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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

{C(2020) 8750 final}

Contents

1. INTRODUCTION

1.1. Background

Already in 2015, the Commission adopted the Digital Single Market Strategy[1] that highlighted the importance of connectivity. In June 2016 the European Council confirmed its view on the Digital Single Market and called for very high-capacity fixed and wireless broadband connectivity across Europe as a precondition for future competitiveness, with a better regulation and reduced administrative burden for entrepreneurs. In response, the Commission set out a vision for a Gigabit Society[2], where availability and take-up of very high capacity networks (VHCN) would enable the widespread use of products, services and applications in the Digital Single Market. The Commission proposed as well a refit of the electronic communication framework. On 21 December 2018, the European Electronic Communications Code (Code or EECC in this document)[3] entered into force, along with the Regulation on the Body of European Regulators for Electronic Communications (BEREC)[4], to modernise the Union's rules in the field of electronic communications. Member States are to apply their national measures transposing the Code from 21 December 2020. In 2020, the Commission reconfirmed in the Union's strategy "A Europe fit for the digital age"[5] the importance of digital technology in people's lives and its significance for the future economic and social development of Europe, including the need for accelerating investments in Europe's Gigabit connectivity as one of the key actions for shaping the Europe's digital future.[6]

The role of digital connectivity in our lives has grown over the recent years, but we have never been so acutely aware of how critically we depend on it as during the COVID-19 crisis. The COVID-19 outbreak has demonstrated the strategic importance of a robust, resilient and secure digital infrastructure to the social welfare of everyone in society and the continued functioning of the economy. The importance of digital infrastructure has been further recognised by the

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1 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A Digital Single Market Strategy for Europe (COM/2015/0192 final)

2 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society - COM(2016)587 and Staff Working Document - SWD(2016)300

3 Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code, OJ L 321, 17.12.2018, p. 36.

4 Regulation (EU) 2018/1971 of the European Parliament and of the Council of 11 December 2018 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Agency for Support for BEREC (BEREC Office), amending Regulation (EU) 2015/2120 and repealing Regulation (EC) No 1211/2009, OJ L 321, 17.12.2018, p. 1–35

5 https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en

6 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Shaping Europe's digital future, COM/2020/67.

allocation of 20% of the EU budget for recovery (the Recovery and Resilience Facility, RRF[7]) for digital investments and reforms. Each recovery and resilience plan will have to include a minimum of 20% of expenditure to foster the digital transition.

The COVID-19 crisis led to an increase of the demand for bandwidth both downstream and upstream and raised awareness regarding new patterns of working, healthcare, education, provision of public services and entertainment. It is reasonable to anticipate that such growth of connectivity services and some of the new usage patterns are likely to continue. The crisis is expected to act as an accelerator of digital transformation because residential and business users have become familiar with new forms of consumption and processes and the recovery initiatives will further target the digital transformation. It is clear that these growing network capacity demands resulting from changing trends in consumption and increasing needs of consumers and businesses will not be fully met by traditional copper technology in the future.

Thus, the deployment and the upgrading of future-proof connectivity infrastructures will be crucial to support the digital transformation and allow the free flow of data, the collaboration of people wherever they are and the connection of more objects to the Internet.

The Code provides new regulatory tools to incentivise major network investments in VHCN while promoting effective competition and consumer rights. The regulatory framework aims to facilitate the roll-out of new, very high capacity networks, with inter alia: (i) a focus on infrastructure competition and return on investment in new networks; (ii) rules for co-investment that will be more predictable and promote risk sharing in the deployment of VHCN; and (iii) specific rules for wholesale-only operators with significant market power.

The Significant Market Power (SMP) regime[8] remains one of the key instruments for *ex ante* regulation. The imposition of *ex ante* regulatory obligations on undertakings that have SMP on a specific market can be justified if proven that these markets are characterised by high barriers to entry and do not tend towards effective competition, and that competition law instruments are insufficient to tackle the identified competition problems. An undertaking is deemed to have SMP, if, either individually or jointly with others, it enjoys a position equivalent to dominance, i.e. a position of economic strength, which gives it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers.

The national regulatory authorities (NRAs) should then impose obligations on SMP operators, which are proportionate, justified and based on the nature of the problem identified, also with a view to achieving the objectives set out in Article 3 of the Code. When assessing the proportionality of the obligations and conditions to be imposed, as when carrying out their market

[7] See https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

[8] See Article 68 of the Code.

analysis, NRAs should take into account the different competitive conditions existing in the different areas within Member States.

1.2. The Commission Recommendation on relevant markets

The Commission Recommendation on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation (Recommendation on Relevant Markets, the Recommendation or RRM) is a central building block of the SMP regulation in the Union. The Commission adopted the first Recommendation on 11 February 2003[9], the second on 17 December 2007[10] and the third on 9 October 2014[11]. The Code confirms the key role of the Recommendation on Relevant Markets to ensure the overall functioning of the Union's Regulatory Framework. Article 64(1) of the Code [12] requires a further review of the Recommendation by 21 December 2020 and a regular review thereafter.

The Recommendation identifies those product and service markets within the electronic communications sector, whose characteristics may be such as to justify the imposition of regulatory obligations set out in the Code, without prejudice to markets that may be defined in specific cases under competition law.

The Recommendation seeks to ensure the achievement of the regulatory objectives, in particular promoting connectivity and access to VHCN and promoting competition in the provision of electronic communications networks.

It allows NRAs to focus their efforts on markets where competition appears to be not yet effective at Union level and provides regulatory predictability and legal certainty to market players, thus allowing stable business planning. In particular, the definition of a list of market susceptible to ex ante regulation at Union level seeks to ensure that generally the same product and services markets will be subject to a market analysis in all Member States. Therefore, NRAs should regularly (at least every five years under the Code) analyse the markets that are contained in the Recommendation.

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9 Commission Recommendation 2003/311/EC of 11 February 2003 on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation, OJ L 114, 8.05.2003, p. 45.

10 Commission Recommendation 2007/879/EC of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation, OJ L 344, 28.12.2007, p. 65.

11 Commission Recommendation 2014/710/EU of 9 October 2014 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation, OJ L 295, 11.10.2014, p. 79.

12 According to Article 64 of the Code "*The Commission shall adopt a Recommendation on Relevant Product and Service Markets ('the Recommendation'). The Recommendation shall identify those product and service markets within the electronic communications sector the characteristics of which may be such as to justify the imposition of regulatory obligations set out in this Directive, without prejudice to markets that may be defined in specific cases under competition law. The Commission shall define markets in accordance with the principles of competition law. The Commission shall include product and service markets in the Recommendation where, after observing overall trends in the Union, it finds that each of the three criteria listed in Article 67(1) is met. The Commission shall review the Recommendation by 21 December 2020 and regularly thereafter*."

However, the Recommendation does not prevent NRAs from analysing markets which differ from those identified in this Recommendation but that are regulated within the territory of their jurisdiction based on previous market analyses, or other markets, if they have sufficient grounds, because of national circumstances, to consider that those specific markets meet the three criteria used for identifying markets susceptible to ex ante regulation[13].

Both the Commission for the purpose of the Recommendation and NRAs, in order to define relevant markets, have to comply with the principles of competition law as further specified in the Commission Notice on Market Definition[14] and the SMP Guidelines[15]. The so called 'three criteria test'[16], that serves the purpose of identifying markets susceptible to *ex ante* regulation, was previously part of the Recommendation and is now embedded in Article 67 of the Code.

NRAs are required, taking the utmost account of the Recommendation and the SMP Guidelines, to 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, in accordance with the principles of competition law.[17] Based on such market definition, NRAs will determine whether these markets are effectively competitive and as the case may be impose, amend, or withdraw regulatory obligations accordingly.

When there is effective competition, the Code requires *ex ante* regulatory obligations to be lifted. On the other hand, where competition is not yet effective, NRAs should adopt appropriate and proportionate measures to remedy the identified competition problem(s) and, at the same time, incentivise new infrastructure investments. Deployment of competing infrastructure will induce competition into the markets and allow either the lifting of regulatory obligations in markets that are considered competitive or a relaxation of regulation, including access obligations, in areas where the infrastructure competition had developed but not to the extent to conclude that they constitute separate markets that can be fully deregulated.

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13 See Recital 165 and Article 67 (1) of the Code. For further explanation see section 2.2. below.

14 Commission Notice on the definition of relevant market for the purpose of Community competition law, OJ C 372, 9.12.1997, p. 5-13, "Commission Notice on Market Definition". A review of the Notice was launched on 3 April 2020. More information on the review can be found in https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12325-EU-competition-law-market-definition-notice-evaluation.

15 Guidelines on market analysis and the assessment of significant market power under the Union's regulatory framework for electronic communications networks and services (2018/C 159/01), "SMP Guidelines".

16 In order to establish whether a market warrants ex ante regulation, the NRA should check whether: i) high and non-transitory structural, legal or regulatory barriers to entry are present; ii) there is a market structure which does not tend towards effective competition within the relevant time horizon, having regard to the state of infrastructure-based competition and other sources of competition behind the barriers to entry; and iii) competition law alone is insufficient to adequately address the identified market failures. See further below section 2.2.

17 Article 64.3 of the Code.

Ultimately, the objective of *ex ante* regulatory intervention is to create benefits for end-users by making retail markets competitive on a sustainable basis, allowing European citizens to enjoy choice and competition even during the transition to a fully competitive market.

1.3. The Explanatory Note to the Recommendation on relevant markets

Due to the high level of technological innovation and dynamic market developments in the electronic communications sector, it is necessary to adapt regulation rapidly and in a coordinated and harmonised way at Union level. This is particularly relevant because experience from regulatory practice (based on cases notified under Article 7 and 7a of the Framework Directive[18] further in the text reffered as 'Article 7 procedure') has shown that divergence among the NRAs in the implementation of the regulatory framework may create a barrier to the internal market. Furthermore, in the electronic communications sector, products and services continuously evolve because of technological development and increasing capabilities of various technologies. Whenever similar services can be delivered over different types of networks, a convergence of markets might follow.

These technological, regulatory and market trends need to be fully assessed, with a forward looking perspective, when deciding which wholesale electronic communications markets should continue to be recommended for regulation. This Explanatory Note explores in the first part these relevant trends and their impact on the markets.

The history of Relevant Markets Recommendations confirms the need for constant adjustments in order to reflect technological, regulatory and market trends. The subsequent versions of the Recommendation have indeed shown a transition to more competitive markets, with the first Recommendation from 2003 identifying eighteen relevant markets, the second from 2007 – seven and the third one from 2014 - five. The 2014 Recommendation clearly showed at Union level that retail markets are no longer the focus of *ex ante* regulation and identified the following markets susceptible to *ex ante* regulation:

(i) the market for wholesale call termination on individual public telephone networks provided at a fixed location;
(ii) the market for wholesale voice call termination on individual mobile networks;
(iii) the market for wholesale local access provided at a fixed location;
(iv) the market for wholesale central access provided at a fixed location for mass-market products; and
(v) the market for wholesale high-quality access provided at a fixed location.

[18] Article 7 and Article 7a of the Framework Directive required national regulatory authorities (NRAs) to conduct national and Union level consultations on draft regulatory measures they intend to take prior to their adoption. These consultations should comprise the definition and analysis of relevant markets, designation of operator(s) having significant market power (SMP) and the proposed imposition or removal of regulatory remedies on providers of telecoms networks or services. The procedure is now provided for in Article 32 and Article 33 of the Code.

Going forward, the objective is that NRAs will ultimately be able to find retail markets to be competitive even in the absence of wholesale regulation. This may occur especially due to the further innovation expected and the enhanced competition derived *inter alia* from the development of VHCN. In such a scenario, wholesale market regulation would no longer be warranted.

It is therefore also the purpose of this Explanatory Note to set out in greater detail in the individual market sections below, which developments could lead an NRA to find that regulation of currently identified relevant wholesale markets is not needed, in particular in some more competitive geographic areas. This Explanatory Note therefore sets out in detail the reasoning behind the changes in the fourth Recommendation and provides explanations as to why some markets should be retained on the list and others should not.

The Recommendation as well as this Explanatory Note have been informed by 6 years of regulatory practice since the 2014 Recommendation, the public consultation, which took place from February to April 2019,[19] the meetings, discussions and workshops[20] with the BEREC Expert Working Group, NRAs and stakeholders, as well as by an expert study delivered to the Commission in May 2020 (WIK study)[21]. The Commission took into utmost account BEREC opinion on the European Commission's Draft Recommendation on relevant product and service markets susceptible to ex-ante regulation' (BEREC opinion) that was delivered on 16 October 2020[22]. All these important inputs are summarized in the Annex of this Explanatory Note and referred to in the following chapters.

2. MARKET DEFINITION AND IDENTIFICATION OF MARKETS SUSCEPTIBLE TO EX-ANTE REGULATION

2.1. Market definition

Whilst the retail markets are no longer the focus of *ex ante* regulation at Union level, nevertheless, sustainable competition at retail level to the ultimate benefit of consumers and end-users remains the final objective of regulatory intervention. Therefore, for the Commission and for NRAs, the starting point for the identification of wholesale markets susceptible to *ex ante* regulation is the analysis of the corresponding retail markets. The analysis of effective competition at the retail and at the wholesale level is conducted from a forward-looking perspective over a given time horizon, and is guided by competition law, including, as appropriate, the relevant case law of the Court of

19 https://ec.europa.eu/digital-single-market/en/news/consultation-revision-recommendation-relevant-markets.

20 https://ec.europa.eu/digital-single-market/en/news/stakeholder-workshop-recommendation-relevant-markets

21 https://ec.europa.eu/digital-single-market/en/news/study-future-electronic-communications-product-and-service-markets-subject-ex-ante-regulation

22 https://berec.europa.eu/eng/document_register/subject_matter/berec/opinions/9505-berec-opinion-on-the-european-commission8217s-draft-recommendation-on-relevant-product-and-service-markets-susceptible-to-ex-ante-regulation. (BoR (20)174).

Justice[23]. Therefore, SMP-based *ex ante* regulation should be applied only where this is needed in order to address, under the modified Greenfield approach[24], a lack of effective competition at the retail level. If it is concluded that a retail market would be effectively competitive in the absence of *ex ante* wholesale regulation on the corresponding relevant markets, this should lead the NRA to conclude that regulation is no longer needed at the relevant wholesale level.

Market definition, for the purposes of the Recommendation, is a prerequisite before assessing whether a particular market is characterised by effective competition or should be subject to *ex ante* regulation. The market definition sets the boundaries within which competitive dynamics are analysed and identifies in a systematic way direct and indirect competition constraints faced by the undertakings that are present in the market in question. The objective is to identify whether companies are capable of constraining each other's behaviour and preventing the others from behaving independently of their competitors, customers and ultimately consumers within the defined market.

Markets defined in the Recommendation are without prejudice to the markets defined in specific cases under merger control and *ex post* competition law. Indeed, markets identified in the Recommendation, while based on competition law methodologies, will not necessarily be identical to markets defined in individual competition law cases.[25]

The market definition also depends on the prospective time horizon considered. As *ex ante* regulation addresses the lack of effective competition that is expected to persist over a time horizon in accordance with the duration of the review period[26], NRAs' market analyses have to be forward-looking.

The starting point is the definition of retail markets over a given time horizon, taking into account demand-side and supply-side substitutability from the end-users perspective. The analysis should assess whether the market is prospectively competitive and whether any lack of competition is durable, by taking into account expected or foreseeable market developments. In this regard, a retail market may become effectively competitive only after the review period , but there may be clear evidence of market dynamics, even geographically limited, which indicate that the market will become effectively competitive in the near future even without the imposition of *ex ante* regulation in the market concerned. Where market dynamics are changing rapidly, care should be taken in choosing the relevant time horizon to reflect the pertinent market developments.

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23 Recital 169 of the European Electronic Communication Code.

24 Point 17 of the SMP Guidelines, OJ C 195/1 of 7.05.2018.

25 Chapter 4.2.1. of the WIK study with further references to merger control cases.

26 Pursuit to Article 67 (5) of the Code the standard review period is now five years. NRAs should analyse the market without delay in case major developments change significantly the market conditions.

Having defined retail markets, it is then appropriate to identify the corresponding wholesale markets, taking into account demand-side and supply-side substitutability[27] of products from the perspective of an operator that wishes to compete in supplying[28] end-users and contestability.

In this regard, it must be noted that commercial agreements, including agreements on wholesale access, co-investment agreements and reciprocal access agreements between operators, are likely to become more common in the near future and should be taken into account by NRAs when assessing the competitive dynamic of a particular wholesale market. If such agreements have been entered on a lasting basis, are sustainable and improve competitive dynamics, they can contribute to the conclusion that a particular wholesale market does not warrant *ex ante* regulation[29].

The regulation imposed on related markets can have an impact when determining whether a given market warrants *ex ante* regulation, and therefore should be taken into adequate consideration. Hence NRAs should analyse related markets in a consistent manner and where possible, at the same time or as closely as possible to each other in time.

2.2. Identification of markets susceptible to ex ante regulation by the Commission

Article 64(1) of the Code requires that the Recommendation identify those product and service markets within the electronic communications sector, the characteristics of which may be such as to justify the imposition of regulatory obligations set out in the Code. According to recital 161 of the Code, there is a need for *ex ante* obligations in certain circumstances in order to ensure the development of a competitive market, the conditions of which favour the deployment and take-up of VHCN and services, and the maximisation of end-user benefit. [30]

Regulation must be targeted and balanced in accordance with the principle of proportionality. NRAs should therefore choose the least intrusive way of addressing potential harm to effective competition in the identified market. Indeed, an excessive regulatory burden on operators could stifle investment and innovation, whereas insufficient regulation and a failure to apply it where it

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27 See paragraph 27 of the SMP Guidelines regarding the so-called 'hypothetical monopolist' or SSNIP test for assessing the existence of any demand and supply-side substitution. Under this test, an NRA should ask what would happen if there was a small but significant and non-transitory increase in the price of a given product or service, assuming that the prices of all other products or services remain constant ('relative price increase'). While the significance of a relative price increase will depend on each individual case, NRAs should consider customer (consumer or undertaking) reactions to a small but non-transitory price increase of between 5 and 10 %. Customer responses will help determine whether substitutable products exist and, if so, where the boundaries of the relevant product market should be delineated.

28 See paragraph 32 of the SMP Guidelines. It can be difficult to apply a SSNIP test empirically where there is not a readily available product and price. If no such product, commercial or regulated, exists on a network but could (potentially) technically and commercially be offered, NRAs should consider self-supply on that network for the delineation of markets and construct a notional market encompassing the self-supply, where there is consumer harm at the retail market and potential demand for such product exists.

29 Recital 170 of the Code.

30 Recital 161 of the Code.

is needed would reverse the achievements of the past decades of liberalisation, and reduce consumer choice and competitive dynamics in the sector.

The Code has now expressly set out the three criteria test, which has already been used in the regulatory practice[31], to be applied in order to identify which electronic communications markets are susceptible to *ex ante* regulation. According to Article 67(1) of the Code, *ex ante* regulation may be justified for markets meeting the following criteria cumulatively:

i) High and non-transitory structural, legal or regulatory barriers to entry are present;

ii) There is a market structure which does not tend towards effective competition within the relevant time horizon, having regard to the state of infrastructure-based competition and other sources of competition behind the barriers to entry;

iii) Competition law alone is insufficient to adequately address the identified market failures.

There are common principles and indicators to take into account when carrying out the analysis of whether the three criteria test is met. As a general point, the analysis should consider any market developments, which are potentially able to have an impact on the market's tendency towards effective competition. At the same time, the analysis should take account of all relevant competitive constraints (both at the wholesale and retail levels) which have an effect on the relevant market analysed. The effect on the market is the key indicator for the relevance of these constrains irrespective of whether the products or services, which exercise these constraints are part of the relevant market. They can therefore derive from communications networks, electronic communications services, or other types of services or applications, which are comparable from the perspective of the end-user. Other constraints to be taken into account can originate from the existence of other types of regulation or measures imposed outside the relevant market but affecting the relevant market or related retail market.[32]

(i) The presence of high and non-transitory structural, legal or regulatory barriers to entry

Barriers to entry in this sector may be structural, legal or regulatory. The existence of high barriers to entry and to the development of competition in an electronic communications market is considered an indication that regulatory intervention may be required to ensure the development of a competitive market. Where barriers to entry are high in the absence of regulatory intervention, even an undertaking that is more efficient than the incumbent is unlikely to be able to enter a market and compete successfully to the benefit of the consumers.

An important qualification of this first criterion is whether high entry barriers are likely to be non-transitory in the context of a modified Greenfield approach. Under the modified Greenfield

[31] These criteria, which have been used in the 2003, 2007 and 2014 Recommendations, have proven to be robust when assessing whether markets are susceptible to *ex ante* regulation.

[32] For example obligations imposed in accordance with Articles 44, 60 and 61 of the Code or obligations stemming from the Broadband Cost Reduction Directive.

approach, NRAs should take into account existing market conditions, including other type of regulation affecting the market, as well as expected or foreseeable market developments over the course of the next review period in the absence of regulation based on significant market power.

A structural barrier to entry exists when the state of the technology and the nature of the network, with its associated cost structure, and/or the level of demand, are such that they create asymmetric conditions between operators, preventing market entry or expansion of competitors. For instance, high structural barriers may be found to exist when the market is characterised by absolute cost advantages, substantial economies of scale and/or economies of scope, capacity constraints, and high sunk cost. Such barriers can be found in sectors that rely on the deployment of networks, such as fixed networks.

Legal or regulatory barriers are not based on economic conditions, but result from legislative, administrative or other State measures that have a direct effect on the conditions of entry and/or the positioning of operators on the relevant market. Examples are legal requirements related to the necessary permissions to roll-out own infrastructure, which could range from planning permissions for civil works to the need to obtain permission where property and land ownership rights are affected, such as rights of way or other permission to roll out a network over private property. Another example is the scarcity of available spectrum.

In order to exclude the existence of high and non-transitory barriers, it is not sufficient to examine whether entry has occurred or is likely to occur in the market at all, but rather it is necessary to examine whether new entry can be sufficiently timely and stable in the absence of regulation, so that it can limit market power. Small-scale entry (e.g. in a limited geographic area) may not be considered sufficient where the market is wider, since it may be unlikely to exercise an appreciable constraint on the dominant undertaking(s). Further, there may be objective limitations to expansion beyond the initial small-scale entry, such as the lack of economies of scale outside the most densely populated urban areas, which would make such entry unlikely to constrain the SMP undertaking(s) within the relevant time horizon. Indeed, barriers to entry will also depend on the minimum efficient scale of output, and the fraction of costs, which are sunk.

Ongoing technological progress in the electronic communications markets may gradually reduce the relevance of barriers to entry. For example, the relevance of legal and regulatory barriers in liberalized markets subject to gradual deregulation has been constantly decreasing, as the past monopolistic rights of incumbents had been lifted. In such markets, competitive constraints often come from threats exerted by potential innovative competitors that are not currently in the market. Therefore, the possibilities to overcome barriers to entry within the relevant time horizon should also be taken into consideration when identifying the relevant markets for possible ex ante regulation.

(ii) The market structure does not tend towards effective competition within the relevant time horizon, having regard to the state of infrastructure-based and other competition behind the barriers to entry

An analysis of effective competition should include an analysis as to whether the market is prospectively competitive, and thus whether any lack of effective competition is durable. In view of the character of electronic communications markets, for regulatory intervention to be justified, market characteristics should be analysed not only in a *static* but also in a *dynamic* and forward-looking manner. Market dynamics in the absence of sector-specific *ex ante* regulation may make barriers to entry disappear over time, for example because of technological developments or previously imposed wholesale regulation. The deployment of alternative infrastructures allowing to offer substitutable services at the retail level can result in changes of competitive dynamics throughout the supply chain. Convergence of previously distinct markets may increase competition. Alternatively, there may be a sufficient number of players active in the market for effective competition to emerge despite the barriers to entry, e.g. on the relevant retail market, even without *ex ante* regulation.

To be susceptible to *ex ante* regulation a market should present characteristics demonstrating that it will not tend over the relevant time period towards effective competition. This criterion therefore takes into account a number of structural and behavioural aspects, which on balance indicate whether or not, over the time period considered, the market has characteristics, which may justify the imposition of regulatory obligations.

The application of this criterion involves examining the state of competition. Indeed, other structural factors or market characteristics and disruptive developments may mean that the market tends towards effective competition even in the presence of high barriers to entry. This is for instance the case in markets with a limited, but sufficient, number of undertakings behind the entry barrier facing price-elastic market demand. There may therefore be markets where incentives for innovation or expansion may exist and market shares may change over time and/or falling prices may be observed.

Market dynamics may also be affected by technological developments or by the convergence of products and markets. The presence of infrastructures that are based on different technologies but that offer products that are substitutable for end users can also alter competitive dynamics across the supply chain, including competition on price, choice and quality. Indeed, indirect competitive pressures on operators need not necessarily derive from other comparable operators, but may be exercised by undertakings that, while adopting different business models, are able to supply products that can be regarded as an alternative by end users. Indeed, in innovation-driven markets competitive constraints often come from innovative threats from potential competitors that are not currently in the market, and dynamic or longer-term competition can take place among undertakings that are, from a static perspective, not necessarily competitors in an existing market.

A tendency towards effective competition does not necessarily imply that the market will reach the status of effective competition within the period of review. It simply means that there is clear evidence of dynamics in the market within that period, which indicates that the status of effective competition will be reached in the foreseeable future without *ex ante* regulation in the market

concerned. Therefore, anticipated events must be expected within a precise timeframe and based on concrete elements (e.g. business plans, investments made, new technologies being rolled out) rather than indications that are only theoretically possible. For example, decreasing market shares or uncertain future technological developments are not in themselves sufficient reasons to find that the market tends towards effective competition.

National regulatory authorities should also take into account whether wholesale access is available to any interested undertaking on reasonable commercial terms permitting sustainable competitive outcomes for end-users on the retail market. Commercial agreements, including agreements on wholesale access, co-investment agreements and reciprocal access agreements between operators, which have been entered on a lasting basis and are sustainable, are likely to improve competitive dynamics, and may ultimately resolve competition concerns at the related retail market and therefore could lead to decisions not to regulate or deregulate markets.

In general, the later effective competition is expected to materialise in the future, the more likely it is that the second criterion will be fulfilled.

(iii) Competition law alone is insufficient to adequately address the identified market failure(s)

Ex ante regulation should only be imposed where competition law remedies are insufficient to address the competition problem identified[33]. As such, *ex ante* regulation and competition law serve as complementary instruments in achieving their policy objectives in the electronic communications sector and in dealing with lack of effective competition[34]. This third criterion therefore assesses the sufficiency of competition law to deal with the market failure identified in the market analysis, in the absence of *ex ante* regulation.

Only markets where national and the Union's competition law is not considered sufficient by itself to redress market failures and to ensure effective and sustainable competition over a foreseeable time horizon, should be identified for potential *ex ante* regulation. *Ex ante* regulation would for example be an appropriate complement to competition law in circumstances where the regulatory obligation necessary to remedy a market failure could not be imposed under competition law (e.g. access obligations under certain circumstances or specific cost accounting requirements), where the compliance requirements of an intervention to redress a market failure are extensive and must be maintained over time (e.g. the need for detailed accounting for regulatory purposes, assessment of costs, monitoring of terms and conditions including technical

[33] Recital 163 of the Code. This recital also indicates that newly emerging markets, even where de facto the market leader is likely to have a substantial market share, should not be subjected to inappropriate obligations. The Commission considers that 'emerging markets' are markets which are so new and volatile that it is not possible to determine whether or not the '3 criteria' test is met.

[34] In this respect Article 11 of the Code establish a principle of general collaboration.

parameters and so on), or where frequent and/or timely intervention is indispensable, or where creating legal certainty is of paramount concern (e.g. multi-period price control obligations).

In summary, whether an electronic communications market is susceptible to *ex ante* regulation would depend on the existence of high and non-transitory entry barriers, on the lack of a tendency towards effective competition and on the insufficiency of competition law by itself to address persistent market failures.

2.3. Identification of markets susceptible to ex ante regulation by NRAs

Given the examination of retail markets and their related wholesale markets conducted by the Commission in this Explanatory Note, there is a presumption that for the markets listed in the Recommendation, the three criteria test is met across the Union. However, an NRA may consider it appropriate, based on specific national circumstances, to conduct its own three criteria test on the wholesale markets in this Recommendation and notify its findings according to the consultation procedure set out in Article 32 of the Code.

At the same time, NRAs should always carry out the three criteria test when they intend to regulate a market which is not listed in the Recommendation but which, in the light of specific national circumstances and having conducted an analysis of competition at retail level, could be susceptible to *ex ante* regulation. This would be the case when an NRA identifies an instance of consumer harm that cannot be addressed by imposing regulation on another market listed in the Recommendation. In such case, the market to be analysed first is the one that is most upstream from the retail market in question in the vertical supply chain.

Moreover, the exact boundaries of the specific product or service markets may differ among the Member States due to national specificities (e.g. network topologies or technology) and/or their geographic dimension.

NRAs should at all times ensure that a market identified on the basis of national circumstances (i) is defined on the basis of competition law principles laid down in the Commission Notice on Market Definition, (ii) is consistent with the SMP Guidelines[35], and (iii) satisfies the three criteria set out above. Based on Article 32(3) of the Code, the definition and analysis of relevant markets is subject to the consultation procedure set out in Article 32 of the Code.

2.4. Relation between the three criteria test and the assessment of significant market power

The three criteria test differs from the assessment of whether one or more operators active on a particular market have significant market power, even though both analyses may make use of similar indicators. The indicators used in the analysis of the first and second criterion are also relevant for the assessment of SMP and for the deregulation of markets when the market no longer

[35] See SMP Guidelines, OJ C 195/1 of 7.05.2018.

fulfils the three criteria test. The three criteria test focuses on overall market characteristics and structure, for the sole purpose of identifying those markets that are susceptible to *ex ante* regulation. The assessment of significant market power, instead, determines whether a specific operator active in a market that has been identified as susceptible to *ex ante* regulation enjoys a position equivalent to dominance, namely a position of economic strength affording it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers.[36] While a market may meet the three criteria for the purposes of the Recommendation, and is therefore considered as susceptible to *ex ante* regulation at Union level, regulation on the identified market in an individual Member State still requires the designation of an SMP operator.

In this context, for the imposition, maintenance, amendment or withdrawal of obligations, Article 68 of the Code requires a determination based on a market analysis that a relevant market is not effectively competitive and that one or more undertakings are found to have SMP. This should always be done having regard to the ultimate objective of the regulatory framework of ensuring effective competition on all related retail markets.

2.5. The definition of relevant geographic markets

This section addresses issues linked to the definition of relevant geographic markets by NRAs. It provides explanations for the NRAs to take account in their assessment. The Commission services consider that such explanations are relevant for all product markets and that the assessment of the geographic dimension of these markets should be based on the analysis of the prevailing competitive situation in each of them. The Recommendation aims at ensuring that NRAs base their assessment of the geographic scope of a relevant market on a consistent set of parameters thus furthering regulatory consistency and predictability across the Union.

Once the product market definition is complete, the next step for NRAs is to define its geographical dimension[37]. It is only when the geographical dimension of the product or service market has been defined that an NRA may properly assess whether the competitive conditions on this market require *ex ante* regulation. According to the legislation and to established case-law, the relevant geographic market comprises an area in which the undertakings concerned are involved in the supply and demand of the relevant products or services, in which the conditions of competition are sufficiently homogeneous, and which can be distinguished from neighbouring areas in which the prevailing conditions of competition are appreciably different[38]. On the contrary, areas in which the conditions of competition are heterogeneous do not constitute a uniform market[39]. Significant variations of competitive conditions between different areas of a same country - for instance, but not limited to, differences between urban and rural areas - might

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36 Article 63 of the Code.

37 SMP Guidelines, paragraph 46.

38 Commission Notice on Market Definition, paragraph 8. A review of the Notice was launched on 3 April 2020.

39 SMP Guidelines, paragraph 48.

therefore require the definition of separate relevant markets and eventually lead to different designations of SMP and regulatory treatment of the SMP undertakings.

As for the product market definition, the tools for geographic analysis are based on the principles of competition law. They include analyses of demand and supply-side substitutability[40], and potential competition, when relevant and to the extent possible at this stage of the analysis [41].

Based on such analysis, NRAs can find the geographic scope of relevant electronic communication markets to be transnational[42], national, regional or local. In the past, NRAs found most markets to be national, reflecting the footprint of the legacy network that was in most cases national. However, the trend from recent years tends towards a more granular type of analysis. In several recent cases[43], NRA have defined local/regional markets. As a result, fifteen Member States already have some form of geographic segmentation on markets 3(a), 3(b) or 4, at the level of market definition, remedies, or both (see table 1).

Table 1: NRAs applying geographical segmentation of markets and/or remedies (by 31-04-2020)

	Market 3a	**Market 3b**	**Market 4**
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

This trend is likely to increase in the future, as the infrastructure-based competition is developing at a different pace within Member States, which in turn leads to different competitive conditions at subnational level. For instance, the wholesale broadband access market used to be characterized by a ubiquitous copper network owned by the national incumbent. With the competition of cable networks that cover, in most of the cases, only parts of the country, the progressive deployment of fibre by various actors and the switch-off of the copper network in certain areas, competitive conditions are likely to become heterogeneous within many Member States.

40 Demand-side substitution takes place when consumers switch from one area to another in response to a price change. If consumers can source their requirements from suppliers located in other areas, then it is unlikely that price increases will be profitable. Supply-side substitution takes place when suppliers start offering their services in an area where the price has increased.

41 Potential competition, like supply-side substitution, refers to the ability of alternative suppliers to enter a market, but on a longer timescale. See for instance case SE/2019/2016 mentioned below.

42 Article 65 of the Code contains specific provisions for the definition of a transnational market.

43 E.g. market 3a: Italy and Poland; market 3b: Germany, Ireland, Lithuania, Poland, Portugal, Spain and the UK.

Sweden[44] is a relevant example of this evolution towards increasing geographical heterogeneity of competitive conditions within a Member State. In its last market analysis, the Swedish NRA (PTS) defined a separate market for fibre. The fibre market was characterised by the presence of numerous non-overlapping fibre networks that typically reach very high market shares in their coverage area. Moreover, those networks were found to be unlikely to expand into the coverage area of a different fibre network. The Commission, supported by BEREC, contested PTS's definition of a national market under these circumstances because of the lack of demand and supply side substitution of wholesale access between non-overlapping networks. The Commission argued that PTS should have considered local geographic markets to reflect better the competitive situation in the country.

The SMP Guidelines and the 'BEREC Common Position on geographical aspects of market analysis'[45] already provide some guidance on geographic market definition. However, as the analysis of cases shows (see table 2), NRAs usually look at the intensity of the competition, but through very diverse criteria and thresholds.

Table 2: Criteria used by NRAs for segmentation of markets or remedies (by 29-02-2020).

	Market 3a	**Market 3b**	**Market 4**
Number of significant alternative operators	1&2 (BE*) 2 (ES, HU, IT, PL)	1 (FR), 1&2 (BE*), 2 (PT, HU, IE, IT, LT, PL), 3 (DE)	1 (FR, AT), 2 (PT, IE)
Competitors' market share[46]	10% (ES) 15% (HU)	10% (ES, IE), 15% (HU), 25% (LT)	
Competitors' coverage	20% (ES), 50% (BE, LT) 60% (HU), 65% (PL**) 75% (DK**)	30% (IE), 50% (PT, BE), 60% (HU), 65% (SI, PL**), 70% (LT**), 75% (DK**)	50% (PT), 75% (IE)
Market share of incumbent	40% (DK, IT***), PL) 50% (ES, HU), 80% (IT****)	40% (DE, DK, SI, IT***, LT, PL), 50% (ES, HU, IE, PT), 80% (IT****)	40% (AT), 50% (PT, FR)

* Different regimes if there are 0, 1 or 2 alternative operators on top of the incumbent.
** Cumulative coverage of alternative operators.
*** Retail market share
**** Wholesale market share

44 Commission decision C(2020) 619 in Case SE/2019/2216.

45 BEREC Common Position (BEREC CP) on geographical aspects of market analysis (definition and remedies) of 5 June 2014, BoR (14) 73.

46 When not specified, it is the retail market share.

In light of the market and regulatory developments described above, the Commission services consider useful to provide further clarifications on the geographic analysis.

In the first place, NRAs should define a basic geographic unit on which to perform their initial assessment of competitive conditions. Analysis of such units should be the starting point for the delineation of the geographic market. Based on the analysis at the level of the chosen unit, NRAs may aggregate geographical units that exhibit the same competitive conditions into a single geographical market. Once this geographic market definition is complete, NRAs should subsequently perform the SMP assessment and imposition of remedies on each of the geographical markets defined.

As regards the geographic unit that should be chosen as the basis for the analysis, the Commission has frequently stated that NRAs should ensure that this unit: (a) is of an appropriate size, i.e. small enough to avoid significant variations of competitive conditions within each unit but big enough to avoid a resource-intensive and burdensome micro-analysis that could lead to market fragmentation, (b) is able to reflect the network structure of all relevant operators, and (c) has clear and stable boundaries over time[47]. As regards condition (b), NRAs can use the geographical survey of network deployments required by the EECC[48] if sufficiently robust. NRAs can define units reflecting network topology (e.g. areas covered by a main distribution frame (MDF) / optical distribution frame (ODF))[49]. However, as noted by the BEREC Common Position, this approach is harder to follow when more alternative infrastructures are rolled out and do not necessarily follow the same structure[50]. NRAs may therefore also use appropriate administrative units or proxies – including, but not limited to, municipalities, postcodes, or telephone code areas. NRAs should select the most relevant unit according to country-specific circumstances.

NRAs should first assess whether there are any variations in competition at retail level, assuming, according to the modified Greenfield approach, the absence of SMP based regulation. There could be variations namely in the number of infrastructure-based suppliers (including, where available, cable), quality and prices available, or in wholesale market shares (including self-supply). If competitive differences are found at retail level, a detailed geographic analysis should be conducted at the wholesale level.

Following the principles of competition law, and based on the analysis of the geographic units previously described, NRAs should establish a preliminary definition of the scope of the geographic markets by aggregating together the geographic units previously examined. They should do so on the basis of indicators such as (a) the number of competing networks, (b) their distribution of market shares, (c) a preliminary analysis of pricing and price differences at regional level and (d) behavioural patterns. They should then check and adjust their resulting definition of geographic markets against an analysis of demand and supply side substitutability, as the above

47 SMP Guidelines, par. 49.

48 EECC, art. 22.

49 ES/2015/1818 and ES/2015/1819.

50 BEREC CP, par 87.

indicators could be considered as a proxy for the geographic delineation of markets but should not be treated as the only decisive factor[51].

Criterion (a) should be an important factor in the analysis, as the Code specifies that NRAs should define relevant geographic markets within their territory by taking into account, inter alia, the degree of infrastructure competition in those areas[52]. The mapping of networks foreseen in the Code, where relevant, can once again be useful for that purpose[53]. Networks should be counted if they allow to reach end-users independently (i.e. they should not rely, even partly, on another operator's network unless the operator benefits from symmetric access[54] and if they cover a significant share of end-users in the chosen geographic unit. In addition, if the number of suppliers is identical between geographical areas but the identity of these suppliers differ – especially for the main suppliers - NRAs should consider such areas as different markets. The presence of wholesale-only operator(s) and/or of co-investment agreements can have a significant impact on competitive behaviour. They may be taken into account already at the level of market definition, on a case-by-case basis[55].

Analysis of criterion (b), both at retail and wholesale level, can help to assess the effective level of competition faced by an operator. Retail market shares can usefully supplement data on network coverage, in order to determine whether the SMP operator faces significant competition at retail level. However, in the context of the modified Greenfield approach, it might be only a partially relevant indicator if retail market shares reflect the effects of a past or ongoing regulation of the corresponding wholesale market. NRAs should therefore also take into account wholesale market shares[56].

As regards criterion (c), pricing differences can be useful to assess if competitive conditions differ in various areas. Higher prices in an area can for instance reflect higher costs due to specific geographic conditions, possibly indicating higher barriers to entry. NRAs should however be cautious in using price levels to assess differences of competitive conditions. It should in particular be noted that the presence of a uniform price in an area – possibly the Member State – does not automatically mean that the area constitutes a single geographic market[57].

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51 In the same way, as under competition law, the market share of 40 % or above is a presumption of potential dominance, but cannot be considered, without further analysis, as a proof of dominance.

52 EECC, art 64.3.

53 EECC, art 22 and Article 64(3).

54 According to the modified Greenfield approach, networks can however be counted even if they rely on access to another network, if such access is based on Article 61(3) of the Code or on the BCRD.

55 IT/2019/2181.

56 See for instance cases IT/2019/2181-2, where AGCOM used both retail and wholesale market shares to segment geographically markets and remedies on markets 3a and 3b.

57 See case SE/2019/2245 as well as the BEREC CP, par. 113 and BEREC opinion on SE/2019/2245.

Criterion d) can include elements both on the supply side, such as localised marketing strategies, and on the demand side, such as differences in the level of customer switching and/or churn as well as differentiated demand in terms of speeds and or bundles[58].

In the context of the geographic market definition, demand-side substitutability refers to the ability of customers to switch to suppliers located outside of their hypothetic geographic market in reaction to a price increase. It is likely to play a limited role for the analysis of fixed-networks, as customers can only be served by a network that connects to their premises.

Analysis of supply-side substitutability, however, is likely to be an important factor in NRAs' approach, and contributes to make it more robust from a forward-looking perspective. It refers to the ability of alternative suppliers to enter the geographic market in reaction to a price increase. NRAs should therefore take into account the potential for deployment, using a range of cumulative indicators. These can include the presence of an alternative network in a neighbouring area or of an alternative network in the area considered that does not yet reach end-users' premises. They can also include indicators of a favourable business case, such as a high population density or a low retail market share of the potential SMP operator. NRAs may combine these indicators with rollout plans from network operators, especially if such rollout is already underway.

NRAs have usually defined two types of geographic markets: competitive and non-competitive areas. However, intermediary situations between fully competitive areas and areas with very little or no competition should be reflected already at the level of geographic market definition. For instance, competitive conditions in areas with only one network can already significantly differ from areas with two competing networks and even more from areas with a multiple networks' presence. However, it should be recalled that whether a market is competitive or not is for NRAs to determine taking into account local circumstances, and that there is not a single number of competing networks that would automatically qualify a market as competitive. Moreover, as mentioned before, the number of competing networks is an important criterion to assess competitive conditions but NRAs should also analyse other criteria and not conclude their assessment solely on the basis of the number of networks.

Geographic segmentation of markets and of remedies are not mutually exclusive[59]. Geographic differences of competitive conditions that are significant and sufficiently stable over time are in principle to be treated at the level of market definition[60]. The present methodology encourages in particular NRAs to adopt a forward-looking approach in order to proceed to a robust market definition. Moreover, in accordance with recital 181 of the Code, if dynamic competitive conditions require it, NRAs should conduct market reviews more often than the 5-year maximum period foreseen by the Code but not earlier than three years after the previous market review, unless there are significant developments on the market. This ensures a right balance between the

58 See for instance UK/20017/0733.

59 See for instance IT/2019/2181.

60 SMP Guidelines, par. 50.

need to adapt the market review to the evolution of competitive conditions and the need to provide regulatory certainty to operators and to avoid disproportionate administrative burden for NRAs. Geographical differentiation at the level of remedies should be limited to less significant or less stable variations of competitive conditions than mentioned previously. It might for instance be used by NRAs for a periodical or punctual update of remedies, in accordance with Article 68(6) of the Code. The market review may foresee such reviews and the criteria to be used for that purpose.

In any case, a granular geographic analysis should be done first, in order for the NRA to determine whether a geographic segmentation is necessary or not, and whether it should be done at market definition level, at remedies level, or both. It should indeed be noted that both approaches are not mutually exclusive: NRAs may for instance define separate local markets and differentiate remedies within these.

In conclusion, market trends indicate growing differentiation of competitive conditions within most Member States, some of which can be expected to last for a long time. Therefore, without prejudice to the conclusion reached by NRAs on the geographic market definition, the Commission services emphasise the importance of a proper geographic analysis and of applying the bottom-up approach recommended above.

3. HORIZONTAL ISSUES

3.1. Technological developments

An understanding of the technological dimension is of paramount importance for the relevant markets defined in the Recommendation. Performance of alternative technologies directly determines the type and degree of replacement that may be possible for end users, while at the same time, it is also important to evaluate what types of access can be provided via different technologies and the degree of freedom a wholesale access seeker may have when designing its own product using the wholesale input. The objective of this section is therefore to synthesize the main past, current and future technological trends and developments that have and will continue to have an impact on competition at retail level and on the boundaries of the relevant markets during the period of this Recommendation.

3.1.1. Retail level

The performance of access technologies is primarily determined by the physical characteristics of the medium that is being used: twisted pair copper in an unshielded or shielded manner, coax, optical fibre or radio waves. The performance is subsequently determined by the way the medium is accessed and the efficiency of the transmission protocols used.

Analysis of household behaviour and upcoming digital use cases suggests that both residential and business consumers will increasingly require very high capacity connections of up to 1Gbit/s and more in the coming 5-10 years, to meet their needs, such as use of improved video standards, cloud services, applications based on virtual and augmented reality, artificial intelligence (AI)

applications, automated driving, logistics and manufacturing processes. Increased symmetry of upload and download speeds and low latency will be required for some of these applications. In addition to high and symmetrical guaranteed data rates and low latency, redundancy and high service levels are already vital for high-end business needs such as big data processing.

The Internet-of-Things (IoT) introduces a wide variety of new end-users, with a wide range of communication needs, both in terms of consumer IoT and industrial IoT. These new classes of end-users typically require a different treatment and require dedicated high capacity connectivity to be available in locations where it was not previously developed (e.g. alongside roads or to remote businesses and farms).

Fibre networks

Deployment of full fibre networks to homes and businesses has accelerated since the last Recommendation was adopted in 2014. A significant gap can be observed between the technical capabilities of current generations of upgraded copper and those of fibre-based technologies. Current and upcoming copper upgrades like G.fast and G.mgfast[61] can address the existing gap to some extent, but further upgrades to Fibre to the Home (FttH) technologies[62] are set to largely surpass the expected performance available via upgraded copper networks during the next decade. Additionally, fibre networks are not only the most advanced technology but also the most cost efficient and carbon efficient solution currently available on the market. All these factors cause a shift in strategy towards fibre installation, with at least regional FttH deployment even in countries in which the incumbent's initial focus was on Fibre to the Cabinet (FttC), very high speed digital subscriber line technology (VDSL)[63], vectoring[64] or G.fast. Cable operators' investment strategies mostly rely on the upgrade of existing networks with DOCSIS 3.1[65]. However, when expanding their existing footprint, cable operators mostly deploy FttH technology and it is reasonable to expect that in the period towards 2030, all cable operators will adopt an FttH deployment strategy.

61 G.fast is the latest generation of copper broadband technology that is currently deployed. G.mgfast technology represents a further step in development and the G.mgfast standard should be finalised by the end of 2022.

62 XGS-PON is a technology that can deliver upstream and downstream (symmetrical) speeds of up to 10 Gbit/s and Next-Generation Passive Optical Network 2 (NG-PON2) represents a new generation of PON technologies.

63 Fibre to the cabinet (FttC) is a telecommunications system based on fibre-optic cables run to a platform (located in a cabinet) that serves several customers. Operators in the cabinets generally use very high speed digital subscriber line technology (VDSL).

64 Vectoring is a transmission method that requires the coordination of line signals for reduction of crosstalk levels and improvement of preformance.

65 Cable specification realised in 2013. It provides for 10 Gbit/s downstream and 1-2 Gbit/s upstream.

5G networks

5G is the latest developed generation of wireless communication technologies supporting cellular data networks[66]. 5G will enable a vast coverage of new applications across the economy in both private and public sectors in addition to its consumer dimension, in fields like logistics, connected mobility, intelligent cities, infotainment, health care, and the IoT. In Europe, a number of pilot projects are currently being run; the impact of the new technology and services on the market remains to be seen.

5G has three main specific areas of application:

- eMBB – enhanced Mobile Broadband: up to 10Gbps peak speed. Average speed can be expected in the range 0.5-0.6 Gbps in dense urban areas;
- mMTC – massive Machine-type Communication – up to 1 million devices/km2;
- uRLLC – ultra Reliability Low Latency – 1-10 msec.

It is expected that initial 5G services will mainly be focussed around enhanced mobile broadband and potentially 5G Fixed Wireless Access (FWA). FWA based on 5G could offer downlink data rates which are equivalent to downlink data rates offered on some currently used fixed technologies [67], while the ITU IMT2020 [68] specification for 5G should offer even better performances in terms of speeds and latency. However, it is not expected that 5G in any of the coming specifications will outperform 1 Gbit/s FttH Ethernet in a point-to-point (PtP) topology (1000BASE-X[69]). 5G will also support diverse IoT use cases based on new radio capabilities. Taking into account the need for increasing industrial reliance on connectivity, the new wireless or mobile IoT applications will likely require in the coming years a dedicated fixed connectivity to key sites coupled with 5G.

Terabit connectivity

Shared media technologies or infrastructures are not suitable for many large business customers. These require terabit access to cloud infrastructures and High Performance Computing centres (HPC) based on a PtP fibre topology and switched optical transport network (OTN) nodes. The

66 See Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee and the Committee of the Regions 5G for Europe: An Action Plan, COM(2016) 0588. The European 5G Observatory monitors market developments and preparatory actions taken by industry stakeholders and Member States in the context of 5G roll-out in Europe and beyond. The Observatory helps the Commission to assess the progress of Europe's 5G Action Plan, and take action to fully implement it.

67 VDSL2, VDSL2-Vector and VDSL2-35b, for DOCSIS 3.0 through 4.0, and for BPON, GPON, XGPON and XGS-PON from 2017.

68 International Mobile Telecommunications-2020 (IMT-2020 Standard) are the requirements issued by the ITU Radiocommunication Sector (ITU-R) of the International Telecommunication Union (ITU) in 2015 for 5G networks, devices and services.

69 1000BASE-X is used in industry to refer to gigabit Ethernet transmission over fibre.

development of big data analytics, requiring two-way access to high performance computing facilities, is also likely to require dedicated connections, with some links needing terabit connectivity to support real-time processing of data by HPCs. This need is further escalated by the European EuroHPC [70] project for supercomputing facilities, with the objective to develop European HPC infrastructure based on Exa-scale Systems, connected by a Terabit network infrastructure with the N-REN (National Research and Education Networks) of the Member States. It is envisaged that these HPCs could provide access to the computation infrastructure not only for the science and public research community, but also to other stakeholder groups such as hospitals, large, medium and small enterprises and even small/home offices and student homes. Taking all this into account, it is clear that in the future we can expect increasing need for dedicated connectivity as the only way to provide terabit connectivity.

3.1.2. Wholesale level

Technologies in and by themselves can also influence the degree of retail competition that is possible in cases where there is a limited number of parallel infrastructures. For instance, the degree to which a particular service is tied to a particular technology or the degree to which technologies can be physically unbundled or can allow for a variety of virtual services to be offered as such can affect the degree of competition that is possible via wholesale access. The limitations defined by the used technologies also influence whether a wholesale access seeker would consider two wholesale products to be functional substitutes. Taking all this into account, the main trends like decreasing usage of physical access, wholesale access to upgraded copper networks or xPON[71] based networks in the form of Virtual Unbundled Local Access (VULA) [72] and network-slicing technologies will be important in the upcoming ten years.

Prospects for physical unbundling

Physical local loop unbundling (LLU) [73] at the local exchanges was the basis of infrastructure-based competition in the last two decades. It resulted in unbundling by operators of the copper access lines as the main access product in the denser populated areas of a country. However, the deployment of VDSL2 and G.fast copper technologies have shifted the active equipment from the local exchange towards the end-users (first to the cabinet then to the distribution point located even closer to an end-user). This undermined LLU and resulted in an economically non-viable sub-loop unbundling (SLU), as explained below in section 4.1.3 .

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70 The EuroHPC Joint Undertaking is a legal entity which enables pooling of EU and national resources in HPC.

71 A PON is a P2MP passive optical network: x stands for different technologies GPON, XG-PON, XGS-PON, NG-PON (only using part of the wavelength for one operator).

72 See dedicated section below.

73 LLU refers to the process in which operator with SMP lease, wholly or in part, the local segment of their access/distribution copper or fibre network to a competitor.

In parallel, FttH networks are mostly deployed using Point to Multipoint (PtMP) topology with splitters closer to the end user (e.g. cabinet, distribution point located even closer to an end-user) and physical unbundling at the last splitter towards the end user is in most cases not economically feasible, as an alternative operator would need to deploy fibre very close to end users. Fibre unbundling is viable with PtP network architectures that move the concentration point higher than cabinets or distribution points in the network, or with new technologies such as Wavelength Division Multiplexing (WDM)[74]. However, fibre unbundling is still not available in many markets, and where it is available, it may be geographically limited.

Therefore, it is expected that in general physical unbundling will in many cases become less important over the course of the next 10 years.

Virtual Unbundled Local Access (VULA)

In the 2014 Recommendation on Relevant Markets, the Commission introduced the concept of VULA as an alternative to the use of physical unbundling where fibre physical unbundling was not technically or economically possible, or where copper physical unbundling would not allow the realization of benefits achieved by using vectoring technologies. VULA should provide, to the extent reasonably possible, the wholesale access seeker with the same degree of product functionality as physical unbundling. VULA is defined as an access product provided at local level; however, virtual access products provided at different handover points may be designed with similar characteristics[75]. VULA is already the most common wholesale access product in case of upgraded twisted pair copper access[76] as well as in case of xPON based networks, because many alternative operators climbed the ladder of investments and developed their own networks to the local access point.

With the transition to DOCSIS 3.1 FD (4.0) and the implementation of an optional feature of Business Service over DOCSIS (BSOD)[77] accompanied by the full digital use of the coax cable spectrum, a Very High Capacity (VHC) bitstream or VULA equivalent could also be defined for DOCSIS-based access networks. In practice, the BSOD prerequisites for VULA offering are likely to be installed by DOCSIS 3.1 FD (4.0) operators, only if they are required to do so, or have sufficient spare capacity and face a competitive situation, which forces them to fill their network with wholesale instead of directly contracted retail customers [78].

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74 The introduction of WDM in optical access networks provides an opportunity to assign different wavelengths to different operators, i.e. it allows for a functional equivalent unbundling of the access based on wavelengths.

75 See also BEREC Opinion, BOR (20) 174, Page 20.

76 FttC/VDSL and G.fast.

77 Business Service over DOCSIS: allows for transporting L2 Services with dedicated capacity and QoS and thus enables VULA like services if sufficient upstream capacity can be provided.

78 Source: WIK report, chapter 2.7.2.

Given the migration trends from passive access products towards VULA, a properly specified VULA product could become the main wholesale access product in the future.

Software Defined Networking (SDN) and Network Function Virtualization (NFV)

Another development that may enhance the potential for service providers to innovate based on wholesale access is the emergence of Software Defined Networking (SDN) and Network Function Virtualization (NFV). These technologies facilitate the so-called slicing of networks, i.e. the creation of virtual networks that can be tuned towards the needs of particular user groups or to particular users, such as Mobile Virtual Network Operators (MVNOs) in case of mobile networks or Fixed Virtual Network Operators (FVNOs)[79] in the case of virtualized fixed networks. Through virtualization, MVNOs/FVNOs can have the same degree of network control as MNOs/FNOs[80]. This would remove any differences that exist today between the services provided by operators using bitstream or VULA access and the services that are provided by the incumbent operator. However, this requires that services management via application programming interfaces (APIs) is opened-up to the virtual network operators in a multi-tenant manner. The open question is whether this will allow access seekers to offer distinct products from those access products the access provider offers. This will depend on the suppliers' capability to offer multi-tenant Operations Support Systems (OSS)[81] and network operating systems and the demand from and willingness of access providers to procure such solutions. SDN/NFV-based network systems are already implemented in some networks, and thus are in the process of penetrating the network platforms of the operators. However, since the features required for providing VULA-based services are not mandatory elements of the SDN/NFV implementation, a regulatory obligation to provide VULA features and characteristics would still be required to ensure that this solution is taken up. If these characteristics can be met, the point of handover for the VULA services can be migrated from local to a regional level, following the trend of longer access network links associated with fibre transmission conditions.

79 Mobile Virtual Network Operator (MVNO) and Fixed Virtual Network Operator (FVNO) do not possess the network infrastructure, instead they provide telecom services by acquiring the required capacity from other operators. These network providers are classified as virtual because they offer network services to clients without possessing the actual network.

80 Mobile Network Operators (MNO) and Fixed Network Operators (FNO) possess their own network infrastructure.

81 Operations Support Systems (OSS) are computer systems used by telecommunications service providers to manage their networks.

3.2. Market trends

3.2.1. Personal communications

Since 2014, the take up of fixed and mobile broadband has increased across the Union, but growth in terms of number of connections has recently slowed down due to saturation of the market.[82] The amount of mobile data traffic has increased significantly over that time period and is expected to increase further at growing pace. A 2.6 fold increase in mobile data traffic per smartphone in Europe between 2019 and 2025 can be expected. Differences persist between Western Europe and Central and Eastern Europe in the number of GB used per month[83].

The demand for mobile broadband has increased due to the proliferation of additional connected devices[84] and the increasing availability of unlimited, or more generous mobile data plans. Internet video streaming is projected to be the dominant factor for personal internet traffic, both on fixed and mobile networks, and will continue to grow. However, according to IDATE estimates, pay-TV revenue reached a high point in 2018 and will begin to decline slowly[85].

While the volumes of mobile voice calls have remained relatively stable over the last years, there has been a decline in the volumes of fixed calls in many countries, and an even steeper decline in the use of SMS. Managed telephony is likely to stagnate or decline in the coming years. However, it remains a core service for certain users and use cases. At the same time, the usage of OTT voice and messaging services will further increase. Indeed, it is expected that data transmission will form the basis of the vast majority of communications services and managed voice services will have fully migrated towards IP in most cases.

3.2.2. Internet of things and machine to machine communications

Internet of things (IoT) and Machine-to-Machine (M2M) communications are expected to grow significantly over the next years[86]. The number of M2M devices has increased significantly in recent years and will soon overtake the number of personal devices globally. They are expected to account for more than 60% of connected devices in Western Europe already by 2022 and the

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82 In 2019, there were 96 mobile and 35 fixed connections per hundred population in the EU. Source: WIK report, chapter 3.1.1.

83 Ericsson predicts data consumption to increase from 10GB in 2019 to 37GB in 2025 in Western Europe, while in Central and Eastern Europe, data consumption will increase from 7GB in 2019 to 24GB per month in 2025, triggered by the continuous increase in video consumption over mobile data (through streaming and VoD services and embedded video). Source WIK report, chapter 3.1.1.

84 Cisco predicts that the number of devices per capita will increase from 5.4 to 9.4 in Western Europe between 2017 and 2022. Source: WIK report, chapter 3.1.1.

85 WIK report, chapter 3.1.1

86 Staff Working Document: "Advancing the Internet of Things in Europe", accompanying the document "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Digitising European Industry - Reaping the full benefits of a Digital Single Market COM(2016) 180.

related traffic is expected to increase significantly from 0.8 GB to 2.1 GB per device and per month[87].

5G will play an important role for M2M communications. 5G is expected to be deployed from 2020, and IDATE forecasts that it will represent 8.7% of total M2M SIM cards by 2023. The automotive market and data-hungry applications are expected to support the early adoption of enhanced mobile broadband (eMBB). The massive use of IoT devices is expected to follow after 2022[88].

3.2.3. Digitisation of the workplace and industry

Business communications have seen a clear trend towards remote collaboration and the virtualization of the workplace. This trend has been drastically accelerated due to the Covid-19 crisis in early 2020 and is likely to remain. The usage of integrated audio – video solutions and web conferencing has increased and is expected to grow further at a higher pace. The trend towards full virtualisation of the workplace requires support through cloud services to enable the virtualisation of business applications, data centres, security and data storage.

Digitisation of industry refers to the development and industrial use of digital applications and services such as IoT, cloud computing, big data, artificial intelligence and robotics to improve processes and business productivity. Recent studies estimate that digitisation of products and services can add more than EUR 110 billion of annual revenue to the European economy in the next five years[89]. Indeed, in all Member States, actions have been taken to support the digitisation of industry, with a particular focus on the manufacturing sector[90].

As is pointed out in the Commission's European Strategy on Data, the digital transformation of the Union's economy depends on the availability and uptake of secure, energy-efficient, affordable and high-quality data processing capacities, both in data centres and closer to the user "at the edge". Indeed, a new data paradigm can be expected to emerge, where proportionately less data will be stored in data centres, and more data will be spread in a pervasive way 'at the edge'[91].

Moving forward, those trends will show a clear intensification. The global cloud data centre traffic is expected to reach 19.5 zettabytes (ZB) per year by 2021, up from 6.0 ZB per year in

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87 Cisco (2020): Annual internet report (2018–2023), White paper, retrieved from: https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.html, retrieved: 2020-05-04.

88 WIK report, chapter 3.1.2.

89 https://ec.europa.eu/digital-single-market/en/policies/digitising-european-industry.

90 https://ec.europa.eu/digital-single-market/en/news/workshop-monitoring-progress-national-initiatives-digitising-industry.

91 Communication from the Commission A European strategy for data, COM(2020) 66 final of 19.2.2020, page 9 -11.

2016[92]. The increasing demand will be supported by an increased number of large-scale public cloud data centres.

3.2.4. Standard broadband for business use

As networks are upgraded and are able to achieve higher data throughput, the connectivity needs of businesses can increasingly be met in full or in part over a standard broadband connection, such as FttC[93], FttH and cable connections, thanks to SDN and virtual private networks (VPN)[94]. Suppliers of business applications and VPN functionalities are more and more independent from the suppliers of the broadband connection. Moreover, encryption techniques are implemented to ensure that company data can be securely placed on 'the public internet'.

We expect that in the future the trend towards virtualization, through SDN and NFV, will increasingly enable network slicing and allow services to be better tailored towards the needs of business users.

3.2.5. Entry of new economic actors and operators' response to new emerging competition

OTT-based services have emerged and gained significant importance as a competing force to certain retail services, in particular with respect to video content, cloud services, IoT services etc. Some, in particular incumbent operators and other large telecommunication infrastructure owners, reacted and have sought to develop similar products and try to compete in those retail markets (for example by launching their own OTT video content or by bundling of OTT offers in the case of consumer services; by supplying cloud and IoT in the case of business services). Other operators have reacted to the emergence of OTT services and their retail success by solely focussing their commercial activities at the infrastructure level as "wholesale only" providers.

Entry into electronic communications markets by non-telecoms operators such as utilities (energy, railway) or operators linked to municipalities has expanded in recent years, in many cases as a response to the failure of incumbent operators to upgrade their networks towards gigabit capabilities. As these types of operators do not have an existing retail customer base and/or (in the case of municipalities) may intrinsically prefer to avoid competing with commercial retail service providers, many have pursued a wholesale only approach.

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92 WIK report, chapter 3.1.2. for further reference.

93 WIK report, chapter 5.1.2.

94 Already today, a significant number of "high quality" lines provided to businesses have been offered via "mass-market" broadband technologies, including FttH/B, FttC and cable, while the number of symmetric dedicated connections for business (leased lines provided via point to point FttP or copper) has remained stable or in some cases (especially for copper) has been in decline.

3.2.6. Trends in infrastructure deployment

Fixed networks

The deployment of full fibre networks to homes and businesses has accelerated since the adoption of the 2014 Recommendation. FttH and FttB together represent 19% of Union broadband subscriptions[95] or 31% of total NGA subscriptions. However, compared to global frontrunners such as South Korea and Japan, Europe as a whole continues to lag behind in the deployment of these technologies[96].

The relatively low EU-wide coverage rates for FttH entail significant variations between EU Member States. While FttH/B coverage is high in several countries including Spain, Portugal, Scandinavian countries and much of Eastern Europe, including Latvia, Bulgaria and Lithuania, full fibre coverage remains limited in Germany, Italy and Belgium, and is fragmented in France and the Netherlands. In the case of Germany, Italy and Belgium the initial focus for the incumbent was on FttC/VDSL, supplemented with vectoring in Germany. However, today there is a clear trend towards FttH deployment in all Member States from both incumbents and alternative operators, at least at regional level.

Cable operators, which are present across the whole of Belgium, the Netherlands and Malta, and in some regions of other countries including Germany, Spain, France, Poland, Portugal and Ireland, have mainly pursued incremental investment strategies relying on the upgrade of existing networks with DOCSIS 3.1[97].

At retail level, technological developments have generally led to inter-platform competition between services provided via fixed networks, as retail services provided over different platforms have been found to be functionally equivalent and increasingly interchangeable from the demand-side perspective. As a result, regulators have established a high degree of substitutability between broadband services delivered via VDSL and coaxial cable from consumers' perspective, because of their similar characteristics and costs. Indeed, in some Member States[98], access seekers found access to cable preferable over access to the incumbents' FttX network, because of the availability of higher speeds and overall better performance of the network. The functional equivalence at the

95 FttH/B is the most widely used technology in Lithuania, Latvia, Sweden, Romania, Spain, Bulgaria and Finland.

96 Digital Economy and Society Index (DESI) 2020, Connectivity.

97 WIK report, chapter 3.3.1.

98 French cable operator Numericable initially provided cable access on a commercial basis to operators such as Bouygues Telecom. Following the merger between Numericable and SFR, the French competition authorities mandated the supply of cable bitstream by the merged company. The Commitments originally made in 2014, were however not renewed at the time of the Competition authority's review in 2019. Also TDC, in Denmark, has played a more active role in the provision of cable-based bitstream access since launching a commercial offer (in use since April 2016) for alternative telecommunications companies to access its cable TV network. (Source: WIK report, page 180).

retail level of internet access over VDSL and over cable networks is generally accepted. Also retail prices are usually similar[99].

At wholesale level, regulated access to cable networks is currently only available in Belgium and in Denmark based on a centrally provided bitstream product.

The potential for duplication in FttH varies according to population density and these variations are relevant in considering the need for geographic segmentation of the market or differentiation of remedies. FttH requires significant investments, which can affect the degree to which access networks can be profitably duplicated. Theoretical models suggest that there are areas, which can commercially support only a single fibre network or areas which cannot support the commercial deployment of such networks and that subsidies are required. Moreover, the presence of cable beside competing traditional FttX networks can also limit the degree to which additional replication is commercially viable [100] . However, the prospects for duplication of FttH infrastructure can be improved, at least in dense urban areas, through duct access. Even where end-to-end duplication of the network is not viable, competitive access can also be provided through various co-investment models, or through regulated or commercial wholesale access.

As investment in FttH require high market shares to be viable, there has been a trend in some markets towards co-investment based on joint ventures or infrastructure swaps. In other Member States or areas (e.g. Italy, Sweden, France's Public Initiative areas), wholesale only models have emerged to aggregate traffic on fibre networks. Wholesale only models with their reduced incentive for discrimination have the capacity to improve competition in access-related markets characterised by persistent problems, making it easier for compliance with non-discrimination obligations to be verified and enforced while maintaining incentives for investment in new networks. Another supporting factor for wholesale only networks has been an influx of capital from financial investors, who see fibre networks as a utility type of asset, providing a stable stream of revenues over a relatively long expected lifetime of about 50 years while the risk is perceived as relatively low.

In the coming 5-10 years, it is likely that fibre will overtake copper as a primary source of electronic communications connections. In most countries, this is expected to be driven by incumbent operators, which progressively upgrade their networks to FttH and the related progressive switch-off of the copper network. Estonia and France, for example, have set concrete milestones for the copper switch-off[101].

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99 Commission Staff Working document accompanying the Guidelines on market analysis and the assessment of significant market power under the EU regulatory framework for electronic communications networks and services of 27.4.2018, SWD(2018) 124 final.

100 WIK report, chapter 3.3.2.

101 WIK report, chapter 3.3.4.

Mobile networks

5G will provide higher bandwidth and will enable operators to provide tailor-made services for the different requirements of different customers in terms of latency, reliability, bitrates, and end-to-end service levels. Although 5G services are likely to be made available in certain areas in the relatively short term, initial 5G services will mainly be focussed around enhanced mobile broadband and potentially 5G FWA. 5G deployments capable of supporting ultra-reliable low latency communication (URLLC) and connected automotive mobility (5G CAM) are likely to take longer, and may only enter into widespread use in the medium term[102].

Fixed-mobile convergence

There is an increasing trend of fixed-mobile convergence both commercially and technically.

Commercial convergence: Customers can purchase different electronic communications services such as IP-TV, fixed internet, fixed telephony and mobile telephony as standalone products or in a bundle. Sometimes these services are sold jointly for a single price and are not available on a stand-alone basis, or comprise various services that are also sold on a stand-alone basis but the sum of the stand-alone prices is higher than the bundled price ("pure bundles"). Other times, services are sold jointly with a discount but those products are also available as stand-alone products ("cross-selling"). A number of Member States have seen an increase in the popularity of commercial convergence at retail level, although the degree varies considerably in different Member States.

Technological convergence: Convergence also has a different aspect as fixed fibre networks are increasingly needed for the transmission of mobile traffic. Mobile networks often use microwave and sometimes fixed-line (e.g. copper, fibre) solutions as backhaul for the transmission of data between base stations and the core network. However, if the current trend of exponential growth in data consumption in mobile networks continues, fibre connections may become necessary for backhaul in mobile networks, especially in the most densely populated areas. This situation will be reinforced by 5G networks, which will require denser networks with smaller cells and thus more cell sites. Significant synergies between integrated FttH and 5G deployments are therefore to be expected.

Therefore, many operators that historically were providing fixed-only or mobile-only services have become converged fixed mobile operators, either by deploying networks themselves or through corporate mergers and acquisitions. However, for those operators that have not succeeded yet in becoming converged operators, fixed-mobile convergence poses questions relating to possible competition concerns. For example, if bundles become prevalent, mobile-only operators (i.e. operators without a fixed network) may be progressively forced out of the market unless they

[102] WIK report, chapter 3.4.1.

can have wholesale access to fixed services. Similarly, fixed-only operators require wholesale access from an MNO to provide mobile services[103].

3.3. Self-Supply

Given that in the context of *ex ante* regulation, NRAs will have to assess whether future regulatory intervention in a relevant market is warranted, the issue of how to take into account the self-provision of wholesale inputs arises frequently in both defining and analysing wholesale markets[104]. In some cases, what is under consideration is the self-supply of the incumbent operators. In others, it is the self-supply of alternative operators.

NRAs should commence the exercise of defining the relevant product or service market by grouping together products or services that are used by consumers for the same purposes (end use). Where self-supply and external supply are undistinguishable from a consumer perspective and services are functionally similar and interchangeable, such self-supply should be considered to be part of the same product market as the services supplied externally[105].

In cases where there is likely demand substitution, i.e. where wholesale customers are interested in procuring from alternative operators, it may be justified to take self-supply of such products into consideration for the sake of market delineation. Even where there is an alternative potential supplier, it may share the same strategic interests as the incumbent regarding supply to third parties. Alternative operators' self-supply should, in particular, be assessed when alternative operators' networks are included in the relevant market due to the strong direct pricing constraints they exert on the incumbent operator. However, this is not justified if alternative operators face capacity constraints, or their networks lack a sufficiently large scale within the relevant geographic market expected by access seekers, and/or if alternative providers have difficulty in entering the merchant market readily.

The correct treatment of self-supply in the market analysis is not only relevant for the question whether the wholesale market comprises only one or multiple network infrastructures. It is also essential in order to carry out a proper market analysis and to identify correctly the competition

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103 Another competitive challenge is that convergence increases barriers to entry in telecoms markets, not only because new entrants would have to be able to offer both fixed and mobile products, but also because consumer switching might be reduced (i.e. switching telecoms operator may become more difficult if consumers have to switch fixed and mobile services at once).

104 The objective of the market definition exercise under Article 15 of the Framework Directive is to assess whether regulatory intervention is warranted in the first place, which justifies a potentially different treatment of the self-supply of wholesale services if compared with *ex post* competition law.

105 See Case AT/2017/2020. The NRA proposed in its draft measure to define a market, excluding self-supply of the SMP operator to its parent company. The Commission required the NRA to withdraw its draft measure, finding that the exclusion of self-supply would not be in accordance with Union law.

problems in the market, which need to be taken into account in the assessment of the appropriate remedies[106].

In addition, in many cases the incumbent operator is the only undertaking that is in a position to provide a potential wholesale service. In the absence of a merchant market and where there is consumer harm at retail level, it is justifiable and appropriate for NRAs to construct a notional market when potential demand exists. Here the implicit self-supply of this input by the incumbent to itself should be taken into account.

4. EXAMINATION OF MARKETS IN ORDER TO IDENTIFY RELEVANT MARKETS FOR THE PURPOSES OF THE RECOMMENDATION

4.1. Access to data and related services at a fixed location

The aim of this section is (i) to describe and define markets for access to generic data services (in particular the provision of Internet service) at fixed locations at a retail level, (ii) to define the linked wholesale markets and (iii) to identify the relevant markets which are susceptible to *ex ante* regulation.

Related to data services at fixed locations, the 2014 Recommendation identified the following markets as susceptible to *ex ante* regulation:

Market 3: a) Wholesale local access provided at a fixed location

b) Wholesale central access provided at a fixed location for mass-market products

Market 4: Wholesale high-quality access provided at fixed location

4.1.1. Retail markets

According to the SMP Guidelines (point 33), when defining the relevant product and services market, NRAs should begin by grouping together products and services that consumers (end-users) use for the same purpose.

As a first step, NRAs should assess, at the retail level, whether, from a demand side perspective, they can observe a difference in demand at the retail level for broadband and broadband-enabled services between different end-users.

Retail mass-market

Residential customers have an increased tendency to purchase bundles, which are combined offers including several different types of services. Despite a large variety of combinations across Member States, services that are being bundled usually include a combination of two or more of the following services: voice, data access, TV, and mobile. It is important to bear in mind that

[106] Case AT/2017/2020.

despite the significant increase in the demand for bundles[107] and although certain operators have a strong tendency to bundle Internet access with fixed telephony, the majority of operators continue to offer stand-alone services besides the bundle, especially in their core businesses. Another important factor when assessing whether a retail market for bundles exists is the increased use of services offered by OTT providers. Those services break the link between network access and service provision. The reason is that users relying on OTT services would usually have no real incentive to subscribe to a bundled plan, as broadband access alone may suffice for the delivery of the required service bouquet. Depending on the outcome of the retail analysis, an NRA might however define a retail market for bundled offers[108].

At the retail level, a number of broadband access possibilities at a fixed location exist. These include copper-based Digital Subscriber Line (DSL) networks (which includes a variety of technologies, such as ADSL[109], ADSL2, ADSL2+, FttC/VDSL), fibre networks (FttB[110], FttH), cable networks and satellite communications, capable of providing retail Internet services and TV.

In addition, from an end-user's perspective, services provided over alternative technologies (WiMAX, mobile and FWA) may, under certain circumstances, also be regarded as a substitute for services over fixed infrastructures. Indeed, WIMAX had been deployed in certain areas in Europe and at a much larger scale in the USA. Meanwhile it has been- overtaken by 4G mobile services. 5G FWA offers more promise as a potential alternative to wireline VHC broadband connections. However, its capabilities lie at the lower end of those available via FttH. NRAs should thus consider whether it offers a substitute on a case by case basis, noting that it may offer a permanent alternative to copper infrastructure in very rural areas, while substitution between FWA and wireline VHC technologies in other areas may depend on the presence of and prospects for FttH deployment[111].

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107 WIK: According to the Eurobarometer survey, almost 60% of respondents said they bought at least two communications services as a bundle. While there are differences between Member States, it is interesting to note that only two countries in the survey had a bundle penetration rate of less than 50% of households.

108 E.g. in the past, some NRAs (e.g. in Greece and Belgium) considered the imposition of the multicast functionality in broadband markets as justified and proportional vis-a-vis the market trends towards the provision of multiple play offers, with the capacity to offer TV services constituting an essential element in the provision of competitive bundled offers. Also, the Dutch NRA defined a retail national market for fixed internet access services.

109 ADSL - Asymmetric Digital Subscriber Line. A technology that enables, for example, rapid access to interactive broadband services and video on demand through copper wire used in existing local telephone loop plant, In its "2+" iteration, ADSL supports one-way transmission at bit rates up to 24 Mbps on a single pair of copper wires and enables subscribers to connect to data networks and the Internet at speeds from 50 to 200 times faster than current analogue modems operating at 28.8 Kbps.

110 Fibre to the house or building are broadband network architectures using optical fibre to create a broadband network for the last mile.

111 WIK Report: Future electronic communications product and service markets subject to ex ante regulation Recommendation on relevant markets, page IV.

As regards mobile data services that are currently widely used (mainly 4G/LTE), significant improvements have been made in mobile downlink data rates across different generations. Already today 4G/LTE is able to provide performance and customer experience comparable to copper based technologies (ADSL , ADSL2, ADSL2+, VDSL). However, fixed technologies have also experienced substantial improvements. While upgrades in more advanced fixed and mobile technologies are made in tandem[112], performance gaps appear to persist between them.

In some Member States, mobile broadband is regarded as substitute to fixed broadband. In particular in areas where the fixed networks have not been upgraded, achievable speeds over mobile networks are similar or even superior to the speeds achievable over fixed networks and operators market the relevant products with generous or unlimited data volumes.[113] In most Members States to date that is not observable and fixed and mobile broadband remain complementary[114].

From a technological perspective, the capacity in mobile networks is increasing and it requires additional transport capacity in the fixed network. In fact, to support increasing data rates the cell deployment needs to become denser which in turn extends the demand for fixed backhaul. 5G is the new generation mobile protocol, which in addition to delivering higher data throughput speeds also allows for the virtualisation of network functions and intelligent management of network elements. Next Generation Access (NGA) and VHCN are defined on the basis of the speeds that can be provided over those networks. Already 4G/LTE significantly improved the bandwidth achievable through mobile connections by bringing mobile broadband services closer to the bandwidth offered by fixed broadband. With respect to 5G, bandwidth is only one of the main characteristics together with latency, reliability and data rates. However, 5G is also a mobile technology, which implies that even if the performance of a fibre-based network could be the same, the possible areas of application are very different.

Mobile technologies are in continuous expansion. Therefore, it is likely already with in the timeframe of this Recommendation, that the potential substitutability between fixed and mobile, particularly 5G, broadband access will need to be considered. This applies in particular in areas that are not covered by fibre networks.

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112 Where the fixed network has not been upgraded to at least NGA, the gap between mobile and fixed broadband performance – if any – is limited and the technologies may be regarded as full substitutes.

113 See case AT/2017/1987-1988, C(2017) 4687 final, regarding the Austrian markets for wholesale local and wholesale central access provided at a fixed location. The NRA found mobile broadband to be part of the residential retail broadband market.

114 WIK Report: "*Already today, while the percentage of mobile-only households is continually increasing in the Union, a majority of customers still takes both fixed and mobile subscriptions: more than half of all households have both fixed line and mobile access (54%), while 37% only have mobile access, 7% only have fixed line access. These figures indicate a greater degree of complementarity than of substitutability between these products in most Member States*.".

Retail market for small and medium enterprises

Data connectivity services provided over the "last mile" connection can, apart from serving mass-market customers, target business clients. As networks are upgraded and are able to achieve higher data throughput, the connectivity needs of businesses can increasingly be met in full or in part over a standard broadband connection, such as FttC, FttH, thanks to SDN and VPNs. While the data throughput of some business users might be fully satisfied with general broadband products, those broadband products might need to be adjusted with heightened Service Level Agreements (SLAs) and performance indicators such as KPIs to enhance e.g. reliability and security of the connection. The prices for that type of business connections tend so far to exceed the price for mass-market broadband. From the demand side perspective, products for business customers therefore tend not to be direct substitutes of mass-market retail products. However, from the supply side perspective, many suppliers of mass-market broadband connections are readily able to also supply certain business products. Therefore, those producs are substitutes from the supply side.

Retail market for large and/or technologically advanced businesses

While the demand for connectivity by small offices/home offices and SME business customers may develop along that of residential customers with a higher level of quality, especially large and/or technologically advanced accounts cannot be satisfied by shared media technologies or infrastructures and will need dedicated capacity.

High-quality users have typically demanded a number of features that were not available to end-users of mass-market broadband connectivity. The target retail customers are for example banks or large corporate customers, which wish to connect their multiple premises located in one or several Member States with a reliable high speed broadband network or purchase complex and bespoke bundles of services combining connectivity with hardware and applications.

The digitization of industry and public interest services may encourage an increasing number of businesses and public services such as hospitals and schools to require also dedicated connectivity. Indeed, the reliance on connectivity is set to increase further with the addition of "smart" applications supported by M2M and IoT e.g. in the fields of smart agriculture, transportation, health, education etc. Moreover, the development of big data analytics, requiring two-way access to high performance computing facilities, is also likely to require dedicated connections, with some links needing terabit connectivity to support real-time processing of data by HPCs.

There is evidence that the needs of these businesses are distinct from the standardised communications services that may be purchased by consumers or some small businesses with lower connectivity needs. Some of the services provided to this segment of users require high and symmetric bandwidths, dedicated capacity, high quality of service metrics (including low latency, jitter and packet loss), high levels of reliability and redundant connections to ensure alternatives

are available in case of failure. In addition, those services are provided through higher SLAs, with short repair times and service desks available 24/7. Due to these specificities, the cost of these wholesale services is typically much higher than the cost of the access products for the mass market.

The entry of mass-market providers into the deployment of FttH could provide a source of alternative supply, as such players may offer point to point FttH or be able to deploy it alongside mass-market PON solutions. Such players could expand the coverage of areas for which competitive supply of dedicated access is available. However, the geographic coverage of mass-market infrastructure-based alternative operators (or regional or municipal providers) is still typically lower than the incumbent one, and thus may not address the problem in its entirety. Moreover, there are zones in which FttH may not be viable, and mass-market connectivity may be provided via wireless solutions. However, even in these areas, it should be possible for major business and public sector customers to obtain a dedicated fibre connection. Even if mass-market providers of FttH are able to supply dedicated capacity in the areas in which they have deployed infrastructures, they may still need access to wholesale dedicated capacity outside their networkfootprint to compete for multi-site contracts. Otherwise, the incumbent for the time being might still maintain an advantage for multi-site contracts, because of the ubiquity of its network.

Therefore, both from the demand side and supply side perspective, some business products cannot be substituted with mass-market retail products.

Analysis of the retail markets

Any analysis of a wholesale market must be preceded by an assessment of the competitive conditions at the related retail market absent regulation. If, based on a modified Greenfield scenario, the retail market would not be competitive absent wholesale regulation, the NRA should first examine the most upstream wholesale market. Conversely, where retail markets are found to be effectively competitive even in the absence of wholesale regulation, NRAs should conclude that regulation is no longer needed at wholesale level and withdraw existing regulation on the corresponding wholesale markets.[115]

After imposing regulatory remedies at the most upstream wholesale level, the modified Greenfield assessment should be carried out in order to assess if the retail market is competitive. If this is not the case, an additional layer of *ex ante* regulation of a more downstream market might be necessary as well. If one or more operators hold SMP in any such wholesale market, the NRA should impose *ex ante* regulation.

Evidence gathered through the Article 7 procedure suggests that, although retail broadband markets are not yet fully effectively competitive across the Union absent regulation, in many

115 See i.a. Recital 29, 168 and 169 of the EECC

Member States there are important market entrants (e.g. cable operator or local fibre operators) that introduce infrastructure based competition, often on a regional scale[116].

If there are competing infrastructures present with significant coverage in a given geographic market, which are providing equivalent user experience, a retail market competitive problem absent wholesale regulation should not be assumed solely based on the number of infrastructures present, but should be further supported by analysis of other structural and behavioural elements.

However, in most Member States, retail competition and choice between providers for consumers and businesses continues to be heavily supported by the presence of SMP regulation at wholesale level. If SMP regulation were removed, it is likely that the degree of competition would be much more limited. This is due to the high sunk costs involved in deploying electronic communications infrastructure, which affects the degree to which this infrastructure can be viably duplicated at least in some geographic areas.

In many Member States, the business market segment is experiencing an increasing competitive pressure in particular in more densely populated areas and business districts and in the higher speed segment. Nevertheless, in the absence of appropriate wholesale regulation, the fixed incumbent would continue, in principle, to be the only operator with a ubiquitous local access network. This means that in certain areas, where alternative infrastructures are not present, the incumbent could be incentivised to act as a monopolist, for example by charging excessive prices. In particular it may also be able to do so vis-à-vis those customers who require multi-site access and procure services from a single supplier.

Having in mind the above, the three criteria test has been applied to the related wholesale markets below.

4.1.2. Wholesale inputs to fixed broadband access

In order to supply broadband access to Internet and related data services to an end-user at a fixed location, a suitable communication channel is required that is capable of passing data in both directions and at rates that are appropriate for the service demanded. Therefore, any undertaking willing to provide broadband services to end-users has the choice to either build such a communication channel network to their locations or obtain access to an already existing infrastructure.

Access to the network can be granted at several network levels, potentially allowing the access seeker to replicate each of them. Full replication of the network access occurs when operators can build the entire access transmission channel to an end-user location, i.e. the local access or local loop. Following a typical demand and supply substitutability analysis, networks access products may fall into different broadband wholesale access markets.

[116] Strong presence of alternative infrastructure which had an impact on regulation at regional level is visible e.g. in Germany, Italy, Poland, Sweden, and Spain.

A key trend that has accelerated since the last Recommendation is the deployment of full fibre networks to homes and businesses.

The initial focus of some incumbents was on FttC/VDSL, supplemented with vectoring and/or G.fast. That is why DSL remains the most widely used fixed broadband technology within the Union, although its market share declined from 79% in 2009 to 58% in 2019 – more than 20 percentage points in 10 years. Its main challenger - cable - increased its share slightly (from 15% to 19%) during the same period[117]. Moreover, there has been a recent shift in strategy towards FttH, with incumbents in all Member States targeting at least regional FttH deployment [118]. The VHCN coverage remains significantly different among Member States. Several countries are getting close to full VHCN coverage, while in a large group of Member States the rollout is limited or patchy[119].

On the supply-side, the emergence of full-service providers in countries in which FttH has been widely deployed for the mass-market (e.g. via PON) provides some signals that the entry conditions for dedicated access could become closer to those of the mass-market, over time. However, the multi-site nature of high-end business demand tends to reward operators with a "ubiquitous" network, and requires competitors to piece together access, potentially over a range of networks.

Cable operators with nationwide or regional presence have mainly pursued incremental investment strategies relying on the upgrade of existing networks with DOCSIS 3.1. This is recently changing as some cable operators have deployed FttB networks to households within their existing footprint, while others have plans to expand their existing footprint with FttH technology.

Current situation and technological trends

NGA rollout

In 2019, coverage of NGA technologies (VDSL, VDSL2 vectoring, FttP, DOCSIS 3.0, DOCSIS 3.1), capable of delivering download speeds of at least 30 Mbps, reached 86%, up from 83% the previous year thanks to an increase of 3 percentage points in VDSL and 4.5 percentage points in FttP coverage. Coverage of DOCSIS 3.1 networks was 19%. DSL coverage remained stable. 44% of households already benefit from VHCN coverage with gigabit connectivity on FttP and

117 Digital Economy and Society Index (DESI) 2020, Connectivity

118 In 2019, 19% of EU broadband subscriptions was served using FttH and FttB infrastructure, whereas market share of FttB/FttH broadband subscriptions 8 years ago was insignificant.

119 Digital Economy and Society Index (DESI) 2020, Connectivity - Broadband coverage: In 3 Member States VHCN coverage is at least 90% (Malta, Denmark and Luxemburg). On the other hand, in 3 Member States VHCN coverage is less that 20% (Greece, Cyprus and Austria).

DOCSIS 3.1 networks, up from 29% last year. 4G mobile coverage is almost universal at 99.4%[120].

Upgrade of coaxial-based networks

Coaxial-based networks play an important role in providing broadband services and exerting competitive pressure on incumbent operators in several Member States. In 2013 the DOCSIS 3.1 specification was released. It provides for 10 Gbit/s downstream and 1-2 Gbit/s upstream. DOCSIS 3.1 allows for a smooth migration from DOCSIS 2.x and 3.0. It does not require major stepwise investments, but rather enables investments to be made incrementally to meet demand. With the introduction of DOCSIS 3.1 regional differences in specifications have disappeared. In 2019 the 10/10 Gbit/s full symmetrical specification was released as DOCSIS 4.0.

DOCSiS 3.0 cable networks have a household coverage of 46% at EU level. This is the second largest network coverage after xDSL[121]. The footprint of DOCSiS 3.1 that may be subject to wholesale access, reached 19% and is expected to grow further.

Apart from access to cable mandated by the regulators[122], cable access has already been implemented and launched on a commercial basis[123] in some Member States by smaller cable operators. However, such offers remain limited.

Access to current generation of cable networks (DOCSIS 3.1) can only be provided at central level. Therefore, the WLA market does not include access to cable networks. However, a relatively widespread presence of cable at retail level can constrain the ability of fixed incumbents to act independently at wholesale level. Under such circumstances, the WLA market could be left, at least partly, unregulated based on indirect retail constraints stemming from cable. Such deregulation is not unprecedented[124].

The analysis of the economic impact of cable companies' indirect retail constraints on the WLA market is particularly necessary where fixed electronic communications markets have evolved away from single market dominance towards more oligopolistic market structures.

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120 Digital Economy and Society Index (DESI) 2020, Connectivity.

121 Digital Economy and Society Index (DESI) 2020, Connectivity.

122 At wholesale level, regulated access to cable networks is currently only available in Belgium and in Denmark based on a centrally provided bitstream product.

123 Dutch operator Ziggo provided such access in the past. The offer was withdrawn in March 2015. Also French cable operator Numericable initially provided cable access on a commercial basis to operators such as Bouygues Telecom. Following the merger between Numericable and SFR, the French competition authorities mandated the supply of cable bitstream by the merged company. The Commitments originally made in 2014, were however not renewed at the time of the Competition authority's review in 2019.

124 E.g. this approach was taken by the Romanian NRA which decided not to regulate either of the wholesale broadband markets due to competitive conditions at retail level, mainly resulting from the strong presence of cable networks.

Deregulating the WLA market could risk undermining the business case and investments of alternative operators who have invested in unbundling and have an impact on wholesale competition as well as competition on downstream retail markets to the detriment of end-users.

DSL acceleration techniques

Some incumbents[125] have chosen to rollout a FttC/VDSL network i.e. replace the copper between the local exchange and the street cabinet with fibre while upgrading the final few hundred metres of copper to support VDSL. In this regard, some technological developments have arisen in the last years, in particular, the use of vectoring, a dynamic crosstalk cancellation technique, which was standardised in 2010 for use in combination with VDSL2 and VDSL2+. The use of vectoring requires all copper loops to be operated by one network operator, rendering physical unbundling impossible.

In 2014, the G.fast specification was approved for the deployment on copper loops of max. 500 metres. G.fast implies the use of vectoring. At a distance of 500 metres it can provide 100 Mbit/s. At distances less than 100 metres an aggregated capacity (sum of uplink and downlink) of up to 1Gbit/s can be realised. The ratio between down link and uplink data rates is flexible. In G.fast deployments, fibre in the access network is extended to the distribution point (FttDp) close to the homes or inside larger multi-dwelling units. The fibre architecture used can be PtP or PtMP with GPON, XG-PON, EPON and 10G-EPON[126].

Higher data rates on shorter copper loops avoid the need of replacing the final existing copper access links with fibre and thus the expensive trenching towards individual homes and limit the in-house adaptations to the replacement of modems. A G.fast DSLAM[127] today aggregates up to 48 copper access lines, with interference prevention through the use of vectoring.

High-quality access

High quality access (HQA) products provide dedicated, and uncontended connections, and symmetrical upload and download speeds. Those connections are provided using a range of technologies: PtP connections on legacy network, as well as Ethernet-based leased lines technologies both on PtP and PtMP architecture. Based on an analysis of demand and supply conditions (including the need for business-grade SLAs) some NRAs[128] also included business-grade bitstream as substitute for dedicated business-grade products in a number of markets. The actual engineering of the network, in particular the degree to which spare capacity is built-in,

125 E.g. in Germany, Greece, Belgium.

126 See for a discussion the section below on fibre-based access.

127 DSLAM - a digital subscriber line access multiplexer is a network device, often located in telephone exchanges, that connects multiple customer digital subscriber line (DSL) interfaces to a high-speed digital communications channel using multiplexing techniques.

128 NRAs in France, the Netherlands, Portugal, Spain and Sweden included business bitstream in the market definition.

determines whether higher data rate demands of business users can be provided in a timely manner in a passive optical network (PON). As the optical networks migrate to higher capacities over time, the needs of SMEs can increasingly be served through the provision of virtual circuits.

Most NRAs have restricted the scope of HQA market to active wholesale products such as traditional and Ethernet interface leased lines[129]. However, dark fibre is available on commercial terms from certain operators (such as business-focused providers or municipal network providers) in most countries. Some NRAs[130] have included dark fibre within the HQA market as a substitute for Ethernet leased lines, although the regulation has been limited geographically.

In contrast to residential markets, cable has traditionally been excluded from the scope of HQA markets. Traditionally the PtP copper network provided a better control over QoS than the shared coax network. Deployment of the DOCSIS 4.0 standard will allow full symmetrical connectivity and reduced latency. However, according to the WIK report and BEREC opinion[131], DOCSIS 4.0 is not foreseen to be widely deployed during the period of this Recommendation.

FWA technologies, in particular associated with 5G, are expected to offer data rates similar to wired solutions, which may be sufficient to serve the capacity needs of some businesses. However, currently FWA technologies are considered insufficient to meet the high quality demand and it remains to be seen whether the desired QoS can be provided once 5G has been broadly implemented. This is largely a matter of the technical characteristics and network topologies, as well as the engineering on the one hand and costs of provisioning on the other.

As 5G allows for differentiation in QoS and allows for network slicing to provide certain service characteristics, 5G may provide a solution for certain types of business services. Moreover, it is anticipated that 5G will be able to provide for the potential future needs of business users through its support of a wide range of use cases: enhanced mobile broadband; ultra-high reliability and low latency; and mass machine type communication. Furthermore, the use of 5G in enterprise networking and the flexibility it provides may offer an alternative in some cases for wired enterprise solutions. However, the high and symmetric data rates coupled with high quality requirements, security and resilience suggest that large business premises will continue to require PtP fixed connectivity.

129 E.g. in Germany, Belgium, Poland, Greece, Italy.

130 In its 2018 Decision, the Austrian regulator TKK concluded that the scope of the “high quality access” market should include dark fibre.

131 WIK report p. VIII and BEREC opinion, p.14.

Need for re-assessing the product characteristics and boundaries of the wholesale broadband access markets

Wholesale broadband access may be granted at central or local level. Local access is usually defined as access at the MDF/ OLT[132] or closer to the customer, while central access is provided at one or few interconnection points.

Due to the history of network investments (triggered by regulation), many alternative operators deployed their networks up to the local exchanges, as unbundling has always been considered as access means which guaranteed access seekers' independence and even a possibility to outperform the access provider[133] .

WLA is regulated in almost all Member States[134]. Local access markets typically include access via copper, FttC and FttH/P[135],while central access may also include coax cable.

Nearly all NRAs consider that wholesale local access is not limited to physical access but includes also virtual access (VULA[136]).

The question as to whether the market should be defined narrowly (local) or more broadly (local and central) should be based on a number of factors such as a proper evaluation of the degree of virtualisation of wholesale access products, the technical specifications of WLA and WCA products, the observed patterns of wholesale and retail demand substitution, as well as the extent of indirect constraints. This is also in line with the BEREC opinion[137].

Virtual access products may be designed in a way that they display similar or equal product features, regardless of the location of the handover point for access. Therefore, it could be technically possible to provide wholesale broadband access at central or local level with comparable quality of service from both the access seeker and the end-user perspectives. In particular, the characteristics of high quality virtual access products provided at central level could be set equivalent to those of VULA, allowing access seekers to provide similar retail services based on either product.

Both the product features and the willingness of access seekers to migrate between access points or to make use of various handover points within the network architecture need to be analysed as

132 OLT - an optical line terminal is a device which serves as the service provider endpoint of a passive optical network.

133 If access seekers rely on Bitstream or VULA, there is no possibility to outperform the host network operator.

134 WLA access is not regulated in Romania, Bulgaria and the Netherlands, and is not regulated in certain geographic areas in Italy and Poland.

135 The Swedish regulator found that access via copper and access via fibre are separate local access markets due to a lack of substitution.

136 WIK Report: Future electronic communications product and service markets subject to ex ante regulation Recommendation on relevant markets, Table 5-4, page 140.

137 BEREC opinion, p.13.

part of the substitutability analysis[138]. In particular, in relatively small Member States, alternative operators might consider switching from local to central interconnection points (and vice versa), while in larger markets they might be more reluctant.

If, because of national circumstances, virtual access products with enhanced functionalities[139] provided at different handover points are found to be substitutes, the market should be defined to encompass all substitutable access products. As such a broad market would differ from the recommended WLA market, the NRA would have to assess if it meets the three criteria test, based on specific national circumstances.

The question as to whether the market should be defined narrowly (local) or more broadly (local and central) may also arise and be relevant in the presence of cable networks. Traditionally, while cable would be part of a broader market, it would likely not be part of a local broadband access market[140]. Furthermore, in the absence of existing or potential cable-based wholesale access, provided at local level (e.g. VULA), NRAs could nevertheless assess indirect constraints stemming from cable retail offers and wholesale central offers (potential or actual) and include cable in the local access market based on indirect constraints[141].

The requirements for business broadband, depending on scale and type of business customers, can be very broad. Therefore it is most likely that business services will not be delivered via a single access product. The needs of large businesses are distinct from the standardised communications services that may be purchased by consumers or small single site businesses. Differences include the manner in which services are bundled, the "multi-site" nature of service requirements, and the need for dedicated fibre-based capacity. However, as networks are upgraded and VHCN deployed, thus becoming able to achieve higher data throughput, the 'standard' or 'mass-market' connectivity needs of SMEs and small and home offices (including those supplied by business-grade bitstream) can increasingly be met in full or in part over a standard broadband connection with enhanced SLA.

138 Migration between handover points refers to the situation where an access seeker who is currently interconnected at interconnection point A would consider migrating from interconnection point A to B. Making use of various handover points refers to the situation in which an access seeker makes use of different access products that are provided at different handover points to serve equal retail products in different areas of one Member State.

139 See: Description of VULA in section 3.1.2 above.

140 See for example DK/2017/1994 and BE/2018/2074.

141 See for example PT/2016/1889, UK/2018/2062 and DE/2019/2200.

This is confirmed by the evidence from the Article 7 procedure, showing that in many Member States, there is a clear trend of businesses customers relying on mass-market broadband infrastructure[142].

Nevertheless, a gap between mass-market customers and certain categories of business customers is likely to remain, in particular as regards the scale of bandwidth required, the needs for reliability, redundancy and high service levels as well as the possibility to serve multi-site businesses.

In particular, significant performance gaps are likely to remain between shared and dedicated PtP fibre connections. Indeed, an analysis[143] of the performance of different technologies and the evolution of connectivity demand points towards a distinct market segment for dedicated (or guaranteed) high quality connections. This high quality market serves different needs and therefore is separate from the 'mass-market' for shared connectivity for residential and business use.

This evidence of the segmentation both from the demand-side and supply-side supports a potential review and clarification of the market boundaries between shared and dedicated accesses. It appears, in general, appropriate to define a wholesale market for dedicated capacity access which may include a wider range of access products necessary to fulfil the needs of business service providers.

However, in cases where a PtP fibre infrastructure has been deployed to the mass-market, the same network could provide services for all the ranges of connectivity needs, including for the dedicated high quality connectivity. In those circumstances, full-service providers could emerge and a single connectivity market (including both 'mass-market' and dedicated connectivity market) could be found based on supply-side substitution.

Overall, the analysis of the retail broadband markets has shown that distinct markets for mass-market broadband and high quality broadband exist. Mass-market broadband usually includes all types of fixed connectivity, including copper, fibre and cable. The inclusion of wireless broadband services depends on national circumstances. In particular, where VHCN are available, some smaller and medium size businesses may be sufficiently served based on mass-market connections, possibly with reinforced SLAs. Larger businesses and businesses with high connectivity needs however will depend on HQA-based products, which provide dedicated and uncontended connections, as well as symmetrical upload and download speeds. This type of connectivity cannot currently be supplied by cable networks. In the future, 5G may provide a

142 A number of respondents to the European Commission's public consultation, primarily incumbent operators and specialist providers of business connectivity, also highlighted trends towards an increasing reliance by businesses on mass-market broadband infrastructure. See replies to question 5.2.6.

143 WIK report: Future electronic communications product and service markets subject to ex ante regulation Recommendation on relevant markets, page 111.

solution for certain types of business services. However, the high and symmetric data rates coupled with high quality, security and resilience requirements suggest that large business premises will continue to require a PtP fixed connectivity.

4.1.3. Wholesale Local Access at a fixed location

Relevant product market

At present, the Wholesale Local Access (WLA) market primarily consists of physical access products as well as those virtual access products that mimic the capabilities of physical access (VULA) enabling transmission of internet and related data services[144]. Copper local loop unbundling (LLU) and copper sub-loop unbundling (SLU) – although to a decreasing extent – are still applicable access products used throughout the Union.

So far, experience under the Article 7 procedure has not, in most Member States, shown significant breaks in the chain of substitution when comparing current generation broadband services provided over copper to those provided over fibre. Therefore, at least in the near term, access to FttH, FttB or FttC/VDSL (either PtP or PtMP) network should be considered as a substitute to traditional copper LLU. However, in particular where the copper network has not been upgraded to FttC/VDSL and FttH/FttB has overtaken copper as the dominant technology, a break in the change of substitution between broadband technologies might increasingly occur[145].

The development and deployment of VDSL vectoring, G.fast and G.mgfast move the transition point from fibre to copper closer to the customers' premises. In most cases sub-loop unbundling is not economically feasible and the vectoring technology used in these architectures requires all copper loops to be operated by one network operator. Therefore, physical unbundling is no longer feasible in these situations. Hence, as typically these networks cannot be duplicated in an economically attractive manner, this development has necessitated a greater regulatory focus on virtual and active access products.

The introduction of WDM in optical access networks provides an opportunity to assign different wavelengths to different operators, i.e. it allows for a functionally equivalent unbundling of the access on the basis of wavelengths. However, it is the network operator that provides for the (active) WDM equipment and the provisioning of the wavelength services. This is different from physical unbundling of the optical fibre, whereby the access seeker obtains access to the full fibre capacity (dark fibre). Thus, this solution still presents some limitations, i.e. the wavelength

144 Note however, that in principle, it is not adequate to include civil engineering infrastructures in the market given their lack of substitutability with data transmission products. Access to such an infrastructure may constitute nevertheless a remedy on the WLA market or based on national circumstances a separate market.

145 See case SE/2019/2216-2218, C(2019) 8884 final. The Swedish NRA found that broadband via copper is not in the same market as broadband via fibre or cable. This finding was attributed mainly to the fact that copper subscriptions were generally more expensive than fibre subscriptions and to a lack of competitive pressure that copper was able to exercise on fibre and cable, due to the limited importance of upgraded copper.

capacity, on the degree of innovation possible in comparison with physical unbundling (i.e. full fibre capacity, the full wavelength spectrum).

As explained above, there are technical limitations regarding the physical unbundling of fibre PtMP topologies and VDSL vectoring deployments. Experience under the Article 7 procedure has shown that many NRAs regulate virtual access products that functionally replicate the key features of physical unbundling. Such virtual access products should be included in the WLA market. VULA characteristics should be applied not only in case of FttC/VDSL and G.fast, but also in the case of xPON based networks, unless these allow for wavelength unbundling.

VULA should as far as possible be functionally equivalent to physical unbundling. In technical terms this means that access should, (i) in principle occur locally; (ii) be generic and provide access seekers with a service-agnostic transmission capacity which is uncontended in practice; and (iii) provide access seekers with sufficient control over the transmission network to allow for product differentiation and innovation similar to LLU. In addition, effective migration processes towards VULA from physical unbundling should be implemented to foster take-up, and ensure that competition is preserved where technological solutions force a migration from unbundled access to VULA.

In order to identify precisely the boundaries of the WLA market, NRAs should assess, in line with competition law principles, the constraints stemming from cable and other platforms (e.g. LTE) used to provide services on the retail broadband market.

Cable networks are already capable of providing IP-based bitstream, as defined in Market 3b of the 2014 Recommendation. With the transition to DOCSIS 3.1 FD (4.0) accompanied by the full digital use of the coax cable spectrum, a VHC bitstream or VULA equivalent could also be defined for DOCSIS-based access networks. This is however not the case yet. The offering of VULA is likely to be technically feasible once DOCSIS 4.0 is implemented by operators. WIK considers that the availability and timing of wholesale offers via DOCSIS 4.0 may fall outside the period of this Recommendation[146]. BEREC puts forward that DOCSIS 4.0 is not foreseen to be widely deployed during the period of this Recommendation[147].

Three criteria test

In the following section, the Commission services shall examine whether the WLA market meets the criteria for including it in the list of relevant markets susceptible to *ex ante* regulation.

Presence of high and non-transitory structural, legal or regulatory barriers to entry

In the large majority of Member States, the WLA market is characterised by the existence of only one infrastructure capable of offering local access products on a national scale. Given the high

146 WIK report, p.170.

147 BEREC opinion, BoR(20)174, p.14.

sunk costs and the time needed for any potential entrant to replicate the infrastructure of such a ubiquitous access network, the entry barriers in this market should be considered to be high and non-transitory. In addition, given the small number and often limited geographic reach of competitors operating their own alternative infrastructure it is unlikely that without continued regulatory intervention, the competitive dynamics in this market will change significantly on a national scale over the foreseeable future. Networks based on alternative technologies such as cable or mobile technologies are likely to remain limited both in terms of their geographic coverage and in terms of availability of wholesale access products, which are substitutes for traditional WLA access products.

5G FWA as well as other wireless technologies could potentially decrease the costs of the last metres to connect the end-user, as compared to establishing fixed connections. Trials have shown that speeds of 1Gbit/s can be achieved over 500m with 5G FWA technology. Although 5G services are likely to be made available in certain areas in the relatively short term, initial 5G services will mainly be focussed around enhanced mobile broadband and potentially 5G FWA[148]. Moreover, the capabilities of 5G FWA fall short of the most performant FttH infrastructures, and lie at the lower end of those available via FttH. Thus, it is not clear that it would continue to be a substitute over the coming decade, in particular if widespread availability, service demands and the capabilities of FttH will further evolve, although it may be more relevant as a constraint in areas where there is currently no business case to upgrade to fibre (or even to further upgrade the copper network).

Although the vast majority of NRAs have excluded cable from the WLA market on the basis that it does not provide a direct constraint to physical unbundling and VULA services, this technology should be analysed from an indirect constraint perspective as explained before.

If there is effective competitive pressure stemming from alternative platforms at retail level, such platforms should be included in the WLA market if the following conditions are met: (i) access seekers would be forced to pass a hypothetical wholesale price increase onto their consumers at the retail level based on the wholesale/retail price ratio; (ii) there would be sufficient demand substitution at the retail level based on indirect constraints such as to render the wholesale price increase unprofitable; and (iii) the customers of the access seekers would not switch to a significant extent to the retail arm of the integrated hypothetical monopolist, in particular if the latter does not raise its own retail prices. When the above-mentioned criteria are fulfilled, constraints should be deemed to be strong enough so that the platform concerned is included in the market. When indirect constraints are found to exist but are not strong enough to constrain the

[148] 5G deployments capable of supporting ultra-reliable low latency communication (URLLC) and connected automotive mobility (5G CAM) are likely to take longer, and may only enter into widespread use in the medium term (3-5 years). However these kind of 5G use cases are likely less relevant in the context of the market for wholesale local access.

price of other WLA products, they should be taken into account when assessing whether the incumbent operator has SMP on the relevant market.

Market structure tending towards effective competition

Some NRAs fully or partly deregulated the WLA market relying on a strong presence of alternative infrastructure (mainly cable) at retail level[149]. The availability of (multiple) alternative fixed infrastructures is not yet the predominant market structure in a majority of the Member States. Therefore, in the absence of direct constraints and, even though it is not excluded that indirect constraints become more significant over time, it is not expected that effective retail competition will be ensured in the absence of regulation of wholesale local access.

However, the impact of alternative infrastructures on infrastructure-based competition needs to be monitored and assessed on a case-by-case basis and direct or indirect constraints from in particular cable should be taken into account in NRAs' assessment. Indeed, SMP access regulation should be applied only where this is necessary in order to address – under modified Greenfield approach – a lack of effective competition at the retail level. It should thus be removed as soon as competition is achieved at retail level, which is sustainable in the absence of (wholesale) regulation.

According to competition law principles, if indirect constraints coming from the downstream (retail market) are strong enough to make an increase in the WLA price unprofitable for an access provider, it might be concluded that this operator does not have SMP. With regard to the indirect competitive constraint stemming from retail cable services (or, in the coming future also from mobile technologies), it is assumed that in case of a small but significant non-transitory increase in price ("SSNIP") (5% to 10%) the retail price of the broadband access would increase, and as a result end users would switch to cable-based access products to such an extent as to make the price increase unprofitable[150].

Sufficiency of competition law alone to adequately address the identified market failure(s)

Throughout the Union, access-based competition influences the competitive situation on the retail fixed broadband market by allowing access seekers to offer not only often less expensive but also differentiated products. *Ex post* competition rules seem unlikely to be able to effectively address the observed market failures, requiring frequent intervention, persistent monitoring and price setting remedies.

Given the crucial importance to guarantee effective and timely network access, *ex post* competition law alone is not yet able to address such entrenched access bottlenecks. As a result, the use of *ex ante* regulation appears indispensable, at least for the time being.

149 E.g. Full deregulation took place in Romania, Bulgaria whereas partial deregulation was observed in e.g. Italy and Poland.

150 PT/2008/0850.

The three criteria test therefore continues to be met for the WLA market.

Potential geographic market differentiation

The fact that the WLA market would in general pass the three-criteria-test is however without prejudice to specific competitive scenarios, which may justify the lifting of regulation in the WLA market, either on a national, or more likely on a sub-national basis.

In some Member States infrastructure or inter-platform competition is more advanced, although not always necessarily throughout the whole country. The presence of cable networks, subject to constant developments, is visible on regional or even nationwide scale. Moreover, in many Member States fibre operators have deployed FttH networks at local or regional scale[151]. Also the Code is expected to further stimulate the emergence of infrastructure based competition through, for example, co-investment or wholesale only schemes.

As a result, the competitive conditions in the WLA market may vary considerably across the territory of one Member State. This means that in Member States with a higher degree of inter-platform competition, in particular in areas where penetration of alternative infrastructures is high, an analysis of the relevant variables of competitive conditions in different parts of the country is necessary.Therefore NRAs should assess whether there is a case for defining separate sub-national relevant geographic markets in specific competition conditions and consider whether *ex ante* regulation is still needed or could be lifted or differentiated in particular areas.

4.1.4. Wholesale Central Access at a fixed location

Relevant product market

Compared to WLA, Wholesale Central Access (WCA) products are typically provided to the access seekers at a higher and more central layer in the network architecture[152]. As regards WCA services, it remains likely that there is a chain of substitution between copper DSL-based bitstream services[153] and fibre-based bitstream services provided over FttH and FttC/VDSL networks in the near future.

Alternative operators have developed their own network infrastructures up to local access points in order to provide retail services based on SLU, LLU, VULA or local bitstream[154]. However, as BEREC observes in its opinion[155], the deployment of alternative infrastructure was often focused

151 Digital Economy and Society Index (DESI) 2020, Connectivity - Broadband coverage: FttP coverage at Union level is 34%.

152 At layer 3, i.e. typically referring to regional and national hand over points.

153 For example, ADSL, ADSL2, ADSL2+, and VDSL.

154 See WIK study chapter 5.2.6.2. Based on data provided by NRAs regional bitstream accounted for around 10% of total lines provided by alternative operators. The remaining 90% were provided either entirely via their own infrastructureinfrastrucutreinfrastructure or based on local access.

155 BEREC opinion, p.17.

on urban and densely populated areas, while deployment in rural areas has been limited and fragmented. In those latter areas, the reliance on regional bitstream has persisted to a significant extent to serve the end-users that depend on copper connections. However, commercial network upgrades and state aid[156] programmes are likely to further reduce the reliance on copper in rural areas. In particular, the Recovery and Resilience Facility and Connected Europe Facility (CEF) will be used to reinforce digital investments in networks.

Moreover, it can be expected that wireless technologies will compete with or replace copper infrastructure in such areas and further competitive options for VHC access via wireless infrastructure may develop with the deployment of 5G FWA[157]. Although BEREC points out that today most Member States conclude that there is a lack of substitutability between fixed and fixed wireless technologies and believes it is premature to consider those technologies as substitutes, BEREC also acknowledges that this perceived lack of substitutability may lessen in the future[158]. As of 2020, substitution between fixed and FWA technologies has been already found in Italy, Hungary, Romania, Belgium, the Czech Republic[159], and in Austria, mobile broadband is part of the retail broadband market. In other Member States, to date FWA does not yet serve as a viable substitute. However, in view of the expected short to medium term developments of mobile technologies, 5G FWA in particular is expected to play a significant role as a substitute for fixed access , particularly in rural areas across Member States (e.g. in Estonia, Sweden and Italy)[160]. Significant advancements of 5G roll out can be expected in the coming years[161], which are in many Member States coupled with comprehensive coverage obligations, which require coverage of a large majority of housholds in rural areas. Moreover, mobile broadband technolgies are already relatively broadly used. Given the forward looking nature of the Recommendation, BEREC's assessment may be unduly cautious.

Cable should generally be included in the WCA market. Whether the WCA market includes all broadband technologies capable of providing bitstream offers or consists of separate segments e.g. for Fttx and cable depends on the degree of constraints on switching at the wholesale level. In order to determine whether different wholesale platforms such as copper, fibre and cable should be included in a single wholesale market, the SSNIP test should be applied.

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156 WIK report, chapter 5.2.6.2. A summary of national state aid programmes and proposals for the implementation of the EU CEF2 programme are contained in Ecorys et al (2020). The Commission has proposed funding of €3bln to cover digital infrastructure via the new CEF programme.

157 WIK study chapter 5.2.6.2.

158 BEREC opinion, BoR (20) 174, Page 17.

159 BEREC opinion, BoR (20) 174, Page 17.

160 Estonia plans to switch 10% of its copper connections to wireless in the context of copper switch-off. 42% of Sweden’s copper exchanges have been closed in rural areas and replaced by wireless technologies. See WIK (2019b). Wireless technologies have been used for rural areas in the context of state aid programmes in Italy, Greece and elsewhere. SourceWIK report footnote 363.

161 The 5G EU action plan foresees a coordinated launch throughout the single market: at least one major city in each Member State by 2020 and 5G available in all urban areas and along the main transport paths by 2025.

In this context, it should be noted that switching between cable and copper/fibre platforms may give rise to costs and potentially stranded assets for access seekers. If these factors are significant to the extent that one platform could raise prices above the competitive level without risk of losing wholesale market share, then separate segments should be identified for each technology group. However, given the forward-looking character of the analysis, such assessment should take into account that potential access seekers which are not yet providing access-based services do not have to consider switching costs when choosing their access platform. This assessment should address, on a case-by-case basis, the significance of such entry, while bearing in mind that the scale of future entry is inherently difficult to predict. Furthermore, such analysis should assume a hypothetical competitive access regime facilitated by regulation, disregarding non-objectively justifiable impediments to switch which may have been artificially inflated by the network operators to prevent switching away from, or to a given platform[162].

In cable networks, the wholesale customer can offer broadband to retail customers from one or a few centrally located points in the network. Thus, the criterion of the possibility of central network access to collect traffic is met.

The use of cable bitstream as an alternative to xDSL or Fttx bitstream, although still limited, has been increasing in markets where such access has been mandated by the NRA or where the cable operator has voluntarily provided cable bitstream[163].

Three criteria test

Presence of high and non-transitory structural, legal or regulatory barriers to entry

WCA products can be provided by alternative operators using their own infrastructure or by relying on an upstream access product (for copper LLU, VULA or fibre-based equivalents). As regards the high barriers to entry, operators, relying on WLA products, who control the backhaul component of the network are in a position to provide WCA, thus directly constraining the incumbent services. It is also possible that the effective regulation of backhaul, for example via the market for dedicated connectivity, could support more extensive use of WLA in areas where there has been reliance on WCA.

Furthermore, experience from Article 7 notification procedures so far shows that cable technology is available in a significant number of Member States[164]. Where it is present and relatively widespread, cable is typically considered part of the relevant market(s) for wholesale central access market and it may have important implications for finding or otherwise of individual or joint SMP within its coverage area.

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162 See point 40 of SMP guidelines.

163 Bitstream access over cable is mandated in Denmark and Belgium.

164 Apart from Italy and Greece, all Member States have, at least regional coverage of cable networks. Cable has a very high market share in Belgium, Hungary, Malta and the Netherlands, with the last three countries having national coverage.

In addition, in certain other cases, with the migration to NGA, and associated challenges in maintaining physical unbundling, bitstream access on NGA has been mandated through the WCA market. However, the introduction of VULA in the WLA market in these countries is expected to be sufficient to support downstream competition, because of the sufficient commercial availability of trunk capacity to reach the local interconnection point.

Market structure tending towards effective competition

In most Member States, WCA is gradually losing its significance. Data provided by NRAs on the degree to which alternative operators have climbed the ladder of investment show a significant increase in competition based on own infrastructure and local access (based on SLU, LLU, VULA or local bitstream). As of 2018, regional bitstream accounted for around 10% of total lines provided by alternative operators[165]. Mostly in rural areas, in the absence of regulated access to copper bitstream, customers for whom copper is the only network available may experience a decline in the choice of service provider and some regionally targeted intervention by means of ex-ante regulation may be still required.

As regards the tendency towards effective competition, the presence of access seekers on WLA markets and alternative platforms, such as cable networks, which can actually or potentially constrain WCA services provided by former incumbents lead to the increase of competition at central level. Indeed, connection points for FTTC/VDSL and FTTH-based infrastructure may aggregate a larger number of households than were possible via copper, improving the economics of reaching rural communities via regulated WLA. The presence of different types of potential access providers being able to create wholesale competition is coupled with indirect constraint stemming from wireless broadband connections. As stated above, it can be expected that wireless technologies will compete with or replace copper infrastructure in some, mainly rural, areas and further competitive options for VHC access via wireless infrastructure may develop with the deployment of 5G FWA.

Therefore, even if those markets are not fully competitive, the Commission services consider that in most cases they exhibit a tendency towards effective competition over the timeframe of this Recommendation.

Although BEREC rightly points to the fact that WCA remains at least partially regulated in the majority of Member States[166], as of 2018, regional bitstream accounted for around 10% of total lines provided by alternative operators[167]. The increasing role of virtual access products with

165 Chapter 5.2.5.9. of the WIK Report.

166 BEREC opinion, BoR (20)174 p.18.

167 BEREC argues that the three criteria test of the WCA is currently fulfilled in the vast majority of member states, as 24 out of 27 Member states still regulate at least part of the market. However, it should be noted that under the 2014 Recommendation on Relevant Markets, WCA is recommended (market 3b of the 2014 Recommendation) and therefore, NRAs do not need to individually prove the presence of the 3 criteria for the WCA market in order to regulate the market. Given the technological and market trends outlined above,

enhanced functionalities[168], which can be considered as part of WLA products, lead to the conclusion that the three criteria test is not met for the WCA market on a forward looking basis. as barriers to entry into the market in many Member States[169] can no longer be considered to be high and non-transitory and the market is tending towards effective competition at Union level.

Sufficiency of competition law alone to adequately address the identified market failure(s)

In view of the above, in particular the lower barriers to entry and tendency towards effective competition, the competition law instruments seem to be sufficient to ensure competitive market conditions of the WCA market from a forward-looking perspective. The ex- post competition law safeguards are more suitable to address potential (individual) market problems than ex ante regulatory intervention.

Conclusion

At Union level, a difference between the markets for WLA and WCA remains, as access seekers in most Member States do not consider local and central access products as substitutes.

The market for WLA remains relevant across the Union at least in some areas. However, significant geographical variations of competition are likely to exist within a given Member State due to local fibre deployments, which might require a thorough geographical market analysis.

The WCA market no longer meets the three criteria test at Union level, due to significantly lower barriers to entry, which have been overcome by a number of alternative operators that have developed networks up to local interconnection points. Additionally, cable network upgrades to DOCSIS 3.x allow the possibility to offer wholesale cable access. Consequently, in most cases cable is considered part of the WCA market. The market therefore is found to tend towards effective competition.

However, given the high number of Member States where the market for WCA has currently not been found effectively competitive, it is possible that some NRAs will not yet identify a sufficiently clear tendency towards effective competition in their national markets combined with a sufficiently pronounced lowering of entry barriers. Where this is the case, the market can be seen as (remaining) susceptible to ex ante regulation provided that the three-criteria test is satisfied for the subsequent review period.

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it can no longer be established that the market for WCA meets the three criteria test at EU level with a forward looking perspective.

168 E.g. in Germany, Denmark.

169 WCA is already completely deregulated in some Member States, e.g. Bulgaria, Romania, Malta, the Netherlands and Sweden. Further, WCA is only partly regulated at least in Italy, Lithuania, Poland, Portugal, Germany and Ireland.

4.1.5. Wholesale high quality access – Dedicated capacity market

Relevant product market

While the evolution of mass market access products ensures their capability to serve, under certain conditions, business customers, an important segment of the business market requires dedicated capacity. At the same time, reliance on connectivity is set to increase further with the digitisation of industry and demand by public services such as hospitals and schools[170]. Indeed, significant performance gaps remain between mass-market shared capacity connections and dedicated PtP connections and therefore the specific need for dedicated capacity could, in particular in certain geographic areas, become a competitive bottleneck. Currently, the wholesale market for HQA is regulated in most Member States.

The dedicated capacity market should comprise the terminating segments of leased lines providing dedicated capacity[171]. The terminating segment can be defined as the portion of the PtP line service between the end-user site and the closest exchange. The precise definition of the market should however be determined by the characteristics of the service delivered rather than by technological details. Depending on the network topology in a given Member State, there may be a dedicated connection all the way between the exchange and the customer or traffic can be collected already at an aggregation switch and transmitted to the exchange over an interconnection link, which provides scope for overbooking. In these cases, the physical link may not be "dedicated" across the whole path, but may still be distinguished from residential offers, when the service provider is offering "guaranteed" bandwidth, with very stringent quality of service parameters and service level guarantees. Especially when there is limited or no overbooking provided for, point-to-aggregate leased lines may constitute substitutes for PtP leased lines. At the same time, noting that a ladder of investment may exist for dedicated circuits as well as for mass-market fibre, elements for which access is made available should be as disaggregated as possible to enable the use of own-built or competitively supplied backhaul.

Ethernet (layer 2) is likely to be the prevailing interface for terminating segments of leased lines.[172] As demand for higher bandwidth increases, there is likely to be increasing take-up of WDM leased lines, because leased lines of 1 Gbit/s or more can be more efficiently connected to the underlying OTN[173].

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170 As an example the development of big data analytics, requiring two-way access to high performance computing facilities, is also likely to require dedicated connections, with some links needing terabit connectivity to support real-time processing of data by HPCs.

171 This is to confirm that areas/routes that are competitive should not be regulated. Inter-exchange/trunk segments should normally be excluded as normally provided on competitive basis.

172 Terminating segments of leased lines with traditional interfaces can be considered still part of the products market provided that the substitutability test is passed.

173 OTN - Optical transport network or its DWDM (Dense wavelength division Multiplex) functions.

With a view to delineating the boundaries of the market for dedicated capacity and other business access products, several factors should be taken into account (i.e. different product functionalities and intended use, price evolution over time, cross-price elasticity). The distinguishing product characteristics of leased lines are their ability to provide dedicated and uncontended connections and symmetrical speeds. Moreover, certain advanced quality characteristics are relevant at the wholesale level, such as (i) guaranteed availability and high quality of service in all circumstances (including SLAs, uninterrupted customer support, short repair times and redundancy), (ii) high-quality network management resulting in upload speeds appropriate for business use and in very low contention and (iii) the possibility to access the network at points which have been defined according to the geographic density and distribution of business rather than mass-market users.

Dark fibre could, based on an appropriate substitutability analysis under certain conditions and in certain geographic areas, be included in the dedicated capacity product market, due to its flexibility in terms of technical characteristic, price and bandwidth. In particular, access to dark fibre could be included in cases where either access to physical infrastructure is not available or in areas where there are not sufficient incentives to deploy. Already today some NRAs (e.g. Austria and UK) mandated dark fibre wholesale access on the HQA market. The substitutability depends on the ability of the access seeker to self-provide the knowledge and active equipment needed as well as the difference in price to active products. If dark fibre is found to exert sufficient competitive constraint over the pricing of leased lines, it could be included in same relevant market for dedicated capacity.

Dark fibre based connections are capable of providing dedicated capacity, despite the need to purchase additional active equipment. As Gigabit symmetric broadband connections grow in terms of prices and functionality, operators requiring significant bandwidths might choose dark fibre instead of active connections. From a functional viewpoint, darkfibre can provide higher quality and greater potential for customization because of the potential to integrate the lines into the access seeker's own network operation systems and/or because of the capability to use different Ethernet protocol parameters (i.e. larger packet sizes) or even different protocols (others than Ethernet) than those offered by the access providers .

There is evidence from a number of countries (notably including those with significant PtP fibre deployment[174]) that operators and larger businesses purchase and make use of dark fibre (fibre unbundling) in a similar manner to the way in which they would use active leased lines. Moreover, from the supply-side, there are relatively low barriers to a dark fibre supplier to offer active leased line connectivity and vice versa, and many commercial suppliers of dedicated capacity make both options available in the areas in which they are present. Under certain circumstances, dark fibre and active dedicated connections may be included in the same wholesale dedicated capacity market.

174 E.g. Luxemburg, the Netherlands and Sweden.

Where NRAs determine based on a substitutability analysis that dark fibre and active dedicated connections belong to the same market, it may be justified to identify a market for high quality dedicated connectivity encompassing terminating segments of leased lines (with a focus on fibre-based lines) and dark fibre. However, with a view to delineating the boundaries of the market for dedicated capacity and other business access products NRAs should ensure that the relevant wholesale products[175] correspond to the retail market problem identified. In particular, because currently retail mobile markets are in general competitive at EU level[176] absent wholesale regulation, in the absence of additional elements relevant in a prospective analysis to include the mobile backhaul within the market for wholesale dedicated capacity.

Three criteria test

In the following, the Commission services shall examine whether the high quality dedicated connectivity markets meet the criteria for including them in the list of markets relevant for ex ante regulation.

Presence of high and non-transitory structural, legal or regulatory barriers to entry

The deployment of alternative infrastructures providing a dedicated fibre connectivity for business has increased significantly, in particular in more densely populated areas, commercial centres and business districts. However, in less competitive areas, it is less economically viable to duplicate networks providing isolated dedicated connections, in particular for certain customer types, including schools and hospitals, which are not able to pay high prices to obtain the required connectivity. The prospects for effective competition in dedicated connectivity for businesses can be improved in the case where duct and pole access is available. However, the cost of deploying PtP fibre is still very high, especially in rural areas so it is unlikely that deployments of alternative infrastructures in those areas will occur. Consequently, it is unlikely that without continued regulatory intervention, the competitive dynamics in this market will change significantly over the foreseeable future. Lastly, it must be noted that networks with nation-wide presence hold an important advantage to secure multi-site-contracts.

Market structure tending towards effective competition

It is worth noting that the increase in demand for dedicated connections from businesses and industry but also from socio-economic drivers such as schools, hospitals etc. will not only occur in dense areas, but will be more widespread across the regions. In less densely populated areas, due to a lack of infrastructure-based competition, there is a risk that the demand would not be served with competitive dedicated connections in the absence of regulation.

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175 Moreover, NRAs should consider whether access to physical infrastructure is already available upstream, which may improve Mobile Network Operators' potential reach and ability to deploy dedicated fibre connections with a high degree of flexibility to operate their networks.

176 See also the opinion expressed by the majority of stakeholders in the public consultation process.

Moreover, wireless technologies are unlikely to be able to replicate dedicated fibre connections because business users do not consider wireless technologies as a substitute but as a complementary service. This complementarity is further reinforced by the fact that the dedicated fibre connections will be increasingly essential for the deployment of wireless technologies to be able to meet the required quality of service.

Suppliers of mass-market fibre may be well placed to enter the market for the provision of dedicated fibre access; however, the prospective entry is likely to be limited to certain more competitive areas. The same conclusion can be reached with regard to the fibre networks deployed under commercial co-investment agreements, because it is unlikely that such agreements would cover economically less viable areas. As incumbents are strongly placed in dedicated infrastructure outside more densely populated areas, they can leverage their wider coverage to gain multi-site contracts and obtain an advantage in the speed of provisioning of 5G and the quality of the broadband connection. Incumbents, in order to protect their strong market position, would also have limited incentive to offer wholesale access on a commercial bases.

Sufficiency of competition law alone to adequately address the identified market failure(s)

In the absence of direct constraints, and even though it is not excluded that indirect constraints become more significant over time, it is not expected that effective retail competition will be ensured in the absence of regulation of the wholesale market for dedicated connectivity. Ex post competition rules also seem unlikely to be able to effectively address the observed market failures, requiring frequent intervention, persistent monitoring and price setting remedies, especially taking into account that such measures are subject to a very high standard of proof. Therefore, competition law alone would not ensure effective, non/discriminatory and timely wholesale access.

As a result, at least in the mid-term, the three criteria test continues to be met for the dedicated capacity market.

Potential geographic market differentiation

As competition in VHC develops, we can expect a more important role for geographic market segmentation in the market for dedicated fibre business access. Therefore, the market for the dedicated capacity, although it would in general pass the three-criteria-test, is likely to have different competitive characteristics which may justify the lifting of regulation or a differentiated regulatory approach, either on a national, or more likely on a sub-national basis. Some Member States have already geographically segmented the HQA market [177]. In addition to the considerations already developed above[178], there are some specificities linked to the dedicated

[177] E.g. in countries such as Ireland, Austria and the UK.

[178] See section 4.1.3 of this document.

capacity market for example business districts may be served by specialist business access providers, which are not present in residential areas.

The geographic units chosen by regulators when analysing the market should therefore, as far as possible, enable a reflection of the scope of coverage of existing infrastructure-based competitors and in particular take into account the specificities of the network presence in case of dedicated capacity markets[179]. Indeed, a network can be considered as present when it is relatively close to the customer premises which need to be connected[180].

However, there may also be remote geographic areas where FttH has not been deployed (and may not be viable in the long term), but where demand for dedicated connectivity remains and may increase in the future, with limited potential for competitive supply.

Moreover, in contrast with consumer and small business demand, high-end business demand is often multi-site or even multi-national. Because competition for contracts requires competitors to connect multiple sites, there may be an advantage from having networks with national-wide coverage, which may confer a benefit for the incumbent operators[181]. It also means that competitors to the incumbent seeking to win multi-site or multi-national contracts, are likely to require wholesale access, and will probably not be able to rely solely on the footprint of their own network.

In conclusion, after the geographic analysis, an NRA should assess whether there is a case for defining separate sub-national relevant geographic markets based on specific competition conditions and, as a result, consider whether *ex ante* regulation is still needed or could be lifted in particular geographic areas.

4.1.6. Physical infrastructure

Physical infrastructure are facilities or elements associated with an electronic communications network, which enable or support the provision of services, and include buildings or entries to

179 Indeed the geographic segmentation will not necessarily correspond to that of the WBA market. The high value nature of business services in certain countries leads to the situation that certain districts have become competitive for dedicated access, while they are not (yet) and may not become competitive as regards very high capacity connectivity to the mass-market.

180 Some NRAs considered that a 50 metres from business parks or premises is a distance sufficient to consider the network to be present in a given area. However, the appropriate distance may vary due to national circumstances.

181 This practice can be observed, for example, in the Spanish high quality access market review from 2016, when the NRA found that the retail market share revenues of Telefonica in fixed business communications had fallen significantly for companies with up to 10 sites (although still remained about 60%), but had declined very little for businesses with more than 10 sites, remaining at 75.9% in 2014. See table 12 page 41 https://circabc.europa.eu/sd/a/5f7c608d-d39d-4d6b-b6a9-87fc07b2421e/Proyecto%20Medida%20Mercados%203a%203b%204_18%2011%202015_PARTE%201_PUBLICA.pdf

buildings, building wiring, antennae, poles, towers and other supporting constructions, ducts, conduits, masts, inspection chambers, manholes, and cabinets[182].

Physical infrastructure that can host an electronic communications network is essential for the deployment of new networks. Physical, or civil engineering, infrastructure is the most upstream market of all electronic communications markets as, in the majority of cases, fixed and mobile networks rely on ducts and poles to install copper, fibre and cable lines. Physical infrastructure represents a significant proportion of investment in networks as civil works can represent up to 80% of the total cost of deployment. Where civil engineering assets exist and are reusable, effective access to such physical infrastructure may significantly facilitate the roll-out of competing networks.

Regulatory framework: Code and Broadband Cost Reduction Directive

According to Article 72 of the Code, NRAs may impose obligations on undertakings with significant market power to meet reasonable requests for access, and use of, civil engineering. This new provision provides a more flexible tool compared to the previous practice of many NRAs, to impose duct and pole access purely as an ancillary remedy in market 3a of the 2014 Recommendation (wholesale local access provided at fixed location). The Code allows for a specific physical infrastructure access (PIA) remedy, which can be imposed as a stand-alone remedy when denial of access, or access given under unreasonable terms and conditions having a similar effect, would hinder the emergence of a sustainable competitive market and would not be in the end users' interest. In these cases, NRAs may impose obligations of access to physical infrastructure, even if the latter is not included as a stand-alone product in the relevant market in accordance with the market analysis[183]. This is particularly relevant as it can be imposed as a stand-alone remedy in different regulated markets when needed[184].

In addition, the Code establishes that where NRAs intend to impose an access obligation for specific network elements and associated facilities, they must first assess whether the imposition of obligations of access to civil engineering under Article 72 alone would be a proportionate means by which to promote competition and end users' interest[185].

Where an NRA analyses electronic communications markets with a view to determine whether any of those markets require ex ante regulation, and before imposing any obligations, an NRA must take into account other types of regulation or measures already imposed which affect the

182 Article 2(10) and 72 of the Code.

183 Article 72(2) of the Code.

184 This will be in particular significant for business providers, which in order to design their offer use both products from mass-market connectivity and from dedicated capacity, and can therefore have a similar remedy for access to physical infrastructure in both markets, and thanks to this design their offer more independently and with greater flexibility.

185 Article 73(2) of the Code.

relevant market[186]. This includes, in the case of physical infrastructure, measures taken under the Broadband Cost Reduction directive (BCRD)[187].

The BCRD aims to facilitate and incentivise the rollout of high-speed electronic communications networks by promoting the joint use of existing physical infrastructure and by enabling a more efficient deployment of new physical infrastructure so that such networks can be rolled out at lower cost[188]. To that end, the BCRD mandates that any network operator (not only from the electronic communications sector but also from other utilities sectors such as energy, transport and water) meet all reasonable requests for access to its physical infrastructure under fair terms and conditions, including price. Access may only be refused for objective, transparent and proportionate reasons. In addition, if parties cannot reach a commercial agreement on the terms of access, a dispute resolution mechanism is available. Access through the BCRD represents a dispute-resolution based intervention, and is not based on an *ex ante* intervention by the regulatory authority[189].

Current situation across the Union

Evidence gathered through the Article 7 procedure shows that, at present, several NRAs regulate access to civil engineering infrastructure as an associated facility[190] to the market for wholesale local access provided at a fixed location (market 3a of the 2014 Recommendation) as an SMP-related remedy[191]. Only one Member State[192] has included civil engineering infrastructure in the market for wholesale local access at a fixed location, as a substitute for other forms of wholesale physical access, namely local loop unbundling.

Only in one Member State[193], the provisions of national law implementing the BCRD, accompanied by extensive use by alternative operators of their own ducts, have been considered

186 Article 67(2)(c) of the Code.

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

188 Article 1(1) of the BCRD.

189 The review of the Broadband Cost Reduction Directive (BCRD) is included in the 2020 Commission Work Programme as a REFIT initiative and is part of the actions announced in the Commission's Communication 'Shaping Europe's Digital Future' (COM(2020)67 final).

190 Article 2(10) of the Code includes physical infrastructure in the concept of 'associated facilities' defined as the associated services, physical infrastructures and other facilities or elements associated with an electronic communications network or an electronic communications service which enable or support the provision of services via that network or service, or have the potential to do so, and include buildings or entries to buildings, building wiring, antennae, towers and other supporting constructions, ducts, conduits, masts, manholes, and cabinets.

191 Belgium, Cyprus, Germany, Estonia, Spain, France, Hungary, Ireland, Italy, Lithuania, Latvia, Poland, Portugal, Sweden, Slovenia, Slovakia, United Kingdom.

192 See: FR/2017/2030. However ARCEP has recently proposed a separate PIA market (FR/2020/2277).

193 Bulgaria. Please note however that the Bulgarian NRA found the WLA market competitive and lifted all regulation.

by the NRA as sufficient to ensure access to ducts and poles and hence the SMP access to PIA was lifted[194]. However, in the large majority of cases, the BCRD alone is not considered sufficient to ensure effective access to relevant civil engineering infrastructures for access seekers[195].

Furthermore, information collected in the context of the WIK report indicates that the SMP-based duct and pole access has been used extensively in several Member States where fibre rollout is well advanced, and is currently stabilising[196], while increasing in Member States with a lower level of fibre deployment.

However, some national regulators did not impose access to civil infrastructure even where they found that the WLA market lacked competition, based on national circumstances. In some cases, duct access was only imposed in the feeder segment of the access network. The lack of imposition of a duct access remedy is also linked with the fact that in some countries[197] the duct and pole access network of the incumbent operator is not ubiquitous. This may occur where only part of the incumbent operator's network has been deployed in ducts, namely the segment between the MDF and the street cabinet, but not the terminating segment connecting the street cabinet and the end user. Duct access was not imposed in some Member States due to limited demand for ducts[198] in particular where wholesale-only networks are available.

Moreover, two NRAs have concluded that the WLA market was competitive and, therefore, did not impose any SMP-based remedy[199]. That conclusion was based on evidence suggesting that alternative operators were deploying and expanding their network while using their own physical infrastructure as well as on the consideration that the BCRD is a sufficient tool to address any potential competitive concern.

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194 BG/2019/2155: The Bulgarian national law transposing the BCRD directive significantly reinforced its provisions by including obligations for access, non-discrimination, transparency - including the publication of a reference offer - and price control equivalent to a significant extent to the set of obligations imposed on BTC due to its SMP status. Thus, CRC considered that the opportunities for BTC's anti-competitive behaviour are constrained.

195 This is also confirmed by Recital 187 of the Code, that states that *'in addition to the rules on physical infrastructure laid down in Directive 2014/61/EU, a specific remedy is necessary in those circumstances where civil engineering assets are owned by an undertaking designated as having significant market power'*.

196 In particular Spain and Portugal.

197 For example Germany and Austria.

198 SE/2019/2216: PTS did not intend to impose access to ducts as it considers access possibilities to passive infrastructure provided through national law to be sufficient. PTS did not have current data on the extent to which re-using of existing ducts for fibre deployment is possible. It would depend on the condition of the ducts, the precise geolocation of ducts, available capacity etc. According to PTS, the quality of the ducts was likely to be questionable. Lack of demand for ducts may also due to the widespread presence of Point-to-Point fibre municipal networks. The Commission vetoed the Swedish draft measure. The Luxembourgish NRA withdrew access to ducts (LU/2019/2137-2138) on the bases of the specific national circumstances in Luxembourg such as the observed lack of demand for regulated access to ducts and in light of alternative access possibilities through national legislation.

199 RO/2015/1804 and BG/2019/2155.

So far, two national regulators have, or are proposing to, define and regulate a self-standing market for access to civil engineering infrastructure, namely the UK's Ofcom and France's ARCEP. This approach reflects specific market circumstances, with a ubiquitous electronic communications-specific ducts and poles infrastructure of the incumbent and a clear policy choice to incentivise fibre deployment through regulation focusing on creating network competition. Ofcom argued that when ducts and poles access turns out to be the key factor, which promotes competition in the WLA or dedicated access market, the latter should be deregulated and the analysis should move to a separate market upstream for ducts and poles access.

Overall, NRAs' practice regarding access to physical infrastructure appears to be very heterogeneous. The divergences are justified by differences in network topologies, availability of ubiquitous ducts, level of demand for access to ducts and poles etc.

Duct and pole access voluntarily provided by utility companies or mandated on the basis of the measures implementing the BCRD could in theory be sufficient – but it was rarely in practice – to address competition concerns where utilities' ducts and poles are suitable to host electronic communications-specific cables. Indeed, in a number of countries, utilities' infrastructure has been used extensively, but not exclusively, to support broadband deployment[200].

Therefore, provisions in the Code as well as past and current experience show that SMP-based remedies are likely to be necessary to ensure effective access to the SMP operator's civil engineering infrastructure.

PIA: stand-alone remedy or separate upstream market?

NRAs should consider mandating PIA as a stand-alone remedy based on an SMP finding in one or more of the downstream markets.

According to Article 73(2) of the Code, where NRAs assess the appropriateness of imposing an access obligation in accordance with the principle of proportionality, NRAs must first analyse whether other forms of access to wholesale inputs, either on the same or on a related wholesale market, would be sufficient to address the identified competition problem. NRAs must thus assess whether there are existing commercial access offers, regulated access under Article 61 of the Code, or planned regulated access to other wholesale inputs. In light of the level of market development, NRAs should take into account whether it would be technically and economically viable for operators to use or install competing facilities based on duct access.

In those Member States where downstream markets (WLA or dedicated access) lack sufficient competition, a self-standing remedy of physical infrastructure access may be an appropriate and sufficient instrument to support the deployment of alternative network infrastructure in the next years. In such cases, alternative networks may indeed still rely on the access to the SMP

[200] This is the case for example in Italy, France and Portugal, where PIA was also imposed based on SMP regulation.

operator's ducts and poles. In this particular case, based on the modified Greenfield approach[201], NRAs may maintain regulation on the WLA or dedicated access market by imposing only the PIA remedy. For this purpose, it is essential that Member States correctly implement Article 72 and 73 of the Code.

As suggested by WIK[202], Article 72 may prove to be a practical and efficient alternative to the delineation of a separate PIA market:

- In the short term, in Member States where infrastructure-based competition is emerging and/or where it is unclear if PIA will play a significant role in driving infrastructure-based competition and new market entry;
- In the longer term, in Member States where a ubiquitous physical infrastructure network owned by a single operator is not present (ex. Germany) or demand for PIA is absent or very limited (ex. Sweden), and therefore a separate PIA market cannot be clearly defined or distinguished;
- Where SMP-based PIA is not or might not be the trigger for deployments, or where it is only imposed to a limited extent, if at all, this approach could be particularly appropriate.

However, as also suggested by WIK, Article 72-based PIA might not be appropriate, and therefore NRAs might consider delineating a separate PIA market:

- In cases where SMP-based PIA is (or becomes in future) the only SMP remedy required to ensure effective competition in electronic communication markets;
- Where PIA is effective in stimulating deployment by alternative operators, and the reliance on PIA as a remedy could lead to a mismatch in the geographic scope of PIA obligations and the geographic scope of downstream markets, due to emergence of infrastructure competition in some areas (warranting no SMP designation) and/or the deployment of VHC infrastructure by an operator other than the incumbent, which may warrant an SMP finding (e.g in other areas where only one VHC network is economically viable).

In this case, NRAs may be inclined to define downstream VHC or dedicated access markets as national (due to their reliance on a nationwide PIA remedy). Indeed, today WLA markets have mainly been defined on a nationwide basis, in part due to the ubiquity of incumbent's PIA and copper networks. However, this may not accurately reflect the competitive conditions of VHC networks, and may risk over- or under-regulation. In addition, it would be particularly odd in

[201] This requires NRAs to assess whether markets are effectively competitive from a forward-looking perspective in the absence of regulation based on a finding of significant market power.

[202] Chapter 5.2.3 of the WIK Report.

cases where SMP operators and/or competitive characteristics in downstream market would be different from those of the potentially separate PIA market.

Therefore, where the competitive conditions across the same Member State differ in the downstream market, NRAs should consider the need to define separate geographical markets downstream and to deregulate those areas of the country, which are found to be effectively competitive absent regulation. However, downstream competition in some areas may depend on the use of existing ducts of the SMP operator.

In such cases, NRAs should consider whether it would be justified and proportionate, based on competition law principles, to define a separate market for physical infrastructure, with the aim of facilitating the deregulation of parts of the downstream market for wholesale local access or for wholesale business connectivity.

The definition of a separate market for PIA would be particularly relevant in Member States where one single operator owns a physical infrastructure network which is ubiquitous (it has national coverage and allows reaching all households in the national territory) and suitable for the deployment of alternative fibre networks.

In such cases, a separate PIA market would have the benefit of allowing the use of physical infrastructure for multiple purposes, including providing local access, central access, backhaul, and potential future/new emergent services. In this sense, PIA could be a "cross-market" wholesale remedy that can be used to facilitate the deployment of fixed access infrastructure to consumers as well as businesses and (if applied in the relevant network segments) for fixed and mobile access and backhaul.

PIA as a separate market

The Commission acknowledges the potential benefits associated with the delineation of a separate market for PIA. However, at this stage and given the diverse characteristics of physical infrastructure networks across Member States, the Commission does not consider it appropriate either to mandate the definition of a PIA market or to include such a market in the list of markets susceptible to *ex ante* regulation at Union level.

With respect to situations where the delineation of a separate market for PIA would be the most balanced approach, the chapter provides further indications on how the PIA market could be defined in its product and geographic market dimensions.

Separate product market

A separate market for PIA would be upstream of wholesale broadband markets and dedicated connectivity, and ultimately of the retails markets for broadband services for mass-market and business customers.

The relevant product market may comprise physical infrastructure and other facilities, which can be used to host elements of a network, including buildings or entries to buildings, building wiring,

antenna installations, towers and other supporting constructions, pipes, ducts, conduits, masts, inspection chambers, manholes, and cabinets.

This market would include the supply of wholesale access to electronic communications-specific physical infrastructure for deploying an electronic communications network. The scope should be limited to networks that can be used to host fixed elements of electronic communications networks, such as ducts, poles and chambers.

The scope of the relevant product market would likely be limited to the electronic communications-specific physical infrastructure in many Member States. This is because ducts constructed for other purposes may not be always suitable to host electronic communications networks for the following main reasons:

- technical characteristics, including lack of suitable sites for hosting technical facilities,
- accessibility, including the lack of sufficient access points and/or restrictive rules for access (in particular for water, gas and electricity physical infrastructure),
- unsuitable network design or topology – they may be more fragmented and may not mirror the routes followed by electronic communications-specific infrastructure,
- constraints arising from saturation of certain segments,
- security requirements and risks, including a hostile environment for network co-existence (sewers),
- difficult and costly adaptation and repair. For instance, district heating networks may not be suitable due to temperature and leakage constraints, and it may be particularly difficult to install fibre within water and gas networks due to the presence of valves, while rail and motorway networks lack the necessary capillarity for the deployment of electronic communications networks.

All these factors raise costs in comparison with the use of ducts specific for hosting electronic communication networks. In addition, the terms and conditions for access may potentially be less favourable.

Although non-electronic communications infrastructure is currently used to host electronic communications networks, this use is limited in scale and has led to only limited network rollout[203].

There is no demand-side substitution between electronic communications-specific physical infrastructure and non-electronic communications physical infrastructure. NRAs may however

[203] Based on an assessment conducted by WIK in its report. However, the use of utility infrastructure is significant in Italy and France. As noted by WIK, there is also much interest in municipal and utility infrastructure in Germany, judging by the number of disputes brought on this subject under the BCRD.

examine whether utilities' ducts voluntarily provided or mandated via BCRD have such characteristics that may allow them to exert a constraint on the offer of electronic communications ducts and poles. Generally, non-electronic communications infrastructure would be excluded from the product market.

NRAs do not need to identify specific use cases associated with ducts and poles, or to distinguish between the use of ducts for access and backhaul (open-ended approach). Some flexibility is desirable as the full range of potential access seekers cannot be predicted at this stage, nor the downstream services provided over that network, nor the network architectures they desire. Any product market definition in relation to stylised use cases could result in remedies that artificially restrict innovation and lock access seekers into existing markets and network topologies.

Geographic dimension of the market

In the assessment of the geographic dimension of the market, the relative ubiquity and suitability of the duct and pole network deployed by the incumbent electronic communications network operator (where present), is likely to present a considerable advantage for access seekers over use of multiple PIA networks with different standards. This factor, considered in conjunction with a national demand, the non-availability of commercial offers for duct access and the considerable cost that would be associated with the combination of multiple non-ubiquitous networks and/or self-built physical infrastructure (where these circumstances are confirmed), may be relevant for the definition of a national market. Indeed, operators investing in their own fibre networks would seek to install their infrastructure with the least inconvenience, greatest relevance (in delivering services to customers) and lowest cost. From a demand-side perspective, ubiquity is likely to play an even greater role for operators deploying infrastructure for major businesses and/or mobile networks. The reason for that lies in the relevance of multi-site provision of services for business customers (and to dispersed mobile base stations), the flexibility to roll-out networks to target locations where there is demand and the cost advantages of using a single provider of physical infrastructure.

Furthermore, the situation where operators have already used the incumbents' ubiquitous duct and pole network may point towards a national market definition, given the operational and administrative complexity associated with concluding ducts and poles access agreements, and the lack of potential to switch to alternative arrangements for the hosting of installed fibres.

That said, the geographic dimension of the market should be assessed on a case-by-case basis. The national dimension of the market should not be presumed, especially in situations in which the physical infrastructure network of the SMP operator is not ubiquitous. Lack of ubiquity may occur, for example, where ducts are present only in the segment between the MDF site and street cabinet (but not the final segment) or where an alternative operator rather than the incumbent has delivered fixed coverage in certain areas, whether commercially or in the context of state aid.

In cases where it is not possible for operators to purchase PIA from a single supplier, they would need to self-install or buy a combination of duct and poles from different PIA providers in the electronic communications sector or from utilities.

It should also be considered that in view of the high and sunk costs involved in deploying physical infrastructure, it is unlikely that there would be many areas with extensive availability of three or more parallel duct and pole networks suitable for electronic communications networks. However, based on the evidence gathered by WIK, even if and where such areas exist, wholesale access is unlikely to be made available on a commercial basis, meaning that, in the absence of regulation, there would be high barriers for operators to enter as a mass-market supplier, or deploy networks for specific purposes such as dedicated access or mobile backhaul.

Conclusions

Based on the above considerations, it is at this stage premature to include access to physical infrastructure in the list of recommended markets at Union level, given the differences in national circumstances. BEREC supports the proposal of the Commission services, not to include the wholesale market for access to physical infrastructure in the revised list of recommended markets, as this would oblige all NRAs to undertake an analysis that in many cases would offer little, if any, material benefit[204]. Nevertheless, the Commission services acknowledge recent developments in Member States' regulatory practice, which strongly signal the increasing importance of access to physical infrastructure in the next 5 to 10 years, in particular in those Member States where ubiquitous physical infrastructure is available.

Indeed, the ability to connect any site using a ubiquitous infrastructure of national coverage allows an access seeker to design its networks with more flexibility[205]. Even in case of future deployments that can be made without adding the burdens and costs of changing access infrastructure. Having ubiquitous physical infrastructure provides a clear advantage over the alternative of either combining multiple non-ubiquitous infrastructures, or complementing the use of non-ubiquitous infrastructure with partial self-build infrastructure.

The growing focus on upstream regulation is embedded in the Code, which aims to promote the deployment of VHCN and to foster network-based competition.

Moreover, the deployment of fibre networks by alternative operators may result in the emergence of different competitive conditions within a Member State (i.e. some areas may become competitive while others would remain non-competitive), which may warrant lifting access remedies, in those areas where competition develops in the market for wholesale local access or

204 BEREC opinion, BoR (20) 174, p. 27.

205 This flexibility gives to alternative operator the possibility for example to choose the best alternative connection between different points of the network.

dedicated capacity for business users. BEREC welcomed the Commission's indications on how the PIA market could be defined in its product and geographic market dimensions[206].

4.2. Termination Markets

As regards wholesale call termination, the 2014 Recommendation identified the following markets as susceptible to *ex ante* regulation:

(i) the market for wholesale call termination on individual public telephone networks provided at a fixed location;
(ii) the market for wholesale voice call termination on individual mobile networks.

This section describes and defines termination services markets and assesses whether they are still susceptible to *ex ante* regulation.

Voice termination rates are the wholesale rates that electronic communications operators charge each other to terminate calls on their respective networks ("termination rate"). Each operator has full control over terminating voice calls to its own subscribers. Thus, each operator has a monopolistic position on the market for terminating calls on its own network and has the ability and incentives to set the wholesale price for terminating calls at a level that is significantly above-cost.

In the 2007 and 2014 Recommendations on relevant markets, termination services were considered the least replicable wholesale inputs for retail voice services. The Commission found that the wholesale fixed and mobile termination markets met the three criteria test and consequently included both markets in the list of markets susceptible to *ex ante* regulation.

In terms of regulatory practice, in all cases but one (Finnish fixed termination markets[207]), NRAs followed the Commission's recommendation and concluded that national circumstances do not warrant deregulation of the termination markets.

NRAs can impose both price and non-price obligations on providers of fixed and mobile voice termination services. Price control obligations are always in the form of a maximum fixed and/or mobile termination rate and cost accounting to support price control. Non-price obligations include obligations such as access, non-discrimination, transparency and accounting separation. The scope of non-pricing obligations varies across the Member States. Access obligations are

206 BEREC opinion, BoR (20) 174, p. 27.

207 The Finnish regulator (FICORA) found that 'end users can substitute calls made to a fixed telephone subscription by making a call from a fixed or mobile telephone subscription to a mobile telephone subscription'. Consequently, FICORA proposed to remove existing regulation of the fixed termination markets. However, following the Commission's veto decision, FICORA withdrew its notification. See case FI/2013/1498.

imposed in all Member States, transparency and non-discrimination obligations are very common[208], while accounting separation obligations are often imposed only on large operators[209].

4.2.1. Relevant product market

In line with the 2014 Recommendation, the Commission services consider that even in presence of substitution between fixed and mobile calls at retail level, termination of fixed and mobile calls at the wholesale level represent different services[210]. Thus, the Commission services continue to identify a separate product market for the wholesale termination of fixed and mobile voice calls.

Any specific call can only be terminated by the network provider of the called party. This means that there is no substitution between terminating calls on a different network. Due to this lack of substitution between networks, each network represents a separate product market.

Most NRAs[211] define termination markets based on the number called rather than the type of the network (i.e. fixed or mobile) on which the call is terminated. Some NRAs (e.g. Luxembourg) define termination services by reference to both network and numbering range. BEREC favours 'a definition of wholesale voice call termination which is not technology based (fixed networks or mobile networks) but based on numbers[212].

In line with current regulatory practice, the views expressed in the public consultation on the Union-wide voice termination rates[213] and the BEREC opinion on the Delegated Act[214], the Commission services consider a delineation of the termination markets based on numbering as the most appropriate. Calls to geographic numbers are part of the fixed termination markets while calls to mobile numbers are part of the mobile termination markets.

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208 For example, the Lithuanian regulator imposed non-discrimination and the transparency obligations only on the largest fixed operator but not on the others. See case LT/2019/2162. The Dutch regulator did not impose non-discrimination obligations on any fixed and mobile operators. See cases NL/2017/1975-1976.

209 For example, the Czech regulator imposed access, transparency and non-discrimination obligations on all providers of fixed termination services. In addition, it imposed accounting separation obligation on the largest fixed operator (CETIN). See cases CZ/2016/1927-1928. The Irish regulator imposed access, transparency, non-discrimination and price control obligations on all SMP operators and removed the cost accounting and accounting separation obligations previously imposed on Eircom. See case IE/2019/2151

210 Commission Staff Working Document Explanatory Note accompanying the 2014 Recommendation on Relevant Markets, SWD(2014) 298, p 28.

211 NRAs in Austria, Belgium, Bulgaria, Croatia, Czechia, France, Greece, Ireland, Lithuania, Malta, Portugal, Romania, Slovakia and Sweden use a number based approach. Germany is currently considering moving from a network-based to a number-based market definition.

212 See Synopsis Report on the open consultation on the scope of the Delegated Act setting the maximum Union-wide voice termination rates, https://ec.europa.eu/digital-single-market/en/news/synopsis-report-open-consultation-setting-maximum-union-wide-voice-termination-rates.

213 See Synopsis Report on the open consultation on the scope of the Delegated Act setting the maximum Union-wide voice termination rates, https://ec.europa.eu/digital-single-market/en/news/synopsis-report-open-consultation-setting-maximum-union-wide-voice-termination-rates.

214 BEREC opinion on Delegated Act, BoR (20) 190.

As in the past, the Commission services maintain a technology-neutral approach and consider that all technologies used to terminate calls (e.g. on a 2G, 3G, 4G or 5G network and/or via WiFi, any type of fixed network), form part of the termination markets. Similarly, the origin of calls (national/international, fixed/mobile) is not a relevant differentiating element for the product market definition.

Non-geographic numbers other than mobile numbers

There are several services provided through non-geographic numbers other than mobile numbers. BEREC identifies the following main categories[215]:

a) value added services (VAS)[216],

b) machine to machine (M2M) services, in Member States where non-geographic numbers other than mobile are used for M2M voice communications,

c) fixed nomadic services[217], and

d) emergency services (e.g. 112).

In BEREC's opinion, the business model and economic rationale of voice interconnection to VAS services are very different from person-to-person voice interconnection, because of the involvement of service providers in the value chain. Fixed and mobile voice termination under the calling party pays[218] (CPP) principle follow a 'two-way' model, whereby an interconnection agreement needs to be negotiated by the interconnecting operators A and B, to deliver calls from operator A's customers to operator B's customers, and vice versa. However, the competition dynamics are different when negotiating interconnection agreements to access VAS. Voice calls to VAS are one-way only, and the charging principles do not follow the traditional CPP charging regime. The provision of VAS is subject to the receiving party pays (RPP) principle (free-cost numbers) or revenue sharing agreements (e.g. premium numbers) where the terminating

215 BEREC opinion on Delegated Act, BoR (20) 190, p. 8-9.

216 VAS consist of (1) free-phone services, where the charge for the call is paid by the called party and not the caller, (2) premium-rate services used for calls where certain services are provided, and for which the prices are higher than normal calls. Unlike a normal call, part of the total call charge is usually paid to the premium rate service provider, generally a distinct entity from the ECS provider, thus enabling businesses to be funded via the calls, (3) shared-cost services, which allow the caller to be charged for only part of the cost of the call, with the called party being charged for the remainder, (4) social value services, such as the EEA harmonised number range 116 XXX, and (5) Other special phone services, which do not fall into the other categories but are charged more than a regular fixed call, like directory services, (e.g. 11 8 XY in some MS used for directory services).

217 Common examples of fixed nomadic services are VoIP, delivered through wireless technologies such as WiFi and Bluetooth.

218 Under the calling party pays principle applicable in the Union, it is the operator of the calling network that pays the termination rate to the operator of the called network. The called party is not billed for termination services and thus it is unaffected by the level of the termination rate set by its network provider.

network/service provider determines the end-user pricing of the call and the originating operator charges a wholesale origination rate.

In line with the above arguments, most NRAs exclude VAS from the relevant market. Most NRAs, however, include calls to fixed nomadic and emergency numbers in the fixed termination market because they follow similar competition dynamics as calls to fixed geographic numbers. The Commission services accept BEREC's arguments and acknowledge that the competition dynamics for terminating voice calls in numbering ranges for VAS differ from "traditional" CPP-based termination. Therefore, the Commission services consider that the termination for calls to numbering ranges for VAS are not part of the termination markets.

Regarding M2M services, the Commission services note that as they are overwhelmingly not voice based[219]; they should therefore not be part of the voice (fixed and mobile) voice call termination markets.

Regarding fixed nomadic services and emergency services, BEREC does not argue that they are substantially different to "traditional" fixed termination services. The Commission services have not identified special characteristics of these services that would require their exclusion from the fixed termination market. The qualification of fixed nomadic services as part of the fixed termination market also reflects common business practice of operators of billing such services as fixed calls in retail calling plans for end-users.

Interconnection ports

The Delegated Act setting single maximum Union-wide voice termination rates includes the cost of interconnection ports into the termination rates. This is justified by the fact that interconnection ports are essential – for all operators and in all Member States – for the provision of voice termination services, which require the interconnection of networks. However, this is not the case for most (if not all) associated facilities which depend on the individual agreements and situation per operator in each Member State (for example colocation is often used to provide other services than termination and is in the majority of cases also needed for origination services). For these reasons and in line with the Delegated Act, the Commission services consider interconnection ports to be part of the termination markets.

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219 However, in BoR(20)190, BEREC notes that „*there are MS (e.g. Spain and the Netherlands) where specific M2M numbering ranges are assigned to both fixed and mobile operators for voice connectivity of M2M equipment. In these cases, voice termination interconnection agreements are in place, applying FTR or MTR depending on the terminating network operator*. BEREC adds that *in some MS, (e.g. Germany) dedicated M2M numbering ranges do not exist. M2M business models often use normal numbering ranges if they use telephone numbers at all. If they use normal telephone numbers, it is difficult if at all possible for originating operators to identify that a call is an M2M connection in these cases. There are also hybrid M2M-Cases, for example eCall (M2M communications with the possibility of voice communication in case of an accident)".*

Voice over Internet Protocol (VoIP)

The substitutability of fixed and mobile voice services by managed and unmanaged VoIP services depends on a number of factors such as product characteristics, quality of service, broadband penetration, pricing, and possibility of receiving domestic or international calls.

Managed VoIP, usually over fibre, cable TV or DSL networks, has been included by NRAs in the same market as traditional voice calls. Unmanaged VoIP provided as an OTT service is considered functionally not a full substitute because the service is mainly used to make or receive calls to/from other users using the same service. The termination of voice calls originating from some OTTs (e.g. Skype, Viber or Google Voice) to numbers in the numbering plan as a paid-for service is included in the relevant market.

The usage of unmanaged voice services has been significantly increasing in the last years. In parallel, the volume of voice calls has been declining or stagnating[220]. Despite this trend, unmanaged OTT VoIP is not considered by NRAs as a substitute for fixed or mobile voice when defining the relevant retail or wholesale markets. The functionalities are different: in order to make and receive calls, both users need to be logged on to the specific service and have the device (a smartphone, a tablet or a laptop/PC) switched on in order to utilize the service. The UK regulator found that only around 18% of those who have ever used the internet to make voice or video calls do so daily. On the other hand, 70% of mobile phone users make telephone voice calls at least daily[221].

Therefore, in line with current regulatory practice, the Commission services do not consider unmanaged voice as part of the same market. Nevertheless, the impact of unmanaged voice service on (fixed and mobile) voice termination services should be taken into account for the assessment of SMP on a forward-looking perspective[222], as an indirect competitive constraint.

4.2.2. Relevant geographic market

Some NRAs define the geographic scope of the termination markets as national (e.g. Czechia[223]), others as the geographic coverage of the networks concerned (e.g. UK[224]). In most cases, this does not amount to a real difference because fixed and mobile networks usually cover the whole territory of a Member State. However, some fixed networks have a regional coverage only. Therefore, defining the relevant geographic market in relation to the network coverage is more precise and therefore the recommended approach.

220 DESI report 2019, European Commission, https://ec.europa.eu/digital-single-market/en/desi.

221 WIK Report, p. 251.

222 FR/2014/1670.

223 See case CZ/2020/2239.

224 See case UK/2017/2024.

The geographic origin (same Member State or other country) of the terminated calls is not relevant for the definition of the geographic market because the call termination service is functionally the same and often indistinguishable from the perspective of the terminating operator.

4.2.3. Three criteria test

In the following, the Commission services examine whether the termination markets meet the criteria for including them in the list of relevant markets.

High and non-transitory barriers to entry

Call termination can only be provided by the operator of the called party. No other network operator can replicate this service. The barrier to provide termination by any network operator other than that of the called party is unsurmountable.

Consequently, the first criterion of high and non-transitory barriers to entry is satisfied.

Market structure tending towards effective competition

The main characteristic of the wholesale call termination markets is the presence of a single supplier. Each network is a separate product market and every operator has a 100 % market share on its network.

In the Explanatory Memorandum to the 2014 Recommendation on relevant markets, the Commission considered that due to the calling party pays principle (CPP) operators are not constrained in setting termination rates. Indeed, excessive prices have been throughout the years of regulation of termination markets the most serious threat to competition, given that operators were free – as monopolists on their networks – to set termination rates above competitive levels.

However, the ability of terminating operators to set excessive termination charges will be addressed by the application of a single maximum Union-wide mobile voice termination rate and a single maximum Union-wide fixed termination rate (the single maximum Union-wide voice termination rates). Article 75 of the Code empowers the Commission to adopt a delegated act setting single maximum Union-wide voice termination rates that will directly apply to any provider of fixed and mobile termination services in the Union. The single maximum Union-wide voice termination rates will cap termination rates of all operators providing terminating services at the cost of an efficient operator. NRAs will closely monitor and ensure compliance with the single maximum Union-wide voice termination rates, but they will no longer be able to impose price controls on termination rates.

Under the modified Greenfield approach, the assessment whether markets are effectively competitive should be carried out in the absence of regulation based on a finding of SMP. However, the analysis must take into account the effects of other types of (sector-specific)

regulation, decisions or legislation applicable to the relevant retail and related wholesale market(s) during the relevant period[225].

In the presence of single maximum Union-wide voice termination rates regulation the termination markets lack competition but not a competitive outcome (in terms of prices). The Commission services consider that, for the purpose of the three criteria test, the 'competitive pricing' imposed by the single maximum Union-wide voice termination rates, taking into account the specific characteristics of these markets, favours the emergence of effective competition on retail markets[226].

As explained, the single maximum Union-wide voice termination rates remove the most serious competition problem identified on these markets – the risk of excessive prices. However, price control is not the only remedy that could be imposed on terminating operators. Operators may be obliged to provide access[227] under non-discriminatory[228] and transparent[229] conditions. These obligations are of particular relevance to prevent anticompetitive behaviours by large operators towards small operators and are usually imposed by NRAs together with the price control. Some NRAs also impose obligations on associated facilities, such as co-location or interconnection equipment, and on other detailed aspects of the provision of interconnection and access (closure/move of points of interconnection, reference offer, transition to IP interconnection)[230].

In any event, the likelihood of terminating operators systematically refusing access, interconnection or imposing discriminatory and non-transparent conditions has to be seen in light of the threat of re-regulation[231] and of competition law enforcement. NRAs maintain their powers to impose appropriate obligations, except price controls. Such intervention can be implemented

225 Commission Guidelines on market analysis and the assessment of significant market power under the EU regulatory framework for electronic communications networks and services, 7.5.2018, OJ C 159/1, par.18.

226 Similarly, the 2007 and 2014 reviews recognise that the fact that each operator is a monopolist on its own network does not automatically mean that it has significant market power.

227 Access obligations can include, among other conditions, meeting reasonable requests for access, providing access to fixed and mobile termination services and associated facilities, negotiating in good faith, not withdrawing access to facilities already granted, granting access to technical interfaces, protocols and other technologies, ensuring access is provided in a timely manner, etc.

228 The transparency obligation on voice termination providers typically consists of an obligation to publish technical and price information to be made available to access seekers, frequently in connection with the access and non-discrimination obligations, in order to overcome information asymmetries between providers of termination services and termination seekers and avoid lengthy negotiations between termination providers and access seekers.

229 The non-discrimination obligation on voice termination providers addresses possible discriminatory terms in the provision of non-price elements, such as quality of service, to operators requesting termination services, including a more favourable treatment of the terminating retail operator's wholesale arm.

230 BEREC response to the EC public consultation on the review of the Recommendation on Relevant Markets, BoR(19) 107, 13 June 2019, p.9. and BEREC opinion on Delegated Act BoR (20) 190.

231 Although not necessarily timely, possible fines could be imposed by a competition authority.

relatively swiftly since deviations from long established behaviour (status quo under previous regulation) should be easily observable.

This is particularly true for refusal of access. First, Article 60(1) of the Code obliges all operators, when requested, to negotiate with each other interconnection for providing publicly available electronic communications services, in order to ensure provision and interoperability of services throughout the Union. Second, operators can 'circumvent' any refusal of access by making use of indirect interconnection (transit services). The possibility of substituting direct by indirect interconnection may vary across markets. Thus, if relevant, it should be analysed at the national level.

Furthermore, the incentives for operators to refuse access or discriminate is much more limited than charging high termination rates. High termination rates increase the revenues and profits of the terminating operator and increase the costs of the originating operator, who is often a competitor of the former. Thus, terminating operators benefit twofold from high rates, increased profits and improved competitive position relative to other operators. Refusing access harms competitors as well but at a cost. Operators refusing to terminate calls from other networks would become less attractive to customers and thereby undermine their own business. The same basic logic applies to discrimination but insofar as it creates a noticeable disadvantage to customers. Overall, access provided under discriminatory or non-transparent conditions is more likely to occur than refusal of access. The likelihood of such behaviour would depend on special circumstances such as the migration to IP networks and the resulting uncertainty on interconnection points and timing. Such situations tend to be temporary and do not commonly occur in all Member States. If these behaviours occur, they should be relatively easily observable by market participants, regulators and competition authorities. Hence, they could be addressed either by competition law or by regulatory intervention.

Based on the above, the Commission services consider that the second criterion is not satisfied at Union level. Nevertheless, the introduction of the maximum Union-wide voice termination rates might not eliminate all risks to effective competition on the termination markets. If problems emerge or if there is a high risk that they will, NRAs may conclude that the termination markets do not tend towards effective competition. This could be the case where NRAs have received justified complaints from operators that were denied interconnection. In such case, the termination markets could remain regulated, with regard to aspects other than price control, if the three-criteria test is satisfied. This may be justified especially for the period immediately after the introduction of the Delegated Act setting the maximum Union-wide voice termination rates.

For instance, the Delegated Act will include interconnection ports in its scope, and therefore operators will not be able to charge for these services separately from the maximum Union-wide voice termination rates. However, other associated facilities that may be required to provide termination services by certain operators in certain Member States are not included in the scope of

the Delegated Act. Therefore, NRAs should assess whether regulation may be warranted for those services.

Sufficiency of competition law alone to adequately address the identified market failure(s)

There is no need to analyse this criterion since the second one is not met.

4.2.4. Regulatory options available for other obligations than price control

As explained above, the Commission services consider that the implementation of the single maximum Union-wide voice termination rates would be sufficient to reduce operators' systematic ability and incentive to behave opportunistically on the termination markets.

As a general principle, Article 3(4)(f) of the Code stipulates that NRAs should impose *ex ante* regulatory obligations only to the extent necessary to secure effective and sustainable competition in the interest of end-users and relax or lift such obligations as soon as that condition is fulfilled. Moreover, regulatory measures should be necessary and proportionate for achieving the objectives set out in Article 3(2).

Nevertheless, if specific problems arise, regulatory authorities are well equipped to address them.

In the public consultation, both for the review of the Relevant Market Recommendation and the Delegated Act on single maximum Union-wide voice termination rates, BEREC and several NRAs urged the Commission to clarify the powers and tools available to NRAs to address any remaining problems on the termination markets, in particular regarding access, non-discrimination or transparency[232]. The Commission services aim to recall the means available to NRAs to impose such obligations after the entry into force of the Delegated Act.

Article 15(2) of the Code[233] gives providers of electronic communications services the right to obtain access to, or interconnection from, other providers of publicly available electronic communications services covered by a general authorisation.

Article 60 of the Code also provides that operators of public electronic communications networks have the right and the obligation to negotiate interconnection agreements in order to ensure the provision and interoperability of services.

NRAs can impose *ex ante* obligations under Article 61(2) of the Code [234] on access, interconnection and interoperability of services in order to ensure the policy objectives of Article

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232 See Synopsis Report on the targeted public consultation on the Review of the Recommendation on Relevant Markets, p. 5.

233 The general authorisation shall give providers of electronic communication services the right to 'negotiate interconnection with and, where applicable, obtain access to, or interconnection from, other providers of public electronic communications networks or publicly available electronic communication services covered by a general authorisation in the Union'.

3 of the Code[235]. In the Commission services' view, in particular in specific circumstances where there is a likelihood that specific operators would adopt anticompetitive conducts on the market, NRAs could justify imposition of other obligations based on Article 61(2). Transparency and non-discrimination obligations could also be imposed under this provision given that operators requesting interconnection would require non-discrimination vis-à-vis other retail providers, including the termination provider's retail arm, in order to be competitive. In this regard, the Commission acknowledged in its Article 7 practice that Article 5 of the Access Directive (corresponding to Article 61 of the Code) could be the legal basis to impose obligations of transparency and non-discrimination[236].

Where NRAs consider imposing obligations, namely interconnection, transparency and non-discrimination, they would have to follow the procedure under Article 61(2)[237]. The draft measure should therefore first be consulted nationally and afterwards with the Commission under Article 32 of the Code.

It should also be noted that Article 61 could also be the legal basis for imposing obligations in the context of the settlement of a dispute arising between terminating operators.

Finally, NRAs will retain their power to conduct market analyses under Article 67 and impose non-price obligations on SMP operators under Article 68. However, the removal of the termination markets from the list of recommended markets means that NRAs will need to conduct the three criteria test and prove that all criteria are met. In order to do so, NRAs would need to show that specific (non-price related) problems exist. For example, applications for dispute settlement would signal that the market might not function effectively. In such cases, SMP-based *ex ante* regulation may be the more appropriate way to address persistent problems.

It is subject to NRAs' assessment which regulatory tool fits best to remedy identified competition problems according to national circumstances. Imposition of remedies under Articles 61 and 68 requires notification to the Commission.

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234 Article 61(2) states that NRAs 'shall be able to impose: (a) to the extent necessary to ensure end-to-end connectivity, obligations on undertakings subject to general authorisation that control access to end-users, including, in justified cases, the obligation to interconnect their networks where this is not already the case; (b) in justified cases and to the extent necessary, obligations on undertakings subject to general authorisation that control access to end-users to make their services interoperable'.

235 Including the promotion of competition in the provision of electronic communications networks and associated facilities, the development of the internal market by favouring the provision, availability and interoperability of pan-European services, and end-to-end connectivity, and the promotion of the interests of the citizens of the Union by enabling maximum benefits in terms of choice, price and quality on the basis of competition.

236 See case PL/2007/0656.

237 Article 61 applied in the context of a dispute settlement would enable NRAs to address the specific case brought by the parties. However, Article 61 could also be applied on the NRA's initiative.

5. TRANSITION TO THE NEW RECOMMENDATION

The transition between the versions of the Recommendation raises issues for all stakeholders. The underlying principle is that remedies that have been imposed should stay in place until a new market analysis is undertaken.

Allowing a regulatory measure or remedy to run its course, without risk of it being reversed mid-term, is an important element of regulatory commitment, which reinforces the predictability of regulatory intervention. However, as the competitive situation on the markets may rapidly change, the Code provides for a certain flexibility in reviewing the remedies imposed in order to ensure that such obligations still meet the criteria of proportionality required by the Code.

Nevertheless, NRAs should prepare in time for the new round of market analyses following the adoption of the revised Recommendation[238].

Article 67 of the Code obliges NRAs to carry out an analysis of the relevant markets and notify the corresponding draft measures in accordance with Article 32 within five years from the adoption of a previous measure relating to that market. Article 67(5)(b) also stipulates that for markets not previously notified to the Commission, NRAs need to carry out an analysis and notify it within three years from the adoption of a revised Recommendation on relevant markets. Each of the markets envisaged to be included in the updated Recommendation corresponds to a market present in the 2014 Recommendation. Therefore, NRAs should apply a five-year market review cycle if they have previously conducted a market analysis based on the 2014 Recommendation. For the sole purpose of assessing the expiry of the five-year period mentioned in Article 67(5)(a) of the Code, NRAs should consider that market 1 corresponds to market 3a of the 2014 Recommendation, and market 2 corresponds to market 4 of the 2014 Recommendation.

The circumstance may arise that an NRA is in the process of conducting a market review, including a public consultation in accordance with Article 32 of the Code, at the time when the updated Recommendation is adopted. If an NRA considers regulation of a market, which would no longer be included in the updated Recommendation, then it should apply the three criteria test in order to assess whether based on national circumstances that market would still be susceptible to *ex ante* regulation[239]. Therefore, the notified draft decision should outline and justify why the three criteria are satisfied.

On the other hand, if the NRA is considering departing from a market definition as set out in this Recommendation, its notified measure should contain a reasoned explanation of why this is appropriate in national circumstances. Finally, if an NRA notifies to the Commission a draft measure that reflects the market definition(s) set out in the updated Recommendation, having

238 The national regulatory authorities should carry out the market analysis within the period set in Article 67(5) of the Code.

239 National regulatory authorities should consider whether the draft measure consulted at national level already includes the elements of the three criteria test and therefore there is no need for a new public consultation.

already conducted a public consultation on the basis of the market definition(s) set out in the 2014 Recommendation, the mere adoption of this Recommendation should not *per se* require that NRA to conduct a new public consultation.

6. PUBLICATION OF THE RECOMMENDATION AND SUBSEQUENT REVISION

Article 64 of the Code mandates a regular revision of the Recommendation. The length of the review period will depend first on the speed and significance of market developments, especially if they lead national regulatory authorities gradually to find retail markets competitive even in the absence of wholesale regulation. Moreover, timing of the next revision needs to take into account the need for predictability and legal certainty for all market players, as well as the longer length of the market review period of five years.

7. ANNEX - INPUTS TO THE PREPARATION OF THE REVIEW OF THE RECOMMENDATION

The content of the Recommendation as well as this Explanatory Note have been informed by extensive regulatory practice from more then six years of applicability of the 2014 Recommendation, the public consultation, which took place from February to April 2019, the meetings, discussions and workshops with the BEREC Expert Working Group, NRAs and stakeholders, as well as by an expert study delivered to the Commission in May 2020. The Commission also took into utmost account BEREC's opinion of 16 October 2020 on the European Commission's Draft Recommendation. Main inputs are summarized below.

7.1. Results of Public consultation

During the public consultation[240], almost all respondents expected the electronic communications sector to undergo rapid and significant technological changes. They also considered that there is an overall trend towards increasing the capacity of networks in order to meet connectivity needs. According to the majority of respondents, with regard to fixed access networks, new technologies allow for some upgrading of legacy copper networks, while cable technology has evolved to offer gigabit connectivity. However, the highest level of connectivity in terms of latency and speeds are expected to come from the continued rollout and uptake of fibre networks.

As regards the market for wholesale call termination on individual public telephone networks provided at a fixed location and for wholesale voice call termination on individual mobile networks, currently listed in the Recommendation respectively as market 1 and market 2, almost half of respondents consider that these markets should be removed from the list of markets susceptible to *ex ante* regulation in the revised Recommendation. They considered that the

[240] During the public consultation 44 replies (including Body of European Regulators for Electronic Communications - BEREC) were received. Umbrella organisations and individual stakeholders contributed. Replies came mainly from affected operators/industry but also from National Regulatory Authorities (NRAs), individuals as well as business/users associations.

introduction of single maximum Union-wide mobile and fixed voice termination rates (Single maximum EU-wide voice termination rates) by a delegated act under Article 75 of the Code, and the increased competition in fixed and mobile retail markets due to the competitive pressure exerted by OTTs, would render regulation redundant. Those who were in favour of keeping the termination markets in the revised Recommendation underlined that Single maximum EU-wide voice termination rates alone will not be sufficient to counter the risk of monopolistic behaviour and that remedies of access, transparency, non-discrimination and cost accounting may still be necessary.

The majority of respondents were of the opinion that the revised Recommendation should maintain a clear differentiation between local and central access, as operators with different business models require different types of access. Likewise, about half of the respondents consider that the scope of the market for wholesale local access (WLA) provided at a fixed location and wholesale central access (WCA) market should remain unchanged. Some respondents argue that even though 5G will be one of the main technological trends for the coming years, it will not affect the definition of relevant markets. In contrast, other participants called for a 'single wholesale fixed network access market', combining the current markets for wholesale local and central access. They observed clear indications for substitutability between physical/passive and virtual/active products, which, in their view, would justify their inclusion in the same market. They note that substitution of access products within both markets is already very high. According to them, virtual access products with local, central or regional traffic handover rapidly substitute classic physical unbundling (LLU) and layer 3 bitstream services[241].

The majority of respondents consider that the market for wholesale high-quality access provided at a fixed location should remain in the list of markets susceptible to *ex ante* regulation because this market continues to fulfil the three criteria test as the barriers to entry are high and the market is highly concentrated. In addition, they argue that building backhaul infrastructure to reach relatively dispersed customers remains a bottleneck. However, from the public consultation, the trend towards increasing substitution between leased lines up to 1Gb and Fibre to the Premises-based (FttP) broadband services is emerging as suppliers of FttH broadband increasingly can deliver symmetrical gigabit speeds.

Regarding the regulation of physical infrastructure access (PIA), most industry stakeholders, both in the public consultation and in the context of WIK research, expressed concerns regarding a self-standing PIA market and pointed at alternative solutions such as: (i) the Broadband Cost Reduction Directive (BCRD), (ii) symmetric rules, (iii) and PIA as a stand alone or ancillary remedy. Some commented that regulating PIA could negatively affect providers of local fibre networks and disincentivise further investments. Others, in particular independent providers of specialised electronic communications services, were in favour of establishing a separate PIA

[241] L3 bitstream service is an active wholesale access product with handover at the network layer (IP level).

market due to current limitations of the use of ancillary remedies imposed in one market (usually WLA) to other markets (business market).

Finally, some respondents raise the point that future broadband market reviews have to include a rigorous assessment of possible geographic differences due to significant geographical differences of competition in a given Member State. Other respondents maintain their view that variations of competition are not significant enough to justify regional market definitions.

7.2. Expert study

An expert study was carried out by WIK Consult to accompany and further inform this project. WIK identified the following key technological and market developments since the last Recommendation on Relevant Markets was adopted in 2014:

- Increased bandwidth needs for consumers to support the use of new applications in various areas auch as entertainment, home working, eHealth and eLearning;
- Increased bandwidth, symmetry and quality requirements for connectivity to businesses, public institutions, schools and hospitals to support digital applications, cloud computing and the processing of big data.
- The move towards all-IP and switch-off of the PSTN network;
- The expansion of VHC fibre and cable networks and migration from copper to those networks, alongside the switch-off of the copper network within the next decade. In particular, in rural areas, wireless solutions are likely to be used to ensure connectivity.
- The market for 5G mobile and fixed wireless services, alongside IoT/M2M applications in various fields is expected to grow significantly in the coming years, which will drive the need for increased fibre connectivity to base stations and densification of the network;

WIK finds separate retail markets for mass-market data connectivity (which may be used by consumers and businesses/sites with less demanding requirements) and dedicated access at the highest quality levels for business use. Where PtP fibre infrastructure (which can be used for both business and residential purposes) has been widely deployed, this distinction may however not be relevant.

The study suggests that these markets are unlikely to tend towards effective competition on a nationwide basis in the absence of *ex ante* regulation at wholesale level. However, competition is likely to vary significantly across regions within a given Member State and there may be some areas, which are competitively served with competing network infrastructures. Especially in business districts (for the provision of dedicated access), or in a few Member States locations where entrants have deployed their own networks including ducts alongside those of the incumbent and cable operators.

At wholesale level, the study considered the possibility of a separate PIA market as the most upstream wholesale market to be added to the list of recommended markets. The definition of a self-standing PIA market is considered appropriate for some Member States, in particular where PIA is the primary mechanism to support infrastructure-based competition. However, the relevant of PIA varies significantly across Member States and may be less effective in facilitating broadband competition in Member States where the incumbent's PIA network is not ubiquitous, or where demand for PIA is limited due to the availability of i.a. unbundled fibre. WIK concludes that that due to the significant variation of the situation of a PIA market across Member States, it may not yet be appropriate to include this market in the Recommendation.

As regards wholesale broadband access, WIK concludes that the current distinction between WLA and WCA remains appropriate. While technically it may be possible to provide the quality of VULA at a regional handover point to access seekers, the required absence of overbooking in the core network would significantly increase costs of such access. Moreover, alternative operators that deployed their own network infrastructure to local interconnection points would have no incentives to switch from local to centrally provided access.

According to WIK, the WLA market is likely to meet the three criteria test on an EU-wide basis due to significant scale economies associated with the deployment of VHCN. 5G FWA may offer the potential for additional competition, but its effect may be limited to rural areas (or Member States where FttH is not widespread). Moreover, infrastructure based competition relying on end-to end infrastructure duplication may be limited to certain areas and to 10-30% of households.

The WCA market on the other hand no longer meet the three criteria test on an EU-wide basis. NRAs in a number of Member States have found that this market is either wholly or partially competitive. This trend towards competition may continue as service providers climb the ladder of investment from WCA to WLA and/or purchase commercial WCA services, which may be provided on a competitive basis. Even in areas where WCA remains important for access seekers, the availability of backhaul (including via the market for dedicated access where appropriate) may facilitate a further progression towards the use of WLA in rural areas and/or facilitate the deployment of FWA, which may provide a longer-term replacement for copper in very rural zones.

The current Recommendation includes a market for "high quality access", which includes wholesale leased lines alongside business-grade bitstream. In its study, WIK concludes that business-grade bitstream may have similar characteristics to, and could be provided by the same suppliers as are present in the market for mass-market WLA in particular in the presence of VHCN. Thus, NRAs could consider the competitive conditions for business-grade bitstream in the context of the WLA market analysis, and apply additional requirements regarding service levels in that context, where appropriate. On the other hand, the connectivity needs of some commercial and public sector organisations and „socio-economic drivers" are likely to require dedicated connectivity, both to connect businesses and organisations and to extend fibre backhaul to

increase capacity and improve quality on mobile networks. WIK concludes that there is a wholesale market for dedicated capacity for a variety of use cases (including access and backhaul), which is likely to include both terminating segments of leased lines and dark fibre in the terminating segment.

Copper-based traditional leased lines are in the process of being phased out in several Member States and there may be a point at which those traditional leased lines no longer constrain prices charged for higher bandwidth products, at which point separate market segments may have to be identified. However, *ex-ante* regulation should be focused on the higher bandwidth connections.

The study suggests that the market meets the three criteria test. There are areas in most Member States where it is not viable to duplicate dedicated capacity in the terminating segment or in some cases to deploy it in the absence of state aid. However, the competitiveness of that market is likely to vary considerably within a given Member State, as dedicated capacity often will be competitively supplied in some areas, including business districts.

WIK is convinced that significant areas remain where backhaul cannot be viably duplicated, and the owner of fibre backhaul connections in such areas may not have an incentive to provide access to or share their assets in cases where this infrastructure confers an advantage for its own fixed and/or mobile retail business.

As regards the markets for fixed and mobile voice call termination, the study suggests that even though these markets are currently regulated in all Member States, they will no longer be susceptible to ex ante regulation given the introduction of the single maximum EU-wide voice termination rates under Article 75 of the Code, irrespective on any SMP finding. Indeed the primary competition law concern on those markets used to be that operators would not, in absence of regulation, be sufficiently constrained when setting prices for the termination of fixed and mobile voice calls. With the introduction of the single maximum EU-wide voice termination rates, this competition law concern is no longer relevant and hence the market no longer meets the three criteria test[242].

7.3. BEREC Opinion

On 16 October 2020, BEREC issued its opinion on the draft Recommendation on relevant product and service markets susceptible to ex-ante regulation[243].

Concerning the termination markets 1&2/2014, BEREC is not opposed to the removal of these markets from the list in the draft 2020 Recommendation on relevant markets, given the upcoming adoption of the Delegated Act, which will set maximum Union wide voice call termination rates. However, BEREC still voices concerns about possible implications of the removal, in particular

242 WIK report, executive summary, pages 1-15

243 BoR(20) 174 of 16 October 2020.

with respect to non-price related issues, which would not be covered by the delegated act, and maintains its position that the markets would continue to meet the three criteria test due to the monopolistic nature of these markets. BEREC asks for an explicit acknowledgement in the text of the Recommendation of a situation, which could lead many NRAs - due to national circumstances - to continue applying SMP regulation in the termination markets. Furthermore, BEREC welcomes that the Commission acknowledges the possibility for NRAs to address non-price related issues through Article 61 of the Code.

In relation to the new market 1/2020 (former market 3a/2014), BEREC agrees on the need to maintain this market in the list of relevant markets, as a forward-looking analysis shows that high and non-transitory entry barriers will be observed in the majority of Member States. BEREC also agrees on the need for a geographical analysis, which can lead to more targeted regulation of this wholesale market (and not necessarily complete deregulation). BEREC highlights the need for a case-by-case analysis regarding the substitution between local and central wholesale access, given that bitstream products can be designed to display similar product features, regardless of the access point.

Regarding the removal of market 3b/2014 from the list of the Draft 2020 Recommendation on relevant markets, BEREC is of the opinion that the conclusion regarding the Union-wide competitiveness of the wholesale central access (WCA) market is premature and does not reflect the current situation and foreseeable future developments in the majority of Member States. Therefore, BEREC calls upon the EC to reconsider its assessment and to maintain market 3b/2014 in the list of markets susceptible to *ex-ante* regulation. BEREC considers that fixed WCA products have and will continue to have an essential role for enabling retail broadband competition. BEREC is mainly concerned about the level of competition in rural areas, as deployment of alternative infrastructures would be focused on urban and densely populated areas, while state aid programs covering rural areas would be limited and fragmented. Moreover, it takes the view that the impact of 5G-based fixed wireless access is not sufficiently certain at this point. BEREC proposes a detailed geographic analysis as a more proportionate regulatory approach than deregulating the market in its entirety.

With respect to new market 2/2020 (former market 4) BEREC agrees that it should be maintained in the list of relevant markets. BEREC also agrees that dark fibre may be a potential substitute for high-quality access, but is of the view that conclusions regarding the inclusion in the relevant market may differ across countries. BEREC also considers business-grade bitstream services may be part of the product market and this should be reflected in the Explanatory Note. Further to this, BEREC suggests to maintain the definition of this market as a "high-quality wholesale access" market. On mobile backhaul, BEREC considers that the Explanatory Note should acknowledge the need for regulated services in some countries, especially in the light of the expected deployment of 5G networks. BEREC also stresses the need to take into account the specificities of multi-site demand when dealing with both product and geographical market segmentation, when applicable.

Regarding the potential new market for wholesale access to physical infrastructure, BEREC agrees on the approach taken in the Draft Recommendation and Explanatory Noteand welcomes the detailed guidance provided, which will be useful for those NRAs considering, now or in the future, whether this market should be regulated separately.

On transitional issues, BEREC shares the views of the Commission services regarding the transition to the new Recommendation and is highly supportive of the reinforcement of the regulatory predictability principle.