

SHAPING POLICIES TO SUPPORT INVESTMENT IN VERY HIGH CAPACITY NETWORKS

Final Report for ETNO

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EXECUTIVE SUMMARY

About this Report

Very High Capacity Networks (VHCN) lie at the heart of European Commission (EC) policy for the next decade (Digital Decade) and are essential for ensuring that Europe has resilient, secure and trustworthy digital infrastructure to underpin future prosperity. Upgraded networks are also integral to supporting the European Green Deal objectives and empower European citizens and businesses to promote rights and freedoms (supporting leisure, expression and interaction with public administration).

The EC has recently adopted ambitious Digital Compass targets of both full gigabit fibre network coverage for all European households and 5G coverage for all populated areas by 2030. The investment required to meet these targets is substantial. It has been estimated that an additional €150bn of investment is needed for full 5G rollout, while another €150bn is required to upgrade existing fixed infrastructure and roll out FTTH to gigabit speeds in Europe¹. Given the scale of this investment, the EC needs to promote policies that incentivise VHCN deployment; such policies (including horizontal policies that apply to all sectors) need to be developed in a holistic, rather than piecemeal manner. Without this, Europe risks being unable to realise its full digital potential.

The aim of this report is therefore to identify and recommend improvements to European policies and regulations to better incentivise investment in VHCN, including policies related to the EC's current consideration of changes to the Access/Costing recommendations. This includes policies within the fixed and mobile sectors as well as "horizontal" policies covering a wider number of sectors.

Incentivising investments in fixed VHCN

Signal regulatory approach over a longer period of time

Although progress to roll out FTTH has been made, there is still a very significant amount of investment required to meet the EC ambitions. However, investment in fixed infrastructure is subject to risk:

- Demand risk related to uncertainty over users' willingness to pay a premium for higher quality services if they can have access to lower-bandwidth services which consumers perceive as sufficient and 'good enough'.
- Regulatory risk, whereby investors making decisions to finance assets that are largely sunk in nature, with a lifetime of decades, may be impacted adversely if there is a risk of the focus of the regulatory regime changing away from incentivising investment.

Under these circumstances, network operators can be expected to have an incentive to postpone their investment decisions until they face lower risks. As the

¹ See <https://www.etno.eu/component/attachments/attachments.html?task=download&id=8050>

required investments are very long-term, the EC should support the setting out of a regulatory framework for the long-term. This should be developed to support the best outcomes for European citizens and businesses over a period of 10-20 years. The EC should further support the introduction of credible longer-term regulatory mechanisms to ensure regulatory commitment, such as the fair bet.

While setting a regulatory approach over a longer period is crucial, it is also important for NRAs to review the market to ensure that regulation is withdrawn when no longer necessary.

Long term co-investment agreements can support investment

The existence of long term co-investment agreements between operators (access providers and access seekers) can share the risk faced by the access providers and hence strengthen their incentives to invest in VHCN and improve the investment capacity. Such agreements can also mitigate the need to impose SMP regulation by supporting competition. This means that these agreements must be considered by NRAs during the market review process.

The European Electronic Communications Code (EECC) already recognises the role that such agreements play in supporting investment. Hence, under the code, NRAs are able to not impose regulations on SMP operators where such agreements are present and under specific conditions. However, the scope of the types of agreements that can be considered should be widened to promote investment; for example, by including agreements that involve investment in the VHCN network by co-investors of which not all co-investing parties compete in the downstream market. Furthermore, the process for review of the agreements as set out in the EECC is cumbersome, and efforts should be made to streamline the process.

Regulatory intervention should reflect competitive conditions in different geographic areas

The existing regulatory framework states that it is important for NRAs to assess the differences in competitive conditions across different geographic areas. There are a number of locations where VHCN investment is undertaken, and is expected to be undertaken, by competitors (altnets) and SMP operators. The incentives and ability of SMP operators to exercise their market power in such areas to the detriment of consumers or downstream rivals will in general be expected to be lower. The regulatory approach in areas where competition is or may emerge will therefore need to reflect this, to ensure that VHCN investment incentives for all infrastructure operators are not weakened.

Competitive locations

Competitive locations are areas where there already exists competition such that no operator has SMP, or there is a high likelihood of effective competition emerging during the market review period such that no operator will have SMP. This means that ex-ante regulations should be removed within these locations.

Potentially competitive locations

Potentially competitive locations are areas where an operator has SMP, but where there is a degree of competitive constraint either from a competing infrastructure, or because there is the potential for entry in the current market review period or beyond (even if not certain). In these areas SMP operators will face different incentives compared to non-competitive areas as they are constrained by the presence of existing and potential competition (even if the constraint is not yet so significant to justify complete deregulation). The prospects for potential competition means that in these locations consumers could be protected in the longer term by competition, and access seekers by the availability of other supply options – this should be taken into account in the regulatory approach in such areas compared to non-competitive areas.

The precise form that regulatory intervention which incentivises investment while protecting consumers and supporting competition may take in such areas will need to reflect the specific assessment of the strength and speed with which effective competition may emerge. This will reflect market conditions in different countries/areas. Having said that, and recognising that there is also a need for a harmonised approach across different Member States, within these locations NRAs could set an obligation on the SMP operator to provide access to active services under pricing flexibility (i.e. no charge controls) and without a regulated anchor product, where there are competitive offers that can constrain the ability of SMP operators to raise prices (including services provided by another VHCN operator and/or the realistic prospect of additional infrastructure based entry). Economic Replicability Tests (ERT) may also be unnecessary in these areas due to existing and potential infrastructure based competition within these areas. If NRAs consider that an ERT is still required, it should not become stricter than under current rules under the NDCM Recommendation.

Non-competitive locations

In ‘non-competitive’ locations, it is likely that only one or no VHCN would be sustained commercially. In locations that can only sustain one VHCN commercially, EC/NRAs will need to balance carefully the need to deploy VHCN versus the need to introduce access remedies to promote service based competition.

In those locations that can only sustain one commercial VHCN operator, network competition will not be able to moderate prices but the regulatory framework should still recognise that risks remain to roll out VHCN, including from uncertainty about willingness to pay and costs of rollout. Therefore, in order to provide incentives to invest in VHCN and mitigate risks, active access products should also be subject to price flexibility (as compared to cost orientation) with a regulatory mechanism to ensure that there is regulatory certainty over the period of the investment – i.e. going beyond a single market review period.

The risk of the ‘hold-up’ problem is present within non-competitive areas as operators may delay investment if they expect NRAs to truncate what may appear to be relatively high returns, in favour of shorter term low prices. It is important that NRAs commit at the outset to a regulatory approach over the lifetime of the investments that will not inappropriately ‘truncate’ the returns of SMP operators

thereby delaying investment in VHCN and dampening their future investment incentives. One approach to support this is the “fair bet” approach, which allows operators the opportunity to recover sufficient upside to compensate for the downside risk of investment². This approach would involve NRAs checking whether the returns earned by a VHCN provider, after a period of pricing flexibility, are consistent with a fair return on risks that the investor would have expected at the beginning.

Whilst there is limited scope for competitors or entrants to constrain prices in non-competitive locations, other forms of pricing constraints could be present in the market such as uniform national prices – these would reduce the need for a regulated anchor product in non-competitive areas. Where appropriate, NRAs should design any regulated anchor product in the absence of an appropriate retail pricing constraint in a way that supports investment incentives – e.g. where the anchor is applied to FTTH products the price should reflect the greater value and quality offered by FTTH networks.

The design of the ERT should also reflect the maturity of the broadband markets and support investment incentives by not disproportionately restricting the ability of SMP operators to set retail prices. As in potentially competitive areas, the test should not become stricter than under current rules under the NDCM Recommendation.

Regulatory policy on copper services

There should be a clear migration path to VHCN from copper networks. Such a plan will boost incentives to invest in VHCN; will support environmental goals by avoiding the environmental costs of needlessly running double networks; and ultimately will bring consumer benefits.

A clear migration path should allow an incumbent operator to give notice, with an agreed period of 1-2 years that:

- it will stop offering legacy services to new retail and wholesale customers (with wholesale access seekers thus also required to only offer services to their new customers through VHCN) by the agreed date, and
- as from that date, the incumbent and access seekers shall determine a plan to migrate existing wholesale legacy customers to the VHCN network.

During transition, there should not be an ‘automatic’ requirement to price legacy products at cost oriented prices. NRAs should provide some flexibility to incumbent operators in order to set prices in a way which encourages migration towards VHCN in locations where this is possible and allows SMP operators to recover legacy costs.

² In principle the same would apply to any parts of the potentially competitive areas that turn out ultimately to be non-competitive – the fair bet approach could also be used in relation to the returns achieved by the SMP operator in any such areas.

Incentivising investment in mobile VHCN

5G, delivered to its full capability, has the potential to unlock a range of use cases that could deliver significant benefits to individuals and industry. Widespread availability of such 5G is therefore the preferred policy outcome. At the same time, unlocking these use cases will involve a significant network upgrade from 4G to 5G. Under the status quo, mobile network operators (MNOs) may not be as incentivised to roll out such 5G capability as they could be. This is because the incentives to invest in 5G are different to previous technologies – something that policy and future regulation will need to reflect. In particular:

- **The costs of 5G are significant.** The magnitude of these costs increases the risk of operators' investment, particularly if, demand for 5G services is uncertain.
- **Revenues from new use cases are highly uncertain.** The key potential of 5G deployment lies with industrial use cases, but many of these are yet to be developed. As a result, demand and willingness to pay for them – and in particular the share of value that MNOs will accrue – is highly uncertain. These uncertainties may reduce the incentive for MNOs to incur the large costs of rollout.

Accordingly, there is a need for intervention to improve MNOs' investment incentives.

Spectrum policy should support investment

The design of spectrum awards can have an impact on the quantum of spectrum available to a given operator and its price. For instance reservations of spectrum for new entrants/smaller players, and (separately) spectrum caps imposed on larger operators to facilitate expansion of smaller operators, can both reduce the spectrum available to larger, more efficient players and also potentially promote inefficient entry/expansion. Accordingly, in line with Article 52 of the EECC, such interventions should be proportionate and, in the case of spectrum reservations, exceptionally, only be made where there is a strong, objective justification to do so. This need should be assessed through a detailed market assessment.

Similarly, to promote VHCN investment, a conservative approach may be adopted to setting spectrum prices, in particular by ensuring that reserve prices/recurring license fees are set towards the lower end of a potential range of estimated market values.

Further clarity can be provided on network sharing agreements to further facilitate VHCN investment

To facilitate VHCN investment, network sharing agreements ("NSAs") should be encouraged, such as in the latest communication by the EC *"To increase the cost-effectiveness of their network roll-out, the Commission encourages private operators to cooperate in so called "network sharing", whilst ensuring that this is done without unduly reducing competition in each specific case"*.

Given the nascency of 5G and its specific network architecture, the information operators have from the treatment of previous mobile generation NSAs may not necessarily provide a relevant precedent. As 5G network architecture may allow for higher virtualisation, sharing of hardware may be possible while maintaining distinct software. This would allow operators to retain the ability to differentiate and compete on quality, including in instances where an NSA involves two closer competitors and/or is national in coverage. Virtualisation may also allow for common network slices to be tailored to specific services or use cases, providing further means of operator differentiation. In such cases, NSAs may not hold back innovation, with operators retaining the ability to differentiate their product and/or service offerings.

Further clarity could be provided on how NSAs subject to investigation will be assessed. In particular, the assessment of future NSAs focussed on 5G may require economic analysis accounting for the differentiating features of 5G compared to previous generations, and the potential for 5G to generate wider benefits/positive externalities.

A more rounded approach to merger assessment that properly accounts for longer-term efficiencies can promote network investment

The current approach to merger assessment appears to have been focussed on shorter-term effects of consolidation, placing more weight on potential short-term price increases, e.g. the use of the “Upwards Pricing Pressure” framework to estimate shorter term price effects. And, the burden of proof has been on merging parties to demonstrate the benefit/efficiencies from consolidation on market outcomes.

This means that the possible benefits of some mergers on investment may not be realised. Moving forwards, long-term dynamic efficiencies should be given due consideration in the assessment of mobile mergers, balancing them with the impact of consolidation on short-term prices.

Policies on M2M/IoT should support investment

The M2M/IoT connectivity market consists of a large number of industries/verticals, each of which can comprise a number of use cases. The markets are competitive and growing – there are several providers of IoT connectivity including MNOs, specialist MVNOs and resellers, based both within the EU and outside. Moreover, cellular operators compete with other technologies, such as Sigfox and LoRaWAN, for Low Power Wide Area use cases, and with WiFi, Bluetooth or other IoT protocols for short-range use cases. Given that there is competition in these markets, policy/regulatory intervention should only be made if there is evidence of a market failure. In the absence of this, regulation should be minimised – for example by removing M2M/IoT services from the scope of ‘interpersonal communication service’ (ICS) within the EECC, fostering a level playing field between providers of M2M/IoT connectivity using different technological solutions and excluding M2M/IoT roaming from the scope of the EC’s Roaming Regulations.

Horizontal policies that affect telecommunications markets

The incentives to invest in VHCN services are not only affected by regulatory policies within the mobile and fixed telecommunications sectors but can also be affected by policies which apply “horizontally” across all sectors. Telecommunications operators can play a crucial role to support the EC in implementing these policies and achieving their objectives. This is because there are clear social and economic externalities to investing in VHCN infrastructure.

- VHCN networks can support climate and green objectives as they are more efficient than legacy networks and are a key enabler of other carbon reducing technologies.
- VHCN can support the growth in demand and innovation of online services and applications.
- VHCN can support an increase in general productivity, thereby leading to better economic performance.

Given the central role that VHCN networks have in the economy, it is essential that policy makers appreciate the inter-related linkages between objectives around telecommunications networks and other horizontal policies.

Green policies

Climate change and environmental degradation is a well-recognised issue for European Union Member States and the rest of the world. It is, however, important to recognise that VHCN is a crucial enabler of carbon reducing technologies. Policy makers should therefore work with telecommunications operators to ensure green policies are implemented in the telecommunications sector in a way that does not have any ‘unintended consequences’. To support this, policy makers should conduct an assessment to determine the overall impact of green policies and to ensure that these green policies are appropriately targeted. If policies can have a material impact on VHCN rollout incentives, a ‘net’ impact assessment is desirable, to ensure the policies achieve their full objectives.

The EC could also provide more guidance on how environmental benefits could be considered within merger and network sharing agreements (as part of the competition impact assessment or the consideration of different forms of remedies).

Ensuring security of telecommunications supply chains

Given the importance of promoting VHCN deployment across the European Member States, the EC should provide further guidance on how Member States should consider and assess the appropriate policy response to supply chain risks. This should look to ensure a more consistent approach to the threats and costs, and the provision of guidelines to assessing the impact of security policies, in particular vendor restrictions, on downstream markets, while still taking into account of national circumstances. Furthermore, the EC and Member States need to work with industry to build the resilience and diversity of supply of secure

equipment vendors. One way to achieve this is by promoting open vendor ecosystems across Europe.

Net neutrality

Net neutrality should not unduly impair the development of and investment in VHCN (including network slicing or virtualisation technologies). More flexible forms of net neutrality could be explored to promote the ability of telecommunication operators to set tariffs which could expand output of services, and thereby incentivise further investment in VHCN, including the greater use of effects based tests to determine if any practices should be prohibited.

1 INTRODUCTION

ETNO has commissioned Frontier Economics to undertake a broad assessment of the telecommunications economic regulatory framework, the wider telecommunications policy framework, and inter-related horizontal policies, to consider whether they support Europe's telecommunication investment goals, and suggest recommendations for improvements.

The European Commission (EC) has recently adopted an ambitious target of full gigabit fibre network coverage for all European households and 5G coverage for all populated areas by 2030 (the "Digital Compass" targets). This has built on its previous targets under the Gigabit Society, which aimed to provide download speeds of at least 100 Mbps to all European households and 5G coverage for all urban areas by 2025.³

These targets are based upon the fact that full fibre and 5G networks (collectively known as very high capacity network or VHCN services) will provide wider benefits to citizens and consumers across the European Member States. Importantly there are clear social and economic externalities to investing in VHCN infrastructure. This is because the deployment of VHCN will not only contribute towards the Digital Compass targets but also to meeting wider EC targets (such as the European Green Deal) and other policy objectives (such as improving social inclusion, healthcare and productivity):

- **Green and environment benefits.** VHCNs are more sustainable than legacy networks (i.e. they are more energy efficient and reliable) and they are also a crucial enabler of other carbon reducing technologies. Therefore, VHCN can contribute towards achieving the environment and climate change targets under the European Green Deal.⁴
- **Social / inclusion & access / education development.** VHCN will support the development of technologies that can improve social inclusion and educational opportunities. Indeed, one of the strategic objectives within the gigabit society was to provide access to 1 Gbps for all schools by 2025.⁵
- **Healthcare.** VHCNs are also a crucial enabler of new healthcare applications such as video based remote health care consultations, real time vital signs monitoring and home monitoring.⁶
- **Productivity and economic improvements.** VHCN can provide businesses with improved productivity and greater opportunities to develop and monetise new technologies such as over-the-top (OTT) applications (e.g. video streaming, online messaging services etc), autonomous vehicles and smart city

³ See <https://ec.europa.eu/digital-single-market/en/broadband-strategy-policy>

⁴ See https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

⁵ See <https://wayback.archive-it.org/12090/20210726105703/https://ec.europa.eu/digital-single-market/en/broadband-strategy-policy>

⁶ See <https://nic.org.uk/app/uploads/Benefits-analysis.pdf>

applications.⁷ This improved productivity can lead to better economic performance in the form of higher wages and lower unemployment.

Meeting the digital targets will require significant investment from private operators. For example, a recent report has estimated that an additional €150bn⁸ of investment is needed for full 5G rollout. This includes the costs of upgrading existing coverage networks to 5G, increasing densification of networks to offer higher capacity services, and providing enhanced capability services. In addition, a further €150bn⁹ is required to upgrade existing fixed infrastructure and roll out FTTH to provide gigabit speeds in Europe.

On top of the significant costs, telecommunications investments are also subject to risks that can deter or delay investment. These include uncertainty around the demand for services, the potential impact of competition from other sources (e.g. OTT services) and the potential impact of regulation, which can undermine the ability of investors to earn a suitable return from VHCN. This means that there is a real risk that there will be a delay in VHCN rollout and that private investment in VHCN will not be sufficient to achieve the EC's coverage targets. EU citizens and companies may as a consequence not be able to benefit from the range of social and economic externalities listed above.

Indeed, a “business as usual” approach to implementing regulation and policy is likely to act as a barrier to attracting the unprecedented level of private investment that is required to meet the ambitious targets. This is because such an approach may fail to fully reflect the significant remaining risks involved in VHCN investment and the longer term benefits from VHCN deployment.

The aim of this report is, therefore, to identify and make recommendations on how regulation and policy can be implemented and improved in the EU, in order to better incentivise investment in VHCN. This includes policies within the fixed and mobile sectors as well as policies within the wider “horizontal” sectors¹⁰.

Accordingly, this report is structured as follows:

- Section 2 examines the investment challenge in the fixed VHCN sector and considers how the existing regulatory tools can be used to promote better investment incentives in fixed VHCN. This section covers longer regulatory commitment periods, geographically differentiated market assessment and remedies, symmetric obligations, copper switch-off and co-investment in fixed.
- Section 3 examines the investment challenge in the mobile VHCN sector and considers how the existing regulatory tools can be used to promote better mobile VHCN deployment. This section covers spectrum policy, merger control, infrastructure sharing policy and consumer protection policy for mobile.

⁷ See <https://www.itu.int/myitu/-/media/Publications/2018-Publications/BDT-2018/En---Setting-the-scene-for-5G--opportunities-and-challenges.pdf>

⁸ See <https://www.etno.eu/component/attachments/attachments.html?task=download&id=8050>

⁹ Ibid.

¹⁰ It should be noted that this report will not explore and provide recommendations on State Aid for VHCN purposes as the State Aid guidelines are still being developed by the EC. Indeed, at the time of writing, the EC has just launched a consultation on the revised broadband State Aid guidelines. See https://ec.europa.eu/commission/presscorner/detail/en/IP_21_6049

- Section 4 reviews how wider horizontal and digital policies affect investment in VHCN. This section covers policies on green, data security and operation of OTT.

2 INCENTIVISING INVESTMENT IN FIXED VHCN

The fixed telecommunications regulatory framework has evolved significantly over the last two decades. At the heart of the current framework is the European Electronic Communications Code (EECC).¹¹ This was adopted in 2018 and entered into force on 21 December 2020, amending and consolidating into one instrument four pre-existing Directives (the Framework, Authorisation, Access and Universal Service Directives dating from 2002 and amended in 2009).

The EECC is supported by a number of other Directives, Guidelines and Recommendations. These include the Non-Discrimination Costing Methodology (NDCM) Recommendation¹², Next Generation Access (NGA) Recommendation¹³ and Broadband Cost Reduction Directive (BCRD)¹⁴.

The EC has also long recognised the need to promote investment in higher quality fixed access networks, while safeguarding competition (including full network competition).¹⁵ The EECC and the other supporting regulations are intended to provide the regulatory framework to achieve this goal.

This section of our report first outlines the investment challenges for fixed VHCN services. We then consider various key regulatory areas which jointly affect the incentives parties have to invest in VHCN services. Finally, we make recommendations to ensure VHCN deployment is promoted, focusing on the following areas:

- **Pricing Flexibility.** This is a regulatory tool that supports investment by enabling SMP operators to price flexibly in a way that ensures a sufficient return from VHCN (subject to certain safeguards to protect competition and consumers).
- **Regulatory commitment over a longer period of time.** The EECC has extended the market review period to 5 years (from 3 years) in order to improve regulatory stability and predictability¹⁶ but this may not be sufficient to provide the required certainty.
- **Co-investment incentives.** These offer ‘light touch’ regulation (including withdrawal of obligations) to investments that are part of a co-investment agreement subject to various conditions.¹⁷

¹¹ See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L1972>

¹² See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013H0466&from=EN>

¹³ See <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:251:0035:0048:EN:PDF>

¹⁴ See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0061&from=en>

¹⁵ The Digital Single Market Strategy 2015 which led to the EECC noted that “*little full “infrastructure competition” has emerged in fixed-line networks, except in very densely populated areas, where cable networks were already present, or where local authorities have been active. There is a need for simpler and more proportionate regulation in those areas where infrastructure competition has emerged at regional or national scale. The deployment of very high capacity networks needs to be encouraged while maintaining effective competition and adequate returns relative to risks.*”

¹⁶ See EECC, Article 122

¹⁷ See EECC, Article 76 /

- **Geographic assessment and the need to adapt remedies based on local competitive conditions.** The case for further focus on geographically differentiated remedies based on the degree of existing and potential competition.¹⁸
- **Copper switch-off.** Incumbent operators are incurring additional costs due to the need to run parallel copper networks and VHCN, including an expected increase in unit cost of the copper network as subscribers migrate to VHCN. How these are treated and the regulation of legacy networks will affect the incentives to invest in VHCN.
- **Symmetric obligations.** Access obligations that apply to all infrastructure owners, not just SMP operators, can support the deployment of telecommunications networks. This can include infrastructure owners outside the telecommunications sector (e.g. utilities infrastructure).¹⁹

This review also considers how the implementation under the framework can be made clearer and provide flexibility to reflect differing market conditions to support investment in VHCN.

2.1 The investment challenge for fixed VHCN services

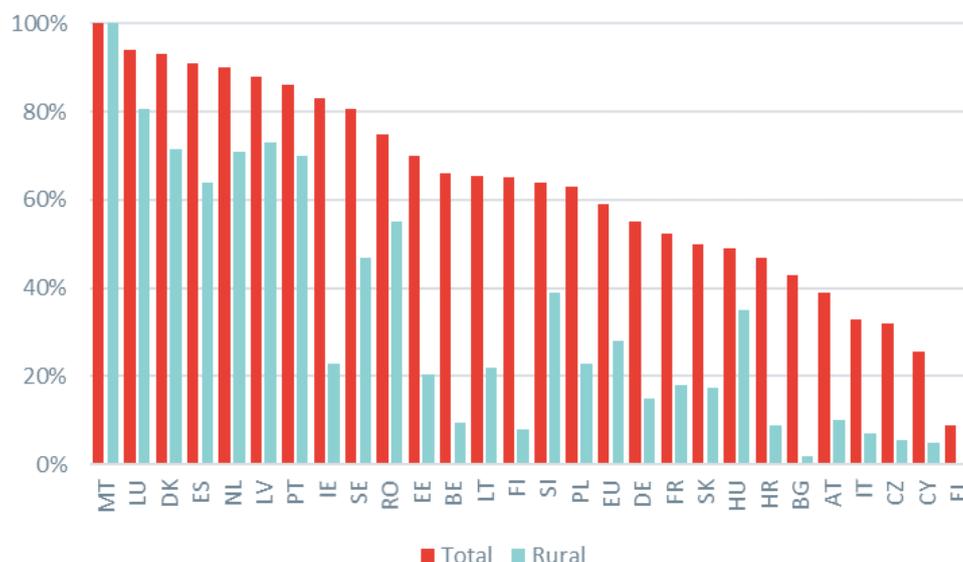
Fixed VHCN will deliver numerous benefits to the European Member States in the form of, among other factors, increased connectivity, productivity and social inclusion. However, while there has been some progress across Europe to roll out nationwide FTTH networks (see Figure 1 below) there is still a significant amount of investment that is required to cover the remaining areas (in order to achieve the Digital Compass targets). This is highlighted by a recent study which estimated that €150bn investment on top of existing VHCN deployment is required to meet the Digital Compass targets²⁰.

¹⁸ See EECC, Article 64

¹⁹ See EECC, Article 72

²⁰ See <https://www.etno.eu/component/attachments/attachments.html?task=download&id=8050>

Figure 1 Coverage of VHCN in mid-2020 (% households)



Source: Frontier Economics based on DESI data²¹

Unlike legacy copper networks where the costs were sunk before liberalisation and incumbents were able to re-use the existing network to deliver fixed broadband services, VHCN requires significant upfront investments. On top of this, investment costs for VHCN are also sunk, assets have long lifetimes and customers are not willing to pay upfront for the new assets. This means that investors have to bear the risks of roll out, with the returns only likely to be made long into the future.

However, these potential future returns are also uncertain, with a number of factors contributing to this uncertainty:

- Demand risk.** There are indications that, although demand for faster speeds is increasing, the willingness of consumers to pay a premium for faster speeds (an “FTTH speed premium”²²) may still be limited, with a minority of end users having a preference for gigabit speeds. For instance, a DESI²³ report shows that take-up of gigabit services is only around 1.3% of households (despite VHCN coverage reaching nearly 60% of households) and take-up is fragmented across the European Member States.²⁴ This is confirmed by the take-up of FTTP services across those households that can access FTTP, see Figure 2 below.²⁵

²¹ See <https://digital-strategy.ec.europa.eu/en/policies/desi>

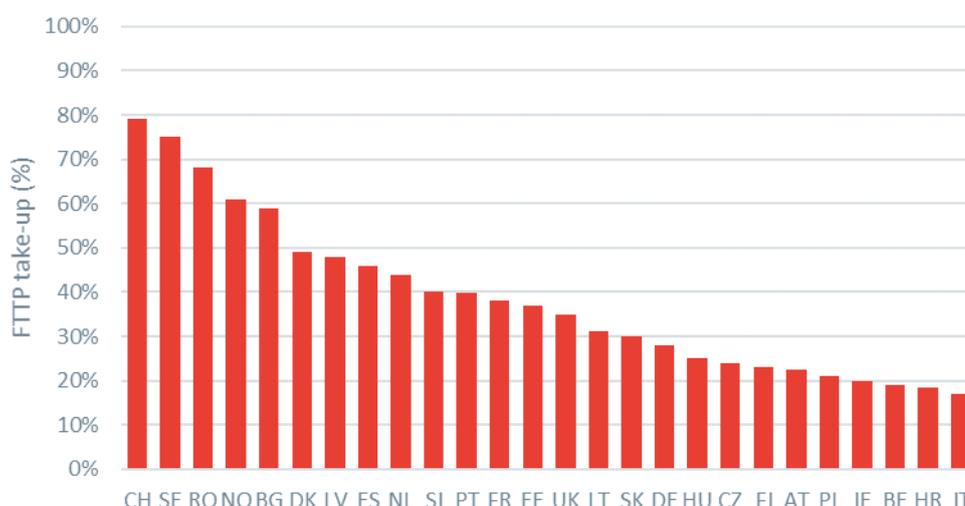
²² i.e. the willingness to pay for speeds greater than 70Mbps offered on VDSL.

²³ See <https://digital-strategy.ec.europa.eu/en/policies/desi>

²⁴ In the UK this is supported by the fact that take-up of FTTP services are low relative to coverage as Ofcom estimated that only 25% of consumers use full fibre (at any speed, not just gigabit speeds) in locations that can access full fibre. See <https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-2020>

²⁵ Note that this shows take-up of FTTP but it is likely that a sizeable proportion of these customers remain on a lower bandwidth product than gigabit speeds.

Figure 2 Take-up of FTTH over premises passed across Europe in 2019



Source: Frontier based on Analysys Mason²⁶

- **Uniform pricing risk.** Rural areas remain to be covered. Furthermore, the costs of deploying network in these areas is higher than in urban areas where networks have already been deployed. Depending on how competition evolves in urban areas, there is a risk that prices in such areas may not be sufficient to cover the costs of VHCNs in rural areas. Although geographically differentiated pricing could address this risk, this can be unattractive both from a commercial perspective and a policy angle.
- **Changes to the value chain** Fixed services are subject to competition from other networks and technologies. Most notably, telecommunications operators face competition from over-the-top (OTT) providers offering competing communications services, with this competition limiting the ability of network providers to earn revenues over the VHCN.
- **‘Market share’ risk:** the evolution of infrastructure based competition for the provision of VHCN can be uncertain and this can add an additional risk²⁷ in terms of the expected network market share for some infrastructure investors.

In addition, regulation can create additional uncertainties, complexities and risks for VHCN providers:

- **Asymmetric regulatory risks.** VHCN investment entails risks, and the outcome could be a ‘good state’ of the world (where returns are relatively high) or a ‘bad state’ of the world, where returns are low. Regulators have a stronger incentive to cap returns under a ‘good state’ of the world (as investments are sunk) than allow operators to increase prices and returns in a ‘bad state’ of the world. This incentive will deter/delay VHCN investment in the first place, as

²⁶ See https://www.analysismason.com/contentassets/ae94d4d039a144529906c1a8ca58d1ea/analysys_mason_full_fibre_europe_rdfi0.pdf

²⁷ The ‘news’ that Sky in the UK (the largest access based ISP in the UK) may be in discussions with Virgin Media/O2 to shift its demand for FTTP connectivity from BT to Virgin Media/O2 led to a significant drop in the BT share price: ‘News of Virgin Media O2’s discussions with Sky, first reported by the Sunday Telegraph, sent shares in BT down by as much as 8% on Monday to a six-month low.’ - see <https://www.reuters.com/business/media-telecom/bt-expects-partner-with-sky-still-fibre-source-2021-10-04/>

investors would prefer to wait, rather than risk uncapped losses in the ‘bad state of the world’.

- **Regulation can change and evolve over time, which can generate significant uncertainties on the ability of investors to generate a sufficient return for their long lifetime investments.** This means any regulatory framework must offer transparency, regulatory commitment and credibility in order to encourage investment in VHCN.
- **The decision to invest in VHCN will typically be assessed alongside a range of alternative options, which are also affected by regulation.** This means that the regulation should ensure that returns on VHCN are sufficient relative to alternative options for the investors in order to incentivise investment.

Taking account of these risks, operators will judge whether it is profitable to invest, to delay investment²⁸ or not to invest at all.

The remainder of this section considers how the regulatory approach in fixed networks can be modified to maximise the opportunity for timely and widespread investment in fixed VHCN, protecting competition and consumers, and taking into account also the need for such an approach to retain flexibility to reflect circumstances in different markets.

2.2 Providing regulatory commitment for incentivising investment in the longer term

Given the risks set out above, in circumstances where the EC/NRAs conclude that some regulatory intervention is appropriate, regulatory certainty and commitment are key for supporting investment in VHCN as well as supporting other long term targets of the EC (including environmental objectives under the Green Deal and other policies that aim to improve social inclusion and productivity). We discuss below the need to consider a longer time horizon when designing regulation of VHCNs, in particular, through the use of a longer term regulatory commitment mechanism.

2.2.1 There is a need to introduce a regulatory approach for a longer period of time and improve regulatory commitment

The EC has extended its market review cycle to a maximum of 5 years (from 3 years). This should help to increase regulatory predictability.²⁹ However, it is important to recognise that telecommunication assets have long asset lifetimes that typically span across multiple market review periods. For example, the assumed fibre asset lifetimes for regulatory accounting purposes can range from 40 years in Spain to 50 years in France.³⁰

²⁸ This is sometimes referred to as the “option value” associated with delaying an investment. “Option value” is especially relevant in the context of investments in new technologies as firms may prefer to wait until the market conditions become more certain. It should be noted that the option value from waiting will be reduced in locations where there is scope for infrastructure competition as operators can invest first and benefit from first mover advantage.

²⁹ See EECC, Article 122

³⁰ See <https://www.wik.org/fileadmin/Studien/2017/best-practice-passive-infrastructure-access.pdf>

Investment decisions will reflect expectations around the regulatory regime over the life of the fibre assets. It is therefore important for NRAs to consider perceptions of regulation of VHCNs in the longer term, not just the next market review period.³¹ This will require a “step change” in regulatory mindsets, which are more accustomed to shorter-term outcomes and focus (e.g. typically over a three year market review period).

As part of the above, the regulatory approach should also be developed to support the introduction of credible longer-term regulatory mechanisms to ensure regulatory commitment over a 10-20 year period. This should ensure that regulators provide appropriate commitments in the outset and prevent regulators from interpreting any commitments in a way that does not support investment when the investment has already been made. In other words, developing a long-term regulatory mechanism should mitigate the “hold-up” problem where investors may underinvest since they perceive a risk that the regulator will expropriate some of the expected returns by reducing regulated prices once the investment has been sunk.

Therefore, in the event that a price regulated wholesale access service is needed within the market (i.e., in locations where an operator has SMP), the regulator should adopt approaches that provide a stronger commitment to the operator being able to recover its costs (along with a reasonable return on risks). This could involve the usage of a **Long Term Incentive Regulation**, such as the fair-bet approach we explain below (section 2.6.4).

While setting a regulatory approach over a longer period is important for VHCN deployment, it is important for the NRAs to also regularly review the market³² and determine whether regulations are still required, nationally or in relevant sub-national areas. This will ensure that regulations reflect the evolving market conditions (eg being withdrawn when no longer necessary).³³

2.2.2 Recommendation

Recommendation 1

In order to improve regulatory certainty, the EC should set out a regulatory approach (where appropriate) for a longer period of time (10-20 years)³⁴. This is key for providing incentives to invest in telecommunications assets, which typically have long lifetimes and payback periods that span across multiple market review periods. As part of this, a credible long-term commitment to sufficient returns is a

³¹ This can also potentially help other wider EC targets as a stable regulatory environment may make it easier for telecommunication operators to implement their green policies.

³² This refers to the need for regulators to review whether regulations should be removed due to the emergence of effective competition. This does not refer to shorter market review periods (less than 5 years) as it is important to implement a long term regulatory approach.

³³ This is consistent with the EECC as it requires NRAs to monitor conditions and if necessary to make changes to regulatory decisions. The EC states that “*Reviews of obligations imposed on undertakings designated as having significant market power during the timeframe of a market analysis should allow national regulatory authorities to take into account the impact on competitive conditions of new developments ... thus providing the flexibility which is particularly necessary in the context of longer regulatory cycles*”. It goes on to state that, given these developments, “*.. it may be necessary to conduct a market analysis more often than every five years ...*”.

³⁴ Whilst the asset life is longer, a period of 10-20 years should reduce sufficiently the downside risk.

necessary condition – a “Fair Bet” approach (as set out in section 2.6.4) is one way to achieve this.

This is without prejudice to committing to remove ex-ante regulation where the development of competition across geographical areas in each Member State warrants it.

2.3 Structural collaborative infrastructure access and sharing agreements

One important element of the EECC is the recognition that the risks involved in VHCN investment can be shared between access seekers and providers, to support a more rapid rollout of VHCN, through the development of different business models, including co-investment models. The EECC³⁵ states that NRAs should support co-investment agreements with SMP operators by removing ex-ante SMP regulation, i.e. the withdrawal of all regulation other than the co-investment agreement,³⁶ if such agreement were to satisfy the following conditions (among others)³⁷:

- The co-investment scheme is open to any other telecommunications provider during the commercial lifetime of the network.
- The scheme will allow co-investors to compete effectively in the downstream market by providing services with terms that include (i) fair, reasonable and non-discriminatory parameters, (ii) flexibility in terms of timing and participation, (iii) possibility to increase participation in future, and (iv) reciprocal rights awarded by co-investors after deployment.
- Access seekers not participating in the co-investment agreement can benefit from the same quality, speed, conditions and end-user’s reach as were available before the deployment. This should be accompanied by an “adaptation mechanism” that maintains the incentives of participating within the co-investment scheme.

BEREC has recently published guidelines for co-investment agreement which provides more guidance on the types of investment models that will be considered as part of the regulatory approach foreseen in article 76 of the EECC. These models include joint-venture models, a reciprocal access model and a one-way access model (including IRU³⁸). In the latter, BEREC notes that these include long term risk agreements in the form of co-financing or purchase agreements of a structural nature.

³⁵ See EECC, Article 76

³⁶ “NRAs should be able to refrain from imposing obligations pursuant to this Directive on the new very high capacity network if at least one potential co-investor has entered into a co-investment agreement with that undertaking” See EECC, Recital 199

³⁷ BEREC has recently published a general guideline that aims to enable a consistent application of the conditions and criteria used for assessing co-investment agreements. This includes guidance on the type models that can be included under this policy, covering joint-venture models, reciprocal access model and one-way access model (including Indefeasible Right of Use (IRU)). In the latter, BEREC notes that these include long term risk agreements in the form of co-financing or purchase agreements of a structural nature. See https://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/9727-berec-guidelines-to-foster-the-consisten_0.pdf. December 2020

³⁸ Indefeasible Right of Use.

Co-investment should be promoted as a tool to incentivise VHCN deployment as the opportunity to share risks may make rollout more appealing to all operators within these locations. It can also provide greater regulatory certainty to operators than five year market reviews. Given the pro-competitive nature of co-investment, collaborative models that do not fall under Article 76 of the EECC (including the possible use of Article 79 on a standalone basis³⁹) should also be supported. Such models should also be taken into account within the regulatory framework if they provide similar benefits to competition (i.e. protection of retail competition) and VHCN deployment as co-investment agreements that meet Articles 76 and 79.

Structural collaborative wholesale arrangements offering non-discriminatory wholesale access can have a positive impact on increasing the dynamics of both retail and wholesale competition in the broadband markets. This means that different types of wholesale agreements should be duly taken into account in the competitive analysis of an NRA's market analysis exercise. For example, structural commercial access agreements that do comply with the conditions of art. 79 (in stand-alone form, without consideration of art. 76) shall also be taken into account by the NRA, prior to it considering whether to impose regulatory obligations.

Such models can include joint ventures that aim to deploy a VHCN network that provides access on an open and non-discriminatory basis but where the co-investment partner does not plan to be involved in the downstream retail market⁴⁰. These are not explicitly supported within the co-investment conditions of the EECC (as one of the conditions require co-investors to compete “*effectively and sustainably in the long term in downstream markets*”) but could, if they dampen incentives of the vertically integrated SMP operator to foreclose or charge high prices, have some of the beneficial outcomes as co-investment agreements that fall within the EECC. There has been some recent examples of these co-investment agreements in Belgium where Proximus has gone into a joint venture with EQT Infrastructure⁴¹ and separately with Eurofiber⁴² to deploy a wholesale VHCN network across Flanders and Wallonia respectively, with both networks offering access on an open and non-discriminatory basis.

Other agreements can include long term commercial deals where access seekers make a commitment to use a certain proportion of the total volumes in return for discounted prices. This will reduce demand risk for VHCN investment thereby supporting VHCN deployment. There have been some examples of this in Germany where DT has signed a long term agreement with Telefonica⁴³, VF⁴⁴ and 1&1⁴⁵ to support VHCN deployment.

³⁹ Article 79 of the EECC refers to the commitments procedure which allows regulators to make commitments by operators (in relation to network access and co-investment) binding rather than impose SMP obligations.

⁴⁰ These arrangements are beneficial to competition as a wholesale only co-investment partner would not be incentivised to discriminate in favour of its own downstream arm.

⁴¹ See <https://fiberklaar.be/new-flemish-company-fiberklaar/>

⁴² See <https://unifiber.be/Release-ENG.pdf>

⁴³ See <https://www.telekom.com/en/media/media-information/archive/dt-expanded-cooperation-telefonica-deutschland-o2-609562>

⁴⁴ See <https://www.telekom.com/en/media/media-information/archive/extension-of-fixed-line-network-cooperation-between-telekom-and-vodafone-614954>

⁴⁵ See <https://www.telekom.com/de/medien/medieninformationen/detail/telekom-und-1-und-1-weiten-zusammenarbeit-im-festnetz-aus-618734>

2.3.1 Co-investment agreements pursuant to article 76 should be reviewed and assessed in a timely manner

The EECC requires the agreements to be reviewed by the NRA (who also then needs to notify the EC). There is a concern that the entire review process can take a significant amount of time and can therefore lead to significant delays before the co-investment agreement can be introduced.

This can reduce the effectiveness of co-investment agreements as operators may be less inclined to participate within these schemes. For example, there is a risk that a delay in regulatory approval could delay copper switch off in some areas, to the detriment of consumers. Therefore, there is a need to ensure that any review and notification of the co-investment agreement is done in a timely manner⁴⁶.

2.3.2 The imposition of any additional remedies needs to be proportionate and targeted

The review of co-investment agreements by NRAs can lead to some additional conditions being imposed on the co-investment parties. This is because Annex IV of the EECC entitles NRAs to potentially impose additional conditions “*to the extent they are necessary to ensure accessibility of potential investors to the co-investment, in light of specific local conditions and market structure*”⁴⁷. Any such additional conditions should be proportionate and targeted to avoid unnecessary regulatory burdens which can reduce the effectiveness of these co-investment agreements and hinder VHCN rollout⁴⁸. This is in line with the objectives of the EECC, as remedies should be applied in the least intrusive way of addressing the problems identified in the market analysis⁴⁹.

2.3.3 Recommendations

Recommendation 2

The EC should support collaborative models that do not fall strictly under Article 76 of the EECC, and recommend that NRAs apply lighter touch regulatory interventions for agreements that reduce the incentives of vertically integrated SMP operators to foreclose/charge high prices. The EC could also encourage NRAs to apply, where necessary and proportionate, Article 79 (on a standalone basis) to co-investments and collaborative models that do not fall under Article 76

⁴⁶ For example, the EC can support this by clarifying that the notification by NRAs to the EC, following the conclusion of the market test by the NRA, should be done within the end of the 6-month period provided for the prior publication of the co-investment offer in case of contextual publication and notification of the offer to the NRA.

⁴⁷ See EECC, Annex IV

⁴⁸ NRAs could be required to notify the EC under Article 32 of the EECC of the application of additional conditions to co-investment models as this would impose clear time limits on parties to respond to an NRA's notification. The EC could then require that a notifying NRA closely follows the EECC and Annex IV (criteria for assessing co-investment offers) in particular to reduce the risk of disproportionately onerous conditions being ‘attached’ to co-investment agreements.

⁵⁰ In practice the approach would be applied in two steps (unless national circumstances prevent it): the first step involves geographic market definition, with ex-ante remedies being removed in geographic areas where there is effective competition. In a second step, remedies would be differentiated to reflect differing competitive conditions in different geographic areas within the same national (or sub-national) geographic market.

but where these have the same effect of promoting investment while preserving competition.

Recommendation 3

The EC should facilitate and accelerate the process for review of co-investment agreements wherever possible, pursuant to article 76 of the EEC..

2.4 Geographically differentiated market assessment and remedies

The telecommunications regulatory framework relies on a well-established process for imposing a set of appropriate remedies on an operator found to have SMP in order to mitigate the risk of market failure due to a lack of effective competition. An important part of defining and imposing remedies involves assessing whether competitive conditions are different across different geographic locations. This section discusses the importance of geographic segmentation of market analysis and the importance of adapting remedies to reflect these different geographic conditions⁵⁰.

2.4.1 Geographic segmentation of the market analysis is essential

In order to ensure that remedies are focused, proportionate and targeted, it is important to conduct market analysis at sub-national (regional or even local) level,⁵¹ especially in Member States where there is significant geographic variation in competitive conditions. BEREC noted historically that “...NRAs found most markets to be national, reflecting the footprint of the legacy network that was in most cases national”. There is however a trend in recent years for markets to be defined sub-nationally eg the EC reported that 15 national markets used some form of sub-national geographic market definition or remedies in 2020..

⁵⁰ In practice the approach would be applied in two steps (unless national circumstances prevent it): the first step involves geographic market definition, with ex-ante remedies being removed in geographic areas where there is effective competition. In a second step, remedies would be differentiated to reflect differing competitive conditions in different geographic areas within the same national (or sub-national) geographic market.

⁵¹ The SMP Guidelines recommends that this is done using a Modified Greenfield Approach which involves defining geographic markets (based on the extent of demand and supply side substitution) in the absence of any SMP regulations.

Figure 3 NRAs applying geographical segmentation of markets and/or remedies (by 31-04-2020)

	Market 3a - wholesale local access provided at fixed location	Market 3b - wholesale central access provided at a fixed location for mass- market products	Market 4 - wholesale high quality access provided at fixed location
Geographic segmentation of markets	FI, HU, IT, PL	FI, DE, HU, IE, LT, PL, PT, ES, UK	AT, HR, FI, IE
Geographic segmentation of remedies	CY, BE, DK, ES	DK, FR	FR
Mix	IT	BE, IT	PT

Source: EC⁵²

Europe is currently in a period where roll out of fixed VHCN varies across jurisdictions, with new entry in certain geographies⁵³. This means that competitive conditions could change significantly over time and across different geographic areas. This creates a risk that changes in competitive conditions may not be accurately reflected within regulation in a timely manner.

It is, therefore, essential that when defining geographic markets, within the overall objective of conducting market analysis and promoting investment in VHCN, such markets should be defined by the (current and expected) availability of network investments. This is reflected within the EECC⁵⁴ as it states: “NRAs shall, taking the utmost account of the Recommendation and the SMP guidelines, define relevant markets appropriate to national circumstances, in particular relevant geographic markets within their territory by taking into account, inter alia, the degree of infrastructure competition in those areas ...”.⁵⁵

It is also important that markets are defined accurately and capture differences in existing and prospective competitive conditions. For example the Commission Staff Working document on Relevant Markets⁵⁶ states that “*Intermediary situations*

⁵² See COMMISSION STAFF WORKING DOCUMENT EXPLANATORY NOTE Accompanying the document COMMISSION RECOMMENDATION on relevant product and service markets within the electronic communications sector susceptible to ex-ante regulation in accordance with Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code.

⁵³ While the framework for ex-ante regulation has historically been predicated on an assessment that there are long term and entrenched barriers to entry, in practice barriers to entry have been eroded over time (not least through EC regulatory measures). Lower barriers to entry will be particularly relevant in areas where costs to roll out are lower.

⁵⁴ See EECC, Article 64.

⁵⁵ The EECC includes provisions that can support the geographic market analysis as Article 22 specifies that NRAs should conduct a geographic survey of the reach of electronic communication networks by 2023 and update this every three years thereafter.

⁵⁶ See COMMISSION STAFF WORKING DOCUMENT EXPLANATORY NOTE Accompanying the document COMMISSION RECOMMENDATION on relevant product and service markets within the electronic communications sector susceptible to ex-ante regulation in accordance with Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code.

between fully competitive areas and areas with very little or no competition should be reflected already at the level of geographic market definition”.

In practice, this means defining typically the following geographic areas:

- **Competitive locations:** these are areas that are fully competitive due to the presence of multiple competing infrastructure operators, such that no operator has SMP.
- **Potentially competitive locations:** these are areas where an operator has SMP but where there is a potential tendency towards competition.
- **Non-competitive locations:** these are areas that, due to challenging local demand and supply conditions, will only be able to commercially support one or no VHCN operator.

2.4.2 Remedies need to reflect different geographic competitive conditions

Having defined markets and assessed the competitive conditions, the EECC requires NRAs to consider applying appropriate, proportionate and targeted remedies. This means that the need for ex-ante remedies, and their nature, should be adapted to each of the geographic locations in the following manner.

Competitive locations

We define “competitive locations” as areas where there is existing effective competition such that no operator has or is expected to have SMP during the market review period (next five years). Operators in these locations should not, by definition, face any SMP remedies.

Potentially competitive locations

We define these locations as areas where an operator has SMP, but where there is a potential tendency towards competition that might, inter alia, come from already present or potential new infrastructure based entry. In “potentially competitive” areas, the overall regulatory approach should be more cautious⁵⁷:

- intervening ‘too early’ or ‘too strongly’ to protect consumers (e.g., through a stringent price cap) could lead to areas that are potentially competitive becoming less attractive for new entrants’ investment, and hence more likely to be non-competitive, to the longer-term detriment of consumers;
- such an intervention could deter not just new entrant investment, but also reduce existing player(s)’ incentives to invest; and
- the emergence of infrastructure based competition can also be expected to provide consumer protection – such a prospect is less likely to be present in non-competitive areas.

⁵⁷ In such areas, the regulatory approach will also need to consider any foreclosure risks for new infrastructure entrant players. Whilst the cause of the risk is similar across jurisdictions, SMP operators’ incentive to foreclose infrastructure based entrants, we expect the ability to act on this incentive to reflect specific market circumstances, hence NRAs will need to have a degree of flexibility in developing their approach.

We discuss remedies for potentially competitive locations⁵⁸ in Section 2.5.

Non-competitive locations

These are areas where there is an expectation that there will not be more than one VHCN (possibly itself deployed with government support), typically due to the areas being higher cost and more difficult to roll out to. Signalling the long-term approach to regulation is particularly important in these areas.

In areas which will not support competition, the regulatory framework is likely to have a more important role to play in balancing objectives of network investment, consumer protection and promoting access based competition. This is because in these areas, the SMP operator, by definition, will not face competitive pressure and hence will not have strong incentives to invest in VHCN. This is in contrast to areas that can sustain more than one network in the future, where competition would also be expected to ‘drive’ VHCN investment. If one company does not invest in VHCN, it risks losing network market share to the company (or companies) that do invest.

It is, however, important to further split these locations into those that can commercially support one VHCN operator and those locations that cannot commercially support any VHCN operator. In the former, SMP remedies will have a role to play to protect competition, balanced against the need to promote investment in VHCN (we discuss the exact remedies for non-competitive locations in Section 2.6). State Aid would be required to support the deployment of VHCN in the latter areas.

2.4.3 Geographic segmentation should err on the side of promoting investment

Geographic segmentation will have to rely, among other things, on forecasts from operators under a degree of uncertainty. However, there are clearly risks to using forecasts that turn out to be inaccurate. For instance:

- By wrongly characterising an area as being potentially competitive when it turns out to be uncompetitive, SMP operators in those areas may face *less* stringent regulation than would be the case had the area being correctly forecasted as uncompetitive.
- Conversely, if the area had been wrongly characterised as uncompetitive when it can support competition, SMP operators in that area may face *more* stringent regulation aimed to protect consumers in the short term, than would be the case had the area being correctly forecasted as potentially competitive, thus potentially hindering investment by that operator.

Under the objective to support investment in VHCN, characterising wrongly an area as potentially competitive would be less of a concern than characterising wrongly a potentially competitive area as non-competitive. The short term consumer

⁵⁸ In these areas there is some general uncertainty on how the competitive conditions will develop over time. This means that there is a chance that some locations may still turn out (in a subsequent market review) to be non-competitive due to a lack of rollout by alternative operators. In these locations, at a subsequent market review, the area may be re-classified as non-competitive, and the appropriate regulation in that area would apply.

welfare loss in the first scenario would be lower than the consumer loss in the second scenario, if it resulted in the regulator taking a ‘strict’ approach to regulation which deters investment (as such investment would have longer term benefits for consumers as discussed above).

Therefore, to reduce this risk, the geographic market analysis should define potentially competitive areas based on an assessment of reasonable probability of rollout, rather than an assessment of certain current rollout (i.e. adopt a “pro investment” rollout assumption)⁵⁹. This would provide more favourable conditions for investors as remedies can be focused on supporting infrastructure competition, even if there is some uncertainty over the outcome of investment during this period.

2.4.4 Recommendations

Recommendation 4

Geographic market analysis should, where the national circumstances warrant it, distinguish between the following geographic locations: (i) competitive locations where there are several (currently or prospectively in the review period) competing infrastructure operators; (ii) potentially competitive locations where there is a SMP operator but there is an existing degree of competitive constraint from another rival infrastructure operator and/or potential infrastructure based entry; and (iii) non-competitive locations where there is only one or no commercial VHCN operator. Remedies should then be tailored in potentially and non-competitive locations to reflect the need to promote VHCN deployment.

Recommendation 5

The geographic market analysis should define potentially competitive locations based on reasonable probability of rollout, rather than certain rollout. This is because characterising wrongly an area as potentially competitive would be less concerning than characterising it wrongly as non-competitive, as the short term consumer welfare loss in the former would be expected to be lower than the consumer welfare loss in the latter.

2.5 Regulatory approach in potentially competitive locations

Potentially competitive locations are defined as areas where an operator has SMP but where there is or will be a degree of competitive constraint from a competing operator or potential new infrastructure based entry in the current market review period or beyond.⁶⁰

In these areas it is clear that SMP operators will face different incentives to supply downstream competitors compared to the incentives they face in non-competitive areas. This is because, in potentially competitive locations, they are constrained by the presence of existing and potential competition (but the constraint is not yet

⁵⁹ This can be based on the rollout plans submitted by operators and collected as part of the geographic survey of network deployments under Article 22 of the EECC.

⁶⁰ We expect competitive conditions in different areas of different EU Member States to vary significantly, both within Member states and between them. The ‘delineation’ of potentially competitive areas, where relevant, will therefore need to reflect the specific circumstances of the geographic areas being analysed.

so significant to justify a complete deregulation). For example, the incentives to offer access will be different in locations where the SMP operator is facing a certain level of competition from one or more infrastructure providers that could also offer access, compared to locations where it does not face any such competition.

Nevertheless, an NRA may take the view that, if there is some uncertainty about the likelihood of entry, it may be premature to remove the SMP obligation. Despite this, the prospects for potential competition means that in these locations consumers could be protected in the longer term by competition, and access seekers by the availability of other supply options – this should be reflected in the regulatory approach in such areas compared to non-competitive areas.

The precise form that regulatory intervention should take in order to incentivise investment while protecting consumers and supporting competition, will need to reflect the specific assessment of the strength and speed with which effective competition may emerge, and we expect this to reflect market conditions in different countries/areas. Having said that, and recognising that there is also a need for a harmonised approach across different Member States, we provide below a description of the remedies that could apply within these locations.

2.5.1 Assessment of the need of SMP-based physical access

As discussed in Section 2.3 above, the development of co-investment models should be considered by NRAs within the market review process as these can determine whether SMP remedies are required within the market. For example, the presence of a co-investment agreement (or other agreements) could make SMP remedies redundant and unnecessary if they satisfy the conditions outlined within the EECC.

In the event that NRAs determine that SMP remedies are required, the EECC sets out that, when choosing the appropriate remedy to apply, NRAs should first consider applying remedies at the most upstream level (civil infrastructure): “... *National regulatory authorities should conduct that assessment for each individual wholesale market considered for regulation, starting with remedies for access to civil infrastructure, as such remedies are usually conducive to more sustainable competition including infrastructure competition, and thereafter analysing any wholesale markets considered susceptible to ex-ante regulation in order of their likely suitability to address identified competition problems at retail level.*⁶¹ To incentivise investment, this provision of the EECC should be assessed together with the requirement that NRAs impose the least intrusive remedies possible: “*In accordance with the principle of proportionality, a national regulatory authority shall choose the least intrusive way of addressing the problems identified in the market analysis.*”⁶²

In line with these EECC provisions, given the prospect for infrastructure based competition within potentially competitive locations, physical infrastructure access to existing assets in such locations would in general be expected to support competing investment, without affecting adversely the incentives of the access provider. NRAs should, therefore, consider if the conditions for physical access on

⁶¹ See EECC, Recital 171

⁶² See EECC, Article 68 2

existing physical assets provide the appropriate incentives for altnets, and, whether an obligation to offer physical access and/or active access under SMP is required, taking into account that:

- even though an operator may have SMP in the downstream WLA market, this does not necessarily mean that access seekers cannot obtain appropriate access to physical infrastructure from the SMP operator or others;
- access to physical infrastructure may not be feasible due to a lack of suitable physical infrastructure⁶³;
- access to physical infrastructure is available based on commercial offers of SMP operator or third parties;
- as a result of symmetric⁶⁴ rules-based access to physical infrastructure, including other than the SMP operator's, NRAs could consider that there may not be a need for mandated physical access to the SMP operators' physical assets; and/or
- the absence of active access remedies could entail a risk of material increases in market power in the retail market.

As we explain below, in section 2.8.2, companies that offer access to others to deploy fixed VHCN, may not face the same type of regulations as SMP operators, since the existing regulatory framework, under symmetric obligations, requires that these operators provide access on a fair and reasonable basis. NRAs, in considering any remedies for SMP operators in relation to physical access, should minimise the risk of distorting incentives between SMP operators and other operators that offer physical access where relevant.

In the event that an active remedy is considered appropriate to protect retail competition, the incumbent could be required to provide access to active services under pricing flexibility (ie without a cost oriented charge control). We discuss below how the usage of a regulated anchor and ERT tests may not be proportionate; and how the application of a strict ERT may disproportionately harm incentives to invest in VHCN within these locations.

2.5.2 Case for removing regulated anchor product

A regulated anchor product is a regulated SMP access service whose purpose is to “anchor” the prices of other access services, subject to price flexibility. It is designed to serve as a regulated competitive constraint on the SMP operator where an alternative *competing* service is not present.

If a regulated anchor product is applied when it is not appropriate, it may serve, instead, to hinder the investment incentives of SMP operators and alternative providers. This is because it can constrain their ability to earn a return from investing in VHCN services and blunt the impact of “price flexibility” as a tool to support investment. In the longer term it may also deter investment in VHCN if

⁶³ For example, the duct infrastructure in Germany in many areas does not go beyond the street cabinet as it is limited to the network portion between the MDF site and the street (cabinet). See <https://www.wik.org/fileadmin/Studien/2017/best-practice-passive-infrastructure-access.pdf>

⁶⁴ The EECC requires the least intrusive remedy should be introduced, *given the availability of other remedies (including symmetric obligations)*. In considering the appropriate set of remedies, the assessment of the NRA will need to take into account the impact of any remedies resulting from symmetric obligations. See EECC, Article 68.

investors form the expectation that NRAs will be tempted to adjust the SMP regulated anchor over time.

In potentially competitive areas there is a case to not require a regulated SMP anchor product as a condition of pricing flexibility. This is because, in these areas, it is more likely that there will be other constraints on the ability of SMP operators to raise prices. These can include services provided by another VHCN operator and/or the threat of additional entry within these locations. These can further include the pricing in competitive areas under a national pricing constraint (that sets geographically uniform prices across all types of areas) which then can act as an “anchor” for prices in potentially competitive areas.⁶⁵

2.5.3 Use of ERTs

The use of ERTs⁶⁶ is one way to ensure economic replicability and support pricing flexibility as it is designed to prevent SMP operators from engaging in margin squeeze⁶⁷ and thereby foreclosing competition. We start in this sub-section by considering the issues related to the application of ERTs in both potentially competitive and non-competitive areas. We then consider the recommendations related to the application of ERTs in potentially competitive areas.

The case for less strict ERTs (in both potentially competitive and non-competitive areas)

The use of ex-ante ERTs can in practice affect the incentives of SMP operators to invest in VHCN services. This is because a strict ERT can restrict unduly the ability of the SMP operator to differentiate prices at the retail level, and hence its ability to increase returns from its VHCN investment.

For margin squeeze testing in general, as a rule, the application of *ex-post* margin squeeze tests under competition policy rules and practice, would be expected (compared to an *ex-ante* test) to provide stronger incentives for investment, as under these rules, the aim is to ensure that there is no distortion of competition, rather than to promote/maintain new downstream entry or favour a particular type of new entrant business model. The ex-ante tests developed and applied by NRAs are therefore typically ‘stricter’, in the sense that they result in general in a requirement for the SMP operator to set bigger margins between retail and wholesale prices than would be the case under the ex-post rules. Where SMP operators face some retail pricing constraint for their VHCN services, and all else the same, such tests could be expected to require lower wholesale prices, leading to expectations of lower returns from VHCN investment and a dampening effect on the SMP operators’ incentives to invest. This could also reduce the expected returns that an access seeker would make from investing in FTTH compared with

⁶⁵ In addition, under copper switch-off (see below), the need to promote migration towards VHCN would constrain the incentive of SMP operators to raise VHCN prices in the short run as this will slow down the rate of migration.

⁶⁶ The regulatory framework covers the usage of ERTs within the EECC, Article 75, and the NDCM Recommendation, Recitals 48 and 49. Annex II in the NDCM Recommendation also provides a high level guidance on the design for ERTs.

⁶⁷ Margin squeeze is a type of exclusionary behaviour that can occur if a vertically integrated operator sets wholesale and retail prices such that downstream rivals cannot compete effectively while using inputs from the vertically integrated operator.

getting access under the ERT conditions, hence dampening their incentives to invest

In practice, different parameters can be adjusted by the NRA. The most important dimensions are summarised below:

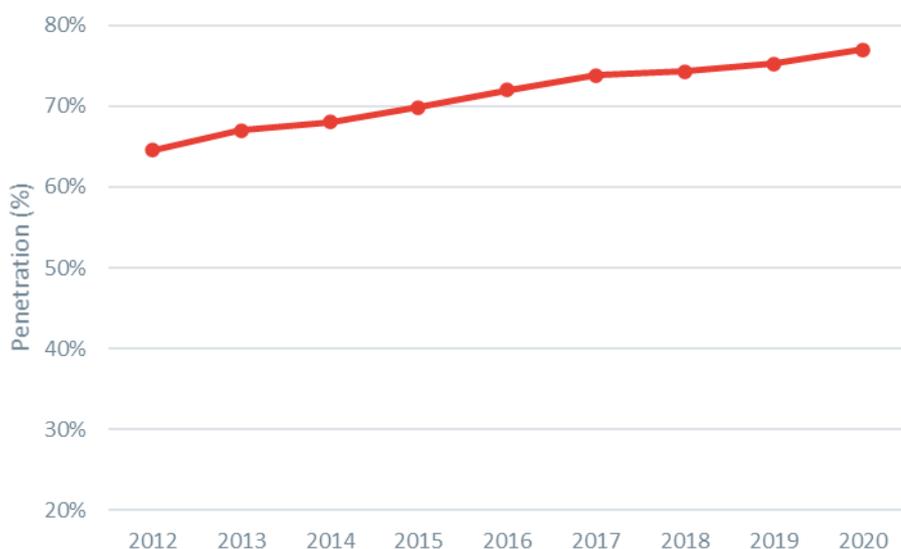
- **Timing of the test – before or after product launch;** the test can be required to be undertaken and ‘passed’ by the SMP operator before a product is launched, or can be undertaken after the product is launched.
- **Portfolio vs flagship vs product by product.** NRAs have adopted different approaches to reviewing the product of the SMP operator. This can range from reviewing each single product (product by product) or reviewing the whole portfolio together. The portfolio approach is a less stringent approach (since it doesn’t require a review of every single product) and can be more appropriate in mature markets (where competition can take place over the portfolio of offers rather than specific products). Conversely, product-by-product approach is the most stringent approach and will in general be less appropriate in more mature markets.
- **Cost standard.** NRAs have used the equally efficient operator EEO, where the test is based on the downstream costs of the incumbent. Some NRAs have used an adjusted EEO or have adjusted the test to reflect a reasonably efficient scale. In practice, the usage of an adjusted EEO or reasonably efficient scale test is more stringent as it will lead to a higher margin between retail and wholesale prices than EEO, all else the same.

An appropriately designed ERT should support service based competition and also ensure that the vertically integrated SMP operator has sufficient commercial flexibility to set retail prices and hence incentives to invest.

As broadband markets are now more mature (due to increasing broadband take-up and competition, see Figure 4 and Figure 5), the case for designing ERTs with the aim of promoting any type of new entrant business model, including niche business models is weaker – indeed, such a design could lead to inefficient entry that would not serve consumer interests. There is therefore a stronger case for the design of ERTs to follow a less strict approach⁶⁸ – we would expect for example that in general the case for reasonably efficient scale adjustments ‘today’ would be weaker than 8 years ago.

⁶⁸ This would require guidance on ERTs under the new Access Recommendation to be ‘less strict’ than the current NDCM Recommendation.

Figure 4 Households with a fixed broadband subscription in the EU (% of households), 2012-2020



Source: Frontier Economics based on DESI 2021⁶⁹

Figure 5 Fixed broadband subscriptions – operator market shares in the EU (% of subscriptions), Jan 2006 – July 2020



Source: Frontier Economics based on DESI 2021⁷⁰

In view of the risks associated with VHCN investment, the guidance provided in the NDCM Recommendation in relation to the requirement for any ERTs not to put the SMP operator at a disadvantage vis-à-vis access seekers regarding the sharing of the investment risk is still pertinent. Two other important elements of the ERT to be considered are the wholesale product to be used and the treatment of discounts:

⁶⁹ See <https://digital-strategy.ec.europa.eu/en/policies/desi>

⁷⁰ See *ibid*

- NRAs should ensure consistency between the appropriate reference wholesale product used or expected to be used within the level of access, which is subject to the market analysis and, if applicable, the appropriate weighted average wholesale service/price at the relevant national or sub-national geographic level;
- The ability to offer discounts is important for incumbent operators as it can be used as a tool to share risks (as part of long term agreements) and encourage migration towards VHCN, thereby supporting investment. Therefore, NRAs should be given flexibility to design ERTs that does not deter discounting (including risk sharing).

Potentially competitive areas

Furthermore, in potentially competitive areas, SMP operators are expected to already face a stronger competitive constraint from another VHCN operator who may also be offering wholesale access or third parties offering physical infrastructure⁷¹; and / or the threat of additional entry in the future. This means that an ERT may not be required within these locations as NRAs can instead rely on competition policy to moderate any potential issue relating to margin squeeze and foreclosure (i.e. NRAs/appropriate authority can perform a margin squeeze test in response to a complaint).

Where the view is taken that an ERT is required due to the risk of margin squeeze, as the ability and incentive of SMP operators to foreclose is lower in potentially competitive areas (compared to non-competitive areas), all else the same, there is a stronger case for the ERT in such areas to be less stringent, for example by using an ERT based on the portfolio approach and/or (unadjusted) equally efficient operator (EEO) cost standard.

2.5.4 Recommendations

Recommendation 6

Active and passive access remedies (incl. access to physical infrastructure such as ducts and poles) should be assessed against the need to support rollout of VHCN infrastructure, taking into account commercial offers and the availability of physical infrastructure under symmetric rules. Other arrangements, e.g. co-investment, which can achieve the same objective, are also to be considered. If SMP remedies are to be imposed, they should be based on pricing flexibility to promote investment in VHCN.

Recommendation 7

In potentially competitive areas, a regulated anchor is not necessary where there are competitive offers that can constrain the ability of SMP operators to raise prices. These can include services provided by another VHCN operator, the threat of additional entry within these locations as well as other constraints such as national uniform pricing.

An ex-ante ERT may also be unnecessary due to existing and potential infrastructure based competition within these areas. If NRAs consider that an ERT

⁷¹ This is because the presence of long term competitive constraints will lead to a lower incentive to foreclose from the SMP operators.

is still required, to maintain regulatory consistency and policy predictability, the approach to ERT under the new Access Recommendation should not become stricter than under current rules under the NDCM Recommendation.

2.6 Regulatory approach in non-competitive locations

Non-competitive locations are defined as areas where effective competition at an infrastructure level is unlikely to develop (i.e. those locations that can only commercially support one or no VHCN operator). In areas which will not support competition, the regulatory framework, including also state aid rules, is likely to have a more direct impact on investment incentives as competition is unlikely to be among the drivers for network investment. We discuss the appropriate regulatory approach in these areas in relation to co-investment models, and SMP remedies for VHCN and copper services.

2.6.1 Other types of investment models should be considered

As mentioned earlier (see Section 2.3), the EECC has incentivised the evolution of different business models to support risk sharing (co-investment). These models of investment should be afforded the removal of ex-ante regulation, provided that competitive safeguards are put in place (such as those specified within Article 76 or those deemed sufficient by the NRA possibly with the application of Article 79), and hence encourage investment in VHCN. The role that such alternative models could play in enabling investment in VHCN may be even more significant in the parts of the non-competitive areas that can support commercially one network, as in such areas there is not a competitive incentive to roll out new networks (unlike in potentially competitive areas).

2.6.2 The impact of nationally uniform pricing should be taken into account

Where the non-competitive areas co-exist with competitive and potentially competitive areas, then the protection provided to consumers in competitive and potentially competitive areas from competition could be effectively 'extended' to non-competitive areas via the existence of nationally uniform retail and wholesale pricing. If this is the case, then the regulatory approach in non-competitive areas should be no different to that in potentially competitive areas.

2.6.3 Active access remedies are likely to play a role in non-competitive areas

The regulatory approach in these locations (where Article 76 and similar agreements do not apply⁷²) should be adjusted based on whether the location can

⁷² In these areas where article 76 competitive models apply, the access and competitive conditions will reflect the commitments given under Article 79 and approved by the NRA. As noted Section 2.3, there is a case for a wider set of agreements to be subject to the conditions equivalent to those in Article 76 and Annex IV in order to promote investment in VHCN.

commercially support one VHCN operator or whether the location cannot commercially support any VHCN operator.

In those locations that can only commercially support one VHCN operator, active access based remedies can be expected to have a greater role to play than in potentially competitive areas. This is because physical infrastructure access remedies are not effective due to the lack of scope for infrastructure based competition. The need to ensure longer term regulatory commitment and the avoidance of a hold-up risk is, however, particularly important in these areas.

In those locations that cannot sustain any commercial VHCN operators, the policy makers need to also focus on State Aid to support the deployment of VHCN services. This would involve updating the existing State Aid rules to reflect the need to deploy VHCN rather than just Next Generation Access (NGA) services (i.e. broadband above 30 Mbps)⁷³.

2.6.4 Pricing flexibility should be applied to VHCN active access obligations

In those locations that can only sustain one VHCN operator, network competition will not be able to moderate prices.⁷⁴ However, it is important to recognise that there are significant risks that can still hinder VHCN rollout.

Pricing flexibility (applied to active access services) can mitigate these risks and support incentives to invest as it allows operators to better react to changing market conditions and introduce innovative tariffs or bundles in order to drive take-up of VHCN services. This is recognised by the EC as pricing flexibility was first included in the NDCM Recommendation and subsequently in the EECC to foster investment in NGA and, later, into VHCNs.⁷⁵ Both require that pricing flexibility be accompanied by “competition safeguards” and these can include “*strict non-discrimination obligations, measures to ensure technical and **economic replicability** of downstream products, and a demonstrable retail price constraint resulting from infrastructure competition or a **price anchor stemming from other regulated access products, or both***” [emphasis added]⁷⁶.

Given the lack of infrastructure competition within most of these locations, there is a risk that excessive pricing and/or margin squeeze could arise. This means that there may be a need to intervene within these markets and impose other competition safeguards on the SMP operator. These are discussed below.

⁷³ The EC has initiated a consultation on the approach to State Aid – See https://ec.europa.eu/commission/presscorner/detail/en/IP_21_6049

⁷⁴ Note, however, as mentioned above, that under uniform prices competition in other zones may contribute to moderate prices in zones where there is only one VHCN operator.

⁷⁵ Pricing flexibility allows operators to better react to market conditions and introduce innovative tariffs. Article 74 states “Due to uncertainty regarding the rate of materialisation of demand for the provision of next-generation broadband services, it is important in order to promote efficient investment and innovation to allow those operators investing in new or upgraded networks a certain degree of pricing flexibility”. This is especially important for fixed VHCN services due to the low/uncertain willingness to pay for gigabit bandwidth services as discussed in Section 2.1.

⁷⁶ It should be noted that the EECC also sets out other situations where it would not be appropriate to impose regulated wholesale access. This can occur in situations where high price elasticity of end-user demand makes it unprofitable for SMP operators to charge prices above the competitive level or where lower population density reduces the incentives for the development of VHCN services (and NRAs impose effective non-discriminatory access).

Furthermore, the need for regulatory commitment is particularly strong in non-competitive areas as infrastructure based competition is very unlikely to emerge – we therefore consider also in this section how a “fair bet” approach can provide such commitment.

2.6.5 ERTs in non-competitive areas

The EECC recommends that pricing flexibility should also be accompanied by measures to “*ensure technical and economic replicability of downstream products*”.

As set out above, (see Section 2.5.3), ex-ante tests developed and applied by NRAs are ‘stricter’ than ex-post tests, in the sense that they result in general in a requirement for the SMP operator to set bigger margins between retail and wholesale prices than would be the case under the ex-post rules. Where SMP operators face some retail pricing constraint for their VHCN services, and all else the same, ex-ante ERTs could be expected to require lower wholesale prices, leading to expectations of lower returns from VHCN investment and a dampening effect on the SMP operators’ incentives to invest.

ERTs in non-competitive areas should be designed in a way which proportionately preserves incentives to invest while protecting downstream competition. This can be done by ensuring that operators subject to the ERT retain flexibility to set prices in a dynamic way: for example, the ERT test could specify the approach to the assessment of whether a margin squeeze exists but be applied after products have been introduced by the SMP operator.

Furthermore, there may also be a retail pricing constraint in non-competitive areas from competition in competitive and potentially competitive areas, and nationally uniform retail pricing. Under such conditions, the adoption of a less strict ERT (as opposed to a stricter test), as in the potentially competitive areas, would be expected to strengthen VHCN investment incentives in non-competitive areas.

2.6.6 The use of a regulated anchor product

As discussed above, the EECC suggests that pricing flexibility should be accompanied by a demonstrable retail pricing constraint and this could result from the imposition of a regulated anchor. This means that NRAs should carefully assess (before the imposition of a regulated anchor) whether demonstrable pricing constraints exist within the market. These constraints can include the pricing in competitive areas under national pricing (that results in geographically uniform prices across all types of areas) which then can act as an “anchor” for prices in non-competitive areas (especially if non-competitive locations are small relative to more competitive locations).⁷⁷

In the absence of such a constraint, as there is likely to be limited scope for competitors or entrants to constrain prices in non-competitive locations, there may be a need for a regulated “anchor” product to protect consumers, if price flexibility is used for regulated access services.

⁷⁷ A regulated anchor may also not be needed if prices have been commercially agreed (and approved by the NRAs) between operators.

In such cases, a regulated anchor product should still be designed in a way that balances the need to protect consumers in the short-term with the benefits of long-run deployment of VHCN services. For example, if the anchor product is ‘transferred’ onto FTTH, the access price could be set higher than an equivalent legacy service to reflect the greater value offered by FTTP networks.

2.6.7 The need for regulatory commitment - regulation of VHCN active access could be based on a “fair bet”

As mentioned above, to support long term incentives to invest in VHCN and mitigate risks, VHCN active access products should be subject to “price flexibility” with a regulatory mechanism to ensure that there is regulatory certainty over the period of the investment – i.e. going beyond a single review period. This is because the ‘hold-up’ problem is present within non-competitive areas as operators may delay investment if they expect NRAs to truncate what may appear to be relatively high returns, in favour of shorter term consumer protection⁷⁸.

It is important that the NRAs therefore commit to a regulatory approach over the lifetime of the investments that will not inappropriately ‘curtail’ the returns of SMP operators and thereby dampen their future investment incentives. One approach to support this is the “fair bet” approach, which allows operators the opportunity to recover sufficient upside to compensate for the downside risk of investment.

In practice, this means that NRAs would commit to assessing whether the returns of the SMP operator are appropriate after a period of time during which NRAs would commit not to impose price regulation. Given the magnitude of the investment required and the long payback period for telecommunications assets (see Section 2.2), such a period should in general be expected to be longer than a single market review period. Following an assessment of whether the SMP operator had earned a fair bet, the NRA would then need to consider what the appropriate form of regulation would be to protect consumers from high prices in non-competitive areas, taking into account the overall market developments: for example, were prices in the non-competitive areas to be constrained by prices in the competitive areas, then price control regulation in the non-competitive areas may be unnecessary⁷⁹.

The “fair bet” approach requires an assessment of the following:

- **The performance of investment vs initial expectations.** This requires an assessment of the initial capex and expected prices and demand for the VHCN against the actual capex, price and demand. SMP operators will likely have earned or exceeded the fair bet if the capex was lower than planned and/or prices and demand is better than expected.⁸⁰ The NRA would commit that the SMP operator could retain any over recovery during the initial period.

⁷⁸ In principle the same would apply to any parts of the potentially competitive areas that turn out ultimately to be non-competitive – the fair bet approach could also be used in relation to the returns achieved by the SMP operator in any such areas.

⁷⁹ As discussed above, NRAs should still regularly review the market to assess whether regulation is still required in some locations due to the emergence of competition.

⁸⁰ For example, Ofcom applied the “fair bet” approach to evaluate BT’s returns on FTTC under pricing flexibility: “BT’s FTTC has outperformed its initial assumptions in several important areas: capex was less than expected; and both take-up and FTTC rental charges are higher than expected. Were we to continue

- **The expected payback period.** This requires an assessment of the time that has elapsed vs the expected payback period. SMP operators will likely have earned or exceeded the fair bet if the payback period was shorter than predicted.
- **The riskiness of the initial investment.** This requires an assessment of the risks the SMP operator faced at the beginning of its investment cycle, including any systematic (market level) and idiosyncratic (VHCN take-up, prices and costs) risks. SMP operators will likely have earned or exceeded the fair bet if the rate of return on investment is much higher than the initial risk.

In contrast to a charge control which requires an ex-ante estimate of the risks of FTTH investment (i.e. before the investment has been made), this is not necessary under a fair bet approach. This means that the fair bet is less sensitive to regulatory error as a charge control (based on predicted FTTH rollout, take up, and costs) may provide inefficient and incorrect signals which might hinder take-up and investment. The fair bet approach would also allow greater 'intertemporal' pricing flexibility compared to an approach based on a cost oriented charge control. Under the fair bet approach SMP operators could achieve higher returns earlier in the period, which could provide stronger investment incentives for SMP operators to not postpone the investment. This would still provide protection to consumers in the longer term, as higher returns earlier in the period of the investment would increase the likelihood of the SMP operator achieving the fair bet sooner.

The adoption of a fair bet approach implies that the SMP operator would be able to price access to VHCN flexibly until the NRA considers that the operator's returns were consistent with a 'fair bet', while still requiring a safeguard to reduce the risk of downstream foreclosure. The application of an ERT could impose a constraint on the SMP operators' ability to price flexibly during the 'fair bet' period. Were NRAs to adopt a fair bet approach, the design of an accompanying ERT could therefore consider any potential impact on the ability of the SMP operator to earn a 'fair bet'.

2.6.8 Recommendations

Recommendation 8

In areas where SMP access conditions are applied to active services, pricing flexibility will support VHCN deployment.

Where price flexibility is offered on active services NRAs should design any regulated anchor product (in the absence of any other retail pricing constraint such as national pricing and commercially agreed prices) in a way that supports investment incentives – e.g. where the anchor is applied to FTTH products the price should reflect the greater value offered by FTTH networks.

Recommendation 9

The design of the ERT should reflect the maturity of the broadband markets and support investment incentives by not disproportionately restricting the ability of

to allow pricing flexibility across VULA services and then impose a cost based charge control in 2020/21, we estimate the IRR of BT's commercial investment would exceed 15% ... our judgement at this stage is that BT has had a fair opportunity to make a return on its original risky investment and a charge control would be consistent with the 'fair bet'."

SMP operators to set retail prices. This could, for instance, be achieved by NRAs setting terms and conditions of the ERT ex-ante but only conducting tests on an ex-post basis, by periodically monitoring prices.

Recommendation 10

NRAs should commit to a regulatory approach over the lifetime of the investments that will not inappropriately ‘truncate’ the returns of SMP operators and thereby dampen their future investment incentives. NRAs may assess in this respect the relevance of using a “fair bet” approach to support the required longer-term regulatory commitment, and reduce/minimise the likelihood of a hold-up, which would delay/deter SMP VHCN investment.

2.7 Copper switch-off

The rollout of FTTH (to support the targets of the Digital Compass) allows and requires incumbent operators to move from running a combination of legacy and new technologies (i.e. copper and fibre) to a single VHCN with low operating costs and improved green credentials.

Incumbent operators are currently subject to strict rules for notifying before they can start to decommission their legacy copper network. This is reflected in the 5 year default period for notification of decommissioning of legacy networks within the NGA Recommendations⁸¹ which stated that “NRAs should ensure that alternative operators are informed **no less than 5 years**, where appropriate taking into account national circumstances, before any de-commissioning of points of interconnection such as the local loop exchange. This period may be less than 5 years if fully equivalent access is provided at the point of interconnection” [emphasis added].

The EECC⁸² states that SMP operators must notify and inform the NRA in a timely manner if it chooses to decommission its legacy network. It further states that NRAs must ensure that the process includes a transparent timetable and conditions (including making available an alternative access product of at least comparable quality to the legacy infrastructure), and NRAs may withdraw obligations on the legacy technology if the provider has established appropriate conditions for migration.

However, it is important to recognise that the SMP operators are incurring additional costs due to the need to run parallel copper networks and VHCN. This will lead to higher costs for operators (both SMP operators and access seekers) and some of these costs may be passed onto end-users. As VHCN networks have much lower ongoing costs than copper based networks, a rapid transition which enables switching off copper quickly allows the cost base to fall more quickly to the efficient level. Based on that it is necessary that the incumbent outlines timing and sequence of the transition steps.

⁸¹ See NGA Recommendation, Recital 39

⁸² See EECC, Article 81

It is also important to recognise that maintaining both legacy networks and VHCN in parallel is undesirable from an environmental point of view as the carbon footprint for both networks will be larger than from one fibre network (VHCN).

Therefore, there should be a clear path of rapid migration to VHCN from copper networks. Such a plan will boost incentives to invest in VHCN; will support environmental goals avoiding the environmental costs of needlessly double running networks; and ultimately will bring consumer benefits. This means that, in areas with planned VHCN rollout, an incumbent operator should be allowed to give considerably less than five years (1-2 years) notice that:⁸³

- it will stop offering legacy services to new retail and wholesale customers (with wholesale access seekers thus also required to only offer services to their new customers through VHCN) by the agreed date, and
- as from that date, the incumbent and access seekers shall determine a plan to migrate existing wholesale legacy customers to the VHCN network.

This should provide access seekers with sufficient time to allow them to announce the switch of their users towards a VHCN product, taking into account the maximum contract length that operators can offer to end-users within the EECC⁸⁴.

During the “stop sell period” (after the incumbent ceases offering legacy services to new customers and until customers are migrated to VHCN), NRAs should recognise that there needs to be some flexibility in allowing the incumbent operators to set prices in a way which encourages migration towards VHCN in locations where this is possible (which could include allowing prices for legacy wholesale services to increase as unit legacy costs increase). This is because the benefits of rapid migration towards VHCN and deployment of VHCN in the long run would in general be expected to override the need to keep prices down in the short run.

To ensure that incentives to invest are not affected by the transition, SMP operators that invest in VHCN should also be entitled to recover the costs of any remaining demonstrable stranded legacy assets from their FTTH customer base.

2.7.1 Recommendations

Recommendation 11

The EC should require a default notification period significantly shorter than five years (1-2 years) to be introduced for SMP operators before stop sell is enacted.

Recommendation 12

During the stop sell notice period and a subsequent transition period before copper is switched off, the NRAs should provide some flexibility to incumbent operators in order to set prices in a way which encourages migration towards VHCN in locations where this is possible, and allows SMP operators to recover legacy costs.

⁸³ This refers to the notification period where operators can stop offering legacy services to new customers. ETNO considers that a period of a minimum of 1 year should in general be sufficient, absent local circumstances that could imply a longer period may be required. Visionary Analytics in their report for the Commission indicated 2 years (Study on Regulatory Incentives for the Deployment VHCN in the Context of the Revision of the Commission’s Access Recommendations).

⁸⁴ See EECC, Article 105

2.8 Symmetric obligations

The regulatory framework has in recent years included a wider suite of non-SMP related tools that aim to support the deployment of broadband services. Symmetric obligations were introduced within the regulatory frameworks of some Member States before being formalised within the BCRD, which provided access to civil engineering infrastructure (such as masts, towers, ducts, poles) of non-telecommunications networks under fair and reasonable terms. The BCRD further ensured that telecommunications operators are able to roll out their network to an access point of a building and then be provided access to the in-building physical infrastructure under fair, reasonable and non-discriminatory terms^{85 86}. We note that the upcoming BCRD Review in 2022 may be expected to widen the scope of available physical infrastructure.

The EECC⁸⁷ expanded the scope of symmetric obligations where telecommunications operators are now able to both access in-house wiring and associated facilities.

2.8.1 The presence of suitable alternative infrastructure should be considered within market reviews where feasible

The presence of suitable alternative non-SMP infrastructure should be considered within the market review process as these obligations can reduce the costs of VHCN deployment and barriers to entry. This is especially the case if the symmetric obligations have been successful at encouraging operators to use alternative infrastructure to rollout their fibre networks and can generally lower barriers to entry.

This means that symmetric obligations should be considered within the market review process under the following:

- **Three Criteria Test.** The presence of symmetric obligations on alternative infrastructures would be relevant in the assessment of whether there are high and persistent barriers to entry, or of whether the market will tend to competition. This is because access to civil engineering infrastructure can enable entry such that markets may tend towards effective competition during the market review period. Therefore, this may mean that the market is no longer susceptible to ex-ante regulation.
- **SMP Assessment.** It is relevant to consider whether symmetric obligations could support network access as this can impact on the ability of an existing operator to exploit SMP..
- **Approach to remedies.** The EECC⁸⁸ requires the least intrusive remedy should be introduced, *given the availability of other remedies (including*

⁸⁵ See BCRD, Article 9

⁸⁶ The BCRD also included a number of other regulatory tools that can reduce the costs of deployment within the BCRD. These further included provisions to aid the coordination of civil works civil works , streamline permit granting processes and creation of a single information point (SIP). See BCRD, Article 5, 7 and 4.

⁸⁷ See EECC, Article 61

⁸⁸ See EECC, Article 68

symmetric obligations). This means that the assessment of the NRA will need to take into account the impact of any remedies resulting from symmetric obligations. Such remedies may require an NRA to modify its approach – for example by considering whether a physical access remedy (e.g. ducts) is necessary to support rival infrastructure based investment. There are examples where NRAs have taken the above into account in coming to a view on remedies, and removed or did not impose an SMP physical access remedy.⁸⁹

Therefore the presence of suitable alternative non-SMP infrastructure within the market review process should be considered, if/where it can significantly reduce the costs of VHCN deployment, especially if it has been successful at encouraging operators to use alternative infrastructure to rollout their fibre networks. For instance, this may involve NRAs withdrawing SMP regulations and/or relying on symmetric obligations instead of only on the SMP operator when access to alternative infrastructure forms a sufficient constraint.

2.8.2 Any competitive distortions resulting from symmetric obligations should be reduced

There are numerous operators that are deploying fixed VHCN and these include non-telecommunications operators such as utility networks (e.g. energy) or municipalities. These operators are able to use their existing physical infrastructure and compete on occasions with other telecommunications operators in the provision of broadband services.

Companies that deploy fixed VHCN or offer access to others to do so, do not face the same type of regulations as SMP operators, since the existing regulatory framework, under symmetric obligations, requires that these operators provide access on a fair and reasonable basis. Telecommunications operators that have SMP on the other hand are typically subject to numerous remedies and obligations under the regulatory framework (e.g. price control). NRAs should, in any remedies for SMP operators, minimise the risk of distortion between SMP operators and other operators that offer physical access.

2.8.3 Recommendations

Recommendation 13

Access to suitable alternative civil engineering infrastructure should be considered as part of the market review process. NRAs should assess if symmetric obligations, alone or in combination with other access products, provide a sufficient support to incentivise VHCN rollout by altnets without deterring SMP VHCN investment.

⁸⁹ For example, in Spain, the NRA adopted a decision in 2009 that imposed symmetric obligations on the basis that the first operator that deploys a local access segment within a building must make this available to other operators at a reasonable price – this then led the NRA to remove any SMP regulation on local access to the fibre network within those buildings in market 3a. Another example can be observed in the Czech Republic where the NRA decided not to impose access to physical infrastructure due to the impact of BCRD (i.e. duplication of access obligations). See https://berrec.europa.eu/eng/document_register/subject_matter/berrec/reports/8597-berrec-report-on-access-to-physical-infrastructure-in-the-context-of-market-analysis

3 INCENTIVISING INVESTMENT IN MOBILE VHCHN

The nature of regulatory and policy intervention differs between the fixed and mobile sectors. Unlike in fixed telecommunications, network competition between mobile operators has been a consistent feature of markets in Member States, limiting the need for ex-ante regulation.

That said there are some policy levers that can affect outcomes in mobile markets:

- spectrum policy;
- merger control; and
- infrastructure sharing policy.

In a 5G world, regulations related to consumer protection and Internet of Things/machine-to-machine communication will also affect investment incentives and consumer outcomes.

This section discusses policy changes to these areas that improve investment outcomes and it is structured as follows:

- we first outline the investment challenge for 5G; and
- for each area highlighted above, we briefly refer to their most influential aspects and recommend changes that may improve the incentives to invest in VHCHN.

3.1 The investment challenge

3.1.1 5G – Significant benefits but also significant costs

5G, if delivered to its full capability, has the potential to unlock a range of use cases that could deliver significant benefits to individuals and industry. Beyond improving existing services, these use cases will generate significant positive externalities. This is because the adoption of 5G technology (or associated use cases) by businesses should drive growth as they benefit from improvements in productivity and efficiency, in turn leading to job creation.⁹⁰

It is for this reason that the EU has set ambitious policy targets with regards to 5G deployment, with an aim to ensure 5G of all populated areas by 2030.⁹¹

⁹⁰ See, for example, Accenture (2021) – The Impact of The Impact of 5G on the European Economy. https://www.accenture.com/_acnmedia/PDF-144/Accenture-5G-WP-EU-Feb26.pdf

⁹¹ European Commission (2021) – communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – 2030 Digital Compass: the European way for the Digital Decade, pg. 6. See <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0118>

USE CASES UNLOCKED BY 5G INVESTMENT

These are split into three main groups.

(1) Enhanced mobile broadband (eMBB)

- Provides opportunities for increased download speeds (i.e. gigabytes in a second) versus 4G technology, ultra HD streaming and 3D video.
- Limited benefits as use cases are largely an extension of the status quo.

(2) Massive machine type communications (mMTC)

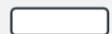
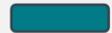
- Will enable connectivity across a large number of devices, supporting Internet of Things (IoT) development and the creation of smart homes and cities.
- Significant benefits unlocked as a result of increases in productivity (IoT), increased energy efficiency (smart homes) and increased efficiency in distributing and allocating resources (smart cities).

(3) Ultra-reliable low-latency communications (URLLC)

- Will support use cases with strict reliability and latency requirements, including virtual/augmented reality, industrial automation and autonomous vehicles.
- Significant benefits unlocked as a result of opportunities for personalised content and digital integration (virtual/augmented reality), increases in productivity (industrial automation) and reductions in vehicle-related emissions and accidents (autonomous vehicles).

However, meeting these targets will require significant investments from Mobile Network Operators (“MNOs”). The figure below illustrates the investments needed to unlock the different 5G use-cases – it demonstrates that the full suite of use-cases (and therefore the full scale of 5G’s benefits) will require that both the core network and RAN are upgraded on a national basis.

Figure 6 Implications for use cases of different 5G rollout scenarios

	5G RAN	5G Core	Coverage	Use cases
 Partial 5G deployment (excl. core)	✓	✗	5G RAN  5G core 	 eMBB Full availability
 Partial 5G deployment (incl. core)	✓	 Urban areas	5G RAN  5G core 	   eMBB mMTC URLLC Limited availability
 Full 5G deployment	✓	 All areas	5G RAN  5G core 	   eMBB mMTC URLLC

Source: Frontier Economics

Given the significant network upgrades required for this deployment, it is important to consider operators' current incentives to meet the EU's targets.

3.1.2 MNOs current incentives to meet the EU's 5G targets are not as strong as they could be

The EU's current goal of having 5G available in all populated areas by 2030 is ambitious yet appropriate because of the significant benefits 5G is expected to generate. However, under the status quo, MNOs' incentives may not be as strongly aligned with this policy goal as would be ideal. This is because the incentives to invest in 5G are different to previous technologies – something that policy and future regulation will need to reflect.

The costs of 5G are significant

Research produced previously for the EC estimates the (inflation-adjusted) cost of 5G deployment across Member States at €58bn in 2025.⁹² The authors acknowledge this is likely to be a conservative estimate of deployment costs: it is based on adjustment to the costs of 4G deployment, however 5G is expected to deliver a range of services beyond those provided by earlier technologies (e.g. voice, data, video).⁹³ More recent research estimates the cost of 5G deployment in Europe to be closer to €150bn.⁹⁴

The magnitude of these costs increases the risk of operators' investment, particularly if demand for 5G services is uncertain.

⁹² European Commission (2016) – Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe. See https://connectcentre.ie/wp-content/uploads/2016/10/EC-Study_5G-in-Europe.pdf

⁹³ Ibid.

⁹⁴ ETNO (2021) – Connectivity & Beyond: How Telcos Can Accelerate a Digital Future for All (research by Boston Consulting Group). See <https://etno.eu/library/reports/96-connectivity-and-beyond.html>

While the industry is working on ways to reduce the cost of deployment (such as through the development of Open RAN – see Section 4.2.1 for more on Open RAN), these are still a work-in-progress and, in some cases, require further policy support.

Revenues from new use cases are highly uncertain

A key potential of 5G deployment lies with industrial use cases but many of these are yet to be developed. Progress in developing these use cases will depend on the performance, capabilities and cost of 5G applications. However, there is currently limited information available on the real-world performance of 5G networks, and so demand and willingness to pay for them is highly uncertain.⁹⁵ Businesses are also unclear on the timelines with which IoT applications will be embedded within business, creating a lack of clarity on the true demand for business-to-business applications of 5G.⁹⁶

This is entirely different to 4G rollout where the use-cases were already established and demand was already present – the use-cases were largely the same as 3G and a large proportion of customers already had smartphones. Thus, operators knew that when they offered 4G, there would be quick take-up.

By contrast, the demand uncertainties of 5G may reduce the incentive for MNOs to incur the large rollout costs, particularly those required to deliver Very High Capacity 5G networks with both upgraded RAN and core.

There is thus a need for policy intervention to help improve the business case for VHCN mobile network i.e. 5G. We discuss how various policy levers can incentivise such investment in the remainder of this chapter.

3.2 Spectrum policy

Given the necessity and scarcity of spectrum as a resource, spectrum policy has played a key role in influencing the structure and outcomes of mobile markets. It has been used by regulators and policy-makers in a number of ways:

- To manage competition in the market through spectrum assignments, in particular by:
 - adjusting the number of operators in the market through new entry via spectrum reservation policies;⁹⁷ and/or
 - influencing the size or scale of competitors through caps on spectrum for existing operators.⁹⁸

⁹⁵ GSMA (2020) – 5G for Smart Manufacturing: Insights on how 5G and IoT can transform industry, pg. 25. See https://www.gsma.com/iot/wp-content/uploads/2020/04/2020-04_GSMA_SmartManufacturing_Insights_On_How_5G_IoT_Can_Transform_Industry.pdf

⁹⁶ See, for example, McKinsey (2020) - The 5G era: New horizons for advanced electronics and industrial companies, pg. 5. See <https://www.mckinsey.com/industries/advanced-electronics/our-insights/the-5g-era-new-horizons-for-advanced-electronics-and-industrial-companies>

⁹⁷ Ibid, Article 52, para. 2(b).

⁹⁸ Ibid, Recital 122.

- To meet investment targets, for example through coverage obligations or network quality requirements imposed as a condition on spectrum awards.⁹⁹
- To ensure the efficient allocation of scarce spectrum resources through spectrum auctions and/or the pricing of spectrum.

The approach to spectrum allocation will influence the quantity of spectrum an operator can acquire and the costs incurred in doing so – and both have important consequences for the quality and pace of 5G rollout.

At a European Level, the key spectrum policies currently derive from the European Electronic Communications Code (EECC), although decisions are often ultimately made by Member States. These policies cover a number of areas in relation to spectrum.¹⁰⁰ However, we focus on the aspects that are expected to have the greatest influence on the incentive to invest – spectrum assignment and spectrum conditions, and spectrum pricing.

3.2.1 Spectrum assignment and conditions

The EECC requires that decisions granting or renewing spectrum awards should be the responsibility of NRAs or other competent authorities (defined as those having the necessary economic, technical and market knowledge).¹⁰¹ Under Article 52, the relevant authority is provided the right to take action that can be expected to “promote effective competition and avoid distortions of competition”.¹⁰² However, measures to manage competition or consumer outcomes in the market can create possible trade-offs and unintended consequences. In this section, we discuss the impact of the following on the incentive to invest in VHCN:

- spectrum reservations;
- spectrum caps;
- spectrum conditions; and
- licence durations.

Impact of reservation policies

Reservations of spectrum for new or recent entrants are typically adopted to promote competition in mobile markets. This was an important objective in spectrum auctions for earlier generation of mobile technology, where the new entrants in growing mobile markets had to compete with existing players who already had significant customer bases. As mobile markets have matured, the benefits of favouring new entrants are less clear as they can distort the market and lower the incentive to invest:

- Spectrum reservations can create spectrum scarcity, lowering spectrum available for incumbent operators. This means that the spectrum they win can

⁹⁹ GSMA (2017) – Effective Spectrum Pricing: Supporting better quality and more affordable mobile services, pg. 50. See <https://www.gsma.com/spectrum/wp-content/uploads/2017/02/Effective-Spectrum-Pricing-Full-Web.pdf>

¹⁰⁰ For example, identification of relevant spectrum bands for 5G, license duration and renewal, guidelines on spectrum use and harmonisation, spectrum fees, spectrum conditions, the role of spectrum in influencing competition, etc.

¹⁰¹ See EECC, Recital 133.

¹⁰² Ibid, Article 52, para. 1.

fall short of their needs. This could reduce the ability of such operators to improve quality of service for their customers and lead to increased network congestion and/or increase costs and reduce economies of scale because more sites have to be deployed to compensate for the lack of spectrum.

- Reservation policies that favour new entrants and/or smaller “maverick” players in the market may allow these players access to spectrum at a lower price than would be possible absent the reservation policy. This may encourage inefficient entry which could then lead to further requests of assistance by smaller players, to support their reaching a viable scale. While this could create short-term gains for consumers, there is a risk of such policies disincentivising investment, if they make the returns to such investment more uncertain, as recognised by the EECC ¹⁰³.
- Reservation policies within bands that have already been allocated among incumbent operators can create additional difficulties as there may be a risk of stranded assets, and lower spectrum utilisation (at least till the entrant rolls out a network of comparable coverage).

Article 52 of the EECC is explicit in requiring that any such measures be based on an “objective and forward-looking assessment of the market competitive conditions”.¹⁰⁴

Given the above, it is desirable to ensure that interventions are limited to exceptional market circumstances where they are proportionate, considering an evidence-based and ideally quantitative cost benefit analysis of any reservation policy, also taking into account the potential of an assignment policy to disincentivise investment in 5G.

Impact of spectrum caps

Spectrum caps tend to be used as tool to avoid creating large asymmetries between players as this could increase the market power of particular players in the retail market.

But the risk of pursuing a symmetric allocation of spectrum as an end in itself can result in inefficient use. This happens when:

- larger players do not receive the quantity of spectrum they need to maintain and improve the quality of service offered to their subscribers; and/or
- new entrants or smaller players are given preferential treatment to achieve or move towards symmetry, resulting in spectrum not being allocated to the players that can make the most efficient use.

Pursuing symmetry for symmetry’s sake could therefore lower allocative efficiency, as spectrum may not be awarded to the operators that can make the best use of it to the benefit of consumers. Thus, spectrum caps, if applied, should be carefully designed to ensure they meet a narrower objective, which is to prevent a player from acquiring such significant amounts of spectrum that:

- they acquire an unassailable competitive advantage in the retail market; or

¹⁰³ Ibid, Article 52

¹⁰⁴ Ibid, Article 52.

- they hoard spectrum and use it to partially foreclose rivals.

Finally, given the possible implications for investment incentives, an objective, forward-looking assessment should be carried out of the impacts of any proposed caps on consumer and market outcomes. These should account for both short-term impacts as well longer-term investment outcomes.

Impact of spectrum conditions

Conditions attached to the award of spectrum licenses provide a means for government and NRAs to influence the actions of spectrum holders in wholesale or retail markets.¹⁰⁵ We discuss below two types of conditions:

- coverage obligations; and
- wholesale access conditions.

Coverage obligations

Coverage obligations relating to population, geography or specific locations (e.g. a minimum requirement on rural coverage) are commonly attached to spectrum awards.¹⁰⁶

In theory, spectrum conditions can promote VHCN investment. Obliging spectrum holders to deliver coverage improvements in areas that may be slower to receive commercial rollout (such as rural or high-cost areas) can lead to large-scale network deployment by the spectrum holder.

However, given 5G costs, rapid full population coverage with high capacity 5G is unlikely to be commercially attractive. As a result, imposing demanding coverage obligations may push operators further into unprofitable areas. This increased cost of compliance, alongside higher resource requirements on planning and deployment (particularly in more challenging environments such as rural areas), could delay overall rollout.

Network deployment in unprofitable regions could instead be facilitated through additional support systems such as State aid, in cases of market failure and recognising that the latest generation of mobile capabilities typically represents a step change compared to the previous ones..

Alternatively, coverage obligations beyond commercially viable areas could be incentivised by reductions in the reserve price (or other measures to reduce the cost of rollout) for the operators willing to meet these obligations.

Wholesale access obligations

Finally, another type of condition that may be imposed is requiring holders to provide wholesale access to competitors. Such conditions must be imposed carefully as they may reduce operators' investment incentives:

¹⁰⁵ GSMA (2017) – Effective Spectrum Pricing: Supporting better quality and more affordable mobile services, pg. 50. See <https://www.gsma.com/spectrum/wp-content/uploads/2017/02/Effective-Spectrum-Pricing-Full-Web.pdf>

¹⁰⁶ Spectrum conditions could also require operators to host MVNOs on their network and provide roaming access to new entrant operators in the market, for instance.

- Mandatory wholesale access may drive down prices in the short-run but could enable unsustainable entry, which would not be in the long-run benefit of consumers.
- Incentive to invest would also be lower because the benefits of any investment to improve quality would not bestow a clear competitive advantage as it would also need to be shared with (retail) rivals that are on their wholesale network. This is particularly true if no quality differentiation is allowed between the network's own retail offering and those of rivals on their network, or if the lead time for sharing new capabilities is limited.

Impact of license durations

The durations of spectrum licenses¹⁰⁷ may similarly impact investment incentives. In general, more certainty over costs and spectrum availability could improve the investment case for newer technologies such as 5G where demand is still developing. This is because if there is a risk that demand develops later than expected and/or there is significant uncertainty about costs in future (e.g. because spectrum may be re-auctioned if license lengths are short), operators may prefer a “wait and see” approach until demand is more certain and expected revenues clearer.

Longer-term spectrum licenses would therefore provide more certainty over long-term decision-making. Complementary mechanisms such as spectrum trading¹⁰⁸ could then provide additional flexibility to operators to either increase their holdings or scale back as needed. Spectrum trading could reduce fragmentation and ensure more efficient use of spectrum – as seen in the United Kingdom.¹⁰⁹ Longer spectrum licenses and spectrum trading may also remove the uncertainties related to payments for spectrum at re-auction.

Furthermore, regulatory predictability should be provided over tendering timelines and procedure so as to provide operators with more certainty – again to the potential benefit of long-term investment. Member States could, for example, ensure that forward-looking plans on possible future allocations of additional spectrum are issued reasonably in advance, maximising the time operators have to plan their investment decisions.

Finally, with regard to procedures for renewing licenses, Member States could consider the merits of extending existing licenses and imposing recurring fees (set conservatively so as to maximising the incentive to invest, see next section) rather than re-auctioning.

¹⁰⁷ The EECC refers to ‘general authorisations’ when discussing individuals rights of use of spectrum by the relevant undertaking. For ease of language, we refer to these ‘general authorisations’ as licenses throughout the remainder of this section.

¹⁰⁸ The EECC provides grounds for introducing spectrum trading or other market-based mechanisms. Article 51 directs Member States to facilitate the transfer or lease of spectrum rights between operators, subject to consideration of any factors that may distort competition and the treatment of spectrum conditions.

¹⁰⁹ Press Release, O2 (2021). O2 & Vodafone customers set to receive 5G boost as companies announce deal to optimise spectrum bands, dated 27 April 2021. See <https://news.o2.co.uk/press-release/o2-vodafone-customers-set-to-receive-5g-boost-as-companies-announce-deal-to-optimise-spectrum-bands/>

3.2.2 Spectrum pricing

The intended goal of spectrum pricing is to promote the efficient use of spectrum. The EECC is clear in providing competent authorities the grounds to impose fees for the rights of use of spectrum, with the purpose of enabling the efficient assignment and use of spectrum.¹¹⁰ Fees should therefore be “justified, transparent, non-discriminatory and proportionate in relation to their intended purpose”.¹¹¹

Spectrum prices must be set carefully as they have an impact on the incentive to invest. While spectrum prices tend to be considered a sunk cost for MNOs, in the long-run, spectrum fees are not necessarily sunk. For instance, there are annual payments for retaining spectrum and operators will take these into account when considering whether to renew a spectrum license.

Thus, spectrum pricing can have an impact on the incentive to invest in new technologies such as 5G. For example, the higher the spectrum reserve prices are, the more they add to the overall cost of rollout, the more they could impact investment. This is because high spectrum reserve prices increase operators’ average costs (relative to a scenario in which spectrum prices are lower), impacting their incentive to invest and make a return on investment in the long-run. Some operators may then choose not to acquire spectrum or acquire less spectrum and/or roll out to a smaller area..

We consider below the two principal ways in which spectrum prices can be set.

- “Endogenous” pricing, where the price is set via bids in an auction; and
- “Exogenous” pricing, where the NRA effectively sets the price either through reserve prices or annual license fees.

One can affect the other: for instance, the exogenous reserve price will influence the endogenously determined final auction price. However, for clarity, we consider them in turn.

Endogenous pricing – pricing outcomes at auctions

The design of an auction can have an impact on prices paid by operators. For instance, as discussed in previous sections, setting low spectrum caps can create artificial scarcity which can subsequently push up spectrum prices.

Similarly, if auction rules are designed such that strategic bidding can take place, this can also artificially inflate the prices paid by operators.

Finally, administrative fees and onerous payment terms can also create an additional cost burden which may negatively affect marginal investment cases.

Thus, auction rules should be designed so as to ensure that prices are not artificially inflated, and administrative fees and payment terms should also be kept reasonable to minimise the burden on operators.

¹¹⁰ See EECC, Article 42.

¹¹¹ Ibid, para. 1.

Exogenous pricing – reserve prices/recurring license fees

The level of reserve prices at auctions or recurring license fees can also influence investment. For instance, if reserve prices or license fees are set above MNO's valuations, some or all of the spectrum may go unsold and no investment will take place.

There are a number of ways in which prices may be set too high.

- First, authorities can face difficulties in estimating the market value of spectrum and the resulting uncertainty can lead to the incorrect pricing of spectrum, whether as a reserve price in auction or when setting recurring fees.
- Second, NRAs or ministries responsible for spectrum allocation may face pressure to maximise government revenues.

In order to promote VHCN investment, a conservative approach could be adopted when setting these prices, in particular by ensuring that spectrum prices are set towards the lower end of a potential range of estimated market values. And reserve prices should be set primarily to avoid “fanciful” bids, rather than as a means to maximise government revenue.

3.2.3 Recommendations

Recommendation 14

In line with Article 52 of the EEC, interventions to influence spectrum assignments (such as spectrum reservations or spectrum caps) should be proportionate, and carried out only after a detailed market assessment (e.g. a quantitative cost-benefit analysis) to test the potential impact of the intervention on short-term outcomes as well as longer-term investment incentives.

Recommendation 15

Spectrum payments should be set conservatively; in particular, reserve prices or spectrum license fees should be set towards the lower end of a potential range of market values given the risks from setting incorrect prices. Auction rules should be designed to avoid artificially inflating prices.

Recommendation 16

Regulatory certainty should be provided to operators, either by way of longer licenses or through clarity on forward-looking plans and mechanisms for possible future allocations of additional spectrum.

3.3 Infrastructure sharing policy

3.3.1 Network sharing agreements (NSAs) can facilitate efficient network deployment

Network sharing, where two or more operators make mutual contributions to share network resources,¹¹² is an important way to increase network efficiency as well

¹¹² This is distinct from wholesale access agreements where one party makes use of the host's network, without contributing network resources of their own, in return for a wholesale access charge.

as reduce the cost of deployment. This has important implications for enabling the business case for rollout, and has been used by operators when rolling out previous generations of mobile technology.

The cost savings that NSAs provide are of particular importance to 5G due to the magnitude of required investment in radio access and transmission networks.¹¹³

Thus, NSAs could help manage these costs and improve efficiency. Studies estimate the capex/opex savings realised through various levels of active¹¹⁴ 5G RAN sharing agreements to be as high as 40%.¹¹⁵ A significant share of these savings arise through more efficient site deployment, the costs of which can be reduced by up to 50% if three operators share the same network.¹¹⁶ Backhaul and core sharing are estimated to unlock additional savings of up to 20% and 30% respectively.¹¹⁷

The magnitude of these potential cost savings suggests that sharing agreements may incentivise increased investment in 5G deployment by operators.

3.3.2 Clarity on the approach to NSA-assessment alongside a 5G focus should benefit 5G investment

There are three key bodies that can influence the ability to strike NSAs:

- the National Regulatory Authority (NRA) of the country where the NSA applies;
- the National Competition Authority (NCA) of the country where the NSA applies; and/or
- the EC.

NSAs should be encouraged to facilitate the deployment of VHCN, such as in the latest communication by the EC *“To increase the cost-effectiveness of their network roll-out, the Commission encourages private operators to cooperate in so called “network sharing”, whilst ensuring that this is done without unduly reducing competition in each specific case.*¹¹⁸ If there is uncertainty on the part of operators as to how compatible NSAs are with current European competition policy, there can be a risk that:

- operators otherwise interested in reaching an NSA fail to do so for fear of contravening competition policy; or

¹¹³ For instance, expensive massive multiple-input multiple-output (MIMO) equipment will need to be installed at certain 5G sites; and fibre optic backhaul will be required for the majority of sites to support data throughput and capacity requirements of 5G. Arthur D Little (2020) – Network sharing in the 5G era: Choosing the right sharing model to maximize efficiency of 5G rollout, pg. 5. See: https://www.adlittle.com/sites/default/files/reports/adl_network_sharing_5g_era.pdf

¹¹⁴ Active sharing involves the sharing of active elements of the network such as antennas and base stations.

¹¹⁵ Nokia (2021) – Network Sharing in the 5G Era White Paper, pg. 4. See https://onestore.nokia.com/asset/210559?_ga=2.207497680.2144994408.1642590857-1961802481.1630948916

¹¹⁶ McKinsey (2018) – Network sharing and 5G: A turning point for lone riders. See <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/network-sharing-and-5g-a-turning-point-for-lone-riders>

¹¹⁷ Nokia (2021) – Network Sharing in the 5G Era White Paper, pg. 3. See https://onestore.nokia.com/asset/210559?_ga=2.207497680.2144994408.1642590857-1961802481.1630948916

¹¹⁸ A competition policy fit for new challenges, European Commission, 18.11.21, See <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=COM:2021:713:REV1>

- operators may reach an NSA that is significantly pared back to limit potential antitrust concerns, and so does not realise the full extent of possible efficiencies from the agreement.

As we discuss below, the precedent on network sharing agreements suggests that there could be further clarity on the following:

- which types of agreement will receive scrutiny in light of new technical developments; and
- how any particular deal will be scrutinised, in particular how the balance of the overall effects of a deal will be assessed.

This should help ensure efficient rollout of 5G networks.

Clarity on *whether* an NSA will be scrutinised in light of new technical developments

It will be important for operators considering a 5G NSA to know the characteristics of an NSA that may raise concerns from relevant authorities – this should allow for NSAs to be designed in such a way that they will not fall foul of competition policy. Given the nascency of 5G and its specific network architecture, the information operators have from the treatment of recent agreements on older mobile technologies are not necessarily relevant precedent.¹¹⁹

Moreover, the fact that 5G network architecture may allow for higher virtualisation needs to be factored into an assessment as it has two implications:

- Sharing of hardware may be possible while maintaining distinct software. This would allow operators to retain the ability to differentiate and compete on quality, including in instances where an NSA involves two closer competitors and/or is national in coverage.¹²⁰
- Virtualisation may also allow for common network slices to be tailored to specific services or use cases, providing further means of operator differentiation.¹²¹ In this case, NSAs may not hold back innovation, with operators retaining the ability to differentiate their product and/or service offerings.

Thus, clarity on where the boundary for acceptable NSAs lies in a 5G world would help ensure that networks are rolled out efficiently.

Clarity on *how* an NSA will be scrutinised in balancing the overall effects

A clearer framework could be put in place for assessing the potential costs and benefits of agreements. For instance, authorities have typically assessed the impact of NSAs on competition across dimensions such as market concentration

¹¹⁹ For instance, the EC's Statement of Objections against the network sharing agreement between O2 CZ/CETIN and T-Mobile CZ concerning 2G/3G/4G technologies acknowledged that its assessment under the framework of Article 101 "is without any prejudice to future assessment of network agreements involving emerging technologies such as 5G, which may have very different characteristics". Press Release, European Commission (2019). Antitrust: Commission sends Statement of Objections to O2 CZ, CETIN and T-Mobile CZ for their network sharing agreement, dated 7 August 2019.

¹²⁰ BEREC (2020) – Summary Report on the Outcomes of Mobile Infrastructure Sharing Workshop, pg. 13.

¹²¹ BEREC (2019) – Common Position on Mobile Infrastructure Sharing, pg. 13.

and the level of coverage (e.g. national vs. sub-national), examining potential reductions in differentiation and price pressure. However, such concerns should be considered within the context of 5G, particularly given the potential for 5G to allow for greater differentiation and innovation by operators as discussed previously.

In addition to this, the potential benefits of NSAs should also be considered in a more holistic fashion, particularly as the benefits of 5G may be further-reaching than those of previous technologies:

- Direct benefits of network sharing such as faster rollout, cost savings and coverage in rural areas should be considered at the very least, as previously noted by the EC.¹²²
- Furthermore, wider benefits and positive externalities from faster 5G rollout (if this is an outcome of the NSA) should also be considered.

It will therefore be important to ensure that authorities' review of future NSAs involves a comprehensive economic assessment of the potential outcomes of an agreement – one in which the scope of consideration for potential costs and benefits in a 5G world is expanded.

3.3.3 Recommendations

Recommendation 17

Further clarity could be provided on how NSAs subject to investigation will be assessed. In particular, the assessment of future NSAs focussed on 5G may require a more detailed economic analysis that accounts for the wider benefits and positive externalities these agreements could unlock. This analysis should also consider the possibility that NSAs over 5G could continue to encourage competition between – and innovation by – operators.

3.4 Merger control

3.4.1 The Commission's current approach can focus disproportionately on short-term effects

The policies most relevant to mergers are the EC's horizontal and non-horizontal merger guidelines. In the mobile context, the more contentious merger decisions have tended to be horizontal mobile mergers as these markets are usually oligopolistic; mergers within such markets tend to have the greatest impact on competition, and so, prices and/or investment/non-price outcomes. We therefore focus on horizontal mergers for the remainder of this section.

The EC's horizontal merger guidelines provide a framework for assessing the possible impediments to effective competition from a merger.¹²³ Using this framework, the EC's assessment of horizontal mergers will usually entail a

¹²² Press Release, European Commission (2019). Antitrust: Commission sends Statement of Objections to O2 CZ, CETIN and T-Mobile CZ for their network sharing agreement, dated 7 August 2019.

¹²³ European Commission (2004) – Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, para. 2. See [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52004XC0205\(02\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52004XC0205(02)&from=EN)

definition of the relevant product and geographic market(s), and a competitive assessment of the merger.¹²⁴

In addition, the EC's merger decisions provide more insight into the application of this framework to mobile mergers specifically. Based on a review of recent EC mobile merger decisions in Europe (see Annex B for further details), it appears that the EC has tended to place more weight in its assessment of mobile mergers on the short-term price effects of the merger, relative to the longer-term effects of consolidation on efficiencies or investment.¹²⁵ In particular:

- Prices appear to be considered the main determinant of consumer welfare outcomes and “upwards pricing pressure” (UPP) or a “gross upward pricing pressure index” (GUPPI) tests are considered to provide an accurate estimate of the price effects of a merger.¹²⁶
- In contrast, efficiencies and other dynamic impacts of mergers are difficult to quantify and the burden of proof on merging parties to evidence these is high: in only 2 of the 5 decisions summarised in Annex B did the EC find that some of the efficiencies claimed by parties fulfilled the criteria defined in its horizontal merger guidelines.

This short-term price focus can be problematic for two reasons.

- First, UPPs/GUPPIs are not accurate measures of post-merger price increases. They capture only the incentive of merging parties to raise prices under a static model of competition i.e. ignoring the long-term responses of both the merging parties and their competitors.
- Second, dynamic efficiencies can play a larger role in determining long-term prices in mobile markets than in many other industries. Technology cycles in mobile markets typically last 8 to 10 years, leading mobile operators to invest in superior technologies that provide opportunities for cost reductions (as well as general improvements in service provision and QoS).¹²⁷ The dynamic efficiencies that technology upgrades enable can then help drive down prices in the longer term – and are therefore a key determinant of consumer outcomes.¹²⁸
- Third, it ignores other benefits the merger may create, beyond price effects.

¹²⁴ Ibid, para. 10.

¹²⁵ See also GSMA (2015) – Assessing the case for in-country mobile consolidation, https://www.gsma.com/publicpolicy/wp-content/uploads/2015/05/Assessing_the_case_for_in-country_mobile_consolidation.pdf

¹²⁶ Intuitively, a UPP or GUPPI analysis tries to capture the incentive for merging parties to raise prices given that, in the event of a price rise by one of the merging parties, a portion of the diverted sales are recaptured by the other merging party.

¹²⁷ Ibid.

¹²⁸ Ibid. Focusing on the period 2004-2014, GSMA find that MNO investment in new technologies as a result of technology cycles in mobile markets is likely to have produced dynamic efficiencies leading to reductions in unit costs (by as much as much as a factor of 5) across European countries between cycles.

3.4.2 The General Court's decision may indicate a change in approach to future merger assessments

There may be scope for this approach to change given the General Court's (GC) recent annulment of the EC decision to block the proposed merger between Three and O2 in the United Kingdom.

Amongst the issues addressed in the GC's annulment is the EC's quantitative analysis of the likely price effects of the merger using a UPP analysis. The GC acknowledges that a pricing analysis of this kind is suitable for use in the competitive assessment of a merger, but emphasises that "it must take into account all the relevant factors which may affect the price level".¹²⁹ This includes considering efficiencies that "may lead the merged entity to lower its prices"¹³⁰ and the medium-term responses of competitors that "force the merged entity to lower its prices".¹³¹

With regards to efficiencies specifically, the GC notes that "any concentration will lead to efficiencies" as a result of the opportunities it presents for rationalisation, integration and the reduction (or elimination) of duplicate costs.¹³² As a result, the quantitative methods used to establish whether a merger is capable of producing adverse effects on competition (prior to the overall competitive appraisal of a merger) are expected to include a set of general efficiencies.¹³³ These efficiencies are therefore a relevant component of any quantitative model used to establish whether a merger is capable of producing adverse effects in the first instance.¹³⁴

The GC's annulment could therefore require the EC in the future to carry out a fuller assessment of the potential effects of a merger.¹³⁵

3.4.3 Consolidation could also enhance the incentive to invest

As discussed previously, 5G rollout is expected to be highly costly, and MNOs may be hesitant to roll out given demand-side uncertainty. As investment in 5G represents a significant fixed cost scale can help operators to reduce the average cost of this investment. More specifically:

- merging parties may be able to reduce the overall cost of network deployment by reducing the duplication of fixed costs; and
- an increase in spectrum or the creation of a better network grid through a rationalisation of existing network infrastructure may help reduce incremental costs.

Finally, consolidation could also reduce risk, thereby leading to faster and more widespread deployment.

¹²⁹ Judgement of the General Court in Case T-399/16 of CK Telecoms UK vs. European Commission (2020), para. 275.

¹³⁰ Ibid, para. 277.

¹³¹ Ibid, para. 276.

¹³² Ibid, para. 277.

¹³³ Ibid, paras. 277-278.

¹³⁴ Ibid, para. 279.

¹³⁵ Ibid, para. 118.

3.4.4 Recommendations

Recommendation 18

Long-term dynamic efficiencies should be given due consideration in the assessment of mobile mergers, balancing them with the impact of consolidation on short-term prices. This implies properly accounting for longer-term efficiencies as well as reduction in the reliance on simple UPPs/GUPPIs analysis as a sole test of potential short-term effects.

3.5 Consumer protection policy

3.5.1 Future policy must consider the trade-off between short-term “static” benefits and long-term “dynamic” efficiencies

Effective consumer protection policies can help ensure that consumers’ rights are guaranteed, the interests of vulnerable customers protected, and consumers provided with clearer information to improve market outcomes.¹³⁶

Policy tools underpinning consumer protection policy in recent years have included, among others, a cap on wholesale maximum roaming tariffs,¹³⁷ a cap on single mobile and fixed termination rates in the EU¹³⁸ and price caps on intra-EU calls¹³⁹.

Consumer protection policies, in general, can offer potential short-term benefits to consumers. For example, intra-EU call caps limit the call prices consumers face when calling outside their home market.

However, such measures also create a trade-off – while prices may be lower in the short-term, there can be a significant impact on the revenues and returns of operators in the long-term. And, this effect can be exacerbated if policies are applied in conjunction. For instance, the effects of the intra-EU call caps have been made more severe by the fact that the introduction of call caps have followed the introduction of “roam like at home” (RLAH) rules that ended retail roaming charges in the European Union.¹⁴⁰

Reductions in revenue as a result of such policies can reduce incentives to invest in future VHCN for two reasons:

¹³⁶ See, for example, European Parliament Fact Sheets on the European Union – Consumer policy: principles and instruments. See <https://www.europarl.europa.eu/factsheets/en/sheet/46/consumer-policy-principles-and-instruments>

¹³⁷ Under this policy, wholesale roaming tariffs charged by one operator for the use of its network by another operator are capped at a maximum rate of 3.2c per minute of voice calls (as of 2017), 1c per SMS (as of 2017) and €3 per GB of data (as of 2021). More information on the policy can be found at https://ec.europa.eu/commission/presscorner/detail/en/IP_17_193

¹³⁸ Under this policy, maximum termination rates that operators are allowed to charge each other for termination services are fixed at a single, EU-wide maximum rate of 0.2c per minute for mobile and 0.7c for fixed calls. Maximum rates will be achieved gradually by 2024, facilitated by a three-year implementation plan. More information on the policy can be found at <https://digital-strategy.ec.europa.eu/en/news/eu-wide-voice-call-termination-rates-become-applicable-today>

¹³⁹ Press Release, European Commission (2019). Digital Single Market: Cheaper calls to other EU countries as of 15 May, dated 13 May 2019. See: https://ec.europa.eu/commission/presscorner/detail/en/IP_19_2429

¹⁴⁰ Under these rules, end-customers of an MNO are able to access mobile services (voice, SMS or data) from another MNO at no extra cost as they travel periodically in the EU/EEA, subject to operators’ fair use policies.

- First, there may be an impact on the ability of operators to invest.
- Second, it creates a risk that any returns earned in future through the provision of 5G and fibre services are expropriated through similar regulatory interventions.

As a result, longer-term consequences of consumer protection policies must also be considered when deciding on its introduction.

3.5.2 Recommendations

Recommendation 19

Future regulation with a focus on consumer protection must balance the short-term benefits to consumers with the longer-term consequences of regulation on operator revenues and investment incentives.

3.6 Machine-to-machine (M2M) and Internet of Things (IoT) connectivity

3.6.1 Regulation should be imposed only if there is a market failure

For VHCN investment to be viable, it will be important to have a profitable market for all of 5G's use cases – this includes M2M and IoT services.

The M2M/IoT connectivity market consists of a large number of industries/verticals, each of which can comprise a number of use cases. The markets are competitive and growing – there are several providers of IoT connectivity including MNOs, specialist MVNOs and resellers, based both within the EU and outside. Moreover, cellular operators compete with other technologies, such as Sigfox and LoRaWAN, for Low Power Wide Area use cases, and with WiFi, Bluetooth or other IoT protocols for short-range use cases.

Given that there is competition in these markets, policy/regulatory intervention should only be made if there is evidence of a market failure. To this end, for instance, there may be scope to limit/alter regulation in the following ways.

- First, it will be important to ensure that there is a level playing field between providers of M2M/IoT connectivity. Under the EECC, NRAs may be directed to regulate some providers of IoT services differently to others. For example, the EECC references the provision of IoT services through numbering-based technology only and does not discuss other technology options such as addresses.¹⁴¹ This risks placing a greater regulatory burden on some providers of connectivity. This can reduce the incentive/ability to invest if the regulatory burden is higher on telecoms providers compared to others. To best promote the provision of M2M/IoT connectivity, there should be a level playing field across different technology options.
- Second, given the reliance of M2M/IoT devices and applications on roaming in order to function, roaming policy is another area that may impact the viability or

¹⁴¹ See EECC, Recital 250.

success of the M2M/IoT connectivity market. As discussed above, if there is no evidence of market failure, the EC's Roaming Regulation¹⁴² should aim to exclude M2M/IoT roaming from its scope.

- Finally, at present, the EECC applies to providers of (among other things) interpersonal communication service ("ICS"), but the definition of ICS excludes devices/services where the interpersonal communication element of the service is "a minor ancillary feature that is intrinsically linked to another service".¹⁴³ This may create ambiguity for M2M/IoT services, particularly those that offer some limited interpersonal communication functionality. If there is no market failure, removing regulation could help incentivise investment.

3.6.2 Recommendations

Recommendation 20

Regulatory intervention in the M2M/IoT market should be predicated on the finding of a market failure.

In the absence of this, regulation should be avoided – for example by fostering a level playing field between providers of M2M/IoT connectivity using different technological solutions, excluding M2M/IoT roaming from the scope of the EC's Roaming Regulations and also excluding M2M applications from the scope of regulation on the grounds that they contain some degree of interpersonal communication functionality.

¹⁴² See Regulation (EU) No 531/2012 (Roaming Regulation).

¹⁴³ See EECC, Article 2 para. 5.

4 HORIZONTAL POLICIES THAT AFFECT TELECOMMUNICATIONS MARKETS

The EC implements horizontal policies that aim to improve the lives of citizens and consumers across the European Member States. These policies include macroeconomic policies, consumer protection, policies that affect digital services (data, security and privacy) and policies on employment, environment, research and innovation, among others. By definition all these policies can affect the telecoms sector, as they apply horizontally across all sectors.

Telecommunications operators can play a crucial role to support the EC in implementing these policies and achieving their objectives. This is because there are clear social and economic externalities to investing in VHCN infrastructure.

- VHCN networks can support climate and green objectives as they are more efficient than legacy networks and are a key enabler of other carbon reducing technologies.
- Investment in VHCN is part of a wider data and information ecosystem that data security policies support.
- VHCN can support the growth in demand and innovation of online services and applications (e.g. OTT services).
- VHCN can increase general productivity thereby leading to better economic performance in the form of higher wages and lower unemployment.

Given the central role that telecommunications networks have in the economy it is essential that policy makers fully understand the inter-related linkages between objectives around telecommunications networks and other horizontal policies. To illustrate the interplay between horizontal policies and investment in VHCN, we consider three specific areas: green initiatives, security policies, and policies aimed at digital service and application providers. It should be noted that the purpose of this section is not to exhaustively articulate every linkage between horizontal policies and the telecommunications sector. Rather, it highlights the need to be aware of the impact of these horizontal policies on investment incentives and ensure that horizontal policies across multiple sectors are coherent and supportive of investment in VHCN services.

This section is structured as follows:

- Section 4.1 considers green policies
- Section 4.2 considers data security policies
- Section 4.3 considers policies relating to the operation of OTT

4.1 Green policies

Climate change and environmental degradation is a well-recognised issue for European Member States and the rest of the world. The EC has proposed a set of

actions under the European Green Deal¹⁴⁴ which includes the objective to reduce carbon emissions by at least 55% by 2030 (compared with 1990 levels) and to achieve carbon neutrality by 2050. To support these objectives, the EC has proposed various tools such as the EU taxonomy for sustainable activities¹⁴⁵ and European green bond standard¹⁴⁶.

4.1.1 Telecommunications networks are important enablers of climate goals

VHCN services are an important “contributor” to these sustainability targets and an important “enabler” of other carbon reducing technologies and/or habits that can further contribute to these climate policies.¹⁴⁷

Fixed VHCN (FTTP) is a more sustainable technology than legacy copper based technologies (in terms of energy consumption and carbon emissions).¹⁴⁸ It is also more reliable than legacy copper networks which means that energy usage can be further reduced due to a decrease in the frequency of maintenance and repairs.¹⁴⁹ Furthermore, FTTP is expected to “enable” other carbon reducing habits (such as remote working which reduces commuter travel)^{150 151} and technologies (such as cloud computing which is expected to reduce emissions due to greater efficiencies in aggregating computing resources).¹⁵²

Mobile VHCN (5G) is designed to be more energy efficient than previous generations and this is mainly achieved through low-power antennas and efficient transmission technologies.^{153 154} Furthermore, 5G is a crucial “enabler” of new carbon reducing technologies such as smart energy grids (where 5G can be used to monitor and improve energy distribution efficiency), electric vehicles (where 5G can be used to facilitate charging points and route optimisation) and manufacturing

¹⁴⁴ See https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en

¹⁴⁵ The EU taxonomy is a classification system that provides companies and policy makers with appropriate definitions for sustainable activities. See https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

¹⁴⁶ The European green bond standard aims to create a uniform standard that will set out how companies and public authorities can use green bonds to raise funds to finance sustainable investments. See https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/european-green-bond-standard_en

¹⁴⁷ It should be noted that the discussion here relates to the overall net impact of VHCN over a long time period. VHCN will generate positive environmental contributions but the deployment of VHCN (e.g. digging trenches) will lead to carbon emissions in the short run. See http://www.investors.ftthcouncil.eu/documents/Publications/Primer_UpdateMay2014_FINAL.pdf

¹⁴⁸ Telefonica notes that fibre is 85% more energy efficient than copper. See [telefonica.com/en/web/responsible-business/environment/energy-and-climate-change-2](https://www.telefonica.com/en/web/responsible-business/environment/energy-and-climate-change-2)

¹⁴⁹ See <https://www.ftthcouncil.eu/policy/our-positions-on-policy-regulation/contribution-of-fibre-to-sustainability>

¹⁵⁰ A recent report by Centre for Economics and Business Research (CEBR) estimated that full fibre in the UK can reduce 300 million commuter trips and reduce emissions by 360,000 tonnes. See <https://www.openreach.com/content/dam/openreach/openreach-dam-files/images/hidden-pages/full-fibre-impact/Openreach%20Cebr%20Report%202021.pdf>.

¹⁵¹ Another report noted that studies on that quantify energy emission of telework remains relative sparse but the majority indicate that telework is beneficial (i.e. negative net emissions). See O'Brien and Aliabadi (2020) Does telecommuting save energy? A critical review of quantitative studies and their research methods.

¹⁵² See <https://www.idc.com/getdoc.jsp?containerId=US47426420>

¹⁵³ See <https://digital-strategy.ec.europa.eu/en/policies/5g-qa>

¹⁵⁴ Telefonica also notes that 5G is 90% more energy efficient than 4G. See [telefonica.com/en/web/responsible-business/environment/energy-and-climate-change-2](https://www.telefonica.com/en/web/responsible-business/environment/energy-and-climate-change-2)

systems (where 5G can be used to support efficient inventory and stock management).^{155 156}

The environmental benefits of VHCN are explicitly recognised by the EC within the Digital Compass¹⁵⁷ as it states: “*Digital technologies are a critical enabler for attaining the sustainability goals of the Green deal in many different sectors. The Commission will explore measures to ensure that digital technologies such as **artificial intelligence, 5G, cloud and edge computing and the internet of things** can accelerate and maximise the impact of policies to deal with climate change and protect the environment*” [emphasis added].

4.1.2 Telecommunications operators support green initiatives

Telecommunications operators understand the role they play in supporting Europe’s green targets. By illustration many telecoms operators are active members of the European Green Digital Coalition (EGDC). The member organisations of this group commit time and resources with the aim of maximising the sustainability benefits of digitalisation. The group aims to (i) invest in developing green digital solutions; (ii) develop tools to measure net impact of green technologies; and (iii) co-creating recommendations and guidelines for digital transformation that benefits environment, society and economy. Members have to also commit to reduce carbon emissions and pledge to become climate neutral or carbon net zero no later than 2040.¹⁵⁸

4.1.3 Policy makers should transparently set out linkages between green objectives and telecommunications objectives

There are a number of climate related policies that particularly affect the telecommunications sector. These include the following.

- **Circular economy action plan (CEAP)** was adopted as a key pillar of the Green Deal. The plan contained a number of initiatives to make sustainable products the norm in the EU, by empowering consumers to contribute to sustainable choices, e.g. by developing methodologies for reliable information related to sustainability (Green Claims) that could be provided at the point of sale, e.g. of mobile phones and tablets. The scope of information should be more broader by including durability, life span and repairability. Misleading practices such as greenwashing and early obsolescence should be prohibited. The initiatives prevent waste and encourage sustainability. For telecom operators, a key action area relates to waste associated with network infrastructure, with the excavation of soil, stone and gravel arising during

¹⁵⁵ See https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA_Enablement_Effect.pdf

¹⁵⁶ Another report from O2 suggested that the 5G deployment could save the UK up to 269 megatonnes of CO2 by 2035. See <https://www.itpro.co.uk/mobile/5g/356745/5g-to-help-cut-269-megatonnes-of-co2-emissions-claims-o2>

¹⁵⁷ See https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

¹⁵⁸ See <https://digital-strategy.ec.europa.eu/en/policies/european-green-digital-coalition>. Membership includes numerous telecommunications operators such as Deutsche Telekom, Liberty Global, Orange, Proximus, TDC, Telefonica, Telekom Austria, Telenor, Telia, Vodafone and others.

construction of networks as well as retired infrastructure (i.e. legacy copper networks) containing valuable materials.¹⁵⁹ This plan may also support the “right to repair” of mobile handsets by setting technical standards to ensure that there are sufficient changeable and repairable parts.

- **Transparency measures on networks** include regulations which require enhanced transparency requirements regarding the characteristics of products and services (e.g. required specific sustainability certifications, Eco standard definitions of the product). These policies can particularly affect European telecommunication operators. For instance **the EU Ecolabel** is awarded to products and services meeting high environmental standards throughout their life-cycle: from raw material extraction, to production, distribution and disposal.¹⁶⁰ Similarly some countries like France have introduced a mandatory “repairability” index which provides information to consumers on the lifespan, documentation, availability and price of spare parts¹⁶¹.

These policies have the potential to affect outcomes in the telecommunications sector. Therefore, while it is clearly the responsibility of policy makers to set policy goals in the first instance, to the extent possible, policy makers should look to the sector to offer solutions which meet these objectives whilst also minimising the risk of ‘unintended consequences’ by affecting VHCN investment incentives. Such sector led solutions that meet the policy objectives would be expected to be less risky and more likely to succeed as they have sector buy-in and are designed by those who intimately understand the costs, risks and trade-offs involved. This could also help ensure policies are appropriately targeted, see ANNEX B.

Policy makers will better be able to meet their climate goals where their decisions on how proposals get implemented in the telecommunications sector are based on impact assessments that consider how proposed policies support overall climate goals taking into account any ‘unintended consequences’ of proposals that could have a potentially negative impact on VHCN which could *delay the achievement* of climate objectives. It is only by making these trade-offs explicit, that policy makers, industry and European citizens can consider the most appropriate policy solutions to meet climate goals.

4.1.4 The green agenda should be considered within any assessment of mergers and network sharing agreements

While it is well known that the telecommunications sector is a key enabler of green agenda, competition authorities may have some scope to consider how mergers or network sharing agreements contribute to the green agenda. The EU Merger Regulation for example does not specifically address sustainability: simply, mergers which result in a significant impediment to effective competition under the significant impediment to effective competition (“SIEC”) test face prohibition or the imposition of remedies.

¹⁵⁹ See https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en

¹⁶⁰ See <https://ec.europa.eu/environment/ecolabel/>

¹⁶¹ See: <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000042837821#JORFTEXT000042837821>
<https://www.bbc.com/future/article/20210128-right-to-repair-how-the-french-are-fighting-avoidable-waste>

The EC has been actively considering whether EU merger control rules and or Article 101 need to be updated or clarified to take account of environmental considerations¹⁶². Some National Competition Authorities are also considering the issue¹⁶³.

Furthermore, there are some examples where environmental concerns have played a role in assessing the positive and negative impacts of a merger. Two such recent decisions are Novelis/Aleris¹⁶⁴ and Aurubis/Metallo¹⁶⁵. In Novelis/Aleris, the EC considered sustainability as part of its product market definition and remedy consideration. In Aurubis/Metallo, the EC decided to investigate this merger due to a concern that the deal might reduce incentives for recyclers to collect and sort copper scrap among other concerns.

Therefore, following the EC's consultation:

- the EC could provide more guidance on how environmental benefits could be considered within merger and network sharing agreements (as part of the competition impact assessment or the consideration of different forms of remedies).¹⁶⁶ These could attempt to quantify the green agenda benefits resulting from the merger or agreement, and apply a similar framework to the assessment of efficiencies in the merger assessment. In this case the inclusion of climate benefits in a merger assessment may make otherwise marginal merger or Article 101 decisions more appropriate for approval.
- The EC should ensure that a common approach across Europe and avoid the risk of inconsistent approaches taken to mergers in different Member States.

4.1.5 Recommendations

Recommendation 21

It is important that telecommunications operators are consulted during the design of green policies relevant for the sector to ensure that such policies do not have 'unintended consequences' through impacting unnecessarily and adversely VHCN deployment. Such policies should also be supported where appropriate by transparent impact assessments that consider how the policy inter-relates with climate related objectives, taking into account the positive impact of VHCN deployment on green objectives. Where possible policy solutions designed and proposed by industry are likely to achieve the green policy objectives more effectively, as these are more likely to have sector buy in.

Recommendation 22

Telecommunications networks are dependent on other downstream and upstream market players. Obligations which are imposed on telecommunications operators in relation to the actions of their upstream suppliers or downstream buyers should

¹⁶² <https://op.europa.eu/en/publication-detail/-/publication/63c4944f-1698-11ec-b4fe-01aa75ed71a1/language-en/format-PDF>

¹⁶³ <https://www.acm.nl/en/publications/guidelines-sustainability-agreements-are-ready-further-european-coordination>

¹⁶⁴ Commission Decision of 1 October 2019, Novelis/Aleris, COMP/M.9076

¹⁶⁵ Commission Decision of 4 May 2020, Aurubis/Metallo, COMP/M.9409

¹⁶⁶ See <https://www.linklaters.com/en/insights/blogs/linkingcompetition/2020/esg/competition-and-sustainability/fostering-green-deals-via-merger-control-policy>

be carefully designed to ensure that they are targeted and proportionate and reflect the actual degree of influence that operators can exert over their upstream suppliers or downstream buyers.

Recommendation 23

The EC should publish guidance on how environmental benefits will be considered within merger and network sharing agreements (as part of the competition impact assessment or the consideration of different forms of remedies).

4.2 Data security policies

Policies to support data security are clearly important for all EU citizens. This section will discuss the implications of these policies to support an open and vibrant vendor ecosystem which will support investment in VHCN.

4.2.1 Ensuring supply of safe and secure network equipment and reliant supply chains

The EC has set out guidelines on how to approach the risks of data security and cyber security in relation to 5G networks.¹⁶⁷ The guidelines set out a number of potential risks associated with the roll out of 5G networks due to increased exposure to attacks facilitated by equipment suppliers and major dependencies on certain suppliers. These policies will impact the whole digital supply chain (and beyond) but will have a particular impact on the telecommunications sector.

Assessing and responding to data security and cyber security threats are clearly important policy areas given the role that digital infrastructure plays across in all our lives. However, it is important to ensure that policy responses are properly calibrated, targeted and proportionate, as well as able to increase the level of security. Taking into account that security is of major importance, the cost to implement security protection policies should be considered, taking into account the uncertain consumers' willingness to pay for them.

European countries have taken diverse approaches to the challenge of data security. For example, some Scandinavian and Eastern European countries have effectively signalled that they will ban certain suppliers in response to their assessment of the risks. Other countries, such as Germany, link the risk assessment of manufacturers to a technical certification of the critical components they use. In contrast to a general ex-ante exclusion of certain manufacturers, the technological integrity of the components used and a guarantee declaration form the basis of an operating permission. This results in a more fact-oriented approach that places security aspects in the focus of assessment. Some countries have signalled that bans may be implemented in the future (for example France's cyber security agency ANSSI said it would permit operators to use Chinese suppliers' equipment under licence for three to eight years¹⁶⁸). Other countries such as

¹⁶⁷ Report on EU coordinated risk assessment of 5G. See https://ec.europa.eu/commission/presscorner/detail/en/IP_19_6049

¹⁶⁸ See <https://www.reuters.com/article/us-france-huawei-5g-security-exclusive/exclusive-french-limits-on-huawei-5g-equipment-amount-to-de-facto-ban-by-2028-idUKKCN24N26R?edition-redirect=uk>

Portugal, Luxembourg, Austria and the Netherlands have reportedly not yet passed laws on the use of Chinese suppliers' equipment.¹⁶⁹

While there may be justifiable reasons for different national governments to come to different decisions on the approach to tackling data security given their own specific circumstances and concerns, the variation in approach across the EU creates uncertainty to those sectors affected by the policies.

Given the importance of promoting VHCN deployment across the European Member States, the EC should provide further guidance on how Member States should consider and assess the appropriate policy response. This will ensure a more consistent approach to the threats, while still taking into account national circumstances. Whilst quantifying the benefits of policies to address data security risks is challenging, assessing and quantifying the impact of major policy initiatives such as partial or full vendor bans, on the industry and consumers is feasible and can, and indeed has, been undertaken. The EC should provide guidance on how to undertake such an assessment, including how it affects downstream markets and consumers. For instance, this guidance could set out the regulatory approach to assessing the impact of a loss in competition on the quality and price of inputs and the approach to assessing the impact on the need for operators to replace their network equipment. As part of this, it may be useful to draw on the existing competition guidelines on how to assess a substantial lessening of competition and adapt this within the new guidance to cover the impact of a loss in competition due to a ban on certain suppliers.

More generally the EC and Member States need to work with industry to build the resilience and diversity of supply of secure equipment vendors, with a focus on policy options that increase the level of security without imposing a disproportionate/unjustified burden on the industry, and ultimately consumers. One way to achieve this is by promoting open vendor ecosystems across Europe.

The adoption of Open RAN standards across Europe is seen as an opportunity to mitigate the challenges of investing in safe and secure network equipment in concentrated vendor markets and to open it to new vendors. Open RAN unbundles the different elements of RAN architecture in a secure and interoperable way. In this way many different vendors from Europe and around the world can compete to supply equipment to support investment in VHCN, in a way that is more difficult under closed RAN architecture where only a small number of vendors have the full capability to provide the full range of services.

However, Open RAN will require support from the EC and Member States to ensure Europe is well placed to benefit from the potential opportunities. Open RAN is a technology that is being developed around the world and Europe can provide leadership in the setting of harmonised standards, in a way that builds on and complements Europe's strong capabilities in innovation in technology equipment and services, whether semi-conductors, RAN hardware or software, and cloud services. European policy makers can support the development of a strong European vendor ecosystem by supporting R&D, funding and support for smaller vendors.

¹⁶⁹ See <https://www.euractiv.com/section/digital/news/eu-countries-keep-different-approaches-to-huawei-on-5g-rollout/>

4.2.2 Recommendations

Recommendation 24

Given the importance of promoting VHCN deployment across the European Member States, the EC should provide guidance to Member States on how to assess the impact on the industry and consumers of measures to improve security. This guidance should set out how Member States can consistently and robustly assess the risks, provide reasonable measures to mitigate risks, quantify/assess the impact of policy measures on downstream markets and consumers, and, if objectively justified and necessary, support measures to migrate to new vendors over a reasonable time scale.

Recommendation 25

Member States and the EC should support the development of more open and competitive vendor ecosystems. Member States and the EC should therefore support the development and adoption of Open RAN technologies, including providing support for R&D, as well as providing leadership in the development of Open RAN standards.

4.3 Policies aimed at online services and application providers

The coming years will see telecommunications operators invest a significant amount of their capital to deploy VHCN services. This section considers whether less strict restrictions on non-discrimination may lead to more efficient pricing structures to support investment in VHCN; and how regulators should respond to any differentials in regulation between equivalent services offered by OTTs and telecommunications providers.

In addition to the above, the expected continued growth in demand for delivery of online content via VHCN networks raises the important issue of how to recover the costs of the required VHCN investment in a way that (a) provides investment incentives and (b) maximises the likelihood of economically efficient outcomes to the benefit of EU citizens and businesses using those networks and content. This includes the consideration of policies that will support the provision of the appropriate pricing/economic signals for all users of the VHCN networks. This is an issue with a number of dimensions (both economic and wider) and therefore goes beyond the scope of this study.

4.3.1 Less strict restrictions on network non-discrimination may lead to more efficient pricing structures to support investment in VHCN

Telecommunication networks can be thought of as “two-sided platforms” which bring together consumers and OTT Content and Application Providers (CAPs)¹⁷⁰. The net neutrality has potentially prevented telecommunications operators from

¹⁷⁰ The BEREC Guidelines on Net Neutrality make clear that CAPs are “end user” customers of operator’s networks. BEREC Guidelines on the Implementation of the Open Internet Regulation BoR (20)112

setting an optimal tariff structure which sets charges to reflect the benefits received from VHCN deployment. While the regulation does not prohibit payments between content and application providers (CAPs) and networks and permits networks to set differentiated tariffs to end users based on volume, its application in practice restricts the forms of tariffs that could be imposed. This is because net neutrality requires that networks do not discriminate between different data traffic (except in specific circumstances), which means that internet service providers are unable to discriminate based on the content, website, application and other characteristics. Net neutrality can therefore restrict telecommunications operators' ability to set specific tariffs which provide enhanced services for certain applications or users¹⁷¹.

These rules were historically designed to protect the development of internet services by helping internet services to grow and expand by ensuring that network providers were unable to exploit an imbalance in bargaining position when negotiating terms of access with different types of Content and Application Providers (CAPs). However, there is now a significant initiative in the EU aiming to restrict the ability of gatekeeper platforms to use their market position to the potential detriment of rivals and consumers¹⁷². Therefore, there is a need to consider whether more targeted forms of net neutrality can better support VHCN deployment while preserving the basic tenets of net neutrality to protect consumers and different types of OTTs rights to access and share content. This is because allowing telecommunication operators to set tariffs to reflect different use cases could increase the ability of these operators to optimally recover costs of their VHCN investments in a way that can *expand* overall demand for network and OTT services.

These different forms of targeted net neutrality could include the following.

- The use of “effects based tests” to determine whether certain forms of pricing behaviour could be allowed (based on its net impact on consumers). This would mean that rather than relying on formalistic tests which determine whether certain practices are prohibited (examining only the features of the practice), instead enforcement of net neutrality should rely more on effects based tests which could prohibit only practices which are likely to have a harmful effect on consumers or content providers, taking into account the wider regulatory framework, including the DMA. Practices that do not have harmful effects should not be automatically prohibited. This would widen the scope of products, and services that are available to all end users, and would clearly benefit them, without causing detriment to end users. NRAs, who are already required to undertake periodic reviews of net neutrality could monitor the extent to which permitted practices might lead to harmful effects¹⁷³. The TSM¹⁷⁴ regulation governing net neutrality already imply that NRAs should apply “effects based

¹⁷¹ There are limited circumstances where operators can discriminate in the traffic on their networks such as specialised services or permitted traffic management.

¹⁷² [Add xref to Digital Markets Act]

¹⁷³ Whilst this is feasible in principle today, it would require a change of regulatory best practice as NRAs have not collected the empirical evidence that is necessary.

¹⁷⁴ REGULATION (EU) 2015/2120 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union. See: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R2120&from=EN>

tests”. For example Article 3(2) of the regulation, and the accompanying Recital 7, permits end users and Internet Access Services (IAS) providers to enter into agreements around the characteristics of their IAS provided that end user choice “***is not materially reduced in practice***” after taking into account the effects of the practice in **its specific market context**. However, in practice when examining practices NRAs tend to apply more formalistic tests (for example whether a practice is “application agnostic” or not) which do not attempt to examine the effects of any practice in its specific market context.

- The scope of permitted managed prioritisation could be widened. BEREC already foresees the possibility to offer IAS subscriptions with different QoS parameters (e.g. speed, latency, packet loss etc.)¹⁷⁵. The interpretation of the rule could be wider and allow further differentiation subject to other obligations being met (such as transparency or guarantees of available capacity).

It is also important to note that net neutrality should not disproportionately impede the development of use cases that rely on network slices or virtualisation. This is particularly important for 5G investment as the core of 5G use cases rely on being able to offer differentiated services to specific customer groups (based on guaranteed latency, service levels, stability and reliability).

4.3.2 Policy makers should consider whether regulation of equivalent communication services provided by telecommunications operators and OTTs should be further aligned

Telecommunication providers have long argued¹⁷⁶ that there should be a “level playing field” between them and OTT providers which would enable them to compete “fairly”. In particular, it has been argued that:

- OTTs providing communication services face less costly regulation for providing the same communications services as telecommunication providers offering Electronic Communication Services (ECS). These regulations include privacy, quality of service, consumer protection, access to other providers/interconnection, portability of data, emergency calls and numbering.
- A combination of EU merger policy, variation in national regulation, and cultural practices prevent telecommunications providers from achieving the multinational scale to compete on a global basis with OTT providers.
- Ex-ante significant market power regulations blunt telecommunications providers’ incentives to invest in networks or services which compete with OTT’s services. For instance, regulations could increase the costs of introducing new services for telecommunications operators thereby reducing their incentives to invest relative to OTT providers.

Recent regulatory developments have attempted to create a more level playing field. For example, the EECC extended some regulation to number-independent

¹⁷⁵ BoR (20) 112, paragraph 34b.

¹⁷⁶ For example in 2015 a group of European operators, including Orange, Deutsche Telekom, Telefónica and KPN, wrote to the President of the European Council urging lighter touch regulation to help them compete with OTTs. See: <https://telecoms.com/426231/operators-call-for-lighter-regulation-to-help-fight-otts/>

interpersonal communication services (NI-ICS) and digital providers are increasingly subject to specific ex-ante regulation around proposed changes to ePrivacy and its application to number-independent interpersonal services¹⁷⁷. Moreover, new regulations have been applied specifically to certain OTTs. For example, the draft Digital Markets Act (DMA) imposes “asymmetric” obligations and restrictions in the provision of Core Platform Services by digital firms that qualify as online gatekeeping platforms.

However, it is likely that differences in regulatory approach will still apply. Where there are such differences in regulation of OTT and telecommunication communication services they should be objectively justified based on clear differences in market, technical, policy or demand characteristics (for example, more extensive multi-homing could justify a less strong focus on measures to encourage switching).

One potential approach to reduce an unnecessary differentiation in regulation of apparently similar services offered by OTTs and telecommunications operators is to target regulation at the different *layers* of the value chain¹⁷⁸.

4.3.3 Recommendations

Recommendation 26

More targeted forms of net neutrality could be explored to promote the ability of telecommunication operators to set optimal tariffs which could expand output of OTT and telecommunication services, and thereby incentivise further investment in VHCN. This could include the greater use of effects based tests to determine if any practices should be prohibited, and avoidance of formalistic rules to determine whether a practice is prohibited by net neutrality; and the widening of the scope for permitted managed prioritisation of services.

Recommendation 27

The EC and Member States should consider whether regulation of communications services provided by telecommunications operators and of OTT providers should be aligned with any differences in regulatory approach objectively justified based on clear differences in market, technical, policy or demand characteristics.

¹⁷⁷ For more details, see: <https://digital-strategy.ec.europa.eu/en/policies/eprivacy-regulation>

¹⁷⁸ This would imply that regulation on the network layer (focusing on bottleneck access or public policy issues such as network coverage) are regulated separately from the services layer (focusing on the protection of consumers)

ANNEX A LITERATURE REVIEW

Figure 7 Summary of recent EC mobile merger decisions

Merger	Approach to price effects	Magnitude of estimated price effects	Consideration for efficiencies	Outcome
Hutchison/Orange (Austria, 2013) 4-to-3	GUPPI	Estimated quality-adjusted price increases of 10-20% in the post-paid segment after the transaction.	No Parties proposed efficiencies relating to increased capacity, network coverage and faster LTE deployment. EC did not consider efficiencies to have met the criteria for inclusion per its horizontal merger guidelines.	Cleared with remedies (divestment of radio spectrum, provision of wholesale access)
Hutchison/O2 (Ireland, 2014) 4-to-3	GUPPI, UPP, merger simulation	Estimated price increases in the range of 5-25% across various segments of the market after the transaction. Calibrated merger simulation approach (to account for competitor responses) gives estimated market-wide price increases of 6% (4%) in the post-paid private (all voice) segment.	No Parties proposed efficiencies relating to LTE speed and scale of LTE deployment. EC did not consider efficiencies to have met the criteria for inclusion per its horizontal merger guidelines.	Cleared with remedies (commitment to sell share of MergeCo network capacity to MVNOs, commitment to continue NSA with competitor Eircom)
Telefonica/E-Plus (Germany, 2014) 4-to-3	GUPPI, UPP, merger simulation	Estimated price increases in the range of 14-34% (5-12%) in the pre-paid (post-paid) segments of the market. Calibrated merger simulation approach (to account for competitor responses) gives estimated price effects of 12-20% (4-6%) in pre-paid (post-paid) segments.	No Parties proposed efficiencies relating to network and distribution network costs, S&G synergies, additional business opportunities and MTR-related efficiencies. EC did not consider efficiencies to have met the criteria for inclusion per its horizontal merger guidelines.	Cleared with remedies (commitment to sell share of MergeCo network capacity to MVNOs, divestment of spectrum, extension of existing wholesale access agreements with MVNO partners)
Hutchison/WIND (Italy, 2016) JV	Merger simulation	Calibrated merger simulation approach gives estimated price effects of 12-13% (10-11%) for Hutchison (WIND) in the overall private segment. On average, the model predicts price effects of 6-7% in the private segment.	Limited Parties failed to demonstrate that efficiencies claimed on fixed cost savings and improvements related to the network were merger-specific or likely to materialise. EC found only part of the parties' claim for variable cost efficiencies sufficient to meet its criteria for inclusion (with the magnitude of these efficiencies found to be small).	Cleared with remedies (divestment of assets sufficient to allow a new operator to enter the market (including of spectrum and mobile base station sites) and transitional agreement to support new entrant via network access temporarily until it has developed a network)
T-Mobile/Tele2 (Netherlands, 2018) 4-to-3	Merger simulation	Calibrated merger simulation approach gives estimated price effects of 5-10% (0-5%) for the post-paid (overall private) segment. On average, the model predicts price effects of 5-10% (0-5%) in the post-paid (overall private) segment.	Yes Parties proposed that the merger would allow the roaming fee that Tele2 pays to T-Mobile for providing access to 2G and 3G networks would be internalised by the MergeCo. EC considered that the claim for efficiencies did meet the criteria for inclusion per its horizontal merger guidelines.	Cleared unconditionally

Source: Frontier Economics based on publicly available information

ANNEX B GREEN POLICIES APPROPRIATELY TARGETED

Telecommunications networks (FTTH and 5G) are typically dependent on other downstream and upstream market players such as electronics manufacturers and logistics providers. Given that telecommunications operators may have limited influence over the operations of these players (including their environmental strategy), it may not be appropriate to make telecommunications operators solely responsible for the entire value chain. Instead, it is important to clearly set out rules and obligations for different players within the value chain and/or allow telecommunications operators to enforce their green policies on these downstream and upstream market players.

This is particularly important for “Scope 3” emissions (i.e. emissions that are only indirectly related to telecommunications networks) that occur throughout the value chain as these can be significant for telecommunications networks.¹⁷⁹ Given that telecommunications operators may have limited influence over these emissions, it may be inappropriate to impose any policies or penalties on telecommunications operators that cover these emissions. Instead, the responsibility for these emissions should be shared between market players within the value chain.

¹⁷⁹ Scope 1 covers direct emissions. Scope 2 covers indirect emissions through the consumption and purchase of energy sources (i.e. electricity, heat and steam). Scope 3 covers all indirect emissions such as from purchased goods and services, business travel, and transportation and distribution (both upstream and downstream). See <https://www.carbontrust.com/resources/briefing-what-are-scope-3-emissions>

