service broadcasters to cease (certain) activities.

OTTs

Under options 1 and 2 OTTs remain unaffected. Option 3 would require OTTs to adjust their algorithms which may negatively impact on their business model (particularly if they apply an advertisement based business model).

Member States

Under option 1, Member States have some degree of freedom to use appropriate tools as required by local market circumstances. The scope remains limited to ECN services (but Member States would remain free as regards non-ECN providers, subject to the currently proposed revision of the Audio-visual Media Services Directive). Option 2 would limit the number of tools available (it takes away must carry obligations as a tool) and option 3 would extend the scope of these tools to include online services.

	Option 1: Status quo	Option 2: Phase out obligations	Option 3: Extend must carry obligations to OTT providers
Consumers	Positive, viewers continue to have access to PSB services via traditional TV networks, with adaptation to connected TV environment.	Negative, in some cases viewers may lose access to PSB services via traditional TV networks before OTT substitution is viable	Neutral compared to option 1: No impact on PSBs (neither small or large) or on the variety of content offered to (i.e. choice for) end-users. The abundance of online content could make it more difficult for some smaller PSBs to build a significant audience
Larger and multi-national commercial content providers	Neutral – market entry might continue to focus on the OTT area which has less regulatory constraints	Positive - market entry could include traditional TV networks to the extent that transmission capacity becomes available subsequent to discontinuation of must carry obligations	Neutral. No change in the possibilities to make content available compared to status quo as OTT providers already include PSB content.
PSBs, including at regional and local level	Positive, existing privileges would remain in place	Negative, appropriate transmission on traditional TV networks would have to be negotiated under market conditions.	Negative as concepts for proportionate and appropriate intervention in the OTT area do not currently exist. Positive effects are possible in the long terms, if such intervention can finally be successfully

			conceived.
ECNs	Neutral/positive – existing regulatory burdens and constraints would remain, but with a perspective that they will be removed gradually over time subsequent to national reviews of obligations.	Strongly positive - existing regulatory burdens and constraints would disappear by 2020-2025	Neutral – no change of existing burdens and constraints
OTT service providers which are not themselves content providers	Neutral – existing obligations do not relate to OTTs	Neutral – existing obligations do not relate to OTTs	Negative as concepts for proportionate and appropriate intervention in the OTT area do not currently exist.

While there is a majority view that transmission obligations imposed on electronic network operators (must carry rules) and rules related to electronic programme guides should be adapted to new market and technological realities, there is sharp disagreement as to how such adaptation should be conceived. Extension of the current rules is supported by some Member States and most broadcasters, whereas most telecom **operators** are in favour of reducing the scope of the rules. Public service broadcasters consider that the future scope of rules should extend to interactive and non-linear services, should also cover hybrid TV signalling and should apply on a technologically neutral basis to all distributors of audio-visual content, not only to ECNs. Telecom **operators** call for a level playing field between broadcasters and online platforms and call for improving access to content rights. Some cable and telecom operators call for complete removal of must carry obligations or at least to limit them to the main/most essential general interest channels. Commercial broadcasters, one telecom operator and a citizen consider that the current provisions are adequate.

4.4.4.2.5 EU value added

The most important reason for EU actions on must carry and EPG access should be found in relation to the European Agenda for Culture which puts cultural diversity, including access to culture and cultural works, at the heart of any EU action on culture..

In the context of this review, the need for EU actions should be related to the mandate given by the EU to Member States in imposing must carry obligations and to NRAs in imposing EPG access obligations. The current provisions in the Regulatory Framework seem to be sufficient. Most PSBs, with an exception of small local PSBs offering niche content, do not experience difficulty in providing their on demand content on IPTV and cable TV platforms. The smaller PSBs find it difficult to build a large enough digital audience. Current provisions by the ECNS regulatory framework do not allow for extending MC and EPG obligations accordingly. Such extension does not appear to be necessary (as there are alternative options available, see the penultimate paragraph of section 4.4.4.2.1)..Accordingly, option 1 scores best in terms of EU value added.

4.4.4.2.6 Summary table comparing must carry and EPG options

Table 11 - Comparison of options – Must carry and EPG

	Effectiveness				Efficiency	Coherence			EU value add
	Streamlining	Competition and innovation	Consumer protection	Fosters cross-border services/entry	Cost/complexity/enforceability	Disruption from status quo (stability)	Internal coherence	External coherence	Additional impact vs MS acting alone
Option 1: no change	0	0	0	0	0	0	0	0	0
Option 2: Phase out MC	-	-	0	0	0	0	0	-	n.r.
Option 3: Extend MC	+	0	0	0	0	-	-	0	n.r.

4.4.4.3 Numbering

4.4.4.3.1 Effectiveness

The redundant rules addressed by Option 2 do not involve administrative costs, do not have implications on competition and innovation and do not impact on consumers or on the Internal Market.

Option 3 likely results in a net reduction of administrative costs (notably related to permanent IoT/M2M roaming and extra-territorial use of numbers) and limits the risks of a lock-in of M2M service providers by connectivity providers. This benefits the competition between connectivity providers and creates a more level playing field for M2M service providers vis-à-vis telecom operators. Option 3 allows for more flexibility of business models for M2M services, resulting in more innovative services and benefiting the (faster) integration of more industries in the IoT. It leads to (faster) integration of diverse industries into the IoT. Option 3 contributes (e.g. via simplifying rules on extra-territorial use of numbers) to cross border connectivity and thereby to cross border IoT services.

4.4.4.3.2 Efficiency

While the numbering resources do not face similar physical limitations as spectrum, the numbering requirements bear costs for the operators. With the rapid development of M2M, regulatory fragmentation under Option 1 and 2 may generate additional costs relating to the fulfilment of divergent conditions for the use of numbers. Option 3 would aim to ease this

fragmentation and could thus reduce the underlying costs, with spillover effects on more efficient marketing of products throughout the single market (e.g. without a need to recall a connected car to replace the SIM when sold cross border).

4.4.4.3.3 Coherence

Option 2 is not a deviation from the status quo: there are minor changes proposed in the framework and the scope remains the same. Under option 2, neither internal nor external coherence is affected.

Option 3 is not a major deviation from the status quo; there are no fundamental changes proposed to the framework; the scope remains the same while option 3 mainly aims to provide clarity, coordination and guidance. Internal coherence (with regards to the overall telecom framework) is improved while objectives with regard to overall objectives of fostering competition, innovation and the internal market are better served in the context of the evolving IoT value chain. While these objectives are not only telecom specific, but also overall EU-wide objectives, external coherence is served as well. Moreover, the provision of clarity and guidance does not impact on the external coherence with existing governance arrangements between Member States and the ITU.

4.4.4.3.4 Impact on stakeholders

Consumers

Under option 1 and 2, bottlenecks in the IoT value chain as well limitations to cross border use may inhibit innovations in IoT applications and have an upward effect on prices for products and services relying on IoT services. Option 3 addresses a number of these bottlenecks.

IoT users (Industry 4.0)

Under option 1 and 2, bottlenecks in the IoT value chain as well limitations to cross border use of IoT services may lead to higher prices for IoT services and hinder the development and adoption of IoT applications by inter alia electricity providers, car manufacturers and producers of medical equipment. Such barriers could lead to a competitive disadvantage for these industries in the EU vis-à-vis the rest of the world. Option 3 addresses a number of these bottlenecks and hence facilitates the development and adoption of IoT applications by other industries.

IoT service providers (including SMEs)

Under options 1 and 2, because of the high costs related to physically swapping SIM cards in IoT devices, IoT service providers (relying on SIM based connectivity) run the risk of being locked-in with their connectivity provider, leading to higher prices for and lower quality of connectivity services. Moreover, as a result of complex procedures regarding extra-territorial use of number, options 1 and 2 would lead to IoT service providers facing difficulty in delivering reliable always and everywhere connected services (domestic and cross border). Measures under option 3 would lower the costs of switching to a different connectivity provider and indirectly result in lower prices and higher quality. Under option 3, the clarification, coordination and simplification of rules regarding extraterritorial use would address these difficulties. All in all, compared to options 1 and 2, option 3 would provide more room for innovations of IoT services.

Operators

For telecom operators, options 1 and 2 would potentially result in higher revenues from connectivity services provided to IoT service providers. Furthermore, assuming an increasing demand for cross-border M2M services, operators would experience higher costs for

administration and implementation. Under option 3, the measures aimed at lowering switching costs would lead to lower prices and revenues. The clarification, coordination and simplification of rules regarding extraterritorial use would lower these costs.

NRA's

Assuming a growing demand for cross border M2M services, options 1 and 2 would also lead to increased implementation costs for NRAs, for similar reasons as those applying to electronic communications providers. Similarly, option 3 would largely prevent the increase in costs.

	Option 1: Status quo	Option 2: only Repeal of redundant rules	Option 3: Address competition
Consumers	A) Higher prices for IoT services	A) same as option 1	A) Lower prices
IoT users (Industry 4.0)	B) Higher prices for IoT services	B) same as option 1	D) Lower prices
	C) Potential barriers for cross border use of applications	C) same as option 1	E) Less risk
	D) Potential barrier for full integration into the IoT	D) same as option 1	F) Fewer barriers
IoT service providers (including SMEs)	E) Potential lock-in with connectivity providers, leading to high prices and lower quality	E) same as option 1	E) Less risk
	F) Potential bottlenecks in delivering reliable always and everywhere connected services (domestic and cross border)	F) same as option 1	F) Less bottlenecks
	G) Less room for innovations of IoT services	G) same as option 1	G) More room for innovations
Telco's	H) High prices and profits	H) same as option 1	H) Lower prices, less profits
	I) Growing administrative costs related	I) same as	I) Lower

	to extra-territorial use of numbers	option 1	administrative costs
NRAs	J) Growing administrative costs related to facilitating the extra-territorial use of numbers	J) same as option 1	J) Lower administrative costs

4.4.4.3.5 EU value added

Exiting arrangements such as the relevant recent CEPT recommendation seem to propose an authorisation regime that could prove burdensome and in any case seem to lack efficient enforcement possibilities. Regulatory fragmentation in the area of numbering management could seriously impede the development of the M2M sector, preventing operators to benefit from economies of scale granted by the Single Market.

4.4.4.3.6 Summary table comparing numbering options

	Effectiveness				Efficiency	Coherence			EU value add
	Streamlining	Competition and innovation	Consumer protection	Fosters cross-border services/entry		Disruption from status quo (stability)	Internal coherence	External coherence	
Option 1: no change	0	0	0	0	0	0	0	0	0
Option 2: Repeal of redundant rules	0	0	0	0	0	0	0	0	0
Option 3: Address competition	+	+	+	+	+	0	+	+	+

4.4.5 The preferred option

4.4.5.1 Services

The Commission considers that option 4 on services is the best option to achieve the overall and specific objectives of the review of the telecom framework as presented in section 3.

Option 4 contributes most to realising efficiency gains: there are lower transactional and compliance costs (by reducing duplicate compliance efforts or duplicate data requests); there is a more equal regulatory treatment (particularly with regards to security and privacy obligations), a reduction of regulatory risk as a result of more clarity about the scope of the regulatory framework which promotes confident future planning and investments; and the regulatory reform contributes to fostering the Internal Market. Through these channels, increased efficiency gains may spur innovations that translate in the growth of total factor productivity and income per capita. The impact on GDP growth of regulatory reforms have been analysed by Haider (2012). The study analyses 1140 reforms in 172 countries during the period 2006-2010. Haider finds that each reform is associated (on average) with a **0.15 percentage points increase in annual economic growth**. These reforms in Haider's study did not include sectorial reforms but

rather reforms of general regulation on doing business²⁵⁰. This option ensures effective access to emergency services envisaging the improvement of caller location, access to disabled end-users and the performance of Public Safety Answering Points (as defined in option 2) and it also brings regulatory clarity with regards the scope of the obligation to provide access to emergency services.

4.4.5.2 Must carry and EPG obligations

Given that option 1 scores best on all criteria (effectiveness, including genuine social impacts, efficiency, including genuine economic impacts, coherence and EU added value) the Commission considers that option 1 is the best option to achieve the overall and specific objectives of the review of the telecom framework as presented in section 3. No macroeconomic effects could be quantified through modelling for this policy area.

4.4.5.3 Numbering

The Commission considers that option 3 is the best option to achieve the overall and specific objectives of the review of the telecom framework as presented in section 3. The macroeconomic effects could not be quantified through modelling for this policy area, Nevertheless, the expected proliferation of M2M in all sectors of the economy from manufacturing to consumer electronics should have a considerable impact on the overall economy.

4.5 Institutional governance

4.5.1 Options

Any institutional structure needs to be functional to the future objectives that the legal framework which it will be called to fulfil and to the problems to be addressed by means of the public intervention. The scope of the European institutional dimension, intended as the governance template, and the procedural tools defined at EU level as necessary to support the future regulatory framework, therefore, depend on the scope and intensity of the desired EU harmonisation. The assessment of options for intervention levels below attempts to identify which tasks are likely to require a more co-ordinated, or harmonised, approach at EU level and what should/could be the intensity of such EU intervention.

The governance options flow from the options presented in each subject area and they assess at the same time the different governance levels/bodies (Commission, independent NRAs, BEREC, RSPG, etc.).

The analysis carried out by the consultant suggests that the maximum benefits can be gained from a more targeted streamlining of regulation, combined with measures to ensure greater consistency at an EU level on aspects which are still subject to regulatory intervention.

In the following sections we describe the potential governance solutions which would support the preferred options identified in each policy area, with a focus on the implications of these options for the distribution of tasks and resourcing of BEREC, the RSPG, NRAs and the Commission.

Option 1: status quo – baseline scenario

Today's regulatory framework provides a high degree of flexibility for national regulatory authorities and Member States. This provides significant scope for regulation to be tailored to

²⁵⁰ The Worldbank Data on which the publication of Haider is based included mainly general reforms aiming to improve 'doing business' in the following dimensions: Starting a Business, Dealing with Construction, Permits, Getting Electricity, Registering Property, Getting Credit, Protecting Minority Investors, Paying Taxes, Trading Across Borders, Enforcing Contracts, and Resolving Insolvency – see <http://www.doingbusiness.org/>

meet specific national or local circumstances. However this system carries significant weakness in areas where consistency is essential or would better serve the common European interest.

The current framework harmonises very few competences assigned to national regulatory authorities responsible for *ex ante* market regulation and allows Member States to assign tasks under the framework to Ministerial bodies or other authorities. The result is a patchwork, since there is no other competence than *ex ante* market regulation for which all 28 national regulatory authorities members of BEREC are also competent for. Even the resolution of disputes between undertakings is not assigned in all Member States to the national regulatory authority responsible for *ex ante* market regulation (it is assigned in Belgium to the competition authority). As a result there is currently asymmetry of information between the different NRAs regarding market developments in the area of services, such as interoperability between communication services. Discrepancies exist for the general authorisation, for numbering, for consumer protection etc. This has an impact when the legislator has given BEREC a role in areas where competence at national level is not harmonised for its members, such as for instance the resolution of cross-border disputes.

As regards access regulation, the current governance structure requires a relatively complex (and some argue²⁵¹ inefficient) system of Recommendations, *ex ante* checks (under the so-called Article 7 procedure) and balances (with different roles for the Commission, BEREC, COCOM, and the national as well as European courts) to ensure that consistent outcomes are achieved, and yet even in cases where common approaches are agreed between the Commission and BEREC, the system does not achieve sufficient consistency. A key example, described more fully in SMART 2015/0002, concerns mobile termination rates, while business access is another area where the existing system does not appear to be yielding effective results.

In the spectrum area, spectrum allocation and technical conditions are harmonised with Commission decisions based on the Radio Spectrum Decision, with the participation of Member States in the Radio Spectrum Committee. There is no institutional set up for coordination of spectrum assignments. RSPG has a purely advisory role to the Commission on some more high level strategic spectrum issues.

Under the current framework the Commission scrutinises (with BEREC) draft *ex ante* market remedies notified by NRAs, but is not able to take binding action (e.g. to use a veto power) under the article 7a procedure. More general Decisions on remedies might be possible in theory under Article 19 of the Framework Directive, but may only be initiated two years following a Recommendation on the same subject (which may have its own period for entry into effect, to be first taken into account) and following a lengthy process involving BEREC and COCOM.

Under this option BEREC for access and the RSPG for spectrum would maintain their current advisory roles. Responsibilities for independent NRAs in areas such as consumer protection and spectrum would continue to vary to a degree at national level. The role of the Commission and BEREC in relation to ensuring consistency of draft measures proposed by NRAs concerning remedies in markets, in which operators with SMP have been identified, would remain of a non-binding nature.

The responses to the public consultation show diverging views with regards to the aptness of the current institutional set up at EU level. Almost half of the respondents to the PC agreed that the current institutional set-up should be revised in order better to ensure legal certainty and accountability. In particular some respondents called for making sure that institutions are accountable for their decisions (both politically and legally).

251 See for example EP (2013) How to Build a Ubiquitous EU Digital Society page 29

On the contrary, BEREC was of the view that the current sectorial institutional set-up has worked well so far and any intervention should be therefore carefully considered. According to BEREC, rootedness in its member regulators must remain core to the regulatory system.

Amongst those who favoured a revision of the current institutional set-up, proposals differed as regards BEREC from a limited advisory role to turning it into a EU regulatory authority with proper decision-making power. Some respondents called for strengthening BEREC's role within the Article 7 procedure and also for improving coordination (with other institutions, regulatory bodies and stakeholders).

Several respondents expressed their views that BEREC in its current form (as a body composed of 28 individual NRAs) has shown a limited ability to act strategically and in the interest of EU competitiveness and it does not contribute to the objectives of the Regulatory Framework in a satisfactory manner.

With regard to spectrum governance, in order to serve the future wireless connectivity needs of the EU, a common EU approach to governing spectrum access was welcomed by respondents to the public consultation in order to enable technologies to be used seamlessly, but respect for spectrum as a national asset was required. Delays in availability of spectrum and fragmentation between conditions of use in different Member States were noted.

Option 2: enhanced advisory role and strengthen competences

Under this option, in order to improve consistency in a number of areas identified in the previous sections of this report, it will be **proposed to strengthen the role of independent NRAs by establishing a minimum set of competences to be carried out by those NRAs across the EU**. This, in turn, should also have a positive effect on the efficiency of BEREC to achieve its objectives since all its members would have the necessary competences and experience in the relevant matters and, at the same time, a more efficient implementation of the best practice guidance provided by the new BEREC, given that all its members would be responsible for implementation at national level. The public consultation supported the alignment of a minimum set of competences. BEREC for instance called for identifying a common set of sector specific competences that should be entrusted to independent NRAs and aligning them to BEREC's own competences.

The harmonisation of the competences of independent NRAs will vest the NRAs with necessary competence to intervene in all main areas related to the electronic communications networks, except spectrum. As (some) NRAs would be assigned an increased portfolio of competences, it is essential to ensure that they are attributed the necessary human and financial resources to carry out those tasks.

At the EU level, both the new Agency (BEREC) and RSPG would continue to have an advisory role and BEREC **should extend its advisory scope to the areas where the independent NRAs are competent in order to align BEREC tasks to those of the NRAs**. However, in order to increase its efficiency and provide more stable management, the governance structure of the new BEREC would be adapted to substantially align with the 2012 Common approach on decentralised agencies²⁵². This means that the regulatory functions would also be carried out under an agency umbrella by a revised body which will operate with legal personality.²⁵³ This would also address the lack of accountability of BEREC raised by respondents to the public consultation.

²⁵² See the [Joint Statement](#) of the European Parliament, the Council of the EU and the European Commission on decentralised agencies of 19 July 2012.

²⁵³ In contrast to the current structure under which the Board of Regulators of BEREC is in charge of decisions on regulatory matters and the BEREC Office (established as an EU agency governed by a Management Committee and an Administrative Manager) is solely entrusted with a support administrative function to BEREC.

Although the seat of the new BEREC is an issue for political consideration, and it may be judged that any adapted agency should be considered as the successor of the current BEREC Office, whose seat has already been determined, the Common Approach states certain criteria to be considered, including assurance that the agency can be set up on time, accessibility of the location, existence of adequate education facilities and appropriate access to labour market, social security and medical care.

A new Management Board would be established to oversee the day-to-day governance of the overall Agency, replacing the current Board of Regulators and Management Committee. Moreover, a more stable governance structure is envisaged through the establishment of a Chairperson (to be selected amongst the members of the Management Board) with a longer term (currently the term is one year), to grant additional stability. The Executive Director will have extended powers compared to the current Administrative Manager of the BEREC Office and will be selected from a list of candidates proposed by the Commission following an open selection procedure as it is foreseen in the Common Approach and is the case in other agencies.

Under this option there will be an exchange of best practices within the RSPG regarding spectrum assignments practice of Member States, and for the rest it will continue advising with a particular focus on pre market-forming aspects.

Option 3: advisory role for BEREC/RSPG with certain normative powers for BEREC and improved process for market review and spectrum assignment

Under this option most elements from Option 2 would be maintained, in particular the minimum set of harmonised competences (now including also a competence to define the regulatory and market shaping elements of ECNS spectrum assignments), the alignment of NRAs and the new Agency's (BEREC's) tasks, the substantial alignment of the Agency's governance structure with the Common Approach for EU agencies and the advisory role for RSPG .

Additionally, a number of changes are implemented in order to address some of the key obstacles identified in the substantive areas, in particular for access, spectrum, services and numbering. Accordingly, BEREC is vested with some additional tasks including certain binding powers. It is worth pointing out that the substantial alignment of the Agency governance structure with the Common Approach on decentralised agencies will also address the concern raised by some PC respondents (in particular incumbent operators) that the current BEREC structure does not allow the body to fulfil executive and binding tasks but only advisory. The alignment with the Common approach will imply that the regulatory functions would be carried out under agency umbrella by a revised body which will operate with legal personality. Under the assessment carried out for access regulation, we identified the need to ensure greater consistency and co-ordination in the practices of NRAs concerning market analyses, in particular with regards to the choice of remedies with a cross-border dimension such as those used for business services. In order to improve the current situation where the Commission and BEREC have only non-binding powers as regards remedies, a **'double-lock' system** is proposed whereby, in cases where BEREC and the Commission agree on their position regarding the draft remedies proposed by an NRA, the NRA could be required by the Commission to amend or withdraw the draft measure and, if necessary, to re-notify the market analysis.

A majority of respondents to the public consultation agreed that the current role and responsibilities of the institutional actors should be amended. On one hand a group of (mainly) incumbent operators proposed more discretion for NRAs with a reduced role of the Commission (or BEREC), highlighting the need for taking account of national circumstances. On the other hand, there was a significant number of voices calling for an increased role of the Commission to ensure consistency (through a veto for remedies, for example).

Currently, neither the Commission, nor BEREC have a full picture of the exact footprint and capacity of electronic communications networks. While mapping initiatives have developed in

most of the Member States, they differ in scope and level of detail and the information they provide is not easily available and comparable. It is therefore proposed that NRAs would, as part of the market analysis, conduct a periodic geographic analysis of the current and prospective reach of networks (including quality of service mapping) and make this information available to the Commission and BEREC in the context of their monitoring tasks. BEREC would also receive the power to request information directly from operators, a power which would be extended to also cover communications services, competence for which would have been harmonised at national level with the NRAs, as in option 2. This will make available to BEREC and the Commission the necessary information on networks and services to perform effectively their monitoring tasks. BEREC shall also to provide assistance to NRAs on the mapping exercise.

In some areas BEREC will no longer have solely an advisory role to the Commission but it will get its own binding powers vis-à-vis its members. Accordingly BEREC may adopt a decision identifying transnational markets, which previously was a power of the Commission. It will also gain a power to adopt guidelines on how NRAs can design market regulation to meet transnational demand. Furthermore it may also adopt decisions on cross-border disputes.

BEREC will also obtain the new non-binding competence to adopt guidelines on minimum criteria for the reference offer of an SMP operator. It will also obtain a new role in assisting the NRAs upon request.

As regard consumption control BEREC shall issue guidelines on the technical requirements of measurement facilities for the implementation of the obligations for providers of internet access services and providers of communications services using numbers to offer end-users the facility to monitor and control their usage of services billed on time or volume consumption.

BEREC shall also adopt guidelines on relevant quality of service parameters and the applicable measurement methods in order to fulfil the obligations of national regulatory authorities who should specify which parameters should be measured and published by providers.

BEREC will also be assigned additional tasks in the area of numbering with a view to assisting NRAs in ensuring an efficient management of extraterritorial use in compliance with the framework and with consumer protection rules. In particular, this task would entail the establishment of a registry on extraterritorial use of numbers and cross-border arrangements. Where extraterritorial use is applicable, BEREC shall facilitate and coordinate the exchange of information to assist the cross border aspects of enforcement and compliance with all the relevant national consumer protection rules or national law related to the use of these numbers.

In addition, BEREC shall develop harmonised criteria for the fulfilment of numbering management requirements in order to become assignees of numbering resources, and shall assist the harmonised development of the triggering factors and scope for scarcity safeguards, i.e. when and how can the NRAs restrict the assignment of numbering resources to prevent the exhaustion thereof.

It will also get new tasks in the area of standardisation by assisting the Commission and the NRAs in identifying a lack of interoperability of communications services that gives rise to significant barriers to market entry and innovation, or an appreciable threat to end-to-end connectivity between end users or a threat to effective access to emergency services, within one or several Member States or throughout the European Union which could be addressed by the imposition of existing European or international standards. When such standards are not available, it will be BEREC's task to assess whether further action should be taken by the Commission in the area of standardisation.

Furthermore, BEREC will be tasked to adopt guidelines on minimum criteria for the definition of harmonised reference offers for regulated wholesale access products taking into account the

needs of access seekers and end users, in particular in the presence of a transnational demand for such products.

All this requires increased financial and human resources in order to enable the new BEREC effectively to fulfil these tasks, which are necessary to ensure more homogeneous market regulation and conditions at EU level, as well as for the independent NRAs as regards their competences (including ECNS spectrum assignment).

As regards spectrum, NRAs responsible for ex ante market regulation would gain decision-making competences concerning only the regulatory and market shaping conditions of spectrum assignment for electronic communications networks and services.

Furthermore, a **'peer review' system** within the EU body of competent national regulators is introduced as a new coordination mechanism in order to improve efficiency and coherence amongst Member States with regard to regulatory market elements of spectrum assignments. This new mechanism will foster common interpretation and implementation across the EU of elements of spectrum assignment which most impact business decisions and network deployment. Such mechanism will require NRAs to notify (in parallel to the national consultation) their measures concerning market shaping to BEREC for review and issuance of non-binding opinion. While the regulatory community encompassing both BEREC and RSPG was of the view that the EU already benefits from substantial coordination and harmonisation processes, and no further EU-level coordination procedures are necessary, the RSPG showed however openness to a peer-review mechanism as regards spectrum assignment and stakeholders broadly recognise the benefits that a peer review can bring in terms of greater consistency.

The administrative secretariat of RSPG would remain with the Commission as today.

Vesting the politically independent NRAs with competence for certain (economic and market regulatory) aspects of ECNS spectrum assignment would be done without reducing their level of independence, which will be extended to all their new areas of competence. While Member States would retain the power to set the objectives of spectrum assignment procedures in accordance with the revised framework, and would be free to assign the competence of conducting the actual assignment procedure to the politically independent NRA or to any other body, the NRA would define at least all aspects which impact economic conditions and competition on the market, in complete independence not only from the operators, but also from any external intervention. This is important to reinforce the sentiment of regulatory certainty and consistency, necessary to the investment community.

Moreover, additional general normative powers would be accorded to the Commission with regard to laying down criteria for defining certain spectrum assignments elements (such e.g. as timing of awards, criteria to define coverage obligations, trading, leasing and sharing conditions, etc.), taking utmost account of advice of RSPG and based on adoption through comitology (COCOM) – to guide individual NRAs, and the Agency peer review. Such a common EU approach to governing spectrum was welcomed by respondents in order to enable technologies to be used seamlessly, but respect for spectrum as a national asset is required. In the public consultation, there was a split between regulators and (mainly) broadcasters that preferred a national approach and telecoms operators that supported a certain level of binding guidance. Most respondents supported the Commission intervening in assignment conditions and/or procedural aspects, including with binding measures.

The RSPG general spectrum advisory role would be more clearly reflected in the regulatory framework by reference to their opinions being taken into utmost account by the Commission before adopting implementing measures by comitology (excluding technical harmonisation decisions).

We could summarize the roles of the respective bodies as below:

The Radio Spectrum Policy Group will remain the advisory body for spectrum responsible for articulating and coordinating national administrations' views on high level strategic issues in spectrum policy and related developments. It will continue to be involved in the conception of multiannual radio spectrum policy programmes and provide advice on conditions necessary for deepening the Internal Market..

BEREC will be the forum for a new peer review process in the spectrum domain, which broadly resembles its current role in market regulation. This concerns primarily the review of draft measures that will affect the functioning of wireless markets or otherwise significantly shape the economic conditions for networks and services using spectrum resources. BEREC will issue (non-binding) opinions on these draft measures that assess the need for such measures based on a thorough and objective assessment of the competitive market situation. These opinions serve to promote a more consistent use and application of such measures which most impact business and network investments decisions. Where national authorities intend to deviate from BEREC's opinion, they will be obliged to state reasons for doing so.

The Commission's role will continue to be to provide strategic orientation for EU spectrum policy, including in international contexts, to decide spectrum allocation and set out harmonised technical conditions under the Radio Spectrum Decision and to ensure compliance with the rules of the regulatory framework. With a number of new procedural obligations to be fulfilled by national authorities, its monitoring and enforcement function in these domains will evolve correspondingly. It will also be competent to present comments, together with BEREC's opinion, on the NRAs' notified draft measures on spectrum assignments.

Option 4: EU regulator with certain implementation/execution powers

A last option is the establishment of an EU regulator, as a reinforced EU agency with the necessary resources to accommodate a transfer of implementing powers, including supervision and enforcement powers. The EU Regulator could act with binding powers in areas where it is necessary to ensure uniform application of EU rules; new services with pan-EU or global dimension, currently unregulated to a large extent or subject to unclear regulatory frameworks (M2M, OTT as well as in other areas where the EU interest is particularly acute, such as roaming or transnational markets).

As regards spectrum, there would also be an a priori peer review mechanism involving the EU Regulator, possibly with a Commission veto power. Furthermore, there would be the possibility for the EU Regulator to coordinate binding pan-European assignment procedures for specific bands. Finally, the EU agency would also institutionalise a good office mediation service for cross-border interference issues (as RSPG currently does ad hoc) and for cross-border regulatory issues.

When asked whether the establishment of an EU Agency with regulatory decision-making powers could positively contribute in achieving regulatory harmonisation in the EU telecoms single market, for all the different areas (market regulation, EU spectrum management, end-user protection and other) a majority disagree. It was argued that an EU agency would not be able to take into account national circumstances. There were also statements regarding administrative burden, bureaucracy, slow decisions, duplications, etc.

Some respondents (mainly operators) in favour for the establishment of such EU Agency recommended that it should be responsible for services of the EU single market or for issues such as service platforms whilst NRAs should continue dealing with local issues (e.g. network, access to network).

As regards spectrum and numbering there was a call for more harmonisation but divergent positions whether these issues should be dealt with by an EU agency. There was little demand expressed in the public consultation for mandatory pan-EU or regional assignments. Most

respondents questioned the need for EU-wide licences, viewed assignment as a national matter, which would however benefit from more consistency and coordination, and stressed that any wider geographical scope should involve the Member States with some respondents viewing it as a Council matter..

Table 12 - Summary of governance options

	Institutional	Access, numbering and services	Spectrum
Option 1: Baseline scenario	BEREC and RSPG with advisory role. Independent NRAs represented in BEREC in charge of ex ante regulation and dispute resolution. The assignment of other competences at national level largely varies.	Market review process with EC/BEREC non-binding powers as regards remedies.	RSPG adopt opinions or reports advising the Commission, or upon request the Council or Parliament. Some NRAs have certain spectrum related competences.
Option 2: Enhanced advisory role + Strengthened competences	Harmonise a minimum set of independent NRAs competences (ex-spectrum) and align with BEREC tasks. Significantly align BEREC governance with Common approach on decentralised agencies. Main role for BEREC and RSPG remain advisory.	Extend NRAs' competences: consumer protection, numbering, authorisation..	Improve process for adopting RSPG opinion or reports, working arrangements. Enhance the current RSPG Offices work through a specific mechanism to ensure cross-border coordination outcomes
Option 3: Advisory role BEREC/RSPG with certain normative powers for BEREC + Improved process for market review and spectrum assignment	Harmonise a minimum set of independent NRAs competences (including the regulatory and market shaping elements of spectrum assignment for ECNS, subject to governmental definition of objectives) and align with BEREC tasks. Significantly align BEREC governance with Common approach on decentralised agencies. Normative powers (EC implementing decisions) for certain spectrum assignment elements	As above + 'double-lock' mechanism for article 7a (EC decision possible if BEREC agrees) + BEREC additional guidelines as regards matters such as mapping, standardised wholesale inputs for business, technical aspects of numbering, switching and	Notification to BEREC for peer review process of regulatory and market shaping spectrum assignment aspects, which issues non-binding opinion. RSPG to remain a Commission Advisory body, to articulate and coordinate national administrations' views on high level strategies issues in spectrum policy as well as contribute its

	taking utmost account of RSPG opinion and adopted through comitology procedure.	interoperability.	opinion to preparation of binding guidance measures.
Option 4: EU regulator with certain implementation/execution powers	Transfer certain competences from national to EU regulator (possibly combining market regulation and spectrum) with implementation/execution and supervision powers. EU Regulator will have normative powers to issue binding pan-European assignment procedures for specific bands and institutionalise a good office mediation service for cross-border interference and other regulatory issues	The EU Regulator/EC would have supervision and enforcement powers implying ability to act where necessary to ensure uniform application of EU rules in cases where EU interest acute e.g. M2M, OTT, roaming.	The EU Regulator/EC would have supervision and enforcement powers implying ability to act where necessary to ensure uniform application of EU rules in cases where EU interest acute. Potential Commission veto power concerning spectrum assignment

4.5.2 Discarded options

This section outlines the options which have been discarded. A more detailed analysis can be found in Annex 3 on discarded options as well as the IA support studies.

- Commission powers to regulate markets directly
- Not having an EU agency at all: substituting the BEREC Office by secretarial support functions to the Board of regulators to be provided by the Commission.
- Merging BEREC with the European Network and Information Security Agency (ENISA)

4.5.3 Impacts

Governance options provide supporting mechanisms for the achievement of the policy options. They do not have social impact per se and their own economic impact is limited to their cost of implementation.

There is no separate analysis of economic, social and environmental impacts of the governance options. This is primarily because the substantive (per area) analysis already includes an assessment of what benefits could be gained from harmonising certain features of the existing regime, and the governance analysis simply seeks to assess which body or bodies (e.g. the EC with BEREC in advisory role, BEREC in a more normative capacity, or BEREC taking certain implementation/enforcement roles) would be best suited to achieve the harmonisation previously identified as a desirable outcome (with attendant benefits already identified). In the comparison of options part below we analyse the degree to which governance options are likely to effectively support these benefits, in particular in relation to the preferred options in the different policy areas. The social and environmental impacts of different governance options are unlikely to be different from those associated with the preferred substantive options we have already discussed.

There is nevertheless a separate economic impact related to institutional choices represented by the respective institutional costs of the different governance solutions which are analysed in detail in the Study SMART 2015/0005 and summarised under the cost of the institutional set up of various options below and Annex 12 includes a table with a more detailed presentation on institutional costs. The efficiency analysis, in section 4.5.4 examines the costs in relation to the anticipated benefits. In the same section, the impacts of the Governance options have been assessed in relation to their effectiveness in supporting ubiquitous connectivity, competition and end-user interests in the single market thereby supporting the economic, social and environmental benefits that have already been identified in relation to these objectives. Their coherence with the 2012 Common Approach on decentralised Agencies and with each other (and specifically whether they achieve synergies and convergence between fixed and mobile communications, content and services) and the degree to which they add value compared with Member States acting alone, and the degree to which they respect the principle of subsidiarity and proportionality, are also analysed in this section.

4.5.3.1 Cost of the institutional set up Option 1

The costs of the current institutional set-up consist in the costs of application of the framework at a national level by NRAs and Spectrum Management Authorities (which may in some cases be integrated into the NRA), and at European level in terms of the costs associated with developing implementing guidelines and conducting case by case reviews of national procedures. **The estimated total cost of the regulatory set-up for implementation of the electronic communications framework with overhead, is approximately €203 m per annum.**

4.5.3.2 Cost of the institutional set up Option 2

This option would entail some increase in the costs of BEREC as an agency resulting from its expanded advisory role and change in structure. A stronger role of BEREC will result in efficiencies at national level given that national regulators can rely on coherent EU-level regulatory guidance provided by BEREC. However, despite these expected efficiency gains, there would be increased support costs for BEREC and increased costs for NRAs resulting from the significantly expanded advisory remit of the new agency compared to the current more limited mandate.²⁵⁴ The precise effect on the agency costs is difficult to assess, but could be estimated at additional staffing of around 12 FTE taking the total to 40 FTE. The costs to NRAs in relation to the new advisory support to BEREC, could be estimated at 10 FTEs (an uplift of around 20%), assuming four additional requests for advice per year, and based on an estimate of 2.5 FTE per advice.²⁵⁵

We have discarded the option of BEREC being (fully or partly) financed by fees due to the nature of the agency functions, which are mainly of an advisory character to the NRAs and EU Institutions with the aim to ensuring greater consistency of telecoms regulation across the EU rather than addressing market players directly.

The Commission's resourcing requirements and associated costs would only marginally increase, to reflect the agency's remit in developing implementing guidelines for example in relation to mapping and standardised wholesale access products as well as in relation to its representation at the Management Board in line with the Common Approach²⁵⁶. Based on Commission estimates, we have envisaged approximately the current level of resourcing i.e. 3 FTEs for this task assuming that the increased need for participating in the substantive work as a

²⁵⁴ It should be noted that NRAs do not have an equal level of participation in BEREC. Some NRAs may contribute more resources and leadership of working groups than others. The figures we use are an average.

²⁵⁵ Data supplied by BEREC suggests that advice provided on various Commission Recommendations required around 2.5 FTE on each occasion

²⁵⁶ The Common Approach foresees that the Commission should count with two representatives with voting rights at the Management Board.

voting member of BEREC will be balanced by the decreasing need for administrative support provided to BEREC currently.

At national level, the budget of some NRAs, which currently count with a low level of resources to contribute to the work of BEREC, would increase despite the more effective resourcing. We have estimated an additional 10 FTEs for 5 NRAs which have expressed concerns²⁵⁷ over current resourcing levels. In addition, NRAs would need to make greater contributions through BEREC's working groups due to the enhanced mandate of the agency, which we have reflected through an increase in NRAs current resourcing contributions to BEREC accounting for 10 FTEs across the EU. Additional resourcing in order to complete thorough mapping exercises may also be required for those NRAs which do not currently engage in such exercises.²⁵⁸ However, many NRAs already engage in such exercises and the extension of the market analysis process to five years should also contribute to the reduction of costs for NRAs associated with market analysis.²⁵⁹ Moreover, cost savings might be achieved as a result of standardised wholesale product specifications which may remove the need for some of the duplicate processes that have occurred at national level.

It should be noted that, while NRAs gaining responsibility for consumer protection (in cases where they do not already have such responsibilities) would require an increase in their resources, this may not influence the costs of the system overall, as there should be a corresponding reduction in resources amongst the national bodies previously addressing these issues.

As regards resourcing for spectrum, we have assumed that the Commission would continue to provide an administrative support function to RSPG equivalent to 2.5 FTEs as in the status quo but that due to the additional advisory requirements stemming from increased guidance on spectrum co-ordination, the substantive contributions of SMAs to the RSPG would increase by around 50% compared with the status quo²⁶⁰.

If cost savings at a national level of around 15% can be made as a result of the streamlining of the market analysis process and specifically the extension of the review period from 3 to 5 years and the potential reduction in the number of markets to be analysed, this scenario should result in costs of around €201m, a saving of around €2m across the EU compared with the status quo. However, if no such synergies are achieved, this scenario would result in costs of around €211m, €8m more than the status quo. **The estimated total institutional set up cost for option 2** under intermediate assumptions concerning efficiencies would result in total costs of **approximately €206 m per annum**, around €3 m more than the status quo across the EU.

4.5.3.3 Cost of the institutional set up Option 3

The main cost impact of option 3 is likely to be the additional resources required by BEREC and its members in order to fulfil its expanded remit especially as regards (i) the preparation of detailed guidelines and decisions; (ii) extension of its remit to encompass market-shaping aspects of spectrum and the associated peer review of NRAs' decisions in this regard. We have assumed that the enlarged BEREC would require 60 FTE, implying a resourcing level in between the

²⁵⁷ Data request April 2016 in context of SMART 2015/0002

²⁵⁸ The additional resources required for mapping are difficult to estimate on a pan-European basis because many NRAs have already engaged in some degree of mapping activity. As regards the costs of setting up a physical infrastructure atlas the Impact Assessment for the Cost Reduction Directive 2014/61 suggests (see footnote 85) that costs may vary from relatively low amounts (1-2m for the German Infrastrukturatlas and Portugal CIS database) to 75-77m for the Flemish KLIP GS mapping and Polish GBDOT.

²⁵⁹ Based on data received from NRAs, the resourcing associated with access regulation is currently estimated at 36% of the total. We have estimated 15% savings on this budget resulting from the decreased frequency of market reviews (and potential reduction in regulation over time) based on Ecorys (2013) assessment of the savings from reducing the number of markets to be analysed by NRAs.

²⁶⁰ This should be considered as the maximum percentage of increase in FTE. For prudential reasons the EC services prefer to overestimate the potential cost, rather than underestimate.

current BEREC Office and the energy agency ACER. We have also assumed additional costs for NRAs contributing to BEREC working groups, expanding their current contributions by 20 FTE over the status quo.

Considering the functions that BEREC would carry out, we have analysed potential charging of fees for the provision of specific services by the agency. However, we have concluded that, due to the nature of the agency functions, there is in principle no room for it to be (fully or partly) financed by fees. Indeed the main functions of BEREC would be in the remit of taking decisions, opinions and guidelines to ensure greater consistency of regulatory intervention at EU level, which do not fit into a 'service' approach. This option could, however, be reconsidered in the future in case the agency is assigned new functions.

As regards access and services, the Commission's remit would remain similar to present (although it would gain the power to issue Decisions on market analyses in cases where BEREC would agree with its serious doubts). However, its role in the development of spectrum guidelines and peer review is expected to require an additional 5 FTE.

Under this option, NRAs currently lacking ECS spectrum responsibilities in the field of market-shaping measures would gain such responsibilities. However, there may be little cost implication if this results in a transfer of resources from existing bodies. Moreover, there may be some cost savings for SMAs due to the introduction of mechanisms to co-ordinate assignment procedures and conditions. We have estimated a potential reduction of 1 FTE per SMA resulting from harmonised procedures resulting in total cost savings at the national level of around €2.6m across the EU.

Assuming these savings could be achieved at a national level, the resulting costs for this option are similar to the status quo, at around €202m. If no such savings can be made at a national level and if the extended timeframes between market analyses also do not result in any national savings, then the total costs of this scenario would be around €215m. Costs under **intermediate assumptions concerning efficiencies** would result in total costs of €208.5m, around €5m more than the status quo across the EU.

4.5.3.4 Cost of the institutional set up Option 4

Under this scenario, it is assumed that a larger scale Agency would be required along the lines of the EBA, with an associated cost of around €31m per annum. We assume that on issues other than spectrum NRAs would make an enhanced contribution to this Agency similar to that estimated for option 3 (i.e. 20 FTE increased resource for BEREC contributions compared with the status quo). As spectrum management would be tightly co-ordinated at EU level under this scenario, NRAs (which would have full spectrum management responsibilities), would also make additional contributions to co-ordination on spectrum matters – amounting to around five times the existing contribution made by spectrum management authorities to the RSPG.

At the same time however, as responsibility for enforcing certain Decisions affecting the single market (such as those relating to certain digital services) would be transferred to the EU level, we assume a reduction of 5 FTEs for NRA activities excluding spectrum compared with option 3.

Similarly, as certain decisions relating to spectrum would transfer entirely to the EU level (to the enlarged BEREC), we assume further reductions of 5 FTE for each SMA (now incorporated with the NRA) compared with option 3.

Under this scenario, increased costs of the centralised Agency would be more than compensated by cost savings at the national level, resulting in a reduction in the overall costs of the institutional set-up to around €198m. However, if the costs of national authorities prove to be

'sticky' then in a worst case scenario absent synergies this scenario could cost €234m, with €216m in an 'average' view under intermediate assumptions concerning efficiencies.

4.5.4 Comparison of options

For the comparison between the different options, it is important to assess the degree to which they will be effective²⁶¹, efficient²⁶² and coherent²⁶³ in supporting the identified objectives and specifically providing for the consistent application of regulation fostering VHC broadband, competition and consumer protection in the single market, and better regulation in terms of reduced cost.

4.5.4.1 Effectiveness

Option 2 (the enhanced advisory role) is likely to result in greater co-ordination than the current set-up. However, like the status quo, an important aspect which may impede its effectiveness is the existence of separate EU bodies for access and services on the one hand and spectrum on the other, as well as the set-up which involves the Commission taking decisions or producing recommendations subject to input from independent advisory bodies. This would maintain the current complicated institutional structure and may risk slow processes, diverging views and incoherent outcomes, potentially undermining the effectiveness of the system.

An important improvement, which is likely to increase the effectiveness of Options 3 and 4 vs the status quo and Option 2, is that these options place greater responsibility with the EU level body for developing guidelines on technical issues, such as business access products, infrastructure mapping and extra-territorial numbering use, while maintaining the Commission's leading role in developing broad guidelines on key policy issues, such as on co-investment or Next Generation Access Networks and on spectrum. For this reason, they are able to derive more benefit from the expert resources of national regulatory authorities and spectrum experts, and in turn are likely to result in greater buy-in to the outcomes by national authorities which have contributed to them. Additionally, these options (and especially option 4) bring together market-shaping elements of the electronic communications sector (wired and wireless, networks and services) under the same authorities, both at national and EU level. This should allow these authorities to implement the framework in a manner which reflects the increasing convergence between fixed and mobile networks and services.²⁶⁴

It is reasonable to assume that these effects would make Options 3 and 4 more effective in promoting consistent best practice in fixed and wireless connectivity than Options 1 and 2. A core distinction between Options 3 and 4 is that under Option 4 the EU Agency would have responsibility for large extent decision-making and enforcement. Option 4 might be effective for those issues in which identical approaches are desirable. However, it is likely to be less effective than Option 3 in cases where knowledge of national and local conditions is required, which is typically the case especially concerning regulation of infrastructure.

We conclude that Option 3 is likely to be most effective in providing the appropriate degree of consistency to support VHC broadband deployment, competition, adequate consumer protection and spectrum assignments in the single market.

²⁶¹ Effectiveness is evaluated on the basis of the degree to which the options would achieve these objectives.

²⁶² Efficiency is evaluated through an assessment of costs the complexity of the system.

²⁶³ Coherence is evaluated in terms of the coherence of the option with the existing set-up (ie degree of disruption implied), with the 2012 Common approach on decentralised agencies and with other similar bodies

²⁶⁴ 4G and 5G mobile technologies require increasing degrees of fibre backhaul, and there are increasing trends towards fixed mobile converged operators which can exploit synergies. At the same time, the take-up of bundled fixed mobile converged offers by consumers is increasing, and many businesses have expressed a desire but some difficulties in obtaining fixed and mobile services from a single provider (WIK 2013 business communications)

4.5.4.2 Efficiency

In assessing efficiency, we have estimated the institutional costs of each of the options. We estimate that the total costs of the institutional set-up (including the costs for the Commission, BEREC, RSPG, NRAs and SMAs) under the status quo are around €203m. See for more details the analysis in section 4.5.3.1 and further details in the detailed institutional set-up analysis in SMART 0005/2015.

The costs of the other options depend on the degree to which harmonised best practice and co-ordination at EU level can be translated to efficiency savings at the national level. We therefore consider a range of costs for each option also in line with indications from the expert group²⁶⁵.

Under an enhanced advisory role (option 2), additional institutional costs would be incurred of around €8m compared with the status quo. The main sources of the increase are the increased resources required by the Commission for the drafting of further implementing guidelines under the revised Framework and increased costs to the Agency and RSPG associated with their expanded advisory role, despite expected efficiency gains by NRAs due to the EU level approaches to specific regulatory aspects. There might also be additional costs for NRAs to address under-resourcing for their contribution to BEREC reported by several NRAs²⁶⁶ and to expand the remit of those without consumer protection responsibilities (although because we assume that this cost would be transferred from other existing authorities it is not recorded in the figures). However, these institutional cost increases might be more than compensated resulting in total costs marginally less than the status quo if the cost of access regulation at national level is reduced as a result of extended market review periods,²⁶⁷ and the implementation of standardised remedies for core wholesale products,²⁶⁸ although requirements for more detailed market reviews involving mapping²⁶⁹ may absorb some of those savings.²⁷⁰

Likewise, in the unlikely event that no efficiencies or synergies could be achieved as a result of more effective co-ordination or extended market review periods, Option 3 is estimated to result in total costs of around €215m (€12m more than the status quo). These additional costs stem mainly from expanding the remit and tasks of BEREC and the introduction of a systematic peer review process for spectrum assignments involving the Commission and BEREC.²⁷¹ However, it is likely that they would be at least partly compensated by potential cost savings regarding spectrum management resulting from greater alignment of auction procedures and certain conditions,²⁷² as well as the extended market review periods. Indeed, **when these efficiencies are reflected, the resulting total cost of this set-up would be similar to the status quo.**

²⁶⁵ The range of costs takes into consideration different possible materialization in time of efficiency savings at national level and reflects the need to consider this aspect as expressed by the Expert group, see also Annex 13.

²⁶⁶ Questionnaire April 2016 SMART 2015/0002

²⁶⁷ Ecorys (2013) suggests potential cost savings of 10-15% resulting from a reduction in the number of markets on the list of relevant markets from 7 to 5. An extension in the review period from 3-5 years might be considered to have equivalent effect.

²⁶⁸ SMART 2014/0023 recorded 13 parallel procedures for the specification of virtual unbundled local access – it seems reasonable to assume that costs to NRAs may have been reduced if common specifications had been pursued.

²⁶⁹ A May 2016 interview with ARCEP suggests a cost of €4.6m over 7 years (~€0.7m annually) to establish a regime similar to that which might be required under the adapted market analysis process. However, it is unclear how many of the activities might be conducted in the context of a standard market review.

²⁷⁰ A precise estimate of the cost difference compared with the status quo associated with mapping requirements is challenging as a significant number of member states have already conducted mapping assessments of various kinds and the cost may vary significantly depending on the type of mapping and detail involved. Moreover, if as is intended, responsibility for infrastructure, investment and quality of service mapping is consolidated within the NRA, it could achieve cost-savings in countries where these activities are distributed across a number of bodies. See SMART 005/2015 for further discussion of the cost implications of mapping.

²⁷¹ We assume that introducing a minimum remit for NRAs including market-shaping aspects of spectrum would be cost neutral, assuming that any resources currently residing in other departments would be transferred to the independent NRAs.

²⁷² These savings are estimated at around €2.6m across the 28 member states on the conservative assumption that each spectrum authority could reduce FTE by 1.

Costs for option 4, at around €234m in the absence of efficiency savings are the highest of the considered options. This is due to the fact that in this scenario the costs for the expanded EU Agency would be significantly higher than for the other options (a cost similar to the European Banking Authority is assumed). However, as certain functions would move from the national to the EU level, it is reasonable to assume that some cost reductions might be possible at a national level as regards access and consumer protection regulation as well as spectrum.²⁷³ If these are taken into account, the total cost is projected to be €5m lower than the status quo.

When assessing efficiency, it is important not only to consider the costs for the institutional actors, but also the cost and complexity to market players. For example, Ecorys (2013) estimated that the costs to operators resulting from the market analysis process were more than four times greater than those for NRAs, and therefore an extension in the period for market reviews could also have a wider impact on industry cost savings.²⁷⁴

Because the institutional set-up for options 1, 2 and 3 involve different roles for different authorities in different countries and for different topics, this set-up is also likely to perpetuate high costs for stakeholders which would need to engage with and provide input to multiple bodies at national and EU level.

Conversely, under option 4, where NRA responsibilities would be extended to cover the full range of electronic communications issues and where a single body takes a leading role in implementing guidelines, thereby addressing tasks that would otherwise be taken by the Commission and/or RSPG, this set-up should result in reduced costs to stakeholders, especially those with a multi-national footprint.

We conclude that if the potential synergies could be achieved, option 4 is likely to be the most efficient solution. However, as costs can prove to be sticky and synergies might not be fully achieved, option 3 may provide the most cost effective solution in relation to the potential benefits that could be achieved through better co-ordination.

4.5.4.3 Coherence

All options would be significantly more coherent with the 2012 Common Approach on Decentralised Agencies than the status quo which departs markedly from the model. Option 2 would provide greater coherence in the handling of consumer protection, but would maintain separate bodies for spectrum and parallel roles for the Commission and BEREC on implementing guidelines, which may result in complex or incoherent outcomes. On the other hand, Option 3 is likely to increase the coherence of regulatory decisions by bringing together responsibilities over market reviews and market-shaping aspects of spectrum. Under Options 3 and 4, the NRAs competences would also include economic and market regulation aspects of spectrum assignment, meaning that all main tasks related to market-shaping can be dealt with NRAs, adding greater coherence. Furthermore the spectrum peer review mechanism, which requires NRAs to notify to BEREC their draft plans for spectrum awards and draft assignment conditions would foster common interpretation and great coherence in the implementation of EU assignment procedures and conditions across the EU. Option 4 would go even further towards this goal by fully consolidating spectrum responsibility with the NRA and to a large extent consolidating responsibility for governance of the electronic communications sector at EU level.

4.5.4.4 Impact on stakeholders

²⁷³ These cost savings are estimated at around €29m across the EU28, assuming reductions of 5FTE per member state in access and service regulation and 6FTE in spectrum, but in practice may take time to materialise, as the costs of regulatory authorities may in practice be 'sticky'

²⁷⁴ See Ecorys et al (2013) Future electronic communications markets subject to ex ante regulation <https://ec.europa.eu/digital-single-market/en/news/future-electronic-communications-markets-subject-ex-ante-regulation> institutional costs are estimated at €50m in contrast with more than €200m for operators.

The preferred option for Governance (Option 3) involves the consolidation and alignment of the remit of Regulatory Authorities at national level, as well as the extension of NRAs' remit to at least market-shaping economic and regulatory aspects of spectrum assignment. BEREC would also receive a consultative role in this regard. Its remit would also be extended to take certain normative powers in relation to developing implementing guidelines in respect of transnational demand (which would be adopted by the Commission) as well as playing a deciding role in enabling a Commission 'decision' in relation to case by case assessment of remedies (under an expanded article 7a FD process). BEREC would also perform the peer review of market shaping aspects of national spectrum assignment procedures.

Alignment of governance mechanisms as well as full harmonisation and greater co-ordination at EU level is likely to benefit OTT players which frequently operate in a multi-national or even global environment, if the status quo would otherwise lead to fragmented national initiatives to regulate aspects of their activities. SMEs will not be directly impacted by changes in governance, but may benefit cross-border operations for smaller businesses by ensuring consistent application of the rules, and interaction with fewer interlocutors. Consumers will indirectly benefit from greater connectivity, cross-border entry and competition that may result from more effective co-ordination at EU level.

The proposed changes to the EU framework for electronic communications would require transposition into national legislation, and will entail changes to the national institutional set-up in countries which do not already have arrangements in place corresponding to the revised EU rules on structures and procedures, as well as changes at EU level. Specifically, at national level, NRAs' remit would be subject to minimum harmonisation (to cover at least market-shaping spectrum assignment issues and sector specific regulation in areas such as consumer protection). Likewise, at EU level the preferred option would give BEREC an expanded consultative role for market-shaping aspects of spectrum assignment and services alongside access, as well as increased responsibilities including responsibility for developing implementing guidelines and an enhanced role in the article 7a process on remedies as well as a peer review role on market-shaping aspects of spectrum assignments.

Additional expenses are expected to vary between Member States, but across the EU overall additional expenses for the resourcing of NRAs are expected to be minimal. Certain NRAs may also need greater resourcing in order to adequately perform duties such as market analyses under the revised framework including the proposed requirement for geographic survey of infrastructure. The additional obligations are however only incremental to the initiatives that already exist in some Member States that implemented advanced mapping systems and to the transparency measures linked to the implementation of the Cost reduction Directive (such as advanced notification of civil works) and to the reporting obligations already undertaken for identification of white areas and investment mapping before notification of State Aid schemes by Member States. There is a cost reduction potential in streamlining and coordination.

Stakeholders' views vary on the degree to which consistency in regulation is important vs flexibility at national level. There is widespread agreement amongst electronic communications providers and digital service providers that consistency is helpful in the field of digital services, which can in principle be supplied and consumed cross-border. More consistency in spectrum regulation is also requested by many cross-border mobile operators.

Interviews conducted for the study SMART 2015/0002 as well as SMART 2014/0023 suggest that consistency in regulation is also important for business end-users and certain suppliers of business and mass-market services, which rely on wholesale access for a substantial element of their customer base. However, it is less important for some nationally focused providers, while many operators designated with SMP in local access prefer regulation to be more tailored to local circumstances.

It should therefore be borne in mind that not all stakeholders seek governance mechanisms which serve to foster the consistent application of the framework. Rather the view of incumbent operators is that institutional streamlining could better be achieved through a reduction in ex ante regulation, which would limit the need for co-ordinating measures at EU level.²⁷⁵

For those stakeholders for whom consistency is important, the impacts of the governance options are associated with their potential effectiveness in achieving the objectives for very high capacity connectivity, competition and consumer welfare in the single market, the potential for the options to achieve coherent decision-making, and the potential to streamline engagement, avoiding the need for multiple parallel contacts at national and EU level. Option 4 would in particular benefit multi-national operators with significant spectrum and/or wholesale access interests as well as business end-users, while Option 3 would also bring greater benefits to these stakeholders than the status quo.

The increased focus on harmonisation and monitoring of consumer protection measures in Option 3 would also meet the demands of consumer groups²⁷⁶ for greater attention from BEREC on consumer matters.

On the other hand NRAs call for more incremental and flexible approaches to governance at EU level combined with better resourcing and an expanded remit for NRAs at national level, which might be better served through an enhanced advisory role as envisaged in Option 2.

Many Member states are also cautious about approaches which entail a reduction in their flexibility to assign responsibilities at national level, especially as regards important resources such as spectrum.

See also tables presented in Annex 12 specifying in detail impacts on stakeholders for each policy option and cost implications.

4.5.4.5 EU value added

Option 2 provides considerable scope for flexibility at national level, and therefore should allow regulation to be tailored towards national circumstances. However, it is unlikely to provide significant added value at EU level compared with the status quo. On the other hand, Option 4 is likely to provide significant EU added value compared with Member States acting alone, but likely does not permit sufficient scope for deviation to reflect national circumstances, and therefore is unlikely to be proportionate. Option 3 provides the best added value as compared to Member States acting alone and maintains an proportionate and appropriate balance between EU and national responsibilities.

4.5.4.6 Summary table comparing institutional governance options

Table 13 - Comparing the impacts of governance options

²⁷⁵ Interview with ETNO SMART 2015/0002

²⁷⁶ As expressed in an interview with BEUC in the context of SMART 2015/0002

	Effectiveness (wrt connectivity imperative, consistency)		Institutional cost	Cost to stakeholders	Coherence		EU value ad
Option 1: status quo	0	Fragmentation in access, spectrum and services policy persists	~€203m	0	0	Incompatible with Common approach	0
Option 2: Enhanced advisory role	+	Stronger EU guidance, but continued advisory roles for BEREC, RSPG impedes buy-in, effectiveness	~€206m	0	+	Reflects Common Approach but maintains parallel processes	+
Option 3: Some normative powers + synergy	++	Greater role and expanded remit for BEREC fosters buy-in, spectrum consistency	~€208m	0	++	Reflects Common Approach, greater spectrum alignment	+
Option 4: Some supervisory powers + synergy	+	Effectiveness impeded by distance from national markets	~€216m	+	+++	Reflects Common Approach & convergence	++

The average (mid-range) assumptions for efficiency savings are used in this assessment of institutional cost. Under full efficiency saving assumptions (best case scenario), the costs for the different options do not differ significantly

Source: WIK-Consult

4.5.5 The preferred option

Based on the analysis provided above, Option 3 appears to provide the greatest overall benefits in relation to the cost. Specifically, it is likely to be more effective and coherent than option 2 in meeting the objectives of fostering very high capacity connectivity, competition and end-user protection because it provides a core role for BEREC in developing implementing guidelines, avoiding potential complexities and divergence between the Commission and BEREC, and fostering buy-in from NRAs. It also extends NRAs' and BEREC's responsibilities for fixed market analysis to market shaping aspects of spectrum management, ensuring a coherent approach between the two. It empowers the Commission and BEREC to impose consistent regulatory practices on access remedies where necessary, with BEREC's NRA-based composition ensuring that adaptations to objective national or local differences will be duly respected.²⁷⁷

Although Option 4 is positive in several respects and could be a relevant solution for aspects of sector specific regulation which require full harmonisation, it appears in the final analysis that across the balance of issues, Option 3 is likely to provide the most effective and efficient outcome in achieving consistent application of electronic communications sector rules, while respecting the principle of subsidiarity. Aligning the responsibilities of NRAs and the corresponding EU body to include market shaping aspects of electronic communications spectrum assignment should create synergies in policy development enabling NRAs and the combined body to reflect the many inter-related aspects in a converging environment. In addition to potentially enabling cost savings in national spectrum assignment processes, the increased effectiveness, coherence and buy-in associated with this option are likely to reap benefits in increased connectivity that considerably exceed the status quo. For example, spectrum assignment policies and conditions affect the deployment and take-up of very high

²⁷⁷ Option 4 which foresees a level of centralised enforcement could on the other hand be very effective and efficient for specific issues. This option could be considered for these specific cases. However, it is unclear at this stage whether there are sufficient issues requiring uniform treatment to make this option worthwhile, and it would be disproportionate and likely ineffective in achieving the objectives in cases where local expertise is needed to provide more tailored solutions.

capacity broadband, while mobile broadband may also impact competitive conditions in the supply of broadband more widely. Meanwhile, the construction of fibre networks is important for the development of new generation mobile technologies.

Importantly, Option 3 also preserves the flexibility of Member States to set objectives relating to spectrum governance, including for specific assignment procedures.

No macroeconomic effects could be quantified through modelling for this policy area.

4.6 Who would be targeted by the different policy options?

The provisions included under the umbrella of the review of the telecom framework have several impacts on a wide range of stakeholders. This includes not only telecom operators (incumbent and challengers, but also entities operating in the wider digital environment such as OTTs and other non-telecom operators, SMEs, consumers and institutional bodies such as NRAs and Member States' bodies dealing with regulatory aspects. Given this level of complexity, a detailed analysis of the different stakeholders affected by the different policy options is provided in Annex 2 which summarises the process of consultation and its outcome and annex 4 which spells out in more detail the impacts from the preferred options on the various stakeholders' groups. Annex 12 presents the impacts of alternative options on groups of stakeholders.

4.7 Applying the Think Small Principle

When analysing the enterprise market, and with specific respect to access regulation we need to draw a distinction between the two core targets: small and medium enterprises (SME) and large businesses. The former have characteristics in common with residential users, as they tend to be very much scattered over the territory and cannot afford dedicated capacity lines, as opposed to large business. Micro enterprises and smaller enterprises outside central business districts (including small businesses in rural areas) are likely to be important beneficiaries of strategies which boost the widespread deployment of connectivity, as these organisations may today be under-served compared with larger corporations which may already have fibre connectivity installed to their premises. For example, the UK NRA Ofcom found in the context of research conducted in 2015²⁷⁸ that a significant minority of SMEs had had less favourable experiences with broadband, including a lack of widespread superfast broadband availability, a concentrated retail market structure, and dissatisfaction in relation to quality of service.

One of the cloud's main attractions for SMEs are Software as a Service (SaaS) solutions that enable them to access familiar applications and pay on the basis of their usage, rather than acquiring an expensive licence. Big businesses can use cloud computing solutions to virtualise their existing infrastructure and streamline their use of it. Infrastructure as a Service (IaaS) can enable them to handle peak loads on their in-house system. SaaS solutions may also be adopted as a way to manage their enterprise software better, especially resource planning (ERP), customer relationship management (CRM), mail, desktop software, etc.

End-users and businesses (including SMEs) in countries and areas currently lacking infrastructure competition are likely to be the main beneficiaries of measures to support the deployment of VHC broadband networks. Measures to support the consistent specification of wholesale remedies may also shorten the time to market for new wholesale offers and boost service competition benefiting consumers in areas where infrastructure competition is not in prospect.

A greater focus on general authorisations over individual licenses has the potential to open up spectrum resources to innovative smaller companies which are not at present able to purchase exclusive access. In addition, many of the end-user businesses which will benefit from

²⁷⁸ <http://stakeholders.ofcom.org.uk/binaries/research/telecoms-research/sme/bb-for-smes.pdf>

accelerated access to spectrum and introduction of 5G will be smaller companies. By opening access to spectrum resources and accelerating 4G and 5G coverage across the Digital Single Market, the spectrum option will facilitate innovation and entrepreneurship which benefits primarily (though not only) start-ups and smaller companies. For instance, there might be companies aiming to bring innovative new applications to market that rely on 5G availability and reliability in sectors such as utilities, automotive and transportation or e-health.

Most of the provisions on services and end-user protection will continue to apply to all end-users. The contract provisions will also benefit small and micro-businesses, who so request, in the same way as consumers. Small and micro- enterprises, many of which provide innovative online services, are in a comparable situation as consumers whereas larger end-users (who may also opt-in under the current rules) are able to negotiate individual contracts for of electronic communications services.

In order to ensure consumer rights and public policy interest, small providers of electronic communications services will have to comply with rules on end-user rights as any other provider. Public interest objectives justify the imposition of security and privacy²⁷⁹ measures on all kinds of providers of electronic communications services. With regards to interconnection and interoperability obligations, their extension to OTTs providing communications services would be subject to an assessment of reasonableness considerations relative to technical feasibility, significance of take-up of a given service as well as cost considerations. No lighter regimes or exceptions are considered for micro enterprises since no telecommunications operators are likely to fall under that category (less than ten employees and a turnover or balance sheet total equal to or less than €2 million).

For an analysis of the implications of the preferred options on SMEs please see Annex 4 on Who is affected by the preferred option and the specific chapter on SMEs..

4.8 Positive and negative impacts, direct and indirect, changes in impacts, potential obstacles

Positive and negative impacts on different stakeholders are included in Annex 12 with an assessment of impacts on groups of stakeholders by policy area for all options and Annex 4 focusing on representative groups of stakeholders and assessing implications of preferred options for electronic communications network and service providers, Over-the-Top players, SMEs, Consumers, Ministries, National Regulatory Authorities and Spectrum Management Authorities. The analysis of the negative and positive and direct and indirect impacts is run for all the main groups of stakeholders identified in the public consultation (see Annex 2).

4.9 How the preferred options relate to the specific objectives

Section 3.2 already identifies for each specific objective, the link with the problems identified in section 1.2 and the link to the main measures that are included under the options for the policy areas identified in section 4.

4.9.1 Contribute to ubiquitous VHC connectivity in the single market

This specific objective is linked to the policy measures proposed under access, spectrum, universal service and governance preferred options.

The preferred option bundle will meet the ubiquitous VHC connectivity objective by fostering infrastructure-based competition in fibre networks in areas where this is feasible (thereby incentivising network upgrades and delivering a more stable competitive structure), while

²⁷⁹ The exact confidentiality obligations would be subject to further conclusions of the review of the e-privacy Directive

elsewhere providing certainty and flexibility for NGA investors and promoting competition through long-term co-investment or open (such as wholesale only) business models for fibre infrastructure, in preference to the current prevalent short-term rental arrangements which are vulnerable to technological and regulatory change. This option also involves an extension of the timing of the current market review process, thereby increasing certainty and reducing costs.

Under this option, NRAs will take responsibility for mapping existing infrastructure and assessing the potential for further deployment, which should also enable them to support deployments in challenge areas which may be less attractive for commercial operators. NRAs would also be able to sanction operators in relation to challenge areas if they provide misleading information without a reasonable justification. Rural investors and their customers may also benefit from the potential for longer contractual commitments linked to instalment payments for physical connections, where needed in exchange for connecting households with high quality networks.

The added boost to fibre deployment under this scenario should support fixed as well as mobile next generation developments, which require fibre backhaul to support higher speeds and quality. The preferred option bundle also provides for the adoption of harmonised wholesale product specifications to reduce needless duplication of specification processes, reduce ‘time to market’, foster cross-border expansion and support the provision of services to multi-national corporations.

In addition, the availability of new mobile technologies will be accelerated across the EU, by reducing the time required to bring spectrum to market, providing the potential for common deadlines for spectrum awards as well as fostering consistent EU criteria for assignment conditions through implementing decisions accompanied by a system of peer review. This could pave the way for extended durations of licences combined with common measures to foster efficient use of spectrum and thereby extend coverage and improve quality. Greater co-ordination and regulatory certainty across countries and over time should in turn speed up investment in infrastructure and services. Measures to facilitate permit granting to foster deployment of small cells and to access Wi-Fi networks will contribute to reduce the costs of future 5G network deployment and support the development of 5G in general, also ensuring faster time to market for spectrum resources.

Moreover, the deployment of these new networks will require greater flexibility in the way spectrum is accessed and used; a wider consideration of the possibilities of sharing; a consistent approach to frequency assignment between neighbouring countries and potentially the identification of more unlicensed spectrum.

In addition, the envisaged package would seek to ensure that price does not present a barrier to the uptake of broadband services, by modernising the universal service concept and focusing it around affordability of broadband connections.

The Single market dimension is specifically addressed by the measures related to the promotion of EU-wide access products for cross-border services to business users in the single market. Spectrum measures are in addition promoting greater consistency of spectrum management elements to achieve a timely deployment of 5G networks and services throughout the EU. The proposed regulation will ensure harmonised means of determining and mapping end user ubiquitous connectivity comprising also quality of service. These measures will be accompanied by a governance structure and effective EU coordination mechanisms that can enable and foster connectivity, including new tasks for BEREC and NRAs, in the area of mapping (including investments, infrastructure and quality of services) and the market shaping elements of spectrum assignments conditions. .

4.9.2 *Competition and user choice in the single market*

This objective is linked to the policy measures proposed under access, spectrum, services and end users, must carry and EPG, numbering, universal service and governance.

A key aspect of the review is to assess to what extent sector-specific end-user protection rules are still warranted in view of technology and market changes and of horizontal consumer protection legislation and to what extent effective protection of the underlying public interest as well as of competition would require extension of some of the sector-specific rules to OTTs. At the same time, consumer protection measures should be coherent and not present a barrier to the single market, and costs to operators should be minimised.

The preferred option bundle tries to ensure a European-wide pro-competitive regulatory framework for networks, internet access services and communication services, enabling choice and affordable prices for European citizens in electronic communications services while addressing new, emerging end-user rights issues based on market developments.

The preferred option fosters trust while creating a regulatory level playing field by applying a limited set of sector-specific rules to communications services, including more extensive obligations for certain OTT services for which the use of numbers constitutes a key feature of the functioning of the service (clarifying thereby the current scope of such rules). Consumers will also benefit from a facilitated switching process for Internet Access, a protection against discrimination based on nationality or the place of residence, protection from automatic roll-over of contracts, better readability of contracts as well as the introduction of comparison tools and websites and the facility to monitor and control their usage of services. In addition, other end-user and public policy interests which are not covered by horizontal rules (e.g. security and potentially confidentiality of communications) will be safeguarded in relation to all newly defined communication services, regardless of how they are supplied.

In addition, in order to foster the development and take-up of digital services across the single market, avoid any lack of coherence, ensure regulatory consistency and guarantee the framework's best contribution to the development of the single market objective, full harmonisation of sector-specific rules applying to digital communications services (such as calls and messaging) is proposed. This should ensure uniform transposition of rules in EU Member States, making it easier for stakeholders to understand and comply with legislation. Full harmonisation will also facilitate that end-users obtain a connection through specific contract arrangements in the EU, including a protection against discrimination based on nationality or the place of residence, and the setting-up of an EU-wide protection regime for end-users of all communications services in terms of security, interoperability (in case of need) and (potentially) confidentiality.

Finally, in order to address challenges associated with connected 'Things', the package envisages adaptations to the current framework in order to enable 'permanent' extra-territorial use under certain circumstances, to promote the remote (over the air) SIM switching to solve the lock-in of M2M providers, and the harmonisation of conditions for the extra-territorial use of national numbers.

4.9.3 *The REFIT potential: simplification of the regulatory intervention and single market coherence*

The policy measures proposed under the preferred option bundle support the REFIT agenda and address the objective of simplification and reduction of administrative burden in line with the findings of the evaluation exercise on the REFIT potential of the review (see section 1.2.3.1 for more details). Several of the proposed changes under access, spectrum, universal service, services/end users, numbering and governance policy areas aim to make rules

clear; allow parties to easily understand their rights and obligations; and to avoid overregulation and administrative burdens.

The proposed changes include specifically: the streamlining and geographic targeting of access regulation; the use (wherever possible) of general authorisation in preference to individual licenses for spectrum; fostering secondary markets for spectrum; the removal of redundant universal service obligations such as requirements to ensure the provision of payphones and physical directories; narrowing of the scope of universal service availability and ending of the sectorial sharing mechanism; clarifying the scope of the Regulatory Framework and the removal of redundant consumer protection obligations where these would already be addressed through horizontal legislation or met by the market; harmonisation and clarification of rules and governance of numbering in the M2M context; and aligning the remit of NRAs with BEREC.

The simplification measures in the preferred options have also a **single market coherence dimension** as they will ensure greater consistency in access remedies and in spectrum assignment processes, which at the moment tend to generate complexity for operators wanting to use spectrum in various Member States, and can also (in case of divergent timetables) cause interference in border areas. Equally the introduction of standardised wholesale remedies for example in relation to business access also facilitates businesses operating cross-border and the lengthening of the spectrum licences fosters the creation of a pan-European secondary market for spectrum as well as a more investment-friendly environment for holders of such licences.

A summary of the likely benefits that may arise as a result of these measures is presented below..

4.9.3.1 The streamlining and geographic targeting of access regulation

Measures proposed aim to provide more guarantees that wholesale access regulation is only applied where needed to address retail market failures (including codification in the law of the "three criteria test"). This should **limit the scope for over-regulation**. The bundle of preferred options also includes an increase of the period in between successive market reviews from 3 to 5 years, which should **increase certainty** for stakeholders and **reduce administrative costs**. Costs savings have been estimated at 10-15% of the current costs involved with market reviews (a saving of up to €7.5m)²⁸⁰.

As regards the market review process, NRAs will be required to conduct mapping exercises before starting a market review which will improve the geographic targeting of regulation. This measure ensures that access obligations are applied only in areas where they are necessary and are the minimum necessary to address the identified problems, thereby contributing to **reducing the scope for over-regulation**.

Giving NRAs a core role in relation to infrastructure, investment and quality of service mapping should also serve to consolidate what are in some countries multiple mapping processes conducted by separate bodies. This should make the process more coherent, ensuring consistency between broadband state aid, ex ante regulation, and mapping conducted in the context of the Cost Reduction Directive. It should also **save in administrative costs and simplify** the data provision exercise for stakeholders.

²⁸⁰ Estimates from Ecorys (2013) suggested that removing 2 markets from the original 7 markets listed in the 2007 Relevant Market Recommendation might result in savings on the market analysis process of 10-15% (a saving of up to €7.5m). This could be viewed as an equivalent change to extending the frequency of reviews from every 3 to every 5 years.

Furthermore, measures contribute to **making rules clear** by shedding light on the relationship between the SMP status and symmetric obligations for access to civil infrastructure, so that such symmetric obligations²⁸¹ can be considered by NRAs when conducting market reviews.

Lastly, the adoption of standardised specifications for key wholesale products used by businesses should **minimise duplicate processes** for wholesale product specification, **reducing the cost** for NRAs and cross-border service providers, although there may be some set-up costs involved if common specifications require changes to previously applied wholesale obligations.²⁸² SMART 2014/0023 shows that as of April 2015, 13 separate processes had been applied for the specification of VULA in different Member States. Standardisation of future key wholesale products could help to limit duplicate effort and thereby speed time to market.

4.9.3.2 General authorisation in preference to individual licenses for spectrum, fostering secondary markets for spectrum and coordination in spectrum management

In the field of spectrum, the preferred option includes a greater emphasis on general authorisations as opposed to individual licenses in an attempt to ensure that national authorities deliver the most appropriate future licensing models to underpin the full benefits of 5G. Such a move toward general authorisations, as well as licensed shared access, would mean that the rules for access to a particular band covered by this general regime are redrafted at EU level to allow for cross-border harmonisation

A greater emphasis on general authorisations in a number of EU spectrum bands would therefore lead to **clearer and more comprehensible assignment rules** across the Union. This would be of particular benefit to smaller companies with more limited resources and which are unable to purchase exclusive access to spectrum in each Member State.

In addition, general authorisations would contribute to **avoiding overregulation and administrative burdens**. This regime will better fit 5G regulatory needs and thus, create the right conditions for accessing and using spectrum in a flexible way – **barriers to spectrum entry** will be lowered to stimulate innovation and new services. Focus on general authorisations would mean that operators could have the same spectrum all over Europe, with similar conditions which in turn would eliminate the need for individual decisions (either at national or EU level) on who gets what spectrum.

Also the measures fostering the creation of a pan European secondary market for spectrum, mainly through lengthening the licence duration, will reduce the administrative burden related to auction processes for authorities and operators. The secondary market for spectrum will allow a dynamic allocation of spectrum in the Union by adapting to the variations of demand over time, new technologies and services will have an easily access to spectrum

The IA study estimated potential cost savings regarding spectrum management resulting from greater alignment of auction procedures and certain conditions, These savings are estimated in section 4.5.3.3.

4.9.3.3 The removal of redundant universal service obligations

In the field of universal service, the preferred option foresees exclusion of the following services from the universal service scope at the EU level: pay phones, directory services and directory enquiry services. These services are considered redundant because in the majority of cases they

²⁸¹ Stemming from of the 2014 Cost Reduction Directive, as well as facility sharing obligations mandated under article 12 of the Framework Directive.

²⁸² See discussion in SMART 2014/0023. Such costs could be mitigated by phasing in changes to coincide with the refresh of systems.

are sufficiently provided by the market by competing providers, and the respective USOs are increasingly lacking at the national level.

Such amendment would render universal service **rules clearer** as the EU-wide universal service scope would be narrowly defined and focused on affordability. This, in its turn, would make the universal service rules **more comprehensible for the affected end-users** who would be able to better grasp the idea of basic communications services, to which they are entitled, and **understand** the amount of **relevant rights**. It would also **reduce administrative burden** for the providers that will not have to supply the redundant services and comply with respective Quality of Service and reporting requirements imposed on them as designated universal service providers.

The ending of the current sectorial sharing mechanism possibility for financing will lead to further simplification and reduction of administrative burden. Financing through public funds will be easier to implement so that it will lessen administrative costs and will contribute to a fairer distribution of costs and benefits of the universal service provision among all market participants with less distortion to competition

4.9.3.4 Clarifying the scope of the Regulatory Framework and the removal of redundant consumer protection obligations

By linking authorisation requirements to the use of numbers and by extending the scope of sector specific rules on security (and potentially confidentiality of communications) to include all communication services (independent of whether they make use of numbers) the proposed measures aim to resolve the lack of clarity which is currently resulting from the ‘conveyance of signals’ definition. The measures thereby contribute to making rules **comprehensible and clear** and to allow parties to **easily understand their rights and obligations**. A majority of respondents to the consultation (strongly) agreed that there was need for more clarity about the scope of the Regulatory Framework. The redefined scope not only addresses regulatory uncertainty perceived by current stakeholders, but also regulatory insecurity for future stakeholders operating in future new digital value chains (such as the IoT). Moreover, clarity about the scope of the regulatory framework **prevents growing regulatory heterogeneity (and associated costs)** that may otherwise result from national authorities responding with their own measures and interpretations of the scope of the Regulatory Framework.

The proposed widening of the scope of the Regulatory Framework leads to a *de facto* **increase of the administrative burden** for a limited number of OTTs that use numbering resources as they will now be subject to more regulation (relative to the current situation, where the applicability of the framework is not widely recognised or implemented). However, not all obligations will result in increased administrative burden. E.g. interoperability and interconnection obligations will have little impact since interconnection and interoperability with the numbering regime is already part of the respective service. Additional burden may result from portability obligations²⁸³ and from administrative charges related to Article 12 and 13 of the Authorisation Directive, which should however be appropriately modulated by reference to effective revenues²⁸⁴. Furthermore, option 4 makes it explicit for OTTs to provide access to emergency services as far as this is technically feasible²⁸³. All OTTs (regardless of the technology used) will experience an increased administrative burden in relation to complying with rules on security and privacy.

The bundle of proposed measures simultaneously aims to **reduce administrative burden** by **removing redundant sector specific consumer protection rules** where these would already be addressed through horizontal legislation or met by the market. Sector specific obligations

²⁸³ Provided Member States do not already impose these obligations following the ERG 2007 guidelines; otherwise there would be no additional burden from the proposed measures.

²⁸⁴ which may add up to 5 to 10 million EUR for an OTT with 7.5 to 15 million paying clients, according to the figures quoted in SMART 2015/0005 in section 7.4.4.

identified as being fully or partially redundant relate to transparency²⁸⁵, quality of service²⁸⁵, contractual rights²⁸⁵, and out-of-court dispute resolution. Telecom operators found it difficult to provide robust calculations of related compliance costs. In qualitative terms they indicated that the overlapping information requirements create additional burdens for businesses that have to check all sets of requirements for any small or national differences and engage with two different sets of regulators in relation to enforcement²⁸⁶. The **reduction in administrative costs will partially be undone** by the additional obligations regarding the quality of IASs, which likely remain limited given the already existing Quality of Service reporting obligations under the Net Neutrality rules and associated BEREC guidelines. Furthermore, facilitated switching processes for IAS services will impose an additional burden on ECN providers.

For NRAs, the widening of the scope of the Regulatory Framework may involve additional administrative burden. Regulators indicate that removing redundant rules would hardly affect their operations, amongst others because if these redundancies and associated tasks for NRAs would disappear, new responsibilities for NRAs would arise in the form of providing technical assistance to more horizontal competent authorities when they were to deal with sector specific issues²⁸⁷

With regards to consumer protection, the impact of the proposed measures is largely positive: consumers are more protected with regards to security (and potentially confidentiality) when using OTT services; consumers are more protected with regards to transparency and switching in relation to IASs; consumers are not less protected with regards to other communication services as the proposed measures only remove sector specific consumer protection rules addressing consumer protection needs that are already addressed through horizontal legislation or that are met by the market, or which have become redundant due to market developments (e.g. Article 17 USD).

Table 14 – Summary table on the scope of rules and impact on selected stakeholders

	Wider scope of RF	Redundant rules	Additional IAS rules
NRA	+	0	+
ECS/ECN	0	- - -	+
OTT	+	0	0
Consumer protection	+	0	+

4.9.3.5 Harmonisation and clarification of rules and governance of numbering in the M2M context

Improved governance of the extra-territorial use of national numbers (in order to realise country agnostic connectivity for M2M applications) will **avoid substantial administrative costs** that are currently preventing extra-territorial use²⁸⁸. A more harmonised governance structure may require a possible extension of the activities (and costs) of BEREC as well as costs related to

²⁸⁵ Where these apply to communication services other than the IAS

²⁸⁶ For more details see SMART 0005/2015 with further analysis on [activities driving compliance related administrative burden for operators regarding contractual terms and transparency](#)

²⁸⁷ For more details see SMART 0005/2015 with further analysis on [relief potential of enforcement costs for NRAs](#)

²⁸⁸ Currently, extra-territorial use of number is governed by Annex E of the ITU E.212 recommendation, advising operators wishing to implement the extra-territorial use of an MCC+MNC, to seek approval of the relevant administrations of both Country A and Country B. The administrations should then confer together on the extra-territorial use of the MCC+ MNC and notify the applicant and all other operators operating in Country A and Country B of their decision. This is a costly administrative exercise in relation to M2M services, given the potential volume of multiple (possible hundreds of) thousand SIM based machines served by a single M2M service provider. For more details see SMART 0005/2015

coordination with CEPT. However, these costs are likely much lower than the costs of the currently required multiple bilateral agreements between NRAs and telecom providers²⁸⁹.

The proposed measures do not directly impact on consumer protection. However, consumers will benefit since the proposed numbering regime will contribute to the removal of bottlenecks in the IoT value chain and the promotion of innovations in IoT applications, with a positive effect on choice and prices for products and services relying on IoT services.

4.9.3.6 Aligning the remit of NRAs with BEREC

The Governance preferred option aims at simplification through harmonizing a minimum set of competences for independent national regulatory authorities essential for market shaping aligned with BEREC tasks focused on the cross-border dimension. This should serve to consolidate responsibilities and expertise within NRAs and simplify the engagement process for stakeholders.

Moreover, the preferred governance option would lead to a streamlined and more efficient governance set-up, in particular with a simplified structure for BEREC in line with the Common Approach for decentralised agencies.

4.10 The legal form of the preferred options

The scope of the current Refit exercise includes four Directives (Framework, Authorisation, Access and Universal Service Directive) and a Regulation (BEREC Regulation)²⁹⁰. Each of the Directives contains measures applicable to electronic communications networks and to electronic communications services providers, consistently with the history of the sector in which undertakings were vertically integrated i.e. active in both the provision of networks and of services. The review offers an occasion to simplify the current structure, with the view to reinforcing its coherence and accessibility, consistently with the Refit objective. It offers also the possibility to adapt the structure to the new market reality, where the provision of communications services is not any more necessarily bundled to the provision of a network. Unlike networks, which are local, these services are more and more pan-European, or even global. In order not to hinder innovation, we should avoid over-regulating these services. Separating the network from the services regulation offers the possibility to establish a lighter and more proportionate regime adapted to different types of services. Any obligation should comply with the principle of proportionality. Restructuring the framework in a way to distinguish network from services regulation will allow precisely to better calibrate the obligations and in general the regime applicable to networks and services. Furthermore, since the previous review, new non-vertically integrated players have also entered the upstream markets, as well as providers of physical infrastructure only (ducts, poles etc.). These network operators, who have no aspiration of entering the services market and have hence no contractual relationship with end-users, should be subject to clearly separate and proportionate rules, excluding for instance consumer protection.

Recasting will also allow addressing certain inconsistencies of the current structure. Currently, the Authorisation procedure is in a different Directive than the general framework. Also, the market analysis procedure is in the Framework Directive, while the access obligations are in the Access Directive. It would be simpler if the procedure was brought closer to the obligations.

²⁸⁹ Under the current highly inefficient arrangements for extra-territorial use of numbers, operators choose to arrange for country agnostic connectivity via the use of shared MCC901 numbers issued by the ITU. However, the range of numbers under MCC901 is too limited to support the growing number of M2M applications and the option of a new shared MCC90x involves several practical and costly problems. See SMART 0005/2015 for more details on current arrangements for extra-territorial use of national numbers

²⁹⁰ The structure of the Regulatory Framework is completed by a number of other instruments, such as the ePrivacy Directive and the Roaming Regulation which are not part of this exercise.

Furthermore, currently, symmetric obligations are scattered in the Framework (Article 12) and the Access (Article 5) Directives. There is a gain in clarity if symmetric remedies are brought together and close to the asymmetric remedies.

It is therefore proposed to proceed to a horizontal recasting²⁹¹ of the four Directives, bringing them all under a single Directive divided in three parts: one part on Generally applicable rules (framework), one part on networks and one on services (alternatively three directives organised on these lines). Furthermore, since BEREC is to be transformed into an EU agency, the BEREC Regulation must be significantly redrafted into a new Regulation. This choice will minimise the changes to those current texts which will be retained intact or only lightly amended, and will ensure that the balance between directly applicable rules and rules allowing Member States to take the necessary organisational measures for the sector is maintained.

4.11 The impact of the preferred options

This section presents in brief the results of the **macroeconomic impact assessment** that was carried out as a part of the support study to this impact assessment. Further details on the methodology, calculations and results of the model are provided in **Annex 5**.

Practical implications of these preferred options for **representative stakeholder groups** such as Over-the-Top players, SMEs, Consumers, Ministries, National Regulatory Authorities and Spectrum Management Authorities are described in **Annex 4**.

The preferred policy options should make a significant contribution towards boosting EU productivity and innovation. Such innovation effects are particularly relevant in view of the fact that the review of the electronic communications framework could support, among other processes, the development and use of the ‘Internet of Things’ (IoT)²⁹² and digitalization of industry inter alia. If benefits are to be fully reaped, supply-side policies for electronic communications, including the regulatory environment need to be complemented by initiatives to support the absorption of new technologies within businesses of all sizes²⁹³. The impact on competitiveness and innovation is described in Annex 7,

4.11.1 Methodology

The impacts from the implementation of the preferred policy options have been quantified using a combination of theoretical models, econometric and computable general equilibrium methods and reference to relevant literature. The four steps are described below.



As a first step, the evaluated impact in terms of effectiveness and efficiency of the proposed policy measures is translated into quantitative (where possible) key performance indicators (KPIs), based on evidence from case studies and theoretical models.

²⁹¹ For more information on this technique, cf. http://ec.europa.eu/dgs/legal_service/recasting_en.htm.

²⁹² BEREC (2016) and McKinsey (2015) identify a number of key enablers that contribute to unlocking the full potential of the IoT. Key enablers are optimal fixed and mobile connectivity (which is realised through policy measures with regards to access, spectrum and numbering), regulatory security for new players in the IoT value chain (which is realised by clarifying the scope of the RF) as well as end-users confidence about security, privacy and confidentiality.

²⁹³ See also the EC initiative "Digitising Industry" under the DSM package, launched on 19 April 2016.

To provide a link between the KPIs and the macroeconomic framework, as a second step, econometric estimates of the effect of the indicators on certain macroeconomic variables are performed.²⁹⁴ These are complemented by other estimates, based on relevant economic literature.

Finally, the evaluated impacts are fed into the CGE modelling framework as an input shock and the effects are multiplied and spread across the entire economy through the model system of equations. The impact of the preferred scenario is evaluated quantitatively by means of comparison against the baseline in each of the considered policy areas.

It should be cautioned that there are **some limitations to the CGE approach**. In particular, it is not best suited to capture the effect of disruptive changes resulting from the digitalization of industry. In addition, achievement of structurally different economic growth will be strongly dependent on the ability of businesses to effectively and efficiently absorb new technologies and benefit to the highest extent from the competitive advantages such technologies might provide. Further opportunities and challenges are discussed in sections 4.11.4 and following.

The use of a CGE framework entails the **following assumptions**:

- No change in the input-output structure of the economies modelled. As already discussed, in the context of the current evaluation this implies that the estimated impacts are very conservative, where there is potential for higher benefits in case of disruptive technologies and innovations.
- Constant share of public investment with respect to the gross value added in the absence of policies
- Constant share of sectorial public investment with respect to the total capital expenditures of the government in the absence of policies
- Assumptions about important model parameters, which are presented in detail in the macroeconomic modelling annex. They are calibrated in order to ensure a plausible trajectory of the macroeconomic variables in the baseline.

In order to present estimates of the magnitude of the estimated impacts in nominal terms, we have also adopted the assumptions that in the **baseline scenario** annual GDP growth in the EU will be 2%, while employment will increase by 0.3% per annum and finally, that annual growth in gross fixed capital accumulation will be around 5%.

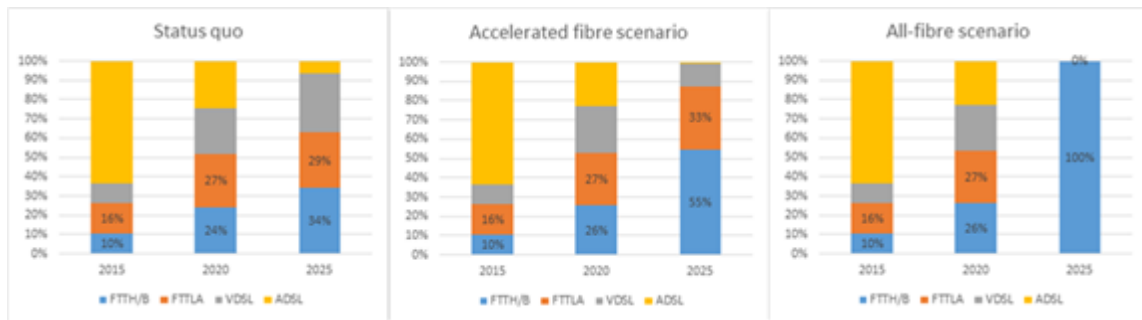
Further details on the macroeconomic methodology and results are provided in the specific Annex 5 (see section 6.5) on this subject.

4.11.2 Impacts of preferred policies on fixed and wireless broadband availability and quality

In the field of access, it is assumed that the inter-institutional process of developing the revised electronic communications framework and its subsequent adoption and transposition will result in adaptations to the market analysis process which stimulates greater deployment of VHC infrastructure from the end of 2020 onwards. In an accelerated fibre scenario, it is assumed that FTTH/B expands to account for 54% of connections in 2025 with an additional 28% consisting in high speed cable connections. Although this scenario is unlikely to be realised, we also model for comparison an all-fibre scenario in which all broadband connections are supplied by means of FTTH/B by 2025.

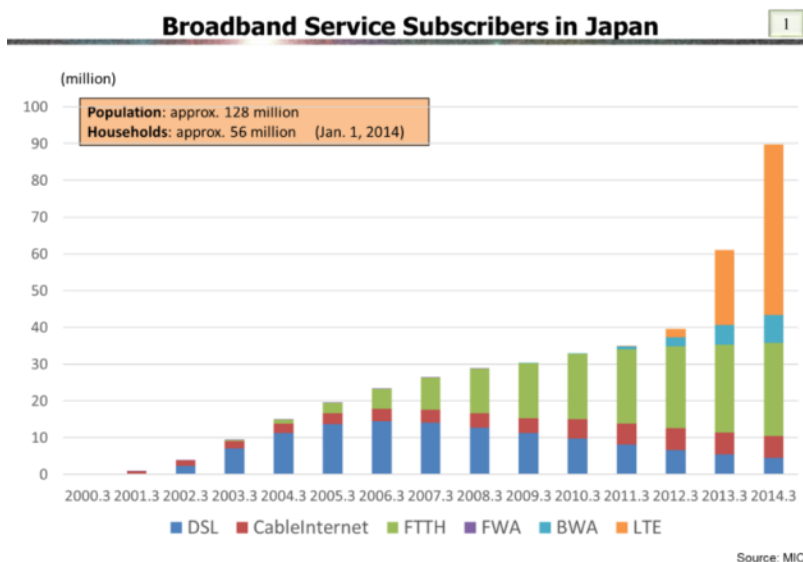
²⁹⁴ To estimate the impact of the KPIs on TFP we have applied stochastic frontier analysis and identified TFP with the efficiency term in the estimated production function. Then, the impact of various e-communication key performance indicators on TFP was evaluated.

Figure 21 - Technology mix under different scenarios



Although ambitious, it is notable that the growth pattern shown for the accelerated fibre scenario is conservative in comparison with the expansion in fibre take-up experienced in Japan between 2005-2010 as shown in the following figure, and there are also examples of high fibre penetration being achieved in some countries in Europe as can be seen from Figure 13 above.

Figure 22 – Broadband in Japan



These technological projections combined with data on actual speeds by technology from Samknows and speed growth trends might result in the following projected speed increases under different scenarios (see figure 32 in annex 5).

Meanwhile, the impact of co-ordinated spectrum assignments on the timeframe to achieve full coverage of enhanced mobile broadband aspects of 5G²⁹⁵ is assessed with reference to experience from the leading Member States as regards assignment of LTE. See Annex 5.

In the 'no change' policy scenario, full eMBB coverage would be achieved only in 2030 due to the different starting dates for availability, while under Option 3, widespread coverage of fast mobile broadband (although not full 5G capabilities which also depend on fibre backhaul deployment), might be expected to be established considerably sooner due to aligned assignment deadlines. Three years is taken as a benchmark based on the time taken for full coverage of LTE in countries such as Sweden.

²⁹⁵ Other aspects requiring intensive densification of networks may take longer to achieve full coverage

4.11.3 Impact of improved broadband quality and electronic communications service development on TFP

Based on the methodology adopted various calculations were performed, assuming that the impact of the preferred policy options will be channelled through total factor productivity (TFP). The latter measures the efficiency with which the production factors (capital and labour) are used in production. Therefore innovations in the production processes are typically reflected in this term.

Confirming the importance of broadband availability and quality for the economy at large, we found, through econometric analysis, that there is a statistically significant relationship (in logarithms) between Total Factor Productivity²⁹⁶ and 4G mobile broadband coverage as percent of households (0.003) and average broadband connection speed (0.021), where estimated coefficients are given in parenthesis.²⁹⁷ We also found a link between TFP and the Heritage index of economic freedom (0.225).²⁹⁸ The elasticities applied in the simulations are presented in the table below²⁹⁹:

Variable (in logs)	AGR	LOWMAN	HIGHMAN	ENERGY	TRANS	TELECOM	ECOM	SER
heritage ³⁰⁰	0.225	0.225	0.225	0.225	0.225	0.225	0.225	0.225
mbb_ltecov ³⁰¹	0.003	0.005	0.003	-0.00000004	-0.00000004	0.003	0.012	0.003
speed ³⁰²	0.021	0.032	0.035	-0.0000009	-0.0000009	0.072	0.072	0.021

The estimated implications of the preferred access and spectrum options on TFP growth could then be directly inserted in the CGE modelling framework.

The policy options in the area of services should also have positive impact mainly on regulatory efficiency and effectiveness in the electronic communications sector. However, the magnitude of this impact is not easy to quantify. In order to overcome this difficulty, we relied on the results of a study by Haidar (2012)³⁰³, which indicates that impact of a more significant regulatory reform on the growth rate of GDP per capita is 0.15% on average. We have assumed that such an impact will be channelled through improved TFP in the e-communication sectors and by means of iterations estimated that an average increase in GDP growth rate of 0.15 percentage points is associated with a 4% annual increase in TFP in the TELECOM and ECOM sectors, starting from 2020.

²⁹⁶ Total factor productivity is a measure of the long-term technological progress. It is typically estimated in a production, where it represents the (Solow) residual that is not attributed to the production factors used (usually labour and capital).

²⁹⁷ This means for example that TFP is likely to grow by the connection speed growth to the power 0.021, while TFP growth would be equal to the 4G mobile broadband coverage to the power 0.003.

²⁹⁸ The Heritage index is used as a proxy of the regulation effectiveness and efficiency and, more generally, of the business and consumer climate.

²⁹⁹ Sector abbreviations: AGR – agriculture, LOWMAN - low-tech manufacturing, HIGHMAN - high-tech manufacturing, ENERGY - energy sector, TRANS - transport, TELECOM - telecommunications, ECOM - other electronic communications-related services, SER - Other services.

³⁰⁰ Heritage index of economic freedom, which is mostly used as a proxy of the regulation effectiveness and efficiency and, more generally of the business and consumer climate.

³⁰¹ 4G mobile broadband coverage (as % of all households)

³⁰² Average broadband connection speed

³⁰³ Haidar J. I. (2012) "The impact of business regulatory reforms on economic growth", *Journal of The Japanese and International Economies*, 26 (2012), pp. 285-307.

4.11.4 Implications for jobs and growth

The specific estimated economic and social impacts of the preferred options for access, spectrum and services – in terms of GDP, consumption, investment and employment, split by country type (state of digital and economic development), are shown in Table 15 below.³⁰⁴

The estimates are considered as conservative as they do not incorporate the possibility for significant structural changes, which might take place if disruptive technologies are introduced as a result of the expected increases in broadband connection speed, introduction of 5G and efficiency gains. Additionally, given their current economic structure, the less digitally and economically advanced economies are now estimated to benefit to a smaller extent from the expected improvements in the e-communication services. There is however a possibility that these economies experience a leapfrogging effect and, in particular, that new e-communication technologies help address the lack of adequate fixed infrastructure in some of the countries.

Table 15 - Impact of assessed scenarios on GDP, consumption, investment and employment (source: Ecorys)

³⁰⁴ The clusters of EU countries according to their economic and digital development and size are as follows:

- *Advanced*: LU, Denmark, Sweden, Finland, Netherlands, Belgium, UK, Germany, Ireland, Austria and France;
- *Intermediate*: Lithuania, Estonia, Malta, Portugal, Czech Republic, Latvia, Slovakia and Slovenia;
- *Less advanced*: Bulgaria, Romania, Greece, Cyprus, Italy, Hungary and Poland

As identified, the clusters are similar to the groupings of countries, based on DESI (<https://ec.europa.eu/digital-single-market/en/desi>), but they are not identical, as for the purposes of CGE modelling we consider GDP in mln EUR rather than its growth rate, thus taking into account more long-term characteristics of the economies - the level of economic development and the size of the economy.

▫

	GDP		Consumption		Investment		Employment	
	2021	2025	2021	2025	2021	2025	2021	2025
Accelerated fibre								
Advanced	0.06%	0.54%	0.04%	0.38%	0.14%	1.11%	0.00%	0.03%
Intermediate	0.07%	0.57%	0.04%	0.35%	0.12%	0.66%	0.01%	0.02%
Less advanced	0.06%	0.52%	0.04%	0.40%	0.08%	0.22%	0.00%	-0.03%
EU28	0.06%	0.54%	0.04%	0.38%	0.13%	0.89%	0.00%	0.01%
All fibre								
Advanced	0.08%	0.96%	0.05%	0.66%	0.16%	1.92%	0.00%	0.04%
Intermediate	0.08%	1.00%	0.04%	0.62%	0.14%	1.09%	0.01%	0.03%
Less advanced	0.07%	0.91%	0.05%	0.71%	0.10%	0.34%	0.00%	-0.05%
EU28	0.07%	0.95%	0.05%	0.67%	0.15%	1.54%	0.00%	0.02%
Services-efficiency gains								
Advanced	0.11%	0.62%	0.10%	0.63%	0.30%	1.38%	0.02%	0.14%
Intermediate	0.11%	0.67%	0.05%	0.49%	0.62%	3.06%	0.01%	0.21%
Less advanced	0.22%	1.25%	0.23%	1.12%	-0.44%	-8.80%	0.06%	0.16%
EU28	0.13%	0.74%	0.12%	0.70%	0.20%	-0.30%	0.02%	0.15%
Spectrum								
Advanced	0.00%	0.16%	0.00%	0.12%	0.00%	0.48%	0.00%	0.01%
Intermediate	0.00%	0.23%	0.00%	0.14%	0.00%	0.74%	0.00%	0.04%
Less advanced	0.00%	0.16%	0.00%	0.12%	0.00%	0.24%	0.00%	0.01%
EU28	0.00%	0.16%	0.00%	0.12%	0.00%	0.47%	0.00%	0.02%

Generally, for all assessed scenarios GDP is expected to increase compared with the baseline, with an anticipated **GDP uplift of 0.16% in 2025 for spectrum policies** compared with the baseline and a **GDP uplift of 0.54% for access policies** based on the ‘accelerated fibre’ scenario, as described in section 6.5.

The cumulative impact up to 2025 is expected to be significant due to the expected supply side impacts, which are built up over time. More positive economic developments will have a significant impact on investment, while the effects on consumption will be more moderate, along with the life-cycle hypothesis for consumption smoothing. In the access scenarios the effects are larger for the intermediate and most economically and digitally advanced economies in the EU, which have the potential to capitalize best the benefits from applying the preferred policy options. In the spectrum scenario, intermediate economies are expected to perform better against the remaining EU countries, as 5G will most probably induce more investments both in the e-communication sectors and manufacturing.

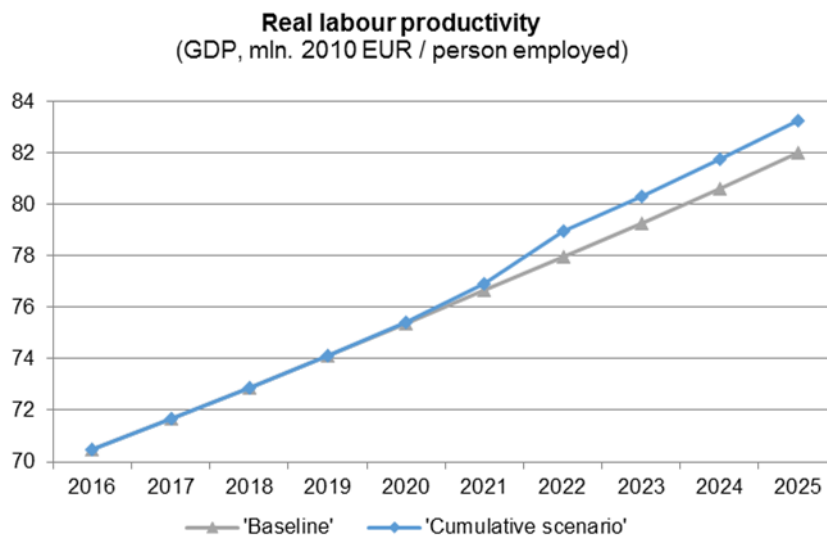
We also find some positive employment impacts from **access and spectrum policies (0.02% higher than the baseline)**, while the efficiency gains potentially driven by reforms fostering **digital services**, might result in increases in employment of **up to 0.15%** compared to status quo.

4.11.5 Impact on competitiveness

The results of the CGE modelling provide some indications as regards the implications of changes to the framework on labour productivity – one measure of EU competitiveness.

In the cumulative scenario case, where preferred policy options are implemented in all areas, real labour productivity will exceed the baseline by an average of 0.8% for the period 2020-2025. This is equivalent to an average of 0.2 percentage points higher growth rate of productivity in the simulation scenario as compared to the baseline.

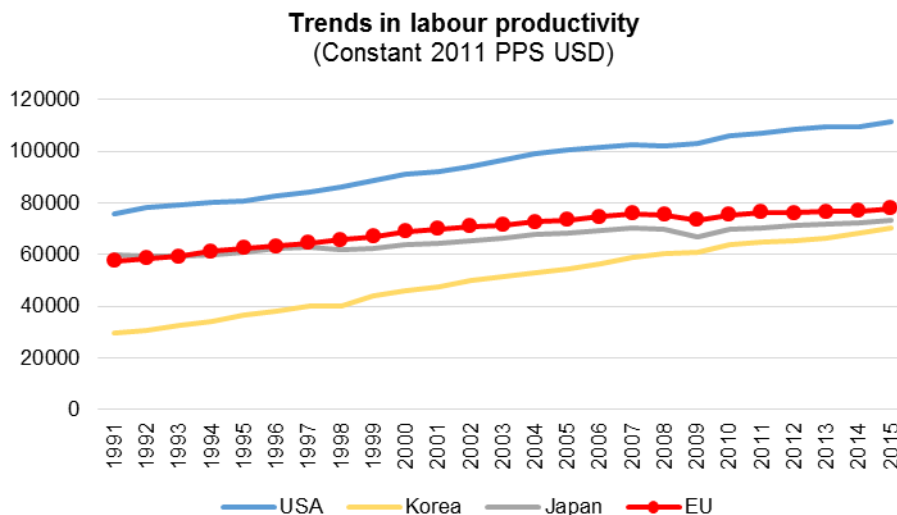
Figure 23 - Real labour productivity (preferred options vs status quo)



Source: Eurostat, own calculations

Viewed in international perspective, historically over the past quarter century labour productivity growth in EU has been lagging by an average of 0.4 percentage points as compared to the US and by 2.4 percentage points as compared to Korea (due its lower base). One can realistically expect productivity growth acceleration in the US and Korea in the forthcoming years as well. Despite this, the implementation of the considered policy changes should make a significant contribution towards boosting EU productivity, and potentially closing the gap.

Figure 24 -Trends in labour productivity – international comparisons



Source: World Bank, World Development Indicators database

4.11.6 Potential for disruptive change through innovation

The assumption underlying the CGE model is that clearer regulation of communication services and better connectivity will allow all sectors of the economy to operate more efficiently and realise higher total factor productivity rates.

In addition, the implementation of the preferred policy options might give a significant boost to innovation. Such innovation effects are particularly relevant in view of the fact that the review of the electronic communications framework could support the development and use of the ‘Internet of Things’ (IoT)³⁰⁵ and digitalization of industry inter alia by fostering:

- More regulatory certainty for all players throughout the IoT value chain contributing to a better investment climate;
- Levelling barriers for scaling up in Europe (by reducing regulatory heterogeneity) to the benefit of start-ups entering as new players shaping the IoT value chain.
- Improving connectivity for SIM based M2M services;
- End-users confidence about security, privacy and confidentiality³⁰⁶.
- Faster adoption of 5G; and
- A more ubiquitous roll-out of fibre networks to homes and lamp posts as to provide a backbone with the stability and low latency that is required by many IoT applications.

In turn, IoT implies an increased role for communication services in (and increased dependency on connectivity by) various industries, including automotive, agriculture, health, transport, etc. As such, policies which unlock the full potential of IoT and the digitization of industry could trigger a so-called “disruptive growth path”.³⁰⁷

It is not possible to estimate ex ante the impact of such structural economic changes on the basis of CGE modelling. Therefore, the CGE estimates should be treated as a lower bound. Assessing the impact of disruptive structure changes would require a case study approach examining how precisely production processes would change as a consequence of a progressing IoT. Such analysis has been done by McKinsey (2015) “The internet of things: mapping the value beyond the hype” which analyses a number of IoT use cases³⁰⁸ involving sectors that are key for EU competitiveness.

³⁰⁵ BEREC (2016) and McKinsey (2015) identify a number of key enablers that contribute to unlocking the full potential of the IoT. Key enablers are optimal fixed and mobile connectivity (which is realised through policy measures with regards to access, spectrum and numbering), regulatory security for new players in the IoT value chain (which is realised by clarifying the scope of the RF) as well as end-users confidence about security, privacy and confidentiality.

³⁰⁶ The reason, as explained by BEREC and McKinsey, is that new categories of risks are introduced by the Internet of Things. McKinsey argues that more devices means more opportunities for potential breaches and BEREC argues that “[d]ue to limited resources in terms of energy and computing power, [...] IoT devices may be vulnerable to cyber-attacks”. Furthermore, McKinsey argues that the impact of a data breach is much larger in the context of the IoT. “when IoT is used to control physical assets, whether water treatment plants or automobiles, the consequences associated with a breach in security extend beyond the unauthorized release of information—they could potentially cause physical harm”. BEREC concludes that “If users do not trust that their data is being handled appropriately there is a risk that they might restrict or completely opt out of its use and sharing, which could impede the successful development of IoT.”

³⁰⁷ See: “Information Technologies and Labour Market Disruptions - A Cross-Atlantic Dialogue” background document by the “interdisciplinary, cross-sector roundtable organised by the European Commission (DG Enterprise and Industry and DG Communication Networks, Content and Technology) in cooperation with The Conference Board and Cornell University ILR School” 3/11/2014, p. 11

³⁰⁸ Outside, Home, Human, Cities, Factories, Worksites, Offices, Retail, environments, and Vehicles,

- IoT will particularly increase **productivity and innovation** in sectors that are considered essential for Europe's **global competitiveness** (such as automotive³⁰⁹ and electrical engineering³¹⁰). Realising the full potential of the IoT in Europe contributes to maintaining/strengthening that position. Not realising the full potential of the IoT in Europe may lead to other parts of the world overtaking that position.
- IoT will also increase **productivity and innovation** in as well as in agriculture³¹¹ which is an essential sector for the **regional competitiveness** of Europe's peripheral areas³¹².
- Furthermore, IoT contributes to **cost savings** in a wide variety of other sectors such as E-health, smart metering/grids, smart homes and cities, etc.

McKinsey estimates for the global economy that by 2025, the full potential of IoT amounts to approximately 3.9 to 11.1 trillion dollars per year (including consumer surplus). In terms of % of global GDP this amounts to 3.3% to 9.4% according to our own calculations.³¹³ If Europe could realise a similar gain by fostering key IoT enablers, this would amount to an additional GDP of 0.56 and 1.59 trillion euros in the year 2025.³¹⁴

The contributions to European competitiveness that could be made from the proposed changes to the EU regulatory framework are summarised in the following table.

³⁰⁹ BEREC BoR(16)39 as well as McKinsey (2015) identify automotive as key sector that will adopt IoT applications. At the same time, it considered a strategic sector of the EU economy http://ec.europa.eu/growth/sectors/automotive/index_en.htm

³¹⁰ Electrical engineering is a sector in which the EU is the global leader and which will benefit greatly from the ongoing growth in mobile devices see: http://ec.europa.eu/growth/sectors/electrical-engineering/index_en.htm

³¹¹ BEREC BoR(16)39 as well as McKinsey (2015) identify agriculture as key sector that will adopt IoT applications.

³¹² Thissen, van Oort, and Diodato (2013)

³¹³ On the basis of data and forecasts provided by the Conference board, global GDP may grow from 88 trillion dollars in 2015 to 117 trillion dollars in 2025, not accounting for a disruptive boost like the IoT. As such, the IoT may create up to 3.3% to 9.4% additional income at global level by 2025. See <https://www.conference-board.org/data/economydatabase/index.cfm?id=27762> and <https://www.conference-board.org/data/globaloutlook/index.cfm?id=27451>

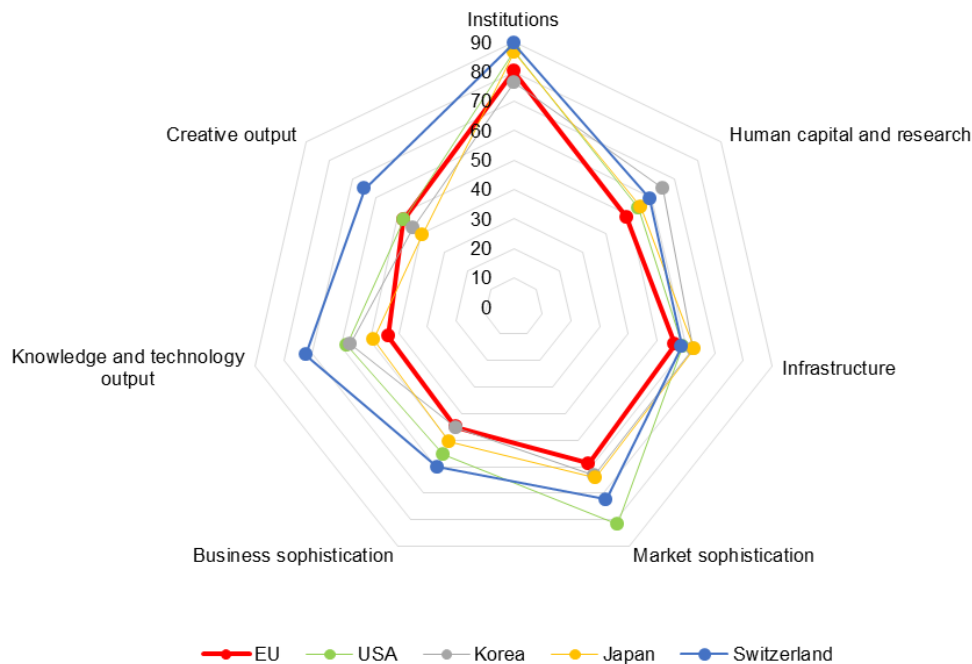
³¹⁴ Assuming the EU economy has grown to 16.58 trillion euros by 2025 (based on forecasts by the Conference board). 0.33% of 16.58 trillion euros = 0.56 trillion euros. 9.4% of 16.58 trillion euros = 1.59 trillion euros

Figure 25 - Overview of competitiveness impacts

	Access	Spectrum	Services
Cost competitiveness	VHC connectivity supports the digitalisation of services, reducing cost and time to market. Standardising wholesale products used for business should also reduce costs and increase efficiency within cross-border organisations	Positive (general authorisation will make access to spectrum more affordable and lower administrative / regulatory costs). This is of particular benefit to smaller companies with more limited resources	The reduction of administrative burden and of regulatory heterogeneity realises cost savings for telecom operators.
International competitiveness	Access policies are likely to boost infrastructure deployment in Europe, closing the investment gap with other economies. Increased bandwidth is likely over time to support increased use of digital services and the attractiveness of the EU as a platform for technological and service development.	Positive (as a result of e.g. device manufacturers seeing Europe as a single market, offering significant scaling opportunities, and producing devices that are able to operate in “European” bands)	Less regulatory heterogeneity contributes to the realisation of a digital single market which facilitates a faster scale-up of European start-ups in the global digital economy.
Innovation competitiveness	The deployment of fibre to lampposts and homes supports 5G development, and new applications. A connected economy may also drive disruptive change in business processes	Positive (general authorisation will open up spectrum access to innovative services, faster roll-out of 4G/5G will foster development of new services based in Europe)	More clarity and equality throughout the value chain with regards to regulation reduces regulatory risk for new (small medium sized and large) players. This increases their willingness to invest and innovate

A key challenge however in realizing the benefits identified from innovations including those stemming from IoT is the capability of European businesses to leverage innovation. For example, comparing EU³¹⁵ innovation capacity and results against peer economies, according to the Global Innovation Index for 2015,³¹⁶ the EU seems to be lagging behind in terms of many aspects of innovation,³¹⁷ although some countries within Europe including Finland, Sweden, Luxembourg, Denmark and Germany are reported to be relatively strong in making use of innovations specifically in ICT.

Figure 26 - EU innovation capacity in comparison with other regions



Source: Global innovation index, own calculations

If benefits are to be fully realized, this highlights the need for levelling up within Europe, not only in terms of supply-side policies for electronic communications including the regulatory environment, but also – importantly – on initiatives to support the absorption of new technologies within businesses of all sizes.

4.11.7 Conclusions

Overall, if all the preferred options are pursued as a result of the review of the electronic communications framework, we expect expanded market-driven investment and consumption and a cumulative effect **on growth of 1.45% and on**

³¹⁵ EU figures are derived aggregating the member states scores, weighting them with the respective country population.

³¹⁶ The Global Innovation Index is an annual ranking of countries by their capacity for, and success in, innovation. It is published by INSEAD and the World Intellectual Property Organization, in partnership with other organisations and institutions. It is based on both subjective and objective data derived from several sources, including the International Telecommunication Union, the World Bank and the World Economic Forum.

³¹⁷ There are clear differences for the business sophistication pillar of the index, which includes knowledge workers and R&D activities performed in the business sector, links between the business sector and the academia and means of knowledge absorption. Another aspect where EU is performing relatively worse concerns indicators for 'knowledge and technology' including knowledge creation, diffusion and impact.

employment of 0.18% in 2025, assuming that the reforms are implemented by 2020. A step change of 0.8% in labour productivity is also envisaged during the period 2020-2025.

Assuming a baseline with an average annual EU growth of 2% and average annual increase in employment of 0.3%, the cumulative impacts by 2025 on economic activity and job creation in nominal terms will amount respectively to EUR 910 bn. and 1.304 million additional jobs. This is a conservative estimate, as it does not take into account the possible synergetic effects that might occur in case the preferred options in all policy areas are implemented simultaneously. The model does not capture the potential for technological developments to drive disruptive change throughout industry, as might occur if Europe leverages on strong infrastructure and single market for digital services to achieve leadership in the Internet of Things (see Annex 7). This finding must be qualified by the acknowledgment that private sector investment will play the most important role in upgrading the necessary and underlying network infrastructure to meet the connectivity needs. For this reason, the positive impacts described will rely on those investments being made at a higher rate than is the case today. The choices to make those investments will ultimately be taken by present and future network owners, and regulators and legislators alone cannot implement the expected outcome.

While absolutely necessary, changes to the electronic communications framework are not sufficient in themselves. Initiatives to support the creation of the Digital Single Market and enable business to take full advantage of the potential offered by digitalisation, will also play a crucial role in driving Europe's competitiveness.

5 HOW WOULD ACTUAL IMPACTS BE MONITORED AND EVALUATED?

5.1 Plan for future monitoring and evaluation - consider what should be monitored and evaluated and when.

The present section explains how the impacts that were identified in section 4 above will be monitored and evaluated once the revised telecoms framework comes in place. Some entities may be subject to specific evaluation requirement enshrined in their legal base.

5.1.1 The European Digital Progress Report

The **European Digital Progress Report** (EDPR) covers 28 Member States and provides comprehensive data and analysis of market, regulatory and consumer developments in the digital economy. It is based inter alia on DESI³¹⁸ (Digital Economy and Society Index) and the Telecom Implementation Report³¹⁹. It combines the quantitative evidence from the DESI with country-specific policy insights. DESI is based on data from Eurostat and various studies and surveys³²⁰, and structured in five dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. European Digital Progress Report also includes a section on R&D.

Insights on national policies come directly from the in-house expertise and research of country teams and daily work on telecom issues and the input from Member States. The information provided is complemented by information collected through country visits.

The EDPR combines the reports and all evidence published for the Digital Scoreboard³²¹ with the Telecom Implementation report, and adds country reports. The EDPR is thus fed with evidence coming from:

³¹⁸ DESI reports available here: <https://ec.europa.eu/digital-single-market/en/desi>

³¹⁹ Latest Telecom Implementation Report available here: <https://ec.europa.eu/digital-single-market/en/news/implementation-eu-regulatory-framework-electronic-communications-2015>

³²⁰ Indicators and sources are available here: <http://digital-agenda-data.eu/datasets/desi/indicators>

³²¹ The reports are available at: <https://ec.europa.eu/digital-single-market/en/digital-scoreboard>

- **Digital Scoreboard**, which measures progress of the European Digital Economy. It is fed by data conveyed by the National Regulatory Authorities, Eurostat and additional relevant sources and includes data about the general situation of all dimensions of Digital Economy Society Index in the EU Member States³²². DG CONNECT together with European Commission services selected around 100 indicators, divided into thematic groups, which illustrate some key dimensions of the European information society (Telecom sector, Broadband, Mobile, Internet usage, Internet services, eGovernment, eCommerce, eBusiness, ICT Skills, Research and Development). These indicators allow a comparison of progress across European countries as well as over time³²³.

- **Telecom reports on European electronic communications regulation and markets**, which provide comprehensive data and analysis of market, regulatory and consumer developments in the sector. These reports cover a broad set of indicators such as prices, number of alternative providers, investment by incumbents and new entrants, market shares of operators, broadband and NGA coverage and take-up, and development of new technologies. As explained in section 4.5 above, NRAs and BEREC would receive new tasks which would facilitate monitoring of electronic communications markets. On the one hand, NRAs would receive the task of performing a periodic geographic analysis of the current and prospective reach of networks and BEREC that of developing technical guidelines for infrastructure mapping. On the other hand, the harmonisation of powers of NRAs to include services will also facilitate monitoring from the Commission and BEREC, in particular since the latter will be vested with a power to request directly information from undertakings.

5.1.2 Eurobarometer annual household survey

The current Eurobarometer survey provides insight of how the e-comms market performed for end-users and on the consumer's attitude on service platforms uptake and usage of services in relation with a number of consumer protection-related issues. As an example, the 2016 edition³²⁴ focuses on a number of end-user rights' issues in relation with the topics addressed as part of the review of the Telecom Regulatory Framework, e.g. transparency, switching, contracts, but also explores the perception and the actual take-up rates of Internet-based communications services as compared to more traditional telecom services (e.g. instant messaging v SMS).

5.2 Core monitoring indicators for the main policy objectives and the corresponding benchmarks against which progress will be evaluated;

The table below outlines the core indicators of progress that will be monitored by the Commission Services to evaluate whether the objectives of this initiative are being met. The indicators will be monitored through various sources including Commission's missions in Member States and permanent dialogue with National Regulatory Authorities, the yearly European Digital Progress Report and the statistics provided by the National Regulatory Authorities, Eurostat and additional sources, included in the Digital Scoreboard³²⁵ and Digital Data Tool³²⁶ as well as ad-hoc studies in case is needed for specific policy monitoring purposes.

³²² All information is available here: <https://ec.europa.eu/digital-single-market/en/download-scoreboard-reports>

³²³ All data is available at: <http://semantic.digital-agenda-data.eu/dataset/digital-agenda-scoreboard-key-indicators>

³²⁴ See: <https://ec.europa.eu/digital-single-market/en/news/new-data-shows-mobile-internet-used-more-phone-call-remains-most-popular-communication>

³²⁵ All information is available here: <https://ec.europa.eu/digital-single-market/en/download-scoreboard-reports>

³²⁶ Available here: <https://digital-agenda-data.eu/>

Table 16 - Monitoring indicators by policy objective

Policy objective	Monitoring indicators
Contribute to ubiquitous VHC connectivity in the single market	Connectivity indicators in EDPR
	Fixed and mobile Coverage and take-up by technology, speed and QoS.
	Analysis of retail prices, bundles and number of operators in the market
	Time to market for spectrum resources
	USO affordability analysis. Quantification of investment needs and developments to reach objectives .
Competition and user choice in the Single market	Competition and End-user Market indicators in EDPR.
	USO affordability analysis.
	Trends in switching.
Simplification of the regulatory intervention and single market coherence	Telecom regulatory Indicators in EDPR at EU and MS level.
	MHz assigned on the basis of general authorisations (as opposed to individual rights)
	Governance costs

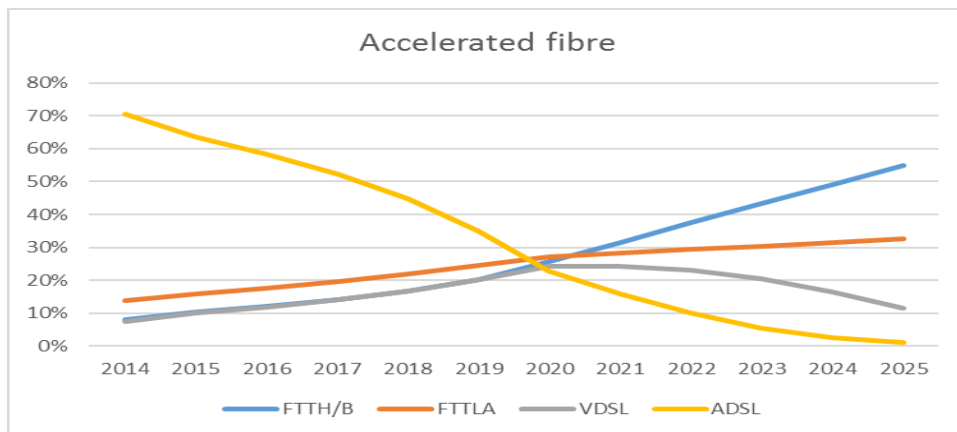
5.2.1 Benchmarks

It is important to define measurement indicators in relation to a standard against which progress can be compared.

Contribute to ubiquitous VHC connectivity in the single market

The Impact Assessment conducted for this study is based on a projection of accelerated FTTH/B deployment resulting in 55% of broadband connections being on the basis of FTTH/B by 2025, from a business as usual projected ‘starting point’ of 20% in 2019. Take-up could therefore be gauged against this metric (Specific targets might be decided in the context of the European Gigabit Society strategy). The projections also envisage that 87% of broadband connections would be supplied on the basis of very high capacity connections (via FTTH/B (potentially including G.fast) or cable Docsis 3.1), which could provide a broader measure.

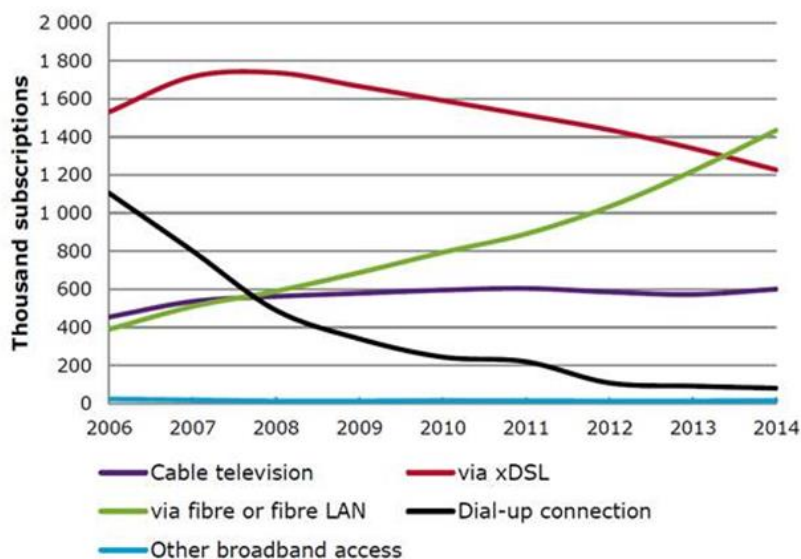
Figure 27 - Projected FTTH/B take-up (as % BB)



Source: WIK-consult – baseline to 2020 based on IDATE forecasts SMART 2015/0002

Data on the diffusion of fibre in Japan (see case study in SMART 2015/0002) as well as that shown for Sweden below suggests that such a take-up target for very high capacity broadband could be achievable within a ten year timeframe, even starting from a low base.

Figure 28 - Broadband take-up by technology in Sweden



Source: PTS

High take-up rates require high *very high capacity broadband coverage*. FTTH/B coverage in Sweden stood at 70% and exceeded 90% in Japan in 2014,³²⁷ thereby meeting a FTTH/B coverage target which had been set by Japanese policy-makers for 2011.³²⁸ Indicators for very high capacity

³²⁷ FTTH FTTx watch

³²⁸ <http://point-topic.com/content/operatorSource/profiles2/japan-broadband-overview.htm>

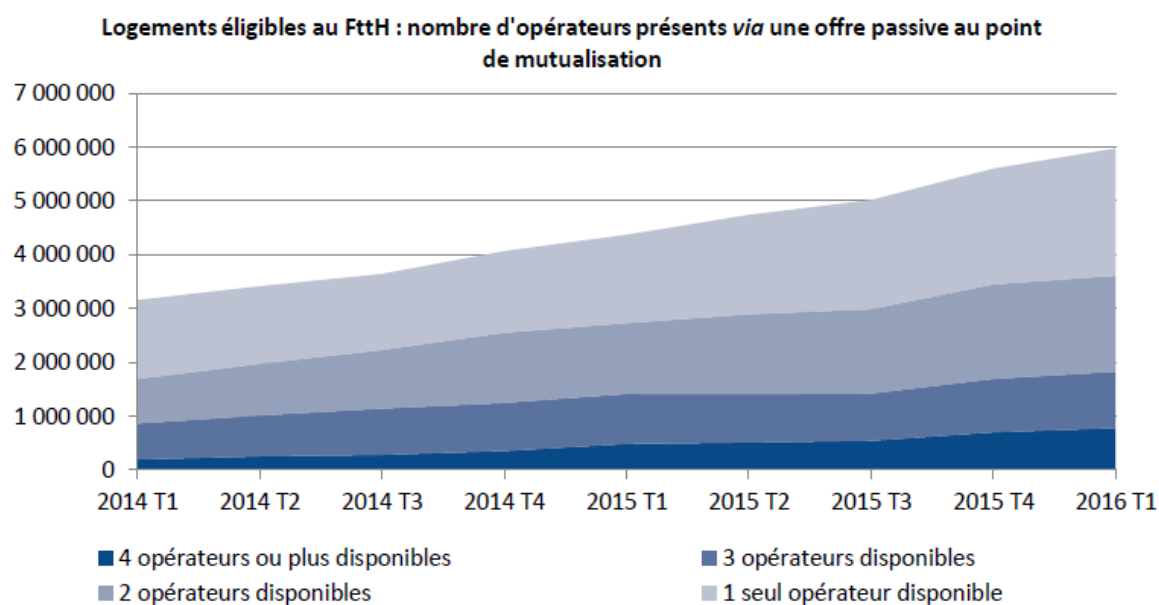
broadband coverage could be measured against benchmarks such as these based on fibre technologies (as in Japan) or Gigabit capabilities (as in Singapore).³²⁹

The Impact Assessment conducted for this study is based on a 5G deployment scenario which can be used as a benchmark against which to judge actual deployment. In addition, just like for access, European wireless broadband deployment figures can be compared to other world regions such as the US, Japan or South Korea.

Metrics for average actual download (and upload) speed within individual countries and the EU as a whole could also be compared with high performing countries such as Sweden or Japan and South Korea, drawing on research from companies such as Samknows and/or publicly available data from Akamai and/or Opensignal.

As regards operational metrics, take-up rates of duct access in Spain (see SMART 2015/0002) provide a useful example as regards take-up rates that could be targeted in countries where ducts are available and where investors of suitable scale exist.

Meanwhile, data from ARCEP illustrates how the availability of choice (of 2, 3 or 4+ providers) in very high capacity fibre networks might be illustrated, although it shows that, notwithstanding significant progress, there are still limitations in the infrastructure-based competition available in high speed broadband in the French market.



Source: ARCEP observatory Q1 2016³³⁰

Competition and user choice in the Single market

Usage can be a useful measure of the utilisation of VHC broadband and of **user choice**. Usage measures are currently high in countries such as the US, which have significant diffusion of online

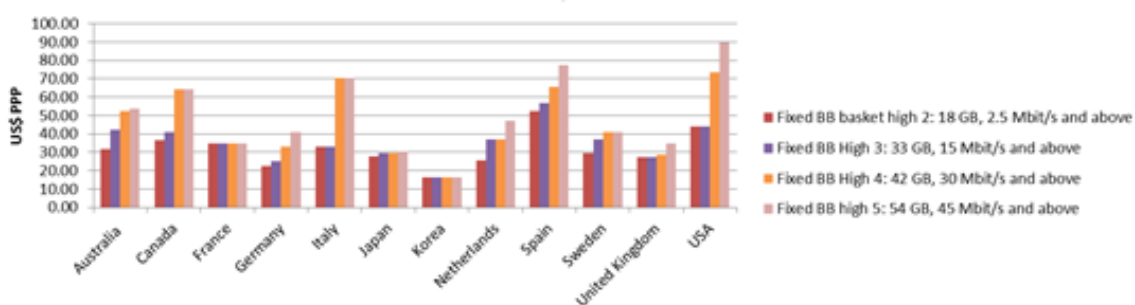
³²⁹ Singapore targeted 1Gbit/s for 95% of households by 2012, albeit with the support of an extensive state aid programme. See Cullen International Benchmarking 15 national broadband plans <http://www.cullen-international.com/asset/?location=/content/assets/research/studies/2014/ericsson-benchmarking-15-national-broadband-plans.pdf>

³³⁰ http://www.arcep.fr/fileadmin/reprise/observatoire/hd-thd-gros/t1-2016/Obs_HD-THD_T1-2016-deploiements.pdf

video and cloud services, and within Europe are typically higher in Nordic countries compared with Southern Europe countries, notwithstanding the strong fibre coverage in some of the latter. An internal EU-benchmark could be used as well as a comparison of usage in EU member states compared with the US, South Korea and Japan.

Price baskets are a measure of **competition** and affordability of users' choice. They will need to be adapted to capture future targets for very high capacity coverage and take-up (potential at speeds well above 100Mbit/s). As illustrated below from OECD data, comparisons should be made not only within Europe, but with countries such as Japan and South Korea which have achieved high coverage at relatively low prices. It should be noted however that pricing can be affected by exogenous factors such as cost differences, which in turn may be influenced by population density and dispersion.

Figure 29 - Fixed broadband price baskets 2012



Simplification of the regulatory intervention and single market coherence

Given the unique status of European regulation in the context of the single market it is more difficult to propose international benchmarks for this specific objective. Benchmarks for this area should be based on EU best practices.

The European Commission could launch a multi-year benchmarking study to survey the NRAs, the ministries and other interested entities have implemented the measures proposed in the preferred options of this IA. NRAs would then be benchmarked among each other to understand how effective and efficient they were in streamlining the market analysis process and ensure coherence between the Framework, broadband state aid and the CRD. The impact on the European Commission services should also be part of the analysis.

5.2.2 Summary

A summary of potential benchmarks is shown in the table below.

Table 17 – Summary of potential benchmarks

Indicator	Potential benchmarks
Take-up of VHC	<p>More than 50% take-up of FTTH/B by 2025</p> <p>More than 85% take-up of very high speed technologies by 2025</p> <p>Based on forecasts used in the Impact Assessment cross-checked against</p>

	progress in Japan and Sweden
Speed of 5G deployment	Compared with 4G deployment speed and patterns in Europe as well as against other regions in the world
Coverage of VHC	More than 90% coverage of FTTH/B or Gigabit technologies by 2025 based on 2011/12 targets in Japan
Wireless broadband and 5G coverage	Coefficient of variation in wireless broadband and 5G coverage across Member States and regions
Speed	Measure against average and peak actual speeds in countries such as Sweden, Japan and South Korea
Usage	Compare GB per user per month within Europe against US, Japan and South Korea
Pricing	Compare updated price baskets (based on speed/technological targets) with benchmarks within Europe and with US, Japan and South Korea
Duct usage	Compare duct usage (km/total) in comparison with countries with established duct access such as Spain, France and Portugal
Infrastructure-based competition (including co-investment)	Compare % households with choice of 2, 3 or 4+ very high bandwidth connections against statistics from countries with established infrastructure based competition and/or co-investment such as France, Spain and Portugal

5.3 Monitoring of the preferred policy option:

The set of preferred options selected above will be monitored by the indicators listed in this section and organised along operational objectives deriving by each of the preferred options. The table below summarises this process.

Table 18 – Operational objectives for preferred options

Policy area	Preferred option	Operational objectives	List of monitoring indicators
Access regulation	Option 3 – Focusing regulation on VHC connectivity and the transition to NGA rollout	<ul style="list-style-type: none"> • support deployment of VHC networks • ensure competition on price • ensure competition on quality • ensure consumer choice 	<p>Coverage of NGA and VHC networks</p> <p>Take-up of NGA and VHC networks</p> <ul style="list-style-type: none"> - Number of players in European markets (fixed and mobile) - Number of new entrants (fixed and mobile) - Market share of incumbent operators - HHI index in EU markets - Timeframe of implementing regulatory actions in the European markets - Number of BEREC opinions guidelines and/or recommendations - Number of art.7 vetoes/ number of notifications - Pricing resulting in the EU for comparable offers/bundles in 2009-2014 and - % increase of households than can benefit from at least 2 NGA connections
Spectrum	Option 3 – Binding and enforceable EU coordination of spectrum management with greater focus to adapt spectrum rules to the future 5G challenges	<ul style="list-style-type: none"> • Faster time to market of spectrum resources • increase consistency in some aspects of MS spectrum management • support deployment of dense 5G networks 	<p>Timeframe (years) between technical harmonisation and assignment of the band.</p> <p>Number of Peer-reviewed assignment procedures</p> <p>Type and nature of coverage obligations in new licenses</p> <p>Number of new licenses to expire beyond 25 years</p> <p>Number of assignment processes with</p>

			<p>coordinated timing</p> <p>Number of sharing agreements between operators</p> <p>Number of MHz assigned on basis of general authorisations</p> <p>Number of small and macro cells roll-out on cost sharing</p> <p>Number and content of implementing measures adopted by COM</p>
USO	Option 3 Incremental adaptation to trends with the focus on broadband affordability	<ul style="list-style-type: none"> • Inclusion of affordable broadband under USO in MS 	<p>Fixed BB Price</p> <p>Development of social tariffs</p>
Services	Option 4 – IAS and regulatory obligations linked to the use of numbering resources	<ul style="list-style-type: none"> • Streamlining of current provisions concerning ECS • link the authorisation requirement for ECS services and subsequent regulatory obligations to the use of numbers, • safeguarding other end-user and public policy interest (not covered by horizontal rules) • access to emergency services, including disabled end-users • operationally adequate caller location accuracy 	<p>- Internet Users</p> <p>- Take up of bundles</p> <p>-_Use of the internet for different communications services</p> <p>COCOM 112 Key Performance Indicators³³¹</p>
Must carry	Option 1 – Maintain MS' possibility to impose must carry obligations	<ul style="list-style-type: none"> • Include reporting about reviews of must carry obligations in the implementation reports • Facilitate exchange of experience and best practice in 	The review of must carry obligations will be done at MS level. MS may define the monitoring and evaluation processes and the respective competences of national authorities

³³¹ <https://ec.europa.eu/digital-single-market/en/news/implementation-european-emergency-number-112-results-ninth-data-gathering-round>

		reviewing must carry obligations where necessary ad hoc via discussion in COCOM	
Numbering	Option 3 – Adapting the EU framework on numbering to address the competition issue on the M2M market	<ul style="list-style-type: none"> • assignment of numbers (in particular E.212 numbers) by NRAs to non-MNOs 	

There are several ways to monitor the impact of the preferred governance options. One solution could be to require BEREC to periodically report on the achievement of the objectives assigned to it, as. Another could imply an obligation for the Commission to prepare an evaluation report on the experience acquired as a result of the operation of the new agency. Annual reports should also be sent to the European Parliament in order to enhance transparency and accountability of the agency.

With regard to NRAs, the annual reporting obligation and the already existing transparency obligations allow monitoring their performance in their new or amended tasks.