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Future electronic communications markets subject to ex-ante regulation

Final report

Client: DG Connect

Rotterdam, 18 September 2013

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The opinions expressed in this Study are those of the authors and do not necessarily reflect the views of the European Commission.

ECORYS

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Preface

More than four years after the current version of the Recommendation on relevant markets has been adopted, the Commission considered it appropriate to start the procedure for the revision of the list of relevant markets. To obtain “a quantitative and qualitative analysis of EU electronic communications markets” and an assessment of “the impact of altering the list of relevant markets against the key policy objectives”, the Commission published on 17 July 2012 an invitation to tender for a study on “Future electronic communications markets subject to ex-ante regulation (Recommendation on relevant markets)" – SMART 2012/0007.

The study was granted to Ecorys Netherlands, supported by subcontractors and individual experts. Responsible for the management of the project and overall analysis are Professor Dr Marcel Canoy, Patrick de Bas and Nicolai van Gorp (Ecorys). The chapters of the main report have been written by Nicolai van Gorp, Jonas Rosenstok (Lexonomics) and Jim Niblett (Regulaid).

Analysis of trends and market data is provided by Idate (Christoph Pennings, Vincent Bonneau, Didier Pouillot, Frédéric Pujol). The legal analysis of NRA notifications is provided by a cooperation of University of Leuven (Dr. David Stevens), Shanghai University (Liyang Hou) and University of Namur (Alexandre de Streel). The methodological working paper is developed by Professor Dr Andrea Renda (CEPS) and Jim Niblett.

The project team was advised by a team of experts. The advisory panel consisted of: Dr Paul de Bijl (CPB Netherlands Bureau for Economic Policy Analysis), Dr Theon van Dijk (Lexonomics), Professor Dr Steffen Hoernig (Universidade NOVA de Lisboa), Professor Dr Pierre Larouche (Tilburg University), and Professor Dr Peggy Valcke (University of Leuven).

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We would like to thank the steering group from the European Commission for its constructive comments and excellent guidance and advice throughout the entire period of this study. We also thank all participants to the technical meeting hosted on 20 February in Rotterdam for their contributions.

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Executive Summary

Background, objective and approach

Background

The Recommendation on Relevant Markets is up for its second review; notably the list of pre-defined relevant markets subject to ex-ante regulation. The first review took place in 2007. The second review is to take place in 2014 and should define an updated list of relevant markets subject to ex-ante regulation for the period up to 2020. This study on "Future electronic communications markets subject to ex-ante regulation" was commissioned by the European Commission (DG Connect) with the objective of gaining inputs for the upcoming review of the Recommendation on Relevant Markets; more specifically, to form a basis for a revision of the list of relevant markets in that recommendation.

The Recommendation on Relevant markets includes a list of pre-defined relevant markets that are subject to ex-ante regulation. NRAs are required to examine all the markets that are on the list in their periodic market analyses. The list does not, however, prescribe NRAs to regulate these markets! That decision should follow from the analyses by the individual NRAs and their conclusion on whether or not there is a problem with Significant Market Power (SMP) by one (or more) operator(s). Nor does the list prevent NRAs regulating markets that are not on the list. Again this decision should follow from the NRAs analyses of SMP. However, for NRAs to regulate a market that *is not* on the list (or to *not* regulate a market that *is* on the list) the NRAs should present additional evidence that the problems identified do (not) pass the so-called Three Criteria Test, meaning: (i) the market is characterised by high and non-transitory barriers to entry; (ii) the market structure does not tend towards effective competition within the relevant time horizon; and (iii) competition law alone is insufficient to adequately address the market failure(s) concerned.

Purpose of the study

The objectives of the study are twofold:

- First, the Study should provide a quantitative and qualitative analysis of EU electronic communications markets to allow the Commission to ascertain:
  - Whether the boundaries of the relevant markets have to be adjusted;
  - Whether all the markets in the current Recommendation (whether or not with adjusted boundaries) still warrant ex ante regulation or whether regulation should be withdrawn;
  - Whether any new markets can be identified that warrant ex ante regulation; and
  - Whether regulation affects the internal market dimension of electronic communications markets.
- Second, the study should assess the impact of altering the list of relevant markets on:
  - Administrative and regulatory costs borne by NRAs and market players;
  - Economic costs and benefits for society at large.

Approach of the study

The above objectives have been realized in several working packages, divided over three phases. The first phase entailed gathering of data and opinions, as well as providing an overview of prior work in the literature and by NRAs. In the second phase we consolidated the outputs of the first phase and analysed a broad range of electronic communication markets, which resulted in a preliminary list of markets with potential SMP problems. In the third phase we assessed the impact of the new list of markets subject to ex-ante regulation.

Gathering data, opinions and prior work

A first group of working packages comprised i) an analysis of all NRA notifications since 2007, ii) a methodology paper on the analysis of markets and competition and iii) an analysis of the major trends in terms of technology, market and end-users.

Analysing markets

All of these working packages (together with the results of a public consultation organised by the European Commission) formed the basis for an extensive review of market definitions and potential problems with significant market power (SMP). We analysed markets that are on the current list, (a selection of) markets that were on the previous list, as well as potential new markets that may suffer from an SMP problem.

We analysed each market following the logic that the wholesale market that is least replicable (this generally is the market that is physically closest to the end-users) should be first analysed and possibly regulated, before going down the value chain to the next least replicable markets. This commonly adopted interpretation is based on the ladder of investment. More specifically, an iterative process of assessing retail, then wholesale (closest to end-users), then retail and again possibly wholesale (next-closest to end-users) should be followed, as depicted below.

Figure - 1 Analytical cycle followed to address competitive issues in vertically related electronic communication markets

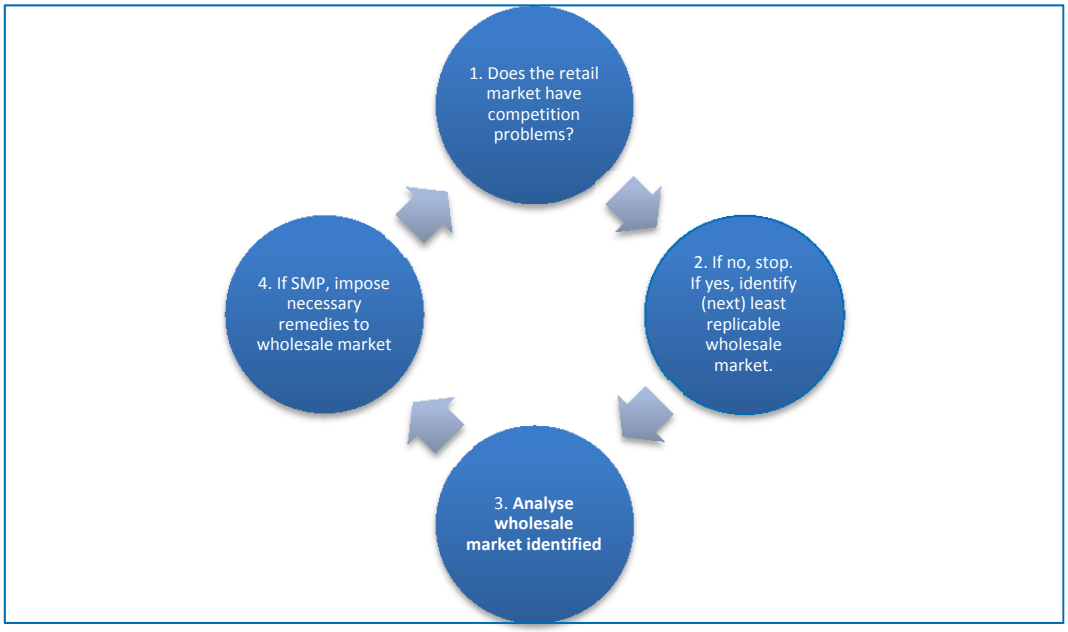
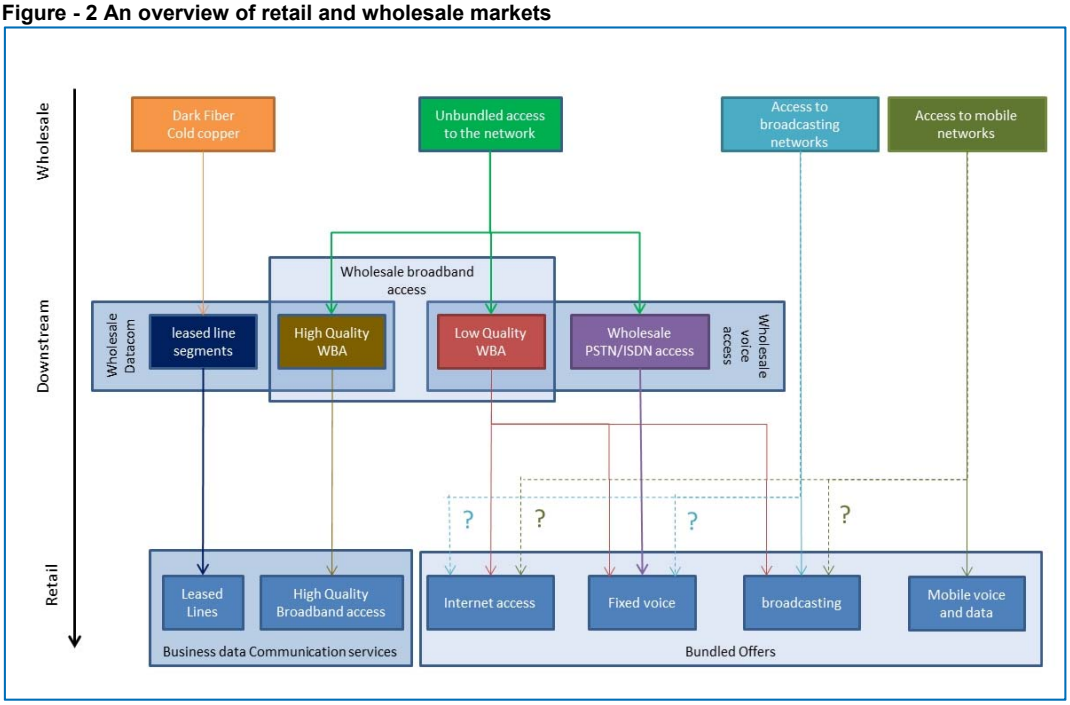


Figure - 1 shows a simplified representation of the basic analytical cycle that should generally be followed when dealing with more than one vertically related wholesale market according to the ladder of investment principles. After completing the first analytical cycle (retail / wholesale assessment), the competitive conditions at the retail level should be reassessed in the presence of the imposed wholesale obligations (i.e. in a *modified greenfield* setting). If the retail market is then found not to have any remaining competition problems, the process ends. If not, the wholesale level that is next in line downstream (next-least replicable) should be identified and the same process continues. Subsequent iterations continue until the retail market is found not to have any remaining competition problems. If wholesale solutions fail to remedy the problem, retail measures may be necessary.

The figure below describes the relationship between wholesale and retail markets in today's telecom sector.

Figure - 2 An overview of retail and wholesale markets



Source: authors.

At the most elementary wholesale level, we identify dark fibre/cold copper, unbundled access to (copper/fibre) networks, access to broadcasting networks (including cable) and access to mobile networks. These wholesale markets may either feed directly into the retail markets or via a downstream product, like leased lines, wholesale PSTN/ISDN access or Wholesale broadband access (high-quality or low-quality). As such, these markets should be analysed first in case a competition problem has been identified in one or more retail markets.

The link between wholesale, downstream and retail markets is indicated with arrows. Question marks indicate that it is not clear whether there is a link today or in the future. This will be explored in this study.

Furthermore, some markets may be grouped into one market because of substitutability or complementarity (this is indicated in the figure with the blue boxes). Whether this is the case should be determined on the basis of a so-called SSNIP-test (significant structural non-transitory increase in price). Such a test analyses whether end-users substitute one product for the other in case of a 5% to 10% increase in price. In case of a bundle it analysis whether end-users will choose to unbundle the bundle in response to a 5% to 10% increase in price.

Assessment of impacts

The impact assessment focussed on analysing the administrative and regulatory burden for NRAs and market participants, and on the economic costs and benefits for society at large.

In order to assess the regulatory burdens we carried out a number of in-depth interviews that focussed on i) the organisation of a typical market analysis process, ii) the costs and manpower involved in such process (for NRAs and market participants) and iii) how dropping or adding a particular market would affect the costs and manpower (positive or negative). The inputs from the

interviews have been used to estimate the current regulatory costs for all NRAs and providers in the EU (in €) and the effect a modification of the list may have on these burdens (a range in %).

The costs and benefits for society at large have been estimated on the basis of empirical analyses as well as on qualitative analyses. Notably the static effects in terms of consumer and producer surplus have been assessed (where possible) empirically. Dynamic effects (in terms of innovation and investments) have been assessed via a qualitative approach.

Trends and drivers

Bundles

Operators have continuously upgraded the Internet access service with add-ons, thereby bundling a number of components: first they added a voice service (dual play), then (from 2003 onwards) ISPs added TV to their bundles (triple play) and, more recently, they added mobile services (quadruple play).

The success of bundles in the communications market is motivated by both consumer preferences as well as operator preferences.

Consumer preferences

For consumers there are mainly two advantages: lower transaction costs and a lower price. The lower transaction costs stem from the fact that multiplay plans offer a higher degree of convenience as they provide a one-stop shop for all communications needs. The other major reason why users tend to opt for bundled offers is that these typically come at a discounted price compared to an equivalent bouquet of standalone services. The lower price transmits the lower costs of production stemming from the re-use of infrastructure (*e.g.* the DSL modem can be used for voice and thus makes PSTN equipment in the MDF obsolete).

Operator motives

For operators the issue is more complex, as bundles are a sort of double-edged sword for them. On the positive side, bundles can be produced at lower costs and, hence, an operator can make a more competitive offer. For this reason a voice service in a voice broadband bundle is typically based on VoB and not on PSTN. On the other hand, by bundling a highly competitive service (*e.g.* broadband) with a less competitive one (*e.g.* voice access), operators risk exporting price competition to the hitherto less intensely competitive adjacent market.

Impact on market analysis

In order to maintain the competitiveness of the market, it is essential that enough players have the ability to provide the bundles that end-users demand. This boils down to enough players having access to all essential wholesale products. As such, the phenomenon of retail bundles does not necessarily affect the analysis at the wholesale level. This is only the case if the retail bundle is mirrored at the wholesale level. For example, if end-users prefer a flat fee for fixed voice services, the voice service is essentially bundled with the connection service against a fixed monthly single price. It follows that the analysis of the wholesale market can focus on wholesale access and that a separate analysis of the voice services at wholesale level is redundant.

LTE

Demand for mobile connectivity increases to such extent that current 2G and 3G networks are incapable of managing that demand without significant congestion problems. LTE (the fourth generation of mobile technologies – 4G) is expected to be able to better cope with the increased

demand for bandwidth and as such governments and operators are motivated to roll out the new technology as soon as possible.

Fixed and mobile convergence

The 4G network is, however, also not free from congestion problems. The most efficient way for dealing with these congestion problems remains channelling the wireless data requests through a fixed wireline as soon as possible. In other words, irrespective of the technology used, congestion is a driver to invest in more antennas, making the cells of the mobile network as small as possible. As such, there is a trade-off between costs of network deployment and the capacity of the network. It follows that the most efficient network architecture combines a macro cell overlay (for reach) with small cell underlay (for managing congestions).

The small cell underlay can come in the form of picocells, microcells and femtocells – ranging a few dozen meters and often used indoors. Another possibility for offloading is WiFi hotspots. Especially femtocells and WiFi hotspots are likely to be deployed in customers' homes and can then use the customer wireline connection broadband as backhaul (i.e. to offload the wireless data onto the fixed network). This turns customer premises into valuable docking stations for offloading and it means that mobile and fixed networks converge as they are complementing each other increasingly to provide the service of mobile broadband.

4G as a substitute for fixed broadband

The main driver for data demand, and thus the bottleneck for LTE, is expected to be video. While mobile networks, with LTE, can theoretically offer speeds similar to VDSL, their capacity is limited. With increasing demand for data within a given network cell, congestion problems will arise and speeds will go down. Notably if LTE is massively used for IPTV services, customers will experience congestion problems during peak times such as an important football match between Germany and Italy.

The ability to manage peak loads increases with the density of fixed offload points, which is typically high in urban areas. In rural areas, there are fewer possibilities for offloading because of fewer fixed-line users per area and possibly lower speed per fixed-line. On the other hand, there are less mobile network users and people may rely more on terrestrial or satellite broadcasting. This makes the congestion problem less pronounced. In rural areas LTE may be more of a substitute for fixed broadband than in urban areas. In urban areas, LTE and fixed broadband may be much more complementary services, with the end-users needing to 'always be on-line', resulting in potential problems for fixed-only operators. Also mobile operators without access to a ubiquitous fixed (offload/access) network are put at a disadvantage. The latter highlights a possible new advantage of LLU and WBA regulation that goes beyond the functioning of fixed electronic communications markets.

Uncertainty

We explicitly note that all these projections are carefully phrased in terms of 'this *may* happen', thereby expressing a great deal of uncertainty. So far, only a few countries have rolled out LTE, and under very different conditions. It is also not clear how the TV broadcasting market (and demand for IPTV) will develop and how exactly offloading will be realized or whether it will form a bottleneck. Moreover, the boundary between urban and rural areas – and thus between areas where the relationship between fixed and mobile broadband is complementary or substitutive – is rather blurred. It is therefore difficult to forecast the effects LTE will actually have on competition.

OTT Communication

OTT (over-the-top) refers to retail communication and information exchange services that are based on Internet connectivity, but that are not specific to a certain operator or technology. There are two ways in which OTT affects the traditional operators: first, it can be a substitute for voice, text or even video services, thus possibly cutting into the operators' revenues; and second, it creates large demand for bandwidth and can cause congestion problems, while the network operators cannot use the OTT revenues for the required investments into the network.

OTT vs. traditional communication services

Over the past years end-users have increasingly made use of free OTT communication services such as WhatsApp, Skype etc. If at all, the increased use OTT communication services may have a positive impact on subscriptions to mobile or fixed broadband connections. However, it may have a negative impact on the use of operator-managed voice and text messaging services; at least on the revenues generated by these services. From the data, it is however, difficult to estimate the exact substitution effects because the data is typically presented at an aggregate level, *e.g.* not distinguishing between national and international calls via fixed and mobile networks. The use of OTT services free of charge not only substitutes traditional services, but it also adds to traditional services in terms of demand for bandwidth. Notably video services increase the demand for bandwidth and thus the need for operators to invest.

Is there a competition problem?

The OTT services thus challenge the operators in terms of lowering revenues combined with a need to invest. Consequently, network operators would like to charge OTT providers. One way to increase their bargaining position is to block OTT providers. However, popular applications such as YouTube or Facebook are unlikely to experience such treatment, as their bargaining power is actually larger than that of the operators. Too many consumers would want to switch network (provided any SMP problem at the retail Internet access service level has been dealt with appropriately under the Framework). It is thus questionable whether a pure blocking strategy would work.

For sake of completeness, we assess whether the market would pass the Three Criteria Test.
The relevant retail markets include a wide variety of service markets, some of which may exclusively be based on electronic communications services, others not. Such a market would be a form of aftermarket; having made their choice of service provider, consumers have access only to the over-the-top applications permitted by that service provider. The relevant wholesale markets are the markets for origination and termination of data (possibly restricted to data arising from over the top applications) and possibly segmented by individual networks.

Such an individual network approach can be immediately taken to satisfy the first of the Three Criteria. As for the second, the arguments above suggest that in some very important respects (web-browsing, email, access to Facebook and You Tube), data termination is subject to powerful competitive forces. Only for a proportion of services is there a possible competition problem. It seems therefore that the second of the Three Criteria is satisfied only in the case of a very narrow (and arguably artificial) market definition. The third criterion is probably satisfied provided the blockage is widespread (in which case the issue might well be investigated in practice by a competition authority).

Analysis of fixed voice telephony

Our analysis concludes that Markets 1/2007 and 2/2007 do not pass the Three Criteria Test for the period 2014-2020 as the market seems to head towards effective competition in most Member

States. The primary reason is that the traditional PSTN-based voice and access services experience increased competitive pressure from VoIP services that are based on broadband access.

Relevant retail market

We conclude that the call services are increasingly sold at retail level in a bundle of minutes in combination with a subscription for the access service. This trend is reflected at wholesale level as well. The market share of C (P) S is rapidly decreasing and is mainly being replaced by (managed) VoIP services. Furthermore, (managed) VoIP services are also gaining market share from the incumbents' PSTN lines. We observe end-users gradually switching from PSTN-based services to VoIP-based services, indicating that VoIP services (delivered over broadband) are considered a substitute for PSTN-based services (delivered over narrowband).

In some Member States the PSTN to VoIP migration has advanced more than in others. While PSTN to VoIP migration progresses, the decline in PSTN lines may stagnate because some PSTN-users are perhaps unable or unwilling to switch and are thus 'captive'. In order to establish whether VoIP exerts enough competitive pressures on PSTN, we advise NRAs to assess whether the *relative* pool of non-captive end-users is large enough to prevent a SSNIP by the hypothetical monopolist. The analysis should have a prospective approach, taking into account the autonomous migration from PSTN to VoIP and thus the autonomous decline in the *relative* size of the pool of non-captive end-users.

On the basis of a critical loss analysis we conclude that, *ceteris paribus*, the pool of non-captive end-users should be at least 30% of the current number of PSTN users to prevent a SSNIP during the respective time period up to 2020. In other words, a maximum of 70% of the current PSTN users should be unwilling / unable to switch to VoIP. Although we do not know of a proper assessment of the share of captive PSTN-users in the European Member States, we estimate that it will be less than 70%. However, in certain Member States where PSTN-VoIP migration is more advanced, the situation can be different if all non-captive end-users have already made the switch. These calculations do not account for technological developments potentially setting the captives free; for example, the development of VoIP-based alarm systems. While accounting for such development, a number of end-users that perceive to be captive today may not perceive to be so in the future. This further weakens the case for defining separate markets.

We conclude that VoIP-based services and PSTN-based services belong to the same relevant market. Our analysis furthermore suggest that fixed and mobile substitution is not characteristic for the majority of Member States (hence we do not include mobile in the relevant market), but this could differ from one country to another and should be analysed further by the NRAs.

Assessment of competition problems: a modified greenfield analysis

In a modified greenfield situation (assuming a rather competitive broadband market) today's market share of the incumbent is around 85%, of which 60% points are served via PSTN. A certain (unknown) share of these PSTN users is currently experiencing considerable barriers to switch from PSTN to VoIP. If this share is large enough, it gives the incumbent power to raise PSTN prices. The extent of this threat may be analysed in a similar manner as the SSNIP-test above, but then accounting for the fact that incumbent also offers VoIP-based services and thus that it can recoup a share of the non-captive end-users that switch from PSTN to VoIP. In other words, the size of the captive PSTN-users should be even larger than the 70% mentioned above. Furthermore, VoIP-based competitors may be induced to subsidise the switch to VoIP.

Given the large market share of the incumbent in the joint PSTN/VoIP market we conclude that there is a competition problem at the retail market. The question is then whether the wholesale market(s) pass the Three Criteria Test?

The wholesale market comprises narrowband and broadband access lines. The market is a mirror image of the modified greenfield retail market. In the absence of voice-specific regulation, entry is possible on the basis of broadband access (LLU, WBA and/or own infrastructure). Note that we assume any WBA reference offer to include VoIP functionality.

Conclusions on the Three Criteria

Given the regulation of LLU and WBA access, we think that the Three Criteria Test is not passed:

1. In greenfield situation (i.e. in the absence of any form of wholesale access regulation) it is not possible for competitors to serve end-users on the basis of PSTN access. However, in case of regulated LLU and WBA access (i.e. in a modified greenfield situation), competitors can serve end-users with VoIP as an add-on to the broadband service. As such, the market would not be characterized by high non-transitory barriers for entry;
2. Indeed, a certain (unknown) share of the current PSTN-users is perceived to be captive. In the absence of regulation (beyond wholesale broadband access) VoIP competitors as well as end-users will be induced to adopt technologies facilitating the switch from PSTN to VoIP. This will again spur the development of such technologies (if they do not already exist). Therefore, in a modified greenfield setting, there are dynamics towards effective competition;
3. If the first out of the three criteria are not met, general competition policy can deal with any remaining competition problems.

The fact that the Three Criteria Test is not passed does not imply that some end-users can be considered particularly vulnerable (e.g. people of old age). On political grounds, national governments may choose to implement alternative policies for protecting vulnerable end-users (such as a Universal Service Obligation).

Analysis of call termination

Our analysis suggests keeping the markets for fixed and mobile call termination on the list. Neither market developments nor technological developments affect the problematic functioning of the wholesale markets that would (in the absence of regulation) lead to strongly increased retail prices. We do note that there are methodological reasons for joining the markets into a single market for call termination, but such a merger would not change the outcomes of the market reviews and would unnecessarily inhibit the flexibility of NRAs.

The problem

The network operator of the calling party sets the call up (originates the call). The network operator of the receiving party completes the call (terminates the call). In Europe, the calling party bears the costs of termination. Under the ‘calling party pays principle’ (CPP), the receiver’s choice of provider is not directly affected by the price of calls that other customers pay, whereas the calling party has no choice at all when making a call. As such, an operator is not constrained by the receiver to set lower terminating charges. In other words, by subscribing to an operators’ network the receiver grants monopoly power to that provider on all calling parties wanting to interconnect. It follows that every terminating network can be considered a separate relevant market where the operator of that network is a monopolist.

The subsequent question is: does this monopoly power at wholesale level lead to problems at retail level? If yes, there are reasons to regulate the wholesale market in order to correct the competition problems at the retail level.

Relation between retail and wholesale markets

Termination is one of the three wholesale services (next to call origination and call transit) that jointly form the call service at retail level. As concluded previously, the retail markets for call services are typically bundled with the retail market for access.

The termination rates are embedded in the end-users' prices. The revenues of operator A are the costs of operator B and vice versa. The revenues of termination tend to lower the price of the end-users' subscription fee (referred to in the literature as the 'waterbed effect'), whereas the costs of termination increase the per-minute price for making calls (referred to in the literature as the 'cost pass through'). For end-users it is not transparent how the price of incoming calls affects their total surplus, which is a function of the net price they pay for a certain number of calls, and the number of calls they receive. A subscriber cares most about the prices that are visible: subscription fee and per-minute charges.

It follows that if the wholesale termination market is not functioning properly and wholesale termination charges rise, this impacts on the subscription fees and the per-minute calling charges of the various operators and thereby (potentially) on the competitive position of an operator vis-à-vis other operators.

Analysis of the wholesale market

Every terminating network can be considered a separate relevant wholesale market where the operator of that network is a monopolist. A distinction could be made between termination on a mobile network and termination on a fixed network. This is also what the current recommendation advises. A reason for this distinction is that fixed and mobile operators do not directly compete in the same retail market. Indirectly, however, an integrated fixed/mobile operator may have some incentives to strategically use termination rates to leverage the two markets. Furthermore, differences may arise due to an asymmetry in regulation, e.g. when the fixed operator is regulated and another is not. As such, from an analytical point of view, it doesn't make sense to differentiate between fixed and mobile networks. However, in terms of outcome it makes little difference: termination charges for both fixed as well as mobile networks should be regulated. We explain this below.

Termination is a typical wholesale input that operators supply to each other. This causes some problems of 'raising-each-others-cost' and countervailing buying power, the combination of which may lead to incentives to negotiate prices equal to marginal costs. If follows that being a monopolist is not a sufficient condition to conclude on SMP. In order to draw that conclusion, one has to analyse whether there are reasons to believe that countervailing bargaining powers are not balanced, preventing an efficient outcome of negotiations. There are several barriers for negotiations:

- Asymmetric costs structures among operators;
- Asymmetric preferences of end-users;
- Different sizes of the networks; and
- Multi-market vs. single-market operators.

The first two asymmetries lead to higher transaction costs that *de facto* neutralise any countervailing buying power and thereby cause negotiations to fail. The differences in size and number of markets (fixed and/or mobile) in which the operators are active also directly affect

countervailing bargaining power, thereby causing negotiations to fail. In sum, operators do not experience countervailing buying power and, hence, possess SMP.

One could argue that the largest network (often that of the incumbent) has the most bargaining power and should therefore be regulated only. However, regulating only one network, would grant bargaining power to the other networks. So, it follows that if you regulate one, you need to regulate all operators in both fixed and mobile markets.

Conclusion

Whether or not Markets 3 and 7 are merged does not matter for the conclusion: each terminating network is a separate relevant market and the operator of that network has SMP. Each relevant market passes the Three Criteria Test (sustainable entry barriers, lacking dynamics towards effective competition and insufficient ex-post regulation).

Analysis of broadband access

Concerning broadband access, we suggest to maintain wholesale regulation on the list of pre-defined relevant markets. We do, however, suggest some redefinitions and refinements:

- We distinguish separate retail markets for mass-market broadband services and high-quality bespoke broadband services – which are typically demanded by residential and non-residential users respectively;
- We define a market for Wholesale Local Access (WLA) comprising “wholesale (physical) network infrastructure access or functionally similar wholesale local virtual network access”;
- In the same line of reasoning we define a market for Wholesale Central Access (WCA) comprising wholesale bitstream access or other forms of central virtual network access;
- We argue the case for defining subnational geographical markets at the WCA-level;
- The distinction at retail level between mass-market and high-quality broadband services translates into separate wholesale markets for WCA with possibly a different set of competition problems. In order to avoid confusion, we separate the analysis of these two wholesale markets.

Analysis of the retail market

Retail demand for broadband services

We observe a difference at retail level between consumers and small enterprises on the one hand, and medium-sized to large businesses on the other. The first category of end-users is considerably larger in numbers and has (until now) been well served with a standardised broadband product (in terms of service levels and key performance indicators). The mass-market is increasingly asking for managed IP add-on services (such as VoIP and IPTV). Consequently, end-users may demand differentiated levels of quality of service (QoS) for different services. Mass-market demand is distributed over densely populated (urban) areas and sparsely populated (rural) areas.

The second category of end-users already demands higher levels of QoS, even for similar services (specifications may even be customized to the end-user’s needs). The prospect is that there may be a continuum of different quality grades demanded by medium-sized and large firms (business grade). Business demand is also geographically distributed over areas with different population (or site) densities. Furthermore, a single business user may have sites in both urban as well as rural areas. In order to connect all of its sites, the multisite company demands a variety of broadband products of different quality grades: e.g. uncontended high-bandwidth connections for its head office and data centre(s), and contended low-bandwidth connections for the satellite offices or retail

outlets. Also a single site company may have a demand for a lower-quality broadband product as a back-up in the event that its high-quality broadband connection fails. Firms demanding multiple broadband connections prefer to buy these multiple products from a single supplier and at uniform service levels as to minimize transaction costs.

Retail supply for broadband services (greenfield)

In a greenfield analysis, the only form of competition that the incumbent may experience at retail level is competition from other networks such as cable, fibre and/or mobile. The presence of such alternative networks differs from one region to another. Furthermore, the extent to which these alternative networks impose competitive pressures on the incumbent is different for the two retail markets that we defined:

- While the mass-market may be served by cable, this is mostly not the case for demand for business grade broadband products. Furthermore, in many Member States' cable networks are only present in a few (often urbanised) regions. It follows that in some Member States the greenfield mass-market may benefit from competition from cable at a sub-national level. The greenfield market for business grade products is clearly less competitive in most regions.
- FttH networks have a similar impact in geographical terms: competition from fibre only exists at a sub-national level (if at all). A difference with cable is that fibre networks may be better geared to serve mass-market demand as well as demand for business grade products. Competing fibre networks are still scarce in most EU countries and this might continue to be the case in the coming years.
- Similarly, in a select group of regions/countries mobile networks may serve mass-market demand, however this does not typically describe the situation across European markets. In the coming years, 4G may prove to exert competitive pressures on the incumbent's network; although there are doubts whether mobile 4G networks are fully equipped to compete with fixed NGANs. At this point in time, we can only speculate (see also the topic under 'Trends and drivers' above).

The fact that the supply of mass-market broadband services may differ at sub-national levels has little consequences for the analysis of supply of business grade products. In order to effectively operate in the business segment, ubiquitous coverage is typically needed, which, in the greenfield situation, only the incumbent is able to offer. The incumbent can easily differentiate across mass-market users and users of business grade products, because substitution effects are limited (or even absent).

Conclusions on the greenfield retail analysis

In the greenfield situation:

- The above observations may form the basis for defining different relevant product markets as well as different relevant geographical markets at the retail level, because:
  a) only in a few sub-national regions, one may find multiple infrastructures competing at the retail level. In such cases NRAs ought to consider the merits of defining separate relevant markets for sub-national markets if the competitive conditions diverge sufficiently; and
  b) in the product dimension of the relevant market, there is a difference between mass-market demand and demand for business grade products and only the incumbent is able to offer a ubiquitous supply of business grade products, yet is well able to differentiate across the two market segments.

  The incumbent is dominant in both product markets as well as in most geographical markets.

Assessment of the wholesale market (1): Wholesale Local Access

The primary wholesale market to be analysed is the one closest to the end-users. Currently that is Market 4/2007 defined as the market for *physical access*, including local loop and sub-loop access.

Our analysis suggests redefining Market 4 along the lines of "wholesale (physical) network infrastructure access or functionally similar wholesale local virtual network access" or simply "wholesale local access" or WLA. The change in definition is based on the observation that certain Next Generation Access Networks do not allow for physical local access, but do allow for *virtual unbundled local access* (or VULA). In a technological sense, VULA seems similar to the current WBA product as it provides virtual access. Functionally, however, it may be a closer equivalent to physical LLU (assuming it is defined such that it delivers maximum configurability to the user). This suggests that the distinction between physical and virtual access may no longer be the most important factor distinguishing Market 4/2007 from Market 5/2007 further upstream. For the market definition, it is the ability to replicate that matters and not whether this is achieved through physical or non-physical access. Since the distinction between physical and non-physical access is becoming blurred with the emergence of access methods such as VULA, it may be appropriate to depart from the physical vs. non-physical terminology and adopt a slightly different distinction of local vs. central access.

One wholesale market?

One might argue that the wholesale Markets 4 and 5 may be combined depending, among factors, on whether the products delivered on these two markets represent substitutes. However, this ignores the fact that the two products are vertically related and that an entrant that is rolled out to the MDF level will still consume the WBA product, be it internally. For this reason, the products currently distinguished by Markets 4 and 5 are, in actual fact, complementary products that can not belong to the same relevant product market in a strict market definition sense.

The definition of the market for wholesale local access (WLA) needs not account for the difference between mass-market and business grade services at retail level because the local access service can be used to deliver both. Wholesale local access products include the following:

Network technology	Local access product
Traditional copper local loop	**Local loop access at MDF**
P2P fibre to the home	**Physical access at the local node**
Fibre to the street cabinet	**VULA or possibly sub-loop access at street cabinet.**
PON fibre to the home	**VULA and Wavelength-division multiplexing (WDM)**

In our analysis we rule out local access via cable because:

- It is uncertain whether cable operators are technologically able to offer a local access service;
- If they were, there remain doubts whether local access-seekers regard the service as a substitute because it cannot offer national ubiquity; and
- For the representative Member State (in which cable has a stable 15% market share at the national level) it seems not to matter for the outcome of an SMP analysis. However, this may vary between Member States and between regions. Again we state that NRAs should consider the merits of defining separate relevant markets for sub-national markets if the competitive conditions diverge sufficiently.

With the existence – in most geographical areas – of only a single infrastructure that is capable of offering the relevant wholesale local access service, the Three Criteria Test is met at the national level. More specifically, high and non-transitory barriers to entry exist and are expected to remain for the relevant timeframe; the relevant market structure is not expected to tend to effective competition within the relevant timeframe and application of competition law alone is not expected to be able to sufficiently resolve the market failures concerned.

Re-assessment of the market for mass-market broadband services (modified greenfield)

We presuppose the imposition of adequate remedies in the market for wholesale local access and (as a consequence) that entry in the retail market is possible. It follows that in most areas, a retail price that is structurally too high (or the quality level too low) will provoke entry through the possibilities created by regulation. For most areas, such entry (or even the threat of entry) should discipline the incumbent to a sufficient degree.

For some areas this result may not hold. Notably in areas of low population density, a potential entrant may fail to build an economically viable business case for rolling out to the local access level. It involves significant costs which an entrant may not be able to recover due to the number of end-users at that local level being simply too low. Therefore, areas may remain where, even in the presence of regulated access at the level of local access, no credible threat of entry ensues. Dominance of the incumbent may remain at the retail level for such areas.

Since this possible lack of effective competition in the modified greenfield setting is expected to occur in some regions of most Member States (or in some regions of our notional RMS), it is appropriate to conclude that the Three Criteria Test is passed for those areas where the remedies level of local access do not lead to sufficient entry.

> **Impact of NGA**
>
> The current trend of NGA roll out may have a negative impact at the level of local access, e.g. when the fibre optic network is a passive optical network, disallowing traditional forms of local physical access. This may especially be the case if it becomes apparent that wavelength unbundling techniques do not deliver functionally equivalent alternatives to physical unbundling within the relevant timeframe (which will become evident only over time). This may in theory reduce the possibilities of entry at the retail level through access at the level of local access. If this turns out to be the case, the impact of regulation at the local level on the competitive state of the retail markets may decrease.

Assessment of the wholesale market (2): Wholesale Central Access

As already discussed, the distinction of physical/non-physical access appears to become obsolete due to technological change. The definition should therefore shift focus to the ability to replicate, possibly better captured in terms of local and central access and extent of configurability. Currently, bitstream access to networks based on copper access networks and (partial) fibre access networks is generally included in the relevant product market.

Direct pricing constraints

The main source of direct competitive pressure may arise from operators that have rolled out their own network up to local access node. This includes the incumbent network operator and any LLU, SLU and/or VULA-based entrant, be it on copper or P2P fibre networks. However, so far, WLA competitors do not seem to provide external WCA products. This seems to indicate that the entrant is less competitive than the incumbent in the WCA market. A notable reason may be that it has no ubiquitous network, which forces alternative retail operators to contract multiple parties, leading to process inefficiencies. Furthermore, since an LLU-based competitor is in principle capable of offering a WCA service externally, their self-supply of non-local access should be accounted for in the market shares. However, since there are reasons why WLA-based competitors may be less competitive than the incumbent at the WCA level externally, the SMP assessment should take into account that the presence of self-supplying WLA-based competitors at the WCA level may lead to market shares that understate the actual market power of the incumbent.

One can assume that cable operators are capable (technologically and commercially) of offering an access service akin to WCA. However, NRA's should investigate whether 1) cable operators in their Member State are willing and able to offer such services and 2) whether the cable-based wholesale broadband access offer would be regarded as a credible alternative by potential central access-seekers. In most Member States, cable networks do not have ubiquitous supply and the cable operator may thus face similar competitive disadvantages at the wholesale level as the local access-based entrants such that a SSNIP is likely profitable for the incumbent operator (but again, this may vary across Member States).

Analysis of SMP

At the national level, 10% of the retail market (including both mass-market as well as business grade services) is served on the basis of an externally supplied WBA product (i.e. traded at the wholesale market). These lines are practically all provided by the incumbent. While accounting for self-supply of WBA by all operators with local access as well as by cable operators, the market shares at the retail level should therefore be adjusted accordingly to reflect the market shares at the WCA level. Concretely, the analysis concludes: the incumbent has a market share of between 55% and 65%; wholesale local access-seekers have between 20% and 25% market share and cable has a share of around 15%.

The above market shares form a basis to conclude on SMP by the incumbent at a national level. However, since we concluded that there is limited demand substitutability between mass-market products and business grade products, the above mentioned market shares are of little relevance. Furthermore, we suspect that these market shares at the national level are not representative of the competitive conditions at a sub-national level. We therefore recommend assuming a sub-national perspective on the relevant market.

Sub-national markets

The competitive conditions (reflected in the market shares of the different actors) differ considerably from region to another. In some regions the incumbent is the only provider with local access. In others it has to share the market with one or two local access-seekers. In a third category of regions there are more local access-seekers.

In the first category of regions, the incumbent's SMP position is clear. In regions with multiple operators with local access (be it cable or DSL players), the SMP position of the incumbent may be less clear and should be determined on a case-by-case basis. Depending on local circumstances an NRA might develop a few rules of thumb that would need to be justified through empirical analysis. For example, OFCOM regards regions with fewer than three DSL competitors (with local access) as potentially problematic and regions with more than three DSL competitors as not problematic. The exact basis for distinguishing sub-national markets may differ per country, e.g. because of the competitive position of alternative networks such as cable, mobile broadband or fibre.

Furthermore, we note that in the event that a passive fibre optic network is rolled out in a particular region and current local access-seekers revert back to the centralised level as the preferred level of access, the incumbent's SMP position in the market for wholesale-centralised access would increase.

Conclusions on the Three Criteria Test

Due to the remaining existence (in some geographical areas) of only a single infrastructure that is capable of offering the relevant WCA service, the Three Criteria Test is met in such sub-national geographical markets. More specifically, in those sub-national markets:

- High and non-transitory entry barriers are expected to remain for the relevant timeframe; most notably because population density is too low for alternative operators to roll out to the local access level;
- For similar reasons, the relevant market structure is not expected to tend to effective competition within the relevant timeframe; and
- Application of competition law alone is not expected to be able to sufficiently resolve the market failures concerned.

We therefore recommend that the market for WCA remains on the list of relevant markets, but that special emphasis is placed on the fact that this market should in principle serve only to 'fill the gaps' that might remain after adequate regulation of the market for wholesale local access. However, if the trend of increasing NGA roll out has a detrimental effect on uptake of local access, the importance of central access at the national level as an alternative may grow. We recommend that NRAs stay aware of this risk, which may justify the regulation of WCA in order to remedy competitive issues at a national level.

Wholesale central access in the non-residential segment

Our analysis suggests keeping WCA for high quality broadband services on the list of relevant markets and potentially join this market with the market for leased lines termination.

Retail demand revisited

The previous chapter focused on the retail mass-market catering mostly to residential customers and small business customers. Arguably, residential customers all have slightly different tastes for bandwidth, performance and price of their broadband service. However, given the scale of the market and the typically low value per user, the market responds to this demand by offering several standard options from which the consumer has to choose. For most residential customers and for many small businesses, a mass-market product exists that sufficiently matches their demand.

Demand for higher quality

In contrast to this mass-market outcome, the non-residential market segment (comprising medium-sized to large firms) is much more geared towards catering for the exact needs of every customer. These needs include: availability, up- and download rates, symmetry, resilience, latency, jitter, dedicated capacity, and range. To cater for these needs, bespoke contracts are possible due to the high-value contracts. The values of the contracts tend to increase further as there is an increasing trend in outsourcing the management of communication services. Typically, these services are tied in the contract to the connection service.

However, not all businesses choose to source their services from the bespoke business segment. For some businesses, the available mass-market products suffice. Others use cheaper mass-market products to complement the 'higher-quality' business-grade products. Hence no clear segmentation exists between demand for connectivity from residential customers and from non-residential customers. A considerably more meaningful segmentation exists between mass-market broadband products and bespoke connectivity products.

A single supplier

The majority of large companies have a preference for using a 'single supplier' delivering a range of services rather than using separate suppliers for each site and/or service. The prime reason for this preference is the convenience of having a one-stop shop while outsourcing a variety of

interconnected communication services. Sometimes a company prefers using multiple suppliers due to a need for resilience or a preference for specialist suppliers for different services.

Potential competition problems

The above demand specifications impose a need for operators to differentiate in terms of QoS. Both the incumbent owning a network and the Altnets having ubiquitous LLU access do not face any bottlenecks in this respect. However, an Altnet relying on bitstream access may face a bottleneck if the differentiated retail products offered in the market by the incumbent are not all available at the WCA level.

Implications of bundling

Non-residential customers with a need for multiple electronic communication solutions delivered at multiple sites prefer to purchase these solutions in a bundle from a single supplier. That supplier can be the national incumbent operator, a national challenger in the business segment or an international integrator that operates on a pan-European scale. Retail suppliers thus need to offer a competitive full-service package (or bundle).

Our previous analysis of mass-market broadband services found that generally there remains a clear-cut case for national regulation at the level of wholesale local access. This was found to deal with most competitive issues at the retail level, such that only a marginal (possibly sub-national) case remained for regulation at the WCA level. However, the same reasoning may not hold for the bespoke non-residential segment where retail suppliers need to offer a competitive full-service package (or bundle):

- First, bespoke non-residential demand does not have the same scale as 'mass-market' demand. Therefore, it may be less viable for suppliers of this bespoke segment to resort to wholesale local access;
- Furthermore, alternative DSL-operators with local access that target the mass-market are often inexperienced in servicing the non-residential segment and may not be fully equipped or organised to deal with the demands of the bespoke non-residential segment;
- Finally, in the absence of proper WCA regulation, alternative DSL operators would be handicapped because their own core-network does not have national coverage. Not having national coverage can often be a deal-breaker for the non-residential customer having sites outside the reach of the Altnet's network that need to be connected as part of the integral solution.[1]

For the above reasons we conclude that a form of 'business grade WCA' (providing access to the incumbent's network) is essential for operators offering a competitive full-service package to business users. Such a package includes both high-end connectivity services (close to leased-line type connectivity) as well as relatively low-end broadband access type connections as part of the same contract. The variety of quality grades at retail level should ideally be reflected in the reference offers WCA products as well.

Implications for the geographical market

The geographical relevant markets in the bespoke segment may be quite different from the sub-national geographical markets in the mass-market segment. It may even be the case that the geographic market is national:

- First, cable networks are not usually able to deliver a bespoke high-quality broadband product;

[1] The second argument is not strong in isolation: inexperience alone is not a bottleneck for entering a market. But in combination with the first we may have a serious problem. Indeed we have seen some examples of alternative LLU-operators that service both the mass-market as well as bespoke demand; for example Tele2 in the Netherlands. However, this case seems to be rather unique *and* in the Netherlands there is a regulated high-quality bitstream product available!

- Second, even if we disregarding potential barriers for mass-market operators to service bespoke demand as well, it is unlikely for all regions that are deemed competitive in relation to the mass-market to be competitive for the bespoke market as well. For this to happen each provider must be present in all local exchanges. Otherwise a business operator seeking ubiquitous wholesale local access still depends on the incumbent being the only operator with a ubiquitous network. This outcome results from the inefficiencies associated with multi-party contracting and non-uniform service levels.

It follows that the merits of defining sub-national markets for business grade WCA are likely less than for mass-market WCA.

Pan-European business market

Increasingly, European businesses operate from more than one Member State. Similar to most other multi-site companies, they often prefer to source their telecoms services from a singe (in this case) transnational operator. These pan-European operators usually have not rolled out there core-network to any of the local access points in the Member States because their client base is too dispersed to benefit from scale economies at the local level. Consequently, the pan-European retail operator combines several national wholesale products (typically WBA and/or Leased Lines) into an integrated pan-European retail package.

The trans-national retail operators encounter two typical problems:

- First, the competitive conditions of retail supply are determined at the national level. If there is a competitive issue in one or more Member States, this may lead to inefficiencies in the integrated pan-European package. Notably, it leads to national incumbents having a home advantage while tendering for business grade contracts with end-users having most of their locations in a particular country;

Second, the added value to a multinational end-user of having a single pan-European supplier increases with the extent to which the single pan-European supplier is able to offer a uniform service level for all its connectivity products in the various Member States. Consequently, the pan-European retail suppliers prefer similar wholesale services in each Member State at the exact same specifications. However, currently there are no mechanisms (other than the general fostering of competition) that lead to the availability of wholesale services of the same specifications across Member States. It follows that the pan-European retail operator is hampered in delivering the value added that their clients desire, and that they cannot deliver the specific additional value added that could have countered the incumbent's home market advantage mentioned above.

Given the current state of affairs (that competition is created through regulated wholesale services), there are two causes underlying the above problems:

1. not all NRAs have defined a separate business grade wholesale market and/or impose reference offers with improved service level agreements (causing the first problem); and if they have;
2. there is little coordination among NRAs and/or national standard setting platforms on this issue (causing the second problem).

We restate the conclusions from Ecorys et al (2011) that there may be considerable gains from standardized reference offers for business grade WCA products across Europe. Specifying these standards falls outside the domain of the Recommendation and would better be placed in the hands of ETSI and CEN. However, once such standards were set, a finding of SMP by the NRA in its market analysis could be a route towards adopting that standard.

Conclusions on the Three Criteria

We conclude that (from a national perspective) the case for subnational markets for business grade WCA is less strong than for mass-market WCA as a result of inefficiencies associated with multi-party contracting and non-uniform service levels. From the perspective of multinational end-users and operators, this argument gains in strength. Pan-European operators already struggle with multi-party contracting and non-uniform service levels across countries. Adding similar problems within countries will not lessen the home advantage of incumbents.

The incumbent operator may be expected to have a competitive advantage in the bespoke non-residential segment. Although we do not have sufficient data to determine whether this market segment meets the three criteria, we suspect this to be the case in most Member States. Interviews with several stakeholders confirmed that the incumbent generally has a higher and more stable market share in the bespoke non-residential segment than in the mass-market segment. Interviews with several non-residential end-users generally confirmed this view.

Leased lines and other high-quality business data connectivity services

Retail market

As stated before, business demand is increasingly interested in a communication service that includes the connectivity product; more so than in the specific connectivity product as such. In other words, the end-user wants to communicate at a certain quality level and it does not care what kind of infrastructure is used. Furthermore, the full package of communication services are increasingly outsourced to a single business connectivity provider. While composing its overall business offer, the operator will seek the optimal mix of traditional leased lines, Ethernet-based services and suitably-specified DSL services that is needed to deliver the required quality of service. The optimal mix (and the extent to which different technologies are substitutable) depends on the exact demand specifications of the end-users as well as the installed base at its sites (there may be a legacy problem that prevents substituting traditional leased lines for Ethernet-based products).

On the basis of available data, it is impossible to prescribe a generic set of market definitions, either at wholesale or retail level. We present therefore a basic scheme which can be adapted to national circumstances.

Typically, customers for bundles of services which span a wide geographic area experience less competition to supply services than those whose service premises are confined in a single “business district”, as a consequence of differences in the geographic intensity of competition. Subsequently, we conclude that that retail markets should normally be considered to be national unless it is possible to identify *high-intensity business areas of national significance*; i.e. contiguous geographic areas of reasonable size and significance (in the sense that sales account for a significant proportion of national sales) within which the supply conditions are clearly materially different from those which apply elsewhere.

In the absence of regulation, SMP would be expected in Retail Markets outside any identified “high-intensity business areas of national significance” and we have no reason to believe that the competitive retail landscape for the period 2016-2020 would be significantly different from what can be observed today.

Wholesale Market

We propose a market for high-quality business data connectivity comprising traditional leased line segments, Ethernet services and suitably specified DSL services. The generic characteristics of the

market are that the service should provide transparent dedicated capacity with a high specification service wrapper. Segmentation of such a market by bandwidth has been a common past practice and we would expect that this continued to be justified empirically in many cases.

It has not been general practice to segment the market between traditional and Ethernet technologies but we think there are some strong arguments for this. Despite a significant cost differential (as, for example, reflected in retail price differences reported by OFCOM) at most bandwidths, migration of leased lines to the more modern Ethernet technology is proceeding only slowly. This indicates that a significant number of users do not perceive the services to be close substitutes. Obtaining a comprehensive supply of high-quality comparative data that would support a firm recommendation on this point has been beyond the scope of this study. But we think the point deserves more in-depth consideration.

We also think that NRAs need to consider carefully whether certain 'business grade' bitstream services should properly be considered to be substitutes for leased lines rather than a component of wholesale central access. Again, the point deserves more in-depth consideration.

To give NRAs flexibility to reflect accurately on differences in national circumstances, we propose a market for "wholesale leased line segments in areas of low network replication" to replace the current Market 6/2007. Terminating segments would normally fall within this definition, except in the limited case of the *high-intensity business areas of national significance* (to be defined, if at all, by individual NRAs). Routes between major cities would normally fall outside the definition, but many low-intensity regional routes could fall within it. We do not consider it practical (or indeed desirable) to segment the analysis by individual routes. Nevertheless, a rule-of-thumb for segmentation (e.g. national vs. regional routes) may well reveal significant differences in competitive conditions, as recently reported by OFCOM. It would be useful for guidance to be developed, by or with the co-operation of BEREC, to provide for a practical distinction between areas of 'high' and 'low' network replication in a way that avoided atomisation of analysis.

Competition analysis

The market for "wholesale leased line segments in areas of high network replication" is not a serious candidate for ex-ante regulation and need not be considered further.

For the low replication market, we conclude that the first two criteria are satisfied. Also the third criterion is satisfied, notably as it would be extremely difficult and resource-intensive (and probably impractical) to sustain a competition law investigation.

New candidate markets

We don't advise to add new markets to the list of relevant markets.

Market for physical infrastructure

This market would comprise the services of providing access to physical infrastructure (e.g. ducts, poles, exchange buildings and street furniture) for the purpose of delivering electronic communications services. It can be readily accepted that the market power of fixed-line incumbents does ultimately derive from their ownership of physical infrastructure. Moreover, the assessment of the Three Criteria in the next downstream market (unbundled access, leased line terminating segments, leased line trunk segments) would likely be identical or near-identical to that for the corresponding physical infrastructure market. On that basis, it seems possible to define one or more physical infrastructure markets that satisfy the Three Criteria. The question therefore is

whether it adds value to define a physical infrastructure market either instead of the existing markets (4 - local unbundled access and 6 - wholesale leased line terminating segments) or in addition.

There appears little to be said for *adding* such markets to the list. Where an NRA reaches the conclusion that access to civil infrastructure would be an effective and proportionate *remedy* to deal with identified competition, it is not necessary to define a separate *wholesale market* to achieve that outcome. Notably in the case of Market 4, remedies that may be imposed under Article 12 of the Access Directive include, next to (local) loop unbundling, access to dark fibre and access to unused duct capacity. It appears therefore that adding civil infrastructure markets to the list delivers no added value, but inevitably requires more resources.

The arguments against *replacing* either or both of Markets 4 and 6 by infrastructure markets appear equally powerful. On the basis of the above arguments, the same SMP players would be designated and the same set of remedies could be imposed. However, reduced regulatory certainty would result, as an analysis of a 'new market' would be more likely to face a legal challenge.

Access to 'special rate' services

Retail competition between service providers typically focuses on services with high-visibility, especially calls, subscription charges and (in the case of mobile) subsidy of handsets. Other ('special rate') services barely figure in consumers' choice of service provider. There is a *de facto* near-monopoly for origination for such services. Once they have made their network choice, consumers are locked in to the network for any such services they use, as accessing the service in any other way is, at best, inconvenient and, at worst, impossible. Roaming is one such set of services with these characteristics. International calls and SMS and calls to non-geographic numbers are others.

The first and second criteria of the Three Criteria Test appear to be satisfied, at least for as long as it is not practicable for consumers to bypass the high retail prices charged by their service provider. As for the third criterion, it is unlikely that most national competition authorities would give priority to an investigation. Moreover, not all of the consumer harm could readily be dealt with under competition law. The case law on excessive pricing would not necessarily lead to a clear finding of abuse. It is a reasonable conclusion, therefore, that the Three Criteria would be satisfied.

However, it is less clear that it would be proportionate to apply ex-ante SMP Regulation, especially given the need to carry out SMP analysis and apply remedies on an individual network basis. Notably consumer detriment needs consideration. While irritation at experiencing apparently very high prices for 'special rate' services is natural, the aggregate amounts spent on such services may nevertheless constitute a small part of a typical consumer's mobile spend. Furthermore, SMP regulation is not the only possible route under the Framework. Some NRAs have taken advantage of their powers to regulate tariff principles to require service providers to adhere to rules on how the retail charge is constructed. Depending on how this is implemented, this could both improve transparency for consumers and reduce problems arising from discrimination.

SMS termination

The basic intellectual arguments in favour of regulation are much the same as for voice regulation and barely need to be rehearsed. There is a *de facto* termination monopoly. There are two noticeable differences with the case of voice termination. First, SMS traffic is always from mobile-to-mobile. The problem of fixed/mobile-integrated operators (as we saw with voice termination) is not present here, which reduces the asymmetry among market players. Second, the traffic is typically more balanced because an SMS is often replied with an SMS. Perhaps for this reason, termination

rates tend to be reciprocal, in which case the level of the rate should be of no significance for the purposes of MNO finances.

Given that there is a larger degree of symmetry between the operators, also the mutual bargaining positions of operators are more balanced. Consequently, we believe that it is less obvious that the Three Criteria are satisfied than is the case for voice call termination. The possible substitutability by instant messaging services suggests that, at some point, the second criterion may no longer be satisfied. Nevertheless, on the basis of traffic projections that point has not yet been reached.

In principle, this leaves open the possibility that individual NRAs could conclude that there was sufficient consumer detriment in their territory justifying their proposed regulation. In doing so, they will of course be aware that they risk disadvantaging their own network operators to the benefit of other European operators with the commercial freedom to set their own rates. Any such increase in cross-border distortions should concern the Commission.

Old candidate markets back on the list?

We advise not to put former candidate markets back on the list of relevant markets.

Market 15/2003 - MVNO access

Market 15/2003 dealt with access and origination services that MNOs supply to themselves and to any MVNOs hosted on their networks. Whereas Market 15/2003 related solely to voice calls, any defect in competition would be likely to apply equally to the fast-growing mobile data market.

Potential problems are similar to the equivalent fixed market (2/2007), except that there is, generally speaking, more inter-infrastructure competition in the mobile market. In most Member States the market is oligopolistic in nature, some way removed from the world of fixed networks where some markets remain dominated by the incumbent. It is debatable whether these markets are always competitive in an economic sense. In the light of the impracticality of an attempt to apply SMP regulation in oligopolistic markets (and because there is an expectation of increased competition as a consequence of growing use of VoIP), it does not seem worthwhile to spend material effort in defining markets and considering whether or not the Three Criteria are satisfied. It is, however, worth identifying some competition issues that may arise in future.

Although, consumers may increasingly prefer one-stop-shopping, we don't expect this to be a dominant trend. Notably because economies of scope arising in the provision of both fixed and mobile services to the same consumer are relatively limited and therefore do not give rise to significant cost savings (one still needs to operate two networks). Any attempt to raise the price of the bundle above the market level would be unlikely to succeed unless there was a corresponding rise in the price of mobile-only bundles. Although assuming the price of mobile-only bundles is set at a profit-maximising level, such a rise would not be commercially attractive.

Where a player has both a fixed and mobile network and invests in a public WiFi network, it can potentially take advantage of economies of scope to control the scale of the investment in mobile infrastructure necessary to support fast-growing mobile data usage. Instead of transmission via the 3G/4G mobile network, data would be offloaded via WiFi to the modems of fixed-line customers. The fixed service providers with the most extensive set of connections would be best placed to take advantage of such economies of scope and, in principle, to leverage any market power they possess into the fixed market. At first sight, the risk of an adverse impact on mobile competition

appears limited, notably because SMP in the retail broadband market is unlikely (assuming there is wholesale access regulation).

All in all, although the oligopolistic mobile markets are often not truly competitive, there is little that can be done under the Framework. Market developments may alleviate any such concerns over time (e.g. OTT communication). If not, the area is a candidate to be reviewed during any future review of the Framework.

Market 18/2003 – Broadcasting

Where a significant number of end-users rely on the terrestrial platform, SMP regulation may be justified in order to restrict the transmission prices payable by public service broadcasters to levels consistent with a competitive market. Although the case for regulation depends on considerations surrounding public service content, all broadcasters using the platform should be entitled to benefit from such regulation, to avoid the possibility of distortions of the retail market. The same arguments may sometimes be valid for cable networks. However, in this case, it is more likely that 'must carry rules' are in place to deal with the problem. If there are bottlenecks relating to use of broadcasting satellites, these should be dealt with on a transnational basis. The wholesale satellite transmission market is transnational.

As for the other platforms, it is relevant to consider whether significant volumes of consumers rely on those platforms for access to public service content and it seems rather unlikely that the conditions justifying ex-ante regulation of a) access to bottleneck facilities or b) managed transmission services are satisfied. Where this is the case, ex-ante regulation of the relevant transmission markets may be justified.

We would accept, on the basis of the above arguments, that ex-ante regulation of Market 18 remains justified in some Member States. Although, in practice, removal from the list undoubtedly raises the burden of proof on NRAs to regulate, we presume that this barrier has been successfully cleared in Member States where regulation remains appropriate, given the significant number of such notifications. Therefore, the Commission's decision to remove it from the list of recommended markets in 2007 seems not to have caused problems in this case. Consequently, we think there is no need for re-insertion. Given that the rationale for regulation is not likely to be uniform among those Member States where regulation remains appropriate, it should be for individual NRAs to make the case that the appropriate preconditions are satisfied in their market circumstances. In many Member States, this will not be the case.

Regulation of operators with significant market power under these circumstances would be comparable to fitting a square peg into a round hole. Undoubtedly, it would be preferable to deal with problems relating to public service content using legislation designed for the purpose.

Conclusion on the list of relevant markets

Based on the analysis of the previous chapters, we come to a suggested list of four relevant markets for the new Recommendation.

Table 1 Suggested list of markets for the Third Market Recommendation

Second Recommendation (2007)		Suggested third Recommendation (2014)	
Retail fixed access	1		
Fixed voice call origination	2		
Fixed voice call termination	3	1a	Call termination on fixed networks
Mobile voice call termination	7	1b	Call termination on mobile networks
Local loop unbundling	4	2	Wholesale Local Access
Wholesale broadband access	5	3	Mass market Wholesale Central Access in sub-national markets
		4a	Business grade Wholesale Central Access
Leased lines terminating segments	6	4b	High-quality business data connectivity

Markets 1 and 2 of the Second Market Recommendation do not pass the Three Criteria Test as the market seems to head towards effective competition in most Member States.

In the field of call termination, the Markets 3 and 7 of the Second Market Recommendation operators do not experience countervailing buying power and, hence, they possess SMP. The markets pass each of the Three Criteria and are included in the list of markets.

The wholesale markets for local loop unbundling, wholesale broadband access and the leased lines terminating segments remain on the list, with some modifications:

- We define a market for Wholesale Local Access (WLA) comprising "wholesale (physical) network infrastructure access or functionally similar wholesale local virtual network access";
- In the same line of reasoning we define a market for Wholesale Central Access (WCA) comprising wholesale bitstream access or other forms of central virtual network access;
- We argue the case for defining subnational geographical markets at the WCA level;
- We distinguish separate retail markets for mass-market broadband services and high-quality bespoke broadband services – which are typically demanded by residential and non-residential users respectively. The distinction at retail level translates into distinct wholesale markets for WCA with possibly a different set of competition problems;
- The market for "wholesale leased line segments in areas of high network replication" is not a serious candidate for ex-ante regulation. For the low replication market (i.e. outside areas of high network replication), we conclude that the three criteria are satisfied.
- Business-grade Wholesale Central Access may form one market with leased lines, however this is best analysed at the country level.

Impact of changing the list of relevant markets

We assessed the impact of changing the current list in terms of the regulatory burden experienced by telecom operators and NRAs and in terms of economic costs and benefits. The assessment of the regulatory burden is based on interviews with a selection NRAs and telecom operators. The assessment of economic costs and benefits is (where possible) based on empirical research and (where this was not possible) complemented with a qualitative assessment.

Regulatory Burden

Dropping 1/2007 and 2/2007

The regulation for these two markets is seen as rather 'old fashioned' with a lot of related implementation costs (especially for SMP operators). It is expected that these markets will 'phase out' in the coming years (some countries already deregulated these markets). Two interviewees indicate (with a rough estimation) that dropping Markets 1/2007 and 2/2007 may result in a cost reduction of 10-15% of the total regulatory burden of roughly € 216 million per year, which equals a cost reduction of roughly € 27 million per year.

Split Market 5/2007 into low-quality bitstream access and high-quality bitstream access

The impact is assessed to be neutral (for countries that already have this split) or negative. The main reason for this latter impact is that both NRAs and operators have to start with a new situation, which requires additional research, developments of expertise, etc. From the previous cost assessment it became clear that Market 5/2007 already is one of the most 'costly' markets. The proposed change seems to add to that position.

Economic costs and benefits

Dropping 1/2007 and 2/2007

For the Representative Member State, it seems appropriate to drop markets 1 and 2 from the list. The pool of potential switchers (*i.e.* non-captives) is large enough for the PSTN incumbent to experience competitive pressures from VoIP challengers. The risk for monopolistic price setting seems low. Moreover, alternative VoIP operators could gain from informing (and perhaps subsidising) PSTN-users to switch to VoIP (or Ethernet).

Furthermore, incumbents may have efficiency motives to encourage end-users in switching to VoIP since this will facilitate the switch-off of the PSTN network. Whether these motives are relevant during the period 2014 to 2020 depends on the time horizon that incumbents have set for the switch-off. Some have indicated that this is planned for some time close to 2020. The migration will have to be completed before that date.

Split Market 5/2007 into low-quality WCA and high-quality WCA

In order to assess the impact of regulating WCA one needs to recognise that WCA complements the business case for Altnets that seek access on the basis of WLA. The economic viability of investments up to the local level by alternative operators depends (for once) on the connection density in the local exchange. Typically alternative DSL operators are thus present in the local exchange in high-density areas (regions A) and would have to rely on bitstream access in low-density areas (regions B). Alternative operators that pursue a nationwide strategy rely on WCA as an essential input for serving B regions. As such WCA allows these operators to reduce the overhead per user (stemming from *e.g.* advertisement campaigns, billing, helpdesk and so on).

At the same time WCA is to a certain degree a substitute for WLA. The economic viability of an investment in LLU access thus depends on the price WCA. WCA is not a perfect substitute for local access because of fewer degrees of freedom for the alternative DSL operator in competing on quality and download rates. Therefore, there is a trade-off between the 'power (or independence) to compete' and the costs of access. Alternative operators generally prefer the business case of WLA because they regard this model to be more sustainable.

In sum, we estimate that wholesale broadband access in B regions complements the business case for WLA-access in A regions and thus contributes to the welfare gains realized from WLA regulation. The welfare gains of the latter have been assessed in terms of static and dynamic efficiency (notably the role of LLU access in driving NGA investments). We concluded that

regulation of WLA has a positive effect in both dimensions. The dynamic effects are hard to quantify. The static welfare gains of WLA regulation have estimated around 60 to 110 million Euros annually for the Representative Member State. In terms of percentage of GDP this amounts to around 0.01%.

1 Introduction

The Recommendation on Relevant Markets is up for its second review; notably the list of pre-defined relevant markets that NRAs are required to examine in their periodic analyses of markets subject to ex-ante regulation. The first review took place in 2007. The second review is to take place in 2014 and should define an updated list of relevant markets subject to ex-ante regulation for the period up to 2020.

This study on "Future electronic communications markets subject to ex-ante regulation" was commissioned by the European Commission (DG Connect) with the objective of gaining inputs for the upcoming review of the Recommendation on Relevant Markets; more specifically, to form a basis for a revision of the list of relevant markets in that recommendation.

Background of the study

The current EU Regulatory Framework in the electronic communications sector entered into effect in 2003 and was amended at the end of 2009. It aims to promote sustainable competition in the single market, to contribute to the development of the internal market for electronic communications networks and services, to promote the interest of the citizens and to ensure a high level of consumer protection in the EU.[2] In order to achieve these goals, one of the most distinct features of the Regulatory Framework is the so-called significant-market-power (SMP) regime. This regime requires national regulatory authorities (NRAs) to impose obligations only after designating an undertaking or undertakings with SMP, a concept equivalent to dominance within Article 102 TFEU. Regulation should be rolled back when no SMP can be identified.

The relevant market

In analysing whether an undertaking or undertakings have SMP, the definition of relevant markets is of fundamental importance since effective competition can only be assessed by reference to the markets defined. Relevant markets within the context of the Regulatory Framework bear the same set of principles and methodologies as those under EU competition law. A relevant market comprises two dimensions: the relevant product market and the relevant geographic market. The geographical scope of the relevant market has traditionally been determined by reference to two main criteria: the area covered by the network and the scope of application of legal and other regulatory instruments.[3] This corresponds generally to the territory of the Member State concerned. However, investment in alternative infrastructure is often uneven across the territory of a Member State; and in many countries there are now competing infrastructures in at least parts of the country. Where this is the case, NRAs could in principle find sub-national geographic markets.[4] Sub-national geographic markets allow NRAs to deregulate their whole territories from one region to another.

Concerns still remain that NRAs may interpret those principles in diverging ways. The Framework Directive[5] accordingly requires the Commission to publish a list of recommended markets that may be susceptible to *ex-ante* regulation based on the SMP Guidelines. The market Recommendation works as a starting point for NRAs to carry out SMP analyses according to their national

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2 Directive 2002/21 of 7 March 2002 on a common Regulatory Framework for electronic communications networks and services ('2002 Framework Directive'), O.J. 2002 L108/33, which has been amended by Directive 2009/140 of 25 November 2009, O.J. 2009 L337/37, Article 8.

3 SMP Guidelines, para.59.

4 Explanatory Note to the Second Market Recommendation, pp.12-13.

5 Framework Directive, Article 15(1).

circumstances. Moreover, the Regulatory Framework does recognise the importance of flexibility and thus also allows NRAs to define relevant markets beyond the market Recommendation.

The Three Criteria Test

When introducing the list of recommended markets, the Commission not only applies the principles of competition law as they were summarised in the SMP Guidelines. It also takes into account Recital 27 of the 2002 Framework Directive, stating that ex-ante regulation should only be imposed where EU competition law is not sufficient. This has been developed into three consecutive criteria: (i) the presence of high and non-transitory barriers to entry; (ii) a market structure which does not tend towards effective competition within the relevant time horizon; and (iii) the insufficiency of competition law alone to adequately address the market failure(s) concerned. The Commission applies this so-called "Three Criteria Test" before including markets in its Recommendation, but when the NRAs want to define and regulate a market that is not already foreseen in the Recommendation, they must also perform this test.

The three criteria suggest that relevant markets are as a matter of fact constantly changing. Hence the Framework Directive requires the Commission to regularly keep the recommended markets updated. Since the entry into force of the 2002 Regulatory Framework, the Commission has already adopted two versions of market Recommendations, respectively in 2003[6] and in 2007.[7] This reflects also the true reason for having the Three Criteria Test: the market is characterised by high investments and constant innovations such that the risk of getting it wrong (with ex-ante regulation) is a priori considerable. This is a crucial point since the correct application of the recommendation implies that Europe can stay or move ahead in telecoms with a range of indirect benefits (see Ecorys, 2012).[8]

The first review of the Recommendation (2007)

In comparison with the first recommendation, the second removed ten markets from the original eighteen and two other markets were merged. The list of recommended markets was reorganised to seven, and almost all retail markets were withdrawn as analyses showed that wholesale regulation combined with ex-post application of competition law could be considered sufficient to protect users against the abuse of dominant market positions.

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6 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 in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common Regulatory Framework for electronic communications networks and services (First Market Recommendation), OJ L 114, 8.5.2003.

7 Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex-ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common Regulatory Framework for electronic communications networks and services (Second Market Recommendation), OJ L 344, 28.12.2007.

8 *Steps toward a truly Internal Market for e-communications*, Commissioned by DG Connect, 2012.

Table 1.1 A Comparison of Recommended Markets between First Market Recommendation and Second Market Recommendation

First Recommendation		Second Recommendation	
Retain PSTN	1 2	1	Retail fixed access
Retail fixed voice telephone	3 4 5 6		
Retail leased lines (minimum set)	7		
Fixed voice call origination	8	2	Fixed voice call origination
Fixed voice call termination	9	3	Fixed voice call termination
Fixed voice call transit	10		
Local loop unbundling	11	4	Local loop unbundling
Wholesale broadband access (bitstream)	12	5	Wholesale broadband access
Leased lines terminating segments	13	6	Leased lines terminating segments
Leased lines transit segments	14		
Mobile access and call origination	15		
Mobile voice call termination	16	7	Mobile voice call termination
Mobile roaming	17		
Broadcasting transmission	18		

Purpose of the study

The objectives of the study are twofold:

- First, the Study should provide a quantitative and qualitative analysis of EU electronic communications markets to allow the Commission to ascertain:
  - The need for adjustment of boundaries of the relevant markets;
  - Whether the markets in the current Recommendation (with or without adjusted boundaries) still warrant ex-ante regulation or whether regulation should be withdrawn;
  - Any identifiable new markets that warrant ex-ante regulation; and
  - The internal market dimension of electronic communications markets.
- Second, the study should assess the impact of altering the list of relevant markets on:
  - Administrative and regulatory costs borne by NRAs and market players; and
  - Economic costs and benefits for society at large.

Approach of the study

The above objectives have been realized in several working packages, divided over three phases. The first phase entailed gathering of data and opinions, as well as providing an overview of prior work in the literature and by NRAs. In the second phase we consolidated the outputs of the first phase and analysed a broad range of electronic communication markets, which resulted in a preliminary list of markets with potential SMP problems. In the third phase we assessed the impact of the new list of markets subject to ex-ante regulation.

Gathering data, opinions and prior work

A first group of working packages comprised i) an analysis of all NRA notifications since 2007; ii) a methodology paper on the analysis of markets and competition; and iii) an analysis of the major trends in terms of technology, market and end-users. The results of these working packages can be found in the Annexes. A brief summary of ii) can be found in chapter 2. Chapter 3 follows with a brief overview of retail and wholesale markets and how they relate to each other. A brief summary

of iii) can be found in chapter 4. An overview of the conclusions of i) is embedded in the chapters reporting on the market analyses (see below).

Analysing markets

All of these working packages (together with the results of a public consultation organised by the European Commission) formed the basis for an extensive review of market definitions and potential problems with significant market power (SMP). The results of this review can be found in chapters 5 to 11. Here we discuss markets that are on the current list, (a selection of) markets that were on the previous list, as well as potential new markets that may suffer from an SMP problem.

We analyse each market following a logical order of steps:

- Define the retail markets and establish whether there is / would be a competition problem in the absence of regulation; if yes,
- Define the relevant wholesale markets and establish if there is SMP in any of these wholesale markets causing the identified competition problems at the retail level; if yes,
- Apply the Three Criteria Test to establish whether wholesale regulation is warranted; if yes,
- Re-assess the working of the retail market(s) and establish whether regulation of the wholesale market remedies the earlier identified competition problems.

Behind every retail market there may be multiple wholesale markets, some of which are successive. It follows that the order of steps as presented above should be applied in an iterative manner before taking the final step (which should be taken if all else fails):

- Assess whether (in the presence of wholesale regulation) the retail market passes the Three Criteria Test and impose retail regulation.

This latter step is rather strong and we did not identify cases where this is necessary.

The analysis of markets is done in a prospective manner, accounting for current trends and future developments and how they affect the conclusions in each of the above steps for the period 2014 to 2020.

Assessment of impacts

The impact assessment focussed on analysing the administrative and regulatory burden for NRAs and market participants (Chapter 13), and on the economic costs and benefits for society at large (Chapter 1).

In order to assess the regulatory burdens, we carried out a number of in-depth interviews that focussed on i) the organisation of a typical market analysis process, ii) the costs and manpower involved in such a process (for NRAs and market participants), and iii) how excluding or adding a particular market would affect the costs and manpower (positive or negative). The inputs from the interviews have been used to estimate of the current regulatory costs for all NRAs and providers in the EU (in €) and the effect a modification of the list may have on these burdens (a range in %).

The costs and benefits for society at large have been estimated on the basis of empirical analyses as well as on qualitative analyses. Notably the static effects in terms of consumer and producer surplus have been assessed empirically. Dynamic effects (in terms of innovation and investments) have been assessed via a qualitative approach.

2 Methodological considerations

2.1 Introduction

A key component of the methodology used to analyse competition problems in electronic communications markets and to apply remedies to alleviate and, preferably, resolve those problems. In this section we review that methodology. While the Commission and the National Regulatory Authorities (NRAs) have different functions and responsibilities under the Regulatory Framework (RF), they should be applying a consistent and coherent methodology. A number of methodological issues introduced in this chapter are discussed in more depth in Appendix 3.

Section 1 of Appendix 3 summarises the provisions of the Regulatory Framework which concern competition. Very briefly, individual NRAs are responsible for defining *relevant service markets* that apply in their national territories and for delineating the geographical scope of their analyses via *relevant geographic markets*. In defining the markets, NRAs must take the utmost account of the Commission's Recommendation. For each market defined, NRAs must establish whether or not there is a position of *Significant Market Power (SMP)* and, if so, apply remedies in the form of obligations imposed on undertakings with SMP. These processes are discussed in more detail below.

The Commission has significant functions of oversight and control over the NRA activities. BEREC also has a significant potential role in individual cases. These matters are not discussed in this paper. However, the Commission has one further relevant function; it is responsible for defining any transnational markets.

2.2 Ex-ante and Ex-post

The analysis should reflect the policy objectives of the Regulatory Framework (RF), which is developing a better-functioning internal market for telecommunications networks and services by promoting free and fair competition. Thereby, the RF contributes to the creation of a strong communications industry in Europe and the competitiveness of the EU as a whole.

The objectives of the RF are in essence not any different than the objectives of general Competition Policy (CP). The prime difference is that where general CP is enforced on an *ex-post* basis (except in cases of merger control), the RF is enforced on an *ex-ante* basis. The reason for this difference is primarily born out of path dependency. Because telecommunications networks and services were traditionally seen as one integrated system, the natural monopoly characteristics of the most intricate section(s) of the network (the local loop) have characterised the entire system. This, in combination with the fact that telecommunications were seen as a *utility,* has led European governments to roll out the first copper networks themselves and to operate these for many decades during the 20th century via publicly owned monopolies. Towards the end of the 20th century governments recognised that telecommunications system could be regarded as a system of layers (or vertically related markets). With this insight, it was also recognised that not all of these layers were characterised by features of a natural monopoly and that there are great efficiency gains to be realised when these layers are transformed into competitive markets. Given the historic 'one-system-approach' toward telecommunications, the objectives of the RF go beyond the goals of general competition law: the challenge lies in how to guide the transition from monopoly to effective and sustainable competition wherever this is a credible outcome. Having said this, it should be

recognised that there are some layers consisting of markets that, for the moment, seem to have the characteristics of an enduring natural monopoly.

2.3 Three Criteria

2.3.1 Rationale for the Three Criteria

The purpose of ex-ante regulation is to reduce and, where possible, remove any detriment to consumers. Detriment can arise for a number of reasons but this report is concerned only with detriment which arises from significant market power in any of the up or downstream markets. Although the detriment is experienced at the retail level, the fundamental cause of restrictions and distortions of competition is typically experienced at an upstream wholesale level. Since it is preferable to treat the disease rather than its symptoms, there is a strong policy preference under the Framework to apply any necessary remedies at the level where the fundamental bottleneck occurs. The Commission has therefore focused on identification of wholesale markets, so that regulation can be applied at the retail level only where unavoidable.

Given the aim to stimulate sufficient competition so that ex-ante regulation of competition is no longer necessary, the identification of a set of markets that typically have competition problems in many/most European Member States should be taken with a view to constraining the list at any stage and to reducing its scope over time. To provide a methodological framework for such decisions the Commission identified the following three criteria that are to be applied cumulatively to each candidate market. Candidate markets must satisfy all three criteria to be considered suitable for consideration for ex-ante regulation and, consequently, worthy of a place on the Commission's list of recommended markets. The criteria are the following, as formulated by the Commission:

- High and non-transitory barriers to entry;
- A lack of dynamic towards effective competition; and
- Insufficient general competition law to deal with the problem.

The Commission provided guidance on the interpretation of the criteria used to develop the list of recommended markets and to assist NRAs in assessing markets not on the recommended list.

The analysis should proceed on the basis of the "modified greenfield approach" described in section 2.2.5 of Appendix 3, starting with the identification of the relevant retail competition problem.

There is a degree of overlap between the three tests and (for an NRA) between assessment of the Criteria for a proposed new market and assessment of SMP in that market. Such overlap is not cause for concern. The Criteria are a means to the end of identification or "market selection" in a consistent manner across Europe of markets susceptible to ex-ante regulation. Analysis of the Criteria should not be regarded as an end in itself.

There is no strict guidance as to the time horizon over which the Three Criteria should be assessed. For NRAs faced with a 3-year cycle of Market Reviews, the lifetime of the review in question (normally 3 years from the date of completion of the review) is the natural horizon. For the markets selected for inclusion on the recommended list in the following Recommendation the time horizon runs from 2014 to 2020. This should then also be the relevant period for the Three Criteria.

The Commission's original intention was to identify a set of markets that justified regulation in most, if not all, Member States. This was at a time when most NRAs had relatively little experience in application of competition law methodology. Without clear guidance from the Commission, there

would have been a risk of considerable divergence of approach across Europe. The Three Criteria Test provided a sound rationale for the inclusion of markets on the recommended list. The Commission considers that where an NRA defines a market from the list, then there is no need for it to apply the Three Criteria Test. However, where it defines a different market or proposes not to analyse a market on the list, it should apply the test in order to justify its decision.

Now, ten years later, with NRAs having gained considerable experience of defining markets, it is worth considering whether this continues to be the best approach. Section 4.2 of Appendix 3 sets out the case for giving more responsibility to the NRAs to apply the Three Criteria. Furthermore, we believe there is much to be said for applying the Three Criteria to the retail market(s) where competition problems arise rather than to wholesale markets that are candidates for regulation. Current practice (and the Commission's view) is that the Three Criteria Test should be applied to those markets that are candidates for regulation. Either way, we believe the most common practice has been to apply the criteria directly to wholesale candidate markets.

If there is no problem to be solved at the retail level, there is no need to look further. If the Criteria are passed at the retail level, the appropriate wholesale market can then be defined for SMP analysis. This approach has the incidental benefit of reducing the overlap between application of the Three Criteria and SMP analysis. The former is a medium-term test of the need for ex-ante regulation in the area; the latter considers more explicitly where and how such regulation should be applied over the next few years. The relationship between the retail and wholesale levels is explored further in Section 2.4.3 below.

2.3.2 Review of the Three Criteria Test

The Three Criteria Test has been established for some years as the basis for identifying markets recommended by the Commission for SMP analysis by NRAs. BEREC, on behalf of the NRAs, have expressed itself to be comfortable with the test, while noting that guidance on interpretation of the Third Criterion is very slim.

In Appendix 3, we include an extensive review of the Three Criteria. This was prompted by two main considerations. First, our view of the Third Criterion (developed in full in the Interim Report) is that it is almost always possible to advance reasonable arguments for satisfaction of the Third Criterion for markets that clearly satisfy the first two. For that reason, it appears not very useful. Indeed, it gives rise to an element of uncertainty in the appraisal process (because those who wish to avoid regulation will certainly argue the opposite point of view) without adding sufficient value.

On the other hand, scrutiny of the "new markets" suggested by stakeholders (in Chapter 10 below) led us to the conclusion that some of these markets satisfy the Three Criteria whereas we consider the consumer detriment to be low. This makes it very arguable that ex-ante regulation would be disproportionate. However, this is not a consideration that appears anywhere in the Three Criteria.

Finally, we noted that SMP Regulation is highly resource-intensive. In some cases where the Three Criteria are clearly satisfied and there may be a sound continuing case for regulation, the volume of resources devoted seems disproportionate. The resources needed to sustain costing analyses in termination markets, in the face of inevitable complex legal challenges, is a case in point. Where the problems can be dealt with satisfactorily in a simpler way, this should be preferred.

For those reasons, we think it would be advantageous, to adjust the Third Criterion along the following lines, if only to improve transparency.

Whenever the first two Criteria are satisfied, the revised Third Criterion should be presumed to be satisfied unless:

a) There are special reasons to believe that any problems arising in the relevant market can be effectively left to competition law to resolve; or
b) There is objective justification to consider that any problems arising in the relevant market can be dealt with more effectively using other regulatory approaches; or
c) There is objective justification that the consumer benefits expected from regulation are insufficient to justify the resource costs, not only of the NRAs but those that would need to be committed by market players to support regulation.

The first leg of the above is the original Third Criterion.

The second leg relates to existing (national or European) legislation. When applying the test to any new markets they are analysing, NRAs should consider the full range of regulatory alternatives. They might for example consider accepting legally binding undertakings or deal with issues using other regulatory instruments at their disposal. Where transparency measures are sufficient, these can sometimes be imposed under the powers deriving from the Universal Service Directive and/or from generic European or national consumer legislation. The analysis of broadcasting transmission provides a more specific example.

The third leg is a “minimal consumer detriment” test. This should be used to rule out regulation of markets where a competition problem is evident but the potential detriment to consumers appears to be small (e.g. because it involves a very small niche market). In other words, we suggest that the Three Criteria Test includes a form of impact assessment.

As for the first two of the Three Criteria, both tests require a case-by-case analysis. It would certainly promote consistency of application if guidance could be developed on interpretation in practice.

Although we suggest above that the Three Criteria should in the future be applied unambiguously to the retail level, the above adjustment to the Third Criterion is equally valid if the test is applied directly to wholesale candidate markets. In our analyses of the various candidate markets later in this paper, we have made use of the ideas embedded in the proposal for revision to reach conclusions on the susceptibility of the market to ex-ante regulation.

2.4 General competition policy principles and techniques

In order to achieve its objectives, the RF is designed as much as possible on the basis of general CP. As stated above, the significant-market-power or SMP regime (the key feature of the Regulatory Framework) is clearly based on the principle of dominance within Article 102 TFEU and the definition of relevant markets is of fundamental importance to the enforcement of the RF. Relevant markets comprise two dimensions: the relevant product market and the relevant geographical market. Both should be defined on the basis of supply and demand substitution. The latter can be assessed on the basis of a hypothetical monopolist test (also referred to as SSNIP test) – see Textbox below.

2.4.1 Relevant markets in theory

To determine whether a player has a dominant position, it has to be determined first what defines the relevant market. The key word here is ‘substitutability’, as this ultimately determines whether

consumers have a real choice. If they do, then none of the market players can behave independently of its competitors simply because (a critical number of) consumers *can* and *will* switch if they are offered a better deal by a competitor. So, the purpose of determining the relevant market is to establish whether end-users have a real choice. This choice has two dimensions: a product dimension (does another party offer a similar product?) and a geographical dimension (can I get a similar product without having to travel too much?).

It's all about having a choice

In determining the relevant product market, the key issue is to determine what products can be considered 'similar'. In many cases, there are substitutes but not perfect substitutes; for example, a different technology may be used, leading to varying levels of quality. If the 'distance' between two substitutes is too big, consumers do not have a real choice and, thus, cannot or will not switch. In such cases, a supplier with significant market power is in a position to behave independently of its competitors.[9]

Determining the relevant product market is on the one hand a qualitative matter (which products could be substitutes and how likely are how many consumers to switch?), but requires also an empirical assessment. Courts give greater weight to empirical evidence when there are doubts concerning substitutability. The challenge here is to use empirical evidence to map revealed preferences and to draw conclusions with a prospective nature. Failing in this last step allows the defence to categorise the evidence as 'old news' and therefore of little relevance for the future.

Determining the geographical market is essentially the same, however, it is carried out with respect to the sales area of market players.

Tools and Methods

In order to assess product and geographical substitutability, a number of techniques are available. The most common technique is a hypothetical monopolist test (also referred to as SSNIP test) – see Textbox below.

SSNIP test[10]

This test assumes the market to be served by a hypothetical monopolist. The market is initially considered 'small'. Suppose a cable operator is assumed to be a monopolist of analogue TV signals in its own coverage area. Next, a SSNIP test quantitatively and/or qualitatively assesses whether a Small but Significant and Non-transitory Increase in Price (of 5% to 10%, SSNIP) would be profitable for a hypothetical monopolist. If this is not the case because too many end-users 'escape' the price increase by switching to products or regions that they regard as substitutes, the relevant market should be enlarged accordingly. A new SSNIP test follows and this iterative process goes on until a group of products and regions has been determined for which a Significant and Non-transitory Increase in Price would be profitable for the hypothetical monopolist selling all these products.

The SSNIP test is an artificial approach that can serve as a reference point for the extent of substitutability. The test can rarely be done on an empirical basis due to a lack of trustworthy data. Nevertheless, the test serves as a proper legal point of reference.[11]

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9 See: Bishop, S., Walker, M., '*The economics of EC competition law* ', Sweet & Maxwell, London, 1999, p. 57-63 and Motta, M., '*Competition policy: theory and practice* ', Cambridge University Press, 2004.

10 see: Bishop, S., Walker, M., '*The economics of EC competition law* ', Sweet & Maxwell, London, 1999; and Hildebrand, D. '*The role of economic analysis in the EC competition rules* ', Kluwer Law international, The Hague, 1998; as well as Haffner, Robert C.G., '*De relevante markt* ', in: Tijdschrift voor politieke ekonomie, 1997, page 211-231.

11 See footnote 9.

A SSNIP test requires the NRA to estimate the number of consumers switching to another product (and/or to estimate the number of suppliers reallocating production factors in order to produce a similar product) as a result of hypothetical increase in price (with 5% to 10%). Next the SSNIP test requires the NRA to determine whether the volume effect (reduction in number of products sold) outweighs the price effect such that the price increase is loss making for the hypothetical monopolist. As a rule of thumb a period of one year is used during which consumers have to switch, however, shorter periods may be more appropriate if, for example, the market is characterised by daily transactions.

The SSNIP test is not the only method to determine substitutability. In 2010 the European Commission published a consultation document[12] that can be considered an update on the use of economic methods and techniques as already established in the Commission's notice on guidelines for the definition of relevant markets for the purpose of Community competition law (1997).[13] These guidelines were adopted in the Regulatory Framework for telecommunications in 2002.[14] From these documents it is clear that the use of economic methods and techniques has its limitations and is therefore often criticized. The European Commission recognises this in the 2010 consultation paper. The Commission stresses that the economic models should support views that are based on competition law, but that these models will always remain simple representations of the truth. Economic and econometric analyses therefore require accuracy.

Best practices of economics and econometric analyses[15]:

- Defining the research question: economics tests should not only evaluate the null hypothesis, but also alternative scenarios;
- Relevant, complete and correct data: in the absence of reliable data, the Commission argues that the economic analysis can still be done, but the outcomes have to be interpreted carefully;
- Choosing a methodology; any methodology has pros and cons and, hence, the motivation in choosing for a particular methodology must be clear (and compared to alternative approaches);
- Presentation and interpretation: it needs to be made explicit how the model and analysis are constructed, notably to allow replication of the analysis and to check whether the analysis complies with the academic standards;
- Sensitivity analyses: the presentation of the analysis should specify how the results change if different data, method and/or assumptions were used.

In practice it is not always possible to define the relevant market on the basis of robust empirical evidence. Different types of evidence need to be considered. Sometimes there is a choice between various definitions of the relevant market. Yet it is not always necessary to make a unique choice when the relevant competition problems exist independently of the exact definition of the market.[16] Moreover, the Commission sometimes opts for 'short cuts' when this avoids needless analytical efforts.

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12 DG Competition, "Best practices for the submission of economic evidence and data collection in cases concerning the application of articles 101 and 102 TFEU and in merger cases", 2010. See: http://ec.europa.eu/competition/consultations/2010_best_practices/index.html.

13 See the "Commission notice on the definition of relevant market for the purpose of Community competition law" (1997). Prior to this publication there were no official guidelines about how a relevant market was to be determined which caused doubt and uncertainty. This notice confirmed what was already established in European jurisprudence. The notice distinguishes six types of evidence, amongst which qualitative evidence (such as elasticity, cross elasticity, price movements through time, and causality with prices). The SSNIP-test is a variant of these tests.

14 See the Notice on relevant markets 2002/C 165/03.

15 See footnote 12.

16 When for example the incumbent has SMP in the markets for LLU and ODF access, and similar competition problems are expected, it might not be relevant to establish whether MDF and ODF access are substitutes.

Evidence can be gathered by studying the behaviour and strategy of current players, by consulting users and potential entrants and/or by analysing switching costs and product characteristics. Observed (price) behaviour can provide evidence: how did market players react to price chances? How did consumers react? Did price changes lead to entry and/or exit by market players? The latter is particularly relevant from a dynamic perspective and also the Commission places great value on this.[17]

Another point of attention for the empirical analysis is that price elasticity always depends on 'the location' of the market along the supply curve. If prices are at the monopolistic level already, a further price increase is, by definition, loss-making. This doesn't mean that the chosen market definition is incorrect[18] or that it is competitive, but rather that the damage has already been done (this phenomenon is referred to as the 'cellophane fallacy'). As such the SSNIP should (in an ideal situation) be formed on the basis of competitive prices. If it is not, then there is a risk of the cellophane fallacy. Nevertheless, observed prices rarely resemble competitive levels. Another contextual detail which is not reflected in an empirical SSNIP test is that observed losses need not be the result of a price increase, but rather caused by the introduction of a new attractive product by a competitor or entrant. Finally, an empirical SSNIP test alone cannot serve as evidence. The test should be complemented with a qualitative analysis of market developments and trends to make the analysis prospective in nature.

All in all, these considerations lead to the conclusion that the SSNIP test is a useful instrument for assessing substitutability, but that it should not be executed too mechanically and that it must always be put in the relevant context. [19]

A more detailed discussion of the theory and practice of market definition can be found in Chapter 2 of Appendix 3.

2.4.2 Competition problems

Monopoly, duopoly and effective competition

In theory, both a monopoly and a duopoly can lead to competitive outcomes. To realise such outcomes, certain market conditions have to be met. This section elaborates on these conditions.

In case of a monopoly, a competitive outcome can only occur when the monopolist is under permanent pressure of potential entry. Entry can occur on the basis of (radical) innovations where either an entrant introduces a new product or service and takes over the market or the incumbent anticipates entry and innovates of its own accord. Entry can also occur without radical innovations; in such cases the entrant is simply more cost efficient than the monopolist. If the competitive pressure is not innovative, the costs of entry must be negligible. When such costs are substantial, a competitive outcome will only occur when the market is characterised by a tradition of radical innovations (as observed in the pharmaceutical industry, for example).[20]

In case the market is a duopoly, a competitive outcome will be obtained if competition is mainly price-based (described by the Bertrand model with homogeneous goods). In this model, the

[17] See European Commission, "Commission notice on the definition of relevant market for the purpose of Community competition law", 1997, 44-50 in Bishop, S., Walker, M., '*The economics of EC competition law* ', Sweet & Maxwell, London, 1999, p. 57-63.

[18] The SSNIP test fails if the observed price in the market is already at the monopolistic level (the cellophane fallacy);

[19] See also The SSNIP test: some common misperceptions Oxera, March 2005.

[20] See for example: Van den Bergh, R.J., Camesasca, P.D., "European Competition Law and economics – a comparative perspective", Intersentia, Antwerpen, 2001, p. 49-52.

operator with the lowest price wins the whole market. Thus firms underbid each other's price, driving it down to the competitive level (where profits are zero and a lower price is not feasible). The perfect Bertrand equilibrium occurs only when the market is fully transparent, products are homogeneous, transaction- and search costs are negligible and there are constant returns to scale. In trying to escape this zero-profit equilibrium, firms will differentiate their products or contractual conditions. With this differentiation, firms can increase their prices and thus also their profits. Roughly speaking, the greater the differentiation between products is, the higher the price will be.[21]

Strategic behaviour in oligopolistic markets

Canoy and Onderstal (2003) analyse the conditions under which oligopolistic market become 'tight oligopolies' and become conducive to anti-competitive behaviour.[22] A 'tight oligopoly' is characterised by high barriers to entry that may, for example, result from policy restrictions (legal requirements for entry) or from product characteristics (large capital investments needed to start production). Entry barriers may also result from firm strategy. For example, firms may try to foreclose (potential) competitors by contracting with up- and downstream players in the production chain. Such contracts often involve vertical restrictions, such as setting minimum or maximum resale prices, limiting the resale outside a certain geographical area, price and quality discrimination, etc.

Of course, competition law also embraces the concept of joint dominance, which is read into the Framework with only a change of name (Joint SMP). In principle, this allows NRAs to deal with competition problems that arise in duopolies and other oligopolies, as well as those that arise in markets dominated by a single undertaking. Nevertheless, we understand that the general view, both of regulators and commentators, is that the state of development of case-law on joint dominance implies that it has not been a useful concept for ex-ante regulation since the burden of proof that was expected up to now has been too high. This has led to the need, under the Framework, to deregulate some areas where consumer detriment could clearly be observed (for example, in the form of persistent high prices in oligopolistic markets).

Since the original formulation of the Framework, the law has been moving on joint dominance. Under the Merger Control Regulation, joint dominance has been refashioned in *Airtours* (2002) and reconfirmed by the ECJ in *Impala*. The test is now found under 'coordinated effects' in the two Merger Guidelines. It has been at least implicitly taken over for Article 102 TFEU in *Piau*. *T-Mobile NL* is also interesting in that it offers a new path to tackle tacit collusion under 101 TFEU. There seems a good case for guidance on sector specific regulation to catch up with the developments under competition law. Unfortunately, the Framework appears to rigid in dealing with these new legal developments,[23] but it is beyond the scope of this report to assess whether or not these developments would largely solve the problems which NRAs have in practice with the application of joint SMP.

Further analysis

Chapter 3 of Annex 3 further analyses competition in oligopolistic markets. It also examines certain market features that need to be fully considered in carrying out market definition and SMP analysis – for example, concerning the two-sided nature of certain markets and the phenomena of captive customers and aftermarkets.

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21 See for example: Viscusi, W.K., et al, "Economics of regulation and antitrust, MIT Press, London, 2000, p. 109-112, and: Bishop, S., Walker, M., '*The economics of EC competition law* ', Sweet & Maxwell, London, 1999, p. 25-27.

22 CPB; Canoy, M.; Onderstal, S., "*Tight oligopolies: in search of proportionate remedies",* Den Haag: CPB, 2003, CPB document, nr. 29.

23 It is hampered by Annex II to Directive 2002/21, which froze collective dominance in the checklist approach prevalent in 2002, just before *Airtours*. But the Annex is worded very loosely, so it may be possible to interpret the Directives in a manner consistent with these more recent legal developments.

2.4.3 *Wholesale and retail*

As became clear from the aforementioned, telecommunications networks and services together form one system. Where this used to be one integrated system, it is now (as result of policy change) a system of multiple interrelated layers/markets. However, in order to regulate the transition of each layer/market from monopoly to sustainable competition, one always has to consider the functioning of the system as a whole. This means that the analysis should start at the retail level because any sustainable failure in the system of wholesale markets will logically reveal itself at the end-to-end retail market. If then competition problems of any severity emerge in an end-to-end market for the supply of a service to end-users, the next step is to locate them at some point or points in the value chain. Nevertheless, it may sometimes be hard to assess whether or not there are competition problems at the retail market. In that case it may be helpful to assess competition at the wholesale level – if competition problems are more apparent at that level, it can be deduced that competition problems at the retail level are present as well.

The change from the 2003 recommendation with its 18 markets to the 2007 recommendation with only 7 markets was characterised by (amongst other things) a reduction of the number of retail markets on the list. This change signalled the first success of the Regulatory Framework in reaching its ultimate goal: abolishing ex-ante regulation altogether. On the other hand it may also have drawn away the attention of NRAs somewhat from what ultimately matters: the proper functioning of retail markets. Ultimately, introducing remedies at a wholesale level serves only to foster effective competition at the retail level. For some markets, where several, vertically related wholesale levels may subsequently be assessed within the Framework context, the approach to jointly assessing retail and wholesale levels is of particular importance. It may be logical, within the spirit of the regulatory framework, to iterate the analysis of the interactions between wholesale markets, remedies and retail markets, but neither the framework directive nor the recommendation on relevant markets explicitly instruct NRAs to do this.

We distinguish between two areas of linked, but separate, issues:

1. The link between retail and wholesale markets; and
2. The link among wholesale markets (ladder of investment principle).

We deal with the two issues in the two following sections.

The link between retail and wholesale markets

The Commission Recommendation states: “The objective of any ex-ante regulatory intervention is ultimately to produce benefits for end-users by making retail markets competitive on a sustainable basis.” This means that any regulation at the wholesale level exists solely for improving the competitive outcome at the retail level. Any market analysis at a wholesale level should therefore be focussed on the issues of competition that exist at the retail level.

In spite of this crucial interrelationship between the retail and wholesale levels, the Framework Directive does not impose a requirement that NRAs link any of their wholesale level analysis and remedies to outcomes at the retail level. The Recommendation does explicitly describe the interrelationship: “The starting point for the identification of markets in this Recommendation is the definition of retail markets from a forward-looking perspective, taking into account demand-side and supply-side substitutability. Having defined retail markets, it is then appropriate to identify relevant wholesale markets.” The Explanatory Memorandum accompanying the second Recommendation makes the same point.[24] The Access Directive also recognises the link between wholesale access

[24] SEC(2007) 1483 Commission Staff Working Document Explanatory Note Accompanying document to the Commission Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex-

remedies to the retail level: “A national regulatory authority may […] impose obligations on operators to meet reasonable requests for access […], inter alia in situations where the national regulatory authority considers that denial of access […] would hinder the emergence of a sustainable competitive market at the retail level, or would not be in the end-user's interest.”[25]

Given the Framework Directive’s lack of explicit instruction to NRAs[26] to always relate their wholesale analysis to the retail level, the quoted text from the Recommendation should probably be interpreted to mean that “in the process of coming to the list of markets, as listed in the annex to the Recommendation, the starting point has been the definition of retail markets.” Nevertheless, we feel that the actual end-user detriment (i.e. at a retail level) should be central to any and all analyses of competitive issues that may exist at a given wholesale level (i.e. also the individual analyses by the NRAs).

More specifically, the process of analysing retail and wholesale markets should ideally[27] be as follows:

1) Retail markets are analysed to assess whether they are competitive (in a greenfield scenario, i.e. in the absence of retail or wholesale regulation):
   a) If deemed competitive, the process ends;
   b) If not, proceed to step 2;
2) Analyse wholesale markets to see if they are competitive; presumably, if the answer to (1) was negative, there might be an issue at wholesale level. If the markets are not competitive, then appropriate remedies should be imposed; and
3) A reassessment should then be carried out of the retail level in a modified greenfield setting, i.e. in presence of the wholesale remedies imposed in step 2, to assess whether it can be expected that the retail markets will be competitive in the light of the wholesale regulation:
   a) If the answer is yes, the process ends;
   b) If the answer is no, direct regulatory measures at the retail market may be called for to remedy the competition problem.

This process is depicted in the following figure.

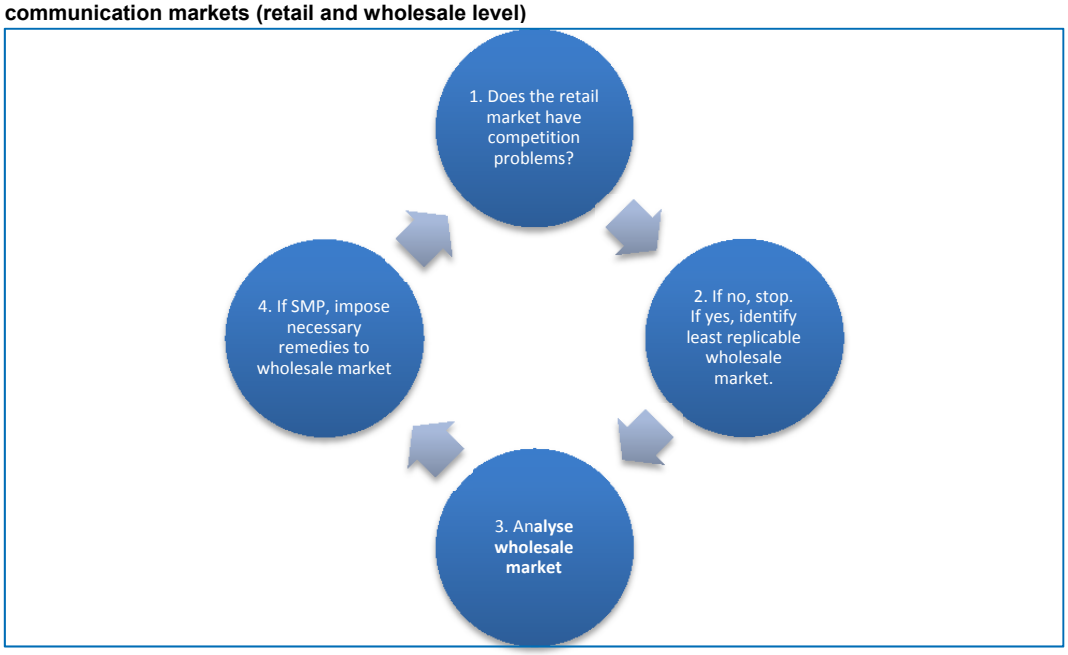
ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services (second edition), section 2.1.

25 Access Directive, art. 12.

26 This doesn’t prohibit NRAs from following this approach though. For example, in their market analyses, both OFCOM and OPTA start off with analysis of the relevant retail markets and relate any wholesale analysis and remedies to the retail level.

27 In practice, it can be quite hard to construct the counterfactual without retail or wholesale regulation, some pragmatism may therefore be required.

Figure 2.1 Analytical cycle followed to address competitive issues in vertically related electronic communication markets (retail and wholesale level)



The regulatory framework follows this iteration, albeit not explicitly, as indicated above. Yet the division of labour between the Commission (Recommendation on relevant markets) and the NRAs (individual market analyses) may hamper the 'free flow' of the three steps. Much of the reasoning in Step 1, in particular, is conducted in the Recommendation, otherwise there would be no wholesale markets identified: the Commission must be reasonably certain that the retail markets relevant to the selected wholesale markets are likely to be problematic across many Member States (indeed, the present report serves as one of the inputs for the Commission to be able to make its selection).

With Market 1 as the exception, the Recommendation currently identifies only wholesale markets, leaving the related retail markets undefined. Due to the current lack of explicit guidance on retail market assessment in relation to the recommended wholesale markets, NRAs are to some extent free to disregard retail markets, in spite of the competition law principles (highlighted above) that should theoretically bind them to always assess wholesale and retail markets in conjunction. This may lead to regulatory failure, with a risk of both over-regulation and under-regulation. Both possibilities are briefly discussed below.

Risk of over-regulation

The situation is conceivable that a retail market tends to effective competition but an isolated assessment at the wholesale level would nevertheless point to SMP issues at that level. Such assessment of the wholesale level only, disregarding the retail level, could lead to the incorrect conclusion that regulation is required.

For example, a retail market for broadband Internet connections could be characterised by competition from alternative (vertically integrated) infrastructure players and might be effectively competitive. Nevertheless, if the retail market is not assessed before addressing the wholesale market of unbundled local loop access, an overly formalistic approach could lead to the conclusion that the wholesale market is not effectively competitive and therefore requires regulation; leading to over-regulation.

Risk of under-regulation

To complicate matters, one wholesale market can possibly serve as an input to more than one retail market (or, as is increasingly the trend, to a bundle of retail market services). This gives arise to the question of which retail market (or markets) should be assessed to analyse the efficacy of regulation at a wholesale level? Presumably, all related retail markets should be assessed. Currently, the Recommendation provides no guidance on this issue.

Due to the current lack of explicit guidance on retail market assessment in relation to the recommended wholesale markets, NRAs are to some extent free to regard or disregard certain markets (or market segments) at the retail level (or, indeed, to disregard the retail level altogether). For example, an NRA may assess voice and broadband retail services but disregard television services, which may be delivered using the same general wholesale input (as well as other inputs more specific to that retail service). Similarly, an NRA may assess the competitive conditions on the retail mass-market for broadband access, but may disregard the retail market for higher quality access such as may be consumed by large business customers. This could result in an outcome where the competitive issues of a retail market are sufficiently dealt with by regulating a relevant wholesale input, while other competitive issues – that might be particular to a neighbouring retail market and not adequately resolved – are left unaddressed.

As a result, less harmonisation between Member States is attained than should theoretically be possible within the ECF. We therefore recommend making the link between wholesale market analysis and retail market analysis more explicit in the next Recommendation. Furthermore, it is advisable to provide some guidance to Member States regarding which retail markets to assess in dealing with the wholesale markets of the Recommendation. Note that it is not necessary to include more retail markets in the Recommendation in order to achieve this – it could be sufficient to have a section in the Recommendation to set out the possible retail markets that are affected by the relevant wholesale markets in the Recommendation.

Administrative burden

A drawback to the recommended approach is that it may impose an additional material burden on those NRAs that do not currently carry out an initial assessment of competition issues at the retail level (greenfield analysis) and reassessment of the retail level after dealing with the relevant wholesale market (modified greenfield analysis). At a time of particular strain on public authority resources, this could be difficult to justify. However, since the approach is compliant with general competition law one might argue that those NRAs that do not currently follow this method are in fact not acting in accordance with the Framework. The mere fact that the assessment of retail level is already done by Commission in coming to the Recommendation, does not form an excuse to skip the analysis at the individual member state level. It only excuses NRA from doing the Three Criteria Test at the retail level (unless they find all retail levels to be effectively competitive, then they would arguably have to perform the Three Criteria Test at retail level).

The link among wholesale markets (ladder of investment principle)

As an issue that is quite specific to regulation under the Framework, several wholesale markets may be identified that are vertically related and may serve as inputs to the same retail market(s) at different levels of the value chain. This applies currently to markets 4/2007 and 5/2007 in particular. The interpretation of the Framework is that the wholesale market closer to the end-users should be first analysed and possibly regulated, after which you proceed upwards in the value chain. This commonly adopted interpretation is based on the ladder of investment. More specifically, an iterative process of assessing retail, then wholesale (closest to end-users), then retail and again possibly wholesale (next-closest to end-users) should be followed, as depicted below.

Figure 2.2 Analytical cycle followed to address competitive issues in vertically related electronic communication markets

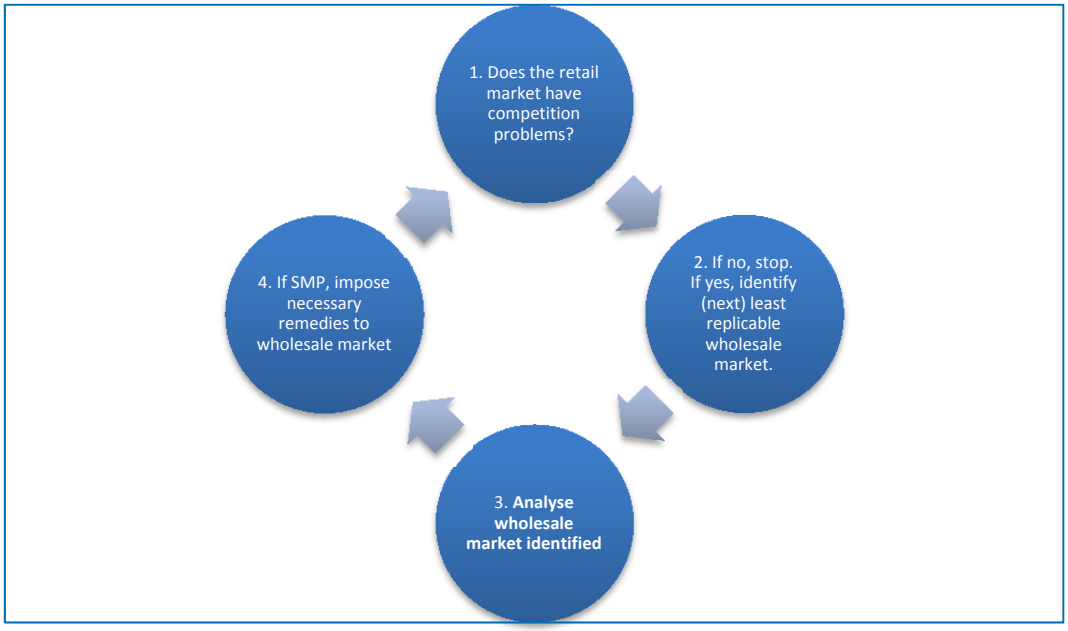


Figure 2.2 shows a simplified representation of the basic analytical cycle that should generally be followed when dealing with more than one vertically related wholesale market[28] according to the ladder of investment principles. What is different from the more general methodology discussed previously, is that after completing the first analytical cycle (retail / wholesale assessment), the competitive conditions at the retail level should be reassessed in the presence of the imposed wholesale obligations (i.e. in a *modified greenfield* setting). If the retail market is then found not to have any remaining competition problems, the process ends.[29] If not, the wholesale level that is one step further downstream (next-least replicable) should be identified and the process repeated. Subsequent iterations continue until the retail market is found not to have any remaining competition problems. If wholesale solutions fail to remedy the problem, retail measures may be necessary.

Assessment of retail markets

The interrelationship between retail and wholesale markets described above gives rise to an important question. The fundamental pre-requisite for regulation is that SMP is established on the relevant market. The Framework Directive (Art 14.2) equates this with the competition law concept of dominance. The situation of interest for the present discussion occurs where SMP cannot be proved in the relevant retail market but where SMP at the wholesale level can be leveraged into the retail market (typically an oligopoly) to give rise to significant consumer detriment. So the relevant question is:

> Is it a pre-requisite for a finding SMP on the wholesale market that (on a modified greenfield basis) there also be SMP in the corresponding retail market? Or is it possible to find wholesale SMP in the absence of retail SMP (especially – but not exclusively – where retail markets are oligopolistic in nature and SMP is all but impossible to establish on the basis of current competition case-law)?

[28] Note that such wholesale level may not of itself be a merchant market, *i.e.* it may be a notional market that exists only of self-supply in the absence of access regulation. We deal more specifically with the issue of self-supply in section 7.5.

[29] A special case could be if there are no appropriate remedies possible at the "highest" wholesale level, *e.g.* in case that remedies at that level would also affect other underlying wholesale and retail markets without competition problems. In such special cases a more tailor-made solution at a "lower" wholesale level might be preferable.

There are arguments in two directions in answer to this question. However we note that, so far, a finding of SMP in the relevant retail market has not been considered a pre-requisite for consideration of regulation in the relevant downstream wholesale market. To our knowledge, the Commission has not addressed this question directly. Despite this, an inference can be drawn that the Commission does not regard *SMP in the corresponding retail market* as a pre-requisite for inclusion of a wholesale market in the list of Recommended Markets. The clearest inference is available from termination markets where it is unlikely to be possible to establish SMP at the corresponding retail level (i.e. the retail market for mobile calls and access). We also looked for explicit guidance in the text of the Directives but found none. Therefore, we conclude that:

a) A finding of SMP at the retail level would be ***sufficient*** to continue the analytical cycle described above; but that
b) Provided that significant retail consumer detriment can be established, a finding of SMP at the retail level is not ***necessary*** for continuation of the cycle

2.4.4 Note on geographic market definition

The Recommendation provides a list of wholesale product markets, but leaves the process of defining the relevant geographic market up to the individual NRAs.[30] Given that the factors relevant to geographic market definition may vary strongly from one member state to another, it would be impossible to define a relevant geographic market within the Recommendation other than at the national level. Because the Recommendation does not define relevant geographic markets, it leaves the option open for individual Member States to find geographic markets other than at a national level.

As described in the Explanatory Memorandum to the second Recommendation, "investment in alternative infrastructure is often uneven across the territory of a Member State, and in many countries there are now competing infrastructures in parts of the country, typically in urban areas. Where this is the case, an NRA could in principle find sub-national geographic markets." This description is certainly applicable today, e.g. where entrants have rolled out their own networks to some, but not all, local loop access points or where local cable networks have been upgraded to be able to offer a full triple-play product, thus able to fully compete (at a local level) with the national incumbent operator.

We expect the issue of diverging sub-national competitive conditions to become of increasing importance within the next few years. So far, however, the prevailing outcome of most NRA analyses is that the relevant geographical markets are national in scope. This outcome may simply mean that the phenomenon of competing networks at a sub-national level does not have important consequences for the competitive conditions at the sub-national level, i.e. the sub-national level does not differ from the national level to such an extent that it warrants separate attention.

A notable exception to the status quo is OFCOM's Market 5 analysis of 2007 (similarly, ANACOM also find separate sub-national geographic markets). We explore OFCOM's approach as a case study in section 7.5.3. Since a harmonised approach is striven for within the Framework, it may be appropriate to provide some additional guidance on the issues related to geographic market definition in the Recommendation and we understand that the BEREC Work Programme for 2013 contains an action to develop guidance for NRAs in this area. We believe that OFCOM's 2007 approach to Market 5 is exemplary as far as geographic market definition is concerned, especially

[30] Framework Directive, art. 15.3: "National regulatory authorities shall, taking the utmost account of the recommendation and the guidelines, define relevant markets appropriate to national circumstances, in particular relevant geographic markets within their territory, in accordance with the principles of competition law. "

as it appears that the additional analysis necessary to support geographic segmentation is not unduly burdensome. Of course this does not mean that the outcome of the analysis should also be the same across Member States.

The existence of common pricing constraints at a national level can often be taken as a reason why local areas with competitive conditions that are distinctly different from the competitive conditions elsewhere may nevertheless belong to the same national market. In their “Review of certain markets included in the Commission's Recommendation on Relevant Markets subject to ex-ante Regulation”, Cave et al. lucidly discuss the implications of common pricing constraints for geographical market definition. We summarise their main points below.

Cave et al. argue that the conventional arguments that licensing is generally national and that mandated or de facto uniform pricing causes regional markets to converge provide insufficient support for a general conclusion that markets are national in scope. Universal service obligations (USO) impose uniform pricing over a geographical area, often taken as a “linking condition” that imposes homogeneous conditions of competition at retail level. This is incorrect; it only leads to uniformity at the retail level, but not at the wholesale level for the reasons described below.

Uniform retail prices can discourage competition in high cost areas and encourage it in low cost areas, distorting geographical market entry incentives and creating regulation-driven heterogeneity in wholesale competitive conditions. A firm with SMP faced with a USO chooses a profit maximising price based on both the profitable and non-profitable market segments. Pricing therefore becomes an average of competitive and non-competitive conditions. This will make it harder for rivals to compete in the USO areas but easier to compete outside those areas (i.e. differing competitive conditions). Even if uniform national pricing is not the result of USO, it may still hide significant regional pricing differences through regional special offers.

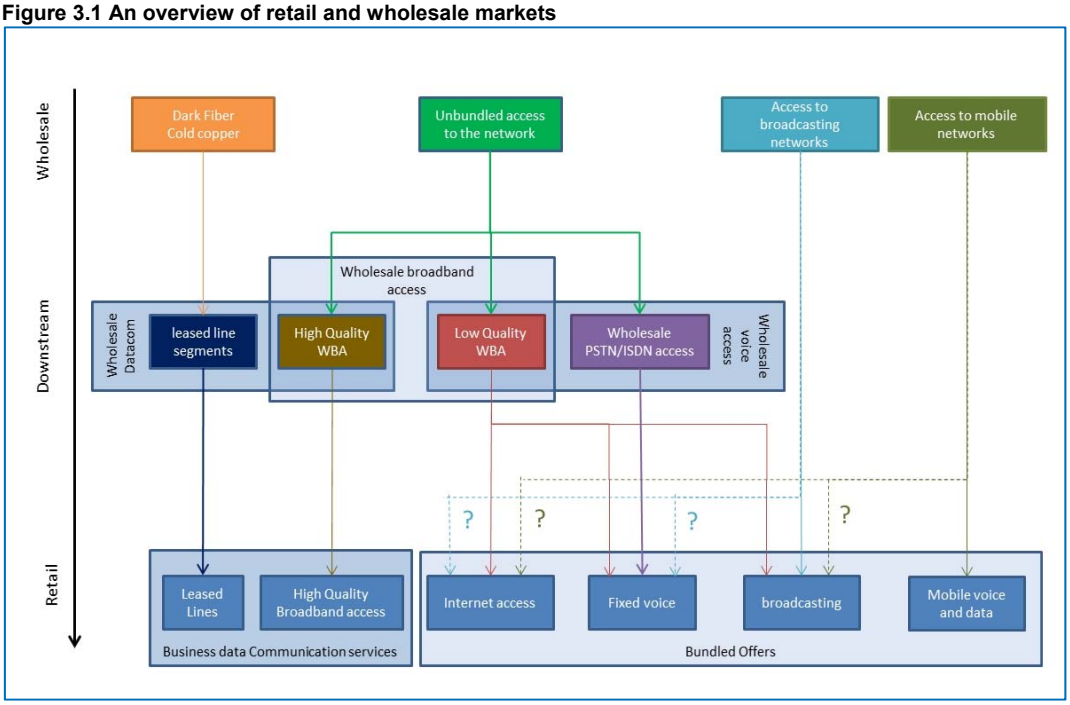
In order to correctly define relevant geographic markets, the analysis should focus on supply-side substitution, addressing the question of whether an increase in price in more sparsely populated areas will attract further investments from firms operating in more densely populated areas or from other firms, possibly using different technologies such as wireless.

3 Retail and wholesale markets

3.1 Retail and wholesale markets 2014

The figure below describes the wholesale markets and retail markets that have been identified in the current telecom sector.

Figure 3.1 An overview of retail and wholesale markets



Source: authors.

At the most elementary wholesale level, we identify dark fibre/cold copper, unbundled access to (copper/fibre) networks, access to broadcasting networks (including cable) and access to mobile networks. These wholesale markets may either feed directly into the retail markets or via a downstream product, like leased lines, wholesale PSTN/ISDN access or wholesale broadband access (high quality or low quality).

Arrows in the figure indicate the links between wholesale, downstream and retail markets. Question marks indicate that it is not clear whether there is a link today or in the future. This will be explored in this study.

Furthermore, some markets may be grouped into one market because of substitutability or complementarity (this is indicated in the figure by the blue boxes). The potential grouping of markets is also examined in this study.

3.2 Markets 2003 and 2007

In comparison with the First Market Recommendation, the Second Market Recommendation removed ten markets from the original eighteen and two other markets were merged. The list of recommended markets was reorganised to seven, and almost all retail markets were withdrawn as

analyses showed that wholesale regulation combined with ex-post application of competition law could be considered sufficient to protect users against the abuse of dominant market positions.

Table 3.1 Overview of markets in First Recommendation and the Second Recommendation

First Recommendation (2003)		Second Recommendation (2007)	
Retain PSTN	1	1	Retail fixed access
	2		
Retail fixed voice telephone	3		
	4		
	5		
	6		
Retail leased lines (minimum set)	7		
Fixed voice call origination	8	2	Fixed voice call origination
Fixed voice call termination	9	3	Fixed voice call termination
Fixed voice call transit	10		
Local loop unbundling	11	4	Local loop unbundling
Wholesale broadband access (bitstream)	12	5	Wholesale broadband access
Leased lines terminating segments	13	6	Leased lines terminating segments
Leased lines transit segments	14		
Mobile access and call origination	15		
Mobile voice call termination	16	7	Mobile voice call termination
Mobile roaming	17		
Broadcasting transmission	18		

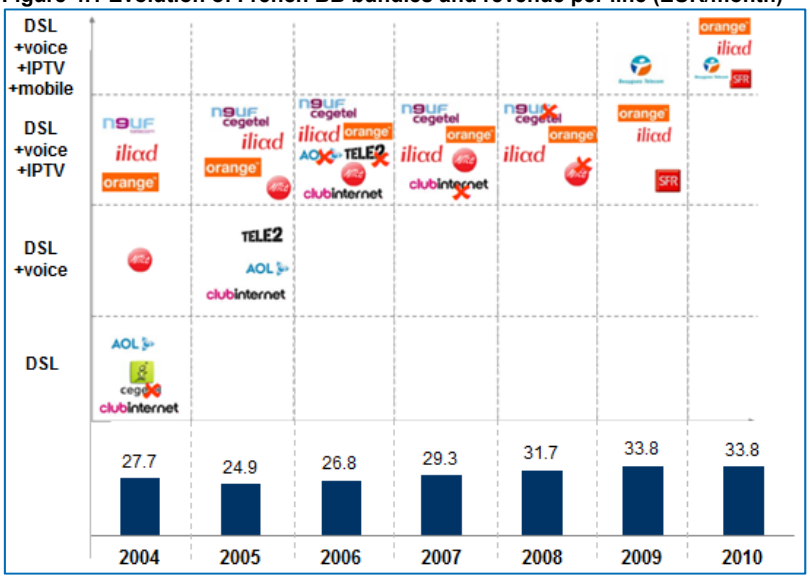
4 Trends and drivers

4.1 Bundles

4.1.1 Trends

The evolution in broadband markets has been rather favourable to users over the years; the value they receive for their money has improved substantially. Maximum (headline) speeds have increased continuously while prices have come down. At the same time operators have continuously upgraded the Internet access service with add-ons, thereby bundling a number of components: first they added a voice service (dual play bundles), then (from 2003 onwards) ISPs added TV to their bundles (triple play), and more recently they have added mobile services (quadruple play). The French market illustrates this evolution very clearly.

Figure 4.1 Evolution of French BB bundles and revenue per line (EUR/month)[31]



Source: IDATE.

The term 'bundle' refers to a combined offer that includes several different types of services. These packages of different services can come in a wide variety of combinations. Nevertheless, one can identify three main bundle formats:

- Dual play (Internet + home phone), which has become the standard offering. Most offers of Internet access include a fixed voice service. This package can be extended with a bundle of calling minutes, possibly customized depending on what kind of home phone calls the subscriber usually makes (e.g., to include calls to mobile phones, calls to specific foreign countries, etc.) or what time the calls are made (e.g., off-peak hours only);
- Triple play (Internet + home phone + television) includes a basic package of (mostly free) channels, and (in most cases) subscribers can add on premium channels; and
- Quadruple play includes a mobile component. Most operators that offer bundled packages also offer a basic mobile plan (with one hour of talk time, for example). There are a number of possible combinations with quadruple play. For example, a subscriber can choose to sign up for mobile and Internet, but opt against TV.

[31] This Figure excludes offers by French cable operators. The market share of cable in the French market is around 3.75%.

Table 4.1. A wide range of multiplay bundles

	Double play	Triple play	Quadruple play
Standard offering	Internet + home phone.	Internet + TV + home phone.	Fixed Internet + home phone + TV + mobile services (voice, text, Internet).
Innovative bundles	• Internet + mobile; • Fixed Internet + mobile Internet (3G dongle); • Internet + home phone calls to landlines; • Internet + home phone calls to landlines and mobile phones; • Unlimited calls to landlines + Internet via mobile network (LTE/HSPA).	• Internet + home phone + mobile; • Internet + TV + mobile TV + home phone + mobile.	Fixed Internet + 3G dongle + TV + fixed voice.

Source: IDATE.

A number of general trends can be identified:

- Single play packages are gradually disappearing, although operators still offer single play services in their core business (mobile services for mobile operators, home phone or Internet service for network operators and television for cable operators). When they position themselves in segments other than their core business segment, operators tend to offer bundled plans;
- Fixed voice is becoming a commodity that is routinely included with Internet access. Some operators, such as Free and Numericable in France, Fastweb in Italy, Jazztel in Spain and Deutsche Telekom in Germany no longer offer fixed Internet service without home phone service;
- Triple play has become a standard offering from fixed line operators across the board (including cable companies). A number of mobile operators also offer triple play packages. But in certain highly competitive markets such as the UK, many mobile operators have opted to focus on their core business, including Vodafone, T-Mobile and 3. Yet the penetration of triple play is still limited. In the European market, 11% of households were subscribed to a triple play package in 2011 (up 3 points since 2009); and
- Quadruple play is still nascent and not all operators offer such bundles. However, integrated players are increasingly launching quadruple play propositions and the fact that challengers like Tele2 in the Netherlands or cable operators such as Telenet in Belgium have recently acquired spectrum licences shows that operators' strategies are indeed focussed on providing the full range of communications services. In terms of penetration, according to the Eurobarometer household survey, only 2% of European households had subscribed to a quad play plan as of late 2011[32]. Although, this figure may be somewhat conservative, given that 4-play have met with a certain success already, notably in markets like the UK, Romania or France.

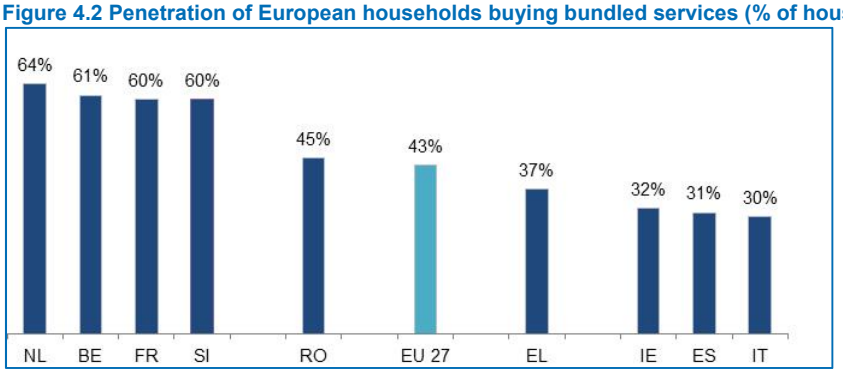
The text below provides some detailed figures on the adoption of bundled offers at the retail level.

[32] Eurobarometer E-Communications Household Survey (June 2012), available at: http://ec.europa.eu/public_opinion/archives/ebs/ebs_381_en.pdf.

Penetration of bundled services in European households

Bundled services have already achieved high penetration in European households. Nearly half (43%) of European households have subscribed to 'a grouped service offered by one operator at a single price' (referred to as a 'bundle'), up five percentage points since 2009. In the Netherlands, almost two-thirds of all users are subscribing to a bundle. In Italy, the country with the lowest bundle adoption rate, penetration stands at no less than 30% of households.

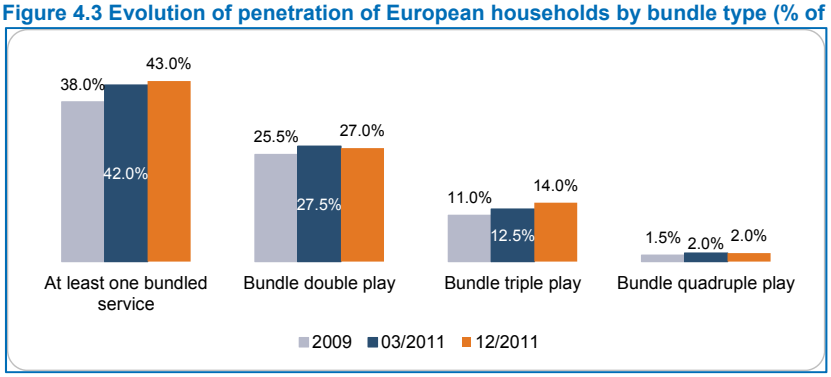
Figure 4.2 Penetration of European households buying bundled services (% of households)



Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

Double play is still the most frequent package, subscribed to by nearly one quarter of European households. Its popularity seems to be declining though, mainly in the favour of triple play, which gained 1.5 percentage points between March and December 2011 alone. Quadruple play is rather stable with an increase of only 0.5 percentage points of households between 2009 and late 2011.

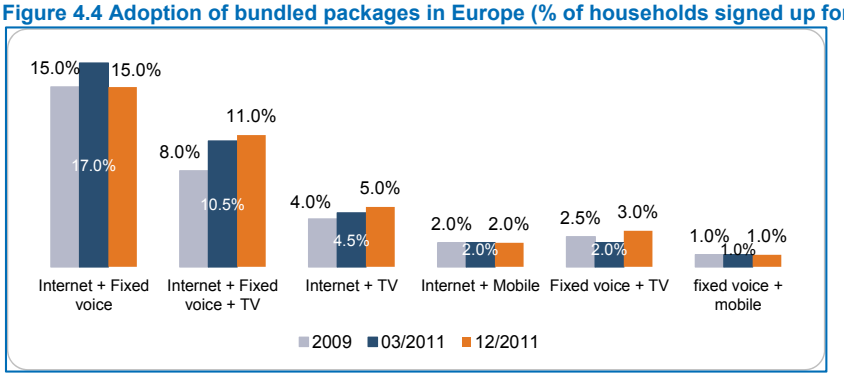
Figure 4.3 Evolution of penetration of European households by bundle type (% of households)



Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

Most consumers (15%) of households still have a double play bundle that includes Internet access and fixed voice service. The "standard" triple play package (Internet + home phone + TV) is starting to gain ground, with more than 11.5% of households having subscribed to this type of service. Triple play is also the bundle that has seen the biggest increase, gaining +3 points between 2009 and the latest waves of the survey. Double play offerings combining Internet access and TV service are also beginning to emerge (5% of households in December 2011, up from 4.5% in March).

Figure 4.4 Adoption of bundled packages in Europe (% of households signed up for the service)



Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

Table 4.2 Bundled subscription details

	I-net	Fixed phone	TV	Mobile Phone	2009	2012	Dif.
Quadruple play	●	●	●	●	1.5%	2%	+ 0.5
Triple play		●	●	●	0.5%	0%	- 0.5
	●	●	●		8%	11%	+ 3
	●		●	●	0.5%	0%	- 0.5
	●	●		●	2%	3%	+1
Dual play		●	●		2.5%	3%	+ 3
			●	●	1%	1%	0
	●		●		4%	5%	+ 1
		●		●	1%	1%	0
	●	●			15%	15%	0
	●			●	2%	2%	0
X play	At least one bundled service				38%	43%	+ 5.0

Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

We currently do not have a complete set of market forecast data, but the adoption of bundles can be expected to continue growing over the next years. The degree of penetration will also remain very different between countries. For France, IDATE expects that 50% of users will have a quadruple play subscription in 2016. In Romania the rate will be similarly high, 41% of users according to IDATE estimates. Spain will follow closely with 35% of users whereas in markets like Poland and Slovakia, 4-play penetration will not surpass single-digit levels.

4.1.2 Drivers

The reasons that these bundles have met with success in the communications market can be found on the side of consumers as well as that of operators.

Consumer motives to buy bundles

For consumers there are mainly two advantages of opting for a bundled offer: lower transaction costs and a lower price. The lower transaction costs stem from the fact that multiplay plans offer a higher degree of convenience than separate subscriptions as they provide a one-stop shop for all communications needs. Thus users have to pay a single bill only instead of an individual bill for each service to which they subscribe. The other major reason why users tend to opt for bundled offers is that these typically come at a discounted price compared to an equivalent bouquet of standalone services. The lower price transmits the lower costs of production stemming from the re-

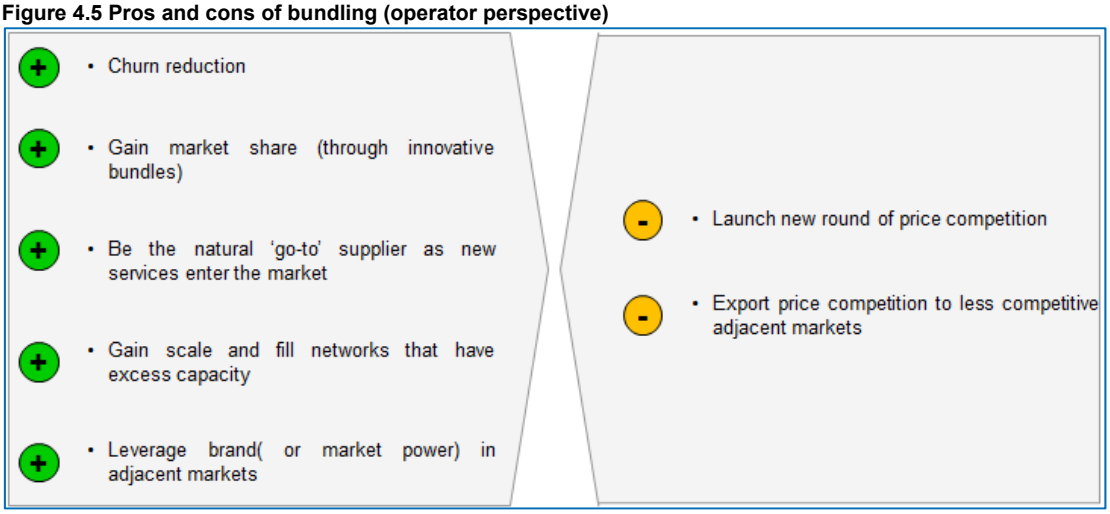
use of infrastructure (e.g. the DSL modem can be used for voice and thus makes PSTN equipment in the MDF obsolete).

A potential development that might counter the "bundling trend" is the increased adoption of Over-The-Top (OTT) services by end-users.[33] The adoption of OTT services breaks the link between network access and service provisioning. Users relying to a large extent on OTT voice, messaging or video services have no real incentive to subscribe to a bundled plan. On the other hand, operators' might in response include voice "for free".

Operators' motives to sell bundles

For operators the issue is more complex, as bundles are a sort of double-edged sword for them. On the positive side, bundles can be produced at lower costs and hence an operator can make a more competitive offer. For this reason a voice service in a voice broadband bundle is typically based on VoB and not on PSTN. On the other hand, by bundling a highly competitive service (e.g. broadband) with a less competitive one (e.g. voice access), operators risk exporting price competition to the hitherto less intensely competitive adjacent market.

Figure 4.5 Pros and cons of bundling (operator perspective)



Source: IDATE.

Despite these risks for the operators' business, there are also a number of very good reasons for them to package different services in bundles:

- Bundles are an effective means to reduce churn, as the switching cost for users are higher if they have to migrate several or all of their communications services to another provider rather than just one service;[34]
- Bundles allow for innovative retail offers and thereby contribute to capturing market share;[35]
- Through bundling, operators may not only export price competition from one market into another but they may also be able to leverage the brand reputation (or market power) they have in one product market in adjacent markets that are part of a bundle;
- As operators gain scale via bundles, this enables them to improve the utilisation rate of their infrastructures and realise economies of scale and scope. This also goes for adding mobile to

[33] OTT services are communication services provided via the open Internet on the basis of IP interconnection.

[34] After the period of high growth in the late 1990s, early 2000s, mobile and broadband markets are increasingly saturated and subscriber numbers grow at much lower rates than they used to. Therefore, operators' focus has shifted from customer acquisition to customer retention.

[35] For instance, this was the strategy pursued by Free in France, which took the Internet access market on directly by offering a low-cost (30 EUR) triple-play bundle. The strategy proved to be a success and the operator is now France Telecom's primary competitor in the access segment.

the bundle of fixed services because of the (increased) need for mobile operators to offload mobile traffic to fixed networks[36];

- In sum, bundles can create entry barriers and thus raise market power.

A number of factors will favour the development of bundles in a given country. Access regulation that effectively enables challengers to replicate the SMP operators' bundle, e.g. through the imposition of wholesale broadband access with multicast functionality or access to MVNO services, is an important element in this respect. More endogenous factors, such as the intensity of price competition, also play a role. If the level of price competition is high, operators will also be more aggressive on the size and the price of bundles. Quadruple play bundling will be more relevant if integrated challengers with a significant footprint are present in the market, which can push these offers into the market on a large scale. Incumbents (most of which are integrated players) providing 4-play bundles may trigger the development of a quadruple-play market.

4.1.3 Impact on competition and markets

The popularity of bundled offers rises as they provide better value for less money to end-users: better value due to the lower transaction costs associated with the one-stop-shop and less money due to scale and scope economies in the network (assuming that part of these gains are transferred into end-user prices). Consequently, there is (likely) asymmetric substitution of bundles for stand-alone services and, thus, bundled offers do discipline stand-alone services. The other way around, the disciplining effect is less because of the higher costs of production of stand-alone services.

In order to maintain the competitiveness of the market, it is essential that enough players have the ability to provide the bundles that end-users demand. In telecommunication markets this might be a problem if the provision of one or more services in the bundle requires access to one or more bottleneck infrastructures at the wholesale level. If such access is not guaranteed, the dominant operator is not only able to defend its position in the SMP market, but can potentially also leverage its market power into the adjacent markets of the bundle's other components. Competitors therefore need to have access to wholesale products enabling them to compete with the SMP operator's bundles. Otherwise, subscribers to the SMP operator's bundles will be unwilling/unable to switch to a competitor if the letter cannot replicate all components at competitive costs. Defining a separate relevant retail bundle market would resolve this issue: any competition problem at this bundle market would require wholesale remedies that enable competitors to compete at the bundle market.

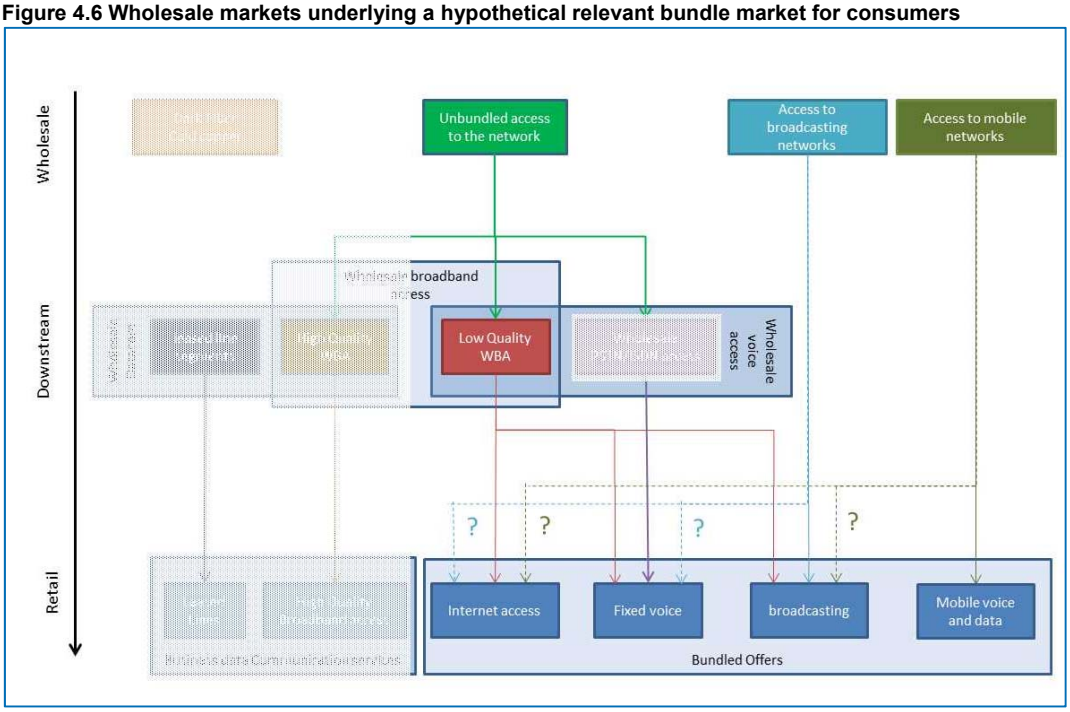
A first step would be to determine the relevant market for the bundle. The starting point would again be a SSNIP test analysing the following question: would end-users unbundle the bundle in response to a 5% to 10% increase of the bundle price relative to the sum of the prices of the respective stand-alone products? A next step is to identify potential bottleneck infrastructures, if there are any at all. One may need to do such analysis separately for residential demand and non-residential demand.

Below we present an overview of the wholesale markets to take into account the hypothetical bundle market for residential users. In chapters 0 and 9 we discuss bundled demand for business data connectivity in more detail.

[36] The roll out of LTE networks will lead to greater economies of scope between fixed and mobile network infrastructures, due to the re-use of fixed backhaul infrastructure. For instance, traffic from LTE devices will be offloaded on the fixed network via femtocells. The cells of the mobile networks will also be smaller than in previous generations of mobile standards, thus integrated operators have benefit from the capillarity of their fixed networks to connect LTE base stations. Consequently, the incentive for operators to market quadruple play or other forms of fixed/mobile bundles rises. Pure play fixed or mobile operators will therefore find themselves in a disadvantage even if they can secure some sort of wholesale access to the infrastructure type they are not running themselves (see also section 4.2.

A hypothetical bundle market for residential users comprises the services Internet access, fixed and mobile telephony and TV. Figure 4.6 depicts how this bundle of retail markets is connected to wholesale markets.

Figure 4.6 Wholesale markets underlying a hypothetical relevant bundle market for consumers



Source: Authors.

The figure is the same as Figure 3.1, but we shade those markets that are not relevant for the discussion on the hypothetical residential bundle market. Notably we shaded the market for wholesale PSTN/ISDN access because this form of access does not allow for the re-use of infrastructure and is therefore not suitable to offer better-value-for-less-money. The principal forms of access that are required are LLU and/or WBA access with additional functionalities such as VoIP and multicast. Up until now, LLU and WBA have been regulated by NRAs because of potential competition problems in the market for Internet access. In order to make LLU and WBA fit to deal with a competition problem in the bundle market, however, NRAs should in addition specifically require VoIP and Multicast functionalities to be included in WBA products.

LTE and cable may serve as alternative infrastructures to deliver bundled offers. Most Member States do not have a (ubiquitous) cable network. However, all Member States have a mobile market that is free from a (single) SMP problem. If LTE is, in the future, able to lift mobile networks to a higher level such that they can deliver broadband access and broadcasting (next to voice), the bottleneck may cease to be a bottleneck (we elaborate on LTE's potential in the next section). If it is not, and cable networks have no significant coverage in a Member State, then regulation of LLU and/or WBA access (including VoIP and Multicast functionalities) may be required to prevent competition problems in the bundled retail market. For this, it is not (yet) necessary to define a separate bundle market. It may suffice to establish a competition problem at the retail broadband market and SMP at the wholesale markets for broadband access.

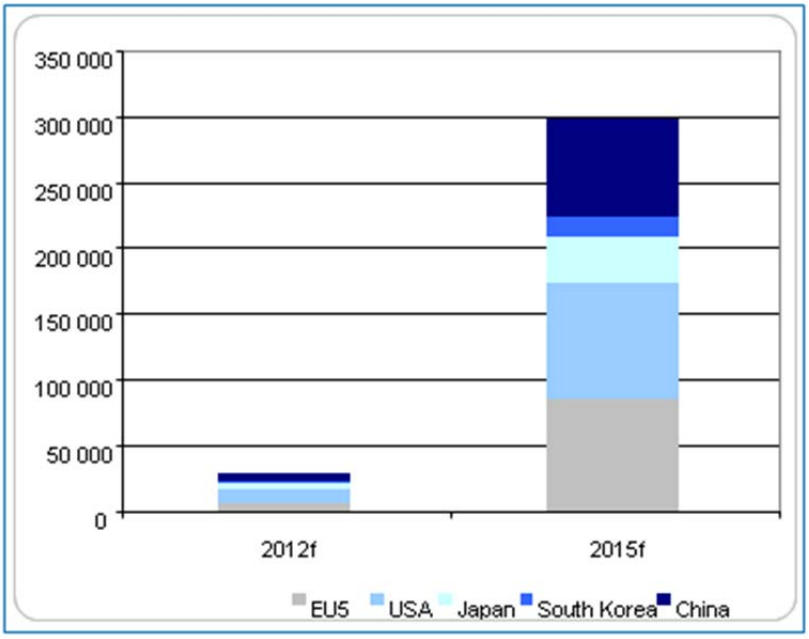
A similar analysis can be done for a hypothetical relevant market for bundled services demanded by medium to large businesses. In such a case, the bundle would include, for example, leased lines and high quality broadband access (and perhaps even low quality broadband access). Such analysis is presented in chapters 0 and 9.

4.2 LTE

4.2.1 Trends

LTE subscribers should reach the 300 million mark at the end of 2015 in the main OECD countries and China. Worldwide, we expect close to 536 million LTE subscribers by the end of 2015.

Figure 4.7 LTE driving backhauling upgrade (LTE subscribers, 000s)



Source: forecasts by IDATE.

With the congestion challenges that LTE brings, two developments are changing the network design.

First, to address congestion in the backhauling network, backhauling technology is migrating towards full Ethernet, relying on microwave and fibre technologies. Microwave, with a low cost-per-bit, remains the best solution for a fast short-term migration to Ethernet to meet increasing traffic demand. In the long run, fibre is a key investment supporting both fixed and mobile areas. The reuse of existing FTTx infrastructure is a solution shared and considered by incumbent operators for transporting large amounts of mobile data traffic from cell sites to the core network (i.e. developing FTTCS, fibre to the cell site).

Second, we expect small cells to represent 90% of the total number of cells in mobile networks in developed countries in 2020. The co-existence of macro cell overlay and small cell underlay will be inevitable to overcome congestion problems on the radio interface by lightening the traffic load from the clogged macro-cell at low cost. In other words, mobile operators want to *offload* mobile data flows as quickly as possible via fixed infrastructures. These complementary network infrastructures can come in the form of picocells, microcells and femtocells – ranging a few dozen meters and often used indoors. Another possibility for offloading is Wi-Fi hotspots. Especially femtocells and WiFi hotspots are likely to be deployed in customers' homes and can then use the customer wireline connection broadband as backhaul. This links the radio interface and the backhauling network; it turns customer premises into valuable docking stations for offloading; and it means that mobile and fixed networks converge as they are increasingly complementing each other to provide the service of mobile broadband.

4.2.2 Drivers

Regulator requirements have played a special role in the deployment of LTE. [37] In some countries, operators have been quick to make LTE available in larger cities with the aim to increase mobile broadband capacity in densely populated areas, where congestion problems occurred. The situation is different for rural areas, where policy plays a large role in shaping LTE rollout as governments are working towards achieving their Digital Agenda objectives. In 2009 and 2010, respectively, Germany and Sweden auctioned the 800 MHz frequency linked with a supply obligation: rural areas without broadband access have to be served before the LTE network can be further deployed.[38] According to the second monitoring report of the German broadband strategy (November 2011), the short-term aim to cover 'white spots' on the broadband availability map and to supply these households with bandwidth of at least 2Mbit/s has already been reached by upgrading existing base stations to LTE standard. The development of LTE has also led to an improvement of the surrounding 'grey spots' (availability of more than 2Mbit/s, but only one broadband technology available) because it meant that another broadband technology became available.

Customer demand is another driver for LTE development, and one that is expected to increase. In general (or especially) in cities, customers demand more and more mobile data transfer, especially multimedia content, as LTE has the specific feature of supporting broadcast, multicast and unicast. This leads to a capacity challenge for the operators.

As a consequence, operators have to respond to the coverage and capacity challenges to fulfil their obligations and to keep their customers satisfied. In this sense, offloading or fixed-mobile convergence is a business imperative – which introduces quite some changes to the competitive environment.

4.2.3 Future developments

The main driver for data demand, and thus the bottleneck for LTE, is expected to be video. While mobile networks can, with LTE, theoretically offer speeds similar to VDSL, their capacity is limited. With increasing demand for data within a given network cell, congestion problems will arise and speeds will go down. Customers have already experienced a deterioration of speed as usage increased, especially at peak times.[39]

TV broadcast can become an important source of congestion especially with the upgrade to HD / 3D offers. Video is expected to account for 90% of mobile traffic in the next three or four years[40] and "video and HD video are widely promoted by LTE operators"[41]. In this sense, the crucial

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37 So for example Austria and Sweden. See RTR (2010), "Presseinfo aus dem Bereich Telekommunikation", at https://www.rtr.at/de/pr/PI20092010TK; http://ovum.com/2011/04/04/swedish-regulator-promotes-rural-mobile-broadband-in-the-digital-dividend-auction/, http://newsroom.tele2.com/?page_id=8&url=http://cws.huginonline.com/T/133413/PR/201011/1462356.xml&year=2010, http://www.lte-verfuegbarkeit.com/lte-verfugbarkeit-in-europa-im-vergleich/.

38 Cpr. Bundesnetzagentur (2011), "Tätigkeitsbericht 2010/2011 Telekommunikation", at http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/BNetzA/Presse/Berichte/2011/TaetigkeitsberichtTK20102011pdf.pdf?__blob=publicationFile, also http://www.buddeblog.com.au/frompaulsdesk/sweden-lte-availability-expected-for-99-of-the-population-by-end-2012/http://ovum.com/2011/04/04/swedish-regulator-promotes-rural-mobile-broadband-in-the-digital-dividend-auction/http://www.pts.se/en-GB/News/Press-releases/2011/Four-in-ten-can-get-superfast-broadband/. LTE in German cities was deployed only afterwards but the development has also been quite dynamic: http://www.itespresso.de/2012/07/05/lte-ausbau-in-den-stadten-nimmt-fahrt-auf/.

39 http://maxwireless.de/2013/telekom-call-surf-via-funk-vermarktung-unterbrochen/, http://www.teltarif.de/vodafone-lte-zuhause-aktion/news/47346.html.

40 http://arabianindustry.com/comms/news/2013/feb/28/ericsson-eyes-lte-broadcast-growth-4223245/.

41 IDATE (2013), "LTE 2013 White Paper".

question when looking at the convergence and substitutability of fixed and mobile broadband could be the capability of LTE mobile networks to provide TV broadcasting services.

Scenarios for cities and rural areas

In cities, most accounts assume that offloading will play a crucial role in avoiding mobile network congestion: "mobile operators will seek to shift traffic from mobile networks to fixed networks"[42].

Offloading implies that both fixed and mobile networks are used and are thus complementing each other. With further fixed-mobile convergence (FMC), the services (and billing) become more integrated and the customer may not even notice which of the two networks she is using at a particular moment.[43]

In rural areas, there are fewer possibilities for offloading because of fewer fixed line users per area and possibly lower speed per fixed line. So complementarity will presumably not be the major trend in rural areas. On the other hand, there are less mobile network users. This makes the congestion problem less pronounced.

4.2.4 Impact on competition

A scenario, as outlined above - where fixed and mobile broadband services are substitutes in rural areas and complements in more densely populated areas - is plausible.

Substitutability (in rural areas) implies that:

1. If no (or inferior) fixed broadband access is available, then mobile broadband is a substitute. The deployment of LTE in these areas is the result of policies related to Digital Agenda objectives. This is asymmetric substitutability in the sense that mobile broadband can offer the services of something else that is not available. The only alternative for users would be lower bandwidths; and
4. If only one fixed broadband technology is available, mobile broadband is a relevant alternative technology. In these areas, the substitutive relationship can be considered symmetric and mobile broadband introduces competitive pressure on the broadband market.

Complementarity (in cities) implies that:

1. driven by congestion, mobile operators need access to a fixed network.[44] As such, fixed and mobile bundling turns from a pure marketing strategy into a technical necessity for integration of infrastructures;
2. there may be a convergence of market structures:
   - Due to LLU, many countries have more retail fixed line operators than MNOs. If each mobile operator has a fixed line operation, any fixed line operator without a mobile service is at a disadvantage (OECD p. 32).
3. there may be new bottlenecks:

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42 OECD (2012), "Fixed and Mobile Networks: Substitution, Complementarity and Convergence", OECD Digital Economy Papers, No. 206, OECD Publishing, http://dx.doi.org/10.1787/5k91d4jwzg7b-en, p. 27, see also IDATE trends report and IDATE (2013), "LTE 2013 White Paper".

43 Cpr. OECD (2012), "Fixed and Mobile Networks: Substitution, Complementarity and Convergence", OECD Digital Economy Papers, No. 206, OECD Publishing, http://dx.doi.org/10.1787/5k91d4jwzg7b-en, p. 9: "The third step is a full integration of fixed and mobile networks and services so that a customer does not notice where one starts and the other ends."

44 OECD (2012), "Fixed and Mobile Networks: Substitution, Complementarity and Convergence", OECD Digital Economy Papers, No. 206, OECD Publishing, http://dx.doi.org/10.1787/5k91d4jwzg7b-en, p. 32.

- A mobile operator without access to a ubiquitous fixed (offload/access) network may be at a disadvantage. This highlights a possible new advantage of LLU regulation that goes beyond the functioning of fixed electronic communications markets.

Uncertainty

There is a lot of uncertainty about the developments to come. So far, only a few countries have rolled out LTE and done so under very different conditions. It is also not clear how the TV broadcasting market (and demand for IPTV) will develop, and how exactly offloading will be realized or whether it will form a bottleneck. Moreover, the boundary between urban and rural areas – and thus between areas where the relationship between fixed and mobile broadband is complementary or substitutive, respectively – is rather fuzzy. It is therefore difficult to forecast the effects LTE will actually have on competition.

4.3 OTT Communications

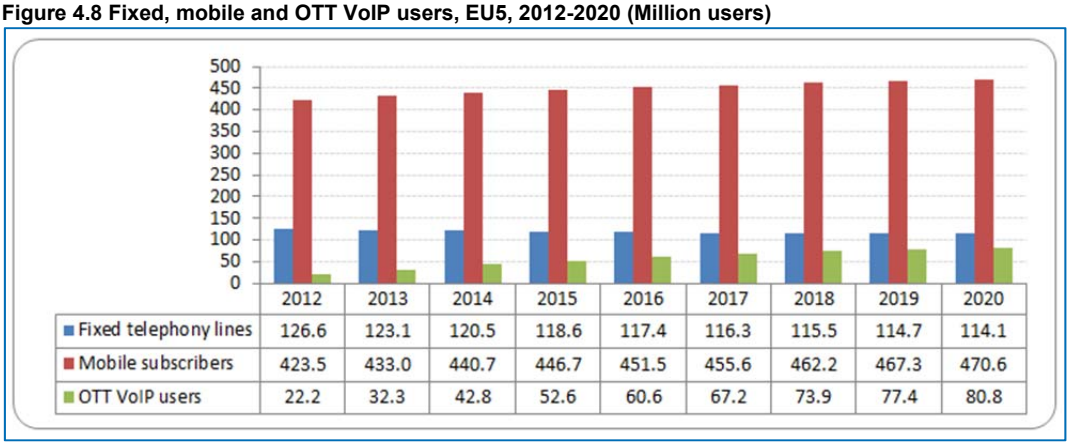
OTT (over-the-top) refers to retail communication and information exchange services that are based on Internet connectivity, but that are not specific to a certain operator or technology. There are two ways in which OTT affects the traditional operators: first, it can be a substitute for voice, text or even video services, thus possibly cutting into the operators' revenues; and second, it creates large demand for bandwidth and can cause congestion problems, while the network operators cannot use the OTT revenues for the required investments into the network.

4.3.1 Trends

Substitute for voice?

Forecasts for the EU5[45] show that mobile subscriptions are still expected to grow until 2020 despite OTT offers. Thus fixed telephony lines will show only a modest decline. There is no indication for a high number of customers migrating from fixed or mobile voice subscriptions to OTT VoIP services. The fact that a Skype caller has to ensure that his/her conversation partner is online before a call can be made may make them reluctant to completely substitute fixed or mobile telephony with OTT VoIP.

Figure 4.8 Fixed, mobile and OTT VoIP users, EU5, 2012-2020 (Million users)



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed telephony lines	126.6	123.1	120.5	118.6	117.4	116.3	115.5	114.7	114.1
Mobile subscribers	423.5	433.0	440.7	446.7	451.5	455.6	462.2	467.3	470.6
OTT VoIP users	22.2	32.3	42.8	52.6	60.6	67.2	73.9	77.4	80.8

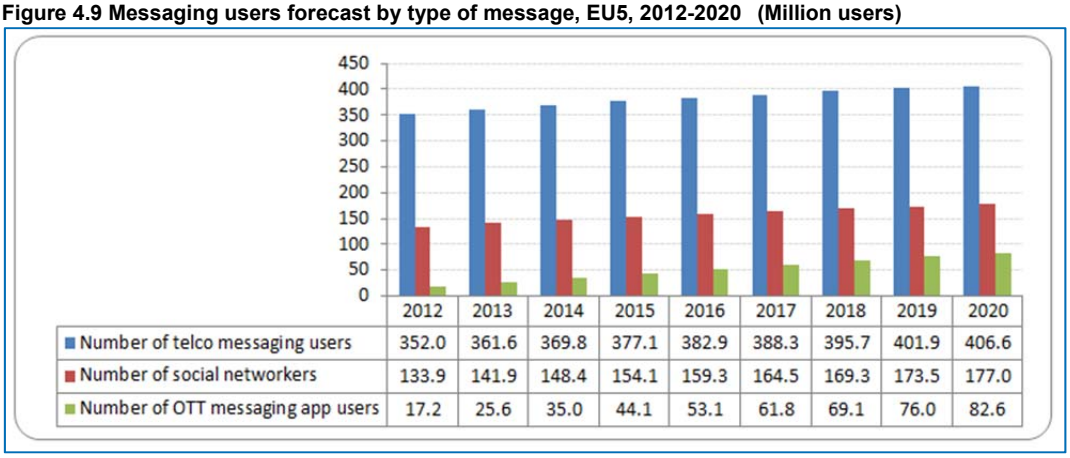
Source: IDATE.

[45] EU5: Spain, Italy, Germany, France and United Kingdom.

Substitute for text?

For messaging, the picture is similar: All three categories of telco messaging users (mainly SMS users), social networking users (we define social networks also as a messaging service) and OTT messaging apps users are expected to show growth, with CAGR of 1.8%, 3.6% and 21.6% respectively over the period 2012 to 2020. It is expected that there will be more users who use multiple modes of messaging in the future, but nevertheless telco messaging users are expected to remain dominant.

Figure 4.9 Messaging users forecast by type of message, EU5, 2012-2020 (Million users)

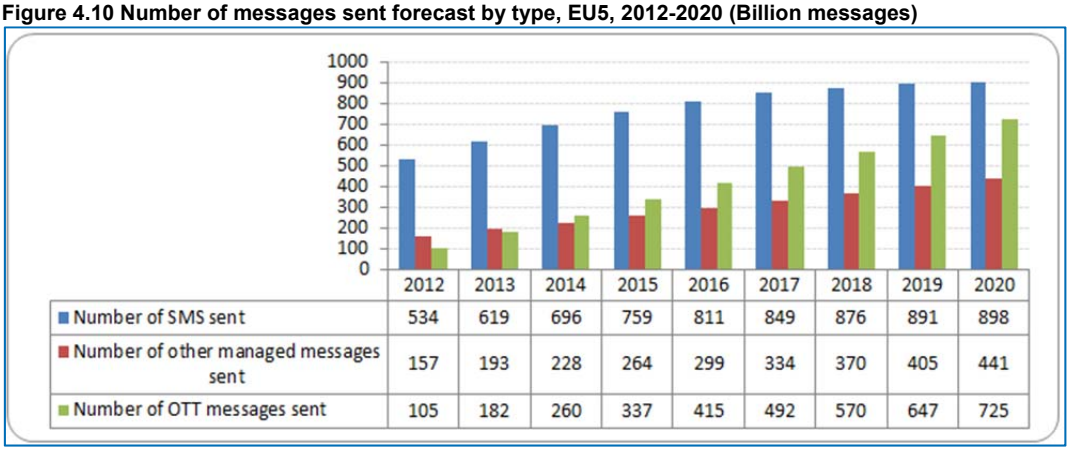


	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of telco messaging users	352.0	361.6	369.8	377.1	382.9	388.3	395.7	401.9	406.6
Number of social networkers	133.9	141.9	148.4	154.1	159.3	164.5	169.3	173.5	177.0
Number of OTT messaging app users	17.2	25.6	35.0	44.1	53.1	61.8	69.1	76.0	82.6

Source: IDATE.

Looking additionally at the numbers of messages sent, we observe an interesting pattern. There are few (in comparison to telco messaging users) OTT messaging app users and social networkers, but these few are expected to account for a high share of the messages sent in 2020 in the EU5. In 2012, telcos had 87% of messaging share, dropping to 65% by 2020, with OTT showing strong growth in messages sent, from 13% in 2012 to 35% in 2020. OTT does not effectively reduce the number of telco messages, however. It rather seems like an additional channel of text communication or a substitute only for a selected group of users.

Figure 4.10 Number of messages sent forecast by type, EU5, 2012-2020 (Billion messages)



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of SMS sent	534	619	696	759	811	849	876	891	898
Number of other managed messages sent	157	193	228	264	299	334	370	405	441
Number of OTT messages sent	105	182	260	337	415	492	570	647	725

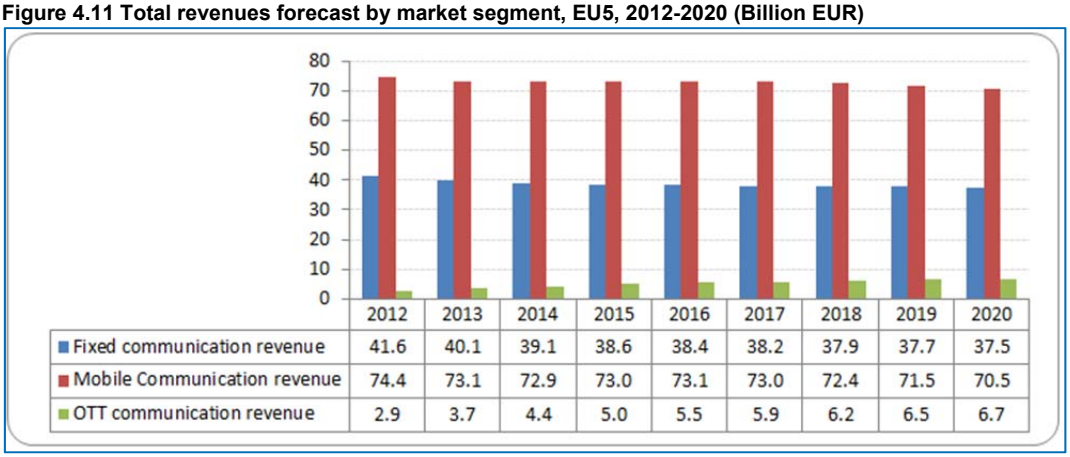
Source: IDATE.

Revenues of OTT: small in comparison to total communication revenues

While the share of OTT in provision of communication services is expected to grow significantly, a look at revenues provides a different picture. Mobile telco communication has the largest share in the EU5 with 63% as of 2012, decreasing to 61% in 2020. Fixed telco communication has the next largest share with 35% in 2012, although it is expected to decrease to 33% by 2020. Finally OTT communication will increase from 2% to 6% from 2012 to 2020.

This means that OTT communications will hold a modest 6% of all communication revenues for 2020, compared to the 94% of telcos. This indicates that OTT may take over some – though not much – of the former telco communication services, but isn't able to generate the same revenues out of it.

Figure 4.11 Total revenues forecast by market segment, EU5, 2012-2020 (Billion EUR)



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed communication revenue	41.6	40.1	39.1	38.6	38.4	38.2	37.9	37.7	37.5
Mobile Communication revenue	74.4	73.1	72.9	73.0	73.1	73.0	72.4	71.5	70.5
OTT communication revenue	2.9	3.7	4.4	5.0	5.5	5.9	6.2	6.5	6.7

Source: IDATE.

We can conclude from the above that OTT cannot be expected to become a major substitute for the traditional telco services, especially not in terms of revenue.

OTT: aggregation of communication types

Nevertheless, OTT can change the competitive environment – and force the operators to react – also by aggregating communication methods. It is notable that we are now seeing more and more IP communication providers providing various ways of communication. For example, today it is in fact difficult to find a VoIP service provider who provides solely VoIP; at the very least, they will also offer text and/or chat services. Such a trend means that in theory, users can subscribe to just one IP communication provider to cover all communication, whether it be to voice, text, chat, video, file share and so on.

Table 4.3 Communication providers aggregating communication types

	Talk	Messaging	File share
Facebook	Yes	Yes	Yes
Google	Yes	Yes	Yes
WhatsApp	No	Yes	Yes
Apple	Yes	Yes	Yes

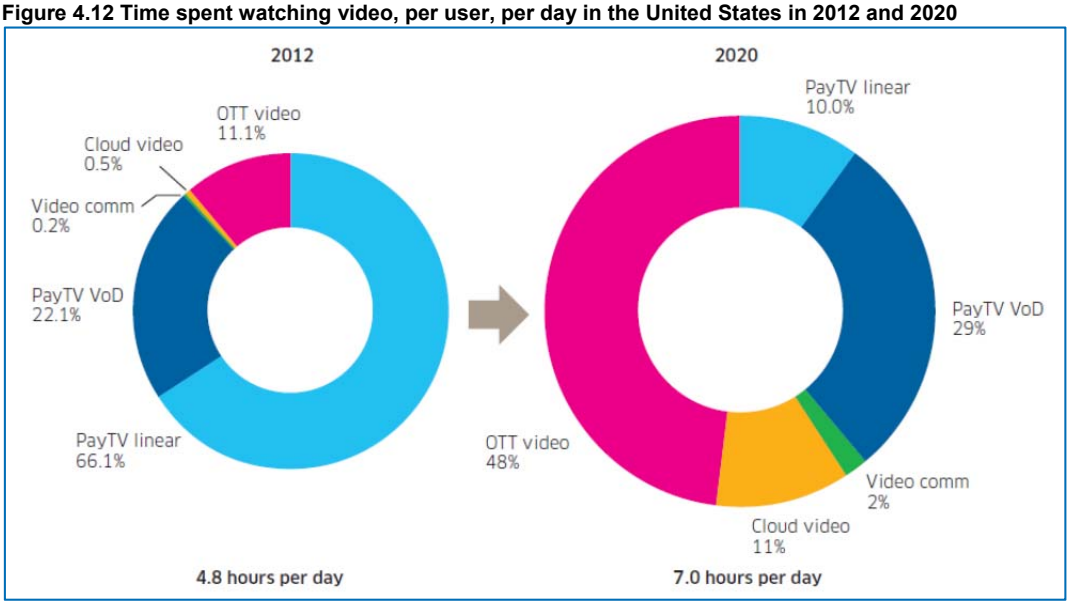
Source: IDATE.

Of particular interest in this area is the recent move by Facebook in January 2013 to integrate VoIP calling capabilities within their Facebook Messenger application for Apple's iOS. It has now been released in the US, Canada and the UK. In short, it allows Facebook users on an iPhone or iPad to place calls via VoIP to other Facebook users over both Wi-Fi and mobile Internet. The potential scale or reach of this – with 604 million active mobile Facebook users worldwide as of September 2012 – is much greater than that of even established VoIP players such as Skype; and this communication opportunity is added to the already extensive information sharing opportunities that Facebook offers in a "bundle".

Congestion and infrastructure problems due to OTT?

Apart from a potential migration of customers and the drive towards integration of communication types, there is another reason why network operators see OTT services as a game changer: OTT generates a high demand for bandwidth and thus cause congestion problems; but the operators do not receive a share in the OTT providers' profits. This has led them to suggest they were forced to under-invest, as they are unable to recover contributions to network investment from OTT providers. "Video traffic is bandwidth intensive and quality of service (QoS) sensitive"[46] and is therefore considered the main driver for congestion problems and network investment pressure.

Figure 4.12 Time spent watching video, per user, per day in the United States in 2012 and 2020



Source: Alcatel-Lucent Bell Labs, 2012 (taken from: Video Shakes up the IP Edge. A Bell Labs Study on Rising Video Demand and its Impact on Broadband IP Networks. Strategic White Paper, 2012).

It is worth noting that the congestion and the substitution issues thus also differ in the content used. OTT video, especially media, is a competitive force on the broadcasting market. Yet as the broadcasting market is not seen as relevant in the sense of the Directive, the threat of OTT services for broadcasting is not further considered here. OTT video is a concern for the present study only because of its impact on bandwidth demand.

Operators' reaction to the increasing threat of OTT communication services

Following the above reasoning, the main concerns for the operators are that they:

- Might be left behind in the competition for additional revenues and integrated services;
- Need heavy investments into the network, while the network is loaded with OTT (especially video) data transfers.

As the main driver for data traffic is video, the relationship between both concerns is not very strong. But they are related, for both reasons: network operators would like to charge OTT providers in order to participate in their additional revenues and to acquire network investment capital.

Operators have already tried to block OTT providers: Some stakeholders claim that their applications are blocked (or seriously degraded) on particular networks. However, popular applications such as YouTube or Facebook are unlikely to experience such treatment as their

[46] ACG Research (2012): Service Providers and OTT Video: The Holy Grail? From http://azukisystems.com/pdfs/Azuki_Systems_White_Paper_ACG_Research_2012i.pdf.

bargaining power is actually larger than that of the operators. Too many consumers would want to switch network (provided any SMP problem at the retail Internet access service level has been dealt with appropriately under the Framework) and the blockage would be unprofitable. Blocking could still be used as a bargaining element when trying to partner up with OTT providers, as discussed further below.

It is thus questionable whether a pure blocking strategy would work, especially for the large OTT players. As a consequence, operators can address both concerns mentioned above separately. They can try to reduce OTT data traffic (especially video) and/or or to get a share of the OTT revenues.

We observe three remaining strategies of operators to react to the OTT challenge:

1. Pricing strategy: operators offer abundant bundles, thereby aggregating communication types themselves and reducing the demand for OTT solutions. It puts operators in a position to generate a new stream of revenues from advertisement services (in a similar way as existing OTT services do today). This addresses both the issues of revenue generation and communication integration and that of congestion, especially if TV is offered in the bundle. In this sense, OTT can accelerate the existing bundling trend;
2. Competing at OTT level: network operators try to get a share of the OTT revenues by entering the unmanaged OTT market themselves (but not necessarily at the expense of the traditional market, as we observed above). Strategy options are:
    - Providing their own OTT communication service, such as Telefónica with their TU Me app and Orange with their Libon app: both apps are downloadable for any iPhone user or (soon) Android user regardless of their network, and offer integrated communication services including text, voice calls and messages and photo transfer. While the Libon app offers free VoIP calls only for Orange customers[47], the TU Me app really is no different from a typical OTT communication app.[48] It is available worldwide and its business model is that of other OTT apps: monetizing the customer base by rolling out paid upgrade services later;
    - Partnering with OTT communication service providers. Most well-known is the case of Skype, which partnered with Verizon Wireless in the US, KDDI in Japan and H3G UK. This allows Skype access to a wider range of users and the operators to get a share of the revenues. Another case is that of 3 Hong Kong (3HK) partnering with WhatsApp; here, incentives for the use of WhatsApp were achieved by letting data flows of this OTT service not count against the data limit. As data limits still prevail in most mobile data contracts, this strategy could be employed elsewhere as well; and
    - Joining the GSMA-led 'joyn' initiative, available in Spain, France, Germany and the United Kingdom, which aims to offer enhanced communication services across all mobile phones in the same simple way as traditional voice and SMS today. However, the service is confined to the participating carriers (and countries) and thus deviates from the typical OTT model.

All these options do not reduce the bandwidth demand in the network; but they enable operators to get a share of the OTT revenues. As indicated above, however, these revenues are rather small compared to those from traditional communications. Especially if the OTT services from operators do not serve the world market (and cannot draw on a worldwide customer base like Facebook or Skype), their business model is quite different from that of typical OTT providers, and may not even be profitable.

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47 http://thenextweb.com/apps/2012/11/21/orange-disrupts-itself-with-libon-a-voip-based-mobile-carrier-in-an-app/.

48 http://www.tu.com/de/me/.

3. Offering managed delivery of OTT content: Operators, with the help of specific infrastructure and their advantage of end-to-end delivery, can offer higher quality services such as IPTV multicast or telco CDN (Content Delivery Network; so far confined to operators' subscribers).

The bottom line of all these strategies is a big question mark. For the OTT services of telco companies the business case is not entirely convincing. Especially the geographical limitations of most telcos' offers make it unlikely that they will become major players which could induce changes on the OTT market. Moreover, the expected revenues from such activities are expected to be low in comparison to revenues from the traditional telecommunications model. All other strategies of telcos, such as bundled offers or managed content, are limited in comparison to pure OTT offers and can therefore not really compete (but could still be interesting in a general market analysis – such as the ever-growing importance of bundles that has been described in the previous chapter). With these question marks in mind, there is no logical best strategy for network operators and the future development of their activities vis-à-vis OTT is unclear.

4.3.2 Drivers

The main driver for the success of OTT communication services is that they are able to satisfy the customers' demand for free, technology-neutral, international voice, video and messaging services. Just like traditional bundles, IP solutions also offer the advantage of a 'one-stop shop' by providing all communication channels in one – especially if they are combined into one application, such as 'joyn'.

OTT communication services crucially depend on Internet connectivity; faster and often unlimited broadband connections worldwide contribute to the success of unmanaged IP-based communication.

Mobile data is a special case: usually, mobile data plans come with data caps. This drives strategies such as partnering with OTT providers or offering their own OTT services: then telco operators can incentivize the use of a specific OTT provider by not counting the data flows of this OTT service against the data limit.

4.3.3 Future developments

WebRTC (Web Real Time Communication) is in development. It is an interface for voice and video communication that can be implemented on websites. So, instead of going to dedicated OTT providers, the revenues of these services go to the owners of the respective websites. As a consequence, it is more difficult for network operators to change the market by partnering up with OTT providers or becoming such providers. In addition, this opportunity for easy voice and video communication can be a driver for video demand.

Increasing video demand is a factor to be considered in general, and specifically for mobile applications. With LTE, mobile video will work better than ever; the 'joyn' initiative already integrates mobile video communication. If telco operators manage to meet the capacity challenge associated with the large data amounts associated with video transfer, for example through offloading solutions (see also section 4.2 on LTE), it need not be a hurdle for mobile OTT video use. However, it is unclear how operators will deal with capacity. They can in fact use the data caps to introduce market power in the OTT market. Providing an own or partner OTT service with unlimited data use on this particular service can become an important strategy for operators especially in the context of mobile video.

4.3.4 *Impact on competition*

For the impact of OTT developments on competition, please refer to Section 10.2.

5 Fixed voice telephony

In this chapter we analyse potential competition problems related to the fixed telephony services at retail level – including subscriptions and calls. We specifically analyse retail problems that result from potential SMP problems in the wholesale market for connections (or access) and the wholesale market for call origination.[49]

To frame the analysis, section 5.1 first presents some necessary background information on the (competition) problem at hand and on how NRAs have dealt with the problem(s) so far. Furthermore, the section presents data for the Representative Member States (RMS) describing developments in the market over the past years.

Section 5.2 seeks to define the relevant retail market(s) in a prospective manner by analysing the impact of future trends (such as, but not exhaustively, described in chapter 4) on how consumers regard different services to be substitutes. We analyse whether subscriptions and calls should be seen as two separate services or as a single bundle of services. We analyse the extent to which VoIP and mobile telephony are considered substitutes for PSTN (now and in the future). Finally we analyse whether to include ISDN services in the relevant market.

Building further on the conclusions from Section 5.2, Section 5.3 describes (again in a prospective manner) the functioning of the retail market. The analysis first examines a static scenario for the future on the basis of forecasts that do not account for potential technological developments beyond those that we already described in chapter 4. Subsequently, the section analyses (in a dynamic scenario) if the potential market distortions identified in the static scenario give rise to incentives for additional innovations lessening or resolving these distortions.

The elaborate analyses in sections 5.1 to 5.3 provide the necessary insights into the workings of the retail market. On the basis of these insights Section 5.4 presents an analysis of the wholesale markets involved, whether there is SMP and (if so) whether the SMP problems might warrant ex-ante regulation on the basis of the Three Criteria Test.

5.1 Background

5.1.1 The problem

Market 1/2007 is defined as “the provision of a connection or access (at a fixed location or address) to the public telephone network for the purpose of making and/or receiving telephone calls and related services”.[50] This definition comprises two important components: firstly, that such an access is established at a determined geographical location and, secondly, that the purpose is to make and receive telephone calls or related services (e.g. fax) that are subject to certain quality requirements. Market 1/2007 is also referred to as fixed narrowband access. It is the only retail market suggested by the Recommendation.

Call origination on the public telephone network provided at a fixed location (Market 2/2007) is a wholesale service offered via an access network. In order to set up an outgoing call for their customers, operators without access infrastructure must purchase call origination services from the

[49] Note that potential market inefficiencies that may arise from call termination at fixed networks are discussed in chapter 6.

[50] Explanatory Note to the Recommendation pp.21.

network operator owning the access network. Alternatively, they share the existing access network already established (say unbundled local loop, hereinafter LLU) or build their own network. The latter option is generally not deemed economically viable [51] and, since LLU can realise more functions than telephone calls, it is (also in view of a shrinking market for fixed calls) not economical that an operator buys an LLU access product for the sole purpose of call origination; it wants to bundle with broadband services.

The most traditionally used technology employed for access to a voice network is via PSTN/ISDN which is predominantly owned by the incumbent operators. Hence, in the absence of regulation *and in the absence of sufficient substitutes*, there is likely SMP in both markets 1 and 2. Due to technological convergence, alternative access networks may be(come) substitutes in the eyes of end-users. Most notably, we see more and more people switching from PSTN to VoIP services (managed and unmanaged) provided via broadband access networks. The alternative services are often tied to the alternative access networks. Hence, whether broadband access is considered a substitute for a PSTN access depends on whether end-users perceive VoIP as a substitute for voice via PSTN.

The substitution between PSTN and VoIP not only has potential consequences for the hypothetical monopoly test (and thus the definition of the relevant market), but also on the analysis of SMP. The latter results from the fact that the incumbent PSTN operator often operates a VoIP network as well. Hence where a 5% to 10% price increase for PSTN-based service may not be profitable for a hypothetical PSTN monopolist (without a VoIP network), it may very well be economical for a real life incumbent operating both networks. The same goes for fixed-mobile substitution.

The key questions to be answered concerning the future need for regulating markets 1 and/or 2 are:

- Does the future relevant market include broadband access networks suitable for VoIP services (managed and/or unmanaged)? If so:
- To what extent will competing broadband networks constrain market power of the copper incumbent?
- Does the future relevant market include mobile networks? If so:
- To what extent will mobile networks constrain market power of the copper incumbent?

5.1.2 *Current legal practice*

All the NRAs (except for the Netherlands, the UK and Finland) consider that Market 1 is not entirely or effectively competitive and is susceptible to ex-ante regulation. Both the Netherlands and the UK consider large sub-segments of this market to be competitive and therefore only impose limited retail (cf. Netherlands) or wholesale (cf. UK) remedies on the non-competitive segments (respectively the single calls market and the ISDN2 and ISDN30 access markets). In Finland the market was deemed competitive because the NRA successfully convinced the Commission and the Court to include public mobile access in Market 1/2007. Overall, one may conclude that Market 1/2007 is not deemed effectively competitive by the NRAs across the EU.

Furthermore, eight Member States include fixed broadband access enabling managed voice over broadband to Market 1/2007 as they consider that substitution becomes substantial in their territories. Six of these Member States further separate Market 1/2007 into low-capacity access (including PSTN, ISDN 2 and managed VoIP) and high-capacity access (including ISDN 30).

[51] The last mile is still considered as a natural monopoly and thus involves high and non-transitory entry barriers.

It is observed that all the Member States define call origination services to include calls to both geographic numbers and non-geographic numbers and added-value services, such as dial-up Internet and fax.[52] Therefore, managed VoB is included and unmanaged VoIP is excluded. Moreover, all the Member States consider that call origination on traditional PSTN/ISDN networks and alternative technologies (most importantly VoIP type services provided via fibre and CATV) are on the same relevant market. In addition, almost all Member States maintain a single market regardless of user types.

5.1.3 The representative Member State

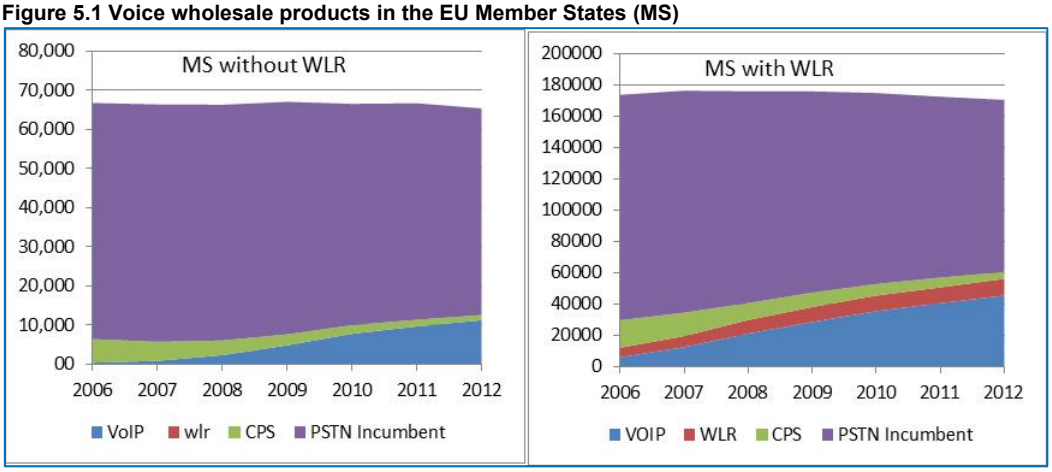
The number of PSTN subscriptions and the penetration rate of the service are on a long-term downward trend. The main driver behind this trend is the rise of managed voice over broadband services. This is linked to an increased demand for double play bundles, where important drivers of bundling are the potential for scope economies stemming from the re-use of infrastructure and lower transaction costs for end-users. In some Member States PSTN lines are substituted for mobile access services. Furthermore, OTT communication services are becoming more convenient and efficient substitutes for circuit-switched voice.

PSTN and VoIP

From Figure 5.1, we clearly see that the decline of PSTN goes hand in hand with an increase of VoIP. This indicates that VoIP-based services are considered a substitute for PSTN-based services and, because VoIP and PSTN are respectively tied to the broadband and narrow band access networks, broadband access may be considered a substitute for narrowband access.

Furthermore, the left panel shows that in Member States without WLR as a wholesale access product, the growth of VoIP subscriptions is mainly taking place at the expense of the market shares of C (P) S[53]-based alternative operators. In Member States where WLR is used as an access service in addition to C (P) S (the right panel), the decrease in C (P) S is considerably compensated by an increase in WLR. As a consequence, in those Member States the main contribution of VoIP is that it contests the incumbent's market share.

Figure 5.1 Voice wholesale products in the EU Member States (MS)



Source: Idate and NRAs.

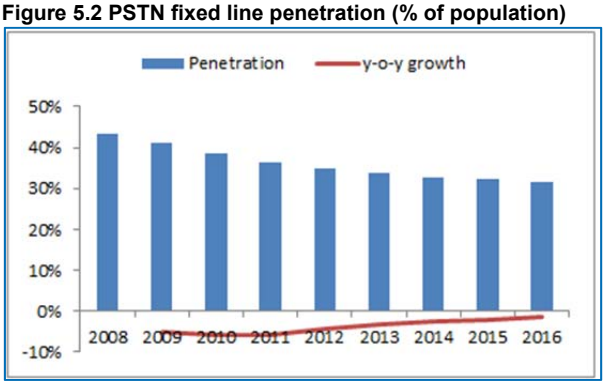
Figure 5.1 shows that the switch from PSTN to VoIP flattens out a bit. Looking at the penetration of PSTN lines (Figure 5.2) a trend towards stabilisation becomes more visible. For the EU27, the

[52] Special Rate Services (such as 0900 number s) and cross border calls are excluded. We discuss them separately in Section 10.3

[53] Carrier (Pre) Select.

penetration rate fell by more than 8 percentage points from 43.1% to 34.8% of population in the four years between 2008 and 2012. For the following four years, this decline will be much less marked. The growth rate of the penetration will remain negative but much less so than in earlier years.

Figure 5.2 PSTN fixed line penetration (% of population)



Source: IDATE.

The trend depicted in Figure 5.2 indicates that there are groups of end-users that are perhaps unable or unwilling to switch and are thus 'captive'. Potential captive subscribers to the PSTN services would be characterised by low price elasticity for three reasons:

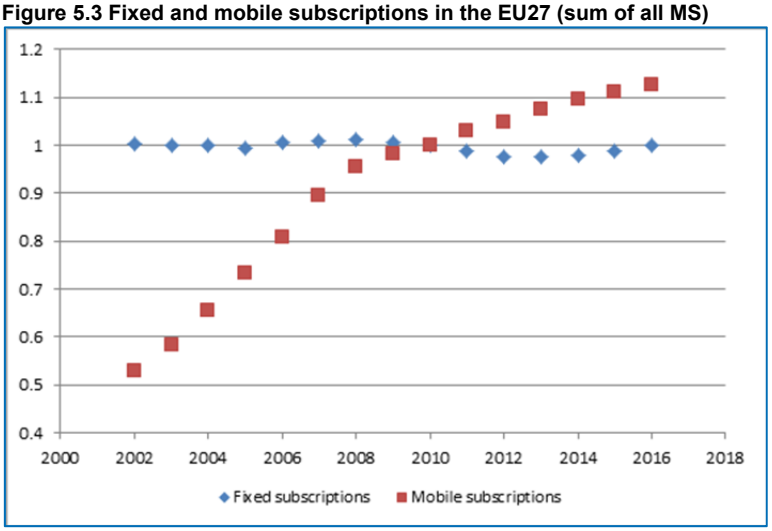
- First, a considerable fraction of end-users is inert as a result of search costs or information asymmetry;
- Second, some business users still use old fashioned PSTN-based telephone systems that will not work with VoIP connections; and
- Third, a considerable number of end-users perceive PSTN to have different functionalities. For example, some end-users depend on PSTN for a proper functioning of the alarm system and/or a proper functioning of electronic payment systems. Important differences between PSTN and VoIP in this respect are the lower failure rates of PSTN and the ability of PSTN to provide back-up power supply.

In sum, the substitution of PSTN by VoIP is a clear indication that many end-users regard them as substitutes. Some end-users may be captive however because either they have a strong (perceived) preference for PSTN or they are dependent on PSTN-specific functionalities. In this case, the incumbent operator could be able to raise PSTN prices noticeably to achieve supra-normal profits. Currently available data do not allow further verification of these hypotheses, but the issue deserves to stay on the radar of decision makers. In section 5.3 below we present a brief analysis of the potential risk of monopolistic behaviour by the PSTN incumbent, as well as the economic impact of such behaviour. A more elaborate analysis follows in the impact assessment in section 14.2.

Fixed and mobile

Figure 5.3 shows that the number of mobile subscriptions in the EU27 has increased considerably since 2002 up to 2008. From that point on, the growth in mobile subscriptions has slowed down, which is a sign of market saturation (note that the data on mobile subscriptions is 'dirty' because it contains many inactive SIMs – mostly prepaid). The number of fixed telephony lines has not been affected by this increase.

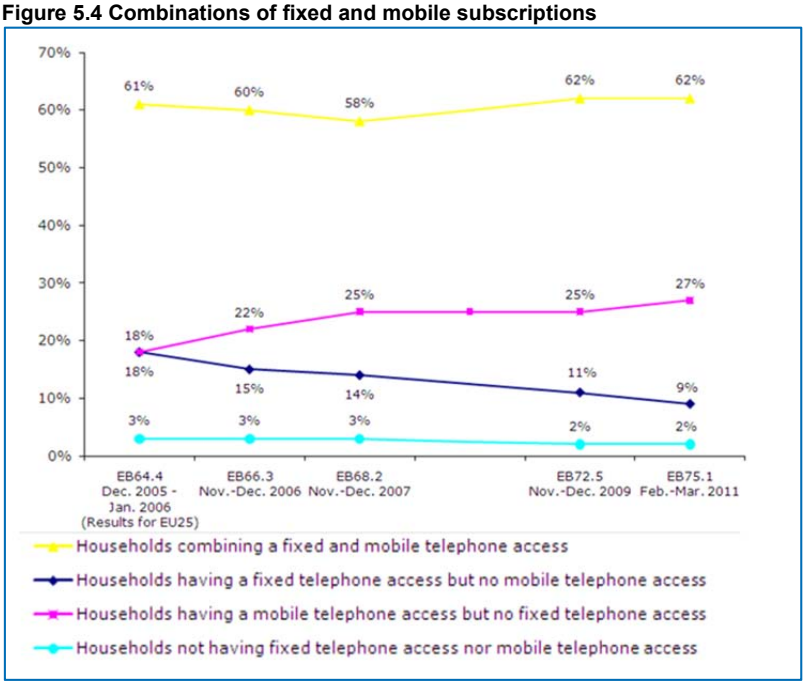
Figure 5.3 Fixed and mobile subscriptions in the EU27 (sum of all MS)



Source: Idate. Index year 2010 = 1.

From Figure 5.4 we conclude that the vast majority of households has a fixed and one or more mobile subscriptions. The number of household with a fixed subscription but not having a mobile subscription is clearly declining. It seems from the period 2007 to 2009 that these households have eventually also subscribed to mobile without giving up their fixed subscription.

Figure 5.4 Combinations of fixed and mobile subscriptions

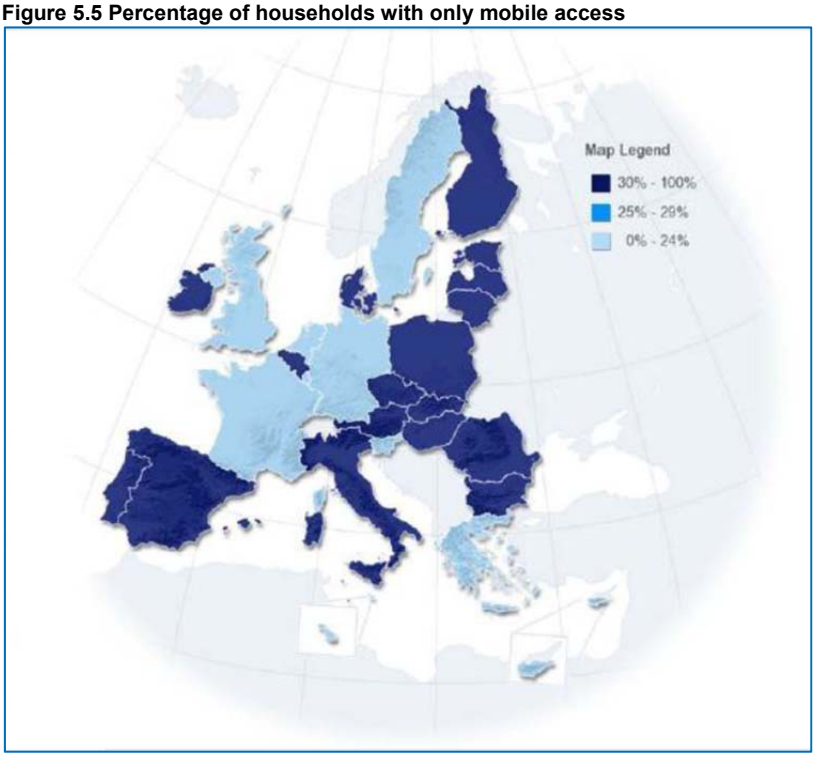


Source: BEREC (2011)[54] referring to the "E-communications household survey (July 2011)".

Figure 5.5 shows that the distribution of mobile-only households over Europe is skewed towards southern and eastern Europe (including Finland).

[54] BEREC (2011), *Report on impact of fixed-mobile substitution in market definition*, BoR (11) 54.

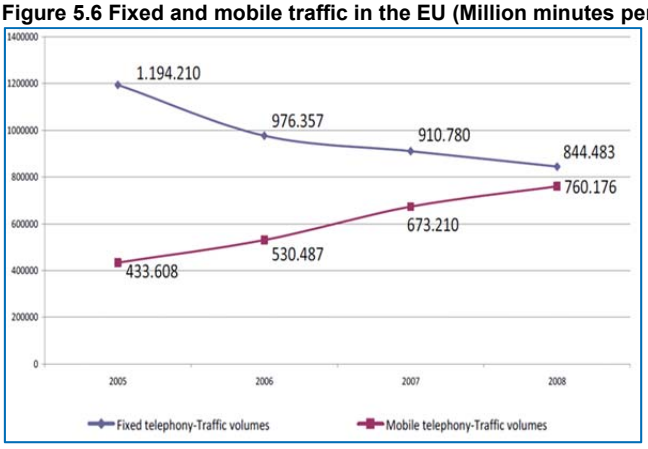
Figure 5.5 Percentage of households with only mobile access



Source: BEREC (2011) referring to "E-communication household survey (2011)".

From Figure 5.6 we notice that there is overall a strong decline in fixed traffic and a strong increase in mobile traffic.

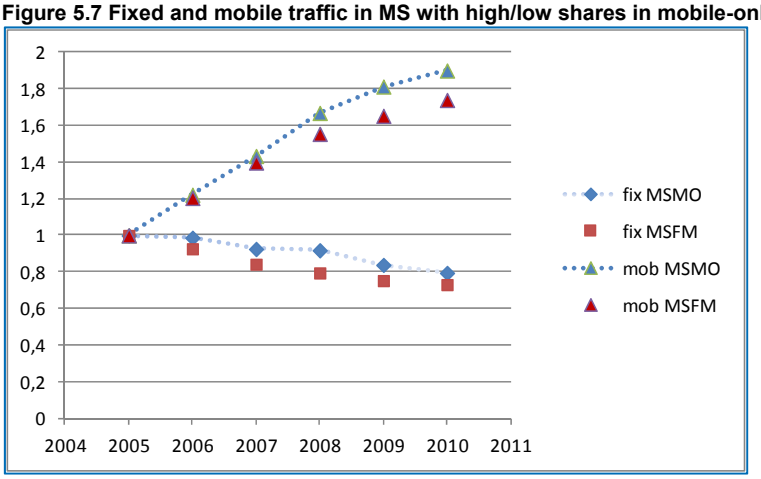
Figure 5.6 Fixed and mobile traffic in the EU (Million minutes per year)



Source: BEREC (2011) referring to "European Commission - Progress report on the single European electronic communications market (15th report)".

If we look a bit deeper (Figure 5.7) we notice that there is no real difference in the rate at which traffic volumes change between Member States with a relatively high share of mobile-only household and a low share of mobile-only households. We cannot conclude from these figures whether fixed and mobile traffic are considered a substitute by end-users. Namely, if that were the case, then all of these growing mobile calls should be made from the home premises. If, on the other hand, people are simply more often 'on the move' we would see a similar trend, but we would not call it substitution.

Figure 5.7 Fixed and mobile traffic in MS with high/low shares in mobile-only



MSMO = Sample of member States with a high share in mobile only (including CZ, HU, IE, IT, PL, SK, ES, BG, RO.
MSFM = Sample of member States with a high share in fixed and mobile (including EL, SE, UK).
Source: ITU.

5.2 Defining the retail market

The analysis below starts in a 'modified greenfield' situation. This means that we assume the fixed telephony market to be unregulated (both at retail and wholesale level), yet we assume that LLU and WBA are regulated[55] such that the market for broadband access is fairly competitive. Furthermore, the analysis follows the standard SSNIP test approach, which is to start with the smallest possible relevant market and then gradually extending it on the basis of an analysis of substitution:

- Our default market is the market for PSTN access;
- We first examine whether managed VoIP is considered a substitute for PSTN;
- Next we analyse whether mobile is considered a substitute; and
- Finally we analyse whether we should make a distinction between low capacity voice (i.e. PSTN) and high capacity voice (i.e. ISND30).

5.2.1 PSTN and Broadband Access

The Recommendation on relevant markets takes a specific look at the possibility of substitution between narrowband access and broadband access. It states that while broadband connections are also capable of facilitating delivery of narrowband services, generally consumers will not upgrade to a broadband service solely for the purpose of accessing voice services. Thus, a certain degree of substitution indeed exists. However, while households with a broadband connection may be prepared to switch off their narrowband connections, those without a broadband connection are not likely to switch, given the focus of their demand. Is this asymmetric substitutability sufficient to establish broadband access being a substitute for narrowband? The Commission concludes 'no',[56] yet it recognises the rapid development of DSL-only offerings (so-called "naked DSL"), as well as its increased substitution with narrowband access (induced by the bundling of VoIP services with broadband access).

However, this seems to contradict the conclusions of the NRAs for Market 2. All Member States consider that call origination on traditional PSTN networks and alternative technologies (most

[55] This is because the NRA has already established SMP in the LLU market leading to competition problem in the retail broadband markets.

[56] Explanatory Note to the Recommendation, pp.22.

importantly VoIP type services provided via fibre, CATV and DSL) are on the same relevant wholesale market. This can only be true if they are also in the same relevant retail market for voice services. Since the VoIP service is typically tied to the broadband access service, it should logically follow that broadband is a substitute for narrowband. In fact, since also most of today's PSTN offers bundle the access service with the calling service as well (as indicated by the decline of C(P)S and the growth of WLR), there are good reasons to no longer define separate markets for voice and access services. This applies to retail markets as well as to wholesale markets.

Next, starting from the argument that there is asymmetric substitution, one has to conclude that this argument loses its strength as broadband penetration rates rise across Europe. It increases the ability of households to switch from (stand alone) PSTN services to VoIP services (bundled with broadband access), making the PSTN access product obsolete. Considering the significantly lower price for VoIP due to scope economies resulting from bundling,[57] many households are likely to switch.

From the previous paragraph we conclude that the relevant product market at the retail level can be defined as the market for access to fixed telephony networks, which then automatically includes the service of making a call. This conclusion must, however, be tested. The only way to establish whether PSTN access networks and broadband/VoIP networks are part of the same relevant market is on the basis of a SSNIP test. Recognising that a certain number of PSTN users may be captive, a first step is to determine the size of the pool of captive PSTN users unable to switch to VoIP. If this pool is large enough, a hypothetical PSTN monopolist will (be able to) increase its price by 5% to 10%.

In principle, the analysis has to be done for the stand-alone versions of PSTN and VoIP (i.e. not tied to another services such as Internet access). Because VoIP is practically in all cases bundled with an Internet access service and PSTN is almost always offered as a stand-alone product, it seems at first sight that such a SNIPP cannot be applied. However, many households with a stand-alone PSTN subscription also have a stand-alone Internet subscription (around 50% of the EU households).[58] In such a case, a switch from PSTN to VoIP *de facto* means purchasing a stand-alone VoIP as an add-on to the existing Internet service.

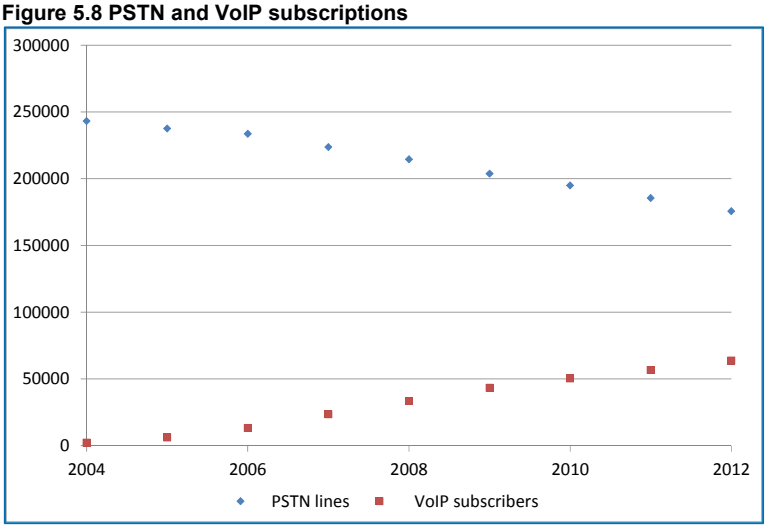
Analysis on the basis of the past 7 years

We noted above that all NRAs consider managed VoIP to be in the same relevant markets as PSTN voice. In other words, NRAs have found that a large enough share of the current PSTN users is able and willing to switch in response to a price increase. This conclusion seems to be supported by the data. Looking at the EU27 as a whole (see Figure 5.1 above and Figure 5.8 below) one observes that the decline in PSTN subscriptions goes hand in hand with an increase in VoIP subscriptions. Furthermore, one observes that the relative price of PSTN to VoIP also declines as the switch from PSTN to VoIP progresses.

[57] On average, the ARPU from PSTN services is 5 times more than the ARPU from VoIP services.

[58] Eurostat reports that 72% of the EU households have broadband Internet access. From Figure 5.1 we know that about 25% of the fixed telephony lines is provided on the basis of VoIP (which is equivalent to about 23% of the EU households) and 75% on the basis of PSTN. It follows that roughly 50% of the EU households has a stand-alone PSTN subscription and a stand-alone subscription to an Internet access service.

Figure 5.8 PSTN and VoIP subscriptions



Standard deviation of 0.10 to 0.20. Source: iDate.

Prospective analysis for the next 7 years

In the prospective analysis we analyse how the trends that we observed in the past are likely to develop in the future. Here we analyse two scenarios: 1) business as usual and 2) dynamic change. The first takes into account the trends and drivers identified previously. The second considers dynamic interactions between VoIP challengers and the incumbent that are drive innovations. As such, these scenarios are not mutually exclusive, however they can be successive.

Business as usual

Recognising that a certain percentage of end-users is captive, and assuming they remain so in the future, it is to be expected that the decline in PSTN will stagnate. While the number of potential switchers gradually declines (because of an autonomous switch from PSTN to VoIP), a hypothetical monopolist may (at a certain point) become able to set monopolistic prices for those that are left behind on the PSTN.

As long as the pool of potential switchers is large enough, the hypothetical monopolist is prevented from setting monopolistic prices. How large the pool of potential switchers has to be in order to restrain the hypothetical monopolist can be determined via a critical loss analysis that assumes the entire pool of non-captive end-users to switch to VoIP once the PSTN price increases. Furthermore, this analysis has to be done in a prospective manner, accounting for the autonomous migration path. In other words, what is the critical size of *today's pool of potential* switchers needed to prevent the hypothetical monopolist to increase its price *tomorrow*? Note that, for a given size of today's pool of potential switchers, the chance of a price increase increases over time. This is because the pool of potential swithers depletes over time as the autonomous migration from PSTN to VoIP continues. All in all, this means that the relevant market slowly shrinks to eventually include PSTN only. The speed at which this occurs depends on the slope of the migration path: the steeper the slope, the sooner a hypothetical monopolist is free to increase its price.

The analysis above assumes switching barriers to remain more or less constant. In the following scenario (dynamic change), we let go of this assumption and allow for innovative reactions by VoIP challengers.

Dynamic change

Starting from the prospects as described in the *business as usual* scenario, there remains a large number of end-users untapped by alternative VoIP providers. As such there is an incentive for VoIP operators to come up with solutions to circumvent the switching barriers that make the captive

group captive. In Belgium, for example, there are plans for installing PSTN cards in the DSL modem at the consumer premises; thereby allowing end-users to hook up their in-house PSTN-based telephony systems to a VoIP network. This technology will not be a solution for addressing a need for back-up power supply or increased reliability. However, one could imagine alarm systems being provided with a stand alone back-up power supply (in the form of a battery) and mobile networks being used for redundancy in case the VoIP line fails.

The adoption of such complementary or alternative technologies leads to a different conclusion on the future relevant market for fixed telephony. If the adoption of these technologies takes away all (perceived) barriers for otherwise captive end-users, the competitive pressure of VoIP on PSTN may remain. This then leads to the conclusion that VoIP and PSTN remain in the same relevant market. In fact, it eventually facilitates the entire switch off of PSTN.

The adoption of such technologies takes time and imposes switching costs, both for the end-user or the VoIP operators. The speed at which complementary technologies are developed and adopted and who bears these costs (end-users, VoIP competitors or the Incumbent) is amongst others determined by regulatory outcomes. We elaborate on that in section 5.3.

For now we conclude that the relevant retail market in the representative Member State includes both narrowband (PSTN) and broadband (VoIP), but during the period up to 2020 the PSTN market may tend towards a captive market that is less and less contested by VoIP-based competitors.

5.2.2 Fixed and mobile access

From a functional perspective the mobile phone is not all that different from a fixed phone: both serve to make and receive calls. In fact a mobile phone can do much more, such as providing for connectivity while being on-the-road. Still, the situation of having a fixed and a mobile subscription doesn't seem strange to most readers because they actually do have a fixed subscription next to a mobile subscription (around 60%). Moreover, this percentage has been rather stable over the past 6 years.[59] Clearly fixed and mobile phones are not the same. Some perceive the sound quality of fixed as superior. For others, it is just a matter of price: the per-minute price on a fixed line is considerably lower than on a mobile phone.[60]

Analysis on the basis of the past 7 years

BEREC has examined the matter in 2011[61] and concluded:

> "Based on these general figures, one may conclude that fixed and mobile access are generally regarded as complementary (and not as substitutes). Once again, other factors nonetheless need to be considered and an analysis based on detailed national data would generally be necessary to reach a conclusion. [However,

[59] See Euro barometer household survey on electronic communications (2011), p. 13.

[60] Depending on one's calling behaviour, the savings on calling charges may outweigh the additional subscription fee of the fixed line. In fact, when sharing a fixed connection with a household, the costs of the cumulative calling behaviour of each household member will surely outweigh the additional subscription fee. Hence a key characteristic of a fixed connection distinguishing it from a mobile connection is the unit in which we define the end-user. A fixed connection is typically purchased by a household and a mobile connection is typically purchased by an individual. In the case of one-person households these units overlap and, following this logic, one expects that most mobile-only users are part of a one-person household. However, this was not confirmed by the resent Euro barometer household survey on electronic communications (2011). The data from the survey seem to indicate no relation between household size and whether or not to give up a landline phone connection. See the table "Proportion of households having a mobile telephone access but no fixed telephone access" at p. 147 http://ec.europa.eu/public_opinion/archives/ebs/ebs_362_en.pdf.

[61] BEREC, 2011: Report on Impact of Fixed-Mobile Substitution on Market definition, December 2011, http://berec.europa.eu/doc/berec/bor/bor11_54_FMS.pdf.

looking] at each country separately, the general picture is highly heterogeneous" […] "Based on the 2011 E-communication household survey, the number of households having at least one mobile telephone access is rather high and homogeneous – from 82% to 96% (average 89%) – across Europe. On the other hand, fixed line penetration is extremely heterogeneous: fixed access is very high in countries such as Sweden, the Netherlands (89%) and France (87%) whereas no more than 17% of the Czech households are connected. This heterogeneity is also striking looking at mobile only households (from 2% to 81% [see Figure 5.5]) and dual access (from 15% to 94%)."

"Based on this observation, the substitution of fixed-voice by mobile voice services should be assessed on a case-by-case basis. Without entering into a detailed case-by-case study, two extreme patterns can be identified:

a) Countries with low and decreasing fixed line penetration, offset by an increasing number of mobile only households (Czech Republic, Finland…cf. Annex 1); and
b) Countries with high and steady (or growing) fixed line penetration and a large majority of dual access households (France, the Netherlands…cf. Annex 1).

We conclude from the BEREC analysis that the extent of substitutability/complementarity of fixed and mobile telephony is different between countries and that NRAs should "[consider] other factors and [require] data based on a national survey […] to reach a conclusion."

Prospective analysis for the next 7 years

We don't expect the heterogeneity among Member States to become less. First, mobile access will not be considered a substitute by those PSTN users that are potentially 'captive'. Second, since the fixed VoIP service is a relatively low-priced add-on to the fixed broadband connection, most people with a fixed broadband connection will subscribe to it in addition to a mobile subscription which gives them connectivity while being on the road. Hence, only when current VoIP users regard Internet access via mobile networks a substitute for Internet access via fixed networks, could mobile voice substitute fixed VoIP. Notably in Member States where the incumbent is currently investing in transition to NGA networks as well as in the roll out of LTE, it is safe to assume that there will be no significant substitution from fixed to mobile broadband. Why would the incumbent otherwise invest in both networks? Furthermore, considering the complementarity between fixed and mobile broadband networks (notably in terms of offloading) it is more likely that mobile and fixed broadband subscriptions will be bundled *as complements*.

We conclude that the relevant retail market in the representative Member State does not (and will not in the future) include mobile networks. NRAs in specific Member States may find justifications to conclude otherwise.

5.2.3 High-capacity and low-capacity

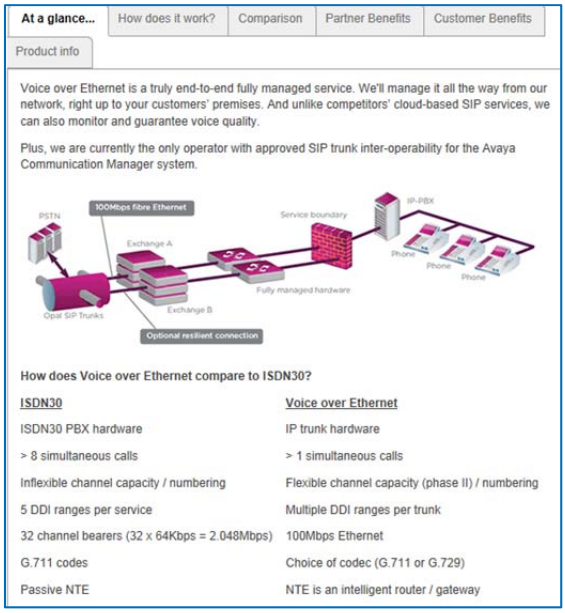
Cave et al (2006) conclude "there appears to be demand substitution between analogue and, where available, ISDN 2 connections, but not between low-capacity and high-capacity connections. While two analogue connections are a substitute for an ISDN 2 connection, it appears that a multiple of analogue or ISDN 2 connections are usually not a substitute for an ISDN 30 connection given the difference in overall price and functionalities." There are no reasons to conclude that technological developments have taken place in PSTN or ISDN technologies that would lead us to draw a different conclusion.

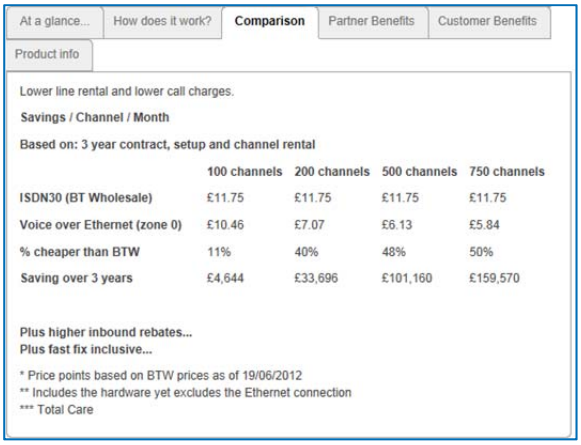
However, this doesn't allow us to jump to the final conclusion that we can distinguish a market for low- and high-capacity access. Indeed, broadband technologies and notably the transition towards Ethernet-based NGA networks opens up alternative means for providing high capacity voice access

(see text below). As such, NGA broadband networks can effectively compete with high capacity ISDN access networks.

Voice over Ethernet

Voice over Ethernet is an end-to-end managed solution that provides a cost-efficient and flexible alternative to ISDN channels.





Source http://www.talktalkbusiness.co.uk/home/partnersold/sell-more/telephony-solutions1/telephony-services/voice-over-ethernet.

We concluded that the relevant retail market includes both narrowband (ISDN) and broadband (Ethernet).

5.3 Potential competition problems at retail level

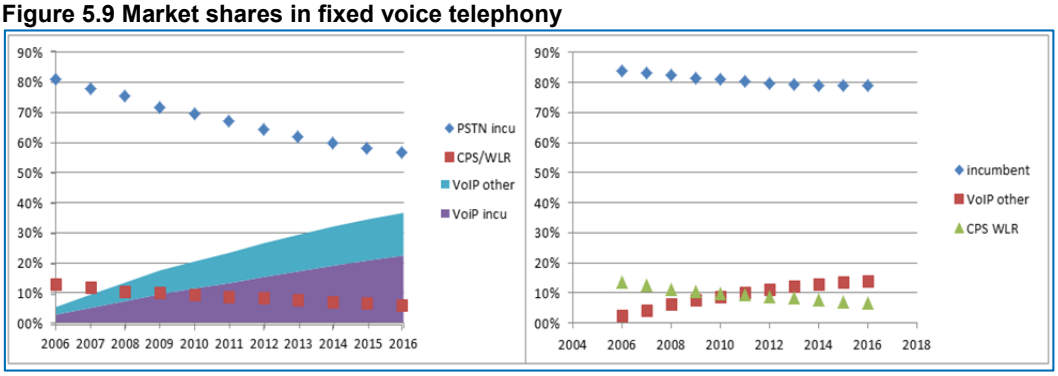
The analysis in the previous section was based on a hypothetical PSTN monopolist without a VoIP network. This analysis only served to define the boundaries of the relevant market. In the subsequent analysis we let go of this assumption and analyse potential SMP problems in the relevant market defined as to include PSTN and VoIP. More specifically, we consider the relevant market to include PSTN and broadband access networks that deliver traditional PSTN voice services or managed VoIP services.

We follow a modified greenfield approach assuming that there is no SMP in the retail broadband market due to regulation of markets 4 and 5. But does that automatically imply that there is no SMP in the retail market for telephony access networks?

To answer this question we first look at the market shares in voice telephony. The left panel of **Figure 5.9** shows the market shares as we observe them today and in the near future (with regulation). It shows the market share of the incumbent's PSTN network, the market share of the incumbent's VoIP network, the competitors' CPS/WLR market share and the competitors' VoIP market share. The right panel shows what this means in terms of overall market shares: in telephony access, the incumbent's market share remains around 80%. In the absence of regulation this share increases to 85%.[62]

[62] 80% plus 80% of the current market share (7%) of CPS competitors.

Figure 5.9 Market shares in fixed voice telephony



Source: figures produced by Ecorys on the basis of data from Idate, NRA questionnaire, and EC digital scoreboard.

How will the incumbent behave in the absence of regulation? First, the incumbent will charge a different price to VoIP-users then to PSTN-users (about two-thirds of its customers). This reflects, on the one hand, the different underlying costs structures of PSTN and VoIP networks. On the other hand, it reflects the higher price elasticity of current VoIP users.[63]

Business as usual

Knowing that some of its PSTN users are captive, the incumbent will set the PSTN price higher such as to maximize total profits. The ability of the incumbent to do so is constrained by:[64]

- The (assumed) competitive situation in the broadband market (which determines the price for VoIP);
- The size of the pool of non-captive PSTN users; and
- Contrary to the hypothetical monopoly test, by the incumbent's ability to retain PSTN-to-VoIP switchers on its own VoIP network, for which the incumbent's market share in VoIP (about 55%) may serve as a proxy.

As a consequence of the third determinant (i.e. the incumbents market share in VoIP) the critical size of the pool of potential switchers that prevents an incumbent from profitably increasing its PSTN prices is larger compared to the critical size that would prevent a hypothetical PSTN monopolist (without any market share in VoIP) from setting monopolistic prices.

In other words, even if the share of non-captive PSTN users is large enough to constrain the hypothetical PSTN monopolist (and thus we conclude that VoIP is part of the relevant market), we may still find that the number of potential switchers is insufficient for controlling an SMP problem.

Whether there is an SMP problem depends again on the relative size of the group of captive users vis-à-vis the group of non-captive users. This relative size decreases over time as a result of an autonomous migration from PSTN to VoIP. Hence, as counterintuitive as it might be, the increasing competition from VoIP increases the SMP problem for captive consumers on PSTN. In section 14.2 (impact assessment) we present a formal model that (while accounting for continuation of an autonomous migration path) can be used for determining the critical size of the pool of captive users leading to an SMP problem in year *t*. On the basis of data on the EU RMS we find that if the number of captive end-users is equal to around 70% of the current number of PSTN users, this would lead to an SMP problem in 2018.

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63 The fact that a user has already switched from PSTN to VoIP makes it more likely that he experiences lower switching costs. Furthermore, once switched from PSTN to VoIP, the choice between operators becomes wider.

64 The analysis does not account for alternative policy options for protecting vulnerable end-users (such as a Universal Service Obligation). If such policies are common in most Member States, this should be added as an additional constraint for the incumbent to set monopolistic prices.

Dynamic change

Assuming that 70% of the current PSTN-users are captive, the incumbent could (according to the above analysis) set monopolistic PSTN prices. The above analysis leading to this conclusion is rather static in the sense that it does not account for innovative reactions by VoIP competitors. The intensity of these reactions is partly determined by regulatory choices. If captive end-users remain protected from monopolistic prices by regulation, the VoIP competitors (as well as the captive end-users) may be less incentivised to invest in alternative technologies setting the captives free. When we account for innovative reactions of VoIP competitors, we should also consider innovative reactions by the PSTN incumbent. If NRAs choose to protect captive end-users, the incumbent is faced with costs of maintaining the PSTN network and it may choose to subsidize end-users in adopting alternative technologies. We elaborate on this below.

We now assume that in the absence of regulation, the incumbent has set a price such that all remaining PSTN users are captive (i.e. all non-captive users have switched to VoIP).

The remaining PSTN end-users could now also switch to VoIP if they make certain investments in alternative technologies. The size of these investments caps the price that the PSTN incumbent can set. If the incumbent increases its price to p^* such that the net present value of the price increase exceeds the investment that end-users have to make for being able to switch to VoIP, the end-user is (in the absence of other search and switching costs) better off by making that investment. Note that the size of the investment may differ for each individual end-user, depending on the extent to which its PSTN-dependent installed base is (in an economic sense) up for replacement. Furthermore, as explained many of these switching end-users will take a VoIP subscription from the incumbent for it also has a considerable market share in the broadband market. As such, the incumbent can set a price at a level above p^*. How much the incumbent can profitably raise its price depends then on the search and other switching costs perceived by individual end-users. Eventually, the incumbent will retain a fraction α of its formerly captive group of PSTN users on the PSTN network - a fraction β on the VoIP network - and it will lose a fraction γ to its competitors in the broadband market.

The analysis in the above paragraph is not complete. It does not account for the fact that, in an NGA environment, the incumbent incurs costs for keeping the PSTN network operational. If these costs are high enough, the incumbent might be better off subsidising the investments that PSTN end-users have to make in order to switch and thereby retain its entire formerly captive group of PSTN users on its VoIP network. This is exactly what we see happening now in Belgium where the incumbent subsidises upgrades of the DSL modems with integrated PSTN functionality at its consumers' premises. The incentives for the incumbent to subsidize the migration to VoIP increase when the incumbent's ability to increase the price of PSTN is constrained by regulation.

From a normative welfare perspective there is no reason to prefer one option over the other. However, in practice the regulatory framework does not give us much flexibility in choosing among alternatives. We can and have to keep the market for fixed telephony access on the list if we establish SMP and the Three Criteria are met at wholesale level. We will examine this next.

5.4 Assessment of the wholesale markets

5.4.1 Market definition

Markets 1/2007 and 2/2007 cannot be analysed separately. From a retail perspective it should be recognised that there are many offers that bundle the access service with calls. This applies to bundling of access and call origination at the wholesale level as well. Notably Wholesale Line

Rental (WLR) is a wholesale product that allows for bundling of these retail products because it is in fact a wholesale bundle of C (P) S and wholesale access. LLU also allows for such bundled retail offers in the form of Voice over IP (VoIP). The only pure wholesale product for voice origination is (stand-alone) C (P) S. In the Member States, however, C (P) S is losing market share to VoIP and/or WLR (if it is available). This has become clear in Figure 5.1 above. It follows that the wholesale market is a mirror image of the (modified) greenfield retail market.

5.4.2 Conclusions on the Three Criteria Test

The incumbent's market share is the same as its market share in the modified greenfield retail market (around 85% - 65% on PSTN and 20% in VoIP).[65] Competitors offer only VoIP services on the basis of LLU or WBA or on the basis of their own access networks. Their joint market share is about 15%, which is consistent with their market share in the retail broadband market.[66] Clearly the incumbent is a strong player but does this suffice to pass the Three Criteria Test?

1. In a greenfield situation (i.e. in the absence of any form of wholesale access regulation) it is not possible for competitors to serve end-users on the basis of PSTN access and it remains to be seen (see chapter 7 below) whether the broadband market would be competitive enough and thus allow competitors to serve end-users on the basis of VoIP. However, in case markets 5/2007 and/or 4/2007 were regulated (i.e. in a modified greenfield situation), competitors can serve end-users with VoIP as an add-on to the broadband service. As such the market would not be characterized by high non-transitory barriers for entry.

Indeed, today, a certain (unknown) share of the market may be captive to PSTN and thus these end-users cannot be served by VoIP competitors. However, we also concluded that:

5. In the absence of regulation, VoIP competitors and end-users may be more incentivised to adopt technologies facilitating the switch over from PSTN to VoIP. Therefore, in an unregulated setting, there are dynamics towards effective competition.

Logically then, it follows that:

6. If the first out of the three criteria are not met, general competition policy can deal with whatever remaining competition problem may exist.

We conclude that the wholesale market for fixed voice access does not pass the Three Criteria Test.

The fact that the Three Criteria Test is not passed, does not imply that some end-users can be considered particularly vulnerable (e.g. people of old age). On political grounds national governments may choose to implement alternative policies for protecting vulnerable end-users (such as a Universal Service Obligation).

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[65] See also **Figure 5.9**. To calculate the incumbent's market share in the modified greenfield situation one has to add most of the market share of the current CPS/WLR players to the incumbent.

[66] From chapter 6 it is clear that the joint market share in the retail broadband market is around 50%. From **Figure 5.9** it is clear that around 35% of the end-users subscribe to a VoIP line. $\pm$ 50% x $\pm$ 35% ≈ 15%.

5.5 Conclusions

We concluded that the relevant retail market comprises PSTN and VoIP (managed) access. As pricing schemes are moving towards flat rate packages, the call services are *de facto* bundled with the access service and the room for competition on calling rates (be it CPS or OTT based) simply disappears. The corresponding wholesale market comprises narrowband and broadband access.

In a modified greenfield situation the incumbent's market share is around 85%, of which 60% points are served via PSTN. A certain (unknown) share of these PSTN users is currently experiencing considerable barriers to switch from PSTN to VoIP:

- First, a fraction of end-users may be inert as a result of search costs or information asymmetry;
- Second, some business users still use old-fashioned PSTN-based telephone systems that will not work with VoIP connections; and
- Third, a number of end-users perceive PSTN to have different functionalities. For example, some end-users depend on PSTN for a proper functioning of the alarm system and/or a proper functioning of electronic payment systems. Important differences between PSTN and VoIP in this respect are PSTN's lower failure rates and the ability of PSTN to provide back-up power supply.

If this share is large enough, it gives the incumbent power to raise PSTN prices. However, in time, these switching barriers are expected to lessen as a consequence of competitive reactions by broadband competitors.

The wholesale market comprises narrowband and broadband access lines. The market is a mirror image of the modified greenfield retail market. In the absence of voice-specific regulation, entry is possible on the basis of broadband access (LLU, WBA and/or own infrastructure). Of course, with WBA, VoIP functionality should be included in the reference offer. In first instance, VoIP entrants will not be able to serve the captive group of PSTN users. However, there are dynamics towards effective competition. All in all, this market does not pass the Three Criteria Test.

6 Call termination

6.1 Introduction

6.1.1 The problem

The network operator of the calling party sets up the call (originates the call). The network operator of the receiving party completes the call (terminates the call). In Europe (as opposed to in the United States) the calling party bears the costs of termination. Under the 'calling party pays principle' (CPP), the receiver's choice of provider is not directly affected by the price of calls that other customers pay, whereas the calling party has no choice at all when making a call. Indirectly, the receiver might experience less value from its subscription if high termination charges decrease the number of incoming calls. The receiver is able to respond by choosing a subscription to a provider charging lower termination rates.

However, consumers are often not aware of termination charges. Even if consumers are aware of termination charges, they would not be able to conclude what this means for the number of incoming calls since termination rates are embedded in the end-user prices. The revenues of operator A are the costs of operator B and vice versa. The net wholesale costs for termination incurred by the calling party's network operator are a function of the balance between its incoming traffic, outgoing traffic and the levels of the respective termination rates. To make it even more difficult for the end-user to consider termination charges in its choice between operators, the revenues of termination tend to lower the price of the end-user subscription fee (referred to in the literature as the 'waterbed effect'), whereas the costs of termination increase the per-minute price for making calls (referred to in the literature as the 'cost pass through').

The price of incoming calls doesn't directly affect the subscriber's choice of operator. A subscriber cares most about the prices that are visible: subscription fee and per-minute charges. Indirectly, however, higher terminating rates may lead to lower subscription fees if the waterbed effect is present and sufficiently strong. As such, an operator is not (directly or indirectly) constrained by the receiver to set lower terminating charges. In other words, by subscribing to an operators' network the receiver grants monopoly power to that provider on all calling parties wanting to interconnect. It follows that every terminating network can be considered a separate relevant market where the operator of that network is a monopolist.

The subsequent question is: does this monopoly power at wholesale level lead to problems at retail level? If yes, there are reasons to regulate the wholesale market in order to correct the competition problems at the retail level.

A distinction could be made between termination on a mobile network and termination on a fixed network. This is precisely what the current recommendation advises. A reason for this distinction is that (as we concluded in section 5.2.2) mobile telephony forms a different market than fixed telephony; fixed and mobile operators do not directly compete in the same retail market. Indirectly, however, an integrated fixed/mobile operator may have some incentives to strategically use termination rates to leverage the two markets. Furthermore, differences may arise due to an asymmetry in regulation, e.g. when the fixed operator is regulated and another is not. We touch upon this in the analysis of retail and wholesale markets.

6.1.2 *Current legal practice*

Call termination on fixed networks (Market 3/2007)

All the NRAs follow the Recommendation in relation to the definition of Market 3/2007 that each termination network constitutes a separate relevant market and designate every network operator as SMP operator. It is found that all the NRAs include managed VoB and exclude unmanaged VoB in this market.

Some NRAs offer modifications to this market, mainly from the subsequent two aspects.

First, while all the NRAs agree that Market 3/2007 includes all call termination on geographic numbers, differences exist with regard to calls terminated on non-geographic numbers. Most NRAs exclude call termination on non-geographic numbers providing value-added services from Market 3/2007, while three Member States propose to include non-geographic numbers of public interest and used for standard purposes (i.e. to make and receive phone calls by end-users) into this market.

Secondly, the Recommendation does not specify precisely at which point on a network call termination starts, but allows a flexible delineation between call origination, call termination and transit services. In their decisions, the NRAs define various points, depending on the typology of the networks in their territory. Some NRAs even defined regional and national termination where operators have only one-level networks.

Call termination on mobile networks (Market 7/2007)

Between 2008 and 2012 the Commission received 121 notifications from 26 Member States (excluding Luxembourg) and 1 region (Gibraltar). All Member States followed the market definition in the Recommendation and designate every network operator as SMP operator. All operators providing mobile termination services are now subject to ex-ante regulation.

Seven Member States proposed to include termination on full mobile virtual networks (who can terminate the calls themselves) into Market 7/2007, which was also accepted by the Commission. As this has not been indicated by the Recommendation, it is suggested that in the next version of market recommendation, the status of mobile virtual networks should be clarified.

6.2 Relevant markets

6.2.1 *The relevant retail market*

Termination is one of the three wholesale services (next to call origination and call transit) that jointly form the call service at retail level. The retail markets for call services are typically bundled with the retail market for access (see also Chapter 5). It follows that if the wholesale termination market is not functioning properly and wholesale termination charges rise, this impacts on the subscription fees and the per-minute calling charges of the various operators and thereby (potentially) on the competitive position of an operator vis-à-vis other operators. Furthermore, in the analysis in section 5.2.2 we identified separate retail markets for fixed and mobile subscriptions (bundled with calls).

6.2.2 *The relevant wholesale market*

We follow the above reasoned definition that every terminating network can be considered a separate relevant wholesale market where the operator of that network is a monopolist. As such the

recommendation *de facto* does not speak of one relevant market for mobile or fixed termination, but of groups of relevant markets: a group of mobile relevant markets and a group of fixed relevant markets. But, since each network is considered a separate relevant market anyway, why does the recommendation define two groups? What are the distinguishing characteristics?

A notable difference between these groups stems from the different network architectures and technologies, resulting in different cost structures. However, also within these groups there may be differences in network typology and technologies (and thus costs); between, for example, PSTN and VoIP; copper, cable and fibre; 2G, 3G and 4G; rural and urban areas; mountainous areas and flat lands, etc. When using network typology and cost structures as a basis for grouping markets, two groups would not be enough and, in fact, we might end up with the same number of groups as there are networks (bringing us back to square one).

Another argument for differentiating between fixed and mobile networks is that they do not compete at the retail level. It follows from the analysis of potential competition problems that whether or not networks compete for the same end-users at retail level makes a difference for how they set terminating tariffs vis-à-vis each other. However, also this argument does not hold since nearly every fixed incumbent is also a mobile network operator and, in some cases, also fixed competitors are operating a mobile network (e.g. Tele2 and T-Mobile in the Netherlands). As we show in the analysis of competition problems below, multi-market operators have different interconnection strategies than single market operators. A separate analysis of fixed and mobile termination cannot account for this. We elaborate on this below.

So, from an analytical point of view, the problem of fixed and mobile termination is best jointly analysed. In practice it is observed that some Member States recognize this and analyse the fixed and mobile termination problem in a single market analysis decision (e.g. OPTA). This does not prevent them from setting differentiated tariffs for fixed and mobile networks and they thereby account for different cost structures. On the other hand, OPTA comes to the same conclusions as any of the other NRAs (all operators (fixed and mobile) are subject to ex-ante regulation), pointing out that the discussion about joining markets 3 and 7 may very well be a non-issue. The value of merging these two markets should then come from cost savings in terms of less regulatory burden for NRAs and Market Players. We analyse this in Chapter 13.

6.3 Analysis of competition problems

6.3.1 A 'notional' retail market approach

The above conclusion on the relevant retail markets typically results from existing billing arrangements where the costs of terminating a call (which are incurred by the receiving party's operator) are billed at wholesale level to the caller's operator. The caller's operator then passes on this bill to its own subscriber via the retail per minute prices as well as the subscription fees. An alternative arrangement under CPP would be that the caller receives two bills: one from its own operator (for access and call origination) and one from the receiver's operator (for termination). Given the CPP principle, the current billing arrangement seems more efficient from a transaction cost point of view. Still, a theoretical analysis of alternative billing arrangement may be worthwhile as it creates a hypothetical retail market for call termination (unbundled from call access, origination and transit services). An analysis of strategic behaviour in such hypothetical retail market potentially gains insights for the analysis of strategic behaviour at the wholesale market (see Cave et al., 2006, p. 88).

In line with the arguments for not differentiating between fixed and mobile termination networks at wholesale level, we continue to not make that distinction in the 'notional' retail market. It follows that we need to slightly deviate from Valletti (2003) and Cave et al (2006) while distinguishing between different types of incoming calls:[67]

- Calls from within the network (on-net); and
- Calls from outside the network (off-net), distinguishing between:
  - calls from a competing network (e.g. fixed-to-fixed *F2F* or mobile-to-mobile *M2M*); and
  - calls from a network in a different market (e.g. fixed-to-mobile *F2M* and mobile-to-fixed *M2F,* international calls from abroad).

In the 'notional' retail market, each operator sends a bill directly to all end-users (including its own) for termination services. In the case of on-net calls, an increase in termination tariffs would affect the operator's own customers. Subsequently, they might vote with their feet by switching to another operator. As such, the operator has an incentive to keep termination charges low or provide a voucher for all on-net calls with the value of the termination payment (thereby cancelling out the bill). In the case of off-net calls, the calling party is not a customer of the terminating operator. Since the receiving party is *de facto* insensitive to the costs imposed on the calling party, the terminating operator is free to set monopolistic prices. If follows that in an unregulated setting an operator will differentiate between on-net and off-net terminating charges.

Furthermore, if the off-net call originates from a competing network, the terminating operator has an incentive to further increase its price in an attempt to persuade the calling party to switch to its own network. If he succeeds, the operator not only gains a customer, but also its existing customers will experience more incoming calls, which increases the value for money they attain in a subscription and thus also their willingness to pay (this is referred to as a call externality). A competing network would respond with a similar reaction and, if both networks start off with equal size, the strategy of the first operator would be neutralised, while leading to an inefficient cost structure for off-net calls and therefore lead to higher prices and lower welfare. However, if the networks are not of equal size, the call externality creates an advantage for the larger network and allows for setting a higher off-net termination price and increasing its own subscription fee due to the network (call externality) effect.

This problem is absent in the case of a call originating from a different market because increasing the terminating price won't gain the operator additional subscriptions. However, if one operator is both a fixed as well as a mobile player, the operator regards all calls from its fixed network to its own mobile network (and vice versa) as on-net calls. All other calls are regarded as off-net calls from a competing network and thus incentives for setting high termination rates may be even stronger. We concluded in the previous chapter on fixed voice access that the incumbent currently has around 80% market share in fixed subscriptions. In an unregulated setting, the incumbent can, via termination charges, leverage this market power to the mobile market.

Finally, several authors[68] mention the possibility that using high termination charges facilitates sustainment of collusive prices because of a 'raise-each-other's cost' effect between competing operators is a very effective tool to enforce collusion.[69] A prerequisite for this to occur is linear retail

[67] Most authors (including Valletti, 2003, and Cave et al, 2006) discuss the case of mobile termination separate from fixed termination. Hence they differentiate between M2M on-net calls, M2M off-net calls, and F2M calls. Our approach is essentially the same, but applies more generally to any type of termination.

[68] Armstrong (1998), Laffont et al (1998a, 1998b), Valletti (2003) and Cave et al (2006).

[69] The idea is that when an operator deviates from the collusive retail per-minute-price, its end-users will increase the number of calls (both on-net as well as off-net). The end-users of the rival's network don't experience a lower price and hence will not change their calling behaviour. The net effect is that the deviating operator will experience a net outflow of

tariffs (i.e. only paid by the minute). In case flat rate pricing (only a fixed subscription fee) or non-linear pricing schemes are adopted (i.e. a fixed subscription fee in combination with a per-minute-charge) the 'raise-each-other's cost' argument fails.[70] Since post-paid flat rate pricing and post-paid non-linear pricing are becoming increasingly dominant pricing regimes (as opposed to linear pre-paid pricing), the enforcement tool is less effective. Still, the idea of raising each others' costs and allowing the end-user to pay the bill is still tempting for mobile operators and, with only two or three competitors, enforcement is generally not the problem.

6.3.2 *A greenfield wholesale market approach*

The intuitions obtained from the analysis of the 'notional' retail market seem to apply as well in the wholesale market analysis. Cave et al (2006) point out, however, that there is one significant difference: while the 'notional' retail end-user does not have bargaining power vis-a-vis the terminating operator, the wholesale originating operator may be in a better position. In fact, because of the raise-each-other's-costs problem, both operators have an incentive to 'strike a deal' that may not only beneficial for them, but also for their end-users.[71] We explain this argument below with a simple illustration of two symmetric operators A and B who do not compete at the retail level and in the absence of other operators:

- Operator A increases its wholesale termination charges to increase its own revenues and thereby increases (reduces) the costs (profits) of operator B;
- The response of operator B is to increase its wholesale termination charges as well with a similar effect on the costs (profits) of operator A;
- In the end both operators charge wholesale termination fees far above marginal costs driving up their retail prices, reducing both volume (or subscriptions) and traffic and ultimately reducing their profits;
- In case operator A and B were able to jointly set (or negotiate) termination charges, the optimal level (maximising joint profits) would be to set prices equal to marginal costs. This would also be optimal for the end-users;
- The threat of entering into a tit-for-tat game is probably enough to bring both parties to the negotiation table and to agree on prices equalling marginal costs.

From this it would follow that although each operator is a monopolist on its own termination network; it does not have SMP because it experiences countervailing buying power. In reality, however, the above argument breaks down for multiple reasons:

- The assumption that only two networks exist is essential for the argument, but in reality, networks face multiple and very heterogeneous counterparties. Entering bilateral negotiations with each counterparty are not a realistic option, especially if the corresponding individual traffic flows are small. The interests and regulatory environment of each counterparty are likely to be different (especially for non-EU counter parties);
- If the two networks compete with each other, Cave et al (2006) argue in line with our simple symmetric example above that "the outcome of bargaining […] could be efficient reciprocal rates possibly approaching costs." Alternatively, they could also set the termination rate such as to raise their joint profits (collusion argument);

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calls. When termination charges are high, this goes hand in hand with a significant outflow of cash. As such, high termination charges are said to discourage deviation from the collusive price in the first place.

[70] With linear prices, the effect of an increase in wholesale termination charges is passed through into the retail per-minute-prices for making calls. With two-part tariffs there is still a cost pass through effect, but there is also a so-called waterbed effect which means that the profits generated from termination are used to lower the fixed subscription fee. In other words, it fails because operators cannot raise their profits, but consumers are still worse off because of a distortion in call prices.

[71] Furthermore, we note that the analogy between the "notional" retail market and the wholesale market also breaks down if the pass-through of termination rates to retail (call) prices is different from 1. Theory predicts that this happens for example in the presence of call externalities.

- In case the operators are not identical, the asymmetry between operators makes it increasingly difficult to agree on termination charges. Negotiations may fail, for example:
  - when two operators have very different cost structures, e.g. because A is a fixed operator and B is a mobile operator. It would require detailed information on each others' costs structures to agree on different termination charges for each network; or
  - when one operator has a client base experiencing larger call externalities – i.e. a biased preference toward receiving calls (e.g. business users) – the bargaining position of this network operator is lower; or
  - if one network is larger (i.e. we don't observe symmetry), it may try to weaken its competitor further by setting high termination charges (foreclosure argument) and thereby strategically use the network externality in a similar way as described in relation to the 'notional' retail market;
- When one of the two networks is integrated with a competitor of the second network then the above-mentioned foreclosure motive applies also to cross-market calls: The integrated network may have the possibility to leverage its power in either termination markets in order to influence competition in the second market – see Hoernig et al. (2013).

The first two points are not so much an SMP problem, but rather a coordination problem. These coordination problems, however, *de facto* neutralize any countervailing buying power and thereby transform all monopoly positions into SMP. From the third and fourth point it follows that (at least) large operators have SMP. The SMP stems from the fact that the large and/or integrated operator has a monopoly on its own termination network(s) *and* because it doesn't experience countervailing buying power. [72] This situation is typical for Europe, which becomes clear from the text below.

> Hoernig et al (2013) state that "Nine of ten largest fixed-line carriers in the world own a controlling stake in a mobile operator. […] Today, most incumbent operators [having on average 80% market share in the fixed voice market – see chapter 5] own 100% of their mobile arms, which tend to be the largest operator in their market. For example, in Europe 11 out of 14 horizontally-integrated mobile operators were the leaders within their mobile market in 2012 [see the table below]. […] In a nutshell, today, integration between a mobile network and the fixed-line incumbent is a pervasive and key feature of most communications markets."

[72] We note that Cave et al (2006) argue that the size of the networks is not important because the size of the network affects the total surplus to be bargained over, not its division. This assumes that there is first of all a willingness of both operators to jointly maximise total termination surplus. However, this is only true in case the networks are not competing with each other at retail level.

Table 6.1 Integrated Incumbents in the EU15

State	Fixed Incumbent	Controlled Mobile Operator	Market Shares (Subscribers, 2012)	Number of MNOs (2012)
Austria	Telekom Austria	A1 - Mobilkom	40.7% (L)	4
Belgium	Belgacom	Proximus	41.1% (L)	3
Denmark	Tele Danmark	TDC Mobil	46.5% (L)	4
Finland	Sonera	Sonera	34% (S)	3
France	Orange	Orange	41.4% (L)	3
Germany	Deutsche Telekom	T-Mobile	30.5% (S)	4
Greece	OTE	Cosmote	48.5% (L)	3
Ireland	EIRCOM	Meteor	20% (S)*	4
Italy	Telecom Italia	TIM	35.4% (L)	4
Luxemburg	P&T Luxemburg	LuxGSM	60% (L)*	4
Netherlands	KPN	KPN Mobile	41.3% (L)	3
Portugal	Portugal Telecom	TMN	42.8% (L)	3
Spain	Telefonica de Espana	Movistar	40.5% (L)	4
Sweden	Telia	Telia	46.6% (L)	4
UK	British Telecom	O2 (up to 2005)	26.5% (2005,L)**[10]	4

* Source: Company web site

** Source: Ofcom (2005), "The Communications Market - Telecommunications"

L = Market Leader

S = Second-biggest operator

Source: Hoernig et al. (2013).

Furthermore, Hoernig et al (2013) predict that "FTM calls to the rival mobile network are priced significantly above marginal cost, while those to the integrated mobile network are priced below cost. This pricing structure creates an additional disadvantage for the non-integrated mobile network, in terms of market shares and profits, and even magnifies any prior asymmetries."

In a greenfield situation *at least* the largest (often integrated) operator has SMP. SMP of other operators is not evident in the absence of regulation of termination on the other networks because, even though they have a monopoly on their terminating network, they experience countervailing buying power from larger operators.

Now let's assume that on the basis of this conclusion the termination charges of the largest operators will be regulated. In that case, the countervailing buying power of the large (often integrated) operator is neutralised and consequently the monopoly positions of all other operators suddenly become SMPs. So, it follows that if you regulate one, you need to regulate all operators in both fixed and mobile markets. This was confirmed by Dewenter and Haucap (2003) and it also logically follows from Wright (2002) who concludes that (when FTRs are regulated) unregulated MTRs allow mobile operators extracting the rents from the fixed network and use these to compete for end-users in the mobile market.

6.3.3 *Conclusions on the Three Criteria*

The Three Criteria Test is passed:

1. Because every terminating network is a separate relevant market, each relevant wholesale market is by definition characterised by high non-transitory barriers to entry;
2. There is no sign of any dynamics towards effective competition; and
3. Ex-post regulation cannot effectively deal with the termination problem.

6.4 Conclusions

We restate the conclusion that each termination network is a relevant market and that each operator is a monopolist on its own termination network. We confirm that at retail level, fixed and mobile telephony are two distinct markets. In our analysis we do not see a need for analysing these two groups of relevant markets separately because the economic issues are the same. Furthermore, from an analytical point of view, we find that analysing them separately cannot properly account for the fact that most incumbents compete in both the fixed and the mobile market. As such, our approach deviates from what has been common practice in the EU so far and we could argue that (from an analytical point of view) there are reasons to merge the two groups of relevant markets that are commonly referred to as Markets 3 and 7. From a practical point of view, however, we recognise that our approach does not lead to different conclusions than those reached by the NRAs so far: all operators have SMP on their own terminating network. The only reason to merge markets 3 and 7 would have to be based on an analysis of potential gains in terms of regulatory burden for NRAs and market players (which we analyse in Chapter 13).

We have concluded that termination is a typical wholesale market for inputs that operators supply to each other. This causes some raise-each-others-cost problems and countervailing buying power, leading at first sight to incentives to negotiate prices equal to marginal costs. If follows that being a monopolist is not a sufficient condition to conclude on SMP. In order to draw that conclusion one has to rule out countervailing buying power, which would lead negotiations to fail.

There are several barriers for negotiations:

- Asymmetric cost structures among operators;
- Asymmetric preferences of end-users;
- Different sizes of the networks; and
- Multi-market vs. single-market operators.

The first two asymmetries lead to higher transaction costs which *de facto* neutralise any countervailing buying power and thereby cause negotiations to fail. The differences in size and number of markets in which the operators are active also directly affect countervailing bargaining power, thereby causing negotiations to fail. In sum, operators do not experience countervailing buying power and, hence, they have SMP.

Whether or not markets 3 and 7 are merged does not matter for the conclusion: each terminating network is a separate relevant market and the operator of that network has SMP. Each relevant market passes the Three Criteria Test (sustainable entry barriers, lacking dynamics towards effective competition and insufficient ex-post regulation). Strictly speaking, it follows that NRAs should do a separate market analysis decision for each network and (if BULRIC pricing is chosen as remedy) NRAs should impose specifically designed remedies for each relevant market. From a practical point of view this might be superfluous if such separate exercises were to result in a duplication of documents that only differ in the names of the operators.

7 Mass-market broadband access

7.1 Introduction

Market 4/2007 is defined as “wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location” and Market 5/2007 as “wholesale broadband access”. The two markets represent vertically related wholesale markets that can both serve as an input to several retail services consisting of unmanaged IP services (e.g. broadband Internet access) and managed IP services (e.g. VoIP and IPTV services). From the perspective of markets 4/2007 and 5/2007, the retail service of broadband Internet access is generally taken as the retail service that is most relevant from a regulatory perspective. The reason for this is that the managed services of VoIP and IPTV are traditionally seen as new challengers to the more traditional services (e.g. voice over the PSTN and TV broadcasted over the air or through cable networks) and are typically seen as an add-on to the broadband Internet access.

One can make a distinction between residential end-users and non-residential end-users of broadband services. Markets 4/2007 and 5/2007 may serve as inputs to both services; however, non-residential users may experience a greater variety of issues than residential users. This may have particular implications at the Market 5/2007 level. In order to avoid confusion, the present chapter focuses solely on services for residential users or “mass-market services”, which are the main services produced with Markets 4/2007 and 5/2007 inputs. In chapter 8, we focus separately on the particular issues that may be of relevance for the non-residential segment. Furthermore, at the ‘high-end’ of Market 5/2007, certain services may be produced that are able to compete with the services at the ‘low-end’ of Market 6/2007. We deal with this in chapter 9.

7.1.1 The problem

The main question assessed in this chapter is whether markets 4/2007 and 5/2007 still deserve a place in the list of relevant markets on the next Recommendation. The question is dealt with as follows:

- First of all, we identify NRA legal practice and current trends and drivers in the Member States and outline the Representative Member State (RMS);
- We then perform a greenfield analysis to the RMS retail level: What competitive problems might exist at the retail level in absence of regulation of markets 4/2007 and 5/2007?
- Next, the question is addressed: to what extent can regulated access to the nearest upstream bottleneck (the Market 4/2007 wholesale level) address the identified retail problems?
- Subsequently, a modified greenfield analysis of the RMS retail level is performed: Might any competitive problems remain at the retail level after regulating access to the nearest upstream bottlenecks?
- Finally, the question is addressed whether regulated access to further upstream bottlenecks (the Market 5/2007 wholesale level) can solve any identified remaining retail problems?

As stated above, the present chapter focuses on the mass-market implementations of access at the Market 4/2007 and 5/2007 levels. The next chapter takes a closer look at issues that may be related to the non-residential segment.

7.1.2 Current legal practice

Market 4/2007

Based on notifications of NRAs and the comments of the Commission, Market 4/2007 meets the requirements of the Three Criteria Test. With regard to the substitutable technologies, Market 4/2007 so far only includes two technologies, traditional copper loop and new fibre loop. NGA fibre networks are generally included within the same relevant market as the traditional copper LLU.

Market 5/2007

The notifications show that Market 5/2007 is still generally not effectively competitive in the EU. In terms of products included in this market, the EU is now experiencing a migration from copper to fibre, although copper continues to dominate the current broadband market. WBA over NGA fibre-based networks are generally included in Market 5/2007. Special attention should be paid to the possible risk that NGA roll out may lead to reduced competitiveness of Market 5/2007. Consequently, Market 5/2007, even if found to be effectively competitive, should be continually monitored by NRAs.

A frequently recurring issue in the Market 5/2007 notifications is the inclusion of cable and other technologies (e.g. WLL) in the market definition. This was observed primarily in arguments of indirect price constraints arising from service-based competition at the retail level. The Commission generally does not accept including cable in Market 5/2007 through the argument of indirect price pressure, arguing instead that the disciplining role of services based on alternative technologies such as cable should be assessed at the stage of SMP determination. We discuss this matter in more detail in section 7.5.2 at the paragraph “Indirect pricing constraints and market definition” (p. 119).

7.1.3 Current trends and drivers

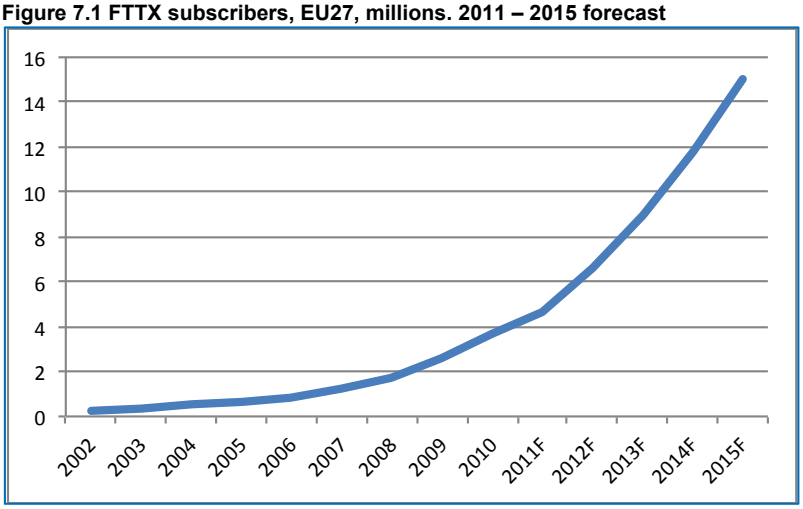
Trend in wholesale physical access products	Drivers
• Demand for virtual access products goes up (either VULA or WBA).	• NGA roll out on the basis of PON, DOCSIS 3 and 3.1, FTTN/C, which cannot provide physical access (and which may be strategically driven);[73] • Limited ability to force incumbents to roll out multiple fibre lines; • Duplication of the fibre-based last mile (or the fibre to the SDF) is hampered by scale economies.

The Europe 2020 Strategy aims to improve the average broadband speed for all EU citizens by 2020 to about fifty times higher than the current EU average.[74] It thus sets up a clear target to foster the deployment and take-up of fibre networks. Under such a policy it can be foreseen that the current-generation access networks, such as PSTN and CATV, will be gradually and persistently migrated to fibre. Fibre will grow exponentially with a reach of 20% to 25% of the households by 2020.

[73] We understand that the DOCSIS 3.1 standard does not impact the possibilities for physical unbundling. The 3.1 standard may however introduce or improve the capabilities of managed or prioritised routing over a cable network which may therefore improve the ability of cable networks to offer a virtual bitstream access service at a wholesale level.

[74] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Digital Agenda for Europe, COM(2010) 245, 19.05.2010, pp.19.

Figure 7.1 FTTX subscribers, EU27, millions. 2011 – 2015 forecast



Source: Idate.

Technological changes affect the network hierarchy, which in turn affects the way access can be provided at a wholesale level. We discuss the main changes here.

Fibre networks

The upgrading of core copper-networks to fibre has no important consequences for access at wholesale levels.[75] The roll out of NGA fibre optic networks does, however. There are several distinctions to be made:

- Traditional copper network operators replacing the local loop fully (FTTH) or partly (FTTC) by fibre:
  - Certain network topologies allow physical access to fibre networks at a local level;
  - Certain network topologies do not allow physical access to fibre networks at a local level. These may be able to offer a virtual service at the local level, functionally similar to physical unbundling.
- FTTC still allows for the technological possibility of unbundled access to the copper twisted pair at the street cabinet level;
- PON fibre networks may at some point in time be able to offer access to specific wavelengths (wavelength unbundling or more formally, wavelength division multiplexing, WDM), although this technology is probably still about five years away (see note below); and
- Other networks, e.g. cable networks, may also increasingly be able to offer a virtual service at the local level, functionally similar to physical unbundling.

Note on wavelength unbundling

In the future, wavelength unbundling (more formally: wavelength division multiplexing or WDM for short) may offer a new alternative to physical unbundling. Note however that WDM unbundling does not work on FTTC/N as copper is installed for the last mile; wavelength unbundling only applies to FTTH architectures. Presently, the maturity of WDM PON access products running on FTTH is not reached. WDM PON is not expected to gain major traction until 2020. Focus is likely to remain on 10GPON instead. 10GPON solutions are offered by several major vendors (e.g. Alcatel Lucent, Huawei, ZTE) for two years and are now about to gain traction in the market. China Telecom has recently issued a major tender for 10GPON, whereas there are currently no major deployments of WDM PON. This scale difference will further improve the cost advantage of 10GPON over WDM PON, with the latter currently being about eight to ten times more expensive than current GPON.

[75] For cable-networks the upgrade to DOCSIS 3 and 3.1 standards may impact the virtual access capabilities. See footnote 73.

10GPON furthermore seems sufficiently 'future-proof' to meet user demand over the relevant time horizon as well as the broadband targets defined by the Digital Agenda.

The first TDM WDM PON products (prototypes) are available but are not yet deployed. TDM WDM will allow using a limited number of different wavelengths. First commercial applications could be deployed in two or three years from now. Next, pure WDM PON products will allow for use of 32 or 64 wavelengths, but this technology is more distant with at least five to six years of expected time to market. We therefore do not expect wavelength unbundling to be an important trend within the relevant timeframe. Nevertheless, the first commercial deployment may take place before 2020, which is within the relevant timeframe. For that reason, we do briefly discuss the implications of wavelength unbundling in the section on market definition.

7.1.4 Representative Member State

Main characteristics

Characteristic	Level today	Trend	Margin of error
Broadband penetration	**See figure 5.1 below:**	**Fibre take-up is still low. The increase in market share of DSL competitors (mainly at the expense of the incumbent's market share) is stagnating.**	**General trend is the same for all countries.**
C3 (sum of market shares of the three largest ISPs)	**2008 75; 2009 74; 2010 74; 2011 73.**	**Constant.**	**Little variation.**
Number of ISPs that serve at least 50% of their clients on the basis of LLU/SLU	**6% of ISPs.**	**Constant.**	**Relatively large due to differences between Member States.**
Households passed with fibre	**More than 50% of the households.**	**Rapidly increasing.**	**Relatively large, due to differences in absolute levels between Member States. The trend is however similar in almost all Member States.**
Market share incumbents in cable market	**0%**	**Constant.**	**In a few countries the incumbent is active in the cable market.**
Market share incumbents in fibre market	**>50%**	**Increasing.**	**Very large due to differences in absolute levels between Member States.**

In our RMS, we can distinguish between two typical competitive settings:

1. Highly urbanised area - typically covered by two fixed networks. This represents about 30% of overall market and the retail market is approximately evenly divided between the two networks;
2. Less urbanised area – typically covered by one fixed network.

We expect this dichotomy to remain largely unchanged over the next 7 years, despite the expectation that fibre network roll out will remain an important trend and gain significant market share at service level over the same period. The reason that this important trend does not alter the dichotomy observed today, is that fibre is generally expected to replace copper connections, therefore not changing the number of competing infrastructures. Some areas may experience divergence from this, but we expect such divergence to be exception rather than rule.

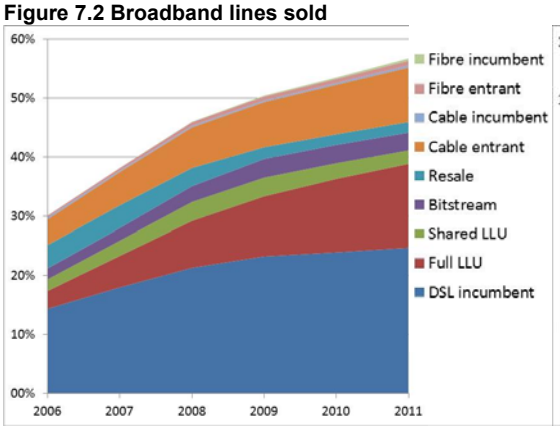
The general expectation that there are two main types of competitive settings, consisting of two and one fixed networks respectively, may first and foremost have consequences for the geographic market definition. We refer to chapter 2 where the issues related to sub-national markets are discussed. If indeed two separate areas are found to represent separate relevant markets, the area with two infrastructures may or may not have a dominant operator at the retail level. In our RMS case, we have assumed approximately equal market shares at the retail level in the areas covered by two infrastructures, so if this area were to be defined as a separate geographic market, it would be unlikely that single dominance were to be found at the retail level.

For the purposes of the present assessment, we will not delineate the geographical boundaries of the relevant market. The exercise of geographical market definition is up to each individual NRA. However, we can analyse the effect that different possible market definitions have for our competitive analysis. To that end, we first outline the market structure of our RMS from a national point of view and then briefly outline some possible differences at the regional level.

National market structure

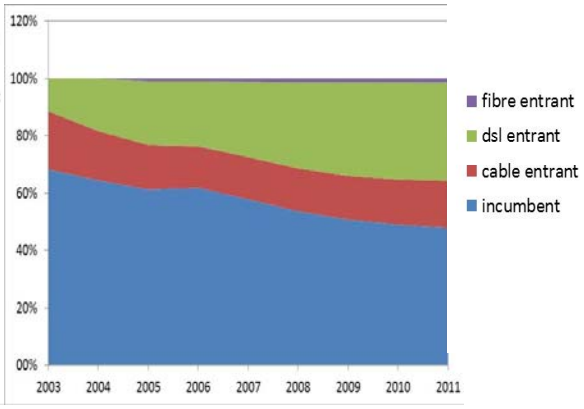
In the past few years, an increasing number of households have gained access to Internet. Moreover, the large majority has access to broadband Internet. The currently predominant broadband connection technologies are xDSL and cable. Fibre connections are increasing, generally replacing copper-based connections (apart from the final drop to the premises in the case of FTTN/C networks). This leads to the following broad picture of the Representative Member State in the 2006-2011 timeframe.

Figure 7.2 Broadband lines sold



Source: Cocom.

Market shares



Source: Cocom (market share of resellers is allocated to the incumbent).

Regional market structure

In terms of regional market structure, the RMS is assumed to have competition at the infrastructure level from CATV network operators in some (but not all) urban areas and similarly the fibre network is typically rolled out in urban areas (if at all). In those areas where fibre networks are rolled out,

fibre market share mostly replaces copper-based DSL market share (although this is only expected to be a regional effect for the next 5 years). Finally, for the Market 5/2007 assessment, the LLU-based alternative operators are assumed not to have ubiquitous LLU-based coverage.

7.2 Relevant retail markets: greenfield assessment

As discussed in chapter 2, prior to assessing any wholesale market, the related retail markets should be assessed in a greenfield setting. Furthermore, specific to markets 4/2007 and 5/2007, the ladder of investment principle prescribes that after assessing Market 4/2007, prior to Market 5/2007, a modified greenfield analysis should be carried out at the retail level in order to determine the effect of Market 4/2007 regulation and whether further regulation at Market 5/2007 level is warranted. For that reason, we carry out a modified greenfield analysis of the retail level in section 7.4.

Referring back to Figure 3.1, the retail markets that may be influenced by wholesale local access to the network are broadband Internet access, fixed voice and broadcasting services. However, we do not deal with all these markets here because they have been discussed at other places in this report:

- Notably, chapter 5 deals with the retail fixed voice telephony markets. There we conclude that high retail broadband penetration (with VoIP functionality) is an important driver of competitiveness in the fixed voice market. A prerequisite is a competitive retail broadband market. The focus of the analysis in this chapter may thus be limited to that objective and refrain from further analysis of VoIP services;
- The same could be said for broadcasting (we analyse that in more detail in section 11.2). However, IPTV functionality seems to be (come) a very important add-on (in the eyes of consumers) and, at the same time, (and partly because of that) it is an important driver of network investments (to increase bandwidth). As such, the market for broadband access may be (strongly) affected by the role of IPTV;
- We notice that demand by residential users differs from demand by non-residential users. To keep the analysis clear we address particular issues that may be of relevance to the non-residential segment for broadband services in chapter 8;
- The analysis here focusses on so-called mass-market broadband services.

Below, we first (briefly) assess the retail markets for broadcasting services and subsequently assess the retail market for broadband internet access.

Broadcasting

The fixed networks can generally be regarded as entrants into broadcasting as a retail service. Traditionally, this retail service has been delivered predominantly over the air and through satellite broadcasting, and for the larger urban areas of many Member States through cable networks. Therefore, in our notional RMS, we expect there to be at least three alternatives to receive retail broadcasting services at the national level:

1. over the air broadcasting, generally (DVB-T);
2. satellite broadcasting (DVB-S); and
3. IPTV broadcasting over fixed (ADSL2+, VDSL or FTTH) network.

Moreover, in the highly urbanised areas (representing about 30% of the total market), a fourth alternative exists:

4. Cable broadcasting (DVB-C).

Given the number of alternatives at the retail level, we do not expect important issues of SMP at the retail level. Nevertheless, in some Member States there may be SMP at the retail level as a result of one of the more traditional forms of broadcasting having a dominant position. If this were the case, it would not be of relevance to the wholesale markets that are under investigation in the current chapter.

Note that the ability to deliver IPTV broadcasting services may be an important competitive asset to any service provider on the retail markets that are discussed presently. This may for example be the case as a result of the increasing trend of selling bundled offers to end-users. Therefore, even though the broadcasting retail service may not be of direct relevance for our RMS in terms of competitive issues on the retail market, it may nevertheless be an important service from the Market 4/2007 or Market 5/2007 regulatory perspective. Note that for individual members states a competition problem could be found at the retail level, either for retail TV or for bundles including retail TV. In such a case the retail broadcasting service would be of direct relevance in the Markets 4/2007 and 5/2007 context.

Broadband Internet access for residential customers

First and foremost, the question that should be addressed is: which retail services may belong to the same relevant product market? This is answered by first investigating the demand-side substitutability of various retail services. Services that represent sufficiently strong demand-side substitutes are deemed to belong to the same relevant market. Secondly, in absence of demand-side substitution, the existence of supply-side substitutability is investigated.

In most geographical areas of our notional RMS, there is only a single fixed network that is capable of offering broadband Internet access for residential customers. However, from a demand-side substitutability perspective, the existence of mobile alternatives may be of relevance. The LTE technology deserves some attention in particular. We do not expect alternative technologies to sufficiently discipline the single incumbent network that exists in the majority of geographical areas for the relevant timeframe. However, NRAs should be aware that the possible effects of other upcoming technologies, such as LTE, may at some stage impose significant competitive constraints at the retail level. We address this issue below.

Does mobile Internet access belong to the relevant retail service market?

Mobile Internet based on 3G technologies is not generally expected to be a sufficient demand-side substitute to fixed broadband at the retail level, even though there may currently be exceptions at an individual level and even in some Member States (most notably: Austria). The main reason for the lack of direct demand-side substitution is the fact that the mobile services are designed with the mobility aspect in mind and are therefore not designed to deliver maximum speed and throughput at the home location. Instead, for the majority of end-users they offer complementary services to a fixed connection, being (for obvious reasons) to provide a connection when not at a fixed location. Given the advantage of mobility, end users generally accept that the typical bandwidth attained through mobile access is significantly lower than with a fixed connection and that the price of bandwidth may be higher for the mobile service.

For these reasons, mobile access is generally excluded from the relevant retail market and therefore does not belong to the relevant product market at the Market 5/2007 level either.

However, a question of relevance to the 2016-2020 period is whether this situation may change with the introduction of LTE technology. LTE is expected to improve the bandwidth achievable through mobile connections, therefore – all else remaining equal – bringing it closer to the bandwidth that is offered through fixed connections.

As a cautious expectation, we do not expect LTE to generally bring mobile Internet access into the same relevant product market at the retail level as fixed Internet access. The main reason is that all else is not expected to remain equal. We expect the fixed connection bandwidth capability to also gradually increase over the next years, as it has done over the previous years. Therefore, it is not clear that the improvements to mobile bandwidth due to LTE will bridge the gap with fixed bandwidth over the next years. Nevertheless, this cannot be predicted with certainty. For the (less probable) case that LTE does become a sufficiently strong substitute to fixed broadband connections for sufficiently many consumers within the relevant timeframe, we will investigate the implications for market analysis and dominance separately.

With higher probability, we expect mobile Internet access to predominantly remain a complementary service to the fixed connection, to be used when on the move. An interesting exception is the case of Austria, described below. However, we consider the Austrian case to be an exception to the rule, due to the fact that the incumbent copper operator in Austria has been relatively slow in rolling out its DSL product, giving mobile operators a relative competitive advantage that differs from other Member States.

Case study Austria on mobile broadband and Market 5/2007

For the consumer market, RTR does not assess competition at the Market 5/2007 level. RTR does not come to such assessment because it finds, based on a greenfield analysis of the consumer retail market that the retail market does not pass the Three Criteria Test. More specifically, RTR finds that the consumer retail market for Internet access tends towards effective competition (i.e. 2nd criterion not passed).

This finding is based on evidence at the retail level that cable broadband, mobile broadband and DSL broadband are in the same retail market for consumer Internet access. Mobile broadband represents roughly one third of all broadband connections in 2010, up from about 12% in 2007, and roughly three quarters of mobile broadband connections are bought as a substitute to a DSL broadband connection.

The Commission voiced serious doubts about RTR's finding, questioning, amongst other things, "whether all three types of broadband connections can be used for applications such as the download of music or films and whether they provide sufficiently secure connections allowing customers to use any of the connections for Internet banking and other applications requiring a protected connection, as many residential broadband users use such functionalities of their broadband connection. Also, RTR does not make reference to the role that double, triple or quadruple play offers already have in the retail market for residential customers. Such offers are usually considered a key source of non-substitutability between fixed and mobile broadband services in other European markets."[76]

The Commission later withdrew its serious doubts, and commented on (amongst others) the inclusion of mobile broadband connections in the residential customers retail broadband access market definition, on the impact of the inclusion of mobile broadband connections in the market definition at the wholesale level and potentially changing broadband market structures over time.

Competitive assessment at the national level

In most geographical areas of our notional RMS, there is only a single network that is capable of offering the retail service of broadband Internet access for residential customers. For this predominant competitive setting, of a single infrastructure only, there remains a clear-cut case of dominance at the retail level. We do not expect this to change over the next 7 years, although

[76] Commission Serious Doubts letter in case AT/2009/0970: Wholesale broadband access in Austria, 5/10/2009, C(2009)7720.

NRAs should be careful to monitor the actual effects that technological advances of mobile technology may have.

Competitive assessment at sub-national level

There may be regions where there are two (or even more) infrastructures that compete at the retail level and, depending on the type of network, even at the relevant wholesale level. In the two-infrastructure case, the effect of infrastructure competition at the retail level should first and foremost be taken into account at the stage of the greenfield retail market assessment. Secondly, the disciplining effect of other infrastructure-based competition, if it does not belong to the relevant wholesale market, should be taken into account during SMP analysis. This means that, even though the market share of the copper incumbent may be high at the relevant wholesale market level, there may be significant indirect competitive constraint from competition at the retail level.

On the other hand, such infrastructure competition may only exist at a sub-national level in most Member States, in which case there may be a case for defining a separate sub-national relevant geographic market. Such a sub-national market will however not be the predominant case in most Member States, which implies that such assessment should be left up to the individual NRAs. Even if most Member States had sub-national markets with competition between two infrastructures, the predominant case would still be the larger (sub-national) market with only one infrastructure. For that reason, we only focus on the single-infrastructure case here. As discussed in chapter 2, it may be of importance that NRAs consider the merits of defining separate relevant markets for sub-national markets if the competitive conditions diverge sufficiently.[77]

Summary

Of all the retail services that are related to the wholesale markets 4/2007 and 5/2007, only broadband Internet access is of direct relevance to our RMS in terms of competitive issues at the retail level. We find that a clear case of SMP exists in the greenfield setting of our RMS at the national level. The Three Criteria Test is satisfied. For that reason, Market 4/2007 should be assessed, which is done in the next section.

Note that this outcome, though it may hold for our notional RMS, may not hold for every Member State. Obvious exceptions could be Member States that have more than one fixed infrastructure competing nationally at the retail level. Furthermore, there is a possibility that with the advent of LTE, mobile broadband Internet access may become a sufficiently strong substitute for fixed broadband Internet access. In that scenario, the Austrian case described above provides guidance. The retail market may still not be sufficiently competitive in a greenfield setting, warranting Market 4/2007 assessment, though of course each NRA should investigate this question separately for their respective Member State. In this scenario, the Three Criteria Test could be carried out at the retail level in a greenfield setting in order to determine whether any regulation at a wholesale level is warranted.

7.3 Local or physical access: market definition and competitive assessment

7.3.1 Current situation

Traditionally, local loop access takes the form of physical access to the unbundled twisted copper pair. However, as technology progresses, virtual alternatives to physical local loop access are

[77] Interesting questions arise in relation to what kind of regulation one should have with two infrastructures. See *e.g.* Vareda, J. en S. Hoernig (2010) Racing for Investment under Mandatory Access, *The B.E. Journal of Economic Analysis & Policy*, Berkeley Electronic Press, 10(1), 67.

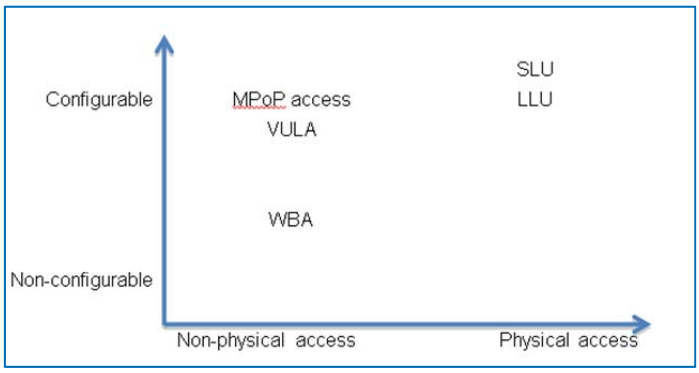
emerging. The Regulatory Framework requires that relevant markets should be defined in a technologically neutral manner. Within the first market recommendation, Market 4/2007 was defined as wholesale, unbundled access (including shared access) to metallic loops and sub-loops for the purpose of providing broadband and voice services. In view of the increasing development of other access technologies, the term 'metallic loops' became out-dated. Consequently, within the 2007 Recommendation Market 4/2007 is defined in a more technological neutral way as "(physical) network infrastructure access". We will revisit the question to what extent this definition remains technologically neutral today and in the upcoming years in the next section.

Due to the aim of technologically neutral market definition, one of the most important questions for the definition of Market 4/2007 is what types of technologies can be included. So far, only copper- and fibre-based local access have been included at the Market 4 level.

7.3.2 Market definition 2016 – 2020

Physical vs. virtual access

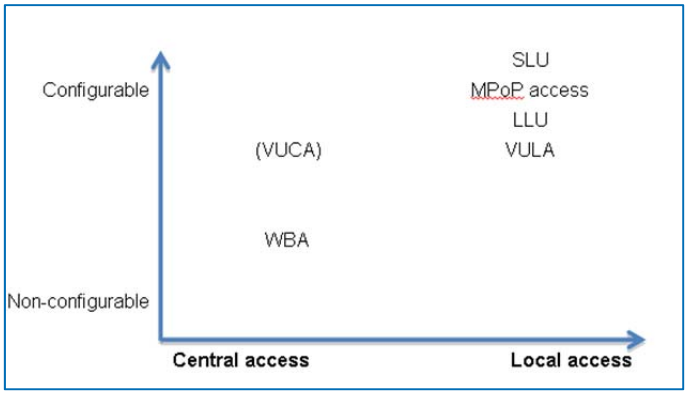
The 2007 Recommendation definition of Market 4/2007 ("physical network infrastructure access") aims to be technologically neutral. However, the distinction between physical and virtual access may become obsolete with the emergence of new technology. In particular, with the emergence of NGA, the Virtual Unbundled Local Access (VULA) method does not seem to fit within the typology created by the term "(physical) infrastructure access" (see graph below). In a technological sense, VULA provides virtual access (similar to WBA). Functionally, however, it may be a closer equivalent to physical LLU. This suggests that the distinction between physical and virtual access may no longer be the most important factor distinguishing Market 4/2007 from the further upstream Market 5/2007. The figure below arranges the various access services according to the dimensions 'configurable vs. non-configurable access' and 'physical vs. non-physical access'. This does not provide any meaningful grouping of services.



From a market analysis point of view, the terms 'physical' vs. 'non-physical' access serve as proxy terms to describe the level of replicability of the retail services. For the market definition, it is the level of replicability that matters, not whether this is achieved through physical or non-physical access. Since the distinction between physical and non-physical access is becoming blurred with the emergence of access methods such as VULA, it may be appropriate to depart from the physical vs. non-physical terminology and adopt a slightly alternative distinction, such as local vs. non-local or central access.

In theory, a service that is functionally equivalent to VULA could also be offered at a central network level. If it was, it would be on a par with WBA in terms of replicability, but, provided it is specified appropriately, broadly on a par with VULA in terms of configurability. Such a service might be named VUCA (the C stands for 'central'). VUCA as an access service would not be useful from the

ladder of investment perspective, since it does not incentivize entrants to roll out their own network to a local level (as achieved by VULA). It might also be very costly to provide as it would not permit multiplexing of traffic to make efficient use of the trunk network. For that reason, we will not explore the possible implications of VUCA further. Graphically, the different forms of access may be represented as follows. The figure shows a more useful grouping of access services.



We therefore propose to modify the definition of Market 4 from 'wholesale (physical) network infrastructure access' to a new definition along the lines of 'wholesale local access' or WLA. Such a definition would include SLU, LLU and VULA but exclude e.g. VUCA and WBA.

Following the same reasoning, the definition of Market 5/2007 ("wholesale bitstream access") could be reformulated as 'wholesale central access' or WCA. The current Recommendation describes that "this market comprises non-physical or virtual network access", which will hold in the future but may no longer be a distinguishing feature from the Market 4/2007 level. It may therefore be useful to place more emphasis on the fact that the Market 5/2007 level provides access at a non-local level, in order to distinguish it from the local access characteristic of Market 4.

Might markets 4/2007 and 5/2007 belong to the same relevant product market?

The question whether the wholesale markets 4 and 5 may be combined depends inter alia on whether the products delivered on these two markets represent complements or substitutes. One might argue that the two products can at least partly be classified as substitutes, e.g. to a potential entrant considering two strategies for rolling out national coverage – WBA and LLU access may be weighed-off against each other.

However, this does not have the usual implications for market definition in terms of the hypothetical monopolist (HM) test. The reason for this is that the two products are vertically related – the WBA product is an explicit or implicit part of the LLU access product. This means that an entrant that decides to roll out to the MDF level will still consume the WBA product, be it internally. For this reason, the products currently distinguished by markets 4 and 5 are in actual fact complementary products that can not belong to the same relevant product market in a strict market definition sense.

Since a market definition encompassing both the Market 4 and 5 level would be at odds with general competition law principles, we therefore do not propose introducing an all-encompassing wholesale access market.

Note that when strictly following the same reasoning, sub-loop unbundling of the copper twisted pair in the street cabinet might also be considered to belong to a different wholesale market than Market 4/2007, since it requires a substantially different level of network roll out. Notionally, SLU is an input to LLU. We do not consider this issue to be of great importance, since SLU does not generally

appear to be a feasible access level for entrants in practice (due to the poor economies of density at the street cabinet level).

Which network technologies are part of the market for wholesale local access

Assuming the market definition of Market 4/2007 is adapted to include virtual alternatives at a local level to physical infrastructure access, any network that is capable of offering access that enables, in a functional sense, the delivery of broadband access to end-users through interconnection at the local level (be it physical or virtual), may be found to belong to the same relevant product market. This will however also crucially depend on whether such a network is able to deliver the functionally equivalent service at a similar cost. NRAs will have to pay special attention to this in any case where the inclusion of an alternative technology may impact the outcome of the SMP analysis.

Traditional copper local loop access network

This is the first product generally considered in the market definition. Copper local loop access may be referred to as the "focal product".

Fibre to the Home access network

A complete fibre optic access loop may be either a point-to-point network or a point-to-multipoint (or passive optical) network. If it is a point-to-point network, physical access at a local node is functionally equivalent to traditional LLU. If it is a point-to-multipoint network, VULA is (if suitably specified) functionally very similar to traditional LLU.

There is a possibility that Wavelength Division Multiplexing (WDM) becomes commercially available within the relevant timeframe. WDM can (in theory) be functionally similar to traditional LLU. Whether this turns out to be the case in practice remains to be seen. For the purposes of our analysis, we will assume that WDM is part of the same relevant market as traditional LLU.

Fibre to the Curb or Street Cabinet

Again, the fibre optic network may be either a point-to-point network or a point to multipoint (or passive optical) network.

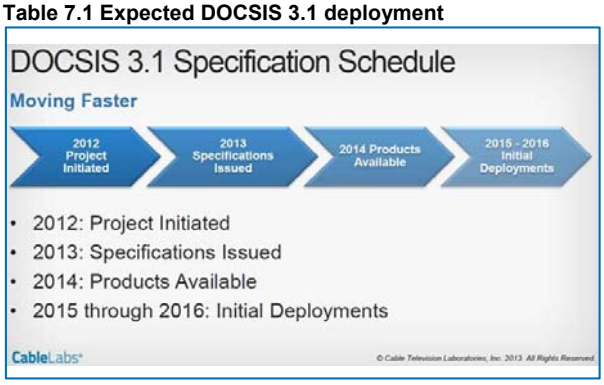
First of all, physical access is possible (but apparently not generally commercially viable) at the SLU level. Due to the SLU level being at a less replicable level than the LLU level, it is questionable whether SLU access strictly belongs to the same market as LLU, however, the question does not have important implications since access at this level is generally not commercially viable in most Member States.

If the fibre optic network is a point-to-point network, physical access at a local node is equivalent to traditional LLU. If it is a point-to-multipoint network, VULA is (if suitably specified) functionally equivalent to traditional LLU.

Cable networks

The eventual adoption of the DOCSIS 3.1 standard should enable VULA-type local access on cable networks. Once this happens (which may not be for another five years), this can probably be found to be a functional equivalent to LLU over traditional networks. The following picture gives an idea of expected DOCSIS 3.1 deployment.

Table 7.1 Expected DOCSIS 3.1 deployment



Source: Cable Television Laboratories.

In some Member States, the cable networks consist of fibre optics up to the street cabinet level. Such networks may in a technological sense be deemed identical to the FTTC networks rolled out by copper incumbents. Therefore, these may well be found to belong to the same relevant market at the wholesale Market 4/2007 level.

There is some uncertainty whether a cable-based LLU service should be included in the relevant market based on direct substitution arguments. On the one hand, if cable operators are technologically able to offer a substitute access service to copper-based LLU, there might be a case for including it in the relevant market (arguments of switching costs of present LLU-based entrants should be disregarded, since the analysis is done from a greenfield perspective). On the other hand, cable is not nationally ubiquitous in our RMS, whereas national ubiquity could be a specific product characteristic that LLU-seekers might demand. If that were the case, cable does not qualify.

However, given that cable only represents approx.15% market share at the national level for our RMS, and we do not expect this to change to a large extent between 2016 - 2020, the question whether cable does or does not belong to the same relevant market at the Market 4/2007 level does not impact the outcome of the competitive assessment at a national level. In our competitive assessment we exclude cable from the relevant market in order to “err on the side of caution”. Even if cable were included in the relevant market at the national level, the limited market share at the national level would not impact the finding of SMP. However, this may vary strongly between Member States. Member states that have a much higher cable presence than average should carefully assess the implications of the existence of cable in their case.

Note that there may also be important considerations of sub-national geographical relevant market delineation to be considered when there are existing cable networks at a sub-national level (which is usually the case). We therefore spend some thoughts of what the implications could be at the sub-national level in our competitive assessment (section 7.3.3).

LTE

There is a possibility that LTE technology has the effect of creating a mobile broadband service that turns out to be a demand-substitute to fixed broadband services, although there will most likely remain a price difference between LTE and fixed broadband services (if not due to underlying cost differences, then simply because the LTE service offers an additional feature that fixed access can not offer, i.e. mobility, which the market should place a premium on). We therefore do not expect LTE to become a strong substitute to fixed broadband access within the 2016 – 2020 period. Note that this expectation would exclude LTE from the relevant market already at the retail level. In the (less likely) scenario that LTE does become a sufficiently strong substitute for fixed broadband Internet access at retail level within the relevant timeframe, NRAs will have to assess whether this

provides sufficient competition at the retail level in absence of any regulation. We do not expect that outcome to be the case in most Member States.

Market definition summary

In summary, we define the relevant product market at the Market 4/2007 level as "wholesale local access" or WLA. In the 2016 – 2020 period, this market includes:

Network technology	Wholesale local access product
Traditional copper local loop	**Local loop access at MDF**
P2P fibre to street cabinet or home	**Physical access at the local node**
PON fibre to street cabinet	**VULA and sub-loop access at street cabinet.**
PON fibre to the home	**VULA and Wavelength-division multiplexing (WDM)**

7.3.3 Competitive assessment

Given the relevant product-market definition above, we can now assess what the expected level of competition will be in this market for our RMS.

In most geographical areas, there is a single network that is capable of offering the relevant access service. For this predominant competitive setting of only a single infrastructure, there remains a clear-cut case of dominance at the WLA level. We do not expect this to change over the next 7 years.

We do not expect alternative technologies to sufficiently discipline the single incumbent network that exists in the majority of geographical areas for the relevant timeframe. However, NRAs should be aware that the possible effects of other upcoming technologies, such as LTE, may at some stage impose significant competitive constraints at the retail level. Such constraints should first and foremost be identified at the greenfield analysis of the retail level and, secondly, these should be considered at the competitive assessment stage of the relevant wholesale market.

Sub-national markets

There may however be regions where there are two (or even more) infrastructures that compete at the retail level and, depending on the type of network, even at the relevant wholesale level. In the two-infrastructure case, the effect of infrastructure competition at the retail level should first and foremost be taken into account in the stage of the greenfield retail market assessment. Secondly, the disciplining effect of other infrastructure-based competition, if it does not belong to the relevant wholesale market, should be taken into account during SMP analysis. This means that, even though the copper incumbent's market share may be high at the relevant wholesale market level, there may be significant indirect competitive constraint from competition at the retail level.

Alternatively, such infrastructure competition may only exist at a sub-national level in most Member States, in which case there may be a case for defining a separate sub-national relevant geographic market. Such a sub-national market will however not be the predominant case in most Member States, which implies that such assessment should be left up to the individual NRAs. Even if most Member States had sub-national markets with competition between two infrastructures, the predominant case would still be the larger (sub-national) market with only one infrastructure. For that reason, we only focussed on the single-infrastructure case here. Again, NRAs may consider the merits of defining separate relevant markets for sub-national markets if the competitive conditions diverge sufficiently.

7.3.4 *Conclusions on the Three Criteria Test*

Because of the existence – in most geographical areas – of only a single infrastructure that is capable of offering the relevant WLA service (equivalent to Market 4/2007), the Three Criteria Test is satisfied in the RMS at the national level. More specifically, high and non-transitory barriers to entry exist and are expected to remain for the relevant timeframe, the relevant market structure is not expected to tend to effective competition within the relevant timeframe, and application of competition law alone is not expected to be able to sufficiently resolve the market failures concerned.

7.4 Relevant retail markets: modified greenfield assessment

In accordance with the ladder of investment principle, as described in chapter 2, it is appropriate to reassess the retail markets in a modified greenfield setting after having addressed any competitive issues found in the market for WLA, prior to assessing the market for wholesale central access (WCA). We carry out such a reassessment here.

In section 7.2 we found that the retail service of broadband Internet access is the primary retail service relevant to the assessment of the local and central wholesale access markets. We therefore reassess only this retail market in the modified greenfield context, referring back to section 7.2 for the other related retail markets.

First of all, we briefly recap the findings of the competitive assessment of the retail market for broadband Internet access in the greenfield setting: We found that at a national level in the most probable scenario, there is a clear case of single dominance of the incumbent fixed network operator. However, we noted that a different result could hold at a sub-national level, where the presence of two or more infrastructures may lead to a significantly different competitive setting. Furthermore, we noted that there is a possibility that with the advent of LTE, mobile broadband Internet access may become a sufficiently strong substitute for fixed broadband Internet access at the retail level. This is also of relevance to the present modified greenfield analysis.

7.4.1 *Competitive reassessment*

We presuppose the imposition of adequate remedies at the market for WLA, ensuing the finding of SMP at that level (as assessed in section 7.3). Such remedies should have the effect that entry on the retail market is possible through regulated access at the WLA level. We therefore assume that, for most areas, if the price level on the retail markets is structurally too high (or the quality level too low), this will provoke entry through the possibilities created by regulation of WLA. For most areas, such entry (or even the threat of entry) should be able to discipline the incumbent to a sufficient extent, i.e. lead to effective competition at the retail level for most areas. Furthermore, if mobile broadband Internet access through LTE provides a sufficiently strong substitute to fixed broadband Internet access, this will provide added disciplinary force to the incumbent, which would further strengthen this outcome.

However, for some areas this result may not hold. There may very well be areas (e.g. areas of low population density) that, for a potential entrant, are unviable to roll out to the WLA level. Rolling out an own network to the local level involves significant costs which an entrant should be able to expect recovering through servicing a large number of end-users at that local level. If the population density of a specific local area is particularly low, this expectation may not hold. Therefore, areas may remain where, even in the presence of regulated access at the level of WLA, no credible threat of entry ensues. Dominance of the incumbent may remain at the retail level for such areas.

Since this possibility of lack of effective competition in the modified greenfield setting is expected to occur in some regions of most Member States (or, in other words, in some regions of our notional RMS), it is appropriate to conclude that the Three Criteria Test is met for those areas where the remedies at the level of WLA do not lead to sufficient entry.

Note that the above analysis holds for the mass-market of broadband Internet for residential customers. However, for the non-residential segment there may exist a separate set of issues that remain after proper imposition of regulation at level of WLA. Specific to the retail market for broadband access for non-residential customers, the scale of demand may not be large enough to make roll out to LLU level viable for a business operator. This implies that competitive issues that may exist for this particular market segment may not be remedied adequately at the WLA level. We deal with these particular issues separately in the next chapter.

7.4.2 Impact of NGA trend

The current trend of NGA roll out may have a negative impact at the WLA level, e.g. because the fibre optic network is a passive optical network, disallowing traditional forms of local physical access. This may especially be the case if wavelength unbundling techniques turn out not to deliver functionally equivalent alternatives to physical unbundling within the relevant timeframe (which only time can tell). This may in theory reduce the possibilities of entry at the retail level through access at the WLA level. If this turns out to be the case, the impact of regulation at the WLA level on the competitive state of the retail markets may decrease. In that case, it may be appropriate to conclude that in the modified greenfield scenario for the retail market, the Three Criteria Test is not passed at a national level.

7.5 Wholesale central access: market definition and competitive assessment

7.5.1 Current situation

Market 5/2007 comprises wholesale bitstream services and equivalent services. The Recommendation defines it as the provision of non-physical or virtual network access in order to be differentiated from Market 4/2007. However, as already discussed, the distinction of physical/non-physical access appears set to become obsolete due to technological change. The definition should therefore shift focus to the level of replicability, possibly better captured in terms of local vs. non-local access and level of configurability.

Currently, bitstream access to networks based on copper access networks and (partial) fibre access networks is generally included in the relevant product market definition based on demand-side substitution arguments. In the next section we assess which access products belong to the relevant product market based on direct pricing constraints.

An issue that is particularly relevant to WCA is how to take into account technologies that may compete at the retail service level but may not offer a viable alternative to wholesale central access. This question is dealt with in the next section in the “indirect pricing constraints” paragraph (p. 119).

A final issue of relevance to the market definition of WCA is the implication for the market definition of the existence of a low- and a high-quality segment at the retail level. Related to this, an issue that deserves brief attention is the possible existence of pan-European business markets. The implications of the existence of such a market are briefly investigated in the next chapter.

7.5.2 Market definition 2016 – 2020

Direct pricing constraints

Copper local loop operators

The main source of potential competitive pressure may arise from operators that have rolled out their own network up to the local access point and are thus able to offer WCA to third parties. This includes the incumbent network operator and any LLU-based entrants.

An external WBA-type service has been known to be offered by LLU-based entrants in practice but it appears so far to be a rather marginal phenomenon. Reasons why LLU-based competitors might not be very successful as a WCA supplier could very well be that they do not (usually) have national LLU coverage so they cannot offer national WCA coverage (so the incumbent may have a superior offer in this respect) or that it may be too cumbersome to get WBA from an LLU-entrant, since there are then two parties instead of one between the WBA-based entrant and the end-user. This may lead to process inefficiencies as well as (potential) problems stemming from non-uniform service level agreements. Moreover, there may be an issue of double mark-ups that make the LLU-based competitor less competitive than the incumbent (although strictly speaking, such issues could be resolved in the regulation at the WLA level).

Since the LLU-based competitors should in principle be capable of offering a WCA service externally, their self-supply of WCA should be accounted for in the market shares at the WCA level. However, since there are important reasons why LLU-based competitors may be less competitive than the incumbent at the WCA level externally, the SMP assessment should take into account that the presence of self-supplying LLU-based competitors at the WCA level may lead to market shares that understate the actual market power of the incumbent.

Fibre networks

The Commission believes that there is a chain of substitution within the category of DSL-based services, e.g. ADSL, ADSL2, ADSL2+, VDSL or other DSL technologies. Fibre is considered as the next generation access networks, and its roll out is generally based on the typology of copper networks. Consequently, the Recommendation maintains that fibre in principle should be also included into the market for WCA due to the direct competitive constraints on copper networks at the WCA level. We do not see any reasons why this argumentation might not hold for the 2016 - 2020 period as well (considerations with regard to investment incentives left aside – an issue that deserves separate attention outside the scope of this assessment).

Cable

It has been considered that even if cable were to offer a commercial WBA product (which is currently rare, though not technologically impossible), the considerable switching costs that current copper-based WBA entrants would face in order to switch over to cable would prevent the cable WBA service to have a disciplining role on the price setting behaviour of a hypothetical monopolist at the WCA level. If this were indeed the case, cable WBA would have to be excluded from the relevant market despite the assumed existence of a commercial cable WBA offer.

However, this argument may be flawed for the following reason. When determining what wholesale products belong to the same relevant market at the WCA level, a modified greenfield approach should be followed. This implies that the existence of regulation may be assumed to exist in upstream markets, such as at the market for WLA, but not at the level of wholesale central access. Therefore, the existence of WBA-based entrants and the eventual switching costs they would face

when switching from copper to cable should not be considered at the market definition stage. This is illustrated with an example.

Example of modified greenfield analysis

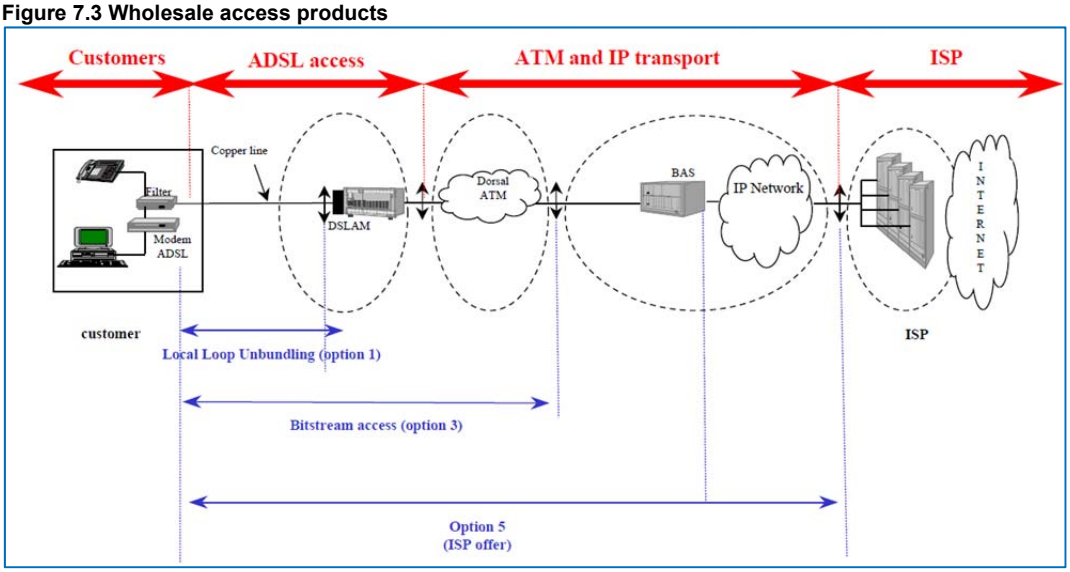
In the (hypothetical) modified greenfield scenario, we assume that local access regulation is in place but there is no WCA regulation. This means that there may be LLU-based entrants in the market, but hypothetically there are no WBA-based entrants in the market yet. The market for WCA is then assessed for dominance in this hypothetical situation. If a cable-based external WBA offer can exist and represents a technically functional substitute to copper-based WBA at similar cost, such a WBA service should most likely be considered to be part of the same relevant market as copper-based WBA. Any argument related to switching costs from copper-based WBA to cable-based WBA should be disregarded in this analysis since in this hypothetical case, no copper-WBA-based entrants exist yet.

WBA over cable may be of interest to entrants for a strategic reason as well. It gives them an alternative to the copper incumbent, therefore strengthening their bargaining position vis-à-vis the incumbent.

A question of relevance here is whether cable operators are able to offer a WBA service (or functional equivalent) on a commercial basis, which we briefly discuss here. First of all, the point was frequently heard that the eventual introduction of the DOCSIS 3.1 standard shall enable WBA access over cable technologically. However, as far as we understand, DOCSIS 3.1 does not have anything extra in it that would allow access sharing. DOCSIS 3.1, just like other DOCSIS technologies, is a common path. A cable modem termination system (CMTS) is required to connect to the cable plant. The only way to really allow shared access is for third parties to setup up layer 2 or layer 3 VPN services over a CMTS that is managed by the local cable company, i.e. logical connections rather than physical. If configured to do so, the CMTS can detect these connections, provide separate QoS, and route the packets over a any number of separate real or virtual backbone connections to a third party provider.

Numericable in France provides a wholesale service akin to WBA access. According to them it is not feasible to reserve a frequency band for a third party in the cable, instead they are handing over IP traffic to the ISP at national level, corresponding basically to ‘option 5’ in Figure 7.3 below. Numericable has a commercial agreement of this type with Bouygues.

Figure 7.3 Wholesale access products



Source: Cegetel (now SFR) 2002[78].

Other than the French example given above, other cable wholesale access offers are available in Hungary[79] and Denmark[80].

For the reasons given above, one can assume that cable operators are capable (technologically and commercially) of offering an access service akin to WBA. However, NRAs should investigate whether cable operators in their Member State also do offer such services (or would at least be willing and able to do so in the short term). If it is found that a cable operator would be willing and able to offer WBA on a commercial basis, it may be appropriate to include cable within the relevant product market at the WCA level. However, offering WBA on a commercial basis is not sufficient to determine that WBA over cable would belong to the same relevant market as WBA over the incumbent's network. To be included in the relevant market, the cable-based WBA offer would have to be a credible alternative to other WBA products that could conceivably exist at the WCA level. The proper test from a modified greenfield perspective would be whether a potential entrant, who is considering entering the retail market on the basis of an externally purchased WBA-service, would be willing to choose cable-based WBA instead of other WBA in case of a SSNIP of the other WBA.

Note that there may also be important considerations of sub-national geographical relevant market delineation to be considered when there are existing cable networks at a sub-national level (which is usually the case). We therefore express some thoughts on what the implications could be at the sub-national level in our competitive assessment (section 7.5.3).

Indirect pricing constraints and market definition

Much has already been written by NRAs and the Commission concerning the relevance of indirect price pressure from e.g. cable networks on the WCA level. The same arguments have also been applied to other technologies such as mobile broadband access and WiFi.[81]

78 *see: http://ec.europa.eu/competition/sectors/telecommunications/archive/inquiries/local_loop/esser_cegetel.pdf.*

79 See http://www.telekom.hu/services/wholesale/national_fixed_line_solutions/broadband/ws_broadband_cable_bitstream_acces_service.

80 See http://yousee.dk/YouSee_Wholesale/Produktbeskrivelse.aspx.

81 Note that theoretical consideration of indirect pricing constraints posed through retail services would only be relevant if such platform is not already included in the relevant market through direct pricing constraints at the wholesale level (which has been dealt with in the previous paragraphs).

Briefly summarizing, a number of NRAs have in past notifications presented the argument that even though an alternative technology may not be a direct substitute at the WCA level, it may indirectly discipline pricing on wholesale central access. This would be the case – so goes the argument – through a series of interrelated effects as shown below. Note that the alternative technology service is assumed to be on the same retail market but *not* on the same wholesale market. For the sake of conceptual clarity, we write "cable" instead of "alternative technology" – although the same argument has been used for other alternative technologies as well (such as WLL and mobile broadband internet access):

1. A SSNIP at the WCA level would affect the retail price level (because the WCA price level represents an input cost to the retail service – the copper operators are assumed to partly pass-through the price increase on the market for WCA to the retail price);
2. The retail price level would rise for all operators that use WCA as an input (i.e. all copper operators, including the retail branch of the incumbent[82]);
3. Since the cable broadband Internet access service belongs to the same retail market as copper broadband Internet access services, the price increase of the copper retail service causes end users to switch to cable;
4. This causes the number of end-users on copper to go down and therefore the demand for WCA decreases as well. This effect may be strong enough to offset the profitability of the SSNIP. In that case, the presence of cable at the retail level disciplines pricing at the wholesale level.

The theory behind such indirect pricing constraints is clearly presented by Cave et al. (2006), including the formal workings of the critical loss test that is required to formally test for indirect price constraints.

One element that the arguments for the existence of indirect price constraints have in common is that the SSNIP at the WCA level would to a large extent be passed on into the retail price by the copper-based broadband Internet service providers. This is usually supported by evidence of the relative importance of WCA as an input for the retail service (in terms of the total cost) and sometimes also by evidence of the slim margins between retail price and total cost which would prevent absorbing the SSNIP of WCA as an input.

Rather than dwelling on the merits of the various well-known aspects to the argument, we present one additional insight into the indirect pricing analysis that may be of significant relevance to the outcome. From the point of view of economic theory, it appears to be important to assess the expected level of pass-through of a cost increase into the retail price not only on the basis of the relative importance of the input cost and the possibly slim retail mark-ups, but also on the basis of the nature of competition at the retail level.

Crucially, the argument supporting indirect price constraints depends on the assumption that there is effective competitive pressure from the alternative technology at the retail level. If this is indeed the case, then economic logic would not necessarily predict that a SSNIP at the WCA level would be passed-on fully or even partly by the service providers at the retail level. The service providers are very likely to be forced to absorb the cost increase entirely or to a very large extent, precisely because of the fact that they are facing competition at the retail level from an alternative technology. The alternative technology supplier has an entirely different cost function, for which WCA is not an input. For that reason, the alternative technology operator will not automatically raise his own retail price following a SSNIP of wholesale central access. Therefore, the copper service providers have to choose between passing on the cost increase (which would cause them to lose

[82] The SSNIP test assumes there is a hypothetical monopolist at the Market 5/2007 level. This means that (within the test) even the incumbent itself is assumed to be a downstream customer of the hypothetical monopolist.

customers to the alternative technology) and absorbing the cost increase (which would cause their profitability to decrease). The effect that competitors with a different cost structure may have on the level of pass-on has been well documented in economic literature concerning merger efficiencies and cartel damages.[83]

Given this trade-off, it is not at all evident that the copper service providers, when faced with a SSNIP at the WCA level, will choose to pass on the cost increase to the retail price. If they do not, or only partly pass on the cost increase, the likelihood that the SSNIP is profitable to the hypothetical monopolist at the WCA level increases, which would suggest that the alternative technology should not be included in the relevant market.

The additional argument concerning the extent of cost pass-through makes it less likely that an alternative technology is found to belong to the same relevant wholesale market based on indirect price pressure. Nevertheless, the disciplining effect of the alternative technology at the retail level should not be disregarded. In order to do justice to the competitive effects of alternative technologies that may not be a direct competitor at the relevant wholesale level but that compete at the related retail level, we make two recommendations:

1. Before analysing wholesale central access, NRAs should always start with a modified greenfield market analysis of the related retail market(s) (i.e. taking account of any regulation that may be in place at the WLA level). The presence of alternative technologies at the retail level may lead to a finding of effective competition at the retail level. If that is the case, the NRA can restrict itself to performing the Three Criteria Test at the retail level in the modified greenfield setting, find that the test is not satisfied and therefore no regulation of WCA is warranted. This approach is followed by RTR (see Case study Austria on p.108);
2. If alternative technology belongs to the retail market but nevertheless SMP is found at the retail level, it may make more sense to include the competitive effects from the alternative technology in the competitive assessment phase than in the market definition phase, as has been frequently argued by the Commission.

We want to emphasise that even though the analysis may lead to the exclusion from the relevant market of alternative technology-based retail providers through an indirect price pressure mechanism, their disciplinary role must not be disregarded when assessing SMP. In this respect, improper inclusion of alternative technology at the market analysis stage may be preferable to inappropriate exclusion of the alternative technology at the SMP determination stage and, as a result, incorrectly ignoring the competitive implications of the existence of the alternative technology. It should always be clear that the disciplining role of another technology is, at the wholesale level, either accounted for by including it in the relevant wholesale market (thus affecting market shares and subsequently possibly leading to the imposition of regulation), *or* by taking it into account as a mitigating factor to market shares at the SMP stage, but not both.

Market definition summary

In summary, we propose to change the current definition of the relevant product market at the Market 5/2007 level to 'wholesale centralised network access' in order to juxtapose it to the proposed new definition of Market 4/2007 ('wholesale local network access'). In the 2016 – 2020 period, this market includes:

[83] See *e.g.* Froeb, Tschantz, & Werden (2005), *Pass-Through Rates and the Price Effects of Mergers*, 23 INT'L J. INDUS. ORG. 703-15, Ten Kate & Niels (2005), To What Extent are Cost Savings Passed on to Consumers? An Oligopoly Approach, 20 European Journal of Law & Economics 323-37 and Yde and Vita (1996), *Merger Efficiencies: Reconsidering the "Passing-On" Requirement,* 64 ANTITRUST L. J.735.

Network technology	Wholesale access product
Traditional copper local loop network, including LLU-based entrants	**WBA**
Fibre access network, including SLU, VULA and physical access based entrants	**WBA**
Cable network	**WBA**

7.5.3 Competitive assessment

Note on self-supply

In the absence of regulation, network operators may or may not choose to offer access on a commercial basis. If they do not, they may still be thought of as self-supplying the service. If such a network operator has been included in the relevant product market definition, some confusion may arise on the question whether such self-supply should or should not be included in the market assessment.

If the WBA product by the network operator in question has been included in the relevant product market on the basis of direct pricing constraints through demand-side substitution, their self-supply should generally be included in the market as well. The reasons for this are the same as the reasons that lead to including the product based on demand-side substitution arguments, i.e. if the product is deemed to form a sufficient demand-side substitute to other WBA products, the current self-supply may in the near-future also be marketed externally.

Note that the question of demand-side substitution in the market definition stage should not take into account any switching costs that currently locked-in WBA-based entrants may face, since the market analysis should be done on the basis of a modified greenfield approach. This means that considerations with respect to current WBA-based entrants should be disregarded.

Market shares

In our RMS we expect to have at a national level:

- An incumbent copper- and fibre-based operator with approximately 45-50% market share at the retail level;
- LLU-based competitors representing 30-35% of the market at the retail level;
- Cable represents 15% of the market at the retail level when measured nationally. We take this into account in our competitive assessment. However, it may do the competitive conditions more justice to define a separate sub-national market e.g. for the area covered by cable networks. We discuss the implications of such sub-national market in the next sub-section.

However, we suspect that these market shares at the national level are not representative of the competitive conditions at a sub-national level. We therefore recommend assuming a sub-national perspective on the relevant market.

Before discussing the competitive assessment at the sub-national level, we again note the potential future risk for competition in the market for WCA at the national level that stems from the fact that passive fibre optic networks disallow traditional forms of local physical access. This may in theory cause current entrants with local access to revert back to the market for central access. If such trend were to occur, a stronger argument for regulation of WCA at the national level would exist.

Sub-national markets

Areas with two infrastructures may very well have different competitive conditions at the WCA level than areas with only one infrastructure. At the WCA level, this may be of special relevance, since the regional differences may on the one hand be caused by the existence of two incumbent networks (copper and cable), but on the other hand may also be caused by the regionally heterogeneous roll out of copper-based entrants up to the local loop level. Hence there may be some merits of defining separate relevant markets for sub-national markets if the competitive conditions diverge sufficiently. This is in fact the approach taken by OFCOM for its Market 5/2007 analysis, which we discuss in the case study below.

> **Case study: OFCOM's approach to Market 5/2007**
>
> OFCOM determined that the competitive conditions on Market 5/2007 differ to such an extent between different localities that the definition of separate relevant geographic markets is warranted. For Market 5, OFCOM found the most natural unit to distinguish between relevant geographic markets to be the geographic area covered by the incumbent's local telephone exchanges. Subsequently, based on homogeneity of competitive conditions as well as expected near-future competitive conditions, OFCOM grouped the separate geographic areas into three distinct groups:
>
> a) where there is a single supplier;
>
> b) where there were two or three competitors; and
>
> c) where there were more than three competitors.

OFCOM's approach to grouping the separate relevant geographic markets into several groups for which the competitive conditions are homogeneous is a practical and effective approach to dealing with a large number of sub-national markets that all face similar competitive issues and is consistent with the EC SMP Guidelines. Their analysis dates from 2007. We do not expect the competitive situation of the UK in 2007 to be exceptional to such an extent that a similar competitive situation does not exist in any other member state to date. This suggests that other NRAs are either finding other methods of dealing with regional competitive differences or are avoiding the issue (e.g. for reasons of available resources).

We believe that OFCOM's 2007 approach to Market 5/2007 is exemplary as far as geographic market definition is concerned, especially as it appears that the additional analysis necessary to support geographic segmentation is not unduly burdensome. Of course this does not mean that the outcome of the analysis should also be the same across Member States. Portugal, for example, applies a similar methodology but finds different boundaries than OFCOM between geographic areas.

7.5.4 Remedying wholesale central access at local level

Since the markets for wholesale local and central access are vertically related (local access is an input for central access), we deal with the two markets in conjunction. One question that may be posed up-front is what the need is to define a second wholesale market downstream to the market for WLA. Arguably, effective regulation at the local access level should lead to effective competition downstream of the market for local access (as long as there are no other upstream bottlenecks). This question was dealt with in the Explanatory note to the 2007 Recommendation:

> The reason for identifying a second separate wholesale market was based on the view that even regulated local loop access would be insufficient in most Member States to constrain potential market power at the retail level and a significant entry barrier would still exist. The fact that the two wholesale markets are linked in this way to the same broadband retail market implies that it is logical for national authorities to undertake a single overall analysis of the broadband market which examines in sequence the impact that (a)

> regulated infrastructure-based access and (b) regulated (non-physical) network-based access could be expected to have on any significant market power that is identified. (Explanatory note, p.32)

This approach conforms to the iterative process fitting with the ladder of investment principle as outlined in Section 2.4.3. So far, we have assumed that the market for wholesale central access may not tend to effective competition within the relevant timeframe, amongst others due to the lack of ubiquity of LLU-based entrants. If one or more LLU-based entrants could be expected to reach a national roll out at the LLU level, the situation may change, since the entrant would then be able to offer an identical proposition to the incumbent (or superior, if the entrant is more efficient than the incumbent). However, the argument is generally accepted that entrants are unlikely to roll out to the LLU level in certain localities due to unfavourable economies of density (too few connections to make the roll out worthwhile).

A second argument is that even if an entrant were to have reached ubiquitous coverage in the WLA market, their WCA product might still be inferior to the incumbent due to the fact that there are two suppliers needed to reach the end-user (incumbent plus LLU-based entrant), whereas through the incumbent's WBA service only one supplier exists between the central access seeker and the end-user.

Both arguments deserve further scrutiny.

Economies of density

The first argument implies that the cost of LLU access in some localities may not be worth the expected benefit of roll out to the LLU level, whereas in other localities the cost of access does seem to be worth the expected benefit.

> Simplified example: We might hypothetically compare a market consisting of only two MDFs, MDF A servicing 6.500 end-users and MDF B servicing 3.500 end-users. If an entrant expects to gain 10% market share wherever he offers his retail product, he may expect to gain 650 end-users by rolling out to MDF A but only 350 end-users by rolling out to MDF B. The cost to the entrant of LLU roll out may be assumed to be such that it is only worthwhile if more than 500 end-users are won. In this example the entrant will want to roll out to A but not to B, therefore only covering 65% of the market.

Process inefficiencies or double mark-up problems

The second argument (of process inefficiencies) may clearly point to lack of sufficient regulation at the level of local access. The regulation at the local level should aim to take away any disadvantages that a LLU-based entrant might have compared to the incumbent. Realistically however, the only way to attain this may be through enforcing functional separation as done in the UK. Adequate regulation would ensure that there are no process inefficiencies if a WBA-based access seeker were to buy access through an LLU-based competitor. Such regulation at the local level would positively impact the level of competitiveness of the market for wholesale central access.

7.5.5 Conclusions on the three criteria

Because of the remaining existence – in some geographical areas – of only a single infrastructure that is capable of offering the relevant wholesale broadband access service (equivalent to wholesale central access), the Three Criteria Test is met in the RMS at such sub-national level. More specifically, high and non-transitory barriers to entry exist and are expected to remain for the relevant timeframe, the relevant market structure is not expected to tend to effective competition

within the relevant timeframe, and application of competition law alone is not expected to be able to sufficiently resolve the market failures concerned.

We therefore recommend that market for WCA remains on the list of relevant markets, but that special emphasis is placed on the fact that this market should in principle serve only to 'fill in the gaps' that might remain after adequate regulation of the local access market.

However, if the trend of increasing NGA roll out has a detrimental effect on uptake of local access, the importance of central access at the national level as an alternative may grow. We recommend that NRAs stay aware of this risk, which may justify the regulation of WCA in order to remedy competitive issues at a national level.

The present chapter has focused solely on the consumer mass-market for broadband Internet access and its implications for regulation at the central and local level. In the next chapter, we separately investigate any issues that may be specific to broadband access for non-residential customers and the specific implications these issues may have for regulation of wholesale central access.

7.6 Summary

The market for WLA meets the Three Criteria Test for the relevant timeframe of 2016 to 2020 at the national level of our RMS. We therefore recommend that Market 4/2007 remains on the list of relevant markets, albeit with a modified description.

The market for wholesale central access also meets the Three Criteria Test for the relevant timeframe of 2016 to 2020, but only at a sub-national level of our RMS. We therefore recommend that the market also remain on the list of relevant markets, albeit with the side-note that it should primarily serve to address regional competitive issues where sufficient competition at the retail level is not attained with effective regulation of local access in place.

The next chapter further investigates issues related to non-residential broadband Internet services that may have consequences for regulation at the level of WCA as well.

8 Wholesale central access in the non-residential segment

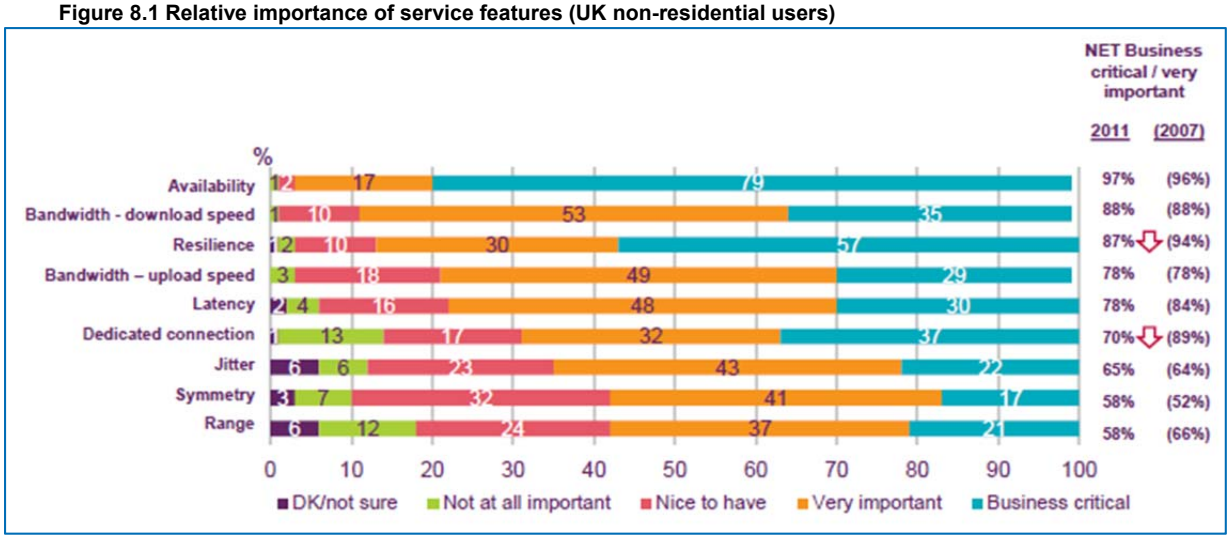
8.1 Demand for bespoke connectivity by non-residential users

8.1.1 High(er) quality

The previous chapter focused on the retail mass-market catering mostly to residential customers and small business customers. Arguably, residential customers all have slightly different tastes for bandwidth, performance and price of their broadband service. However, given the scale of the market and the typically low value per user, the market responds to this demand by offering several standard options from which the consumer has to choose. For most residential customers and for many small businesses, a mass-market product exists that sufficiently matches their demand.

In contrast to this mass-market outcome, the non-residential market segment is much more geared towards catering for the exact needs of every customer. These needs include: availability, upload and download rates, symmetry, resilience, latency, jitter, dedicated capacity and range (see Figure 8.1).

Figure 8.1 Relative importance of service features (UK non-residential users)



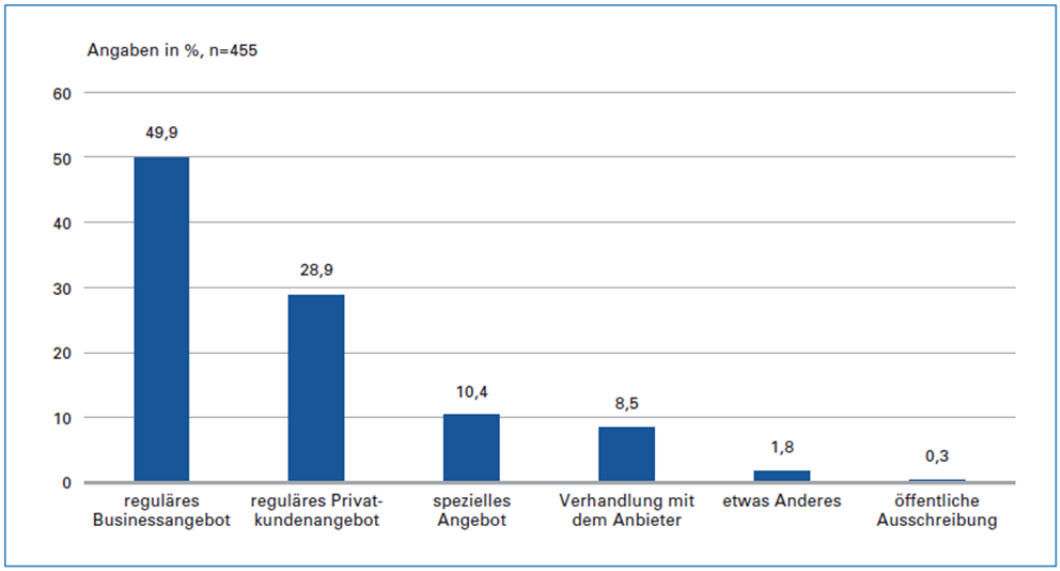
Source: Jigsaw Business Connectivity Services Review (prepared for OFCOM 2011); n (2007) = 450, and n (2011) = 461.

To cater for these needs, bespoke contracts are possible in the non-residential market due to the typically much higher value per contract. The values of the contracts tend to increase further as there is an increasing trend in outsourcing the management of communication services (see Jigsaw, 2011). Typically, these services are tied in the contract to the connection service. These findings specifically relate to business users in the UK,[84] but they are confirmed by a WIK survey among business users across Europe (2012). The WIK survey found that "Companies seek service reliability, bandwidth and technical resilience, along with security and satisfying service level agreements [and that] large companies are primarily interested in communications 'services' rather than the technological elements which underpin them." Also surveys in the Netherlands (Dialogic, 2011), Austria (RTR, 2011) and Spain (according to CMT) confirmed this picture.

[84] The source is the Jigsaw Business Connectivity Services Review, prepared for Ofcom in 2011.

However, not all businesses choose to source their services from the bespoke business segment. For some businesses, the available mass-market products suffice. An example could be a single-site retailer, who might only need connectivity in order to support credit transactions and look up stock availability in the supply chain and there may also be examples of multi-site retailers that interconnect using mass-market broadband products. Some businesses are able to opt for the mass-market products since the connectivity is not business-critical, so possible service interruptions are not too costly, whilst costs are saved through avoiding the more expensive business-grade connectivity solutions. From interviews with Intug and some IT service integrators, we understand however that the number of firms to which connectivity is not business critical is declining. Figure 8.2 presents the situation for Austria for the year 2010/2011.

Figure 8.2 Connectivity products by Austrian business users



Source: RTR (2011) end-user survey.
Translation: Reguläres Privatkundenangebot: regular residential product; Reguläres Businessangebot: regular business offer; Spezielles Angebot: special offer; Verhanldungen mit dem Anbieter: Negotiations with ISP; Öffentliche Ausschreibung: public tender; Anderes: other.

For the reasons given above, no clear segmentation exists between demand for connectivity from residential customers and from non-residential customers. A rather more meaningful segmentation exists between mass-market broadband products and bespoke connectivity products.

8.1.2 Single supplier

Many business users have a preference for buying their different services from a single supplier – see text below.

WIK (2012) – EU27

Business service users show an overall preference (69% of respondents) for using a 'single supplier' delivering a range of services to all relevant sites rather than separate suppliers for each site and/or service. Convenience was cited by 71% of respondents as an important consideration favouring a single supplier. Where companies preferred to use multiple suppliers, the preference was primarily due to value for money and need for resilience, or a preference for specialist suppliers for different services.

RTR (2011) - Austria

RTR asked Austrian businesses with several sites / locations whether they buy the Internet access from the same provider in all locations. The answer was 'yes' in 78% of the cases (the number of respondents

was however only 47, but the results from a 2009 survey were similar which indicates a certain robustness, according to RTR).

Dialogic (2011) – Netherlands

69 % of the multi-site companies are client of one specific supplier. This is especially the case for VPN, due to the supplier's responsibility of the construction and connection. The so-called one-stop-shopping is in addition popular because otherwise there is a need for sufficient knowledge internally regarding connections (especially when redundancy requirements are present).

CMT (answers during an interview) – Spain

Large business customers generally need at least a single solution for the fixed connectivity and a single solution for the mobile connectivity. The incumbent also sells bundles of both the fixed and mobile solutions together. The reason the business customers tend to buy the connectivity as a single solution is that they require a single interface to deal with any problems that may occur. Bitstream and leased line solutions are therefore mostly sold together so that the customer can deal with a single operator.

Jigsaw (2011) – UK

47% of respondents said they used more than one supplier (compared with 50% in 2007), and 53% use a single supplier for all BCS. More than half (54%) of the large companies (with more than 500 employees) use more than one supplier for BCS, compared with around a third (36%) of small companies (100 employees or less). On average, a small company uses 1.5 suppliers and a large company uses 2 suppliers.

The preference for a single supplier applies notably (but not exclusively) to a multi-site company. The multisite users, although limited in number, represent a considerable share of the market. WIK finds that only 2% of companies within the EU could be described as multi-site or multi-national corporations. In a survey among end-users in 2011 the Austrian regulator found it to be 5%. Both however conclude that this relative small percentage represents a considerable share of the market in terms of turnover (in Austria around 20% of the market). However, Jigsaw (2011) found for the UK considerable different figures: around 65% of the companies in their survey had more than 2 sites and around 40% had more than 5 sites. Nevertheless, we may conclude that multi-site users represent a considerable share of the market.

Because of the multi-site dimension of a company, it demands multiple connectivity solutions at different geographical locations connecting all its sites to a single ICT system. It may also require a low(er) quality or even a mass-market broadband product, for example, to connect non-critical sites or as a back-up for high-end connections. However, as became clear from the WIK study above, these need necessarily (and sometimes preferably) not be purchased from the same supplier. Notably a mass-market product can often easily be taken out of the bundle and procured separately without dramatically increasing transaction costs; if not, we would not be talking about a standardised mass-market product. Alternatively, the bundle may consist mostly of mass market products: e.g. a policy organisation with (say) 600 sites and connectivity is business critical to only 550 of these site. In that case, a one-stop-shop is still a preferred procurement model but in case splitting up the contract in two lots (low quality and high quality) would save some costs, a two-stop-shop might be worth the effort.

8.1.3 Summarising: three typical profiles of business users

No two businesses are identical. The specific connectivity needs vary from business to business. For some, connectivity is business-critical; for others this is less so. Most modern businesses have at least some connectivity needs. In order to clarify the spectrum of business connectivity needs,

we describe three typical cases that are located at the lower end, the middle and the higher end of the spectrum as we see it. As mentioned, the really low-end is characterised by non-bespoke (mass-market) solutions only, but we disregard these here (as this segment has already been dealt with in the previous chapter).

At the low-end we find a single-site company with more than 10 employees that typically needs a medium-bandwidth low-contention connection connecting their company to the Internet. This connection may serve the purpose of allowing the employees to access information necessary for day-to-day operations, as well as for remotely backing up the company's most important data. Furthermore, employees may need to be able to access the company's intranet from outside locations (e.g. home or customer premises) through VPN connections. For all these purposes, a single high-bandwidth, low-contention connection may suffice, including a good service wrapper (business grade service desk support, short repair times and guaranteed up-time of e.g. 99,9%). In addition to the high-speed, high-quality connection, the company could also opt for a second, lower speed, contended broadband connection, as a low-cost back-up connection should the main connection fail. This however depends entirely on the question whether the site is connected to a second access network. For most of these small firms this is not the case and redundancy is mainly provided by the guaranteed within the hour repair times (and possibly a mobile connection for keeping the business critical processes on-going).

In the middle of the range we find a multi-site company with more than 50 employees at various offices throughout the country. The main offices would all require uncontended high-bandwidth connections that interconnect the offices allowing all the employees to interact through intranet-connected terminals, share data, enable IP telephony, etc. The company is likely to have a data centre at one of the offices and a secondary (back-up) data centre at a remote location, which would require a dedicated uncontended high-bandwidth connection between the two. In addition to these connections, the business may have one or more secondary sites that do not require the same high-end connectivity. The business could for example have a showroom at a separate location, staffed by only two or three employees, which would be much less dependent on a rock-solid data connection. For such 'satellites', a lower-cost, low-bandwidth contended connection with lower SLA might suffice. Typically, the entire range of connectivity services required is catered for by a single operator in a single contract, except for the redundancy lines (this depends on the network architecture(s) to which the site is connected).

At the high-end we find an international multi-site company with more than 500 employees that has similar needs as the middle-of-the-range company described above, with the additional need for international interconnectivity. Ideally, the company would have the same connection specifications in each country although this may not always be available.

Typical to all types of business customers in the range given above, is that a significant proportion prefers to purchase the range of connectivity services required from a single operator, saving contracting costs and leading to a single contact for any connectivity issues (helpdesk, disruptions, special requirements, etc.). However, some firms specify dual connectivity over different infrastructures to avert the risk of network failure and implement this via separate suppliers.[85]

[85] Note that the above profiles have been verified with a selection of business users during interviews – see also appendix 4.

8.2 Implications at the wholesale level

At the retail level we typically see that demand for Quality of Service (QoS) is getting more diversified and that there is a continuum of different quality grades demanded by medium-sized and large firms. This trend imposes an increased need for operators to differentiate in terms of QoS. Both the incumbent owning a network and the Altnets having LLU access do not face any bottlenecks in this respect. However, an Altnet relying on bitstream access may face a bottleneck if the differentiated retail products offered in the market by the incumbent are not all available at the WCA level. This issue is not always explicitly recognised in most NRAs' analyses of Market 5/2007. Some Member States did identify the issue and differentiated between residential and non-residential products (e.g. Austria) or between high- and low-quality WBA products (e.g. the Netherlands).

For the continuum at the high-end, i.e. catering to the needs of medium- and large-sized firms (including multi-site customers), there is a question of possible substitution with Market 6/2007 type services. We therefore deal with this issue in conjunction with Market 6/2007 in the next chapter. However, also at the lower end of the continuum, the fact that there is a separate demand for high(er) quality (bespoke) broadband services may have implications for the regulation of WCA. This issue is investigated further below.

8.2.1 Implications of bundling

As described above, a significant proportion of non-residential customers has a need for multiple electronic communication solutions. These non-residential end-users prefer to purchase these solutions in a bundle from a single supplier. That supplier can be the national incumbent operator, a national challenger in the business segment or an international integrator that operates on a pan-European scale. Typically, the latter relies fully on bitstream access.

In the previous chapter, it was found that generally there remains a clear-cut case for national regulation at the level of local access. This was subsequently found to deal with most competitive issues at the retail level, such that only a marginal (possibly sub-national) case remained for regulation at the WCA level. However, the same reasoning may not hold for the bespoke non-residential segment where retail suppliers need to offer a competitive full-service package (or bundle):

- First, bespoke non-residential demand does not have the same scale as "mass-market" demand. Therefore, it may be less viable for suppliers of this bespoke segment to resort to wholesale local access;
- Furthermore, alternative DSL-operators with local access that target the mass-market are often inexperienced in servicing the non-residential segment and may not be fully equipped or organised to deal with the demands of the bespoke non-residential segment;
- Finally, in the absence of proper WCA regulation, alternative DSL operators would be handicapped since their own core-network does not have national coverage. Not having national coverage can often be a deal-breaker for the non-residential customer having sites outside the reach of the Altnet's network that need to be connected as part of the integral solution.[86]

[86] The second argument is not strong in isolation: inexperience alone is not a bottleneck for entering a market. But in combination with the first we may have a serious problem. Indeed we have seen some examples of alternative LLU-operators that service both the mass-market as well as bespoke demand; for example Tele2 in the Netherlands. However, this case seems to be rather unique *and* in the Netherlands there is a regulated high quality bitstream product available.

For the above reasons we conclude that a form of 'business grade WCA' (providing access to the incumbent's network) is essential for operators offering a competitive full-service package to business users. Such package includes both high-end connectivity services (close to leased-line type connectivity) as well as relatively low-end broadband access type connections as part of the same contract. The variety of quality grades at retail level should ideally be reflected in the reference offers WCA products as well.

Without such access, the alternative business operators will experience a competitive disadvantage. For example, when servicing a non-residential customer who needs high-capacity non-contended interconnectivity for the main site (which both the incumbent and the alternative operator may be able to deliver) in conjunction with low-capacity contended interconnectivity for a secondary site. The incumbent may be able to offer a DSL solution for the secondary site. However, in the absence of proper WCA regulation, the alternative operator may have to resort to offering leased lines as a solution for the secondary site (which would imply higher costs than for the incumbent) or may offer a mass-market broadband product (which may be of too low quality).

8.2.2 Implications for the geographical market(s)

Above we referred to the 'competitive full-service package'. Such package not only includes a variety of services, the package is also offered at any location that the end-user prefers. For this, a WCA product with improved service levels should be available in those areas in which not enough alternative business operators have rolled out to the local access points. These need not be the same regions that are deemed competitive in the context of mass-market broadband. As such, the geographical relevant markets in the bespoke segment may be quite different from the sub-national geographical markets in the mass-market segment. It may even be the case that the geographic market is national:

- First, cable networks are not able to deliver a bespoke high quality broadband product;
- Second, even if we disregarding potential barriers for mass-market operators to service bespoke demand as well, it is unlikely for all regions that are deemed competitive in relation to the mass-market to be competitive for the bespoke market as well.

It follows that the merits of defining sub-national markets for business grade WCA are less likely than for mass-market WCA.

8.2.3 Concluding on SMP of the incumbent

For all the reasons mentioned above, the incumbent operator may be expected to have a competitive advantage in the bespoke non-residential segment. Although we do not have sufficient data to determine whether this market segment meets the three criteria, we suspect this to be the case in most Member States. Interviews with several stakeholders confirmed that the incumbent generally has a higher and more stable market share in the bespoke non-residential segment than in the mass-market segment. Interviews with several non-residential end-users generally confirmed this view.

We therefore advise the next Recommendation to differentiate between wholesale central access for the mass-market segment and wholesale central access for bespoke non-residential products, allowing the mass-market segment to be partly or wholly deregulated while simultaneously allowing the bespoke segment to have adequate regulation in place. This could be done by simply specifying in the description of WCA that it pertains to both residential and non-residential market segments, or alternatively a separate relevant market could be identified on the list.

It may also be the case that the non-residential segment should be merged with the market for leased lines. While mass market bitstream services and leased lines services are very unlikely to be mutually substitutable for the great majority of customers (because of significant specification differences on the one hand and large cost difference on the other), there is more likelihood of substitutability for higher specification (and therefore more costly) bitstream services. This is an empirical question which would need to be determined by individual NRAs.

8.3 Pan-European business market

Increasingly, European businesses operate from more than one Member State. For reasons of transactional efficiency, these multinational multisite companies often prefer to source their European telecoms services from a singe, transnational operator. Given the fact that such transnational operators also exist at retail level, one may conclude that there is a pan-European market for telecommunication services.

However, these pan-European operators usually have not rolled out there core-network to any of the local access points in the Member States because their client base is too dispersed to benefit from scale economies at the local level. Consequently, there are no trans-national wholesale suppliers of telecom services. The pan-European retail operators combine several national wholesale products (typically WBA and/or Leased Lines) into an integrated pan-European retail package. As a result, the wholesale products provided at a national level in various Member States represent complementary building blocks to an integrated pan-European retail package.

The trans-national retail operators encounter two typical problems:

- First, since there are no trans-national suppliers of wholesale access products, the competitive conditions of retail supply at a pan-European level are determined at the national level. If supply of the necessary wholesale services is competitive in each of the Member States, the integrator faces altogether competitive supply conditions and may then offer a competitive integrated package. If, however, there is a competitive issue in one or more Member States, this may lead to inefficiencies in the integrated pan-European package. Notably, it leads to national incumbents having a home advantage while tendering for business grade contracts with end-users having most of their locations in a particular country;
- Second, the added value to a multinational end-user of having a single pan-European supplier increases with the extent to which the single pan-European supplier is able to offer a uniform service level for all its connectivity products in the various Member States. Consequently, the pan-European retail suppliers prefer similar wholesale services in each Member State at the exact same specifications. However, currently there are no mechanisms (other than the general fostering of competition) that lead to the availability of wholesale services of the same specifications across Member States. It follows that the pan-European retail operator is hampered in delivering the added value desired by their clients, and that they cannot deliver the specific additional value added that could have countered the incumbent's home market advantage mentioned above.

Of course, if supply were truly competitive in each of the Member States concerned, the integrator would be able to get exactly what he demands in each Member State. However, the current state of affairs is that competition is created through regulated wholesale services. So the regulatory measures often prescribe the exact specification of wholesale services available in each Member State. These specifications differ from country to country because:

1. not all NRAs have defined a separate business grade wholesale market and/or impose reference offers with improved service level agreements; and if they have,

2. there is little coordination among NRAs and/or national standard setting platforms on this issue.

This primarily results in the second problem mentioned above and, as a secondary effect, it adds to the home market advantage held by the incumbents.

A study commissioned by the European Commission on “steps towards a truly internal market for e-communications” (Ecorys et al. 2011) concludes that it could be beneficial to the pan-European business environment if a mechanism were in place to ensure uniform wholesale offers across Member States. The study presents the issue as a problem of heterogeneity and interconnectivity, and as such, the problem primarily requires a solution in the context of agreeing on standards. As such, Ecorys et al (2011) suggest ETSI and CEN taking the lead in this, supported by the Commission.

Ecorys et al (2011) also conclude that defining standardised specifications for business grade WCA products alone is not enough. What would be the basis for forcing national operators to adopt such standard? Again we may argue that the primary route to adopting such standard is via competitive markets. The secondary route is for NRAs to include the standards in the reference offers once they have found SMP. The first option is (today and in the coming 7 years) not a viable option. This leaves us with the second possibility that requires NRAs to first define a separate relevant market for business grade WCA and to confirm SMP by the incumbent.

At this point, it is relevant to refer back to the previous section where we concluded that (from a national perspective) the case for subnational markets for business grade WCA is less strong than for mass-market WCA as a result of inefficiencies associated with multi-party contracting and non-uniform service levels. When considering multinational end-users and operators, this argument gains in strength. Pan-European operators already struggle with multi-party contracting and non-uniform service levels across countries. Adding similar problems within countries will not lessen the home advantage of incumbents.

8.4 Conclusions

We conclude that the different retail markets can be defined for mass-market broadband services and for bespoke (business grade) broadband services. The first category of services is generally demanded by residential end-users and small firms. The second category of services is generally demanded by non-residential end-users. Non-residential users often demand higher and more customised quality features. As such, there seems to be a continuum of quality grades within the bespoke segment. Furthermore, the non-residential users often demand a bundle of multiple communication services at various locations.

This split at the retail level warrants a split at the wholesale level as well; in particular at the level of wholesale central access. The reason is that WCA products (as opposed to e.g. local loop access) don’t give the access seekers any option to modify quality specifications to meet the requirements of business demand. As such there is no substitution possible by mass-market WCA products.

In the absence of regulation in the market for business grade WCA, the incumbent is the only party with a ubiquitous network. The importance of ubiquity in conjunction with inefficiencies stemming from multi-party contracting and non-uniform service levels undermines the case for defining sub-national markets. Indeed, when considering multinational demand and supply of business grade broadband services, the case for defining sub-national markets becomes only weaker.

On the issue of multinational users, we restate the conclusions from Ecorys et al (2011) that there may be considerable gains from (one or more) standardized reference offers for business grade WCA products across Europe. Specifying these standards falls outside the domain of the Recommendation and would better be placed in the hands of ETSI and CEN. However, once such standards are set, a finding of SMP by the NRA in its market analysis could be a route towards adopting that standard.

The observation that there is a continuum of quality grades begs the question whether this continuum extends into the leased lines segment or whether there remains a split that warrants a separate definition of the market for leased lines. This will be explored in the following section.

9 Leased lines and other high-quality business data connectivity services

9.1 Introduction

9.1.1 The problem

A retail leased line is a service that provides dedicated transmission capacity to carry voice and/or data traffic. Dedicated in this context means uncontended and symmetric means that there are identical transmit and receive data rates. They are mainly used to carry inter-site and inter-company traffic.

They may be provided using a range of technologies. Legacy options (some no longer offered to new customers but maintained for existing customers) include low bandwidth analogue leased lines, digital lines at a wide range of bandwidths offered via the SDH and PDH networks and low bandwidth symmetric uncontended DSL bitstream services. Increasingly, leased lines are offered over Ethernet, normally at much lower cost (see below) than using the traditional approaches. Taking all variants together, leased lines are available in a huge range of bandwidths and are almost exclusively of interest to business customers. Normally, they are offered with a much higher specification 'service wrapper' (fault repair guaranteed to be very speedy, for example) than is common for mass-market broadband data services. This reflects the different customer needs of the business and mass-market segments.

Wholesale leased lines are also used by network operators as components of consumer communication services, and hence play a significant role in determining the speed and cost of those services. For example, mobile network operators use large volumes of leased lines to carry mobile voice and data services between their radio base stations and switching centres; and providers of fixed broadband services use substantial volumes of leased lines to carry their customers' traffic between the incumbent's local exchanges and their networks.

An end-to-end leased line connecting two premises is, conceptually at least, constructed of a (wholesale) trunk segment and terminating segments at either end. A multi-site business network can be constructed on the basis of a number of trunk and terminating segments, potentially of different capacities, to provide the desired connectivity. The locations of a multi-site business network are not necessarily constrained by country borders. As such, the demand for connectivity may transcend national borders, implying that there might be a cross-border or even a Pan-European demand for connectivity by large businesses.

The degree of retail competition depends critically on competition in the relevant wholesale markets. Companies with very similar connectivity requirements in different geographical locations can experience very different competitive conditions, because of differences in replication of infrastructure: sometimes in trunk segments, sometimes in terminating segments. But as a general rule, more replication can be expected in trunk segments.

Given the number of service variants and the geographical complexities, leased lines markets are extremely hard to analyse and to characterise. No doubt partly for these reasons, useful up-to-date European comparative data seems not to be available. Different competitive landscapes across Europe can certainly be expected as a consequence of some profound variations in geography, business demographics, economic development and extent of competitive network provision.

However, assessment of the extent to which these factors are responsible for differences in regulatory approaches is beyond the scope of this study. In this chapter, we make several references to the market analyses carried out by OFCOM[87] and OPTA[88], each of which shows some significant variations from the analyses of most other NRAs. We do not assert either that their conclusions should generally apply across Europe or that the quality of the analysis is necessarily superior to that of other NRAs. However, these analyses are especially detailed and thorough and provide useful benchmarks for the examination of issues which are likely to arise across much of Europe.

9.1.2 *Current legal practice*

Market 6/2007 is in general considered by all the Member States as one of markets susceptible to ex-ante regulation. Modifications exist in the aspects described below.

First, the Recommendation does not provide a clear definition of Market 6/2007, in particular with respect to the borderline with trunk segments of leased lines. It is important because the market for trunk segments of leased lines is deregulated by the Recommendation. It is observed that most Member States[89] define terminating segments as leased lines between end-user premises and the closest exchange of a service provider. However, two Member States[90] define Market 6/2006 higher in the leased line network, which leads to the concern of over-regulation. The Commission stresses that only in the exceptional circumstances can Market 6/2007 be defined to include trunk segments of leased lines.

Secondly, 10 Member States[91] decide to further divide Market 6/2007 based on bandwidth (usually separated into two sub-markets, i.e. high speed and low speed) because NRAs observed different competition situations on the low- and high-capacity lines. Most importantly, eight Member States[92] decide to deregulate high-speed leased lines. This is not disagreed by the Commission. However, Member States use different thresholds to differentiate low-speed from high-speed leased lines.

Thirdly, due to the substitution between leased lines and wholesale broadband access, the Netherlands combined Market 6/2007 with Market 5/2007. However, the Commission raised serious doubts. But the Netherlands maintained this market definition in its later publication of 28 December 2012.

9.1.3 *Trends and drivers*

Symmetric dedicated capacity can be provided in numerous different ways, notably traditional leased lines, Ethernet leased lines, symmetric DSL services and (increasingly) high-speed broadband services. Even cheap asymmetric DSL services can be used where the bandwidth needed in both directions does not exceed the upstream speed of the DSL access connections. These have different costs and different technical characteristics.

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87 Business connectivity market review - final statement (published 28 March 2013) - http://stakeholders.ofcom.org.uk/consultations/business-connectivity-mr/final-statement/.

88 OPTA (2012), "Marktanalyse hoge kwaliteit wholesalebreedbandtoegang en wholesalehuurlijnen" decision 28 december 2012, OPTA/AM/2012/203111.

89 Czech, Denmark, Finland, Greece, Hungary, Latvia, Poland, Portugal, Slovakia and Spain.

90 Spain (ES/2009/0930) and Estonia (EE/2010/1114).

91 (AT/2010/1048), Bulgaria (BG/2012/1361), Czech (CZ/2010/1145), Germany (DE/2011/1277), Hungary (HU/2011/1269), Romania (RO/2010/1156), Slovakia (SK/2011/1261), the UK (UK/2008/0747), Greece (EL/2012/1331) and Denmark (maintaining a single market at the stage of market definition but separate markets at the stage of remedies, DK/2012/1341).

92 (AT/2010/1048), Bulgaria (BG/2012/1361), Czech (CZ/2010/1145), Germany (DE/2011/1277), Hungary (HU/2011/1269), Romania (RO/2010/1156), Slovakia (SK/2011/1261) and the UK (UK/2008/0747).

Despite the dearth of up-to-date reliable comparative data, prices for leased lines are widely believed to have fallen significantly over a period of several years. The two most significant factors seem to be increased retail competition as a consequence of wholesale access regulation and the application of (especially) Ethernet and (at the highest bandwidths) wavelength division multiplexing technologies to provision of leased lines, each of which generally offers significant cost advantages. Despite these trends, they remain a relatively costly communication service. Users will therefore be highly motivated to find the most economical method of satisfying their needs.

Historically, Ethernet leased lines were often technically inferior to traditional (analogue and digital) leased lines. There were distance limitations. Moreover, inability to control technical features such as jitter, latency and synchronisation meant that they were not considered suitable for some business applications. With the roll out of internationally standardised 'carrier-grade' Ethernet services, most of these technical disadvantages have been eliminated (on a forward-looking perspective), leaving Ethernet suitable for all but the most demanding business applications. Consequently, latent demand for Ethernet leased lines has been growing fast while that for traditional lines has been falling. At the other end of the spectrum, users that can make some concessions on QoS aspects like latency or guaranteed up-time may well switch to broadband services as a substitute if these come with acceptable quality and attractive pricing.

However, similar to the situation in the PSTN market, many users continue to use legacy services, despite a significant cost penalty. Even on a forward-looking perspective, the number of traditional leased lines in use can be expected to be comparable to or even greater than the corresponding number of Ethernet lines. As noted above, this may be sometimes due to the very high specification of the user which can be satisfied[93] only through use of traditional leased lines. Even where there is no technical obstacle to switch to a cheaper option, legacy options remain in use because customers face significant switching costs, usually connected with the end-user equipment to which the leased line is connected. The cost of replacement of end-user equipment that has not reached the end of its economic life and that will not interwork with newer transmission technologies[94] often appears to outweigh any savings which would accrue from use of more modern transmission technologies. In other cases, the user does not wish to risk the disruption to its business that a switch would undoubtedly cause until the most convenient moment. Finally, where the price of Ethernet lines is similar to the price of traditional lines despite the significant cost differences, there is little or no incentive for existing users to switch.

The need to interwork with legacy end-user equipment may give rise to a number of 'locked-in' users whom no one - apart from their existing supplier - is interested to serve. This is especially the case for existing analogue services. In further cases, especially where the contract value would be significant, alternative providers may be interested to 'novate'[95] the end-user's contract and take over provision of service using the existing transmission equipment. However, this option is not usually available unless explicitly provided for by regulation. If the (total business) costs of disconnecting from the existing supplier and reconnecting to an alternative using different equipment make a switch uneconomic, the end-user is again locked in, even though in this case there may be other suppliers ready to provide service.

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93 At least, in the mind of the user – there may still be a perception that some of the past limitations of Ethernet lines still apply.

94 For example, networks of railway ticket machines communicating with a central computer may not be capable of upgrade to use a modern transmission technology. Legacy voice services such as ISDN 30 are also designed to use traditional leased lines as their bearer circuits.

95 This is a process whereby a competitor takes over the running of the transmission service, using the terminating segments and any transmission equipment of the previous provider

Outlook

Over next years, the deployment of NGA networks will progress, making fibre-based access products more widely available. Fibre to the Home / office products offer very high bandwidth and high-quality of service while alleviating the contention issue of traditional broadband access lines. Alternative providers have always competed for leased lines business where they were able to use their own infrastructure or could make use of the incumbent's infrastructure on reasonable terms for a portion of the infrastructure. But more extensive roll out of competitive fibre should intensify the competition, especially to connect offices outside main business districts where there may be little fibre outside the incumbent's network. In addition to this, Ethernet-based bitstream access products facilitate a higher degree of QoS and product differentiation than their DSL predecessors, thereby further increasing the substitutability between leased lines on the one side and broadband on the other. Customers should therefore experience both an increased range of suppliers and the possibility to choose from a wider range of products, although geographic variations in the range of services available and the intensity of competition are likely to remain significant.

9.2 Market definitions

9.2.1 Retail markets

Product market

The previous chapter discussed retail markets for the "bespoke connectivity segment". Although many leased lines are known to be supplied on standard terms and are not embedded in bespoke packages, the terms of supply generally provide for a higher specification service wrapper than would be normal for mass-market products. Therefore, many of the retail market characteristics discussed in the previous chapter apply to leased lines, whether sold as part of a bespoke package or not. In this chapter, we concentrate on features specific to leased lines.

The retail leased line is the basic retail service[96]. As noted above, these are available in a wide range of technical configurations and bandwidths, sold in significant volumes. While the different technical options are often (although not always) technically substitutable (at least in a new installation), they are often not substitutes in an economic sense. This may be for the reasons already discussed, in particular because of switching costs associated with legacy end-user equipment or because of significant cost differences. As noted above, the cost of provision of Ethernet leased lines is generally assessed to be significantly less than that of traditional leased lines[97] so that a customer supplied by Ethernet would not switch in response to a SSNIP where the two services are priced at their respective competitive levels. From a demand perspective, there seems to be a case to consider Ethernet and traditional leased lines to be in different economic markets. However, as the comparable discussion about PSTN and VoIP indicated, such conclusion warrants more information about the size of the group of captive users of traditional leased lines relative to the size of non-captive users of traditional leased lines.

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[96] As noted above, leased lines can also have a significant impact on competitive provision of a range of retail services which may need to be taken into account in individual national market analyses.

[97] We are not aware of a reliable up-to-date comparison of European retail leased line prices. However, indicative figures can be found in OFCOM's latest decision (Section 3). This shows that at low bandwidths, traditional and Ethernet leased line prices are similar in the UK. But whereas traditional leased line prices are highly correlated with bandwidth, Ethernet prices vary much less by bandwidth. Consequently, for leased; lines of bandwidths greater then 8Mb, traditional lines are several times more expensive than a corresponding Ethernet line. These prices are based on BT offers (which should be replicable by competitors, using regulated wholesale inputs where necessary). Although these are retail ***prices*** (and, self-evidently, apply to the UK only), we would expect a broadly similar relationship between relative *costs of provision* of traditional and Ethernet leased lines to apply throughout Europe.

In the past, OFCOM has, in all its Article 7 notifications, segmented the market in Ethernet and traditional leased lines but the approach has not been generally adopted by other NRAs. While NRAs must take account of national circumstances in arriving at their definitions, it seems implausible that the arguments and empirical evidence relied upon by OFCOM apply only to the UK.

While Ethernet may provide a lower cost solution for delivery of leased lines, incumbents have little incentive to undercut the price of their traditional products, unless obliged to do so either by regulation or by competition. We have not been able to obtain up-to-date comprehensive data of leased line prices from several countries on a comparable basis. Nevertheless, it seems that observed prices of retail Ethernet leased lines have in some Member States been little different from that of traditional lines, in particular where no wholesale regulation of Ethernet has been in place and where end-to-end competition is limited by alternative network roll out. However, when considering whether Ethernet and traditional lines are substitutes for one another, the relevant price considerations are the relative *competitive* prices and not the observed prices. The difficulty of knowing what the competitive level should be may be one reason why segmentation has not been more commonly observed. However, the figures published by OFCOM may be taken as a reasonable benchmark for relative costs. Even though absolute costs might well be different in other Member States, the relative cost differences should be sufficiently reliable for the application of a SSNIP.

The matter is significant and deserves further investigation, beyond the scope of this study. Without regulation to enforce the supply of wholesale Ethernet leased lines priced at a competitive level, competition in the retail market may be significantly dampened.[98]

Beyond this basic division, empirical considerations may require market segmentation by bandwidth and/or between analogue and digital lines. Bandwidth segmentations have been common in NRA notifications. OFCOM, for example, has additionally regarded low bandwidth analogue leased lines as being in a separate economic market on the basis of barriers to switching and *de facto* monopoly supply for this legacy service.

NRAs will also of course need to consider whether other services are effective substitutes for traditional and Ethernet leased lines. We note that OFCOM has always considered uncontended SDSL services to be substitutes for low bandwidth leased lines (up to about 2Mb/s). While SDSL is a legacy technology, suitably configured high-speed broadband access (and backhaul) services may be considered economic substitutes for terminating segments. OPTA has adopted an approach that, although articulated differently from that of OFCOM, may have a rather similar effect in practice. OPTA has distinguished between ‘high-quality’ and ‘low-quality’ DSL services and argued that ‘high-quality’ services exert sufficient competitive pressure on prices of low bandwidth leased lines that they should be considered to be in the same economic market. This reflects the high-quality service wrapper required by many (although not all) business users, especially those with a demand for symmetric dedicated capacity.

Although basic leased lines are sold in considerable volumes, retail purchases often take other forms. While a corporate network can be built by an end-user on the basis of retail leased lines, using its own expertise, many end-users prefer to contract-out the management. They would then buy some form of value-added service (e.g. a virtual private network). However, the elements of

[98] We note that segmentation of the market is not an absolute pre-requisite for availability of regulated Ethernet wholesale leased lines from an SMP operator at competitive prices. However, it certainly makes imposition of such an obligation more straightforward.

added value are not electronic communications services and so it is not necessary to distinguish between basic retail leased lines and value-added services for the purposes of this analysis. Especially for large multi-site companies, it is also common to buy bespoke bundles of electronic communication services covering all (or a major share) of the company's fixed voice and data communication needs. Mobile services are sometimes also included in the bundle. This phenomenon is discussed in the previous chapter.

In principle, the retail market may be considered to contain services where the basic connectivity has been enhanced by a value-added layer, as well as standard electronic communication services. As noted earlier, some customers will buy data connectivity only; others will buy bundles of voice and data connectivity.[99] Typically, customers for bundles of services which span a wide geographic area experience less competition to supply services than those whose service premises are confined in a single "business district", as a consequence of differences in the geographic intensity of competition, discussed below.

Geographic considerations

While the question of geographic market definition is not strictly within the terms of reference of this study, we note that the Commission has already to some extent mingled the two issues of geographic and product-market definition in its Recommendation by distinguishing between trunk and terminating segments. Given that this distinction relates much more to different parts of the network rather than a fundamental difference in the nature of the service, we have therefore thought it appropriate to review the issues here.

Geographic analysis is especially challenging for corporate data services. In principle, there are multiple dimensions to the intensity of competition, corresponding to each node of the network and to the trunk connectivity. As a general rule, only the incumbent has near-ubiquitous network. Competing network operators will tend to have a significant trunk network and access network in areas where businesses (especially large businesses) are concentrated. Outside the business districts with the highest density of large businesses, it will often be the case that there are only one or two networks within reach of any particular building. In the absence of wholesale access products supplied by the incumbent, relatively few customers would be able to be served by any provider other than the incumbent, despite the existence of considerable amounts of competing fibre relatively close by. This is particularly so for those who need a provider for a complete corporate network (whether unmanaged or managed). In response to a call for tender for a large contract, competitors may decide to extend their network so as to be able to serve a building not capable of being served from the current network. However, the practicality of this depends on the distance to the nearest point of connection to the current network, on the length and value of the contract and on the customer's timescale for provision of service. Installation of new infrastructure takes time, especially where streets need to be dug and new ducts installed. As a result of these phenomena, the intensity of competition may easily vary significantly between one street and its neighbour.

A 'pure' geographic analysis would seek to identify areas with material differences in the intensity of competition. However, as noted above, these are often likely to be extremely small areas, sometimes covering only a small number of business premises. We think that the resource requirements to identify these areas with accuracy are likely to be much too high for most NRAs to consider this to be a practical approach (even assuming no evolution of the boundaries between adjacent areas as a consequence of factors such as extensions from time to time of one or other

[99] Separate retail markets might be defined corresponding to each of these features – but it adds nothing to the regulatory analysis to do so.

network or consolidation amongst providers). Moreover, unless such micro-segmentation could be performed with considerable accuracy, little added value is likely to accrue from the significant increase in the analytical burden.

This suggests that retail markets should normally be considered to be national unless it is possible to identify, with reasonable analytical effort, *high-intensity business areas of national significance.* Such areas would satisfy (each of) the following conditions, the first two of which are necessary in order to ensure that the analysis is both practical and adds material value (by comparison with analysis only of the overall national situation):

1. They are *contiguous* geographic areas;
2. They are areas of *reasonable size* and *significance* (in the sense that sales account for a significant proportion of national sales);
3. They are areas within which the *supply conditions are clearly materially different* from those which apply elsewhere.

This is a challenging set of pre-conditions but (since these will be areas of more intensive competition and, therefore, an increased chance of finding effective competition) the incumbent can be relied upon to bring them to the attention of the NRA, if they exist. It should be possible to define such a geographic market (assuming significantly different supply conditions from the norm) without excessive atomisation of the analysis. Even so, such a market would logically apply only to retail services (individual or bundles) with geographic scope wholly within the segmented areas. It may well be that there are few such markets identifiable at present although the numbers of credible candidates can be expected to grow.

The corresponding wholesale analysis is covered below.

9.2.2 Retail markets – Greenfield assessment

In the absence of regulation, SMP would be expected in regions outside any identified 'high-intensity business areas of national significance' where the competitive conditions will be different.[100] Indeed, outside these areas, in the absence of regulation, monopoly supply would be the most likely experience, except that value-added service providers might resell the incumbent's basic connectivity services. While there may be considerable roll out of cable networks outside such areas, such networks do not normally compete for the provision of high quality business connectivity services, sometimes for technical reasons, sometimes because it requires a very different business model from mass-market supply[101].

Over the years 2016-20, some reduction of the incumbent's SMP can be expected. There may for example be a growth in the geographical extent of the areas qualifying as 'high-intensity business areas' although this is likely to be incremental in nature. Where competing fibre is rolled out to local access networks, this will also increase the possibility to compete for business connectivity contracts on the basis of own infrastructure. However, since fibre roll out in the local access network is unlikely to be replicated many times (if at all) for economic reasons, the aggregate positive effect on competition for business connectivity may be rather modest. On balance, a greenfield assessment of the competitive retail landscape for the period 2016-2020 is likely to be rather similar to that which can be observed today, at least in most parts of the EU.

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[100] Note that this is a greenfield assessment. We expect that appropriate wholesale regulation should normally provide for the prospect of effective retail competition and that any remaining retail regulation would require exceptional justification.

[101] We note that the technical obstacles are less relevant following the introduction of DOCSIS 3 but the business model obstacles may remain largely unchanged.

It is self-evidently of major importance that businesses should have access to high-quality communications services at competitive prices. On that basis, it is clearly justified to consider the relevant wholesale inputs to the retail markets for business data connectivity for ex-ante regulation.

9.2.3 Wholesale market definitions

Wholesale service market definitions

With regards to the definition of the service markets, we consider that there are a large number of substitutability considerations that can only be determined on an empirical basis by the NRA in question. For example, services may be segmented by bandwidth – or not – depending on the empirical evidence. Equally, analogue and digital may be in separate markets – or not. Uncontended DSL services may be included – or not. Even lightly contended DSL services with a sufficiently high service specification might be substitutes. Although plainly not a complete technical substitute, the availability of dark fibre may in some cases exert sufficient competitive constraint over pricing of leased lines that dark fibre should be considered to be within the same economic market.

For these reasons, it is practical for the Commission to define the relevant markets only at a generic level (as has been the practice so far) while making clear the nature of the substitution analyses it would expect NRAs to carry out. Based on the rather similar analyses of OPTA and OFCOM, we propose a market for high quality business data connectivity comprising traditional leased line segments, Ethernet services and suitably specified DSL services. The generic characteristics of a market for ***high-quality, business-oriented wholesale connectivity products*** are that the service should provide transparent dedicated capacity with a high specification service wrapper.

Based on the analytical approaches taken by OPTA and OFCOM, we believe that there is a strong case for considering the inclusion of certain bitstream services in this market (rather than in the market for wholesale central access). Moreover, we believe that, on the basis of consideration of the relative competitive prices of Ethernet and traditional leased lines, there may be strong arguments for placing them in different economic markets. An in-depth survey of the variation in national circumstances, beyond the scope of this study, may be necessary to resolve the issue of whether or not such approaches would be justified throughout Europe. However, we believe that NRAs ought to consider explicitly in their analyses:

1. The substitutability of certain high quality wholesale bitstream products for wholesale leased lines; and
2. The substitutability of Ethernet and traditional wholesale leased line segments. As argued above, there are reasons to consider that traditional and Ethernet wholesale leased lines should be in separate markets, irrespective of the fact that current incumbent charges for the services may be rather similar.[102]

The services in this market will deliver wholesale inputs necessary for the retail services above. In the case of multi-service retail bundles, many other wholesale services provide inputs but these are all covered by other wholesale markets discussed in other chapters of this paper and it appears generally unnecessary to segment the service markets between domestic and business uses. For example, although businesses seeking to buy a bundle will often require standard quality bitstream

[102] It has not been universal practice to separate them and this may in the past have been responsible for failure to impose an obligation on incumbents to provide wholesale Ethernet leased lines at significantly reduced prices (by comparison with traditional leased lines), thereby suppressing retail competition in practice.

lines (e.g. to provide connectivity to homeworkers) to supplement the high quality leased lines connecting their main office sites, the “mass-market” bitstream service often meets those needs.

Wholesale markets – impact of geographic variations in intensity of competition

As noted above, the Commission has so far taken the view that wholesale services should be segmented between trunk and terminating segments on the basis that trunk segments are more likely to be replicable than terminating segments. In broad terms this is true. But if interpreted too literally, it is bound to lead to inaccurate regulation. How true the replicability distinction really is depends on national geography and degree of dispersion of business premises. For example, in a geographically compact country with high population (and business) density, the ‘trunk’ portions of the network where there are several competing infrastructures may cover most of the territory, leaving only the last few kilometres where competitor networks are more patchy. In a country with a more dispersed population, it is more likely that only parts of the long-distance network are economic to replicate.

Moreover, the separation between trunk and terminating segments is rather artificial. In technical terms, they are the same product (except where provision of transmission equipment at end-user premises is bundled as part of the service). Competitors will frequently need to buy both to fulfil a particular retail contract, for example in cases where they can self-supply only one terminating segment and part of the trunk segment on the basis of their own infrastructure.

As noted earlier, it seems that at least two NRAs have adopted a pragmatic interpretation of the nature of the terminating segment and others may have done so in a less transparent fashion. We believe that the analytical inaccuracies which would arise from a strict distinction between trunk and terminating segments are unlikely to be confined to two Member States. A pragmatic solution is to consider parts of the long-distance network to be ‘terminating segments’ whenever there is low replicability, irrespective of the length of the segment. But this is a little artificial and potentially confusing; a ‘terminating segment’ conveys the idea of something that is local in character, rather than extending well into the long-distance network. We think transparency is important and it would therefore be preferable to ensure that the label attached to a recommended market is indeed descriptive of the services included.

We are not sure whether or not the problem of ‘long, thin routes’ is largely confined to some or all of the (geographically) larger Member States where the incidence of towns served by only one or two trunk networks seems likely to be greater. However, we do not consider it sound simply to assume that competitive conditions are sufficiently homogeneous throughout the trunk network that a single national market can properly be defined. We believe that this should need justification by individual NRAs and note that the removal of trunk segments from the list of Recommended Markets in 2007 was accompanied by no such requirement.

Where a national market is appropriate, it is relatively unlikely that a position of SMP would be found. However, where national competitive conditions within the trunk network are not homogeneous, we think it most likely that there will be no SMP in areas of high network replication and that the incumbent will have SMP in areas of low network replication. Indeed, the competitive conditions in latter areas are likely to be similar to those for terminating segments (and for the same reasons). Given that trunk and terminating segments are often sold together, there seems a valid ‘cluster market’ argument for defining a market for ‘wholesale leased line segments in areas of low network replication’ to replace Market 6/2007. It would be for individual NRAs to define the geographic parameters for such a market, depending on their national circumstances. In some cases, where there is a good degree of replication throughout all parts of the trunk network, the

market would be identical to the existing Market 6/2007, Other NRAs would find it appropriate to include 'long, thin' trunk routes but this would need objective justification.

The advantages of this scheme over the current one are that:

1. It provides a generic approach which fits the circumstances of all NRAs better than the 'trunk/terminating' segmentation of the current Recommendation; and
2. It provides for different treatment of different parts of the trunk network, where justified by differences in competitive conditions.

The proposed change does not seem to give rise to any significant downside; Member States where there is already effective competition for wholesale leased line segments covering all parts of the trunk network would be unaffected in practice by the change.

For all that, analytical separation of the trunk network according to differences in competitive conditions is not necessarily straightforward in practice. Routes between major cities would normally fall outside the definition (of areas of low replication) but many low-intensity regional routes could fall within it. Excessive atomisation of the trunk market needs to be avoided since the resource requirements for analysing competitive conditions on every route between pairs of nodes on the trunk network are likely to be near-impossible to service. It could be valuable for BEREC to work out practical guidance on interpretation of the concept of 'areas of low network replication', defining the boundary partly on the incumbent's network hierarchy and partly on geographic considerations. A rule of thumb, supported by suitable empirical analysis that demonstrated a difference in competitive conditions, would be needed to separate 'high' and 'low' replication. We would expect, for example, that competitive conditions on routes served by one or two infrastructures would prove to be different from those served by four or more but this would need to be demonstrated empirically. If that could be demonstrated, perhaps on the basis of a representative sample of routes, it might suggest a pragmatic segmentation between 'main trunk routes' and 'regional trunk routes' between which the competitive conditions could reasonably be expected to be significantly different. This could then be tested empirically without excessive resource deployment.

9.3 Competition analysis

The competitors in the wholesale markets identified comprise the incumbent and various alternative network operators. Not all operators will necessarily supply a full range of the technical options discussed earlier and these may give rise to restrictions of competition in particular retail segments. In particular, legacy services may be available only from the incumbent. Segmentation, for these and other reasons, can only realistically be performed at a national level. As discussed above, significant geographic variations in competitive conditions may also be expected.

9.3.1 Conclusion on the Three Criteria Test

By virtue of the definition of the market for 'wholesale leased line segments in areas of low network replication' the complementary market (*i.e.* segments in areas of high network replication) is not a serious candidate for ex-ante regulation and need not be considered further in this report. Of course, this does not prevent definition of such a market where justified by national circumstances.

Turning to the low replication market, there should be a strong presumption that the first two criteria are satisfied, given the nature of the definition and the number of years during which markets have been liberalised. Where there is low network replication, there are bound to be very good reasons for it which are unlikely to cease to apply within the next few years. As to the third criterion, this is

an area where it would be extremely difficult and resource-intensive (and probably impractical) to sustain a competition law investigation. An unregulated SMP player can have a significant dampening effect on competition by making a large number of small difficulties over its supply conditions which make it very problematic for competitors which rely, in part or totally, on wholesale services supplied by that player to bid effectively for new business. The abuse would come in practice not from individual policies that might be *prima facie* illegal (e.g. outright refusal to supply) but from an accumulation of modest discriminatory practices. A number of factors make it relatively unlikely that such practices could be prevented in the absence of ex-ante regulation. The practices are likely to be rather opaque to competitors. The fact that detriment would be spread amongst a number of competitors makes it less likely that any of them will be able to gather the evidence for a serious complaint. Moreover, when a market player fails to win a contract, it will not necessarily know whether this was due to a deficiency in its own bid or abusive practices by the SMP player. Competition authorities are likely to need hard evidence to proceed with a case, not simply the disappointment of competitors. These specific factors, when added to the general speed and certainty advantages of ex-ante regulation lead to our judgement that the third criterion remains satisfied in this market.

9.4 Summary

Retail Market

Typically, customers for bundles of services which span a wide geographic area experience less competition to supply services than those whose service premises are confined to a single "business district" as a consequence of differences in the geographic intensity of competition. Subsequently, we conclude that retail markets should normally be considered to be national unless it is possible to identify *high-intensity business areas of national significance*; *i.e.* contiguous geographic areas of reasonable size and significance (in the sense that sales account for a significant proportion of national sales) within which the supply conditions are clearly materially different from those which apply elsewhere.

In the absence of regulation, SMP would be expected in regions outside any identified 'high-intensity business areas of national significance'.

On balance, on a greenfield assessment, the competitive retail landscape for the period 2016-2020 is likely to be rather similar to that which can be observed today, at least in most parts of the EU. This justifies identification of a wholesale candidate market for regulation and application of the Three Criteria to that market.

Wholesale Market

We propose a market for high-quality business data connectivity comprising traditional leased line segments, Ethernet services and suitably specified DSL services. The generic characteristics of the market are that the service should provide transparent dedicated capacity with a high specification service wrapper. Segmentation of such a market by bandwidth has been a common past practice and we would expect that this continued to be justified in many cases.

It has not been general practice to segment the market between traditional and Ethernet technologies but we think there are some strong arguments for this. Despite a significant cost differential (as for example reflected in retail price differences reported by OFCOM) at most bandwidths, migration of leased lines to the more modern Ethernet technology is proceeding only slowly. This indicates that a significant number of users do not perceive the services to be close substitutes. Obtaining a comprehensive supply of high-quality comparative data which would

support a firm recommendation on this point has been beyond the scope of this study. But we think the point deserves more in-depth consideration.

We also think that NRAs need to consider carefully whether certain 'business grade' bitstream services should properly be considered to be substitutes for leased lines rather than a component of wholesale central access. Again, the point deserves more in-depth consideration.

To give NRAs flexibility to reflect accurately undoubted differences in national circumstances, we propose a market for 'wholesale leased line segments in areas of low network replication' to replace the current Market 6/2007 Terminating segments would normally fall within this definition, except in the limited case of the *high intensity business areas of national significance* (to be defined, if at all, by individual NRAs). Routes between major cities would normally fall outside the definition but many low-intensity regional routes could fall within it. It would be useful for guidance to be developed, by or with the co-operation of BEREC, to provide for a practical distinction between areas of 'high' and 'low' network replication in a way that avoided atomisation of analysis.

Competition analysis

The market for 'wholesale leased line segments in areas of high network replication' is not a serious candidate for ex-ante regulation and need not be considered further.

For the low replication market, we conclude that the first two criteria are satisfied. Also the third criterion is satisfied as it would be extremely difficult and resource-intensive (and probably impractical) to sustain a competition law investigation.

10 New candidate markets

In this chapter, we examine a number of cases put forward by stakeholders for new markets to be added to the list. For various reasons, we do not find any of the cases sufficiently strong to recommend inclusion of the market on the list, although SMS termination may be a marginal case.

10.1 Access to physical infrastructure

This market would comprise the services of providing access to physical infrastructure (ducts, poles, exchange buildings, street furniture) for the purpose of delivering electronic communications services. It would not include access to dark fibre (or copper). These would be included in the appropriate downstream wholesale markets (alongside unbundled local loops, for example). The propensity of such facilities to amount to bottlenecks is generally different in different areas and so the appropriate geographic market would not normally cover the entirety of the national networks.

10.1.1 The problem

At least two distinct arguments were made for such a market. One stakeholder (a mobile network operator with growing interests in fixed services) noted that at present, MNOs rely heavily on microwave links to provide network connectivity. However, they foresee that the available spectrum will soon become exhausted and that they will need to make much heavier use of fibre connections. Claiming that leased lines are not always priced competitively, they argue for the introduction of a civil infrastructure market. Where SMP is found in such a market, remedies such as compulsory leasing of dark fibre or access to unused duct capacity could be imposed.

An alternative network operator had a different argument. It noted that its NRA had imposed a 'virtual unbundling' (VULA) remedy on the incumbent with the intention of facilitating competition in very high-speed broadband services. However, in the Altnet's view, the defined VULA remedy did not work properly and in particular gave the incumbent a lot of scope to delay and degrade competition. In contrast, if the Altnet had access to duct and/or dark fibre, it would be in control of its own service specification and would be much better able to compete.

Whatever the strengths of the specific cases considered by these stakeholders, it can be readily accepted that the market power of fixed line incumbents does ultimately derive from their ownership of physical infrastructure. Moreover, the assessment of the Three Criteria in the next downstream market (unbundled access, leased line terminating segments, leased line trunk segments) would be likely to be identical or near-identical to that for the corresponding physical infrastructure market. On that basis, it seems that it would be possible to define one or more physical infrastructure markets which satisfy the Three Criteria.

The question therefore is whether it adds value to define a physical infrastructure market either instead of the existing markets (4 - local unbundled access and 6 - wholesale leased line terminating segments) or in addition to them.

10.1.2 Current legal practice

The Framework Directive addresses access to physical infrastructures within the term of 'associated facilities'. Article 2(e) of the Framework Directive defines associated facilities as

including "*those associated services, physical infrastructures and other facilities or elements associated with an electronic communications network and/or an electronic communications service […]*"(emphasis added). No Member State has defined or regulated a market for access to physical infrastructure.

The practical importance of the concept of associated facilities (and of the passive elements contained within this category) is that it defines the scope of Article 12 of the Framework Directive. Article 12 gives NRAs the power to impose obligations upon all electronic communications undertakings regarding the sharing of associated facilities (and co-location), without the need to conduct first a market analysis in order to identify whether the undertaking concerned has significant market power. These obligations are "symmetric obligations", as they can be imposed upon every undertaking regardless of its market power. This possibility is of particular importance for easing the roll out of new, fibre-based, access networks (*i.e.* next generation access networks, or 'NGAs') to street cabinets or even to individual homes. This provision has been utilised by France.

However, the imposition of an access obligation on passive network elements (such as dark fibre) appears to fall only within the scope of Article 12 of the Access Directive and, to impose such an obligation, an NRA must first designate the undertaking concerned as having SMP on a relevant market and impose the obligation as an ancillary remedy. This obligation has been primarily imposed as an ancillary remedy following SMP findings in Market 4/2007.

10.1.3 Competition analysis

Access to passive infrastructure in the local access network might intensify retail competition for fixed voice and broadband services. Access at the trunk level might additionally benefit mobile services.

This proposal seems to go with the flow of regulatory philosophy. It has been considered sound to analyse markets as far upstream as the source of the market power and to start by imposing any necessary remedies at that level. Only if remedies relating to that level cannot solve the identified competition problem effectively, should an NRA consider imposing remedies further downstream. Where there is market power, the source would usually be at the physical layer.

The Commission has so far confined the scope of its recommended markets to electronic communications services. This does not appear to be a necessary restriction and the reasons for it may be historical rather than fundamental.

At first sight however, there appears little to be said for adding such markets to the list. Where an NRA did reach the conclusion that access to civil infrastructure would be an effective and proportionate remedy to deal with an identified competition problem, it does not appear necessary to define a civil infrastructure market to achieve that outcome. For example, to deal with SMP in Market 4, then copper loop unbundling, fibre loop unbundling, access to dark fibre and access to unused duct capacity are all remedies which are within the scope of the remedies that may be imposed under Article 12[103], Access Directive. Moreover, NRAs are required to make choices of remedies which will deal effectively with the competition problem identified. If in a particular case that requires multiple remedies (for example, unbundled loops plus access to duct), these should be imposed. Equally, if hypothetically access to duct or dark fibre should properly be considered a

[103] Some NRAs, including ANACOM (Portugal) and OFCOM (UK) have imposed access to passive infrastructure as an ancillary Market 4 remedy.

more effective remedy than unbundled access or provision of wholesale leased lines, NRAs should impose such remedies in pursuance of the most effective regulation possible. It appears therefore that adding civil infrastructure markets to the list delivers no added value but inevitably requires more resources.

The arguments against replacing either or both of markets 4 or 6 by infrastructure markets appear equally powerful. On the basis of the above arguments, the same SMP players would be designated and the same set of remedies could be imposed. However, as an analysis of a 'new market' would be more likely to face legal challenge, regulatory certainty would decrease.

10.1.4 Conclusion

It would add little value for such a market to be added to the list of relevant markets. Where there are sound reasons to grant access, this can be achieved via an analysis of other markets on the list, notably 2, 4 and 6.

10.2 'Over the top' (OTT) services

This section examines the case for defining markets relating to the provision of retail services 'over the top' of a retail broadband data service. From the Commission's consultation it shows that two issues are at play. The first concerns market power by the terminating network operator used to block or degrade 'over the top applications' for Information Society services. The second concerns suggestions of under-investment by terminating network operators as a consequence of inability to recover contributions to network investment from providers of Information Society services. The first is a potential SMP problem, the second is a problem of free riding and (if it should be addressed by policy at all) it should be dealt with outside the regulatory framework. We do not consider it further here.

Some stakeholders claim that their applications are blocked (or seriously degraded) on particular networks because they are perceived to compete with services offered or promoted by the network operator itself. For example, consumer use of unmanaged VOIP reduces traditional telephony revenues.

Popular applications such as YouTube or Facebook are unlikely to experience such treatment. Too many consumers would want to switch network (provided any SMP problem at the retail Internet access service level has been dealt with appropriately under the Framework) and the blockage would be unprofitable. However, applications which were only of modest popularity might expect this experience, especially if the services undermined network operator revenues.

10.2.1 Current legal practice

No Member State has defined or regulated a market relating to OTT services.

10.2.2 Relevant retail markets

The relevant retail markets include in principle a wide variety of service markets, some of which may exclusively be based on electronic communications services, others not. However, in most such cases, the network operators probably have no strong incentive to degrade competition unless they provide an own-brand competing service. The main exception is likely to be retail voice

services where network operators may fear a significant loss of call revenue to over-the-top providers.

10.2.3 Relevant wholesale markets

The relevant wholesale markets are the markets for origination and termination of data (possibly restricted to data arising from over the top applications) and possibly segmented by individual networks.

10.2.4 Competition analysis

There are arguments for and against segmenting the wholesale market so that traffic is restricted to that generated by customers on an individual network. The argument for an individual network definition is that, in order to be viable, the target customer base for applications must be as large as possible. Customers may switch in response to non-availability of a popular application but will not switch in response to the non-availability of the great majority of (non-massively popular) applications.

On the other hand, inability to serve customers of one single network is unlikely to make or break a business case of an ISP if others can be served. There is an argument that only an individually dominant network or multiple collectively dominant networks could exert market power effectively. This undermines the case for an individual market definition.

Moreover, as noted above, market power is unlikely to be exerted successfully against providers of popular over-the-top applications. Blockage of YouTube or Facebook, for example, is unlikely to be considered a rational commercial move. Even if individual network operators are considered to have a 100% market share in the relevant market, the countervailing power of such ISPs may therefore undermine the case for a finding of SMP.

Consumers use data services for many different purposes, notably including web browsing and email. Use of over-the-top applications accounts for only a proportion of the data traffic. In only a proportion of the cases do the network operator have a commercial incentive to block. And in a proportion of those cases, the Information Society service provider has sufficient countervailing buyer power to make a blocking strategy ineffective. The services where an issue of blocking may arise therefore seem likely to account for only a small proportion of the data traffic on any network, the rest of which would be subject to competitive forces. Crucially, the more choice there is at a retail level, the less likely it is that a network operator will want to block even this intermediate category of OTT services. Therefore, regular SMP regulation acts as a disciplinary factor to any OTT issues that may exist.

An individual network market defined as above would be a form of aftermarket: having made their choice of service provider, consumers have access only to the over-the-top applications permitted by that service provider. It can therefore be immediately taken to satisfy the first of the Three Criteria. As for the second, the arguments above suggest that in some very important respects (web-browsing, email, access to Facebook and You Tube), data termination is subject to powerful competitive forces. Only for a proportion of services is there a possible competition problem. It seems therefore that the second of the Three Criteria is satisfied only in the case of a very narrow (and arguably artificial) market definition. The third criterion is probably satisfied provided the blockage is widespread (in which case the issue might well be investigated in practice by a competition authority).

10.2.5 Conclusion

The arguments for including this market in the Recommendation are weak at present. In the event of widespread blockage, it appears possible to deal effectively with the issue under competition law. If the blockage is limited in scope and scale, then the Three Criteria are unlikely to be satisfied; and, in this case, the limited extent of consumer detriment is likely to make regulation disproportionate.

10.3 Access to 'special rate' services

10.3.1 The problem

For the purposes of analysis, a working definition could be origination to non-geographic numbers from individual networks. The significant point for market definition is that, on the basis of evidence from consumer surveys, retail competition between mobile service providers typically focuses on high-visibility services, especially calls, subscription charges and (in some Member States) subsidy of handsets. The surveys have shown that other ('special rate') services barely figure in consumers' choice of service provider. There is a *de facto* near-monopoly for origination for such services. Roaming is one such set of services with these characteristics. International calls and SMS and calls to non-geographic numbers are others.

Given the way competition operates in the retail markets, it is not surprising therefore that retail prices of 'special rate' services are often very high by comparison with the costs of provision. Once they have made their network choice, consumers are locked in to the network for any such services they use, as it is at best inconvenient and, at worst impossible, to access the service in any other way. Consumer groups complain about high retail charges for such services and, sometimes, consequential bill shock. Third party providers of such services complain that they suffer price discrimination in comparison with similar services provided by network operators. In effect, network operators are said to be charging a high origination mark-up that rises further in the case of calls to third-party 'special rate' services. Such behaviour tends to suppress competition amongst providers of 'special rate' services.

10.3.2 Current legal practice

For simplicity, we confine the discussion here to mobile call services, as this is the area that seems to generate more concerns from consumers and providers of 'special rate' services. However, the same logic can also be applied to 'special rate' services accessed from fixed lines.[104]

No regulator is currently applying special regulation to such origination services. Italian regulator AGCOM submitted a proposal to define a specific market (Market 15bis) for wholesale mobile call origination services to non-geographic numbers in Italy, but the proposal was withdrawn after the European Commission issued a letter of 'serious doubts'.[105]

However, this does not mean that ancillary services cannot be regulated at all. In addition to the asymmetric regulation imposed under the SMP regime, the current Regulatory Framework also promotes symmetric regulation with no reference to market power, though its applicable scope is very narrow. Article 21 of the Universal Service Directive grants Member States power to "oblige undertakings providing public electronic communications networks and/or publicly available electronic communications service to publish transparent, comparable, adequate and up-to-date

[104] We presume, although it is not beyond doubt, that the relevant fixed and wholesale call origination services should properly be considered to be in separate economic markets, as is the case for normal calls.

[105] Case IT/2007/0575.

information on applicable prices and tariffs, on any charges." Furthermore, Annex II of the Universal Service Directive provides a list of information that must be published by undertakings subject to the obligations of Article 21, which include, inter alia, standard tariffs indicating the services provided and the content of each tariff element, and including details of standard discounts applied and special and targeted tariff schemes and any additional charges, as well as costs with respect to terminal equipment.

Although transparency cannot directly decrease high charges, it has an indirect impact on the behaviour of mobile operators, given the competitiveness of the retail mobile call market. In particular, the requirement of publishing comparative information allows consumers to be able to compare different tariffs among mobile operators. Furthermore, the obligation of number portability under Article 30 of the Universal Service Directive can enhance consumers' freedom of choices in the sense of finding the most suitable 'special rate' services available on the market.

10.3.3 Competition analysis

The relevant retail markets would be the markets for various kinds of 'special rate' services. As for the over-the-top data services, some may be exclusively deliverable via electronic communications services, others not.

The precise market definition would need care and might depend both on national retail tariff principles and on which services are included within popular bundles. In a typical case, the retail revenue is shared between the consumer's network operator, the mobile service provider (if different) and the provider of the ancillary service. The precise split undoubtedly varies. But a typical arrangement is for the service provider to receive its standard mark-up for calls while the network operator retains a wholesale origination mark-up which may sometimes exceed by a significant margin the retail mark-ups of the respective service providers.

In effect, the logic expounded by stakeholders leads to the definition of aftermarkets for such services, at both retail and wholesale levels, segmenting wholesale origination and retail services according to whether the retail service in question amounts to basic national telephony or an ancillary service of some kind. As far as the aftermarket is concerned, the first and second criteria appear to be satisfied, at least for as long as it is not practicable for consumers to bypass the high retail prices charged by their service provider. As for the third criterion, it is unlikely that most national competition authorities would give priority to an investigation. Moreover, not all of the consumer harm could readily be dealt with under competition law. The case-law on excessive pricing would not necessarily lead to a clear finding of abuse.

It is a reasonable conclusion, therefore, that the Three Criteria would be satisfied.

It is less clear that it would be proportionate to apply ex-ante SMP Regulation, especially given the need to carry out SMP analysis and apply remedies on an individual network basis.

SMP regulation is not the only possible route under the Framework. Some NRAs have taken advantage of their powers to regulate tariff principles to require service providers to adhere to rules on how the retail charge is constructed. Depending on how this is implemented, this could both improve transparency for consumers and reduce problems arising from discrimination.

Consumer detriment also needs consideration. While irritation at experiencing apparently very high prices for 'special rate' services is natural, the aggregate amounts spent on such services may nevertheless constitute a small part of a typical consumer's mobile spend.

10.3.4 Conclusion

On the basis of the above proportionality considerations, this market does not seem a strong candidate for regulation. However, on the basis of the Three Criteria, it should probably be regulated.

10.4 Access to international calls

Similar arguments apply as for access to 'special rate' services. Calls from non-incumbent networks (especially from mobile networks) to international numbers are often very expensive. The reasons appear much the same. Consumers do not focus on these charges in making their network choices. And once they have chosen their network, high international charges do not give a sufficiently powerful reason to switch.

However, in this case, there are many bypass opportunities for consumers who care sufficiently about high charges. For example, inexpensive calling card services or callback services are readily available. Moreover, where available, consumers may also choose to use free or inexpensive VoIP options. Consumer detriment therefore appears to be low.

The case for action to reduce the price of the network operators' own services is therefore very weak and we do not consider it further.

10.5 SMS termination

10.5.1 The problem

At first sight, SMS termination gives rise to the same kind of bottleneck as voice call termination. Most aspects of a competition analysis would be identical. A market could be defined along analogous lines to that for voice traffic. Indeed, while the Commission has not unambiguously recommended to NRAs that they analyse SMS termination, its Recommendation certainly provides encouragement to those NRAs which consider it appropriate to regulate.

The pressure to include SMS termination in the Recommendation comes mainly from two quarters. The first is from those NRAs which currently regulate. However, this is only a small number. The majority remain unconvinced of the case for regulation. Given that SMS revenues are a small fraction of overall MNO revenues, it is easy to see that this could be a low priority area for most NRAs. The second call comes from some MNOs which experience material revenue outflows as a consequence of differences in termination rates across Europe.

10.5.2 Current legal practice

Three Member States (Denmark, France, and Poland) and one region (Gibraltar) define a separate market for wholesale SMS termination. The 2007 Recommendation, though not clearly specified, does imply the existence of a separate market for SMS termination. Therefore, all four NRAs carry out the Three Criteria Test. The competition concern of SMS termination is basically similar to call termination where network externalities due to the calling party pay principle make the market not able to be self-regulated. Consequently, all four NRAs propose to regulate the wholesale SMS termination market.

However, two issues in relation to SMS termination deserve extra attention. First, the SMS termination includes both traditional SMS and push SMS[106]. The Commission indicates that the take up of mobile terminal equipment, which allows receiving content by means that are substitutable to SMS - such as for example email delivered onto smartphones - may also constrain the provision of wholesale termination services for SMS Push services. Such services could eventually be substituted if service providers send content via email instead of SMS. The further spread of smartphones may influence the competitive conditions of SMS termination for interpersonal SMS to a lesser extent given that both parties would need to use email instead of SMS, which requires relevant equipment on both sides. The provision of content to end-customers of the MNOs, however, is only dependent on the receiving party's equipment. Therefore, the spread of smartphones will, at this stage, have mainly an impact on the means to provide content, and thereby on the conditions to provide wholesale termination for SMS Push services.[107]

Second, the Danish NRA defines the SMS termination market as including the SMS termination service regardless of where the SMS originates. However, when imposing remedies, it originally proposed a price ceiling for SMS termination rates that can only be enjoyed by those who compete with Danish mobile operators at retail level, while other operators, *i.e.* those not competing at retail level with Danish mobile operators, would not able to claim the regulated rates. This essentially differentiates termination for SMS originated domestically from those from abroad. The Commission raised serious doubts on this proposal as it believes that the termination of SMS originating abroad would be characterised by the same bottleneck situation which is identified for national SMS termination services. The Commission maintained that this proposal would lead to indirect discrimination against foreign mobile operators, and would thus be incompatible with the regulatory framework.[108] The Danish NRA finally applied the same SMS termination rates for all the SMS. Consequently, it seems that the Commission does not support the idea of defining a separate market for cross-border SMS termination.

10.5.3 Trends and drivers

SMS is often said to be a legacy service, given the increasing use of smartphones and accompanying popularity of various instant messaging services delivered via a broadband data connection. OTT messaging does not effectively reduce the number of telco messages, however. It rather seems like an additional channel of text communication, or a substitute only for a selected group of users. This also shows in the figures (see Figure 4.9 in section 4.3.1). Although messaging via social networks and OTT messaging apps is projected to grow faster, SMS and MMS volumes have still been increasing (although rather gradually) and are projected to continue to increase for several years to come.

10.5.4 Competition analysis

The relevant retail market is the market for SMS. Instant messaging services can substitute for SMS in many circumstances. It can be presumed that consumers will use instant messaging

[106] *i.e.* application-originated SMS, not originated on mobile networks but on fixed networks by *e.g.* Internet access providers via a computer. Push SMS allow other players than mobile (virtual) network operators to send SMS or deliver content and services to mobile telephones (*e.g.* for direct marketing, content transmission, message services, closed user groups). See, Commission decision concerning case DK/2010/1100: Wholesale SMS termination services on mobile networks in Denmark, 13/08/2010.

[107] Commission decision concerning Case FR/2010/1094 - Wholesale SMS termination services on mobile networks in Metropolitan France and French overseas territories, 16/07/2010.

[108] Commission decision concerning Case DK/2012/1283: Wholesale SMS termination on individual mobile networks - New entrant: Opening of Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC, 13/02/2012.

wherever it is a possible option, both on grounds of reliability and instantaneity and sometimes on grounds of cost. Instant messaging carries zero incremental cost to those who have a data subscription. SMS may carry an incremental charge. Nevertheless, unless consumers are behaving irrationally (which can generally be discounted), it is clear from the current and future projected levels that there are many circumstances where instant messaging is not an acceptable substitute.

The relevant wholesale markets are, by analogy with voice call termination, the markets for termination of SMS on individual networks.

The basic intellectual arguments in favour of regulation are much the same as for voice regulation and barely need to be rehearsed. There is a *de facto* termination monopoly. There are two noticeable differences with the case of voice termination. First, SMS traffic is always from mobile-to-mobile. The problem of fixed/mobile integrated operators (as we saw with voice termination) are not present here, which reduces the asymmetry among market players. Second, the traffic is typically more balanced because an SMS is often replied with an SMS. Perhaps for this reason, termination rates tend to be reciprocal, in which case the level of the rate should be of no significance for the purposes of MNO finances.

Given that there is a larger degree of symmetry between the operators, also the mutual bargaining positions of operators are more balanced. Consequently, we believe that it is less obvious that the Three Criteria are satisfied than is the case for voice call termination. The possible substitutability by instant messaging services suggests that, at some point, the second criterion may no longer be satisfied. Nevertheless, in terms of traffic projections that point has not been reached yet.

10.5.5 Conclusion

On balance, we are not convinced that consumer detriment is likely to be sufficient to justify regulation in most Member States and that, consequently, it is doubtful that the market deserves a place in the Commission's list of Recommended Markets. In principle, this leaves open the possibility that individual NRAs could conclude that there was sufficient consumer detriment in their territory that they proposed regulation. In doing so, they will of course be aware that they risk putting their own network operators at a disadvantage to the benefit of other European operators being allowed commercial freedom to set their own rates. Any such increase in cross-border distortions should concern the Commission.

11 Former candidate markets back on the list?

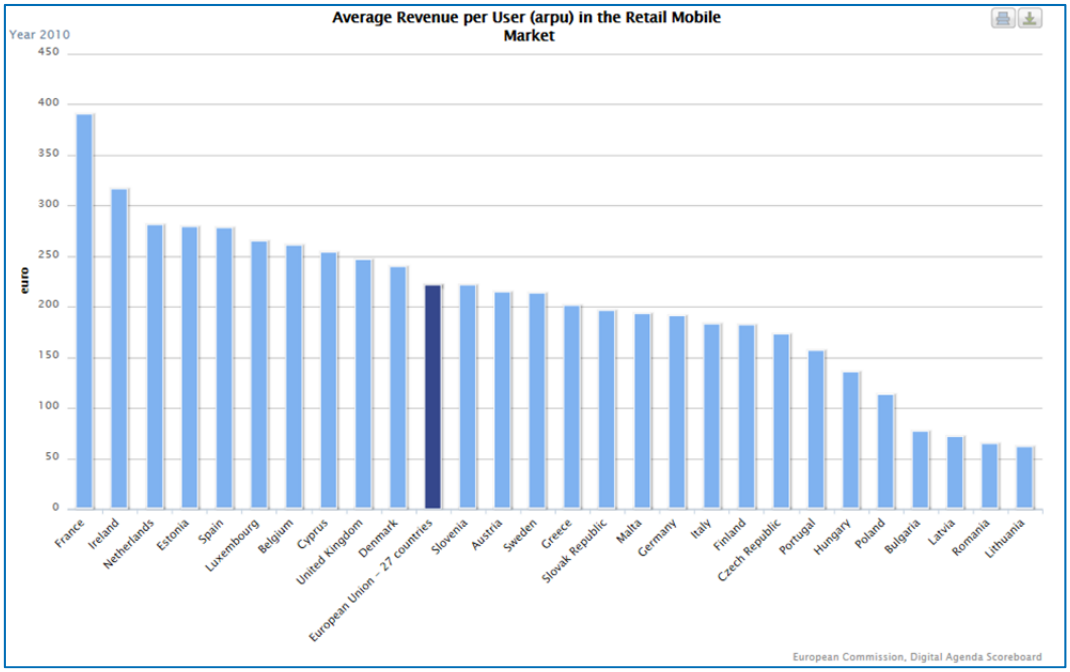
In 2007, various markets were removed from the list of markets in the Market Recommendation as they were deemed sufficiently competitive. As a return from competitive market to non-competitive market – which would mean re-inclusion of the market in the new Recommendation – is unlikely, a few markets from the First Market Recommendation need to be analysed to ascertain that the market can still be considered to be competitive.

11.1 Market 15/2003 - MVNO access

11.1.1 The problem

The problem is similar to the equivalent fixed market (2/2007), except that there is generally speaking more inter-infrastructure competition in the mobile market. In most Member States the market is oligopolistic in nature, some way removed from the world of fixed networks where some markets remain dominated by the incumbent. It is debatable whether these markets are always competitive in an economic sense. Whereas Market 15/2003 related solely to voice calls, any defect in competition would be likely to apply equally to the fast-growing mobile data market.

Access and origination are services which MNOs supply to themselves and to any MVNOs hosted on their networks. MVNOs are now common in many national markets. However, it is arguable that they have not made a significant contribution to increased competition everywhere. In some Member States they have little or no market share. In others, the terms on which they have been able to gain access allow for survival but not for significant undercutting of the prices charged by the host network operator. BEUC reported that in the Czech Republic, the network operators were all sister companies of foreign MNOs who all charged significantly less in their home markets. There is good reason to believe that prices are not yet close to the competitive level throughout Europe, despite the difficulty in establishing SMP, either at retail level or in the wholesale 'Market 15'.



This is consistent with the relevant economic theory that finds that in oligopolistic markets there are often multiple equilibriums whereby access may be offered either at cost, at a high price or not at all. In consequence, MVNOs may have little economic room to compete vigorously.

11.1.2 Current legal practice

Between 2008 and 2012 the Commission reviewed ten notifications from six Member States. Only Cyprus considers that this market still satisfies the legal requirements for regulation. The special feature there is that only two mobile licenses have been awarded while in other Member States three or more mobile network operators are often seen.

11.1.3 Trends and drivers

The roll out of LTE networks will lead to greater economies of scope between fixed and mobile network infrastructures, due to the re-use of fixed backhaul infrastructure. For instance, traffic from LTE devices will be offloaded on the fixed network via femtocells. The cells of the mobile networks will also be smaller than in previous generations of mobile standards, thus integrated operators have benefit from the capillarity of their fixed networks to connect LTE base stations.

Moreover, some stakeholders argue that consumers are increasingly buying telephony in bundles which include both fixed and mobile services. If that form of supply were to predominate in future, any retailer which does not have access to a mobile network would have to withdraw from the market. This raises the possibility that the imperfect competition currently observed in some mobile markets would be transferred to all retail services in future.

A trend that should lead to more intensive competition in the retail mobile market is the increasing use of VoIP to route calls over the data network rather than the traditional PSTN. In the case of managed VoIP services of comparable quality to services over the PSTN, cost savings will accrue to the extent that VoIP proves a more efficient transmission technology. These services might be offered by the MNO, the MVNOs hosted on its network and by 'over the top' service providers. The extent to which such savings are passed through to the consumer depends on the intensity of retail competition and the mobile service provider's ability to block or degrade consumer access to 'over the top services' (see below). Mobile service providers will not, for the most part, be interested in cannibalising their own PSTN revenue.

Additionally, many consumers will choose to use unmanaged 'over the top' VoIP services, especially for generally expensive international calls, despite the lower service quality. Even if not in the same retail market as traditional PSTN services, they will (again assuming no significant degree of blockage or degradation by the mobile service provider) exert a degree of competitive pressure and tend to reduce prices.

Mobile service providers may of course attempt to compensate for loss of traditional voice revenue by raising retail prices for data access and usage. The extent to which this will succeed again depends on the intensity of competition in the retail mobile market.

Representative Member State in figures

Number of players

On average, the number of MNOs per country is between three and four. This number is partly determined by the competitive situation in the market, but also by the approach of competition authorities in case of merger control and the nationally governed spectrum allocation rounds. The

number of MNOs has been constant during the latest years and is fairly common in all Member States. In some Member States the number of players may increase as a consequence of the latest auctions of the 2.6 GHz and 800 Mhz bands in which most Member States have used caps or set-asides to support entrants.

MVNOs with a market share of more than 5% are uncommon. On average only one MVNO per five countries has a significant market share. This makes them virtually non-existent in the *Representative Member State*.

Mobile coverage and penetration

Practically all Member States have complete coverage of GSM/2G technology. All consumers have access to a GSM network. For the UMTS/3G network, 90% of the consumers have access to this network. The 3G network has seen a rapid expansion, but due to ceiling effects, the increase in coverage has been less pronounced in the last two or three years. [109]

On average, every consumer has 1.4 mobile phones in the EU. The majority has a subscription to a 2G network, but this number is rapidly declining. More and more cell phones are capable of handling 3G technology. Already 3G technology has almost 50% penetration rate in 2011. This trend is likely to continue.

Of interest is the speed of roll out of the LTE network. Unfortunately there is no data yet that measures this. Nevertheless, we do envision a very rapid roll out of the LTE network, due to its relatively low investment costs, the ability to compete with fixed data networks (at least in the short run), the availability of suitable devices, and the need of operators to quickly operationalize the very large investments made during the recent auctions. In particular new entrants will be eager to roll out, as they do not suffer from a legacy problem (*i.e.* they do not cannibalize their 2G and 3G networks).

11.1.4 Competition analysis

In the light of the impracticality of an attempt to apply SMP regulation in oligopolistic markets (and because there is an expectation of increased competition as a consequence of growing use of VoIP), it does not seem worthwhile to spend material effort in defining markets and considering whether or not the Three Criteria are satisfied. It is however worth identifying some competition issues which may arise in future.

Bundling of fixed and mobile

The economies of scope arising in the provision of both fixed and mobile services to the same consumer are relatively limited and therefore do not give rise to significant cost savings. Nevertheless, many consumers may increasingly prefer one stop shopping. In that case, the market addressable by fixed service providers will decrease unless they are able to obtain mobile access on reasonable terms.

It is just possible to envisage circumstances where this has an adverse effect on competition. This would be the case in circumstances where mobile competition is not especially effective and where this lack of effectiveness was, as a consequence, translated into competition in fixed services. At present, this scenario seems remote, partly because the extent of quadruple play bundling is still

[109] In some countries, the ceiling effect may be explained by a legacy problems in the 900 MHz band which was traditionally used for GSM/2G and which was (until the recent auction of the 800 MHz band) the only sub-1 GHz band available for commercial mobile telephony services.

low and partly because consumers would in general still retain the option to buy fixed and mobile services from separate providers. Any attempt to raise the price of the bundle above the market level would be unlikely to succeed unless there was a corresponding rise in the price of mobile-only bundles. But assuming the price of mobile-only bundles is set at a profit-maximising level, such a rise would not be commercially attractive.

On balance, while individual fixed providers unable to gain mobile access could certainly expect more difficult trading conditions if quadruple play bundling becomes much more common, the risk of significant consumer detriment resulting from quadruple play bundling seems not to be a concern for the next few years.

Data offload on to fixed networks

Where a player has both a fixed and mobile network and invests in a public WiFi network, it can potentially take advantage of economies of scope to control the scale of the investment in mobile infrastructure necessary to support fast-growing mobile data usage. Instead of transmission via the 3G/4G mobile network, data would be offloaded via WiFi to the modems of fixed-line customers, under the terms of a contractual condition of supply. This will utilise space capacity on the fixed network. The fixed service providers with the most extensive set of connections would be best placed to take advantage of such economies of scope and, in principle, to leverage any market power they possess into the fixed market. At first sight, the risk of an adverse impact on mobile competition appears limited, notably because SMP in the retail broadband market is unlikely (assuming there is wholesale access regulation).

11.1.5 Conclusion

Although benchmarking studies indicate significant retail price variations across Europe (which may not be mainly attributable to cost variation), there is little that can be done under the Framework to address any competition concerns which may arise in individual Member States. Market developments may alleviate any such concerns over time. If not, the area is a candidate to be reviewed during any future review of the Framework.

11.2 Market 18/2003 - Broadcasting

11.2.1 The problem

The Market 18/2003 concerns the transmission of broadcasting service, *i.e.* TV and radio, to the public via various broadcasting platforms, such as terrestrial, cable, satellite, DSL and so on. End-users can receive broadcasting signals with appropriate equipment and (when they want more then free-to-air television) they need to pay for a subscription.

When removing Market 18 from the list, the Commission stated that there is evidence of greater platform competition and that many Member States are likely to have 3-4 competing platforms (terrestrial, satellite, cable and telecom-based) in contrast to 2-3 analogue platforms. While the Commission recognises that entry barriers still exist,[110] it predicts that the transition from analogue to digital indicate the market dynamics are such that the second criterion is not satisfied. Furthermore, the EC (implicitly) assumed that in case competition problems remain, general competition law would be able to deal with it.

[110] Ibid, pp.48.

11.2.2 Current legal practice

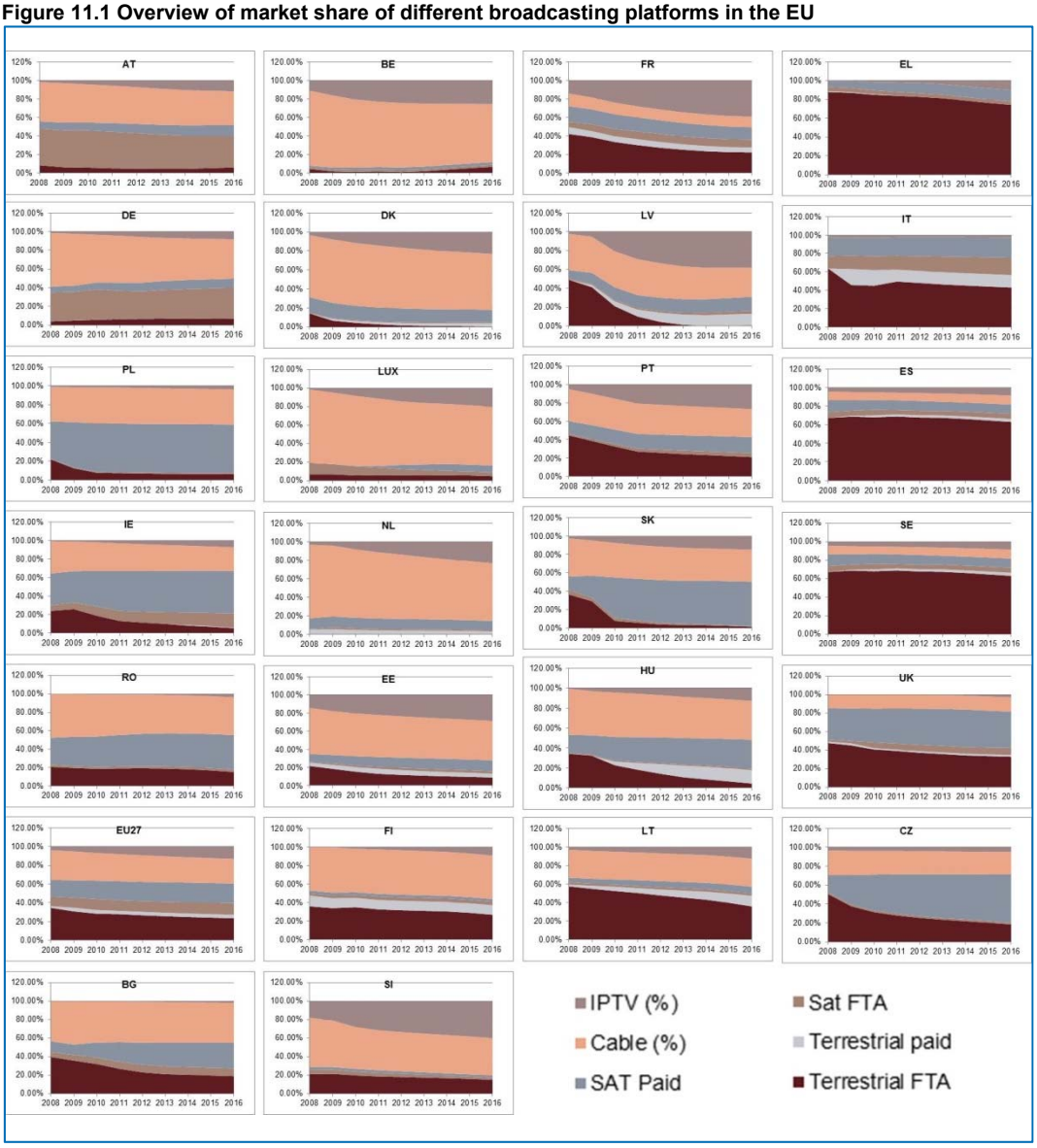
In 2008-2012, the Commission received 27 notifications from 17 Member States. Note is taken that in total 14 Member States consider that Market 18/2003 should still be regulated. Out of those 14 Member States, 12 are concerned with the incumbents' overwhelming power in relation to terrestrial broadcasting networks. The other two (Belgium and Netherlands) identified competition problems regarding cable networks. The difficulty to promote competition between different broadcasting platforms and the lack of substitution between paid TV and free-to-air TV are the two main concerns in those NRAs' analyses.

Such a large number of Member States that decide to regulate Market 18/2008 make it considerably different from other relevant markets that have been eliminated by the 2007 Market Recommendation where only a few Member States are not satisfied with the competition. Therefore, the Commission may wish to reconsider the decision to remove it from the market recommendation.

11.2.3 Representative Member State in figures

The charts below illustrate clearly that the concept of the Representative Member State is strained severely in the case of broadcasting markets, with wide variations in the percentage of customers served by any of the four main transmission platforms (terrestrial, cable, satellite and IPTV). There is further significant variation in the relative national importance of free and pay TV.

Figure 11.1 Overview of market share of different broadcasting platforms in the EU



Source: Idate.

11.2.4 Competition analysis

From the legal analysis it is clear that a large number of Member States have decided to regulate Market 18/2003 to an extent which seems surprising, given the Commission's 2007 view that the market no longer satisfied the Three Criteria. The case appears to require reconsideration.

Competition on Market 18/2003 is significantly affected by the must-carry obligations in accordance with Article 31 of the Universal Service Directive. The must-carry obligations requires broadcasting networks operators to distribute specified radio and TV broadcast channels and services based on clearly defined general interest objectives if a significant number of end users use their networks as their principle means to receive radio and TV broadcasts. Must-carry obligations can strengthen the selling power of content providers and adversely restrict the buying power of network operators in the process of negotiating access to broadcasting transmission networks.

Retail market

As can be seen from a quick glance at the national charts above, the broadcast content markets are extremely complex. Consumers have a choice of:

- Public service TV, normally subject to a universal service obligation;
- National pay-TV packages, via cable, terrestrial, satellite, fixed telephony network and 3G/4G;
- Live TV via Internet;
- Transnational packages via satellite;
- Packages intended for consumers of other MS via satellite; [111] and
- On-demand content via various routes.

Especially taking into account the increasing ability to deliver TV content via IPTV and LTE, the great diversity of transmission routes tends to mitigate any attempts by controllers of network bottlenecks to exercise market power in such a way as to cause significant consumer detriment, at least in respect of standard definition content, which predominates for the moment. This appears to have been relied on by the Commission in their assessment that the second of the Three Criteria was not satisfied (in the relevant retail market). Competition in the supply of high definition content may be more limited. But for the moment, this can properly be regarded as an emerging market which should not currently cause concern to regulators. (If there is a significant market shift in the direction of HD content and retail competition was limited, it would of course be open to individual NRAs to carry out an appropriate market analysis, subject to satisfaction of the Three Criteria.) Nevertheless, the situation still demands deeper consideration.

It is unlikely to be productive to attempt a generic analysis of the retail market. The question of which services are mutual substitutes and should therefore be included in the same market is one which is likely to depend on the relative importance of each transmission platform (which varies widely across Europe), the extent to which those platforms are open or controlled by the platform operator, consumer perceptions of the substitutability of on demand and broadcast concept; the packages of paid content offered on each platform and the national significance of public service and other free-to-air content. However, a certain number of conclusions can be drawn, which appear to be generally valid.

Given the number of ways in which the customer can obtain TV programmes, competition problems which arise as a consequence of control over a network bottleneck seem relatively unlikely to be experienced in most Member States.

This is reinforced by the fact that broadcasting is an efficient way to deliver standard content to end-users. The contribution of transmission to the total costs of retail provision is likely to be relatively modest. Expressed simply, an increase in transmission costs should cause only a very small increase in the total cost of retail provision. Even if network operators are able to exert market power over broadcasters, by charging above the competitive level, the consumer detriment should be small and unlikely to justify ex-ante regulation.

Exceptions may arise where there is integration between network operator and broadcaster which give rise to foreclosure incentives. These can be analysed case-by-case by the relevant NRA and a proposal for regulation submitted if justified.

More generally, the market power arising from control of ‘must have’ content should be considered. Providers of ‘must have’ content are able to exercise material countervailing power in response to any attempt by a network operator to exercise its own market power. The nature of this ‘must have’ content varies amongst the Member States but would often include premium sport and public

[111] Generally, such content should not be available because of geographical restrictions over transmission rights imposed by content owners. But as a matter of fact, the “grey market” is thriving and especially popular with expatriates.

service content. Whether the content provider or the network operator has the upper hand in this struggle is an empirical matter.

If, on balance, the content provider has the upper hand, retail competition problems could of course arise as the content provider has an incentive to raise retail prices above the competitive level. Content services do not fall within the scope of SMP regulation so any such competition problem has to be dealt with outside the Framework. But in analysing transmission markets, it is important to take into account any countervailing power the broadcasters may have.

So far, no general case for ex-ante regulation in Market 18 has been established. To establish one, it is necessary to consider the question of public service content which is identified by most Member States and which is a concept recognised under the Directives as having a special status. In particular, Article 31 of the Universal Service Directive provides for Member States to apply 'must carry rules' to ensure that public service content is carried by networks in their jurisdiction, subject to any remuneration rules which may be considered appropriate by the Member State.

Historically, 'must carry rules' were usually defined in national legislation to apply to cable networks both to ensure universal availability and to prevent cable network operators from exploiting the captive public service broadcasters by charging above the competitive level. In practice, carriage has often been free. Public service broadcasters did not usually require must carry rules for terrestrial transmission. Traditionally, they were allocated terrestrial broadcasting frequencies on very favourable terms in exchange for their public service obligations. Historically, broadcasters often owned the terrestrial transmission networks so that, provided that the communications services they needed to connect broadcasting centres and transmission sites were available on reasonable terms, there was no question of market power being exerted against them.

However, with privatisation of terrestrial transmission networks, it can no longer be assumed that public service broadcasters are immune from exertion of marker power against them. Where Governments have decided, as a matter of public policy, that certain 'public service' content should be universally available, it is appropriate that the public service broadcasters should not face transmission costs which are greater than would be experienced in a competitive market. Fundamentally, this would amount to monopoly rents being paid by the Government. Competition law can deal with excessive pricing but there is a difference (and potentially quite a large one) between prices which are excessive and prices above the competitive level. Therefore, there may be a case for ex-ante regulation arising from the need to ensure universal availability of public service content. While 'must carry rules', where they apply, should be preferred for this purpose, the relevant national statutes are not all sufficiently general to deal with all the relevant cases. Therefore, the suitability of the SMP rules should be considered.

Normally, when applying the SMP rules, the first question to ask is if there is a retail competition problem. By way of exception, this is not the key question here, which is: Do a significant number of consumers rely on transmission over a particular transmission platform? This question must be addressed for each individual network. While, in principle, consumers are generally able to switch platforms, switches are by no means cost-free as they generally entail purchases of new equipment or take-out of additional subscriptions or both. So they "rely" on transmission via a particular platform whenever the cost of switching would be material.

Having answered those questions for each network, a number of possible relevant network-specific wholesale markets can be identified. In principle, these need to be considered individually although it is possible to simplify this process to an extent.

Wholesale markets

At the wholesale level, three generic levels can be identified:

1. Access to bottleneck facilities – these are network-specific. They are either non-replicable or, at least, very expensive to replicate. The following are the most likely bottlenecks:

- For terrestrial, the bottleneck facilities are the relevant transmission masts/sites. For cable, the customer access segment of the cable network is a bottleneck facility;
- For satellite, access to the satellite transponder is a bottleneck;
- For the fixed broadband network, access to the local loop is a bottleneck;
- For any or all of them, the fixed network may be a bottleneck (in particular if transmission sites are served only by the incumbent). However, no special analysis should be needed in general as the necessary high bandwidth access should be available via any necessary regulation of Market 6;
- For any or all of them, the network may embed a conditional access system that is another potential bottleneck (but this has special purpose rules under Article 6, Access Directive and need not be considered further here).

2. Transmission management

   This is a downstream market from access to bottleneck facilities. (There is a reasonable analogy with Markets 4 and 5 for broadband access.) The service is to collect the broadcast stream from the broadcasting play-out centre, arrange for conveyance to the transmission equipment and (depending on the platform) manage the transmission itself. Broadcasters can perform this service themselves if they can get access to the bottleneck facilities. Or they may decide to use a third party manager as they do not want to self-supply. The network operator often offers transmission management but in principle, independent third parties can also provide it.

3. Access to the pay-TV package

   Especially where there is a dominant pay TV package, it may not be commercially viable for most channels to market themselves individually. Therefore, they need a carriage deal with the package operator. This is also the case where the network is closed (*i.e.* the network operator has a monopoly of service provision), as was typically the case for cable. The closed nature may also be relevant for digital TV (because of finite spectrum availability). This level of the market relates to access to Information Society services and is not subject to the SMP rules of the Framework.

Three Criteria Test – Access to bottleneck facilities

We need to establish therefore whether either or both the Markets 18A (access to bottleneck facilities) or 18B (managed transmission services) satisfies the Three Criteria. This must necessarily be done on a network-by-network basis. Although the considerations will vary from one Member State to another, some general conclusions are possible:

- It will normally be appropriate to segment Market 18A by transmission network. For provision of a managed transmission service, access to a terrestrial bottleneck is not a substitute for access to a cable bottleneck, for example;
- However, it is less clear-cut whether to segment Market 18B and a case-by-case analysis would be necessary. This depends on whether a retailer needs access to all platforms or whether access to any one would suffice;
- For terrestrial networks, access to the transmission site/mast will normally be a bottleneck. Indeed, these are usually essential facilities. Normally, there is no option to use a different site, partly for spectrum planning reasons and partly because of the huge cost of replication;
- Cable networks are often closed – that is, the package of content is controlled by the network operator. In such cases, network access will be a bottleneck;

- Broadcasters over satellite have a limited choice of satellite operator. It is likely that access to the satellite transponder is a bottleneck. However, in most cases, control of the transponder will be in a state other than that of the NRA performing an analysis. Therefore, such a market would not normally be a candidate for analysis by NRAs. The market appears to be transnational;
- The local loop is a bottleneck to the provision of an IPTV service over the fixed broadband network.

In most cases, it is obvious that access to bottleneck facilities satisfies the first (and probably the second) of the Three Criteria. Competition law is unsuitable for restricting prices to cost-oriented levels. Therefore the third Criterion is also satisfied.

Three Criteria Test – managed transmission services

The analysis of the third criterion is very similar to that for Market 18A. As noted above, the provision of managed transmission services is a specialist business and contracts are often long-term. This may lead to a shortage of such players interested in bidding for the relatively infrequent contracts, even where Market 18A is regulated. In such a case, the first and second criteria appear to be passed for Market 18B also.

11.2.5 Conclusions

Where a significant number of end-users rely on the terrestrial platform, SMP regulation may be justified in order to restrict the transmission prices payable by public service broadcasters to levels consistent with a competitive market. Although the case for regulation depends on considerations surrounding public service content, all broadcasters using the platform should be entitled to benefit from such regulation, to avoid the possibility of distortions of the retail market.

The same arguments may sometimes be valid for cable networks. However, in this case, it is more likely that 'must carry rules' are in place to deal with the problem.

If there are bottlenecks relating to use of broadcasting satellites, these should be dealt with on a transnational basis. The wholesale satellite transmission market is transnational.

As for the other platforms, it is relevant to consider whether significant volumes of consumers rely on those platforms for access to public service content and it seems rather unlikely that the conditions justifying ex-ante regulation of Markets 18A or 18B are satisfied. Where this is the case, ex-ante regulation of the relevant transmission markets may be justified. For example, in some Member States, the great majority of households are able to receive digital terrestrial television, even if some also have satellite, cable subscriptions or IPTV subscriptions.

We would accept, on the basis of the above arguments, that ex-ante regulation of Market 18 remains justified in some Member States. Although removal from the list undoubtedly raises in practice the burden of proof on NRAs to regulate, we presume that this barrier has been successfully cleared in Member States where regulation remains appropriate, given the significant number of such notifications. Therefore, the Commission's decision to remove it from the list of recommended markets in 2007 seems not to have caused problems in this case. Consequently, we think there is no need for re-insertion. Given that the rationale for regulation is not likely to be uniform amongst those Member States where regulation remains appropriate, it should be for individual NRAs to make the case that the appropriate preconditions are satisfied in their market circumstances. In many Member States, this will not be the case.

While pragmatic use can be made of SMP regulation in these circumstances, there is an element of fitting a square peg into a round hole. Undoubtedly, it would be preferable to deal with problems relating to public service content using legislation designed for the purpose.

12 Conclusion on the list of relevant markets

Based on the analysis of the previous chapters, we come to a suggested list of four relevant markets for the new Recommendation.

Table 12.1 Suggested list of markets for the Third Market Recommendation

Second Recommendation (2007)		Suggested Third Recommendation (2014)	
Retail fixed access	1		
Fixed voice call origination	2		
Fixed voice call termination	3	1a	Call termination on fixed networks
Mobile voice call termination	7	1b	Call termination on mobile networks
Local loop unbundling	4	2	Wholesale Local Access
Wholesale broadband access	5	3	Mass-market Wholesale Central Access in sub-national markets
		4a	Business grade Wholesale Central Access
Leased lines terminating segments	6	4b	High-quality business data connectivity

Markets 1 and 2 of the Second Market Recommendation do not pass the Three Criteria Test as the market seems to head towards effective competition in most Member States.

In the field of call termination, the markets 3 and 7 of the Second Market Recommendation operators do not experience countervailing buying power and, hence, they have SMP. The markets pass each of the Three Criteria and are included in the list of markets.

The wholesale markets for local loop unbundling, wholesale broadband access and the leased lines terminating segments remain on the list, with some modifications:

- We define a market for Wholesale Local Access (WLA) comprising “wholesale (physical) network infrastructure access or functionally similar wholesale local virtual network access”;
- In the same line of reasoning we define a market for Wholesale Central Access (WCA) comprising wholesale bitstream access or other forms of central virtual network access;
- We argue the case for defining subnational geographical markets at the WCA-level;
- We distinguish separate retail markets for mass-market broadband services and high quality bespoke broadband services – which are typically demanded by residential and non-residential users respectively. The distinction at retail level translates into distinct wholesale markets for WCA with possibly a different set of competition problems;
- The market for “wholesale leased line segments in areas of high network replication” is not a serious candidate for ex-ante regulation. For the low replication market (i.e. outside areas of high network replication), we conclude that the three criteria are satisfied.
- Business grade Wholesale Central Access may form one market with leased lines, but this is best analysed at the country level.

13 Measuring regulatory burdens

13.1 Introduction

The suggested modifications to the Recommendation 2007/879/EC on the relevant product and service markets are expected to have an impact on the 'administrative burden' both for NRAs and providers. A change of the list results either in a simplification (or complication) of regulatory procedures and/or it results in less (or more) regulated markets. Such changes also result in less (or more) information-gathering by NRAs, less (or more) market parties involved in the consultation rounds, less (or more) court cases, etc. It is important to note that while the Recommendation can be changed in 2014, the impact of the modification will be delayed with a couple of years (see below).

This annex presents a more detailed presentation of the analysis carried out in relation to the regulatory burdens and the impact of a change in the Recommendation 2007/879/EC. First, some methodological remarks are made about the followed approach and the limitations of the analysis. After that, the estimation of the regulatory burden is presented for both regulators and operators. The last section assesses the main impacts of a modification of the Recommendation.

13.2 Approach and methodological remarks

Use of the Impact Assessment guidelines and the EU Standard Cost Model

For the assessment of the impact of a change in the Recommendation 2007/879/EC on the administrative burdens, the EU Impact Assessment Guidelines (IAG, version 2009) are the most relevant methodological document.[112] The third annex to the IAG 2009 contains an in-depth methodological chapter on how the administrative burdens should be assessed (EU Standard Cost Model).[113] In this study we follow the main principles of the EU Standard Cost Model, but given the time frame it was not possible to carry out a full standard cost assessment.

In line with the EU Standard Cost Model, the assessment does not cover a detailed and representative sample of the costs of NRAs and undertakings,[114] but gives an estimation based on 'ideal types' (typical firms, typical NRAs, etc.) which are supposed to be 'normally efficient entities'. This means that with only a limited number of observations, a hypothetical 'average' NRA or undertaking will be created. In line with the EU Standard Cost Model, the results will then be extrapolated to the EU-level (no specific estimates per Member State). The IAG 2009 suggests using for extrapolation the 'EU database on administrative burdens', but for this analysis this database was of limited use (too general, no specific information on the electronic communications market, etc.). Given the limitations (in data and scope of the project), the extrapolation is based on the number of entities concerned (NRAs and operators).

The definition of 'regulatory burdens' in relation to the EU Standard Cost Model

It is important to note that the common definition of 'administrative burden' (as used in the IAG 2009/EU Standard Cost Model) does not cover all the costs related to defining the relevant product

[112] European Commission, 'Impact Assessment Guidelines', 15 January 2009. The IAG were developed to provide guidance for Commission staff assessing the impacts of Commission initiatives and/or new (or adapted) EU legislation.

[113] European Commission, 'Part III: annexes to Impact Assessment Guidelines', 15 January 2009. Section 10 presents the EU standard cost model.

[114] Annexes to the Impact Assessment Guidelines, p. 55-56 (step 9).

and service markets in line with Recommendation 2007/879/EC. The EU Standard Cost Model assesses the '*net cost of information obligations imposed by EU legislation'*. This means that the 'administrative burdens'[115] only cover the costs related to meeting the legal obligations to provide information on actions or production.[116] This results in an (at least for this study) undesired difference between NRAs and undertakings and too limited focus on costs (see text box below).

> Given the fact that NRAs have a specific legal obligation to carry out the market determination (article 15.3 of Directive 2002/21) their market determination activities (*e.g.* delineating markets, retrieving information from firms and analysing the competitive situation on markets, etc.) fall under the definition of administrative burdens. This is different for undertakings. The Directive does not explicitly list specific obligations to undertakings to provide information in relation to the ex-ante market determination (*e.g.* in line with article 15.3) and as a result undertakings have more 'freedom' whether or not to provide information. At the same time, the Directive (and national regulation) does contain a requirement that determines that undertakings shall provide information to the NRA promptly upon request and in conformity with the timescales and level of detail required by the NRA (article 5.1).[117] So when an NRA requests information, the efforts it takes for undertakings to provide this information fall under the 'administrative burden'. However, NRAs do not in all Member States request similar information and in our experience, the information provided by undertakings to the NRAs, is not always formally requested, but also has a dimension of cooperation and voluntariness. This situation would imply that if undertakings participate on a 'voluntary basis' in the process of market determination, these costs would fall outside the definition of the administrative burden, giving an unrealistic view of the costs these undertakings have.

As a result, the definition of administrative burdens is broadened to all costs related to market regulation ('regulatory burden'). This broader definition covers, both for NRAs and providers, all the costs and resources involved in the process of defining the relevant product and service markets.

Scope of related activities

The EU Standard Cost Model lists in relation to information obligations a number of standard activities (*e.g.* notification of specific activities, submission of recurring reports, certification of products or processes, inspection on behalf of public authorities, etc.) or standard types of required actions (*e.g.* familiarising with the information obligation, retrieving relevant information from existing data, filling forms and tables, etc.). Given the much broader definition of 'regulatory burdens', it was not possible to assess the activities related to the defining of the relevant product and service markets in this level of detail. The next figure presents the scope of the assessed activities (in a cycle of two to four years), which range from the first steps of scoping the market review to the final decision and enforcement of remedies.

> **Counterfactual**
>
> It is important to bear in mind that the activities which relate to the 'regulatory burden' should always be assessed against the 'counterfactual' situation, which in this case has two dimensions. The first dimension is the 'business-as-usual costs', which "*correspond to the costs resulting from collecting and processing information which would be done by an entity even in the absence of the legislation*".[118] The second

[115] The administrative costs consist of two different cost components: (i) Business-as-usual costs (counter factual) which correspond to the costs resulting from collecting and processing information which would be done by an entity even in the absence of the legislation, and (ii) the administrative burdens which stem from the part of the process which is done solely because of a legal obligation. Source: IAG 2009.

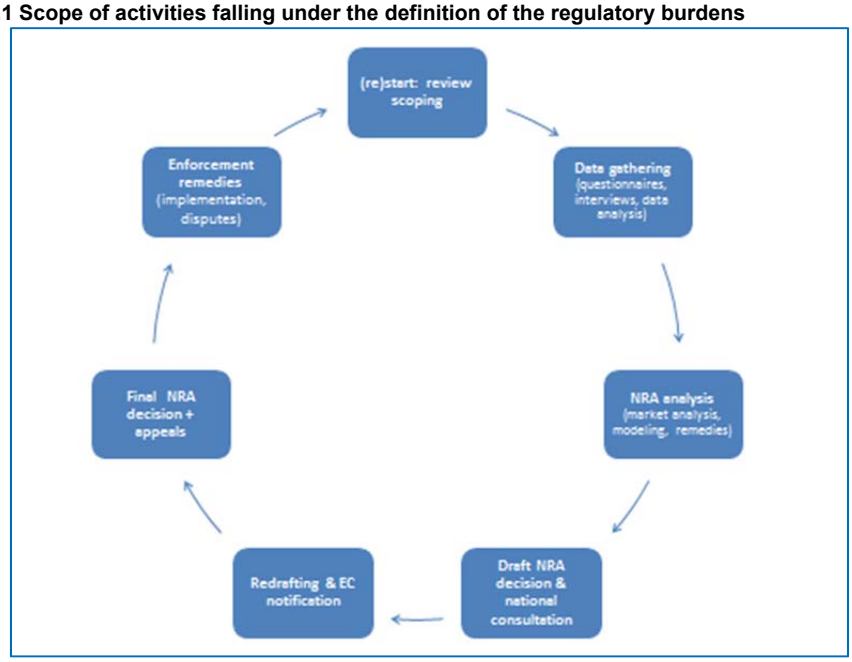
[116] Administrative costs are defined as: "the costs incurred by enterprises, the voluntary sector, public authorities and citizens in meeting legal obligations to provide information on their action or production, either to public authorities or to private parties. Information is to be construed in a broad sense, *i.e.* including labelling, reporting, registration, monitoring and assessment needed to provide the information. In some cases, the information has to be transferred to public authorities or private parties. In others, it only has to be available for inspection or supply on request." Source: IAG 2009.

[117] Article 5.2 of the Directive also makes a link (via the NRAs) to the information the EC needs.

[118] Annexes to the Impact Assessment Guidelines, p. 46-47.

dimension refers to the (potential) change in the Recommendation 2007/879/EC. In this assessment we took the current recommendation as the baseline scenario ('no changes'). At the same time, we assess that undertakings indeed do collect and process information for their normal business operation. However, when this information has to be provided to an NRA in relation to the market review this goes beyond the business-as-usual costs. The same is true for legal procedures and appeals against the NRA market analysis and remedies. Without the Recommendation 2007/879/EC these kinds of costs would not have been incurred.

Figure 13.1 Scope of activities falling under the definition of the regulatory burdens



Source: Ecorys, based on the interviews. Note: throughout the Member States this process differs in specific aspects (*e.g.* in Slovenia there is an additional 'administrative procedure' with the SMP operator after the notification to the Commission.

Interviews and selection of countries

For the assessment of the regulatory burden we carried out 18 interviews with NRAs (8) and operators (10 operators; 4 incumbents, 6 DSL-entrants/cable operators) in eight different Member States. Both parties (NRA and the provider) originate from the same country in order to reduce differences between Member States. Pertaining to the providers, we approached both a number of incumbents and a number of 'challengers'. All approached NRAs and operators cooperated. We assume that these different types of providers (or NRA) together represent the 'typical' undertaking or NRA.

The table below provides an overview of the selected eight countries. These countries were selected relatively ad random, but with the clear 'check' on a number of indicators. With this selection we cover a major share of the total European market (± 56% of total population), we include small and large Member States (in terms of population), we include Member States from the EU15 and EU12, we cover Member States with (seemingly) different intensities of regulation (measured in terms of the number of notifications), and we cover Member States with high and low scores on ECTA's regulatory scorecard 2009.

Table 13.1 Overview selection criteria and interviews

	EU15/12	population (% of EU)	# of notifications 2009-2012	ranking on ECTA's regulatory score card (2009)	Interviews
Belgium	EU15	2.2%	14	11	2 (NRA, operator)
Germany	EU15	16.3%	32	15	3 (NRA, 2 operators)
Italy	EU15	12,1%	28	8	2 (NRA, operator)
Netherlands	EU15	3.3%	25	1	3 (NRA, 2 operators)
Poland	EU12	7.6%	48	17	2 (NRA, operator)
Slovenia	EU12	0.4%	13	18	2 (NRA, operator)
Sweden	EU15	1,9%	20	12	2 (NRA, operator)
UK	EU15	12.4%	28	2	2 (NRA, operator)
Total	-	56%	-	-	18 interviews

Note: due to confidentially the table does not indicate in which countries we talked to the incumbent. In total we interviewed 10 operators, divided in 4 incumbents and 6 DSL-entrants/cable operators.

For the interviews a short questionnaire was used, which focused on the three main elements. First the current process in a country was assessed: what are the different stages of the market review? In addition to that the costs related to the market review were assessed: how much capacity is involved? How many additional costs (*e.g.* lawyers, economists) do undertakings and regulators incur? The third element focused in general terms on the modification of the list and whether a change would result in less additional burdens and the main drivers for this change. The interviews were carried out by telephone (in one case in person) in the period April – May 2013.

Important limitations to the assessment of impacts

From the interviews it became clear that the assessment of the impacts has some severe and important limitations.

Data limitations – Most of the interviewed NRAs and operators were only able to provide rough estimations of the used capacity (in full-time equivalents, FTE). They were not able to provide very detailed assessments of their regulatory costs (in €) or a detailed breakdown (*e.g.* in relation to specific markets or steps in the process). The main reason for this is that the activities related to the market review cannot always be 'isolated' very easily. Most interviewees have a 'core team' that deals with market review, but they also need to involve a lot of other people in their organisation (*e.g.* technicians, the legal department, management, etc.). In addition, estimations are influenced by the irregular stream of work ('peak periods' due to respond time, multiple market reviews at the same time, delays in the process, etc.). Another reason is that these 'administrative costs' are not registered separately.

Confidential information – Besides the lack of clear data, interviewees were not always willing to provide information on costs due to the confidential character of the information. This holds especially for information regarding the costs for external expertise (lawyers, financial specialists, economists, etc.) and the salary and overhead costs.

Large differences between Member States – Other limitations to this analysis are related to the large differences between the Member States on a number of different levels. Differences exist in the set-up of the market review procedure (*e.g.* additional information meetings with stakeholders or an extra administrative procedure) and the number of market reviews. In addition, there also exist 'contextual factors' that affect the market review, like for example (i) differences in market evolution, (ii) differences in the development of competition (*e.g.* related to the existence of separate

networks, the density of the population, etc.), (iii) differences in the regulatory approach/culture, and (iv) differences in the administrative context (*e.g.* possibilities for appeals, law suits, etc.). As indicated before we assume that by creating a hypothetical 'average' NRA or undertaking and extrapolating the results, these differences fall away to some extent.

Confidential policy options – During the interviews it was, due to confidentiality reasons, not yet possible to discuss in detail the exact policy option(s) that were presented by Ecorys to the Commission. As a result, the policy options could only be discussed in the interviews from a general perspective, which had a (negative) trade-off towards the detail of the assessment.

13.3 Regulatory burdens of the current Recommendation

13.3.1 Process of market review

As indicated above, the scope of the market review ranged from the first steps of scoping the market review to the final decision and enforcement of remedies. The next table presents some more detailed insights in the different steps in the process. This also illustrates the roles and positions the different stakeholders have in the process and in which phases the main regulatory burdens fall.

Table 13.2 Detailed overview of the procedural steps in the market review

Main steps	General remarks
1. Scoping	• In the preparation of the market review, some NRAs (*e.g.* OFCOM, ACM) organise a (limited) number of interviews or meetings with stakeholders in order to define the scope and focus of the analysis.
2. Data collection	• For the data collection, most of the NRAs send out (very) detailed questionnaires to market players. In most cases these data can be combined with more regular monitoring data. The questionnaires are in most cases more or less standardised, but may differ per regulation round, per market and in the level of detail. OFCOM publishes also a 'call for input' for more general market insights; • In this phase NRAs often order external (economic) studies to strengthen and support their analysis; • Operators indicate that this phase requires a lot of their capacity, as the required data may be very detailed and often involves a lot of people through all levels of the company; • The number of involved market players differs. In most markets only the incumbent and the main competitors are involved, but sometimes dozens of (smaller) companies are approached and questioned. In some cases market players provide a joined response / vision (*e.g.* Poland).
3. Analysis by the NRA + publication of the draft decision	• This phase is mainly an internal procedure by the NRA. The involvement of operators is very limited (some additional questions, contacts at high senior level). Most NRAs combine the decision on the market analysis with the decision on the remedies (charge control), although for example OFCOM and BNetzA make a split analysis.
4. National consultation + redrafting	• After the publication of the draft decision, the public consultation is launched. For operators this is again a very important (and time consuming) phase, as the consequences of the market review become very clear now; • Some of the regulators are obliged to respond to all the responses made, other NRAs respond only to the key comments. The consultation may lead to a redrafting of the draft decision, but big changes are an exception. Some NRAs (*e.g.* OFCOM, ACM) have to launch a second (smaller) consultation if the changes are significant.

Main steps	General remarks
5. Notification to the EC + publication of the final decision	• In line with the EU regulatory framework the decisions are notified to the Commission and other national authorities (Competition Authorities or Media regulators); • For example in Slovenia, an extra 'administrative procedure' is built in after the notification phase. In this step the SMP operators are consulted (again) about the proposed market remedies.
6. Appeals	• In all the selected countries the number of appeals / law suits against the final NRA decision is very high (sometimes 100%). The main reason for this is the fact that the decisions directly influence the business case of the operators (both incumbents and challengers); • This phase is seen by both regulators and operators as a very expensive phase. Some NRAs and operators have in-house capacity to deal with court cases, but in most cases external expertise is hired (lawyers, but also financial experts, economists, etc.).
7. Implementation / enforcement of the remedies	• This final phase covers the implementation and enforcement of the remedies. Obviously this results in a lot of disputes and/or complaints due to the level of detail and the different interests of the stakeholders (challengers against incumbents, incumbents against the NRA, etc.); • Especially for incumbents this phase results in the involvement of a lot of people throughout the company (technicians, commercial experts, product managers, etc.) and a lot of implementation costs (development of new products, adjustment of existing products, etc.). At the same time, NRAs have to monitor this process and challengers want to ensure that remedies be implemented in the right way.

13.3.2 Regulatory burdens for NRAs and operators

Regulatory burdens for NRAs

As indicated before, most of the interviewed NRAs were not able to present detailed figures on the total costs they make for the whole process of market review. Nevertheless, all NRAs provided an estimation of the total annual capacity (in full-time equivalents) involved. In most cases it was possible to make a good assessment of the number of FTE directly involved in the market analysis (step 1 to 5 in Table 13.2). For the phases of appeal and enforcement (step 6 and 7 in Table 13.2) this was less clear, as other departments (legal department) are responsible or it is more scattered throughout the organisation and work-flow. At the same time it is important to note that, due to the different parallel processes, the workflow for NRAs is not very stable and may vary over the year and the total regulation period (on average three years). In addition to the capacity, the hiring of external capacity for the market reviews (*e.g.* lawyers, financial experts, economists, etc.) is an important cost factor. For most NRAs these costs related to the market reviews were (very) difficult to assess and to some extent confidential.

In the next table we provide an overview of the regulatory burdens for NRAs. These estimations refer to the average costs per year, so these costs may vary from year to year (depending on the number of market reviews and the specific market. For nearly all NRAs it was not possible to provide (more) detailed estimations per relevant market. In general, Markets 4/2007 and 5/2007 are seen as the main 'cost driving' markets, which mainly relates to the process of (detailed) data gathering. Especially for Market 7/2007 a lot of external expertise is hired (in relation to the modelling). Legal costs are relevant for all markets.

Table 13.3 – Estimation of the regulatory burdens (per average NRA, per year)

Type of cost	NRA average	Remarks
Own (internal) capacity	16 – 24 FTE per NRA	• Step 1-6: 16 FTE on average per NRA. The capacity varies from 10 to 25 FTE per NRA. Most of the NRAs have in-house capacity (lawyers, attorneys) for dealing with appeals. This capacity is included in the estimation. • The capacity for the enforcement of the remedies (step 7) is difficult to assess, but this may involve additional capacity of approximately 8 FTE on average (50% of the capacity for step 1-6). The capacity differs per NRA; • Approximately 90-95% of the capacity relates to high-skilled staff members (economists, technicians, legal experts). The level of support staff is very limited.
External expertise (economists, financial experts)	≈ € 300k (rough estimation)	• In most cases, these external costs are seen as confidential information. Costs range from € 100k per year to more than € 1 million. These costs relate mainly to cost modelling and economic research.
External legal costs	≈ € 100k (rough estimation)	• As indicated, most of the NRAs have in-house capacity for legal issues. These external costs are seen as confidential information. There are NRAs with € 100-300k additional legal costs, but this may vary per year (or market review).

Source: Ecorys, based on interviews with 8 NRAs.

Given the estimations for the hypothetical 'average' NRA, it is also possible to extrapolate these regulatory burdens to EU-27 level. The total annual regulatory burden related to the market review is approximately € 1.9 million per NRA and € 50 million for all 27 NRAs. For this estimation the following considerations can be given:

- **Capacity costs–** For 27 Member States, the total capacity related to the market review is approximately 650 FTE (step 1-7). Given the average annual labour costs of € 43,247 (EU-27)[119] and an add-up of 40% for overhead costs[120], the total capacity costs are approximately € 39.2 million per year;
- **External costs –** For 27 Member States the total external costs (roughly € 400,000 per NRA) are approximately € 10.8 million per year.

Regulatory burdens for operators

Like in the case of NRAs, most of the interviewed operators could only provide rough estimations of the regulatory burdens in relation to the market review. It became very clear that the operators use their capacity in a strategic way. They 'follow' all markets, but especially challenge those product markets in which the ex-ante regulation has the biggest (potential) financial impact on their business case. If the financial stakes become higher, the operators put in more capacity and

[119] This is based on Eurostat data for 2010 ('Mean annual earnings by sex, economic activity and educational attainment', NACE: Public administration). Given the high-skilled NRA staff we assumed that in general staff members have the highest level of education (level 6 of the ISCED - International Standard Classification of Education by the ILO), which covers "second stage of tertiary education leading to an advanced research qualification". The EU Standard Cost model suggest to use the harmonized ISCO tariff (International Standard Classification of Occupations by the ILO), but for this analysis the assessment by level of education made more sense. The differences throughout Europe are huge and range from € 7.600 in Bulgaria to € 76.200 in Denmark.

[120] This estimation of 40% is based on the Standard Cost Model as used in the Netherlands. The Dutch Ministry of Finance publishes every year a guideline on the tariffs of civil servant (salary costs + fixed overhead costs). For high-skilled senior employees the overhead costs are approximately 40%. For low-skilled employees the overhead costs may be more than 100% of the salary costs.

(especially) external expertise. In terms of regulatory burden, there exists a huge difference between the traditional incumbents and the challengers. In absolute terms the regulatory burden for incumbents is obviously much higher than for challengers, as they are active in most product markets and often the owner of the networks (which results in very detailed data requests). At the same time, also the remedies are (mainly) directed at the operations of the incumbents. However, given the often much smaller operations of the challengers, also for them the regulatory burden can be quite substantial. Compared to the incumbents they are much more dependent on the regulation of the markets and the actual enforcement of the remedies. More than the NRAs, the operators indicated that cost data was confidential and could not be released.

In some cases, like in the Netherlands, the operators have to contribute to the operational costs of the NRA in relation to the market reviews and broader market regulation/control.[121]

In the next table we provide an overview of the regulatory burdens for operators. Like for the NRAs, nearly all operators we not able to make a (detailed) breakdown per market.

Table 13.4 Estimation of the regulatory burdens (per average NRA, per year)

Type of cost	Average	Remarks
Own (internal) capacity	Incumbents: 16-32 FTE Challengers: 2-3 FTE	• Incumbents: Step 1-6: 16 FTE on average per incumbent. The capacity varies from 5 to 40 FTE (depending on the size). The capacity for the enforcement of the remedies (step 7) is difficult to assess due to the fact that the activities are very scattered. A rough estimation would be that the capacity is at least equal to the capacity used of the market analysis (step 1-6); • Challengers: Step 1-7: 2-3 FTE, but the deployment is very much focused and differs per market (given the strategic focus). Some challengers work together in the consultation and enforcement phase. Enforcement phase (disputes, etc.) is very important and may cover 50-70% of the capacity (and related costs); • Approximately 90-95% of the capacity relates to high-skilled staff members (economists, technicians, legal experts). The level of support staff is very limited.
External expertise (economists, financial experts)	Incumbents + challengers: ≈ € 200k (rough estimation)	• Especially for the cost modelling external expertise is hired by both incumbents and challengers.
External legal costs	Incumbents + challengers ≈ € 400k (rough estimation)	• Incumbents: the incumbents have their own legal department, but for appeals and disputes external expertise is hired. Estimation vary from € 300 k to € 1 million per year (differs per year and market); • Challengers: legal capacity is (relatively) limited, but the relevance of appeals is higher. Estimation vary from € 100 k to € 1 million per year (differs per year and market).

Source: Ecorys, based on interviews with 4 incumbents and 6 challengers (including cable operators).

[121] In 2011 the Dutch telecommunication operators contributed € 12.2 million to the operational costs of OPTA (total costs: € 16.1 million). The contribution depends on the annual turnover. Large operators (turnover > € 20 million) pay a percentage of their turnover (in 2011: 0.077% of the turnover in 2010). Source: Annual report OPTA 2011.

When we extrapolate these figures to EU-27 level, the total regulatory burden for all operators is approximately € 216 million per year. For this estimation the following considerations can be given:

- **Number of operators –** For the EU-27 we assumed that in an average Member State approximately eight 'big' operators are active (one fixed-incumbent, three other fixed ISPs and four mobile operators). Ecorys' data shows that throughout the EU-27 the biggest four operators (C4) have the more than 80% of the market, both for fixed networks (C4: 82%) and mobile (C4: 98%).[122] Although there may be involved dozens of other much smaller companies in a market review, these eight biggest players represent almost all regulatory burdens;
- **Capacity costs -** For 27 Member States, the total capacity related to the market review is approximately 53 FTE per country and 1,430 FTE for the EU-27. Given the average annual labour costs of € 43,247 (EU-27) and an add-up of 40% for overhead costs, the total annual capacity costs are approximately € 3,2 million per Member State and € 86,6 million for the EU-27;
- **External costs** - For 27 Member States the total external annual costs (roughly € 600,000 per operator per year) are approximately € 4.8 million per Member State and € 130 million for the EU-27.

Main cost drivers

The opinions about the main cost drivers differ. In general there is consensus that one of the main factors is the 'complexity' of the market analysis and the related remedies and/or cost calculations (like in Market 7/2007). Another important cost driver is the geographical analysis (like in markets 4/2007 and 5/2007). In some Member States also the possibility and procedures for appeal involve the use of a lot of capacity (and external experts).

13.4 Impact of a change in the Recommendation 2007/879/EC

In this last section we assess the impact on the regulatory burdens of a change in the Recommendation 2007/879/EC.

Policy options

As indicated before, there is one very important limitation for assessment of impacts. Due to confidentiality reasons, it was not yet possible to discuss with the interviewees in detail the exact policy option(s) which were presented by Ecorys to the Commission. The different policy options could only be discussed with interviewees from a general perspective.

The main policy option (option 1) for which we assessed the impact on regulatory burden is the recommended list of markets resulting from our analysis in phase 1 and 2:

- 1a. Dropping 1/2007 and 2/2007;
- 1b. Merging 3/2007 and 7/2007;
- 1c. Maintain markets 4,5,6/2007.

An alternative policy option can also be taken into account. The two most notable alternative sub options are (in comparison to the main policy option):

- 2a. Dropping only Market 1/2007;
- 2b. Split Market 5/2007 into Market 5a (low-quality) and 5b (high-quality).

[122] Ecorys, own dataset.

Comments on option 2a - The rationale behind dropping Market 1 and keeping Market 2 is that retail call origination (Market 1/2007) and retail access are more and more consumed in a bundle. Defining a retail market for call origination therefore becomes rather obsolete. Furthermore, the bundling at retail level is also observed at the wholesale level (CPS is being replaced by WLR and – when WLR is not available – by VoIP).

Comments on 2b - In the revised interim report we concluded that at the retail level there is a difference between high and low quality bitstream access. We also concluded that it is difficult to generalise the consequences of this 'split' for the definition of the wholesale market. Consequently we decided to maintain the status quo and leave it to the NRAs to establish whether a 'split' is warranted. This provides some freedom to NRAs for choosing not to examine a potential split between high and low quality WBA and as such they may overlook potential competition problem and/or may not observe a potential substitutability between high quality WBA and leased lines.

Main general observations

There can be made a number of general observations regarding the impact.

National decision - The first observation related to a change of the Recommendation 2007/879/EC is that any impact depends whether or not a NRA decides to deregulate a market or not. Removing a market from the predefined list gives an important 'signal', but does not automatically mean deregulation. According to Directive 2001/21/EC (as amended), the NRA is obliged to carry out a market analysis within three years from the adoption of a previous measure relating to that market.[123] Only in cases where the NRA concludes that the market is indeed 'effectively competitive', it has to withdraw the obligations in place (taking into account an appropriate period of notice). If the NRA determines that a relevant market is not effectively competitive (meaning that there is still SMP) it has to impose appropriate specific regulatory obligations or maintain or amend these if they already exist. This can be illustrated by the fact that still in a lot of Member States markets are regulated (for example Market 18/2003), which were delisted in 2007. Related to this, is the notice that in a situation in which a market is still regulated, a change in the Recommendation may even increase the regulatory burden to some extent, as NRAs then need to 'prove' that a market needs to be regulated and passes the Three Criteria Test.

Delay of any impact - Markets which are currently regulated and not listed in the new Recommendation (*e.g.* Market 1/2007 or 2/2007 according to our options) will be assessed at least once again before they (in case of effective competition) can be deregulated. This means that after the change of the Recommendation (in 2014) any impact is delayed for at least another regulation period (so two to three years).

Broader regulatory tasks – A third observation is related to the fact that NRAs, even if a market is deregulated, will still monitor the market(s) due to their broader regulatory tasks. Some of the most resource-consuming activities, like data gathering, would be maintained to fulfil with national and EU requirements, even in the event of the withdrawal of a market from the Recommendation.

Shift of costs – Finally it is important to consider that a change in the Recommendation may lead to shift of costs. Especially challengers warn for the risk that deregulation of the current relevant markets results in a shift of costs related to ex-ante regulation to ex-post (competition) regulation. They fear that after deregulation they are forced to defend their interests via the general competition regulation, which is seen as very ineffective compared to the current ex-ante regulation.

[123] Or: within two years from the adoption of a revised Recommendation on relevant markets, for markets not previously notified to the Commission.

Other costs shifts may be related to the implementation of alternative legal instruments (after deregulation), like a universal service. Within the scope of this study it was no possible to assess these specific shifts of costs.

Specific observations on the impact on regulatory burdens

In the table below we provide an overview of the assessment of impacts of the main policy options, including a more general assessment by Ecorys.

Table 13.5 Overview main impacts on the regulatory burden (per policy option)

Options	Impact [1]	Assessment
Option 1		
1a. Dropping 1/2007 and 2/2007	++	• Interviewees assess that dropping Market 1/2007 and (to a lesser extent also) Market 2/2007 may have a big impact on the regulatory burdens. The regulation for these two markets is seen as rather 'old fashioned' with a lot of related implementation costs (especially for SMP operators). It is expected that these markets will 'phase out' in the coming years (some countries already deregulated these markets); • Two interviewees indicate (with a rough estimation) that dropping Market 1/2007 and 2/2007 may result in a cost reduction of 10-15% of the total regulatory burden (≈ € 27 million).
1b. Merging 3/2007 and 7/2007	o/-	• Almost all interviewees indicate that in terms of regulatory burdens the merger of these two markets may have a very limited impact ('neutral') or even a negative impact (additional research, developments of expertise, etc.); • Interviewees indicate that these markets are still separate networks. A merger of these markets would still result in a situation in which both networks need to be assessed separately. In other words, the resources needed for the analysis of the relevant markets and of dominance would hardly be affected. Furthermore, the largest costs are often devoted to establishing the appropriate level of TRs. Since fixed and mobile networks are and will remain characterised by different cost structures, merging the analysis would not bring relief to the NRAs or the market players.
1c. Maintain markets 4,5,6/2007	o	• Given the fact that these markets are maintained, also the impact on the regulatory burdens will be neutral.
Overall assessment Ecorys (option 1)	+	• The implementation of option 1 (including the sub elements) is assessed to have a positive impact (+) on the total regulatory burden. For most of the markets (4,5,6/2007), the impact will be neutral as there is no change in the procedure or in the scope; • We assess further that the merger of Markets 3/2007 and 7/2007 may have little or perhaps even a negative impact, despite the fact that there is now one joined procedure and analysis; • The main impact on regulatory burden is expected for dropping Market 1/2007 and 2/2007. The exact impact is difficult to assess, but may be 10-15%.
Option 2		
2a. Dropping only Market 1/2007	++	• See option 1a. Dropping Market 1/2007 is expected to have a bigger impact than dropping Market 2/2007 due to a difference in the level of remedies.

Options	Impact [1]	Assessment
2b. Split Market 5/2007 into Market 5a (low quality) and 5b (high quality)	o/-	• With some exceptions (NL and DE), this split in Market 5/2007 is not made by all NRAs at the moment; • The impact is assessed to be neutral (for countries which already have this split) or negative. The main reason for this latter impact is that both NRAs and operators have to start with a new situation, which requires additional research, developments of expertise, etc.; • From the previous costs assessment it became clear Market 5/2007 is already one of the most 'costly' markets. The proposed change seems to add to that position.
2c. Main markets 2,3,4,6,7	o	• Given the fact that these markets are maintained, also the impact on the regulatory burdens will be neutral.
Overall assessment Ecorys (option 2)	o/+	• In line with the overall assessment for option 1, we expect also for option 2 a (small) positive impact. The main positive impact for the regulatory burden is related to, if possible on national level, the drop of Market 2/2007 (phase out of market reviews and remedies). The impact of the split of Market 5/2007 is difficult to assess, but may indeed result in an increase in the regulatory burdens (at least in the first round of market review).

Source: Ecorys, based on the interviews. Note: [1] the impact on the regulatory burden. '++' stands for a very strong and positive impact (reduction of regulatory burdens), '+' stands for a positive impact (reduction of regulatory burdens), 'o' stands for a neutral impact, '-' stands for a negative impact (increase of regulatory burdens) and '--' for a very negative impact (increase of regulatory burdens).

Impact on the simplification

A change of the list may also result in a simplification (or complication) of the procedures related to the market analysis. Given the current options, it is not expected that there will be any impact on the 'simplification' of the procedures. The key approach of the market reviews stays the same. Interviewees indicate that a merger (or split) of different markets is more likely to complicate the analysis.

14 Economic costs and benefits

14.1 Approach

The second part of the assessment of impacts relates to the economic costs and benefits in terms of static and dynamic efficiency. To put it differently: do consumers get more or less value for money and do operators invest more or less in innovation and network upgrades?

If a market is regulated, the regulator's focus might in practice be biased towards static efficiency, simply because it is more tangible. Long run consumer benefits require appropriate incentives to invest as well. The costs of adding (dropping) a market to (from) the list of predefined markets can be expressed in terms of two types of errors:

- Regulation where it is not needed (type 1 error, or false positive); regulation may hinder incentives to invest either for the incumbents, for newcomers or both;
- No regulation whereas it is needed (type 2 error, or false negative); consumers will be harmed because market players can abuse market power.

The first category can also relate to types of regulation that hinder investment incentives, *i.e.* it is not regulation per se but the nature of regulation. As indicated in the proposal, including a market on the predefined list lowers the chance of type 2 errors and increases the chance of type 1 errors (in absence of further measures). The current process contains some checks and balances to further reduce the chance of type 1 and type 2 errors, *i.e.* the notification to the Commission and the Three Criteria Test (if applicable).

Policy options

The main policy option for which we analyse economic costs and benefits is the recommended list of markets resulting from our analysis in phase 1 and 2:

1. Not regulating 1/2007 and 2/2007;
2. Regulating 3,4,5,6,7/2007.

Not regulating fixed telephony

What is the impact of the new predefined list on the risks for type 1 and type 2 errors?

- Our proposed list of predefined markets (see chapter 12) drops markets 1 and 2 of the current list. This implies that, compared to the counterfactual (the current list), the risk for type 1 errors decreases and for type 2 errors increases. The latter may, in the case of markets 1 and 2, typically occur if technological solutions offering an alternative to captive customers develop too slowly and/or if NRAs fail to monitor the PSTN-VoIP migration trend;
- Since Member States are rather heterogeneous in the adoption rate of VoIP, also the risks of type 2 errors (*i.e.* the risks to monopolistic pricing behaviour) differ between Member States. If for a particular Member State the risk of type 2 errors is unacceptably high, but the analysis still fails the Three Criteria Test, the MS has the option to address this problem via alternative policy measures (*e.g.* a universal service obligation). What is considered 'unacceptable' is a matter of political debate;
- Concerning the other markets from the 2007 list, we do not suggest dropping any of those markets. Consequently the probability of type 1 and type 2 errors does not change;
- We do not introduce any new markets to the list. Hence the potential impact related to type 1 and type 2 errors does not increase. In fact we have established already (in the market analysis) that for a number of potential markets the chance of a type 2 error is small.

Focus of the analysis

The essence of the assessment of costs and benefits then focuses on the impact of dropping Markets 1 and 2. Questions that we need to answer are:

- What are the risks to anticompetitive / monopolistic behaviour by the fixed telephony incumbent?
- Are there any additional incentives to innovate (by either the incumbent or challengers)?

As became clear from the revised interim report, the risks to monopolistic pricing behaviour increase with the size of the group of captive PSTN users. It also became clear that *if* the PSTN incumbent were to increase its price, this is likely to increase the incentives to develop and adopt technologies that 'set the captives free' (*e.g.* battery-based backup power supplies for alarm systems and using mobile networks for redundancy). In order to get concrete (quantitative) information on these effects we propose the following steps:

- Step 1: assessing risks and impacts of monopolistic prices:
  - Using data on the representative MS, we can assess on the basis of a critical loss analysis, the 'critical' size of the pool of captive end-users that would allow an incumbent to raise its price with 5% to 10%;
  - Next, we estimate the actual size of the group of captive PSTN end-users (or better say a bandwidth) on the basis of interviews with ECTA, ETNO, INTUG and a selection of large providers of home and personal alarm systems;
  - A final step would be to estimate the impact on consumer and producer surplus of a PSTN price increase of (say) 10%. Given that the demand for captive end-users is (nearly) inelastic, the impact of a price increase will likely be a shift from consumer to producer welfare and not so much a decrease in total welfare.

- Step 2: assessing the impact on incentives to innovate:
  - The analysis will be partly qualitative and partly quantitative. For this we would have to assess the incentives to innovate or (better say) to adopt innovations, which depend on the following issues:
    - Is it technically feasible to offer VoIP-based alternatives with similar product characteristics? In other words, are there technological solutions to 'set captives free'?
    - What are the costs for adopting/subsidising technologies allowing a switch towards VoIP?
    - What are the additional profits for a VoIP operator from contesting the PSTN incumbent's position?
    - What are the additional benefits for end-users of 'escaping' monopolistic behaviour by the PSTN incumbent?
  - Answers to the first two questions have been obtained on the basis of interviews with ECTA, ETNO, INTUG and a selection of large providers of home and personal alarm systems. The last two questions can be (roughly) answered on the basis of the outcomes of step 1.

Regulating call termination

In an unregulated setting, markets 3 and 7 likely result in a rise of mobile termination rates (MTRs) and fixed terminating rates (FTRs). In other words, the chance of a type 2 error rises. In a regulated setting, the NRAs set MTRs and FTRs at BULRIC level. On the basis of a model as developed by OPTA (2010) we can estimate the outcomes of an unregulated setting in terms of FTRs and MTRs. The model also calculates the consumer and producer surplus for a given set of FTR and MTR. It should be noted that the OPTA model is not designed to simulate the competitive process, but to calculate impacts (consumer and producer surplus) of various MTR/FTR pricing regimes. Still, on the basis of iteration one can use the model to find the equilibrium levels of MTR/FTR in an

unregulated setting, including the respective welfare effects. These can be compared to the welfare effects of BULRIC pricing and Bill and Keep (*i.e.* MTR=FTR=0).

Regulating wholesale local access

The analysis in the revised interim report established that not regulating wholesale local access will likely result in foreclosure of the market by the incumbent. In other words, in an unregulated setting we would observe the market shares of Altnets serving the market on the basis of LLU access to reduce to zero.

The impact of regulating wholesale local access can then be assessed by comparing the current levels of ARPU, penetration and speeds to the levels that would be observed in an unregulated setting. We do this on the basis of a panel regression analysing the impact of the market share of LLU competitors on ARPU and broadband take-up. This data is available from Telecom Competitiveness Index Database.

On the basis of these regressions we can model the representative Member State. If we set the market share of LLU players at zero, we can calculate the consequences for price, volume and speeds.

Regulating wholesale central access and leased lines

Wholesale central access

The analysis in the revised interim report established that not regulating WCA likely has a negative effect on the supply of WBA products and consequently on the working of the retail market for broadband access. This effect goes directly (via a substitution effect) and indirectly (because LLU and WBA are complements):

1. WBA is a substitute for LLU in the sense that if the price of LLU increases the business case for rolling out to MDF sites in less densely populated areas deteriorates. In those areas the Altnets likely substitute LLU access for WBA. This effect is tempered by the fact that the Altnet loses a considerable degree of independence from the incumbent when switching to LLU;
2. Yet, if the number of WBA-lines in areas not covered by LLU increase (ceteris paribus), the business case for LLU access in the other areas likely increases. This is because Altnets can enjoy scale economies at the level of marketing, billing, etc. and scope economies while serving multi-site end-users (with sites in both densely and non-densely populated areas). In other words, WBA is a complement to LLU while striving for ubiquity.

This dual role of WBA makes it difficult to do a similar analysis for WBA as we propose for LLU (notably we run into problems with correlation between explanatory variables – *i.e.* multicollinearity). Furthermore, it is impossible to get a uniform (standardised) time series for prices of WBA because speeds and service levels differ through time and across Member States.

This leaves us with the option to qualitatively assess what are likely results of WBA regulation in terms of static and dynamic efficiency.

Leased Lines

A quantitative analysis of the costs and benefits of regulating Market 6 at the EU level is nearly impossible because of the lack of data:

- First, NRAs apply different sub categories of leased lines. Hence, on the basis of the information that NRAs provided via the questionnaire, we can only describe the situation of the representative member state in terms of the total number of leased lines;

- Second, not all the NRAs have reported data on leased lines, notably Germany, Italy and the UK failed to provide data as well as Cyprus, Finland and Lithuania;
- Third, same as for WBA, it is impossible to gather proper data on prices; let alone data that are comparable across countries.

This leaves us with the option to qualitatively assess what are likely results of Leased Lines regulation in terms of static and dynamic efficiency.

14.2 Deregulating fixed voice telephony

In this section we analyse the potential impact of dropping markets 1 and 2 from the list of relevant markets. The reason is that end-users consider new technologies for providing telephony services via broadband (VoIP) more and more as being a substitute for traditional telephony (PSTN). The new technology is (because of regulation in markets 4 and 5) much easier accessible for the incumbent's challengers because it is typically provided as an add-on to a broadband Internet access service. We specifically refer to it as an *add-on* to broadband access and not as a bundle. Indeed VoIP is almost never provided as a stand-alone service, but Internet access is. Considering that today almost 72% of the European households has a broadband Internet access, a switch from PSTN to VoIP means in most cases upgrading the current broadband subscription with a VoIP add-on.

The analysis is based on a 'what if analysis': what if the number of captive end-users is at its critical level such that by 2018 the pool of non-captive end-users has largely been depleted due to an autonomous migration from PSTN to VoIP; and what if the incumbent were to raise its price in 2018 by 5% to 10%? What would be the impact on consumer and producer surplus?

We first assess the critical level of captive end-users and then analyse the welfare consequences of a 5% to 10% price increase. Next we do an attempt to estimate the true level of captive end-users.

14.2.1 The model

The migration path of PSTN to VoIP seems to have an autonomous development: gradually PSTN end-users discover that VoIP is priced much lower and can deliver a quality of service that is of comparable level (at least it is good enough for most end-users to serve their fixed voice demand). However, for some PSTN users the difference in quality of service may remain too large and some PSTN users are 'locked-in' because they rely on particular PSTN specifications that VoIP cannot deliver. Knowing that some of its PSTN users are captive, the incumbent may set the PSTN price higher such as to maximize total profits. The ability of the incumbent to do so is constrained by:

- The (assumed) competitive situation in the broadband market (which determines the price for VoIP);
- The size of the pool of non-captive PSTN users (which depletes over time); and
- The incumbent's ability to retain PSTN-to-VoIP switchers on its own VoIP network, for which the incumbent's market share in VoIP (about 55%) may serve as a proxy.

On the basis of these three starting points we developed the following model.

Qpt (Qvt) is the number of PSTN (VoIP) subscriptions in year t. Q'p is the number of captive PSTN users. The average revenue per user (ARPU) for PSTN is Rp and for VoIP it is Rv. Finally we define the cost per subscription in year t as (1).

1. $x_t = F_t + q_{vvt}c_{vvt} + q_{vmt}c_{vmt}$

Ft stands for fixed costs per subscriber in year t; qvvt (qvmt) stands for the number of minutes called from a fixed-to-fixed (from fixed-to-mobile); cvvt (cvmt) are the marginal costs per minute for setting up and terminating fixed-to-fixed (fixed-to-mobile) calls.

The profit function of the incumbent is as follows (2).

2. $\pi_{pt} = Q_{pt}(R_p - x_t)$

The change in profit resulting from a subscription price increase of x% is (3).

3. $\pi'_{pt} = Q'_p(\alpha R_p - x_t)$

Where α is 1+x, and Q'p is the number of PSTN subscriptions after the price increase.

The profits of the incumbent's VoIP activities are as in (4). Where the costs of VoIP equal β times the costs of PSTN.

4. $\pi_{vt} = Q_{vt}(R_v - \beta x_t)$

We assume that the incumbent can retain about 50% of the PSTN-VoIP switchers on its VoIP network. Consequently the change in VoIP profits as a result of a change in the PSTN price with x% is as (5).

5. $\pi'_{vt} = \left(Q_{vt} + \frac{1}{2}(Q_{pt} - Q'_p)\right)(R_v - \beta x_t)$

In year t, the incumbent will be indifferent between a price increase and maintaining the status quo if: (2) + (4) = (3) + (5). Solving this for (2) leads to:

6. $2Q_{pt}(R_p - x_t) = 2Q'_p(\alpha R_p - x_t) + (Q_{pt} - Q'_p)(R_v - \beta x_t)$

We now define OPt as the share of PSTN subscribers that would switch as a consequence of the x% price increase at time t. OPt is equal to (7).

7. $OP_t = \frac{Q_{p0} - Q'_p}{Q_{p0}}$

Note that Q'p = (1 – OPt) * Qp0. Substituting this in (6) and solving for OPt gives (8).

8. $OP_t = 1 - \frac{Q_{pt}}{Q_{p0}} \frac{2(R_p - x_t) - (R_v - \beta x_t)}{2(\alpha R_p - x_t) - (R_v - \beta x_t)}$

In case the incumbent (as does the hypothetical monopolist) does not offer VoIP subscriptions, (8) reduces to (9).

9. $OP_t = 1 - \frac{Q_{pt}}{Q_{p0}} \frac{2(R_p - x_t)}{2(\alpha R_p - x_t)}$

From the above mathematical exercise we conclude that (8) > (9) and thus that, even if the share of non-captive PSTN users is large enough to constrain the hypothetical PSTN-only monopolist (and thus we conclude that VoIP is part of the relevant market), we may still find that the number of potential switchers is insufficient for controlling an SMP problem if the PSTN incumbent also offers VoIP services. The size of this problem depends again on the relative size of the group of captive

users vis-à-vis the group of non-captive users. This relative size decreases over time as a result of an autonomous migration from PSTN to VoIP.

In section 14.2.3 we use (8) and (9) to calculate how large the pool of potential switchers needs to be today in order to constrain the incumbent from monopolistic price setting in year *t*. Subsequently, we calculate the consequences for consumers if the incumbent were to successfully increase its PSTN price with 5% to 10% in time *t*. The data on which we base the analysis is described in section 14.2.2 below.

14.2.2 Data

Primary sources

The data are obtained from different sources. Below we present an overview of the data sources and the weighted average values for the EU in 2012.

Table 14.1 data, sources and values

data	code	source	Value in 2012
Total # of PSTN subscribers	**Qpt_M**	**Idate**	**18,550,000**
Total # of VoIP subscribers	**Qvt_M**	**Idate**	**5,672,500**
Market Shares incumbent	**M%**	**Ecorys**	**82%**
Incumbent's PSTN subscribers	**Qpt_I**	**Derived**	**17,542,200*****
Incumbent's VoIP subscribers	**Qvt_I**	**Derived**	**2,818,900*****
Total traffic from F2F (minutes per sub)	**$qvvt_M$**	**ITU**	**2322*****
Total traffic from F2M (minutes per sub)	**$qvmt_M$**	**ITU**	**329*****
Costs of setting up and terminating F2F calls	**cvvt**	**OPTA (2010)***	**0.01059 euro**
Costs of setting up and terminating F2M calls	**cvmt**	**OPTA (2010)***	**0.0276 euro**
ARPU PSTN	**Rp**	**Idate**	**324**
ARPU VoIP	**Rv**	**Idate**	**143****
Annual fixed costs per subscriber	**Ft**	**OPTA (2010)***	**60**
Costs of VoIP as % of costs of PSTN	**β**	**Assumed**	**25%**

* Assumption based on OPTA (2010) Annex E to the Dutch MTR/FTR decision 2010.
** Value in 2009.
*** Value in 2011.

Data imputation

In order to do a prospective analysis on the basis of scenarios one needs sufficient data from historical developments. However, the historic data shows gaps and sometimes the observations seem intuitively wrong. Within boundaries of what is acceptable, we manipulated the data to a certain extent. Below, we describe this.

Averaging

In some cases, data in between two years was missing. In such cases we took the average of the previous and the following year. Similarly, in cases where an observation in a single year seemed intuitively wrong we took the average of the previous and the following year.

Normalisation

Since the analysis is done for the 'Representative Member State', we used weighted average values, weighted against the relative population size ($Population_{country\ i}/Population_{total\ sample}$). However, the total sample of countries is not the same for all indicators and not the same through

time: *e.g.* we do not have information on VoIP prices for all Member States. Therefore the weight factor needs to include a normalisation factor as follows:

$$\frac{Pop_{EU,t}}{\sum_i Pop_{i,t}} \times \frac{Pop_{i,t}}{\sum_i Pop_{i,t}}$$

In case the sample of Member States covers all EU27 countries, the weight factor reduces to:

$$\frac{Pop_{i,t}}{\sum_i Pop_{i,t}}$$

Linear regression

For some indicators it happened that for some Member States we did not have data in the latter years. In such cases we did a linear regression of the earlier data points against another indicator or time to 'forecast' the latter years. *E.g.* we had data on total traffic volume until 2011, but for traffic volume from F2M (or fixed to mobile) only until 2009. We then regressed F2M traffic against total traffic and used the data on total traffic to forecast the F2M data for 2010 and 2011.

Forecasting

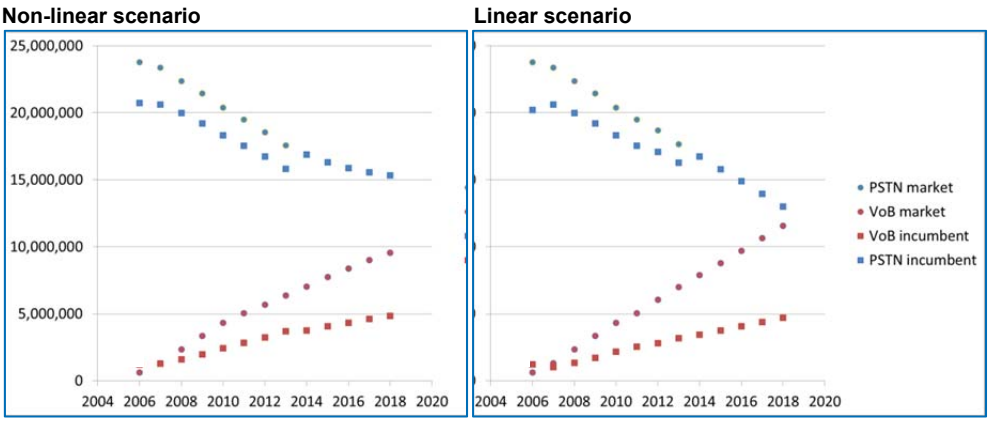
The prospective analysis is based on two scenarios for the future PSTN-VoIP migration path: a linear scenario and a non-linear scenario. The non-linear scenario coincides with the forecasts from Idate on the future number of PSTN and VoIP lines (as presented in the revised interim report). The linear scenario is based on a simple linear OLS regression of the number of PSTN and VoIP lines up to 2012.

Similar data had to be produced for the incumbent's PSTN and VoIP lines. We used the forecasts on the market volumes in combination with a linear OLS regression of data on the incumbent's market share in PSTN to forecast the incumbent's future number of PSTN lines up to 2014. To determine its future number of VoIP lines we used the rule of thumb that the incumbent is likely to retain a share of the decline in PSTN lines on its VoIP network equal to its market share in VoIP. As from 2014 onward, we assumed that due to the abolishment of CPS and WLR regulation, the total PSTN market would be served by the incumbent. The number of VoIP subscriptions with the incumbent is forecasted on the basis of an OLS regression against the forecasts of the total VoIP subscriptions in the market.

The forecasted subscriptions were then used to forecast the traffic volumes, assuming the number of minutes per subscription to remain constant. All other factors in Table 14.1 have been assumed constant over time.

The scenarios in terms of subscriptions look as follows:

Figure 14.1 Number of PSTN and VoIP subscribers



Note that even though the linear scenario does not flatten out, this does not necessarily mean that the phenomenon of captive PSTN users is absent. The curves might show a 'kink' after which they are flat.

14.2.3 Results

Critical size of the pool of captive end-users

In this section we present the results of the calculations on the critical size of the pool of captive end-users *today* (expressed as a percentage of the number of PSTN users in 2012) that would allow the incumbent to raise its PSTN price with 5% to 10% in year *t*.

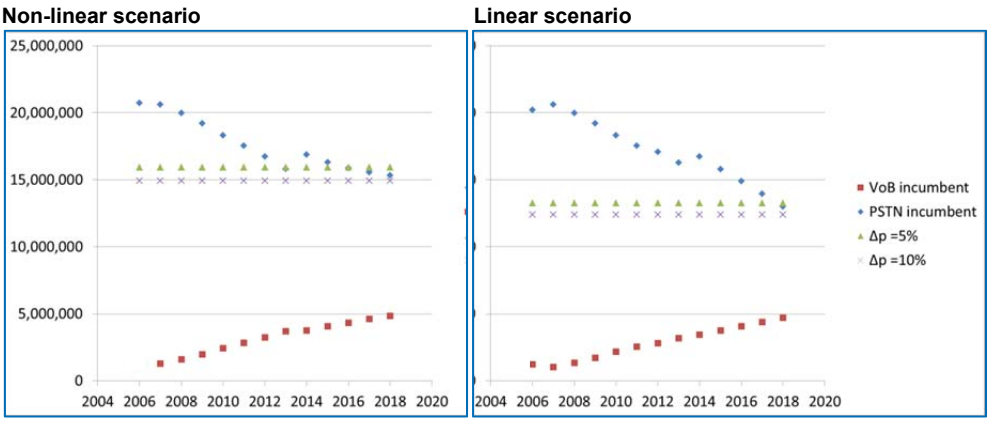
Table 14.2 Critical share of captive PSTN users, with 5% and 10% PSTN price increase

	5%		10%	
t	Linear	Non-linear	Linear	Non-Linear
2013	87%	87%	80%	80%
2014	90%	92%	83%	85%
2015	85%	89%	78%	82%
2016	80%	87%	74%	80%
2017	75%	85%	69%	79%
2018	70%	84%	64%	78%

The table shows that, if the number of captive end-users *today* is about 70% (indicated in red), the incumbent can raise its PSTN price with 10% in 2017 in the linear scenario (assuming all remaining non-captive PSTN-users switch in a response to the price increase). One year later, also a 5% increase in price would be profitable. In the non-linear scenario the critical level of captive end-users are higher because the rate at which the pool of non-captive PSTN-users autonomously depletes is lower.

To put this in perspective we visualised in Figure 14.2 the critical number of captive end-users that would allow for a 5% to 10% price increase in 2018.

Figure 14.2 Critical level of captive PSTN for ΔP with 5% to 10% in 2018



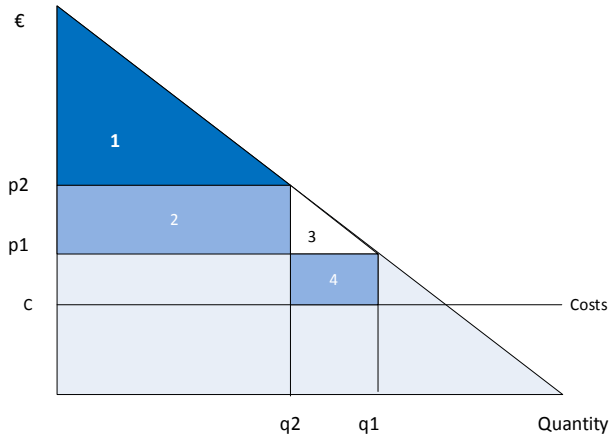
Welfare implications for end-users

To analyse the possible implications for total welfare we present a 'what if' analysis: what if the number of captive end-users is at its critical level and what if the incumbent were to raise its price in 2018 by 5% to 10%? What would be the impact on consumer and producer surplus?

For the analysis we assume that the total number of non-captives will switch to VoIP in response to the increase in price. The number of captive users is set at 64% (78%) for the linear (non-linear) scenario. These are the values for the critical size of captive users that prevent a hypothetical monopolist from raising its price with 10% in 2018 (see Table 14.2).

Visually the analysis is represented below.

Figure 14.3 Welfare effects in the PSTN market



Consumer surplus

Before the price increase, q1 PSTN subscriptions are sold. The consumer surplus is given by the sum of the indicated areas 1+2+3.

After the price increase, q2 PSTN subscriptions are sold. The consumer surplus given by the triangle 1. The incumbent has gained an additional profit, represented by area 2. Total welfare declined with 3. In formal terms, total consumer welfare in the PSTN market has declined with $(P_2 - P_1)q2 + \frac{1}{2}(P_2 - P_1)(q1 - q2)$.

The switching PSTN users now subscribe to VoIP. Previously they encountered switching barriers that were most likely in the form of search costs. The sudden price increase has mobilised them

and hence they abided these one-off search costs. However, now they benefit from the lower price of VoIP services. Their welfare increases thus with $(P_1 - P_{VoIP})(q1 - q2)$.

	Non-linear		Linear	
	5%	10%	5%	10%
$q1_{t=2018}$	15,316,111		12,996,326	
$q2_{t=2018}$	14,468,965		11,956,605	
Pvoip	143		143	
p1	324		324	
p2	340.2	356.4	340.2	356.4
ΔCS PSTN	-241,259,110	-482,518,220	-202,118,739	-404,237,479
ΔCS VoIP	153,333,432	153,333,432	188,189,430	188,189,430
ΔCS	-87,925,678	-329,184,788	-13,929,309	-216,048,049
ΔCS % of GDP	**-0.007%**	**-0.028%**	**-0.001%**	**-0.018%**

Producer Surplus

After the price increase the PSTN profits increase, shown by area 2 minus area 4, which is equal to $(P_2 - P_1) \times q2 - (P_1 - c) \times (q1 - q2)$.

After a price increase, the incumbent retains half of the PSTN switchers on its VoIP network. Hence, the VoIP profits increase with $(P_{VoIP} - \beta c) \times (q1 - q2) \times \frac{1}{2}$ where β are the costs of VoIP as a percentage of the costs of PSTN. We assume β to be around 25%.

	Non-linear		Linear	
	5%	10%	5%	10%
$q1_{t=2018}$	15,316,111		12,996,326	
$q2_{t=2018}$	14,468,965		11,956,605	
Pvoip	143		143	
c	84		84	
βc	63		63	
p1	324		324	
p2	340.2	356.4	340.2	356.4
Δ PSTN profits	31,168,284	265,565,511	-55,730,265	137,966,737
Δ VoIP profits	51,665,145	51,665,145	63,409,747	63,409,747
ΔProfits	82,833,429	317,230,656	7,679,482	201,376,485
ΔProfits % of GDP	**0.007%**	**0.027%**	**0.001%**	**0.017%**

Total Welfare

Because we assume that the captive end-users have an inelastic demand, the total welfare consequences in terms of the sum of consumer and producer surplus is almost nil. From a normative welfare point of view, one should be indifferent to this. From a political point of view, preferences may be biased towards consumers, and notably vulnerable end-users such as elderly. Such wider social concerns may call for additional policy measures (such as a universal service obligation) to protect this group of end-users in the absence of ex-ante regulation.

14.2.4 Estimations of the size of the pool of captive users

The previous analysis is a 'what if' analysis, assuming the number of captive PSTN users to be at its critical level. The question is whether this is a realistic assumption?

A concrete example

In the Netherlands, Ecorys tried to estimate the number of captive end-users in a study commissioned by a consortium of Altnets to feed into their appeal against OPTA's fixed telephony market decision 2012. The study finds indications that 85% to 90% of the current PSTN users in the Netherlands may be captive. This figure is not directly representative for the EU as a whole, notably, because PSTN-VoIP migration in the Netherlands is much more advanced than in the RMS. The share of VoIP subscriptions in the RMS in 2012 was around 23%, whereas in the Netherlands it was around 60%. If, besides the more advanced migration path, the Dutch telecom users were representative for the EU, the number of captive end-users in the RMS would be around 26%.[124] This figure may need some upwards adjustments because the Netherlands has a much higher broadband penetration rate (91%) than the RMS (72%), but this effect become smaller over time as the RMS is catching up quickly (in 2010 the penetration rate in the RMS was only 63%).

From the response to a questionnaire distributed to ECTA, ETNO and Intug, it seemed that the issue was not analysed in most other Member States. This consultation did thus not give concrete figures, besides a loose claim that the number of captive PSTN users in Germany was around 20%.

These figures are far from the critical level of captive PSTN users as calculated above (see Table 14.2) and indicate that VoIP will (remain) exert(ing) considerable competitive pressure onto PSTN for 1) a SSNIP test to pass; and 2) constraining a dominant PSTN operator from setting monopolistic prices.[125]

PSTN Switch-off

Another observation seems to indicate that the number of captive PSTN users is relatively small. We have identified that quite a number of incumbents have plans for switching off the PSTN network entirely in the near future (see text below). If the number of captive PSTN users were significant, such plans would not be economically rational.

Plans for switching off the PSTN network in European Member States

In Belgium, Belgacom has publically communicated concrete plans for switching off the PSTN network by 2018. Initially, Belgacom aimed for a much earlier year. In agreement with stakeholders, such as Beltug,[126] it decided to postpone the switch-off.

In an anonymous survey conducted recently by ETNO among its members, all out of eight respondents had plans or are conducting studies into PSTN/ISDN Network transformation. Of those with firm plans the target date for transformation is before 2020 (with the exception of one which plans to finish the transformation between 2022-2025), with the earliest planning to complete the transformation by 2017.

Some incumbents were openly responding:

- In Denmark, TDC will gradually switch off PSTN but only ending in 2018-20;
- In France there's no precise date, but it won't be before 2017;
- In Germany, Deutsche Telekom has announced to complete IP transition by 2018;
- In Hungary, competitors are already deploying or upgrading NGA networks (fibre and ED3 HFC). Magyar Telekom started an 'all IP' pilot in the 11th district of Budapest – with more or less success in 2010, however there are no declared plans to switch off PSTN in the near future;
- In Netherlands no formal date has been announced but it is expected that PSTN switch-off will be on the agenda in all countries in the coming years.

[124] 0.85x(100%-60%)x(100%-23%).

[125] Provided that LLU and WBA regulation are effective in dealing with potential competition problems in the retail broadband market.

[126] The Belgian organisation of business users of telecom services.

All in all, we do not have any indications that the relative size of captive PSTN-users in the RMS is approaching its critical value that would make price increases profitable. This does not rule out the possibility of reaching the critical level in individual Member States, notably in the Member States which are much more advanced in the PSTN-VoIP migration trend.

14.2.5 Incentives to invest/innovate

Technological feasibility

Is it technically feasible to offer VoIP-based alternatives with similar product characteristics?
Technological barriers to switch from PSTN to VoIP mainly relate to alarm systems that are based on PSTN relying on the stability of the connection and the back-up power supply.

From interviews with producers of alarm systems we learned that the PSTN to VoIP migration has indeed spurred the development of systems with their own back-up power supply and relying on mobile connections for redundancy. Via the mobile connection an end-user (or the control room) is informed about 'movement at the premises'.

Replacement cost

What are the costs for adopting/subsidising technologies allowing a switch towards VoIP?
The costs do not differ considerably for residential users and business users. Residential users have to make an up-front investment of 300 euros (in case their current PSTN-based system allows for an easy adjustment to VoIP by installing a so-called GSM-box) to 2000 euros (in case the current system needs to be replaced entirely).[127]

Gains from switching

What are the additional profits for a VoIP operator from contesting the PSTN incumbent's position?
Assuming that the VoIP ARPU is around 143 euros per year and that the costs of VoIP are around 63 euros per year, a VoIP contester can earn around 80 euros profit per year, per user.

What are the additional benefits for end-users of 'escaping' monopolistic behaviour by the PSTN incumbent?
Assuming that the PSTN ARPU is around 350 euros per year, an end-user could save around 190 euros per year. Indeed an additional mobile subscription may be required, but on the basis of pre-paid, these costs are negligible.

Net result

In sum, end-users have a potential gain of around 190 euros per year; whereas, the switch involves a one-off investment of 300 to 2.000 euros. Hence a residential user has recouped its investment within 2 to 10 years. The main barrier currently preventing the residential PSTN users from switching can relate to search costs (people simply don't know about alternatives) or because they are myopic and prefer short term welfare over long term welfare. The VoIP challenger can (to certain extent) level these barriers by informing end-users and subsidizing the switch.

[127] Based on interviews with engineers installing alarm systems at consumer and business premises.

14.2.6 Conclusions

For the Representative Member State, it seems appropriate to drop markets 1 and 2 from the list. The pool of potential switchers (*i.e.* non-captives) is large enough for the PSTN incumbent to experience competitive pressures from VoIP challengers. The risk for monopolistic price setting seems low.

Moreover, alternative VoIP operators could gain from informing (and perhaps subsidising) PSTN-users to switch to VoIP (or Ethernet).

Furthermore, incumbents may have efficiency motives to facilitate end-users switching to VoIP since this will facilitate the switch-off of the PSTN network. Whether these motives are relevant during the period 2014 to 2020 depends on the time horizon that incumbents have set for the switch-off. Some have indicated that this is planned for some time close to 2020. The migration will have to be completed before that date.

14.3 Regulating call termination on fixed and mobile networks

In chapter 6 of the report we concluded that regulation of terminating rates (TRs) is needed because in an unregulated setting the strategic interaction between operators is likely to result in excessive termination charges. In this section we estimate the outcomes of this equilibrium in terms of consumer and producer surplus and compare these to the welfare levels obtained under BULRIC pricing (as the Commission currently prescribes).

For the analysis we make use of a model developed by OPTA. The model was not explicitly designed for analysing firms' choice of unregulated termination rates. It was designed to calculate welfare effects of a given set of TRs. Still, one can use the model in a way to simulate the interaction between fixed and mobile operators in setting termination charges and to find an equilibrium level of termination charges. This can be done on the basis of iterating the termination charges in multiple rounds (we explain this below).

14.3.1 The model

OPTA developed a model for analysing the welfare implications in the Netherlands of regulating fixed and mobile termination rates at BULRIC level. The model assumes two markets: one for fixed and one for mobile. Operators charge end-users a two-part tariff (using both subscription fees as well as per-minute-charges), and operators charge each other tariffs for termination services. The model treats the termination charges as the choice variable and automatically calculates all the effects on subscription fees, per-minute charges, number of subscriptions, number of calls, etc.[128]

The model implicitly assumes a certain level of retail competition in the fixed market and the mobile market by accounting for a cost pass-through effect[129] and a waterbed effect[130]. Furthermore, the model incorporates a so-called network effect and a call externality. As such, the model accounts for many of the relevant effects identified in the literature. The model does not, however, include a full dynamic competition model that accounts for strategic interactions between operators in setting TRs. It does thus not seek the retail market Nash equilibrium. Yet, the model does calculate the

[128] For the exact details of the model we refer to Annex E of OTPA's MTR/FTR decision 2010 and the explanatory note.

[129] This measures the extent to which changes in the costs stemming from changes in the termination charges by the receiving network are passed on to consumers via higher or lower retail per-minute prices. When retail competition is fierce, the extent to which costs are passed on to end-users increases.

[130] This measures the extent to which termination earnings are passed on to consumers in terms of higher or lower subscription fees. Again, when retail competition is fierce, the extent to which these earnings (or negative costs) are passed on to end-users increases.

effects of change in TRs of operator A on the profits of operator B, and vice versa. This allows us to use iteration techniques to find the profit maximising TR for operator A, given the TR of operator B. We can do the same for operator B, given the TR of operator A. By doing this for multiple rounds, we can simulate the strategic interaction between A and B in an unregulated setting and find a Nash equilibrium by 'intersecting' two best-response functions.

Once we find the unregulated equilibrium values of TRs, the model automatically produces the welfare effects in terms of consumer surplus (CS), producer surplus (PS) and tax effects. These values can be compared to the values in the regulated setting assuming either BULRIC pricing (*i.e.* setting TRs equal to marginal costs) or BAK pricing (*i.e.* setting TRs equal to zero).

Indeed in the literature other models can be found that do incorporate the interaction between operators. However, (as far as we know) all of these models assume fixed termination charges to be regulated and focus the analysis only on the termination strategies of mobile operators vis-à-vis fixed operators. Our approach on the basis of the OTPA model reflects a two-way strategic interaction.

14.3.2 The Data

The data on costs prices is largely taken from OPTA (indicated in the table below with *) who estimated the values for the case of the Netherlands. The information on number of subscriptions is calculated for the representative Member State and is based on the TCI database. The information on traffic is based on the volume per subscriptions in the Netherlands (taken from OPTA) multiplied by the number of subscriptions in the representative Member State (indicated in the table below with **). Values on model specific parameters (such as cost pass-through and elasticities) were also taken from OPTA.

Data			Source
COST (€)			
Marginal cost mobile call origination	cmo	0.012	*
Marginal cost per minute mobile voice call termination	cmt	0.012	*
Marginal cost per minute fixed call origination	cvo	0.0036	*
Marginal cost per minute fixed call termination	cvt	0.0036	*
Marginal cost mobile subscription (per year)	fm	90	*
Marginal cost fixed subscription (per year)	fv	60	*
ORIGINAL RETAIL PRICES Excluding VAT (€)			
Minute price mobile	Pgm0	0.054	*
Minute price fixed	Pgvv0	0.026	*
Minute price fixed-mobile	Pgvm0	0.145	*
Subscription fee mobile (per year)	Pam0	117.5	*
Subscription fee fixed (per year)	Pav0	200.2	*
VAT on the retail price (%)	btw	19%	*
TERMINATION TARIFF (€)			
Mobile termination rate at t=0	MTR0	0.07	*
Fixed call termination rate at t=0	FTR0	0.0069	*
Volumes - 2012			
Volume of calls from mobile	Vm0	52,628,866	**
On-net	Vmon0	23,013,242	**
Off-net	Vmoff0	15,982,951	**
M2F	Vmv0	13,632,673	**
Volume of calls F2F	Vvv0	66,127,837	**

Data			Source
On-net	Vvon0	46,289,486	**
Off-net	Vvoff0	19,838,351	**
Volume of calls F2M	Vvm0	11,030,780	**
Number of mobile subscriptions	Nm0	58,646	TCI x 1000
Number of fixed subscriptions	Nv0	24,731	TCI x 1000
PASSTHROUGH and WATERBED			
Cost pass-through mobile	tm	1	*
Cost pass-through fixed	tv	1	*
Waterbed mobile	ym	1	*
Waterbed fixed	yv	1	*
ELASTICITIES			
Mobile calls	εgm	0.5	*
F2F	εgvv	0.2	*
F2M	εgvm	0.3	*
Mobile subs	εam	0.35	*
Fixed subs	εav	0.15	*
EXTERNALITIES			
Call externality (appreciation for receiving calls)			
Mobile	zm	0.2	*
Fixed	zv	0.2	*
Network externality (cross-market) (€):			
F2M	xvm	7.50794E-08	*
M2F	xmv	1.68211E-07	*

14.3.3 The results

Because most of the parameters apply specifically to the Netherlands one could debate over whether the results are representative for the EU27. In fact, for the Netherlands the data will also have changed over the past three years. However, the most basic parameters on subscriptions do not apply to the Netherlands. They are calculated for the representative Member States. Traffic volumes are adjusted relative to the number of subscriptions. All in all, we stress that the results below are only indicative for the RMS and serve to give a feeling of the order of magnitude of the welfare effects.

Iteration: termination charges set in each stage

The iteration process starts in t0 with termination charges set at the level as they prevailed in the Netherlands before OPTA's market decision 2010. We then iterated the mobile termination rate (MTR) in search for the profit maximising rate, given the fixed termination rate (FTR). The rate increased from 0.024 eurocents per minute (epm) to 0.122 epm. Next, we restored the MTR to its original level and repeated the exercise for the FTR. The rate increased from 0.0069 epm to 0.105 epm. For the next rounds we plugged in the new values for MTR and FTR that we found and repeated the iteration process for several rounds until we found a stable equilibrium. It took 5 rounds.

The model's outcome

OPTA's model automatically calculates the welfare effects for a given set of FTR and MTR. We plugged in three pairs of TRs: both set at zero (BAK), both set at marginal costs (BULRIC), and we plugged in the values we found for the unregulated equilibrium found above.

The results are presented in the tables below (first in euros, than in % of the GDP in the representative Member State).

€ X 1000,000	BULRIC	Unregulated
Consumer surplus mobile	13,444	12,233
Consumer surplus fixed	22,860	21,337
Profits mobile providers	3,827	3,713
Profits fixed providers	5,650	5,485
VAT income tax service	3,453	3,234
Total welfare	49,236	46,004

% of GDP	BULRIC	Unregulated
Consumer surplus mobile	1.13%	1.02%
Consumer surplus fixed	1.91%	1.79%
Profits mobile providers	0.32%	0.31%
Profits fixed providers	0.47%	0.46%
VAT income tax service	0.29%	0.27%
Total welfare	4.12%	3.85%
Comparing scenarios in % points	0%	-0.27%

14.3.4 Conclusions

Obviously the outcomes of the unregulated setting are not efficient: everybody loses considerably, including the telecom operators. This highlights the potential benefits and incentives for operators to coordinate their TR strategies to the benefit of all.

In the response to the Commission's consultation, some have suggested that this could be a reason enough to drop markets 3 and 7; particularly because article 5 of the access directive – giving NRAs a mandate to impose obligation to interconnect their networks (article 5.1.a) at reasonable and non-discriminatory terms (article 5.1.b) – is a credible regulatory threat bringing parties to the negotiation tables. However, the willingness to bargain doesn't mean that the bargaining process will succeed in realising efficient outcomes. In fact, in the chapter on the market analysis and competition problems of termination above we concluded that the structural setting in which operators would have to bargain is not conducive for agreeing on mutually beneficial (and socially optimal) rates. In the end, NRAs would have to enforce article 5 and then the question is: *what is a reasonable rate?*

The position of the EC is that termination charges should be at BULRIC level (and we confirm that any higher level would lead to lower welfare). The current regulation of termination rates gives NRAs the mandate to enforce BULRIC.[131] But can the NRA defend in Court that BULRIC is 'reasonable' in the context of Article 5? Among NRAs, there is great uncertainty about this. In any case, it would mean that NRAs have to do a similar analysis of the costs of termination as they do today.

[131] Although in the Netherlands, the Court did not agree with this.

Given these uncertainties and the potentially large welfare loss that is at stake (around 0.27% of GDP) we don't advise to experiment for the sake of dropping a market (that would have to be regulated anyway). It would not only create uncertainties for NRAs, but also for telecom operators. As a general rule, uncertainties discourage investments.

14.4 Regulating local access

In this chapter we make a quantitative guesstimate of the welfare implications of regulating LLU unbundling. To measure welfare effects we primarily use indicators on price and broadband take-up. A more dynamic approach would be to also include download speeds and the pace of fibre roll out. However, data that we have collected on this are not robust or do not cover enough time for using it in a panel regression.

Our approach is the following:

- First we describe the results of empirical research on the relation between prices and intra- and inter-network competition and between prices and broadband take-up;
- Next we use the outcomes of the regressions to calculate the welfare consequences of abolishing the regulation of LLU access.

14.4.1 Existing empirical research

Nardotto, Valletti and Verboven (2012) analyse the effects of LLU access on broadband penetration and broadband quality (read: download rates). They employed a very detailed dataset covering the whole of the UK. Note that the UK has defined sub-national markets for each LLU access point. The authors found that "unbundling has little or no effect on broadband penetration, compared to those areas where the loops are not unbundled. LLU entry instead has a strongly positive impact on the quality of the service provided. [Cable coverage] has a positive impact on both penetration and quality." These results seem to be supported by Gruber and Koutroumpis (2013) who show on the basis of a panel of 167 countries for the period 2000-2010 that infrastructure competition in general does not lead to acceleration of the broadband roll out.[132] Unfortunately, both studies do not estimate the effect of LLU access on prices.

Lemstra and Van Gorp (2012, 2013) and Van Gorp, Maasland and Rosenstok (forthcoming) have analysed the effects of LLU access on market performance in terms of prices, volume (*i.e.* broadband penetration) and download rates. These publications can be regarded a series of papers that are building on each other, using a progressing panel dataset that is being developed for ECTA. These papers test the following hypothesis: *Access regulation*, *and the related form of access*, *leads to more effective competition than unregulated service competition between two vertically network integrated providers*. By 'effective competition' they mean a market outcome with relatively lower prices, higher broadband speeds and higher penetration of broadband.[133] In this section we present the latest analysis from this series of papers.

The data on which this analysis is based contains a panel of the EU27 countries in the period 2003-2011. This data is used for investigating:

1. Whether the average price a consumer pays for Internet access in a country is affected by intra- and inter-network competition. The first form of competition is between the incumbent party

[132] Which is the roll out of broadband access in general, so it does not include the roll out of NGANs. More empirical research is needed for that.

[133] The hypothesis that more competition leads to lower prices *as well as* higher broadband speeds assumes a form of dynamic competition *a-la* Arrow, 1962 (or *a-la* Aghion et al., 2002, while assuming the market is still at the upward slope of the inverse U-relation between competition and innovation).

(such as France Telecom) and the competitors who access the copper network via unbundled local loop access. The second form is the competition between the incumbent and cable (and fibre) networks;

2. Whether there is a relationship between the retail price and broadband penetration; and
3. Whether there is non-price competition.

The sample of countries used here is smaller than the sample of Gruber and Koutroumpis, but has fewer structural differences in the sense that the EU27 countries are all subject to the same regulatory framework as imposed by the EU.

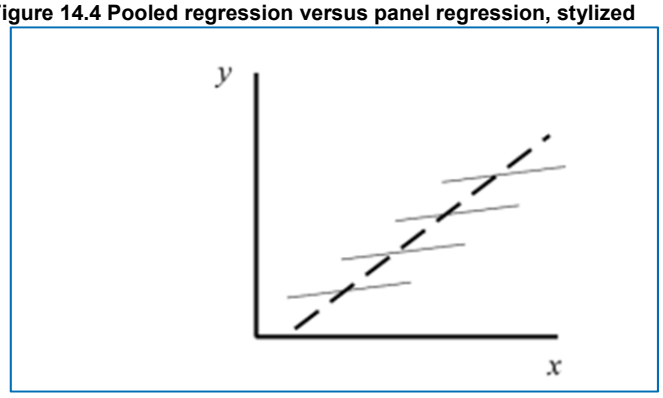
Below we first describe the models that we test (section 14.4.2). We then present the data that we used (section 14.4.3). Section 14.4.4 shows the results of the regressions.

14.4.2 The model

To model the effects of unbundling on the broadband market two separate models have been constructed. The first model is aimed at explaining the impact of LLU access on consumer price, while the second model is aimed at explaining its effect on broadband penetration. Combining the results of these models we can estimate the effects of LLU access consumer and producer surplus.

As the data concerns panel data and because it is fair to expect considerable exogenous differences between countries, it is likely that a simple pooled OLS regression might give false results and that a panel regression gives better results. Figure 14.4 illustrates the difference between a pooled regression and a panel regression. The dashed line illustrates a pooled regression which is a simple straight line through the observations. The panel regression however, considers that there is individual heterogeneity between countries and thus plots a separate line for the different countries. While these separate plots imply a smaller number of data points, the outcome is less prone to heteroskedasticity.

Figure 14.4 Pooled regression versus panel regression, stylized



Within panel regressions, one can estimate results using a fixed effects or a random effects model. A fixed effects model assumes that the country heterogeneity is captured by the intercept. Thus, the heterogeneity is invariant over time and correlated to the independent variables. Within a random effects model, individual differences may vary over time and are captured by the intercept and some random component. This random component is part of the error term. Furthermore, the random effects model assumes that the individual effects are not correlated with the independent variables.

In order to test whether a fixed or random effects model is more appropriate for a given data set the Hausman specification test can be applied. The Hausman specification test rejected the null

hypothesis suggesting that the individual countries' characteristics are crucial in their influence; therefore the consumer price has been regressed using a fixed effects approach. The fixed effect model allows to control for unobserved variables accounting for individual difference. Besides, it removes the effect of the time-invariant characteristics from the dependent variable assessing the net effect on price or broadband penetration.

Price model

The first topic to be addressed in assessing the performance of the broadband market is the price of broadband services. Lower prices lead to more consumers being able to buy broadband services and (thus) to higher consumer welfare. Competition is considered the driving force in lowering prices. We capture this construct by taking price as the dependent variable and the intensity of rivalry as the independent variable.

Price – what consumers pay in the aggregate – is captured by taking the revenue for fixed broadband connections and dividing this by the number of broadband connections. The resulting concept is known as the average revenue per user (ARPU). The consumer price for broadband services is a primary indicator of the performance of the market: do consumers get value for money?[134]

The price model relates the level of the price to the level of competition. We expect a negative relationship but we are aware that the size of this effect decreases with the extent to which competition is based on (not observed) quality characteristics such as bandwidth capacity. We check for non-price-based forms of competition in the broadband model discussed below.

The degree of competition in the market is measured by two indicators: the market share of local loop connections in order to measure intra-network competition, and the market share of cable so to measure the inter-network competition. Furthermore, we expect that exogenous variables such as the income per capita of the country and the degree to which a society is ageing have an effect. Any external shocks over time are captured by the year dummies.

Hence, the consumer price is modelled as follows:

1. $ARPU_{it} = \alpha + \beta_1 MScable_{it} + \beta_2 MSllu_{it} + \beta_3 lnGDPcap_{it} + \beta_4 Age_{it} + \sum_{i=1}^{m} \beta_l Z_{l,it} + \mu_{it} + e_{it},$

Here, $ARPU_{it}$ is the retail price paid by end-users, $MScable_{it}$ is the market share of cable connections, $MSllu_{it}$ is the market share of the unbundled local loop connections, $lnGDPcap_{it}$ is the natural logarithm of GDP per capita, Z is a vector of year dummies, μ_{it} is the error term within a country and e_{it} is the error term between the countries. Other variables that may affect the consumer price include age distribution (measured as explained below).

Note that if competition is based on quality rather than price, the size of β_1 and β_2 in model (1) may be low.

Broadband model

The second topic to be addressed is broadband penetration. This is especially relevant considering the EU 2020 goals. Higher broadband penetration is related to higher welfare through investment in infrastructure and innovation.

[134] Note that, to fully capture the value for money concept, one needs to account for qualitative aspects of the broadband connections as well. A major qualitative aspect is bandwidth. Unfortunately, the data on download speeds that we obtained are too limited (in years covered) for giving robust results in our price model.

A first effect that we expect is a price effect. Lower prices generally lead to higher quantities. In other words, we expect broadband penetration to increase as prices go down. We test for this with model (2) below that (again) accounts for the exogenous factors income and ageing.

2. $BBpen_{it} = \alpha + \beta_1 ARPU_{it} + \beta_2 lnGDPcap_{it} + \beta_3 Age_{it} + \sum_{i=1}^{m} \beta_l Z_{l,it} + \mu_{it} + e_{it}$

From (1) and (2) we may conclude that (inter- and intra-platform) competition is a driving force behind broadband penetration because of a price effect. However, model (2) may not entirely capture this effect if competition is based on quality rather than price. We test for this by comparing the outcomes of (1) and (2) with model (3) taking broadband penetration as the dependent variable and the intensity of rivalry as the independent variable.

3. $BBpen_{it} = \alpha + \beta_1 MScable_{it} + \beta_2 MSllu_{it} + \beta_3 lnGDPcap_{it} + \beta_4 Age_{it} + \sum_{i=1}^{m} \beta_l Z_{l,it} + \mu_{it} + e_{it}$

14.4.3 Data

The data comes from the *Telecom Competitiveness Index database* that is compiled by the Technical University of Delft and Ecorys on behalf of ECTA, based on different data sources (such as the European Commission and COCOM) and a comprehensive survey of the telecom authorities in the Member States.[135] The data includes indicators for all EU27 countries on the *efficiency* of markets (such as prices and broadband penetration). The data also contains indicators on the structure and functioning of both the retail markets and wholesale markets (such as the combined market share of the LLU competitors, cable operators and fibre). The periods vary by indicator. For some indicators (such as broadband penetration) the data covers the period 2003-2012, while for other indicators (such as download speed) the measurement starts only from 2008.

Data for the analysis

- The consumer price (ARPU) is calculated by dividing the revenue of broadband Internet (including VOIP services) with the number of broadband subscribers;
- Broadband penetration (BBpen) is the percentage of the number of households that purchase broadband;
- As an indicator of inter-network competition we use the market share of cable operators within a country (MScable), which is the number of broadband connections via cable as a percentage of the total number of broadband connections;
- As an indicator of the intra-network competition we make use of the market share of LLU connections (MSllu). This variable is calculated by dividing the number of connections on the basis of (full and shared) LLU access by the total number of broadband connections;
- As exogenous variables we take the income per capita of the country (GDPcap), as well as an indicator of the age distribution (Age). Age distribution calculated in a similar fashion as the Gini-coefficient, which measures income distribution. The smaller this number, the more equally distributed is the population in terms of age (in the EU this means a less ageing society).

The units of measurement of all variables and the sources can be found in Table 14.3.

[135] See www.telecompetitiveness.eu.

Table 14.3 definitions, units and sources of the variables

Variable	Unit	Description	Weighted average value
ARPU	Euro	Consumer price	260
BBpen	Fraction	Broadband penetration	0.72 (around 13 million households)
GDPcap	ln	GDP per capita in logarithm	10.06 (23,361 euro per year)
MScable	%	Market share of cable	17
MSllu	%	Market share of LLU	23
Age	%	Age distribution	10

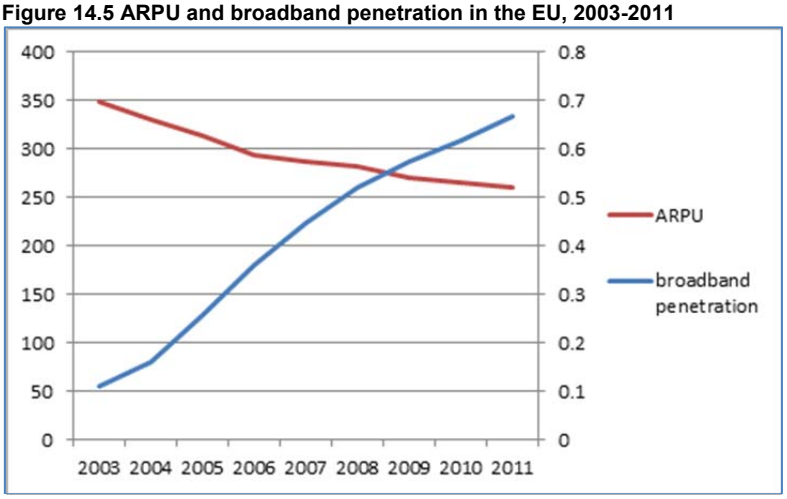
Descriptive statistics

The data is characterized by the following descriptive characteristics:

The ARPU from all countries was around 274 euros per year for 2011, with a maximum price of 475 euros. The weighted average price was 260 euros per year (weighted against the relative number of households). Figure 14.5 shows the evolution of the weighted average ARPU over time.

BBpen or broadband penetration has an average value of 65%, with a maximum of 91% and a minimum of less than 35%. The weighted average penetration rate is 67% in 2011. Broadband penetration is rising and has a distinct logistic shape (see Figure 14.5). This shape implies that following the introduction of broadband in the market, it may take one or two years to find firm footing in the market. Once this has been established, the number of connections rises quickly. As the penetration rate increases the market matures and the growth rate declines.

Figure 14.5 ARPU and broadband penetration in the EU, 2003-2011



Source: Telecom Competitiveness Database.

The market shares of LLU (MSllu) and Cable (MScable) already became clear from Figure 7.2 in the analysis of markets 4 and 5. The market share of cable has grown marginally since 2009. The market share of LLU players, however, has grown significantly since that year.

14.4.4 Results

In this section we present the results of the regressions. This study examines a panel of EU27 countries over the period 2003-2011. Note that we conducted the necessary tests (as explained above) to identify the best type of regression model to be used with our data set.

Price model

The regressions produced the following results:

1. $ARPU_{it} = 1033.072 - 0.882^{*}MScable_{it} - 0.843^{**}MSllu_{it} + 95.493^{**}lnGDPcap_{it} - 0.231^{*}Age_{it}$

Where *** indicates the value is of 99% certainty, ** indicates that the value has 95% certainty, and * indicates a certainty of 90%.
We used year dummies.
The number of observations is 146 and the number of countries in the sample is 21.

From the results we can conclude that competition indeed has a downward pressure on prices. As the market share of the entrants (captured by the market share of unbundled local loop connection) increases, the price is pushed down. This fact is further emphasized by the downward pressure from cable connections on prices.

The size of the effects of both intra- as well as inter-platform competition is significant but seems not to be huge: if the market shares of cable (LLU) were to drop to zero, the yearly ARPU would go down with only 5.7% (7.4%).[136] This might be explained by the fact that competition between operators is not only on price, but also on the basis of qualitative features such as download rates.

In fact, Lemstra and Van Gorp (2013) find on the basis of case studies strong indications that competition on download rates is significant, but due to data limitations this can not be verified statistically. However, the findings of the broadband model below confirm that at least the effect of competition on broadband penetration goes beyond the price effect alone, indicating that competition is also based on non-price characteristics.

Broadband model

To explore whether competitive forces drive the development of broadband penetration in the Member States we ran models (2) and (3) as specified above. Note that we again conducted the necessary series of tests to identify the best type of regression model to be used with our data set.

2. $BBpen_{it} = 4.4839 - 0.0018^{***}ARPU_{it} + 0.2082^{***}lnGDPcap_{it} - 0.0025^{***}Age_{it}$

Where *** indicates the value is of 99% certainty, ** indicates that the value has 95% certainty, and * indicates a certainty of 90%.
We did not use year dummies.
The number of observations is 202 and the number of countries in the sample is 27.

The results from (2) mean that we can say with great certainty that a lower consumer price contributes to higher broadband penetration. Again, this effect seems to be small in absolute terms. Income has a positive effect on broadband penetration, while aging has a negative effect.

3. $BBpen_{it} = -8.3754 + 0.0034^{*}MScable_{it} + 0.0043^{***}MSllu_{it} + 0.8836^{***}lnGDP_{it} - 0.0026^{***}Age_{it}$

Where *** indicates the value is of 99% certainty, ** indicates that the value has 95% certainty, and * indicates a certainty of 90%.
We did not use year dummies.
The number of observations is 133 and the number of countries in the sample is 21.

[136] For cable this is 17 x 0.882 = 15 euros. For LLU this is 23 x 0.843 = 17 euros. The average yearly ARPU in the EU is around 260 euros.

These results from (3) confirm the direction of the findings of (1) and (2), but not the size. The effect of competition on penetration in (3) seems to be larger than the effect implied by (1) and (2).[137] We interpret this as an indication that competition is based on other features than price alone.

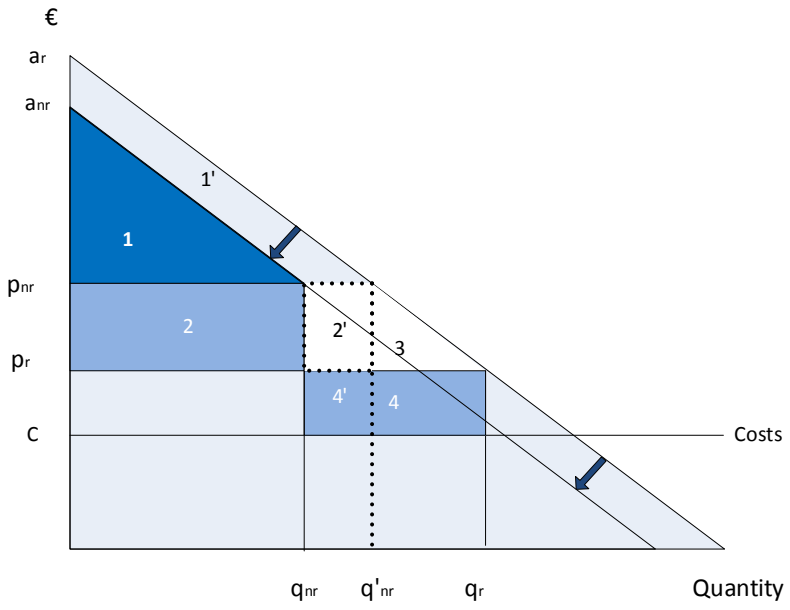
14.4.5 Welfare effects

Static efficiency

To analyse the possible implications for total welfare we present a 'what if' analysis: what if the LLU is not regulated anymore and the market share of LLU competitors plunges to 10% or even to zero. What would be the impact on the consumer and producer surplus?

Visually the analysis is comparable to Figure 14.3. There is however a difference in that we concluded above that there is a great deal of non-price competition. Figure 14.3 depicts an analysis of pure price competition. The non-price element of competition results in changes in the quality characteristics of the service. Consequently, the willingness to pay is affected. In the two-dimensional price-quantity graph in Figure 14.3, a decrease in the willingness to pay results in an outward shift of the demand curve as depicted in Figure 14.6

Figure 14.6 Welfare effects in the broadband market



Change in consumer surplus

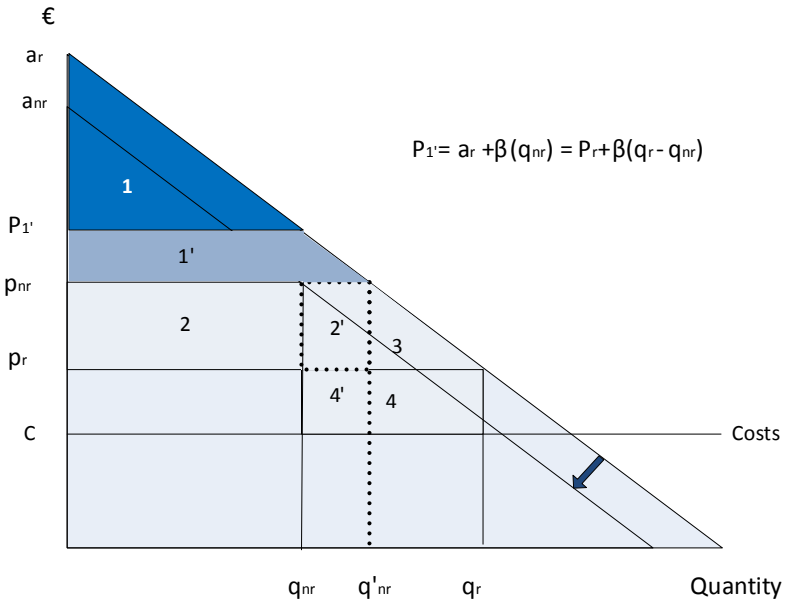
In the regulated setting price equals p_r and volume equals q_r. The consumer surplus (CS) equals then $\frac{1}{2}(a_r - P_r)q_r$. This is equal to 1+1'+2+2'+3.

In the non-regulated setting the price equals p_{nr} and volume equals q_{nr}. The consumer surplus (CS) equals then $\frac{1}{2}(a_{nr} - P_{nr})q_{nr}$. This is equal to 1.

[137] After all, multiplying the βs for MSllu and ARPU from respectively (1) and (2) should yield the β of MSllu in (3). It does not: 0.843 x 0.0018 = 0.0015174, whereas the β MSllu in (3) is 0.0043.
Similarly, the βs for MScable and ARPU from respectively (1) and (2) should yield the β of MScable in (3). It does not: 0.843 x 0.0018 = 0.0015876, whereas the β MScable in (3) is 0.0034.

The impact of regulation on CS equals 1'+2+2'+3. Where 2+2'+3 is easy to calculate with the information that we have.[138] Calculating 1 requires some additional reasoning, which is depicted in **Figure 14.7**.

Figure 14.7 Calculating 1' (compare to Figure 14.6)



Note: β is known from model (2) and equals 1/-0.0018.

Comparing Figure 14.6 and **Figure 14.7** it shows that 1' is equal to $(p_{1'} - P_{nr})q_{nr} + \frac{1}{2}(p_{1'} - P_{nr})(q'_{nr} - q_{nr})$.

In sum the change in CS equals:
$(P_{\mathrm{nr}} - P_r)q'_{nr} + \frac{1}{2}(P_{\mathrm{nr}} - P_r)(q_r - q_{nr}) + (p_{1'} - P_{nr})q_{nr} + \frac{1}{2}(p_{1'} - P_{nr})(q'_{nr} - q_{nr})$

Change in profits

The change in profits is not easily calculated because it is not known how much investments are involved in the upgrades of the quality of the product. While not accounting for these investments, the Producer surplus (PS) in the regulated setting equals $(P_{\mathrm{r}} - \mathrm{c})q_r$. In the non-regulated setting PS equals $(P_{\mathrm{nr}} - \mathrm{c})q_{nr}$. The change in PS equals 2-4-4', which equals $(P_{\mathrm{nr}} - P_{\mathrm{r}})\mathrm{q}_{nr} - (P_{\mathrm{r}} - c) \times (q_r - q_{nr})$. As said, this has to be weighed against the yearly investments that are incentivised by the non-price competitive process.

Total effects

In figures the table below shows the welfare consequences of a decline in the market share of LLU players.

[138] 2+2' = $(P_{\mathrm{nr}} - P_r)q'_{nr}$ and 3 = $\frac{1}{2}(P_{\mathrm{nr}} - P_r)(q_r - q_{nr})$.

Table 14.4 Welfare effects of a decline in LLU market share

MSLLU	23	10	0
ARPU	260	271	279
Bbpen	0.72	0.66	0.59
q (x 000)	13,533	13,533	0
ΔCS (x 000,000)		-205	-461
ΔPS (x 000,000)		0	-3
ΔTW (x 000,000)		-60	-110
ΔCS (%GDP)		-0.02%	-0.04%
ΔPS (%GDP)		0.00%	0.00%
ΔTW (%GDP)		-0.01%	-0.01%

Dynamic efficiency

With LLU access, Altnets are able to compete with higher speeds if they invest in either more modern equipment or have a higher tolerance for packet loss on their equipment. LLU (or more precisely physical access) is unique in this respect since all forms of virtual access would not allow dynamic competition based on investments in better equipment; simply because everybody uses the equipment of the incumbent.

The previous argument relates to upgrades of the active layers. However, the transition towards NGAs involves upgrades of the passive layer (replace copper with fibre, either to the curb or to the buildings). This investment is typically done by incumbents who are primarily driven by end-user demand and not so much pressured by the competitive forces from LLU competitors, at least not directly. However, there are a few case studies that illustrate the importance of LLU competitors in the transition towards NGA networks. Below we present two: the case of Free/Iliad in France and the case of City operators in Germany.

The case of Free/Iliad in France[139]

The first is Free/Iliad in France. In 2006, Free/Iliad joined the "Paris-Digital City" initiative of the Municipality, marking the start of fibre deployment in Paris. Since then, the company developed a leadership role in providing high data rate triple-play offerings at a highly competitive price (30 euro's p.m.).

Free/Iliad is pursuing an Ethernet-based, Point-to-Point, fibre to the home strategy. The company has relied for its early fibre deployments on access to the Paris sewer system and on additional trenching. Since the September 2008 ruling by ARCEP Iliad now also makes use of the opening of the FT ducts (a form of physical access!).

To create a viable business case only those areas/neighbourhoods are targeted where the company has at least a market share of 15%, leveraging the density of existing subscribers. Without the 'stepping stone' provided by unbundling to build a sufficiently large and dense customer base Free/Iliad would not have been in the position to extend their facilities-based operation to include fibre-based access.

The case of City operators in Germany[139]

Germany knows a couple of city operators that, on the basis of LLU access, have built a strong customer base highly concentrated in one particular city. This concentrated scale allows the city operators in Germany to move up the 'ladder of investment'. The operators in Hamburg, Munich and Cologne and

[139] Taken from Lemstra and Van Gorp (2013), "Competition in Broadband Markets: The Role of Unbundling", paper to be presented at the 2nd Conference on the Regulation of Infrastructure Industries, Florence School of Regulation, 7th June 2013.

several others have launched or are planning to launch the building of a Fibre to the Building infrastructure. The most important factor in creating a viable business case for investment in fibre is the existing high market share (gained over the years via LLU access) that allows for an easy transition of the customers and thereby guarantees the take up rates needed for making fibre economically viable.

The two cases above illustrate that having built a considerable market share on the basis of LLU access in particular regions, allows LLU competitors to climb up to the final rung of the ladder of investment by rolling out their own (fibre) access network in that region. Having a considerable client base in a concentrated area is a pre-requisite for making the investment viable.

Indeed, following the above argument, the incumbent (having by far the largest market share in most regions of a country) would be best positioned to roll out fibre access networks. However, the incumbent's financial business case suffers from a cannibalisation problem: rolling out fibre, puts its copper network out of business. The incumbent's profits of rolling out fibre would therefore be largely offset by the foregone profit margins on its copper network. A much more profitable strategy is to roll out fibre to the street cabinet only (FTTC) and at the same time put Altnets for a dilemma: either invest in rolling out to the street cabinet as well (running the risk that the life time of copper is not long enough to recoup these investments) or 'retreat' to WBA access and accept writing off the investments made in LLU access and being more subjected to the control of the incumbent. An intermediate solution is VULA, which gives the Altnet the possibility to stay in (or near) the main distribution frame and maintain a certain level of more control over specifications, but it doesn't allow or dynamic competition via investments in active equipment.

The Altnets suffer less of a cannibalisation problem because they do not own a copper access network. In many Member States, Altnets do not have a geographically concentrated client base. Still, when multiple Altnets join forces, they could make a joint investment in fibre networks viable (see the Spanish Joint-Network Investment initiative of Vodafone and Orange).

The presence of multiple Altnets may also give life to a business case for an outside investor for rolling out fibre and adopt an open access network, inviting multiple operators (including the incumbent) to bring their client base to its network (e.g. Reggefiber in the Netherlands). Such business case would not work in the absence of LLU competitors. If the outside investor would have to rely on the incumbent only to bring its client base to the fibre network, the vertical power relations of the incumbent vis-à-vis the outside investor would be such that the incumbent absorbs all profits. Once the fibre network is rolled out, the copper network is put out of business and the incumbent does not face a cannibalisation problem anymore. Consequently, the incumbent has an incentive to take over the network from the outside investor (which is probably one of the reasons why the venture capitalist is willing to invest in the first place). This is exactly what happened in the Netherlands when KPN bought 40% of the shares of Reggefiber in 2009. And again, the presence of alternative operators strengthens the bargaining position of the outside investor.

From the above, we conclude that regulating LLU access has delivered and will deliver considerable dynamic efficiency gains.

On the negative side, there has been quite some debate about the fact that the regulation of LLU access charges has been too severe with negative consequences for the incumbent's capacity to access finance. Consequently, this is said to hamper the incumbent's capacity to invest in NGA roll out. Indeed we recognise this dilemma, but given the above conclusion on both static and dynamic gains of LLU access regulation, we doubt whether it is a good enough reason to abolish regulation of physical (or local) access.

14.4.6 Conclusions

LLU access regulation has positive impact on both static and dynamic efficiency. We did not account for possible welfare effects from LLU access in the market for business grade broadband services and leased lines. But (based on the market analysis in Chapter 8 and 9) it is fair to assume that LLU access has contributed to a better functioning of the business connectivity market as well.

14.5 Regulating wholesale central access

As explained, the economic viability of investments up to the local level by alternative operators depends (for once) on the connection density in the local exchange. Typically alternative DSL operators are thus present in the local exchange in high density areas (regions A) and would have to rely on bitstream access in low density areas (regions B).

Some operators (such as the German city operators) pursue a local strategy in a particular A region and simply ignore the B regions. Other operators (such as Tele2 in the Netherlands) pursue a nationwide strategy such that they can reduce the overhead per user (stemming from *e.g.* advertisement campaigns, billing, helpdesk, and so on). Alternative operators that pursue a nationwide strategy rely on wholesale bitstream access as an essential input for serving B regions. As such, WBA can be seen as a complement for local access and thus contributes to the welfare gains assessed in section 14.4.

The economic viability of an investment in LLU access also depends on the price of alternative modes of access, such as WCA. WCA is not a perfect substitute for local access because of fewer degrees of freedom for the alternative DSL operator in competing on quality and download rates. There is thus a trade-off between the 'power (or independence) to compete' and the costs of access. Alternative operators indicated during interviews that generally they prefer the business case of LLU because they regard this model to be more sustainable. This preference seems to be supported by the data. Figure 7.2 depicts a small yet constant share of WCA-based broadband lines relative to fairly and growing share of LLU-based broadband lines.

In sum, we estimate that wholesale broadband access in B regions complements the business case for LLU-access in A regions and thus contributes to the welfare gains calculated in section 14.4.

14.6 Regulating high quality business connectivity services

Due to limited information on prices we cannot do a similar assessment (as we did for LLU access) of welfare effects of regulating leased lines. But even if we had, it would be difficult to distinguish the impact of regulating high quality business connectivity services from the impact of regulation of the market for wholesale local access (for the same reasons as mentioned in relation to best effort broadband connections above). But the logic from the previous analyses on LLU and WBA also apply to this market and hence we think that the economic implications are positive in terms of both static and dynamic efficiency.

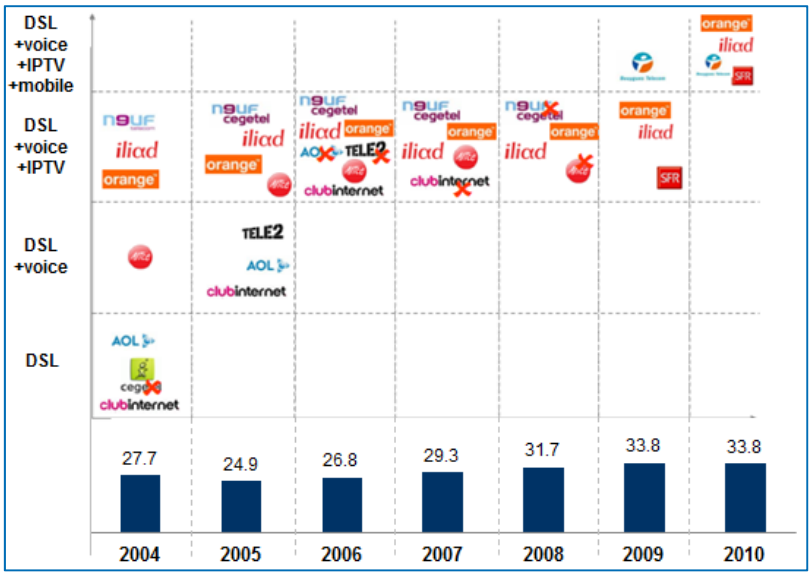
Appendix 1 Trend and data analysis

A1. Multiplay Bundles

A.1.1 Trends

The evolution in broadband markets has been rather favourable to users over the years; the value they receive for their money has improved substantially. Maximum (headline) speeds have increased continuously while prices have come down. At the same time operators have not limited themselves to improving the services of an existing package but have continuously upgraded their bundles in terms of the number of components included. Initially a typical broadband access would not be more than a high-speed (by contemporary definition) Internet access. In the following, dual play bundles including voice as well as Internet access have become the standard. From 2003 onwards, ISPs started adding TV to their bundles before quad-play bundles started appearing in the market in the second half of the decade. The French market illustrates this evolution very well.

Figure A.1.1 Evolution of French BB bundles and revenue per line (euros/month)



Source: IDATE.

The term 'bundle' refers to a combined offer that includes several different types of services. These packages of different services can come in a large variety of combinations; however, one can identify three main bundle formats:

- Dual play (Internet + home phone), which has become the standard offering. Most offers of Internet access include a fixed voice service. This package can be extended with a bundle of calling minutes, possibly customized depending on what kind of home phone calls the subscriber usually makes (*e.g.* to include calls to mobile phones, calls to specific foreign countries, etc.) or what time the calls are made (*e.g.* off-peak hours only);
- Triple play (Internet + home phone + television) includes a basic package of (mostly free) channels, and (in most cases) subscribers can add on premium channels;
- Quadruple play includes a mobile component. Most operators that offer bundled packages also offer a basic mobile plan (with one hour of talk-time, for example). There are a number of possible combinations with quadruple play. For example, a subscriber can choose to sign up for mobile and Internet without TV.

Table A1.1 A wide range of multiplay bundles

	Double play	Triple play	Quadruple play
Standard offering	• Internet + home phone	• Internet + TV + home phone	• Fixed Internet + home phone + TV + mobile services (voice, text, Internet)
Innovative bundles	• Internet + mobile; • Fixed Internet + mobile Internet (3G dongle); • Internet + home phone calls to landlines; • Internet + home phone calls to landlines and mobile phones; • Unlimited calls to landlines + Internet via mobile network (LTE/HSPA).	• Internet + home phone + mobile • Internet + TV + mobile • TV + home phone + mobile	• Fixed Internet + 3G dongle + TV + fixed voice

Source: IDATE.

A number of general trends can be identified:

- Single play packages are gradually disappearing, although operators still offer single play services in their core business (mobile services for mobile operators, home phone or Internet service for network operators and television for cable operators). When they position themselves in segments other than their core business segment, operators tend to offer bundled plans;
- Fixed voice is becoming a commodity that is routinely included with Internet access. Some operators, such as Free and Numericable in France, Fastweb in Italy, Jazztel in Spain and Deutsche Telekom in Germany, no longer offer fixed Internet service without home phone service;
- Triple play has become a standard offering from fixed line operators across the board (including cablecos). A number of mobile operators also offer triple play packages. But in certain highly competitive markets such as the UK, many mobile operators have opted to focus on their core business, including Vodafone, T-Mobile and 3. Yet the penetration of triple play is still limited. In the European market, 11% of households were subscribed to a triple play package in 2011 (up 3 points since 2009);
- Quadruple play is still nascent and not all operators offer it in a packaged format. However, integrated players are increasingly launching quadruple play propositions and the fact that challengers like Tele2 in the Netherlands or cablecos such as Telenet in Belgium have recently acquired spectrum licences shows that operators indeed see an incentive to be able to provide the full range of communications services. In terms of penetration, so far only 2% of European households had subscribed to a quad play plan as of late 2011 according to the Eurobarometer household survey[140]. This figure may be somewhat conservative, though, given fact that 4-play have met with a certain success already, notably in markets like the UK, Romania or France.

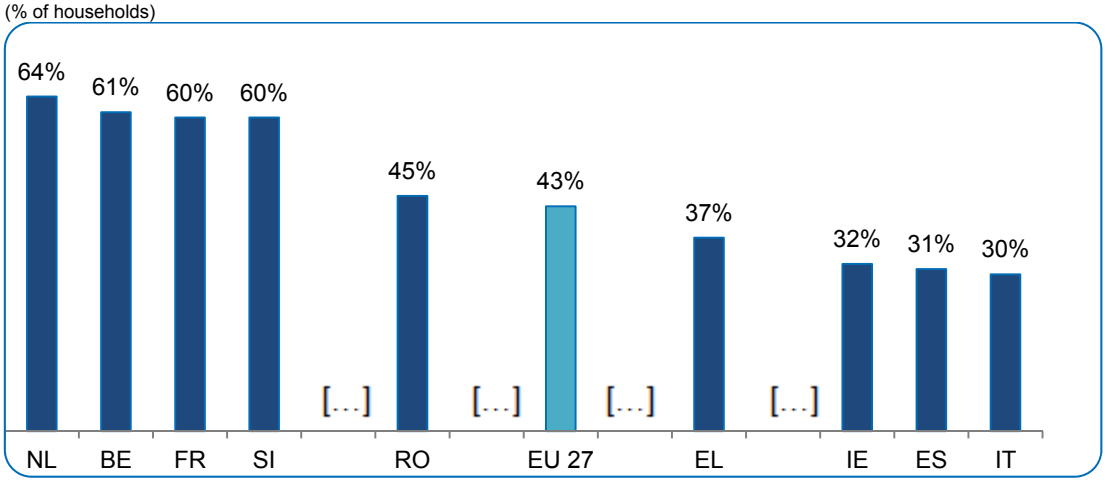
[140] Eurobarometer E-Communications Household Survey (June 2012), available at: http://ec.europa.eu/public_opinion/archives/ebs/ebs_381_en.pdf.

A.1.1.1. Penetration of bundled services in European households

Bundled services have already achieved high penetration in European households. Nearly half (43%) of European households have subscribed to a grouped service offering with one operator, up five percentage points since 2009. In the Netherlands, almost two-thirds of all users are subscribing to a bundle. In Italy, the country with the lowest bundle adoption rate, penetration stands at no less than 30% of households.

Figure A.1.2 Penetration of European households by bundle type

(% of households)

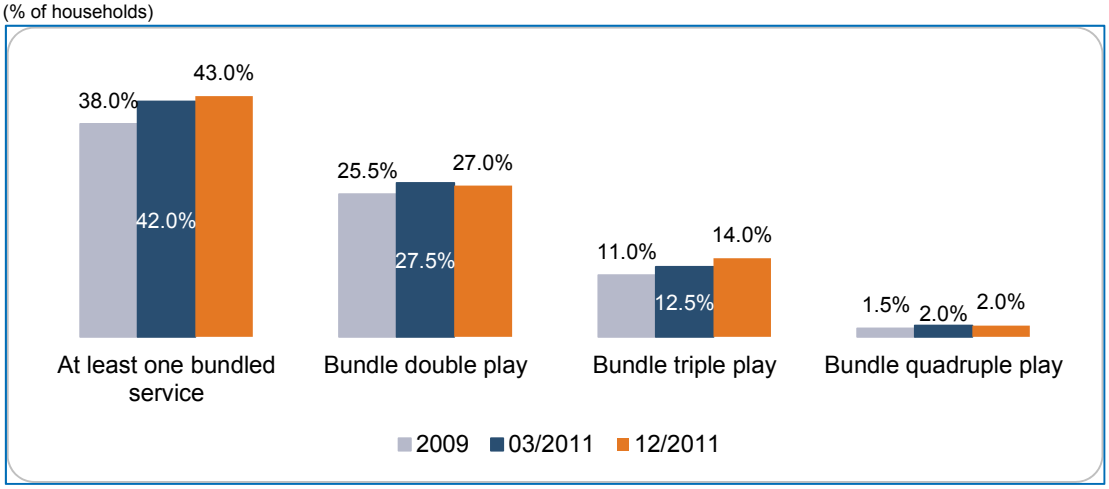


Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

Double play is still the most frequent package, subscribed to by nearly one quarter of European households. Its popularity seems to be declining though - mainly in the favour of triple play, which could gain 1.5 percentage points between March and December 2011 alone. Quadruple play is rather stable with an increase of only 0.5 percentage points of households between 2009 and late 2011.

Figure A.1.3 Evolution of penetration of European households by bundle type

(% of households)



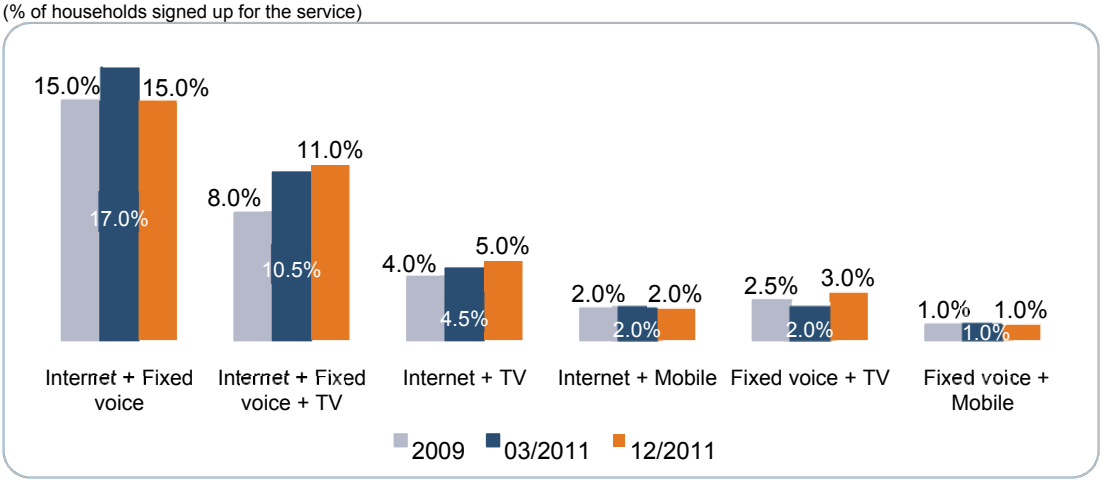
Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

A.1.1.2 Bundle subscription details

Most consumers (15%) of households opt for a double play bundle that includes Internet access and fixed voice service. The “standard” triple play package (Internet + home phone + TV) is starting to gain ground, with more than 11.5% of households having subscribed to this type of service. Triple play is also the bundle that has seen the biggest increase, gaining +3 points between 2009

and the latest waves of the survey. Double play offerings combining Internet access and TV service are also beginning to emerge (5% of households in December 2011, up from 4.5% in March).

Figure A.1.4 Adoption of bundled packages in Europe
(% of households signed up for the service)



Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

Table A.1.2 Bundled subscription details

	Internet	Home phone	TV	Mobile phone	2009	12/2011	Dif.
Quadruple play	●	●	●	●	1.5%	2%	+ 0.5
Triple play		●	●	●	0.5%	0%	- 0.5
	●	●	●		8%	11%	+ 3
	●		●	●	0.5%	0%	- 0.5
	●	●		●	2%	3%	+1
Dual play		●	●		2.5%	3%	+ 3
			●	●	1%	1%	0
	●		●		4%	5%	+ 1
		●		●	1%	1%	0
	●	●			15%	15%	0
	●			●	2%	2%	0
X play	At least one bundled service				38%	43%	+ 5.0

Source: European Commission Eurobarometer, EU-27, based on all households (fieldwork: December 2011).

We currently do not have a complete set of market forecast data, however the adoption of bundles can be expected to continue growing over the next years. The degree of penetration will also remain very different between countries. For France, IDATE expects that 50% of users will have a quadruple play subscription in 2016. In Romania the rate will be similarly high, comprising 41% of users according to IDATE estimates. Spain will follow closely with 35% of users whereas in markets like Poland and Slovakia, 4-play penetration will not surpass single-digit levels.

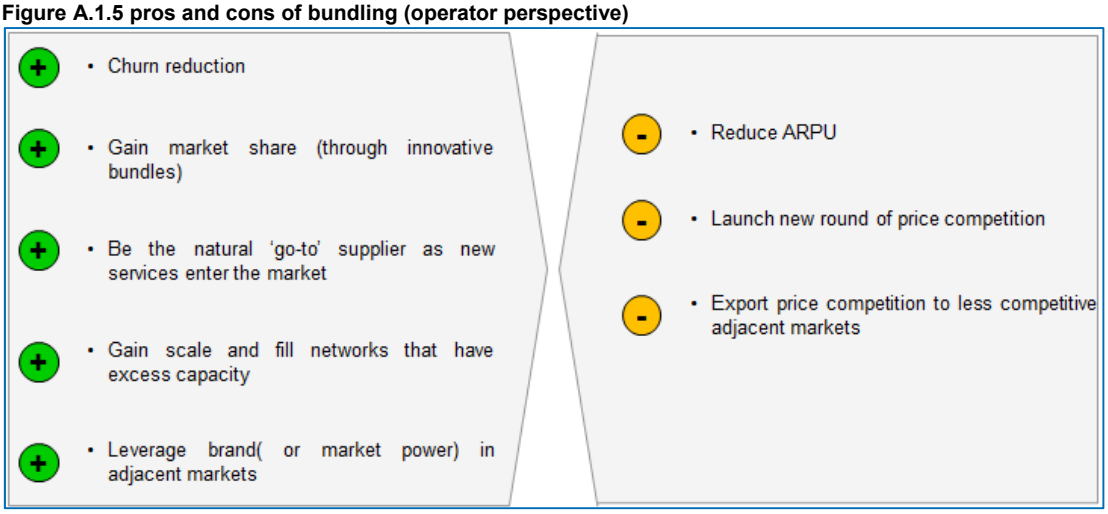
A.1.2 Drivers

The reasons that these bundles have met with success in the communications market can be found on the side of both the consumers as well as the operators.

For consumers there are mainly two advantages of opting for a bundled offer: lower transaction costs and a lower price. The lower transaction costs stem from the fact that multiplay plans offer a higher degree of convenience than separate subscriptions as they provide a one-stop shop for all communications needs. Users thus only have to pay a single bill instead of a separate bill for each service to which they subscribe. The other major reason why users tend to opt for bundled offers is that these typically come at a discounted price compared to an equivalent bouquet of standalone services. The lower price resembles the lower costs of production stemming from the re-use of infrastructure (*e.g.* the DSL modem can be used for voice and thus makes PSTN equipment in the MDF obsolete).

For operators the issue is more complex, as bundles are a sort of double-edged sword for them. On the positive side, bundles can be produced at lower costs and hence an operator can make a more competitive offer. For this reason, the voice service in a voice broadband bundle is typically based on VoB and not on PSTN. On the other hand, by bundling a highly competitive service (*e.g.* broadband) with a less competitive one (*e.g.* voice access), operators risk exporting price competition to the hitherto less intensely competitive adjacent market.

Figure A.1.5 pros and cons of bundling (operator perspective)



Source: IDATE.

Despite these risks for the operators' business, there are also a number of very good reasons for them to package different services in bundles.

After the period of high growth in the late 1990s, early 2000s, mobile and broadband markets are increasingly saturated and subscriber numbers grow at much lower rates than observed previously. Therefore, operators' focus has shifted from customer acquisition to customer retention. Bundles are an effective means to reduce churn, as the switch cost for users are higher if they have to migrate several or all of their communications services to another provider rather than just one service.

Furthermore, market players can capture market share with innovative offers. For instance, this was the strategy pursued by Free in France, which took on the Internet access market directly by

offering a low-cost (30 euros) triple play bundle. The strategy proved to be a success and the operator is now France Telecom's primary competitor in the access segment.

Over the years, new communications services and applications have continued to enter the market. If operators succeed in capturing the supply of several services to a user via bundles, they are more likely to become the obvious 'go-to' supplier for their users for new services, thereby securing a head-start in these new markets. If the added value of new services is high, the operators' additional gain may eventually outweigh the revenue loss caused by discounts on legacy services included in the bundle.

As operators gain scale via bundles, this enables them to improve the utilisation rate of their infrastructures and realise economies of scale and scope.

Finally, through bundling, operators may not only export price competition from one market into another, but they may also be able to leverage the brand reputation or (market power) they have in one product market in adjacent markets that are part of a bundle.

A number of factors will favour the development of bundles in a given country. Access regulation that effectively enables challengers to replicate SMP operators' bundle, *e.g.* through the imposition of wholesale broadband with multicast functionality or access to MVNO services is an important element in this respect. More endogenous factors, such as the intensity of price competition also play role. If the level of price competition is high, operators will also be more aggressive on the size and the price of bundles. Quadruple play bundling will be more relevant if integrated challengers with a significant footprint are present in the market, which can push these offers into the market on a large scale. Incumbents (most of which are integrated players) providing 4-play bundles may trigger the development of a quadruple play market.

A.1.3 Future development

Fixed mobile convergence

The roll out of LTE networks will lead to greater economies of scope between fixed and mobile network infrastructures, due to the re-use of fixed backhaul infrastructure. For instance, traffic from LTE devices will be offloaded on the fixed network via femtocells. The cells of the mobile networks will also be smaller than in previous generations of mobile standards, thus integrated operators have benefit from the capillarity of their fixed networks to connect LTE base stations.

Consequently, the incentive for operators to market quadruple play or other forms of fixed/mobile bundles rises. Pure play fixed or mobile operators will therefore find themselves in a disadvantage even if they can secure some sort of wholesale access to the infrastructure type they are not operating themselves.

OTT services

The adoption of OTT services breaks the link between network access and service provisioning. Users relying to a large extent on OTT voice, messaging or video services have no real incentive to subscribe to a bundled plan.

A.1.4 Impact on competition and markets

Ability to replicate bundles with an SMP-component is key to functioning competition. By bundling SMP products with other services, the dominant operator is not only able to defend its position in the SMP market, but can potentially also leverage its market power into the adjacent markets of the bundle's other components. Competitors therefore need to have access to wholesale products enabling them to compete with the SMP operator's bundles. Otherwise, subscribers to the SMP operator's bundles will be unwilling/unable to switch to a competitor if the latter cannot replicate the bundle's SMP component.

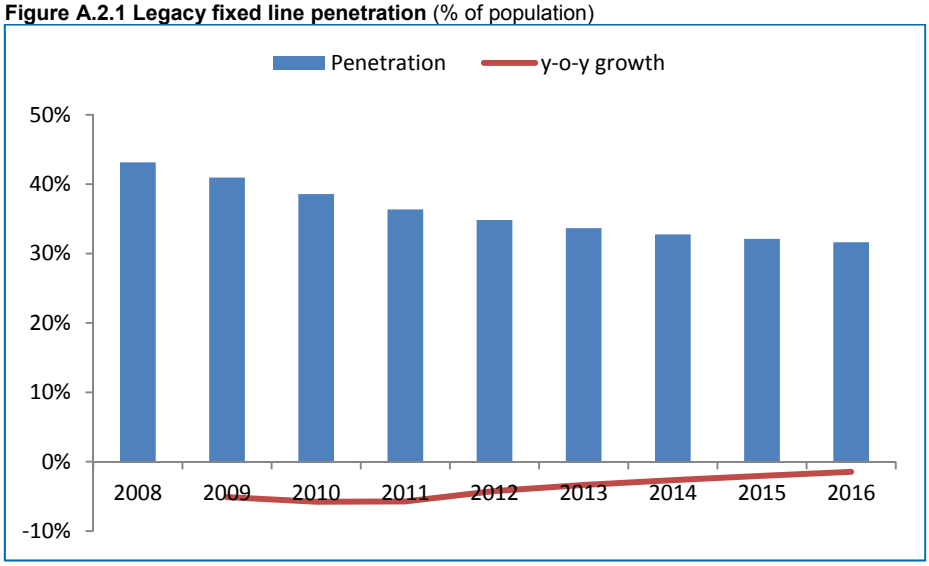
Bundles generally raise the perceived or actual switch cost of a user. Therefore, even if all of the bundle's components are available as stand-alone service, their combination may not be a perfect substitute for a bundle or may not be perceived as a substitute at all. In that case the bundle will have to be treated as a product in its own right. Hence, competitors will require access to a 'bundle' wholesale product rather than a wholesale product for the SMP-component alone.

A.2 Decelerating PSTN decline

A.2.1 Trends

Looking at the penetration of legacy fixed lines the trend towards a stabilisation becomes clearly visible. For the EU27, the penetration rate fell by more than 8 percentage points from 43.1% to 34.8% of population in the four years between 2008 and 2012. For the upcoming four years, this decline will be much less marked. The level of penetration is expected to reach 31.6% of the EU27's population. The growth rate of the penetration will remain negative, but much less so than in earlier years. Between the end of 2009 and 2010, the growth of penetration was -5.8% percent, for the year 2016 the forecast decrease in penetration is merely 1.5% and could tend towards 0% in the years thereafter.

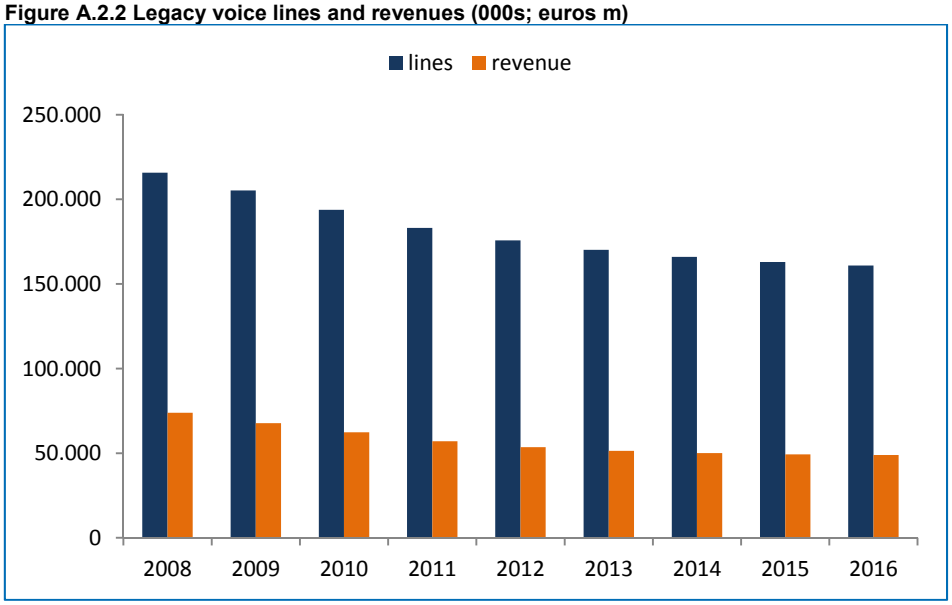
Figure A.2.1 Legacy fixed line penetration (% of population)



Source: IDATE.

The figure below translates this development into absolute lines and revenues. Naturally, the evolutions of the number of lines and of revenues are following a similar pattern. Like the number of subscription, revenues fall rather quickly in the first half of the depicted period, but tend to be more stable towards the end of the forecast.

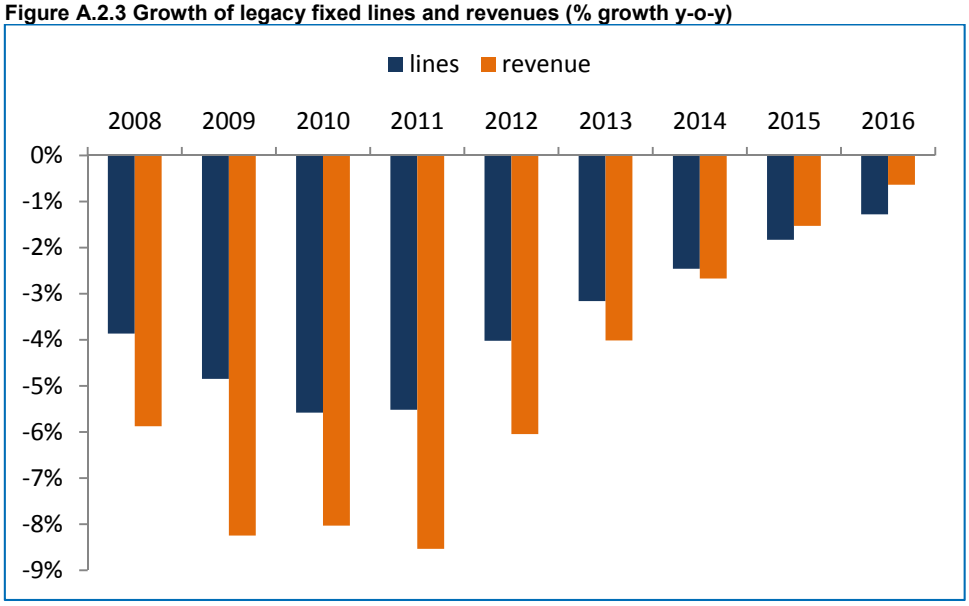
Figure A.2.2 Legacy voice lines and revenues (000s; euros m)



Source: IDATE.

Taking a closer look at the forecasted growth rates reveals why the decelerating decline of legacy fixed line services might be problematic. Plotting the growth rates for the number of lines and revenues in the same graph shows that while revenues historically used to fall at a significantly faster pace than the number of lines, this trend will be reversed over time. The growth rate of revenues is becoming less negative more quickly than that of lines and will improve from -8.5% in 2011 to -0.6% in 2016. For comparison, the number of lines fell by 5.5% in 2011 and is expected to decrease by 1.3% in 2016. The fact that the decline of revenues is forecast to slow down much more significantly than the number of subscriber lines could hint at two developments as potential cause for concern.

Figure A.2.3 Growth of legacy fixed lines and revenues (% growth y-o-y)



Source: IDATE.

On the one hand, legacy fixed lines are an outdated technology without any real growth prospect that may make them increasingly unattractive for operators, hence driving down the competitive pressure in prices. On the other hand, the remaining subscribers to the services are likely to have low price elasticity because either they have a strong preference for PSTN (possibly due to mistrust in alternative technologies) or because they are dependent on PSTN for a certain application (such

as the above-mentioned remote surveillance systems) and are thus captive. In this case, operators could have an incentive to raise prices noticeably to achieve supra-normal profits.

Currently available data do not allow for further verification of these hypotheses, however the issue would deserve to remain in the field of vision of decision makers.

A.2.2 Drivers of PSTN market

For all the well-known reasons, the circuit-switched telephony has been on a declining trend for many. Managed voice over broadband and over-the-top VoIP have become inexpensive and reliable substitutes, making many PSTN subscriptions obsolete. The rise of mobile services and the advent of plans with unlimited or abundant voice minutes and texts have further accelerated this trend.

A.2.3 Future developments

PSTN switch-off

At some point in time, operators will be able and required to fully realise the cost-savings potential of next-generation core and access networks and will therefore decide to switch off legacy networks and migrate all remaining subscribers to a new platform. It is not clear yet when this move will happen. In some cases this may be only well after 2020 but some operators have already indicated they could switch off the PSTN early on in the second half of the current decade.

A.2.4 Impact on competition and markets

As indicated above, as the demand for circuit-switched fixed-line services diminishes, so does competitive choice. For new entrants, the focus clearly lies on the broadband and ultra-fast broadband markets, rather than the declining PSTN/ISDN segments. Yet, if a certain number of captive users are reached, there is a risk that these will face unfavourable conditions, including prices above the competitive level. The question arises whether it is necessary and sufficient to maintain remedies such as WLR and CPS or whether even other measures, akin to some sort of universal service regime would need to be considered.

Furthermore, if and when captive users are migrated to other platforms, what will this imply for them? Should there be an obligation to provide a substitute service on the new platform, if this is feasible?

A.3 Pricing

A.3.1 Trends

A.3.1.1 Convergence of fixed and mobile pricing strategies

Looking at the way prices are structured for fixed and mobile services, one can observe a sort of convergence between these two broad categories. Pricing schemes developed for one market will transit in relatively short time from fixed to mobile and vice versa as the performances of both voice and data services are increasingly similar.

Pricing strategies: from mobile to fixed

With regard to pricing strategies, certain trends are common to the two markets: fixed-mobile bundles, value-added services (especially content services) and the emergence of traffic prioritization plans.

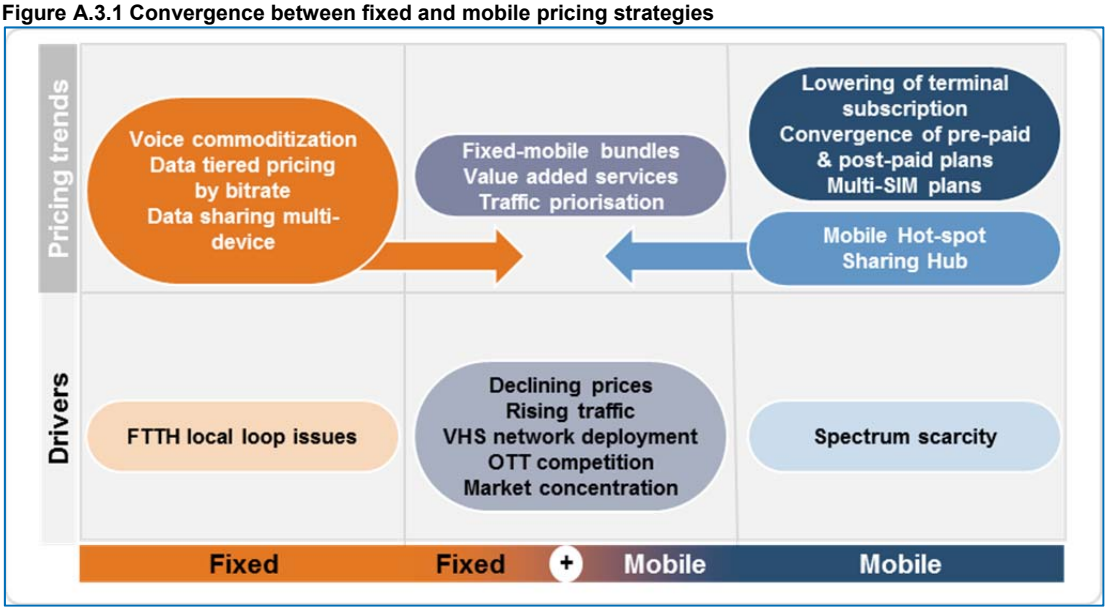
However, some pricing strategies so far specific to the mobile market, such as traffic caps, are beginning to appear on the fixed market. Mobile operators have generally tended to offer tiered plans according to a maximum monthly usage (although some market challengers continue to offer unlimited plans). In the fixed market, operators are also starting to set usage limits faced with an exponential increase in traffic. This is particularly prevalent among US cable, but some European operators, such as Virgin Media, BT and Deutsche Telekom, have also implemented this type of restriction.

Pricing strategies: from fixed to mobile

Similarly, some fixed market trends are emerging on the mobile market:

- 'Commoditization of voice: voice is usually separated from Internet access and is increasingly included in basic fixed Internet access plans;
- Frequent offer of Fixed Internet access plans tiered according to data speeds; this trend is being strengthened by the introduction of fibre optic services. On the mobile data services market, we are seeing the emergence of some plans tiered by speed; and
- Launch of data sharing plans that allow a subscription to be shared between several devices. They depart from the individual approach to mobile services in favour of a multi-device multi-user model, which could involve an individual with multiple devices and/or multiple members of a group. These plans fit into the model of sharing fixed access connections with WiFi devices.

Figure A.3.1 Convergence between fixed and mobile pricing strategies



Source: IDATE.

Tiered pricing and QoS differentiation

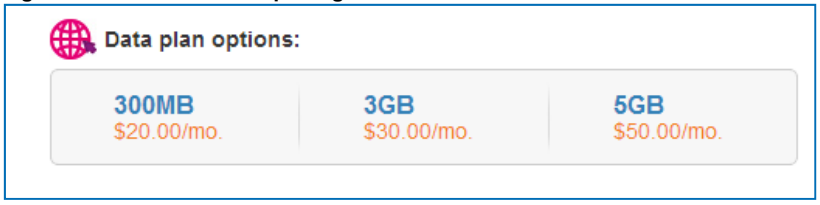
'Tiered services' signal the end of unlimited undifferentiated offers that were used to launch mobile Internet usage. The lack of differentiation between offers for consumers resulted in faster mobile Internet development based on fees for unlimited access. Nevertheless, without segmented offers, all users generate the same revenue, while costs of the various services are very different. While the biggest consumers are responsible for the most traffic, they generate the same amount of revenue as any other user.

Tiered pricing by volume

After the explosion in traffic and usage, one of the pricing policies implemented by mobile operators was tiered pricing on several levels, where billing is based on usage (GB). With this model, users pay based on the volume of data consumed. The user has no restriction on usage and avoids 'bill shock' by consumption monitoring and alerts.

Mobile operators in the United States were among the first to move away from unlimited models (considered no longer viable) to shared fees and tiered pricing for mobile Internet.

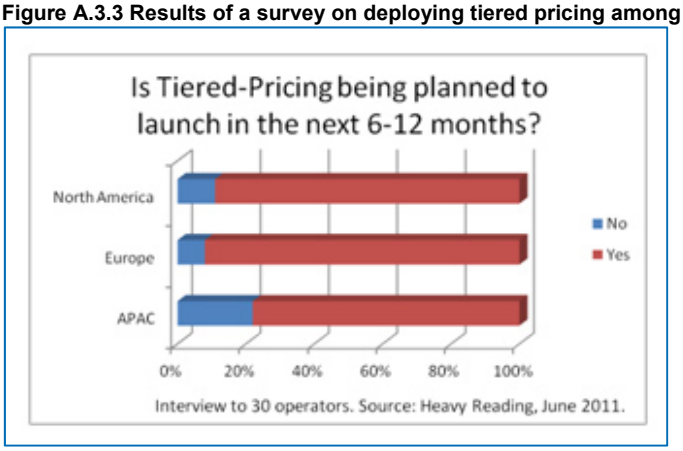
Figure A.3.2 AT&T's tiered pricing offer



Source: AT&T.

However, the phenomenon is not limited to the US, but is also being considered and implemented elsewhere, including in Europe.

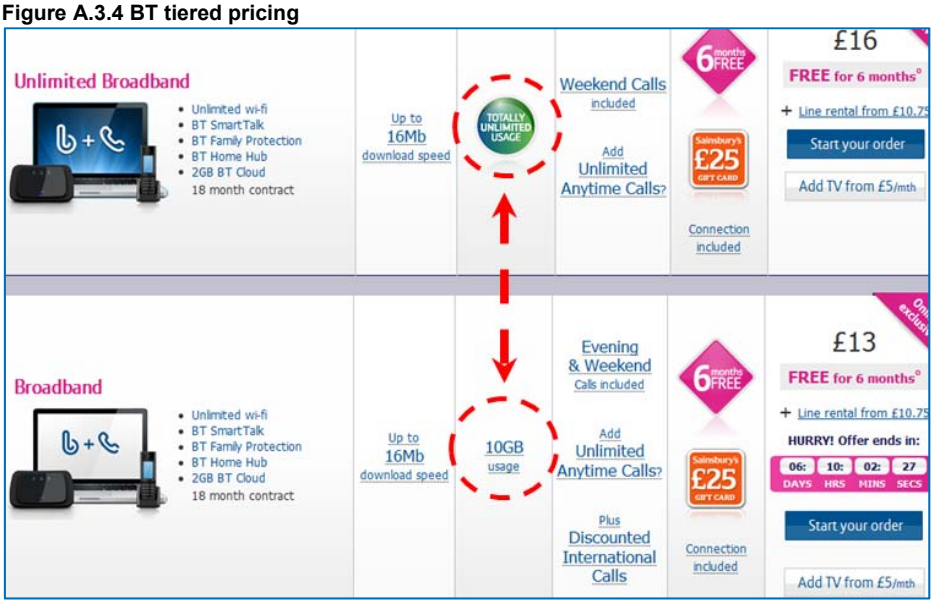
Figure A.3.3 Results of a survey on deploying tiered pricing among 30 operators questioned



Source: Heavy Reading.

In the fixed sector, tiered pricing by volume is less common so far, but does exist. For instance BT offers users a choice between capped and uncapped broadband products that otherwise have very similar characteristics.

Figure A.3.4 BT tiered pricing



Source: BT.

Yet, one can observe some movement of fixed operators toward implementing volume caps. When doing so, however, they have usually emphasised that these caps would have virtually no impact on the average user, but that they were designed to target 'bandwidth hogs': the small percentage of heavy users generating a significant share of overall traffic. Indeed, most caps have been relatively generous so far, with operators allowing up to thousands of GB before sanctions kick in.

US-based AT&T has started implementing data caps for fixed broadband in 2011 after it already did so for mobile in 2010[141]. AT&T has implemented a two-tiered structure. DSL customers get an allowance of 150 GB, whereas subscribers to its U-Verse service benefit from 250 GB monthly, regardless of the contracted bandwidth. Other players, notably cable companies, have followed. In Europe, data caps are much less common than in the United States, especially on the telco side. For instance, in addition to the previously mentioned tiered offer by BT, data caps apply to selected plans of DT in Germany. Interestingly however, DT has data caps in place for its top-tier FttH plans,

[141] AT&T trialled volume caps in Beaumont, Texas and Reno, Nevada in 2010.

whereas BT offers unlimited downloads to subscribers of its flagship plan and implements caps on smaller bundles.

Tiered pricing by speed

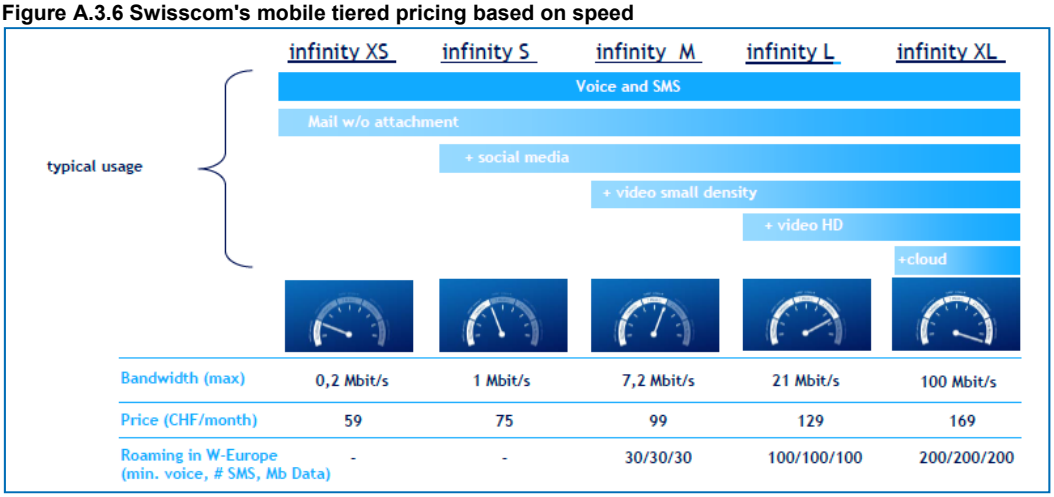
Tiered plans based on data transfer speed are a common phenomenon in most fixed markets.

Figure A.3.5 KPN's tiered pricing offer by transfer speed

Source: KPN.

In mobile, this approach is still relatively new, with Swisscom being one of the pioneers. The operator launched in June 2012 its 'unlimited' offer, Infinity, which includes unlimited SMS, voice and Internet; the added value being the speed selected by the user (from 0.2 to 100 Mbps) to meet her needs. This approach, according to Swisscom, was better suited than differentiating price based on volume, since users had no ideas what their consumption was in terms of volume.

Figure A.3.6 Swisscom's mobile tiered pricing based on speed



Source: Swisscom.

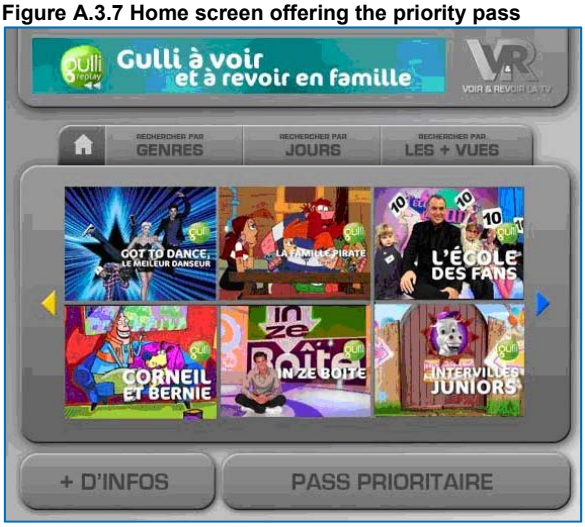
QoS offers

Quality of Service offers are based on giving priority to traffic from subscribers that pay based on their needs (in terms of QoS).

One example is priority Pass from French ISP Free, guaranteeing access to better quality of service on catch-up TV in peak hours (7-10pm), prioritising in case of congestion. The price is 0.99 euros per night and 3.99 euros per month. Subscribers to the Pass have guaranteed priority access if

their local DSLAM does not have enough bandwidth available to serve all households connected in the best conditions.

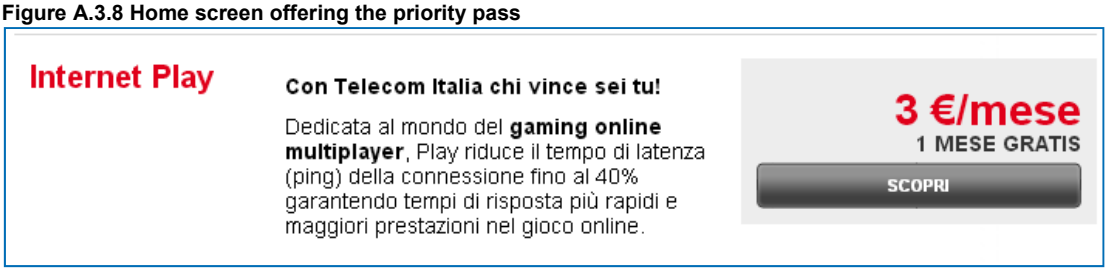
Figure A.3.7 Home screen offering the priority pass



Source: Free.

Telecom Italia is offering an option for online players: for 3 euros per month latency is reduced by 40%.

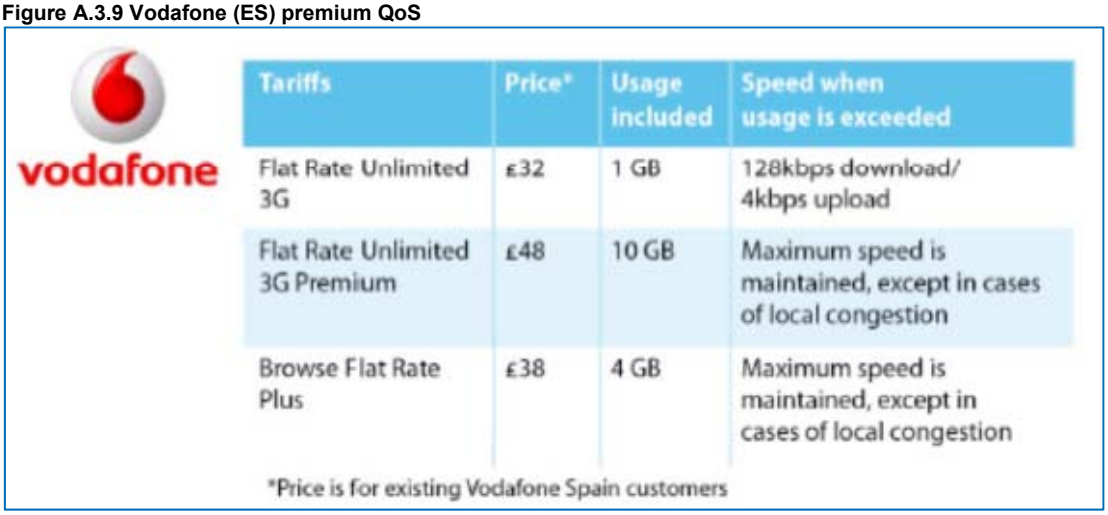
Figure A.3.8 Home screen offering the priority pass



Source: TI.

On the mobile side, Vodafone Spain launched an offer in 2009 giving its subscribers' traffic priority over that of other users in the case of network congestion.

Figure A.3.9 Vodafone (ES) premium QoS



Tariffs	Price*	Usage included	Speed when usage is exceeded
Flat Rate Unlimited 3G	£32	1 GB	128kbps download/ 4kbps upload
Flat Rate Unlimited 3G Premium	£48	10 GB	Maximum speed is maintained, except in cases of local congestion
Browse Flat Rate Plus	£38	4 GB	Maximum speed is maintained, except in cases of local congestion

*Price is for existing Vodafone Spain customers

Source: Vodafone.

Bandwidth 'on demand'

There are alternatives that allow operators offer personalised services by adding value for guaranteed quality of service and generate additional revenue streams.

The principle is based on the initiative of the user, meaning on demand, using a smartphone app:

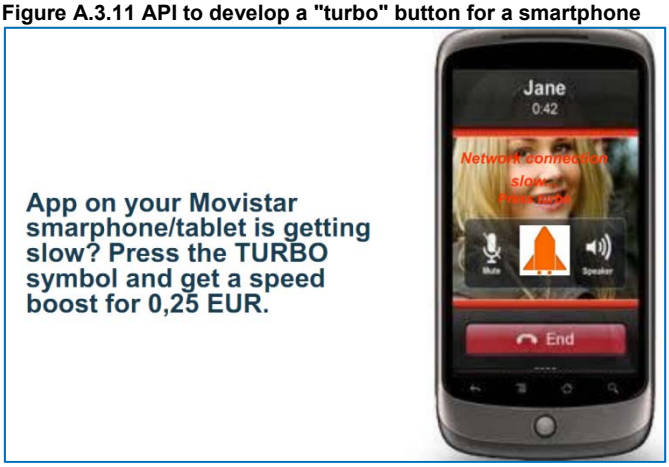
- 'Turbo button': option to dynamically use more bandwidth on demand for a given period or a specific application;
- 'Volume top up': application to use more bandwidth;
- Subscription upgrade: change price on demand.

Figure A 3.10 Traffic on demand system

Source: Huawei.

Telefónica has also developed a network optimisation API that lets users boost their bandwidth using a 'turbo' button. The idea is to let users increase speed when a connection slows down for the cost of € 0.25, for example during the use of an application.

Figure A.3.11 API to develop a "turbo" button for a smartphone



Source: Telefónica.

These 'on demand' options allow users to control their user experience and operators to control revenue generated by data. For operators, it is one of the next big steps in implementing policies that eliminate questions on a model where, in the end, the user pays more money when the network falls behind.

A.3.2 Drivers of pricing change

Pricing strategies are based on a trade-off between maintaining sufficiently high prices to maintain profit margins and offering sufficiently low prices or discounts to secure market share and customer loyalty. In a climate where operators' profit margins are eroding and competition is intensifying, achieving the right balance here is a delicate process.

A.3.2.1 Multiple constraints within the market

Pricing is determined by market conditions, particularly by the level of competition, the state of the economy, technology and regulations.

Competition is a key factor, so when a new low-cost operator emerges such as Free in France, competing operators are often forced to lower their prices. In addition, operators are faced with a new type of competition in the form of OTT services and also with other new ways of accessing networks:

- WiFi as an alternative to cellular access: mobile devices can also use fixed networks, either at home or via public hotspots. For example, about two-thirds of tablets use WiFi connections instead of cellular networks in the United States.

Other factors are also involved in pricing:

- Pricing can be influenced by deployment of new technologies, operator network capacity and geographical coverage. The UK-based operator implemented three very aggressive pricing policies after increasing its network capacity. On the other hand, investing in the network does require a return on investment;
- More broadly, the cost of services is a key factor in pricing, as it essentially determines the operator's profit margin;
- Finally, pricing is also influenced by economic conditions, with prices set higher or lower depending on consumer purchasing power and what financing opportunities are available.

A.3.3 Impact on competition and markets

Although it should be kept in mind that as long as there is competitive choice users will be free to select the offer that best suits their needs. There are several aspects of the pricing trends described above that could have an impact on competition and user welfare.

Where operators establish price tiers by traffic volume, there must be transparency regarding whether all (or only certain) types of traffic are being taken into account. Operators could be tempted to treat traffic coming from internal sources more favourably. (Please also refer the section 9 for a more detailed discussion of this question.)

Similar to the question of managed services versus best effort services on the wholesale side, there is a potential issue of discrimination between users opting for a higher QoS level and those relying on best effort only. To what extent will a restriction of the quality of service for the latter group in favour of the priority QoS subscribers be required and acceptable?

Finally, if SMP operators implement differentiated pricing on an SMP-product, it should be clear whether and in how far competitors must be enabled to replicate the differentiating features. Should Altnets be able to emulate only the basic product (say, broadband access)? If it is considered that

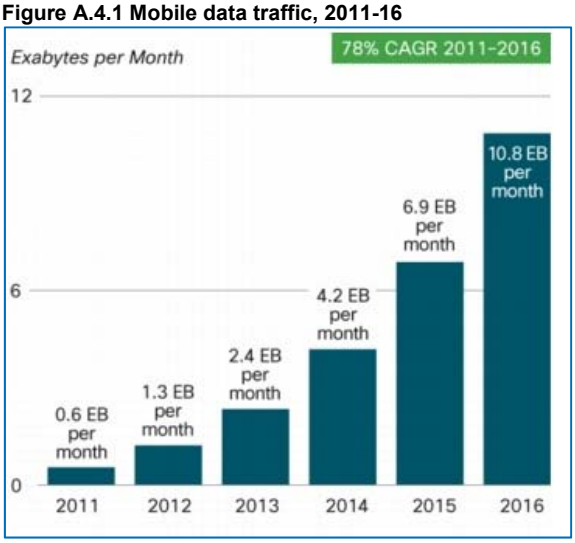
Altnets need to able to provided offers with differentiated QoS-levels themselves, is a basic version sufficient or should they be able to match the SMP operator's range of QoS levels like-for-like?

A.4 Broadband and the advent of LTE

A.4.1 Trends

Users show a virtually insatiable demand for mobile data and traffic volumes continue to grow very quickly.

Figure A.4.1 Mobile data traffic, 2011-16

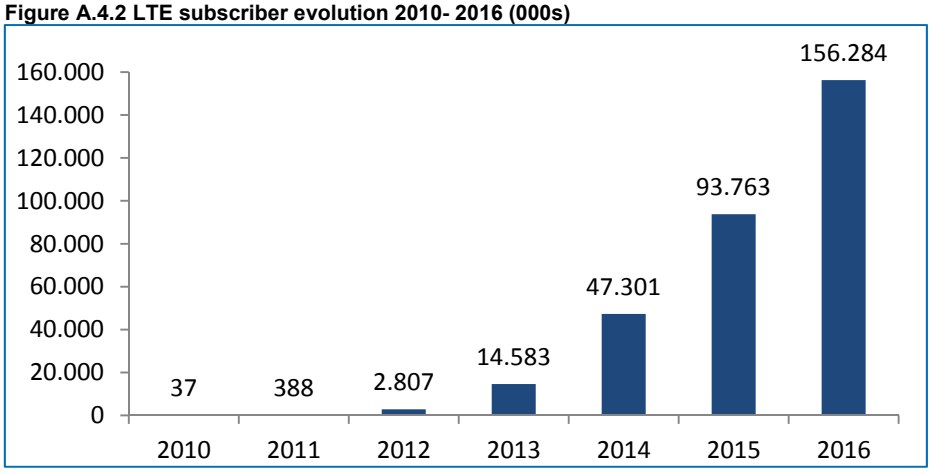


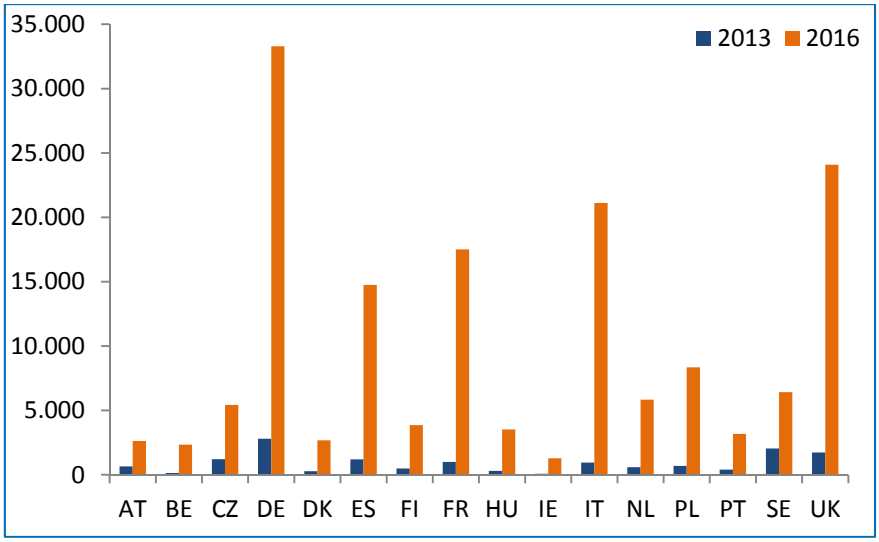
Source: Cisco VNI, 2012.

LTE being the technology best placed to keep pace with the rising demand; the technology will develop quickly across Europe in the years to come.

LTE subscriber numbers will really start taking of in 2013. In the 16 countries tracked by IDATE's LTE Watch Service, during the 2012-2016 period, their number will grow at a CAGR of 173%.

Figure A.4.2 LTE subscriber evolution 2010- 2016 (000s)

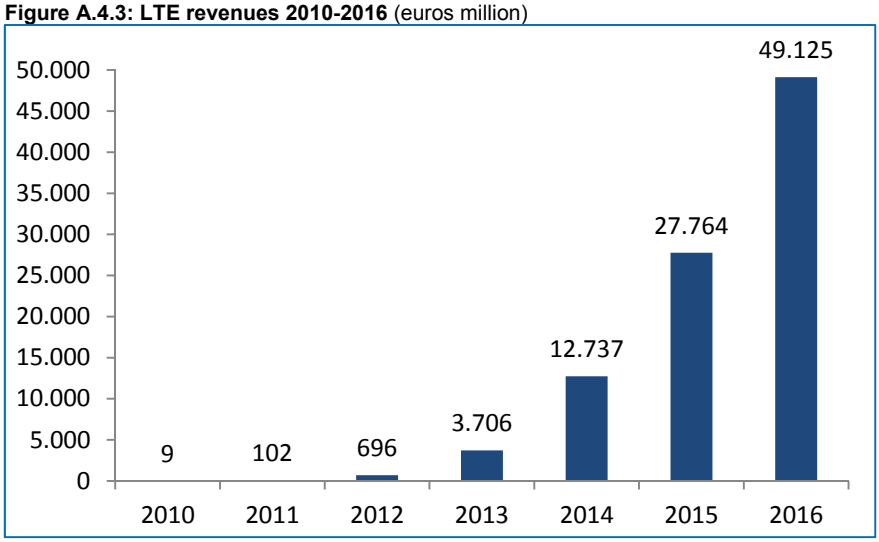


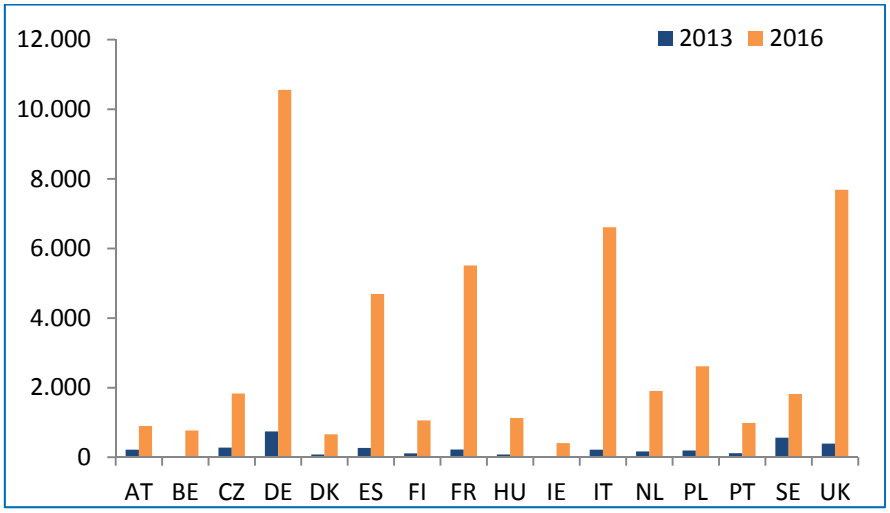


Source: IDATE.

Moreover, in terms of revenues, the LTE market in this set of European countries will experience spectacular growth, albeit at a slower growth rate than for subscribers. The 2012-2016 CAGR for LTE revenues is 90.3%.

Figure A.4.3: LTE revenues 2010-2016 (euros million)





Source: IDATE.

A.4.1.1. LTE as fixed broadband substitute

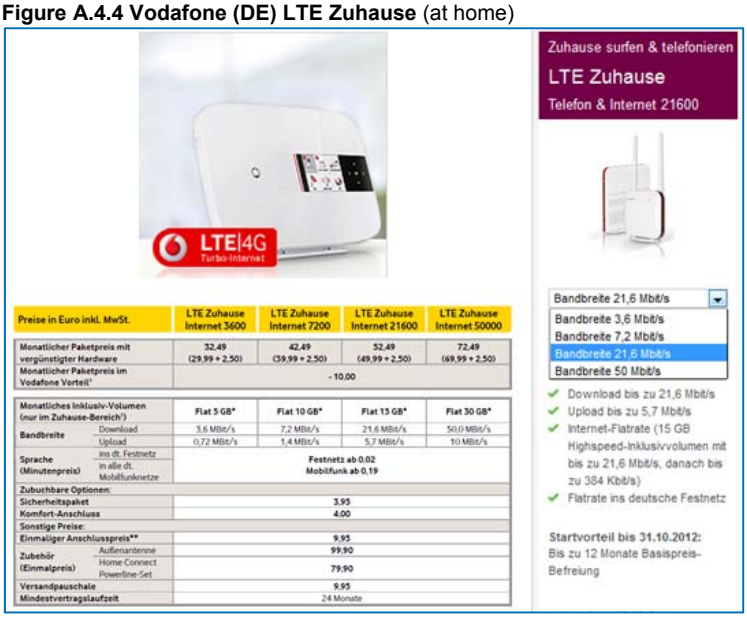
The Digital Agenda for Europe sets a number of ambitious objectives for broadband to be achieved by 2020. Among these goals is the availability of a 30Mbps downstream Internet access to all European households. In areas where upgrades of fixed networks to FTTx are not economically viable and where there is no cable network, LTE will have an important role to play in achieving the DAE's targets.

LTE can indeed rival the performance levels of many fixed line broadband services. In several countries concrete experiences with LTE as a substitute for fixed broadband services have been made already.

Germany – 800 MHz band

In May 2010, the German federal network agency, BNetzA, auctioned off Digital Dividend spectrum tied to rather strict coverage conditions to ensure improvement of rural broadband availability. The obligation to use the 800 MHz band spectrum to build up networks in rural areas first and the ban on starting by rolling out networks in densely populated areas are just two examples.

Figure A.4.4 Vodafone (DE) LTE Zuhause (at home)



Preise in Euro inkl. MwSt.		LTE Zuhause Internet 3600	LTE Zuhause Internet 7200	LTE Zuhause Internet 21600	LTE Zuhause Internet 50000
Monatlicher Paketpreis mit vergünstigter Hardware		32,49 (29,99 + 2,50)	42,49 (39,99 + 2,50)	52,49 (49,99 + 2,50)	72,49 (69,99 + 2,50)
Monatlicher Paketpreis im Vodafone Vorteil*		- 10,00			
Monatliches Inklusiv-Volumen (nur im Zuhause-Bereich*)		Flat 5 GB*	Flat 10 GB*	Flat 15 GB*	Flat 30 GB*
Bandbreite	Download	3,6 MBit/s	7,2 MBit/s	21,6 MBit/s	50,0 MBit/s
	Upload	0,72 MBit/s	1,4 MBit/s	5,7 MBit/s	10 MBit/s
Sprache (Minutenpreis)	ins dt. Festnetz	Festnetz ab 0,02			
	in alle dt. Mobilfunknetze	Mobilfunk ab 0,19			
Zubuchbare Optionen:					
Sicherheitspaket		3,95			
Komfort-Anschluss		4,00			
Sonstige Preise:					
Einmaliger Anschlusspreis**		9,95			
Zubehör (Einmalpreis)	Außenantenne	99,90			
	Home Connect Powerline-Set	79,90			
Versandpauschale		9,95			
Mindestvertragslaufzeit		24 Monate			

Source: Vodafone.

NetCom Norway

In Norway, the TeliaSonera subsidiary markets the Mobile Home Broadband service for 68 euros with 100 GB of data. In it's advertising, Netcom clearly refers to ADSL replacement, stating that (translated) "*We have already tested LTE as a replacement for ADSL in the home, and our experience was that its performance was quite excellent*".

Australia: NBN

The NBN public-private company set up to oversee the roll out and management of Australia's National Broadband Network has selected Ericsson to assist in the deployment of a TD-LTE-based fixed-wireless network in the 2.3 GHz. It will serve rural Australia with download speeds of up to 12 Mbps and upload speeds reaching 1 Mbps. The construction of the fixed-wireless network began in December 2011 and commercial service was launched in April 2012.

A.4.2 Drivers

LTE can meet user demand for true mobile broadband and offer a satisfactory user experience. The upcoming deployment of LTE Advanced will further improve the technology's performance. LTE-Advanced obtained the '4G label' from ITU in October 2010 when it was selected as IMT Advanced 4G technology. Originally planned for 2015, LTE-Advanced has recently gained much more interest from various players. Some say that the commercial launch of the first LTE-Advanced networks could be as soon as 2013.

The target for LTE-Advanced was set considering a spectrum efficiency gain of 1.4 to 1.6 from Release 8 LTE performance.

The requirements for LTE-Advanced are the following:

- Peak data rate DL: 1 Gbps, UL: 500 Mbps;
- Transmission bandwidth: wider than approximately 70 MHz in DL and 40 MHz in UL;
- Latency: C-plane from Idle (with IP address allocated) to Connected in <50 ms and U-plane latency shorter than 5 ms one way in RAN taking into account 30% retransmissions (FFS);
- Cell-edge user throughput double that in LTE;
- Average user throughput triple that in LTE;
- Capacity (spectrum efficiency) triple that in LTE;
- Peak spectrum efficiency DL: 30 bps/Hz, UL: 15 bps/Hz;
- Spectrum flexibility: support of scalable bandwidth and spectrum aggregation;
- Mobility: equal to that in LTE;
- Coverage should be optimised or deployment in local areas/micro-cell environments with ISD up to 1 km;
- Backward compatibility and interworking with LTE with 3GPP legacy systems.

Next to pure performance factors, production cost also plays a role in the development of LTE.

A.4.2.1 Lower production cost

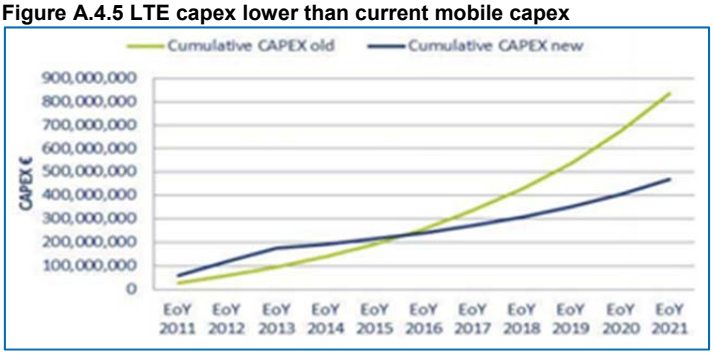
Not only does LTE allow delivering higher bitrates to users, but it also does so at a lower unit cost per MB compared to 3G networks.

Lower capex

In the 3G world, operators needed to take into account the (heavy) weight of backhaul costs when adding new sites. Now operators can reuse existing sites in brownfield cases and add more capacity without adding new backhaul-related costs for each additional site that requires less microwave equipment on the one hand and less maintenance on the other.

Beside the backhauling aspect, RAN equipment is also one of the most expensive parts of a wireless network, alongside the cost of site acquisition that is typically 25% of capex. Hence the re-use of existing site grids offers a significant opportunity for potential capex savings. Similarly, the co-existence of legacy and LTE technologies on the same site creates an opportunity to share expensive backhaul assets.

Figure A.4.5 LTE capex lower than current mobile capex



Source: Omnitele.

Lower opex

The upgrade *stricto sensu* to LTE is largely software-based, achieved with an overlay of the 3G, such as with a simple plug-in. Contrary to previous upgrades, therefore, LTE does not require new towers or new base stations for the RAN part of the network. As a result, less up-front capital investment is required initially, followed by lower operational expenditures. By minimising the number of the new sites and the human interventions associated with planning, deployment, optimisation and operation (thanks to SON solutions), maximum reduction of costs of operations and maintenance within a LTE opex can be achieved. The ability to significantly save on energy consumption, leading to considerable opex savings, is another prime aspect of LTE.

Table A.4.1 Elements of potential savings to reduce network costs for a LTE network

Elements	Capex	Opex
LTE characteristics	RAN and microwave equipment price driving down. Re-use of existing assets (common components). Less equipment with RNC missing within the LTE architecture. No additional backhaul links required.	Less equipment to power with RNC absent within the LTE architecture. No additional sites rental. Less backhaul maintenance required.
Deployment of Multi-RAN platform	No major additional hardware equipment (except circuit boards to plug in the base stations): move to LTE upgrade is largely software-based migration.	Reduced operations and maintenance costs (SON). Energy saving (less space to power).
Network-sharing	Equipment costs and sites shared. Planning and deployment costs shared.	Maintenance shared.
Integration of small cells of Femtocells	Less costly than regular macro base with simplest installation.	Energy saving. Low maintenance required.
Use of alternative power as complementary energy sources		No electricity consumption. Low maintenance required.
Load management (such as base stations being switched off at night)		Energy saving.
Civil engineering	Site re-used.	

Source: IDATE.

It can now be said without a shadow of doubt that LTE infrastructure can be deployed at lower cost than previous network generations (lower up-front investment required) and with the ability to support more traffic. The cost per megabyte is thus unsurprisingly lower than 3G.

LTE clearly results in lower cost per MB of capacity than 3G network can offer. In particular, the higher the volume of traffic transferred, the lower is the cost required to design a network. Indeed, LTE allows higher data traffic delivered at a reasonable price.

Clearly, if capacity per sector is expected to increase with LTE-Advanced technology, the cost per MB is certain to decrease.

A.4.2.2 Broadcast and multicast functionality

LTE has been designed from the outset to be capable of distributing video content. This feature enables operators to provide multiplay bundles, which further adds to LTE's degree of substitutability to fixed broadband services.

Broadcast/multicast support in LTE networks

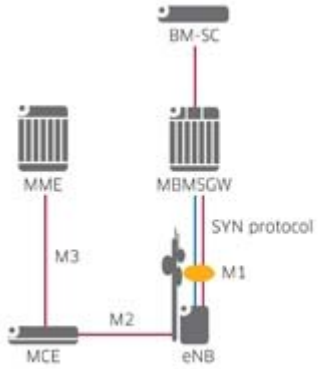
3G networks included the MBMS (Multimedia Broadcast Multicast Service) functionality enabling multicast/broadcast service on WCDMA/HSPA network, however there was a need to implement additional functions in the handset. There was no real commercial implementation of MBMS.

eMBMS (Evolved Multimedia Broadcast Multicast Service) is an evolution of MBMS and is the multicast standard in LTE. The eMBMS standard is supported in 3GPP R9, and initial deployments are expected to begin in 2013. With eMBMS, LTE networks will be able to support broadcast and multicast along with unicast; and the same frequency layer can be used for all these distribution modes.

MBMS provides two different services: broadcast and multicast:

- The Broadcast service is available to any subscriber located in the area in which the service is offered, whereas multicast services can only be received when users have subscribed to the service and have joined the multicast group associated with the service. Both of these services are unidirectional point-to-multipoint transmissions of multimedia data and can be highly applied to broadcast text, audio, picture and video from Broadcast Multicast Service Centre to any user located in the service area. For such a service, only the broadcast service providers can be charged possibly based on the amount of data broadcasted, size of service area or broadcast service duration;
- Multicast is subject to service subscription and requires the end-user to explicitly join the group in order to receive the service. As it is subject to subscription, the multicast service allows the operator to set specific user charging rules for this service.

Figure A.4.6 eMBMS logical architecture



Legend:
MCE: Multi-cell Coordination Entity
BM-SC: Broadcast Multicast Service Center
MBMS-GW: MBMS Gateway

Source: Alcatel-Lucent.

There are four types of MBMS User Service considered by 3GPP:

- Streaming services:
  A continuous data flow providing a stream of continuous media (*i.e.* audio and video) is a basic MBMS User Service. As is the case for digital video broadcasting, supplementary information of text and/or still images (static media) is important. For example, if text includes URLs of some content on the Internet, a user can easily access the content without entering the URL for herself. Still images may also be used for banner images that advertise some product or service. These static media need to be synchronized and displayed with audio/video streams;
- File download services:
  This service delivers binary data (file data) over an MBMS bearer. An MBMS client (*i.e.* UE) activates an appropriate application and utilises the delivered data. The most important functionality for this service is reliability. In other words, it is necessary for the user receive all the data sent in order to experience the service;
- Carousel services:
  Carousel is a service that combines aspects of both the Streaming and File download services described above. Similar to the streaming service, this service includes time synchronisation. However, the target media of this service is only static media (*e.g.* text and/or still images). Time synchronization with other media is also required. For example, text objects are delivered and updated from time to time. Still images may also be collated to display low frame-rate video. In common with the download service, this service also includes reliability (typically 100% reliability is not always necessary). The advantage of this service is that it is possible over a low bit-rate bearer;
- An example of an application utilising the Carousel service is a 'ticker-tape' type service in which the data is provided to the user repetitively and updated at certain times to reflect changing circumstances;
- Television (TV) service
  The Television service is an MBMS service consisting of synchronised streaming audio and visual components.

A.4.2.3 New Services

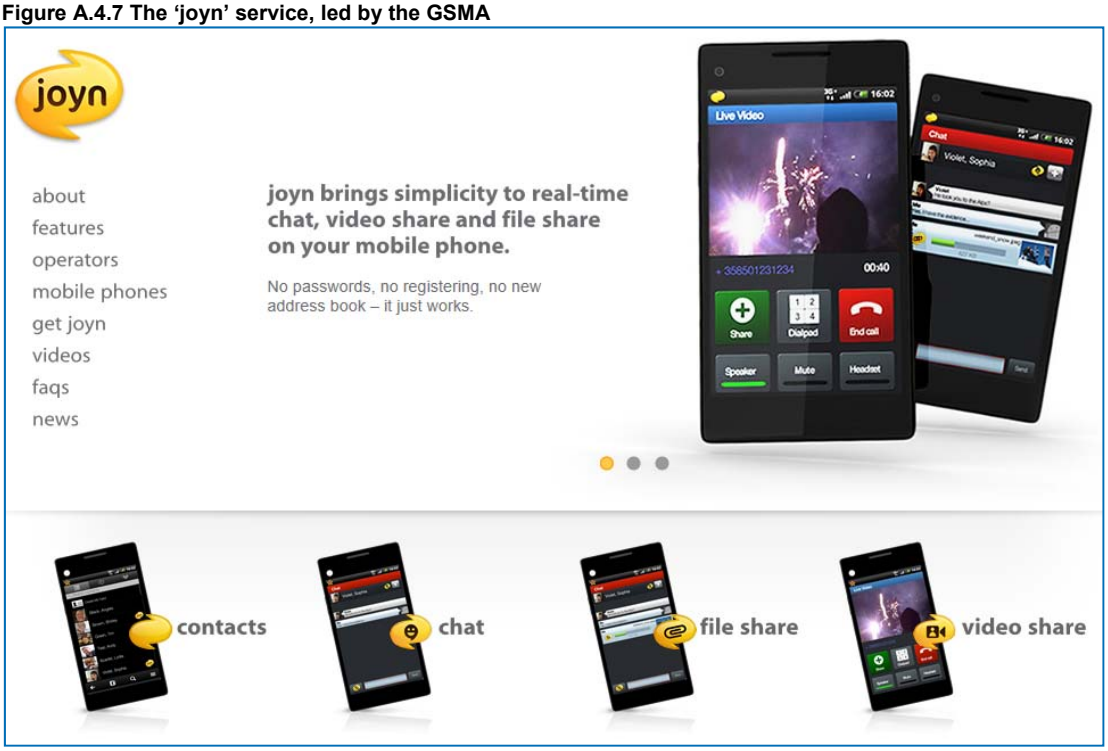
LTE networks not only bring higher data rates, but also reduced latency that proves to be a critical factor for some applications.

The GSMA-led 'joyn' initiative

'joyn' is the GSMA-led telco initiative, launched in February 2012 at the Mobile World Congress. It is the marketing brand of the Rich Communication Suite enhanced (RCSe), which aims to enhance

the communication experience for all mobile users. From a more technical perspective, it can be summarised as the transition from CS (circuit-switched) voice and messaging to PS (packet-switched) that is more suited for the all-IP world (and thus for VoLTE). By making this transition, users can expect more enriched communication, in particular for talk, chat and the sharing of videos, pictures and music. The address book is designed to show the joyn logo for all contacts that also have joyn and automatically knows the modes of communications available with each contact. The core principle of joyn is 'just there, just works', much in the same way as voice or SMS in the mobile phones of today. That is to say there is no download required, no registration, no password, and so on, which is prerequisite in most cases for OTT services. The principle includes 100% reach and voice and SMS are entirely compatible, as is one of the goals for joyn. They aim to have it embedded as a default across all phones from all operators.

Figure A.4.7 The 'joyn' service, led by the GSMA



Source: joyn.

As of January 2013, operator launch status of joyn is as follows:

- Spain: Telefónica, Vodafone and Orange launched;
- Germany: Vodafone already launched, T-Mobile expected within 2012;
- USA: Launch by Metro PCS;
- South Korea: all three operators have launched;

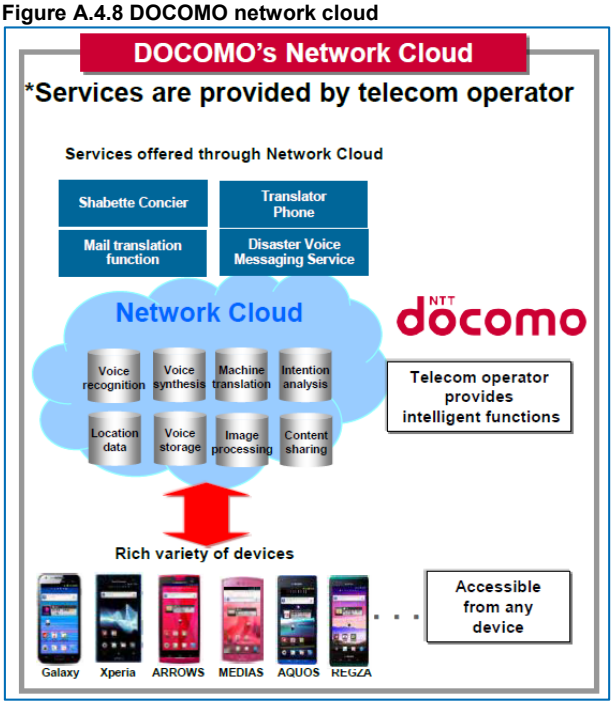
Mobile cloud-based services

Mobile Cloud means access to a shared pool of computing resources over a mobile network access. Cloud-based services such as online storage, backup, enterprise IT system access and file sharing applications will see a spike in use. The low latency of LTE also ensures a reliable connection and enables large-scale multi-player games on mobile.

Leading Japanese MNO NTT DOCOMO is very active with cloud services and has already launched several services:

- Shabbette Concier: a voice agent function service allowing to control smartphone features and to search content in the cloud;
- Voice translator service: launched November 2011, it provided service with three languages. Plans were to extend this to ten languages in June 2012. A mail translation service was also launched in May 2012; and
- Cloud gaming: The G-Cloud gaming service adapts graphic resolution in real-time according to the bandwidth available.

Figure A.4.8 DOCOMO network cloud



Source: NTT DOCOMO.

A.2.3 Impact on competition and markets

LTE shows a number of characteristics that will make it a serious contender in the broadband market. It is capable of delivering high bandwidth, thus offering a true broadband user experience. LTE has also been designed to support a number of innovations, such as different QoS levels as well as broadcast and multicast services. Furthermore, the targets set by the DAE will provide additional momentum to the roll out of LTE as a substitute for fixed line broadband services.

The forecasts show that users will respond positively to the offer and will rapidly adopt LTE services.

Hence, LTE could indeed become a substitute for a number of fixed-line broadband offers. This holds for the demand-side as well as for the supply-side, notably in areas where the upgrade to NGA networks is not economically viable for one or several operators.

Hence there could be a case for the inclusion of LTE in the relevant product market when reviewing broadband markets. The presence of one or more LTE networks could substantially change the outcome of the analysis and the finding of significant market power, either on the national or the regional level.

A.5 M2M

A.5.1 M2M market description and evolution

Definition and scope

The definition used for M2M in this section will be the one that covers the concept of 'communicating devices'. M2M refers to automated communications (both programmed and/or triggered by a man-induced event) that involve at least one remote device that is not a commonly used information device such as a computer, telephone or TV. This, therefore, involves exchanges between several machines without any human intervention in the chain of communication. An application or service can also be called M2M if it involves communication with at least one machine whose primary feature or value is not communication and/or Internet access and can therefore work without any network connection - as with a car or a meter. In that sense, M2M can include consumer electronics (CE) applications where connectivity is not the primary value. Here, connectivity is seen as an enabler of such CE applications as e-readers or connected Portable Navigation Devices (PND). However, netbooks and mobile devices such as the iPad are excluded.

M2M is not in itself a technology, but rather a logical combination of different technologies based on electronics (such as sensors, RFID and modems), telecommunications (as with GPRS, WiFi, SMS and Internet) and computing (of the likes of XML and information systems), all of which makes it possible to build new services. Here, the M2M scope is restricted to cellular M2M.

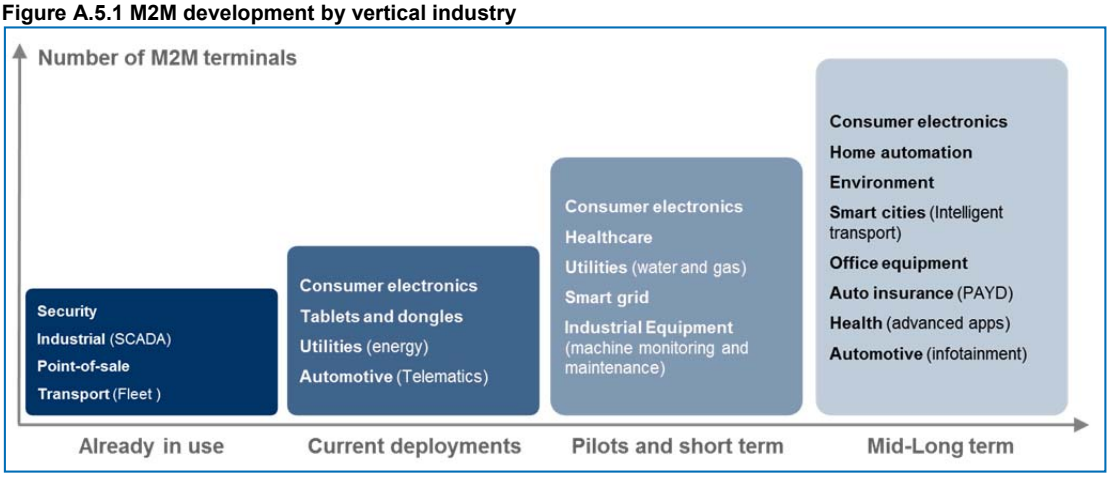
A.5.1.1 Development through vertical markets

M2M development is usually based on a small set of machines that only communicate a limited amount of information.

The prime (very) early adopters of M2M solutions have been security (mainly for fixed facilities) and transportation (mainly around fleet management). The M2M concept is now expanding gradually to more recent adopters in utilities (meter reading), healthcare (patient monitoring from the home or outside) and commerce with the emergence of affordable wireless networks.

The issue of utility (with AMR) has been in the spotlight, especially in Nordic countries, as it involves numerous machines from one major provider around one single basic function. The focus is now shifting to the car fitted with telematics, in particular in the USA, and a few other segments with even larger volumes and numerous functions.

Figure A.5.1 M2M development by vertical industry



Source: IDATE.

Traditional typology of M2M applications has changed little

Over the past few years, the M2M market has witnessed the development of a few applications – security, industrial, fleet management and, now also, consumer electronics. However, the upcoming and even promised applications in healthcare and home automation seem to have been delayed, with emphasis being placed instead on designing current applications and deployments for the mass-market.

Verticals notably affected by downturn

As stated previously, M2M deployment is closely linked to economic growth within the verticals. In various industries deeply affected by the downturn, M2M deployment has decreased and even been delayed.

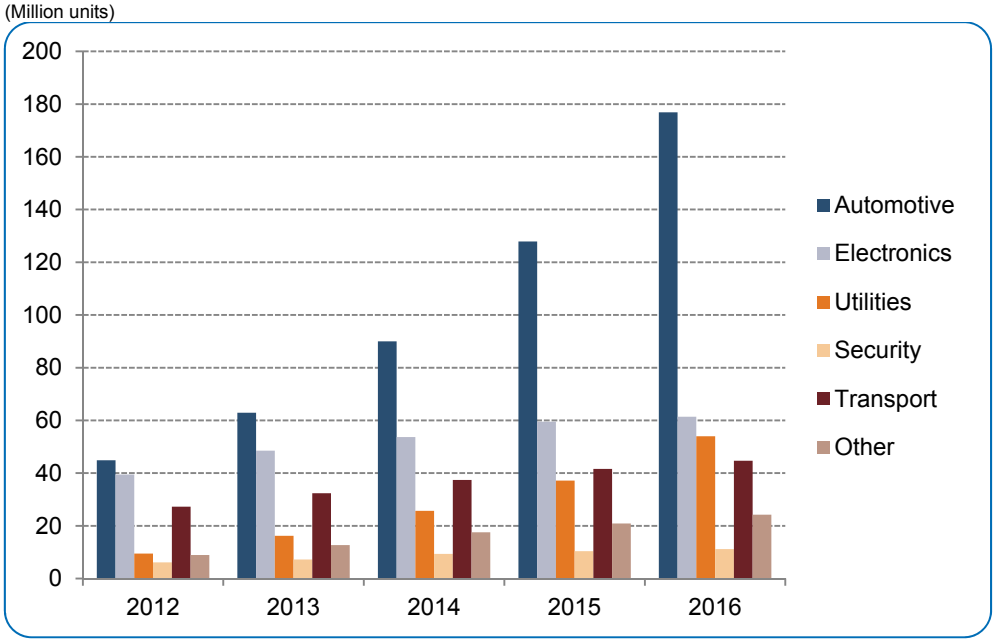
Nevertheless, some verticals have suffered greatly from the crisis, even to the point of stopping production as the automotive market has done. Here the result was an immediate stop to embedding SIM cards within vehicles.

Application forecasts (in volume)

The automotive vertical market will be the first market for cellular M2M growth. It will be specific regulation in typical geographical areas that drive the market (as with eCall in Europe, with a 40% CAGR between 2011 and 2016). The second vertical is consumer electronics, but with a steady growth (15% CAGR between 2011 and 2016), due to substitute technologies (WiFi for instance). The third market are utilities because of the use of concentrators – not all smart meters will be connected by a SIM card, but they represent the main CAGR (60%) between 2011 and 2016.

Figure A.5.2 Cellular modules evolution, by vertical

(Million units)



Source: IDATE.

A.5.1.2 A combination of value chains

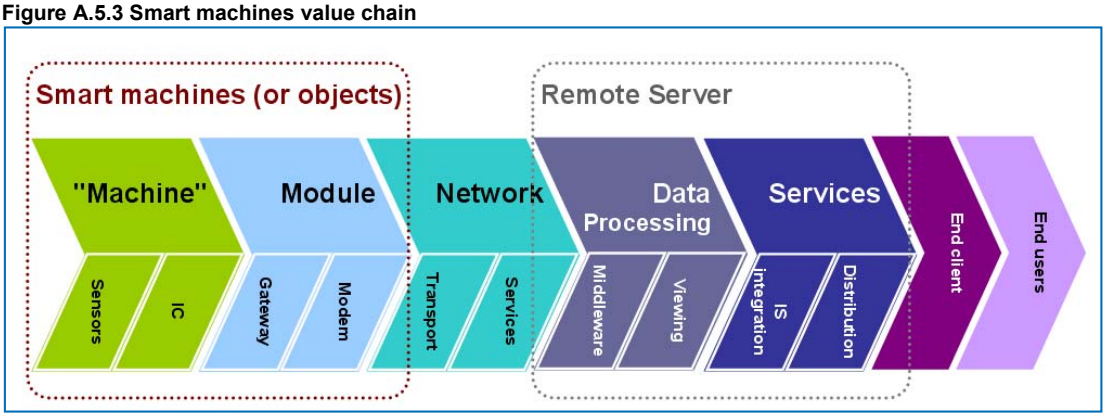
The smart machine value chain is a particularly extensive one. It comprises several value chains of varying level of complexity, namely:

- The electronics value chain that enables data collection and interaction with the machine, from the various sensors to the external connectivity modules to be integrated;
- The telecommunications value chain, chiefly in the case of cellular or satellite markets, since most other networks are generally managed directly, though all include some aspects of service and integration;
- The computing value chain, involving the different software and middleware developers, integrators and service providers in general;
- The value chain of the machines themselves (and the Internet of Things, in the future, with no embedded electronics), from production to marketing (sale or leasing).

Two elements play a central role on this value chain. The first is network access, in a cellular or satellite situation. Very few players are capable of offering this, despite the growing presence of MVNO and traffic resellers (see below).

The second element is that of distribution and access to end-clients, who are to be distinguished from end-users. The latter buy/use the finished machine but do not give any specifications for its design as do end-clients – this link potentially involves all players along the chain.

Figure A.5.3 Smart machines value chain

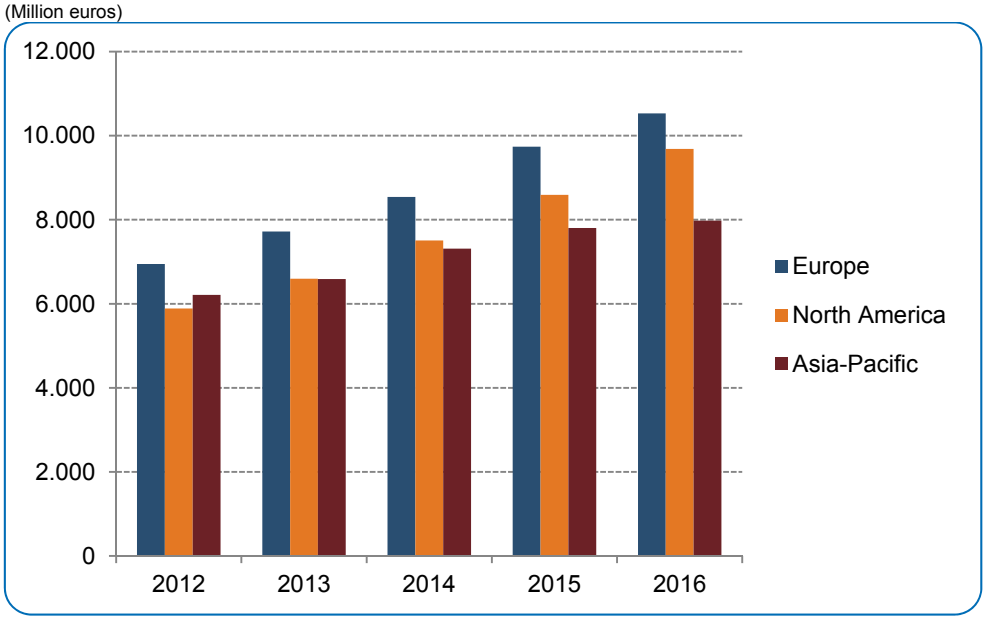


(Note: in the case of an object/item without any electronics - the module will be a regular electronic device such as a mobile phone - and the object will partly get electronised by adding, for example, a RFID).
Source: IDATE.

A.5.1.3 Market estimates and forecasts

The M2M market is growing very fast. In 2012, the cellular market is expected to represent 140 million modules worldwide for a total market of 22 billion euros (of which 5.1 billion euros for connectivity). The annual growth of the M2M market was around 14% in value and 36% in volume. Most revenues will come from software and IT services (around two-thirds of total market value). The world M2M market should grow by 30% in volume to represent almost 370 million modules in 2015. Asia-Pacific should dominate Europe and North America in volume only. Europe should still lead in value, followed by North America.

Figure A.5.4 World M2M markets
(Million euros)



Source: IDATE.

A.5.2 Trends, drivers and main impacts

A.5.2.1 M2M as an opportunity for Telcos

Trend description

M2M is a totally different business for telcos, compared to their traditional operations. M2M represents a considerable market and a range of major opportunities for operators:

- **High growth** (in millions of machines annually), at a time when the classic market is near saturation in most developed countries;
- **A means of generating a return on already deployed networks,** particularly 2.5G networks (that supply permanent connection) which are under-used by all customer segments, at a time when operators are working actively to have their customers migrate to 3G;
- **Network optimisation** thanks to greater traffic predictability, since a great many machines follow predetermined reporting schedules – and less critical applications can also be shifted to off-peak periods.

Table A.5.1 Comparison of key elements in standard and M2M operator business models

	Classic operator	M2M operator
Target	Consumer, own use (business users for their own applications for networks as with Mobitex). One customer per individual subscription.	Industry players, own use or for customer. One client with numerous subscriptions
Customer needs	Little distinction	Customised needs
Voice functions	Primary use (80%+ of ARPU).	Generally absent.
Data functions	Low data usage, except SMS and Blackberry over Mobitex. Broadband needs for multimedia.	Primary usage. Low bitrate requirements.
ARPU	Medium to high (40 euros/month).	Low (1 to 10 euros/month), with 3-4euros/month in average.
Pricing models	Chiefly with a set plan.	Flexible.
Level of service	'Best effort'.	Scalable (but not QoS, in the sense of guarantee of bandwidth).
Churn	Tied to competing packages (price, service, handset).	Tied to the machine's lifespan.

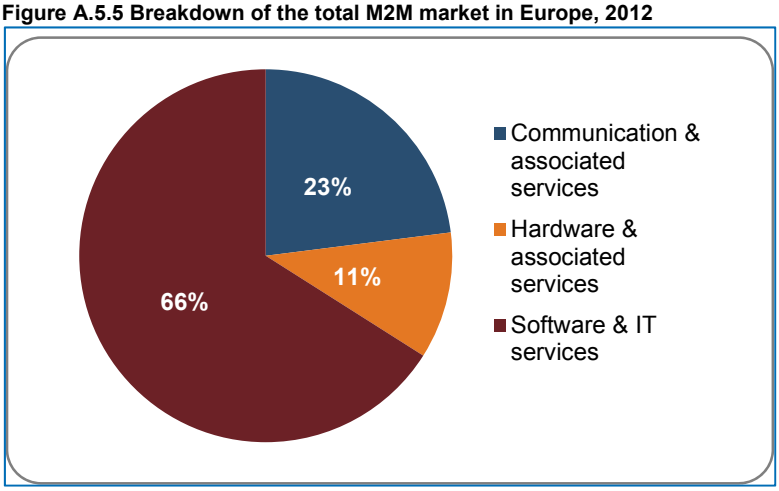
Source: IDATE.

Drivers

The M2M connectivity market and the associated business opportunity (as a growth relay) are encouraging. By 2016, for mobile telcos, M2M could represent 1.1% of their revenues for connectivity alone (around 2.2% of their mobile data revenues in Europe). Even if ARPU is much lower, already decreasing and will drop further with the development of large-scale projects, the financial potential is positive for telcos as acquisition costs and churn are also much lower and most deals represent several thousand units.

Moreover, according to IDATE, the bulk of the market is represented by software and associated IT services as M2M offers greater added value when connected to existing IT systems. In fact, it represents two-thirds of the total market.

Figure A.5.5 Breakdown of the total M2M market in Europe, 2012



Source: IDATE.

Therefore, major deployments involve traditional IT integrators using M2M building blocks supplied by telcos and module providers. Telcos are strengthening their ecosystems to help their customers access integrated solutions and one-stop shopping. They are all broadening their portfolio of network services and related tools with an international offering and the latest 'must-have' (the module management platform) in order to meet the needs of business. Their positioning can vary to a large degree.

The opportunities are now rich enough for telcos to commit themselves wholeheartedly. The leading players are Vodafone, Deutsche Telekom, Orange, Telenor and Telefónica in Europe, while China Mobile is now the dominant player in Asia. In North America, AT&T leads the US market thanks to the consumer M2M market (leveraging its Kindle deal) whereas Verizon Wireless still leads the traditional M2M market.

Impacts on competition

Competition in M2M is going beyond the natural footprint of each player, as most value is now coming from network access and such additional features as portal management or specific SIM cards, rather than from bandwidth volume. Players can therefore position themselves more easily on international markets. Now, beyond connectivity offering, telcos are facing competition from players in other segments, such as module providers that are also investing in the service business. Indeed, the Top 3 module players (Gemalto, Sierra and Telit) now offer a module management platform, a competing offering.

A.5.2.2 Towards QoS, even when roaming

Trend description

Some of the biggest debates in contract negotiations involve data ownership, data usage and indemnification around IP; these are major legal issues. Liability is another major legal issue. For instance, according to M2M players, one recurrent question could be "what happens when eCall does not call or an alarm system does not reach the central station?"

Drivers

Quality of Service (QoS) is a telco criterion and a key differentiator for mobile operators owning their network, unlike the MVNOs. The QoS aspect is the most important criterion for certain applications, notably security and/or those requiring few connections. Some players will insist on the service level agreement (SLA) regarding QoS on the end-to-end link. This can even include

high penalties for them because of difficulties in guaranteeing bandwidth for specific applications, especially, bandwidth being mutualised on the radio section.

However, M2M is not a domestic market. Global M2M client's requirements are entirely different as the Telco footprint is not their own. They need guarantee of service, a continuity of service and ideally a high level QoS, requiring MNO cooperation when roaming. According to telcos, **QoS could be seen as important value-added services (VAS) while they face ARPU decline.**

Finally, in 2011, Ericsson signed a strategic alliance with Akamai to jointly develop solutions around improving the end-user experience on the mobile Web. By definition, the alliance is trying to accelerate bringing mobile cloud-based solutions to market, improving the experience around mobile commerce, enterprise apps and Internet content. Actually, even all-critical applications could be interested by such a system (based on traffic prioritization), as the client could be willing **to pay for optimized delivery**. M-health should be the first targeted application.

Impacts on competition

As a consequence, 2012 has seen the formation of multiple alliances between telcos. Those alliances aim to provide an interoperable M2M service across their European footprint.

TeliaSonera joined the existing alliance between France Telecom (Orange) and Deutsche Telekom (T-Mobile) now called Global M2M Alliance (GMA). Customers will "benefit from operability across borders and enhanced M2M service quality in the mobile networks of the cooperation agreement parties". Moreover, joint testing will be conducted to harmonise module standards, improving module certification as enabling a quicker and more optimised integration of the modules in M2M customers' devices and machines. In the longer term, the alliance aims to provide higher QoS for M2M lines, even **through traffic prioritization**.

In July 2012, Telefónica formed alliance with operators across the globe to develop a M2M product aimed at multinational with the Jasper Wireless platform as a cornerstone.

It will be recalled that Vodafone has the best global international coverage of any operator. It is also a partner of Verizon Wireless (and a shareholder). The main objective of these alliances is to cooperate on technological solutions designed to provide a service to multinational customers requiring seamless M2M connections across different regions.

A.5.2.3 eUICC as a first hurdle for M2M client captivity

Trend description

Basically the principle of the embedded SIM, as the name implies, refers to SIM cards welded into the modules at manufacturing – in other words, **non-removable SIM cards**.

Especially designed for industrial performance improvements (better resistance to extreme temperature, machine vibrations, etc.) that meet M2M client requirements, embedded SIM technology can also bring business improvements, through savings on logistical costs thanks to optimizing supply chain costs.

However, the extension of eSIM service is rooted in the **capacity for remote activation and provisioning over-the-air** (OTA), as well as to **the possibility of switching from one carrier to another**, while still respecting contracted commitment length. The carrier could be a different one

(the white SIM concept) or even a subsidiary of the carrier. **The idea that a M2M client is locked for life (churn close to 0%) with a M2M carrier is now disappearing.**

Drivers

The main key drivers that could enable the development of the eSIM technology are:

- **Technical improvements**: better hardware performance like better resistance to extreme temperature (or humidity), machine's vibration, etc.;
- **The client expectations.** It allows the M2M client to:
  - **Save logistics costs;** potential supply chain savings for M2M clients: a large M2M client company could embed eSIM cards directly into their module and machines from the origin plant, instead of put SIM cards in modules after manufacturing (or when deployed). This implies a supply chain costs optimization;
  - **Better negotiate business contract with Telcos**; greater shortening of the contract with mobile carriers, as the eSIM concept introduces the ability to switch from a carrier to another one.
- **M2M market development acceleration.** Thanks to the previous points, eSIM will remove the traditional hurdles to market development.

Impacts on competition

eSIM also introduces the challenge of switching operators and then the need to integrate a new role in the value chain in order to manage subscriptions. As a subscription manager, the role still under discussion in the industry could be operated by MNOs or by third parties. The subscription manager is responsible for activating and provisioning the embedded SIM cards, meaning that this entity has access to the mobile operators' credentials; which is critical data:

- The **subsidiary carrier switching scenario** could be a credible one and implemented as it does not introduce a huge change to the current situation (Vodafone One Global SIM offering is quite similar, except for roaming costs) in a short and medium term. Multiple tests have already taken place: during a trial in March 2012, Telefónica and China Unicom, with the collaboration of Giesecke & Devrient (G&D), have proven a secure, pre-standard system for remotely managing M2M SIMs subscription data based on the principles of the embedded SIM;
- The **white SIM scenario** (switch from a carrier to another independent one) is not very credible, even for the long term. Indeed, multiple MNOs have already claimed that they are clearly opposed to this. The technology cannot work without their authorization. The main threat comes from the potential transfer of the concept to the smartphone world.

While standardization is not yet ready, the demand for an agnostic platform is definitely on the table. The introduction of the embedded Universal Integrated Circuit Card (eUICC) and the overall ability to change carrier seems to be becoming a potential game changer in the M2M space.

A.6 OTT Communications

A.6.1 Trends

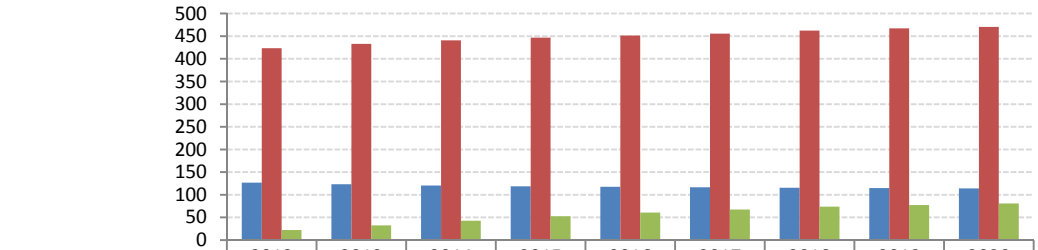
A.6.1.1 Usage figures

It is important to look at the evolution of OTT communication in context, with a view of how it compares to the telco communications market and thus the overall communications market. Hence, this section will provide OTT communication metrics, as well as telco communication figures to give the overall picture in the EU5.

Mobile voice users still much more dominant than OTT VoIP users

IDATE forecasts that fixed telephony will decline, whilst mobile subscriptions are expected to show slight growth and OTT VoIP is expected to show strong growth. CAGR for the period 2012 to 2020 are -1.3%, 1.3% and 17.6% respectively. Still, as can be seen in the figure below, the number of OTT VoIP users is still expected to trail the number of fixed telephony lines in 2020.

Figure A.6.1 Fixed telephony lines, mobile subscriptions and OTT VoIP users forecast, EU5, 2012-2020
(Million users)



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed telephony lines	126,6	123,1	120,5	118,6	117,4	116,3	115,5	114,7	114,1
Mobile subscribers	423,5	433,0	440,7	446,7	451,5	455,6	462,2	467,3	470,6
OTT VoIP users	22,2	32,3	42,8	52,6	60,6	67,2	73,9	77,4	80,8

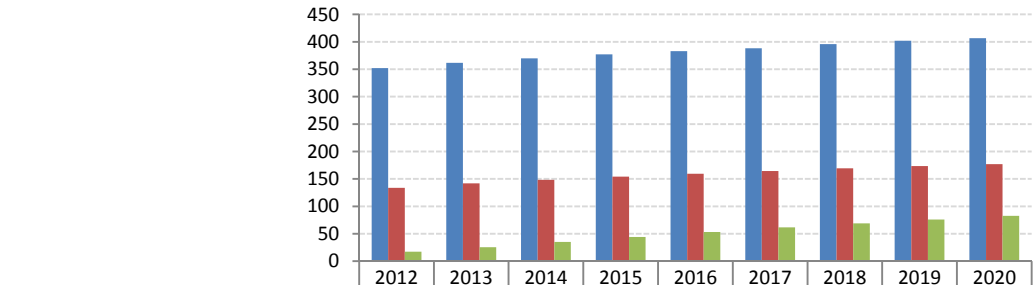
Source: IDATE.

Messaging users of both telcos and OTTs expected to grow

The three categories, telco messaging users (mainly SMS users), social networking users (IDATE defines social networks also as a messaging service) and OTT messaging app users are predicted to show growth, with CAGR of 1.8%, 3.6% and 21.6% respectively over 2012 to 2020. It is expected that there will be more users using multiple modes of messaging in the future, but nevertheless telco messaging users are expected to remain dominant.

Figure A.6.2 Messaging users forecast by type of message, EU5, 2012-2020

(Million users)



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of telco messaging users	352,0	361,6	369,8	377,1	382,9	388,3	395,7	401,9	406,6
Number of social networkers	133,9	141,9	148,4	154,1	159,3	164,5	169,3	173,5	177,0
Number of OTT messaging app users	17,2	25,6	35,0	44,1	53,1	61,8	69,1	76,0	82,6

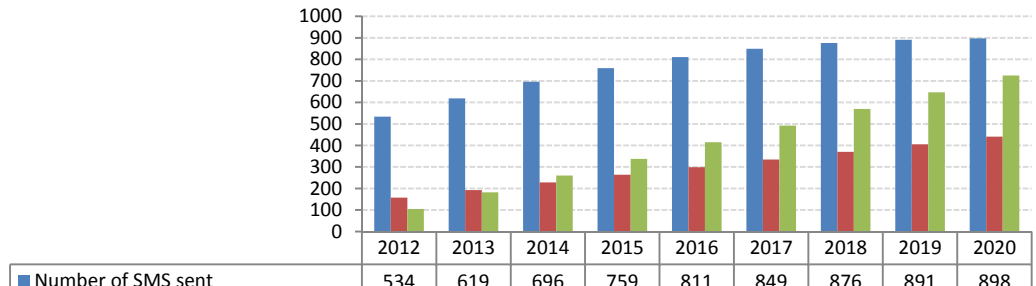
Source: IDATE.

Number of SMS sent still set to grow, but OTT messages are rapidly catching up

The number of SMS sent is expected to reach saturation levels as we approach 2020, with CAGR of 6.7% between 2012 and 2020. Other telco-managed messages will show 13.8% and OTT messages 27.3% CAGR for the same period.

Figure A.6.3 Number of messages sent forecast by type, EU5, 2012-2020

(Billion messages)

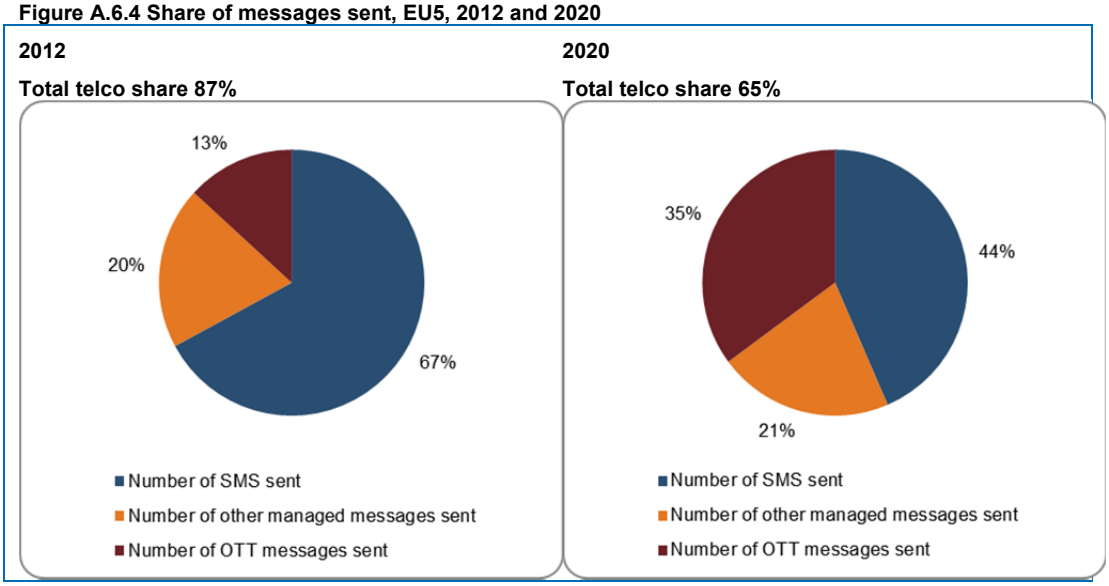


	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of SMS sent	534	619	696	759	811	849	876	891	898
Number of other managed messages sent	157	193	228	264	299	334	370	405	441
Number of OTT messages sent	105	182	260	337	415	492	570	647	725

Source: IDATE.

In the EU5, IDATE forecasts that, whilst SMS messages held a 67% share in 2012, this will decrease to 44% by 2020. Adding other telco-managed messages, in 2012 telcos will have 87% of messaging share, dropping to 65% by 2020, with OTT showing strong growth in messages sent from 13% in 2012 to 35% in 2020.

Figure A.6.4 Share of messages sent, EU5, 2012 and 2020



Source: IDATE.

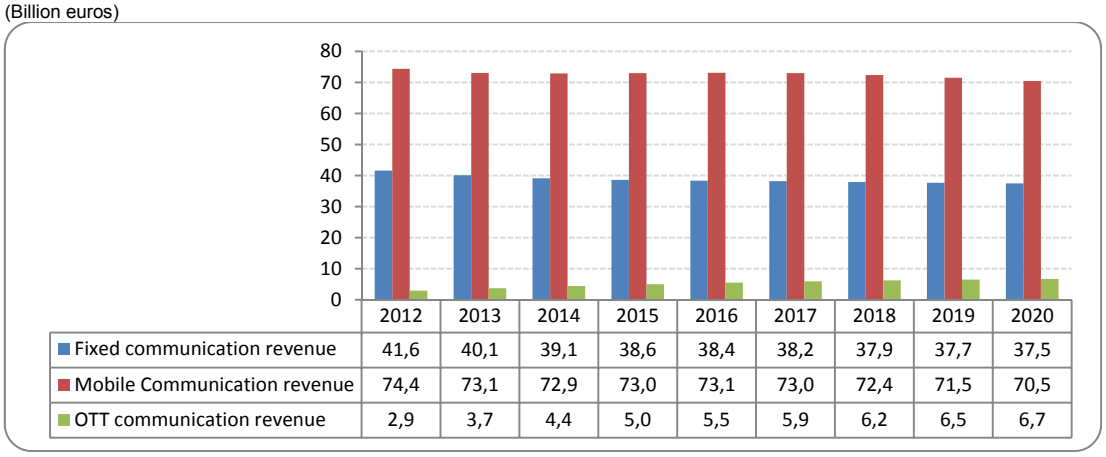
A.6.1.2 Revenue figures

OTT communications revenue will increase, but still hold only a minor share of overall communication revenue

As of end-2012, IDATE estimates total communication revenues to stand at 118.9 billion euros, decreasing slightly to 114.7 billion euros for 2020. This leads to a CAGR of -0.44% over the eight years.

Figure A.6.5 Total communication revenue forecast by market segment, EU5, 2012-2020

(Billion euros)

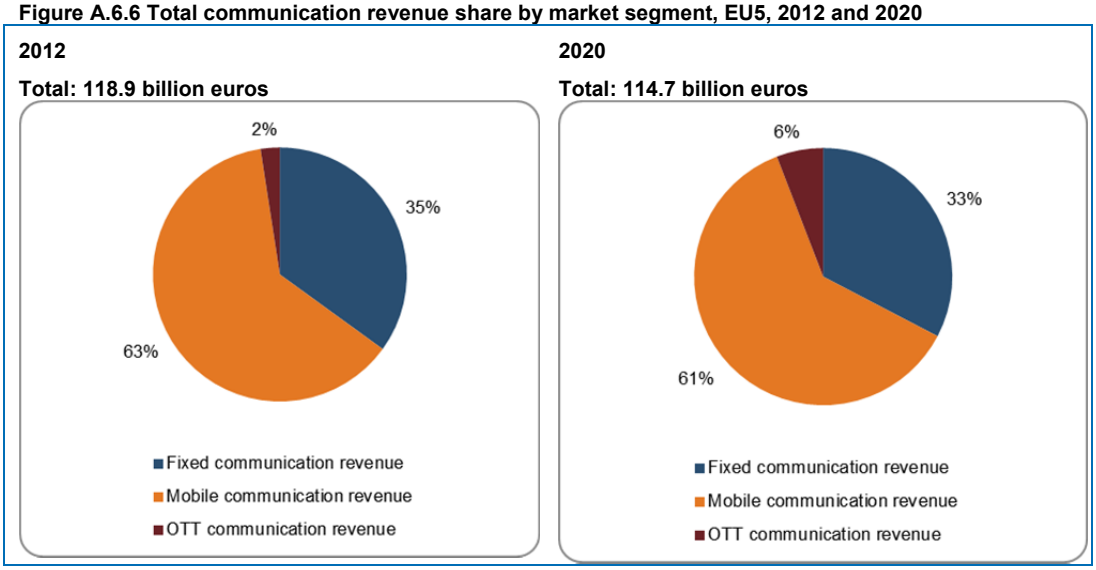


	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed communication revenue	41,6	40,1	39,1	38,6	38,4	38,2	37,9	37,7	37,5
Mobile Communication revenue	74,4	73,1	72,9	73,0	73,1	73,0	72,4	71,5	70,5
OTT communication revenue	2,9	3,7	4,4	5,0	5,5	5,9	6,2	6,5	6,7

Source: IDATE.

Mobile telco communication has the largest share with 63% as of 2012, decreasing to 61% in 2020. Fixed telco communication has the next largest share with 35% in 2012, although it is expected to decrease to 33% by 2020. Finally OTT communication will increase from 2% to 6% from 2012 to 2020.

Figure A.6.6 Total communication revenue share by market segment, EU5, 2012 and 2020



Source: IDATE.

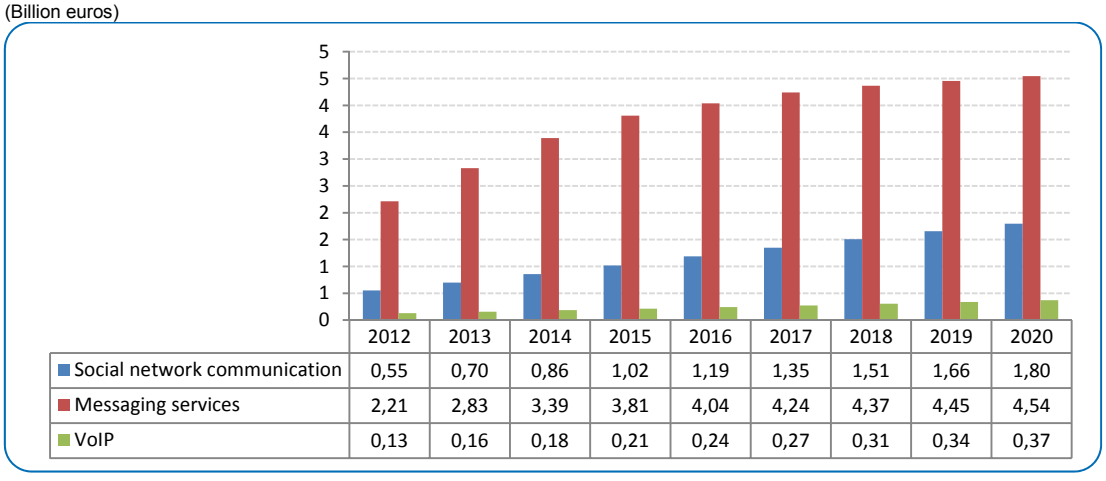
Consequently, this actually means that OTT communications will hold a modest 6% of all communication revenues for 2020, compared to the 94% of telcos.

Breakdown of OTT communication revenues

In the EU5, all three categories of OTT communication revenue (social networking, messaging services and VoIP) are all expected to grow as the figure below indicates. CAGR for the three are 15.9%, 9.4% and 14.1% for social networks, messaging and VoIP respectively from 2012 to 2020. In total, IDATE forecasts CAGR of 11.1%, with 2.9 billion euros in 2012 rising to 6.7 billion euros in 2020.

Figure A6.7 OTT communication revenue forecast by segment, EU5, 2012-2020

(Billion euros)



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Social network communication	0,55	0,70	0,86	1,02	1,19	1,35	1,51	1,66	1,80
Messaging services	2,21	2,83	3,39	3,81	4,04	4,24	4,37	4,45	4,54
VoIP	0,13	0,16	0,18	0,21	0,24	0,27	0,31	0,34	0,37

Source: IDATE.

A.6.1.3 The aggregation of communication types

It is notable that we are now seeing an increasing number of IP communication providers providing various methods of communication. That is to say, communication providers are increasingly aggregating the methods of communication.

For example, today it is in fact difficult to find a VoIP service provider who provides solely VoIP; at the very least, they will also offer text and/or chat services. Such a trend means that, in theory,

users can subscribe to just one IP communication provider to cover all communication, whether it be to talk, text, chat, video, share files and so on.

Table A.6.1 Communication providers aggregating communication types

	Talk	Messaging	File share
Facebook	**Yes**	**Yes**	**Yes**
Google	**Yes**	**Yes**	**Yes**
WhatsApp	**No**	**Yes**	**Yes**
Apple	**Yes**	**Yes**	**Yes**

Source: IDATE.

Of particular interest in this area is the recent move by Facebook in January 2013 to integrate VoIP calling capabilities within their Facebook Messenger application for Apple's iOS. It was initially tested in Canada and has now been released in the US. In short, it allows Facebook users on an iPhone or iPad to place calls using VoIP to other Facebook users, over both WiFi and mobile Internet. What makes this particularly interesting is the scale of Facebook with over 1 billion users worldwide of which there were 604 million active mobile monthly users as of September 2012. The potential scale or reach of this is much greater than that of even established VoIP players such as Skype.

Figure A.6.8 VoIP call option on iOS Facebook Messenger app

Source: Engadget.

A.6.1.4 Operators' reaction to the increasing threat of OTT communication services

It is impossible to talk about OTT communication without also mentioning the significance of operators. On the one hand, OTT communication is only possible thanks to the operators who provide the Internet connectivity that enables the operation of OTT communication services. On the other hand, the OTTs are commoditising the core operator services of voice and messaging, and pushing them more and more towards the role of a simple connectivity provider (often referred to as 'becoming a dumb pipe'). There have been many cases where operators have tried to block OTT services to protect their assets, but through pressure from both consumers and regulators - combined with the concept of net neutrality - such attempts tend to come under heavy scrutiny.

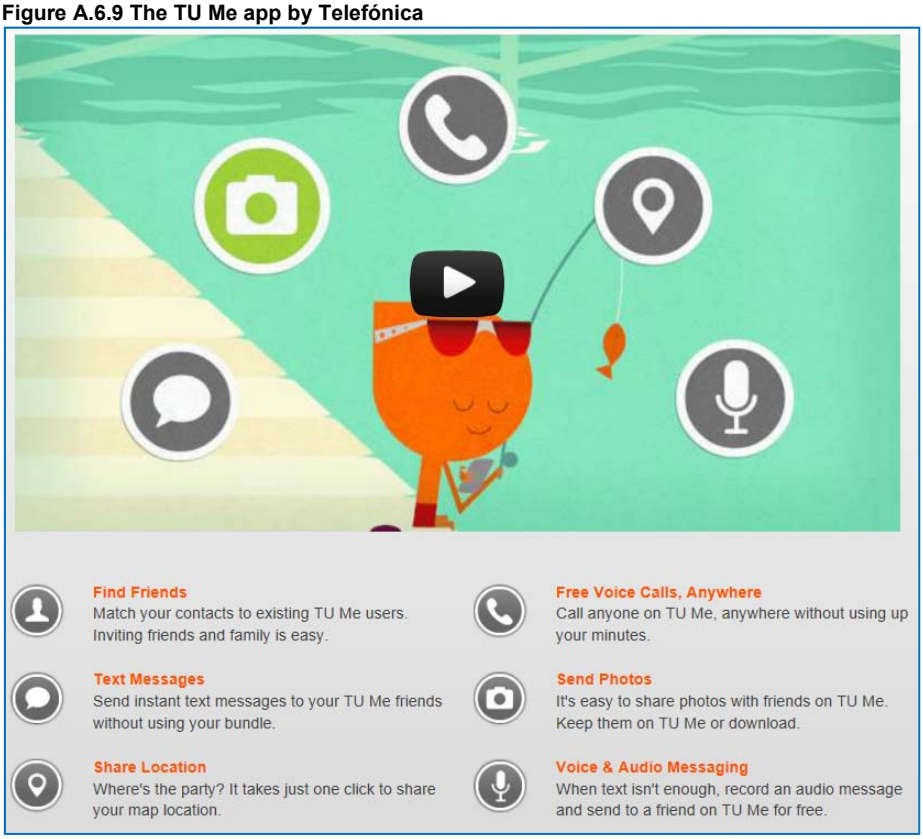
In any case, it is without doubt that operator voice and messaging services are becoming a commodity, with operators being forced into all-you-can-eat offers and bundles to combat the threat of OTT services. IDATE sees the following three main ways in which the telcos are striving to offer more than simply voice and messaging and in order to remain competitive in the market and being more than a dumb pipe:

- Providing their own OTT communication service, such as Telefónica with their TU Me app and Orange with their Libon app;
- Partnering with OTT communication service providers, such as Verizon and H3G UK with Skype and H3G HK with WhatsApp; and
- Joining the GSMA-led 'joyn' initiative, launched by the three principle operators in Spain (Orange, Telefónica and Vodafone), which aims to offer enhanced communication services across all mobile phones in the same simple way as traditional voice and SMS today.

Operators providing their own OTT communication services: the Telefonica TU Me app example

In May 2012, Telefónica launched their own OTT app, TU Me. Available to download for free on iPhone or Android phones, the app is a messaging service integrating text messages, voice messages, photos, location information and voice calls. The user does not have to be a Telefónica customer and the service can be used over both the mobile network and WiFi. It really is no different from a typical OTT communication app, with none of the limitations one would have traditionally expected from an operator.

Figure A.6.9 The TU Me app by Telefónica



Source: TU Me.

Operators partnering with OTT communication service providers: the WhatsApp example

It is arguably Skype, the largest VoIP provider, that is the most known in terms of partnerships with operators, such as Three, Verizon and KDDI. However, it is not only the giants that are partnering with telcos. In September 2012, a partnership was announced between WhatsApp, a very successful OTT communication app, and 3 Hong Kong.

The ‘WhatsApp Data Pack’ gives users free access to all WhatsApp functionality in Hong Kong, for a monthly fee of 8 HKD (roughly 1 USD), with no impact on data allowance. Alternatively, the ‘WhatsApp Roaming Pass’ for 48 HKD (roughly 6 USD) is a daily pass offering unlimited WhatsApp use and 5MB of service in 78 destinations around the world.

Figure A.6.10 WhatsApp offering from Three Hong Kong

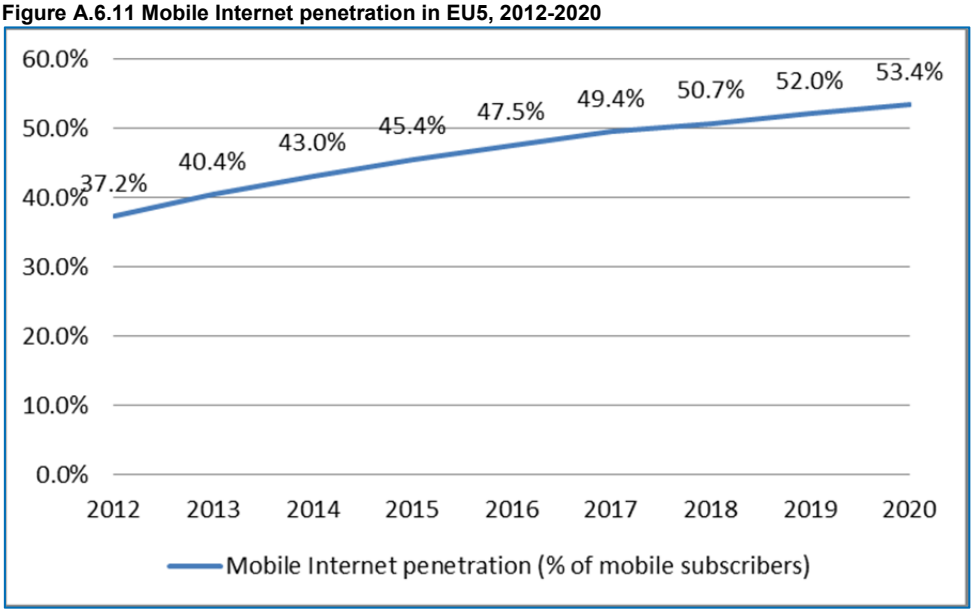
Source: Three Hong Kong.

A.6.2 Drivers

A.6.2.1 Mobile data and WiFi makes strong case for OTTs

In the case of mobile data, with the explosion of smartphones and applications, more data is flooding the network, with operators feeling the strain. Whilst many operators offer unlimited voice and messaging, unlimited mobile data is not so easy to find. There are also cases where, whilst a package may appear to include unlimited mobile data, the small print often refers to the enforcement of ‘throttling’ (the slowing down of speed) after a certain amount of data per month. Still, in the case of mobile voice and messaging, one does not actually require massive amounts of data; and users can thus, on the whole, use OTT voice and messaging services within the use limits of mobile data set by the operators. The number of mobile Internet users is on the rise, meaning that potential users of such OTT voice and messaging services are also increasing.

Figure A.6.11 Mobile Internet penetration in EU5, 2012-2020



Source: IDATE.

Video communication however requires much more data and thus presents a potential hurdle for mobile OTT video use. However, smartphones today have WiFi connectivity; so video communication can be made through WiFi rather than mobile Internet. Though one can argue that, strictly speaking, WiFi is not as mobile as the mobile Internet, most use cases for video communication does not require mobility (for example users normally video-call their loved ones from home or in a stationary place and do not move about while talking). Given that WiFi is often available for free, its existence strengthens the OTT proposition.

A.6.2.2 WebRTC a potential game changer

The concept of Web Real-Time Communication (WebRTC) is one that enables users to communicate in real-time through a Web browser by audio or video calls. It is neither a plug-in nor a real programme; WebRTC is an Application Programming Interface (API) that allows developers to integrate this type of communication on a Webpage.

WebRTC is not yet totally defined and it should become a Web standard just as HTML is now. The technology is in the same mind-set as HTML5, where the idea is to move from separate applications toward an integrated Web application usable on a Web browser. The aim is for WebRTC to be integrated into HTML5.

The WebRTC standard is currently (at the time of writing; January 2013) being elaborated by the W3C and the IETF consortia, especially with the help of Google, Mozilla (editor of Firefox) and Opera (a Web browser). Ericsson is also involved in its development process, in particular concerning mobile integration of WebRTC. However, in January 2013 Microsoft gave a demo of a Skype-like video chat application using the CU-RTC-Web framework, which they are pushing as an alternative to WebRTC. This demo was done between a Mac user running Google's Chrome browser and a Windows user running Internet Explorer 10, with Microsoft thus emphasising the openness and flexibility of CU-RTC-Web. The jury is still out as to which technology will prevail and when, but certainly web browser video and audio chat is gaining traction.

On the other hand, at least for the time being, only Google Chrome is WebRTC-enabled. Mozilla and Opera are currently working on integrating the technology into their Web browser. Given, though, that the technical specifications are not totally defined, usage is still very limited.

Nevertheless, some potential applications are, currently under consideration. Google is reviewing the option, for instance, to migrate its GTalk video call application using Flash toward a WebRTC integrated Web application. Other players, for example, are trying to integrate a VoIP client on the Web browser (using the SIP protocol) using WebRTC, allowing users to call landline numbers from a Web browser for free.

Other usages can be imagined such as communication between customers and after-sales services, support services or customer services. Some businesses currently enable instant messaging between a customer and an operator, through their Website. We can easily imagine such a trend towards using video, as now done by some banks using a Skype connection. WebRTC is, therefore, a strong candidate for the evolution for video and audio communication as it would make IM services interoperable. However, technical aspects still have to be defined to be able to offer a real standard.

A.6.2.3 Genuinely free OTT offers in exchange of user data for advertising

One of the most powerful and obvious advantages of OTT communication service is that it is either free or very low cost and provides parallel services to those of telcos such as Instant Messaging (IM), video call services, social networks or forums/ blogs. On the other hand, telco services are paid services, and while the prices of their voice and messaging calls are progressively dropping, they still need income to support the roll out of new networks (notably LTE and FTTx) and to maintain quality of service. This is in stark contrast to OTT services that rely on the operator networks but then provide their services for free through the advertising model.

A.6.3 Impact on competition and market

OTT communications do not seem to pose a threat to the functioning of the forces of competition in the communications market. Millions of users are already using OTT services for their communications needs and that number continues to grow through, for instance, the integration of OTT into social networks. The usage of OTT services is not only complementary to managed telco services, but also OTT services also considered a substitute for the latter. With OTT services, users have multiple options at hand to originate or receive a voice communication or text/multimedia message. If OTT and managed services are increasingly becoming substitutes for each other, this development could ultimately alter the finding of SMP in call origination and termination markets.

A.7 Peering

A.7.1 Trends

Free peering: avoid paying a transit provider for traffic exchange

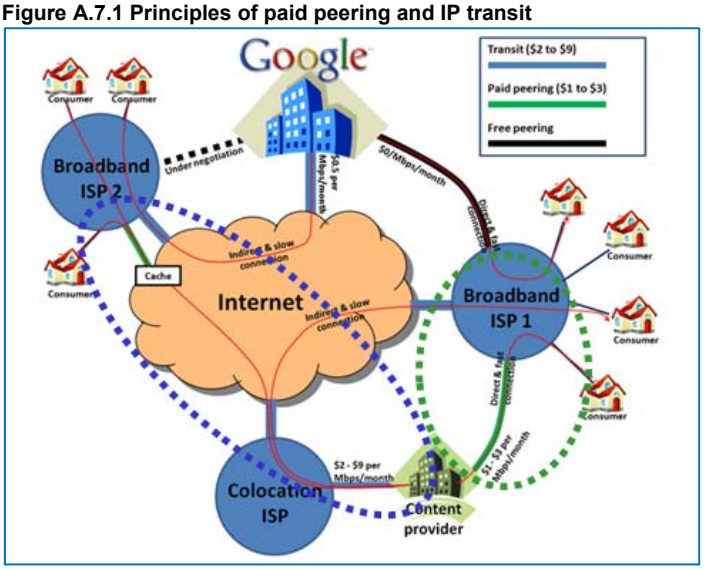
Free peering was implemented as a means to reduce the burden of mutual billing for traffic directly exchanged between two peers, instead of paying transit fees to some transit providers (generally a third party). Players were still required to invest in capacities (servers, networks) on their own to support the downstream and upstream traffic.

Downstream operators find it hard to obtain compensation for terminating the excess traffic with peering (in which excess traffic would be paid by the sender party). Therefore, they often limit their investments in capacities at peering points, leading to lower quality of service/experience in the end for the end-users.

Paid peering: charging content and service providers for their traffic

The idea behind paid peering is to charge for traffic overages to help service providers cover network costs. Telcos are now looking at paid peering solutions. The principles are exactly the same as free peering with a charge for excess traffic. It involves charging for the non-symmetrical portion of traffic that connecting operators generate.

Figure A.7.1 Principles of paid peering and IP transit



Source: Digital Society.

With this approach, the sending party must pay a fee for distribution on fixed or mobile access networks, according to the amount of traffic they generate. In other words, the company that is the source of the traffic (an operator or a content or service provider) pays the player receiving the traffic. This fee, akin to a call termination charge, could be set by bilateral or multilateral negotiations or by regulators.

As with online traffic in general, this IP traffic termination charge could be set according to traffic and/or bitrate, so potentially implies lower per-unit rates for the bigger players. There may also be exemptions to allow a certain level of tolerance, such as billing only when the 2:1 ratio is.

Exceeded; and to avoid penalising the smaller players – *e.g.* billing starting at a certain set threshold.

This model is hard to develop as long as there is still some free peering (notably with Tier 1 networks). Otherwise free gateways to access networks will continue to exist; so a great many players will want to reroute their traffic to those networks that do not charge for termination.

A.7.2 Drivers

Peering, in other words the settlement-free exchange of traffic between operators, governs transport network interconnection to a degree (the remaining relationships being transit-based). The relationships between the main IP transit operators are often governed by settlement-free peering – even if transit agreements are still the most common – with the goal being to reduce costs (avoiding transit fees) and improve quality of service by taking the shortest route. Operators do not bill each other for the traffic exchanged at network access points as long as it is somehow symmetrical (typically, there is no billing anyway if the traffic is two or three times greater in one direction).

The main drivers around the development of peering thus far are:

- The efficiency of peering in terms of price and quality compared to transit costs;
- The growth of traffic encouraging players to find optimized solutions;
- The growth of asymmetrical traffic (with video), with no direct relationship between traffic and revenues; and
- The implication of major Internet players in the Internet infrastructure.

All of these drivers are expected to hold the same importance in the future.

An efficient model

The settlement-free peering model was put into place in order to avoid billing for exchanged traffic that was presumed to be in balance between the two sides. Each provider kept their customers' money and paid their own investment costs. This model is therefore perfectly efficient when traffic is symmetrical. Above a certain level of traffic exchange (which is very moderate), peering is cheaper than transit, even with the price drop of transit (there is indeed a similar price drop for equipment costs at peering points).

Peering under pressure with the development of asymmetrical traffic

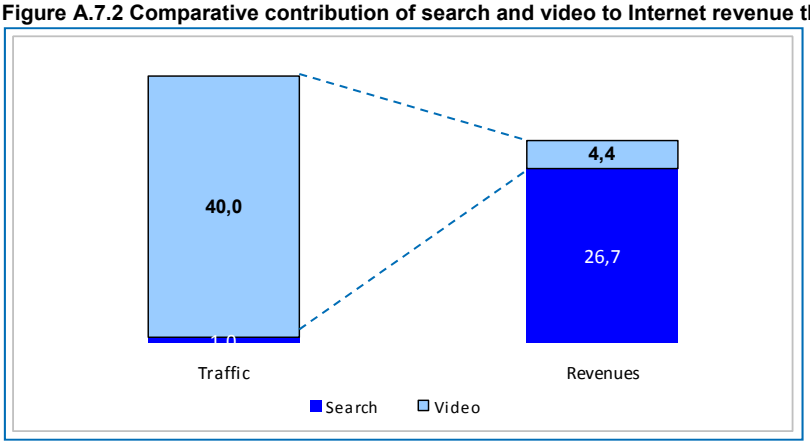
However, once traffic becomes asymmetrical, both parties exchanging traffic need to shoulder the cost of interconnection (servers, collocation, etc.), while only one party enjoys the revenue derived from the use of the service. It follows that the peering model could well be called into question due to the growing amount of asymmetrical traffic travelling over the network (hence imbalanced contributions to financing the networks).

The revenue generated by services and content is relatively independent of traffic volume. The price paid for a piece of content is independent of its size and the traffic it generates. A longer movie is not necessarily more expensive to acquire, even though its distribution poses greater costs to the distributor. The price of content generally varies depending on its popularity and release date. The providers of bandwidth-hungry content or services nevertheless set their prices above the minimum threshold to allow them to cover their costs. By the same token, the advertising value of a video or a web page has nothing to do with its size. Google search result pages all carry more or less the same weight, but their potential to generate revenue will vary according to keyword.

This potentially significant decoupling of the value of a service or piece of content and transport costs is nothing new, and has already arisen with texting whose per-unit per-Mb revenue was and still is very high compared to other mobile services.

This decoupling necessarily makes the relationship between content/service providers and operators more complicated from a financial perspective. A large volume of traffic may generate only very little income and vice-versa. Some content/service providers are therefore unable to cover the necessary costs, so seeking alternative solutions to distribute the content themselves. In the United States, for instance, video accounted for 40% of all Internet traffic in 2009, but for only 4% of Internet services revenue.

Figure A.7.2 Comparative contribution of search and video to Internet revenue the United States, in 2009



Source: IDATE, Cisco, OPA.

Peering goes beyond network players

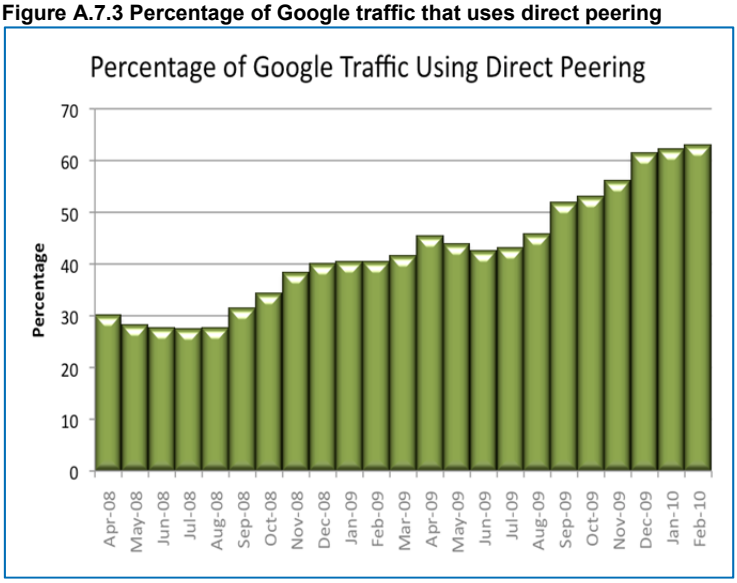
New CDN operators and service providers delivering video traffic (or other very asymmetrical type of services) with their own infrastructure (at least in terms of servers) interconnect to (private or public) network access points, which creates an imbalance in traffic.

In addition to the main transit providers, CDN operators that generate a massive amount of traffic, have been steadily interconnecting with access network operators and benefiting from peering schemes (as it represented savings for ISPs on their transit costs).

The Web's top service providers are working to develop their own infrastructure. In addition to using transit solutions and servers, some are building their own infrastructure that can be interconnected with IP transit and access network operators' systems.

However, this interconnection creates two types of problem: first, the risk of overloading network access points and, second, a risk of asymmetrical traffic at these Internet exchange points. For example, a site like YouTube supplies much more traffic than it receives.

Figure A.7.3 Percentage of Google traffic that uses direct peering



Source: Arbor.

Due to the growing asymmetry in traffic at Internet exchange points (due especially to development of video-like services, that can even reach ratios of 50:1), some may choose to employ the paid peering model.

A.7.3 Future development

In actual fact, however, settlement-free peering is still being used for a great many traffic exchange relationships; it seems unlikely that the whole peering system will be called into question very rapidly, given the Internet's history along with certain indirect consequences. Peering allows for easy exchanges with a great many players, without the often-complex process of drawing up contracts for what are well established relationships.

It would be tricky for an ISP to question an existing settlement-free peering relationship. If they have no paid peering agreement in place with the transit network, the ISP would have to block the traffic coming its way, which means running the risk of losing out to its competitors who continue to accept free peering and who are able to supply access to the corresponding content. In addition to the danger of losing customers, the ISP also runs the risk of having its after sales staff flooded with calls reporting a breakdown in their telecom service.

In addition, if the operator continues to peer with some players but not with others, the blocked traffic will continue to be routed to its network, but routed circuitously via the players with which it continues to peer.

Nonetheless, several operators already have paid peering products, including Comcast with CDNs like Akamai and with content providers. Operators in France are also starting to adopt this type of product. The introduction of this model has been the subject of a great many debates, particularly in France with the Orange-Cogent-Megaupload case, ruled in favour of Orange by the Trust Authority in 2012) and in the United States (Comcast-Level3-Netflix case).

There are finally numerous pricing questions for paid peering (see next section), as contracts remain bilateral. Paid peering can obviously not be more expensive than transit, otherwise players can switch to transit.

Comcast vs. Level 3

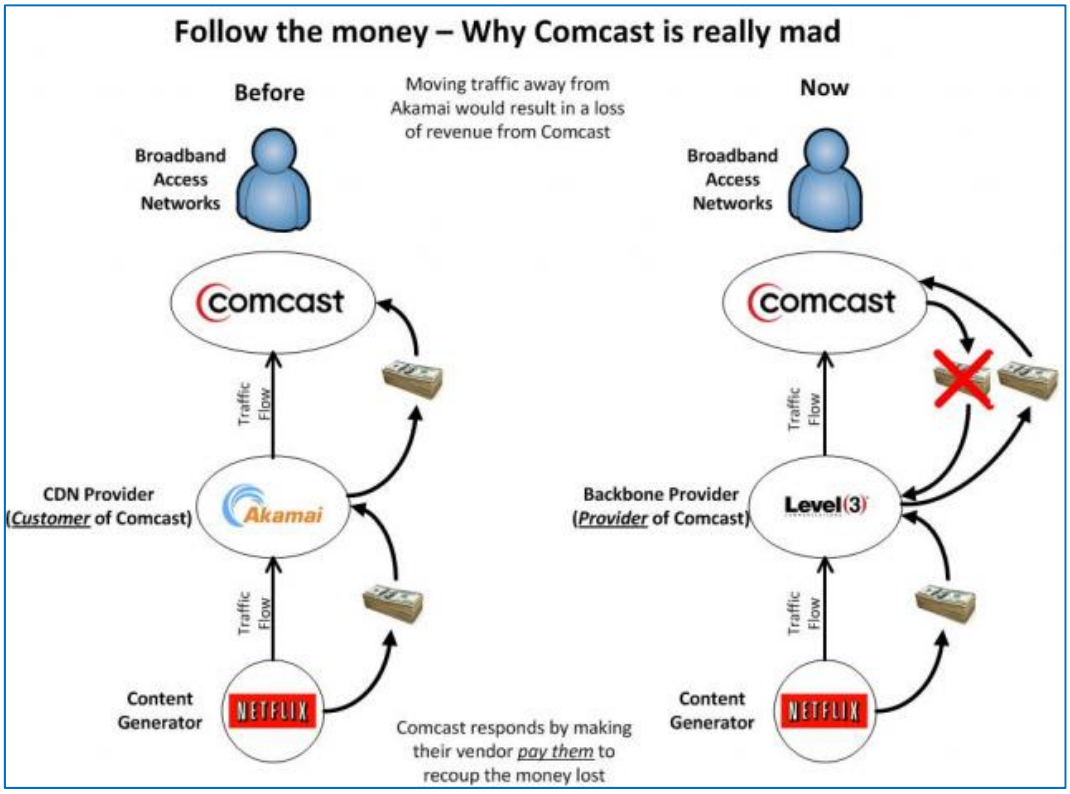
On 11 November 2010, Internet service provider Level 3 announced that it had been chosen by Netflix, providing a subscription-based streaming video service, in order to store the 20,000 products in its digital library and act as its CDN (content delivery network). Less than three weeks after the deal was announced, Level3 went public with a dispute it was having with cable operator Comcast.

Comcast was demanding payment for recurring fees from Level3 that it deemed to be unduly high, arguing that Netflix was generating more and more traffic from customers enjoying unlimited consumption of videos (films, TV series) that eat up a great deal of bandwidth. Level3 did give in, but not without accusing Comcast of unfairly protecting its own pay-TV and video service (Xfinity).

Meanwhile, Comcast denied engaging in traffic shaping and referred to the case as a classic disagreement over imbalanced peering, since Level3 was sending out much more traffic than it was taking in (notably via Netflix).

It was under these circumstances that carrier AT&T and the National Cable & Telecommunications Association (NCTA) appealed to the FCC to ask whether the Net neutrality regulations it had passed – grouped under the title of *Open Internet Order* – actually applied. Without admitting to a single interpretation, the FCC responded that regulations did not apply to commercial disputes over peering agreements.

Level 3 nevertheless intends to appeal to the FCC itself, building a case to prove that Comcast was taking advantage of its large Internet customer base to throttle Netflix traffic. Level3 plans to show the FCC the general terms of the agreements between Comcast and Level 3 before and after November 2010.



A.7.4 Impact on competition and markets

A number of potential competition issues can be identified in the peering market. Telcos could discriminate against players not paying for peering or offer different tariff conditions to different players without any clear justification. Telcos may in addition use paid peering as an argument to get better partnership conditions when they sell managed services from the sending party. Paid peering could indeed be applied only to non-regular partners of the telcos.

Bigger telcos are more likely to be also Tier 1 providers (i.e. transit-free). In this case, paid peering will be easier to implement for them. Indeed, service providers could retaliate against non-Tier1 telcos if the latter tried to establish a paid peering regime by switching to transit. This would imply that both parties (service providers and telcos) would have to pay transit providers, which could imply in turn an advantage for large telcos (typically incumbents) over other telcos.

Peering could also raise concerns when looked at from a different angle. If downstream operators do not manage to obtain a compensation for the (growing) asymmetry of traffic flows and they cannot retaliate against content providers because users would not accept a degraded access to certain services this could hint at content providers having some market power in this market. Indeed, there have already been calls for a regulation of 'data termination' fees.

A.8 OTT and Managed delivery

A.8.1 Trends

The monetization of this additional traffic by carriers (including telcos) can come from:

- The delivery of the traffic itself, with more or less quality, paid by the end-user. This obviously applies really only to metered broadband customers for all their traffic. Users with unlimited flat rates are not really paying any additional fees (but the flat rate should already help to bear the costs of the traffic);
- The delivery of the traffic itself, with more or less quality, paid by the content or service provider. This is often done by transit providers or CDN players. Unless there is some free peering, players get paid on the basis of the traffic delivered, measured in terms of bandwidth or volume. A few telcos have positioned on that part of the market with paid peering and with telco CDN solutions, which applies to all or part of the traffic. Otherwise, telcos generally do not get any compensation for the traffic;
- The intermediation of content sales, as a reseller. For that, a player needs to have a strong position in terms of aggregation (leveraging a brand, a device or a network). As a reseller, players generally get some revenue sharing, often with a commission (that can be in the range of 30% of the revenue). Consequently, telcos can use their networks and devices assets, especially for managed services. This only applies to the contents sold by the telcos and not all of the traffic or contents.

A.8.1.1 Managed retail services

Managed networks[142] involve:

- A technical distribution solution in a closed environment that is controlled by the ISP (*e.g.* IPTV for video services); and
- The ISP taking on the task of distributing video services, in other words designing and marketing a package of services.

The two roles played by managed networks are largely intertwined: because they control their distribution system from end to end, ISPs can offer their customers video services on the television set. However, they may not necessarily do so since:

- There have been plans for opening ISPs' IPTV services to third parties; and
- The package assembled by a telco may also be available on the open Web.

Theoretically, the managed network model allows ISPs to benefit from the development of new video services by handling their distribution and financing network costs to a degree. The income they generate varies a great deal from country to country, depending on the state of the local Internet access market and service providers' positioning in the marketplace – both ISPs and pay-TV providers.

In some countries, telcos are the leading providers of VoD, especially on the TV set, where it is more convenient so far to use managed services rather than OTT services (with a few exceptions like Netflix).

[142] Managed services: services that can be accessed by only a portion of the network's users and not by all Internet users, relying on reserved bandwidth via virtual channels or specific technical solutions such as multicasting, etc.

A.8.1.2 Managed wholesale services

At the same time, telcos have developed optimized infrastructure to handle the traffic and attract OTT players with paid QoS solutions, with for instance telco CDN solutions (CDN within ISP networks).

Unlike traditional CDN solutions, however, such as those sold by Akamai, the QoS offers in this model would be deployed in access networks. So the players that do not subscribe to this type of service would have no additional fees to pay and their traffic would continue to have best-effort routing. So this is more of an additional option in IP transport products for the access network.

From a technical standpoint, there are several ways this differentiation can be implemented:

- Managed services via classes of service (CoS) that prioritise traffic, or through resource reservation. The high-priority traffic enjoys better quality service than the rest of the traffic that will be slowed down when congestion occurs on the network. This can be put into effect using protocols that enable classes of service (MPLS, DiffServ, etc.). So traffic with reserved resources is guaranteed routing regardless of what happens, using a solution such as IntServ;
- Managed traffic optimisation solutions rely on cache servers or multicast servers to reduce the amount of traffic on the network and create shorter traffic routes. Here, optimised traffic is more efficient without really affecting the rest of the traffic, which does not benefit from improvements to traffic management. It may even continue to be vulnerable to bottlenecks in the last mile, and would have no priority status.

This is a relatively credible solution, provided ISPs are able to supply technically viable solutions, notably on mobile systems where there can be interference and bandwidth-sharing issues in the wireless local loop.

Not all of these solutions are technically possible today, or can only be applied to a selection of services (sometimes for regulatory reasons):

- Class of service offers are hard to imagine in practice (very few offers are based on CoS);
- Multicast solutions would involve only a tiny fraction of traffic; and
- Offers using virtual channels/resource reservation are still marginal for now.

A QoS-based system using the content delivery network model is therefore the most credible one for distributing traffic, especially video traffic. This is also the alternative that more and more telcos are working to build, with a CDN solution on their access network, using cache servers – possibly in the core and even backhaul networks as well.

This model makes it possible to charge content and service providers according to desired quality of service. So it is an extension of solutions that already exist in integrated managed services, as well as in the transport layer on the open Web.

While it is still better than delivering the traffic for free (as with peering), it is less interesting than managed services, except for UGC content and to a lesser extent SVoD. For a movie in VoD, telcos can expect for instance 1.5 euros for the rental (through revenue-sharing) against only 10 to 20 cents for telco CDN activities.

The actual amount of revenue earned from this model could be quite meagre indeed. ISPs are likely to earn only a fraction of the CDN market (i.e. local distribution) that is already quite small, generating less than 3 billion USD in sales in 2012. Moreover, competition with existing CDN operators will no doubt be fierce, unless the different players cooperate to supply complete, end-to-

end solutions (open Web and access network) – in which case they will have to share the revenue (like Orange with Akamai).

A.8.2 Market evolution

By and large, online video services (OTT) earn very little money. IDATE estimates that they generated around 5 billion euros in 2010 worldwide, or 2% of the total video market – a figure that could climb to 20 billion euros in 2015 or equal to 6% of the total video market. IDATE also estimates that in France and in Europe they accounted for only 3% to 4% of total Internet services revenue in 2010.

Any increase in revenue earned by online video services has come largely from advertising. Revenue will continue to increase if the players manage to create additional revenue streams by charging users, but several things are preventing this from happening:

- Piracy, which has accustomed consumers to getting their content for free;
- The weight of broadcast TV services in the video market: to be able to charge for their products, new online video services need to secure quality programming and develop low-cost offers, which run the risk of undermining today's key financers of premium programmes.

As a result, in a situation where the total amount of revenue (whether from advertising or customer payments) that is available for video services is increasing only slightly, only the fact of having a portion of the classic video market shift to new online services will enable a significant rise in revenue.

The managed services model, so far dominant for VoD, is being threatened by:

- The upcoming development of the connected (*i.e.* Internet-ready) TV: managed offers lose their decisive competitive edge, namely the ability to distribute video services directly on the television; and
- The growing appeal of services available online: built on a non-exclusive basis, VoD services on managed networks and on the open Web are increasingly similar. By the same token, (often free) VoIP services are also available on the open Web.

ISPs' ability to earn a portion of the revenue generated by these services is therefore equally under threat. The OTT market growth could be in the end at the expense of the managed services markets, if OTT players can bypass telcos and keep the direct customer relationships (and not share any revenues).

A.8.3 Drivers

A.8.3.1 Pure Broadband ARPUs quite stable

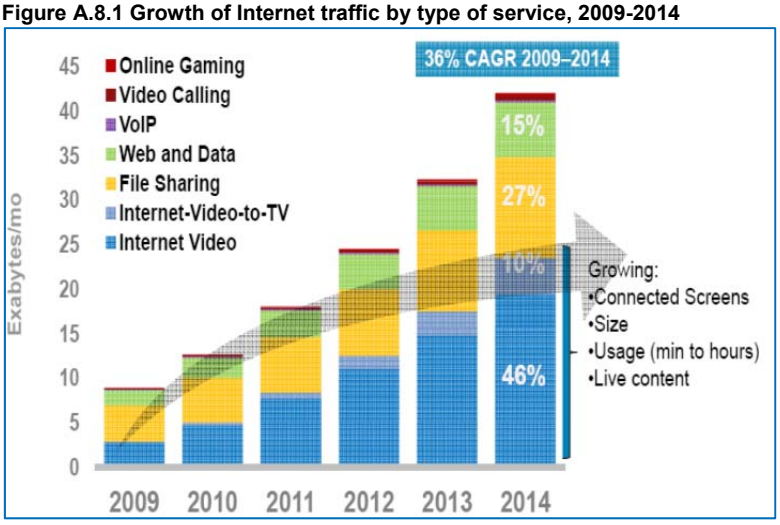
Overall, ARPU of telcos in advanced countries for pure broadband and voice are either stable or declining. There are more abundance offerings or low-cost propositions, transforming voice and more recently data connectivity in a commodity in many markets.

More and more, telcos are facing the commoditization of the broadband and voice markets. They have therefore often decided to diversify and to offer contents and services to generate additional revenues. These added value services are even sometimes key within the business models of telcos to fund the new networks.

A.8.3.2 Traffic and video growth

The Internet traffic is still growing very fast, especially around video. According to Cisco, video traffic is growing by more than 100% a year on wireline networks and at an even faster pace on mobile systems. By 2014, video will account for more than half of all fixed network traffic.

Figure A.8.1 Growth of Internet traffic by type of service, 2009-2014



Source: Cisco.

The gradual development of the connected TV in particular will drive yet another growth spurt for traffic. The video coding needed to render a satisfactory picture quality on the TV is three times what is required for a computer.

The swift development of the selection of video products available online is being spurred by:

- The ubiquity of broadband access;
- The rise of piracy;
- The emergence of new on-demand services that are not available on classic TV networks;
- Some license-holders' desire to distribute their own content directly;
- The development of user-generated content sites such as YouTube; and
- The incorporation of video services into popular online destinations like Facebook.

Despite very strong growth of its traffic, online content (including video) still represents limited revenues. Most services are indeed free or low-cost, and even the most successful generate moderate compared to the offline industry or compared to the traffic-generated. But the growth in terms of revenue is very impressive.

A.8.4 Impacts on competition and markets

To face the commoditization of the voice and broadband businesses, telcos are trying to sell services and contents to end-users and/or to sell additional value added services to third parties. These are often very similar or the same services that are also being distributed from OTT players. With the managed delivery, telcos can guarantee some form of higher quality due to specific infrastructure and end-to-end delivery (IPTV multicast, telco CDN, etc.).

The development of managed-based services from telcos raises some questions:

- Impacts on internal Internet services competition: how to ensure that telco partners will not get unfair preferential treatment for OTT delivery over non-partners? Telcos could be giving better conditions for paid peering or for QoS to content and service providers that have already a deal

with telcos for managed services. Telcos that provide metered broadband (with caps) could also allow having partners content not counted against the retail data caps[143]. Through these different approaches, they could encourage third parties to partner with them;

- Impacts on telco vs. Internet services competition: How to ensure that telcos will not favour their managed network-based services over OTT-based third parties services through some of traffic management? Telcos could reserve more resources for managed delivery (often unregulated) rather than for open Internet or even degrade the quality of some OTT-based services to promote their own managed delivery. Like before, they can also not count against the retail data caps some of their own services.

So there is always the risk of unfair competition, especially if ISPs apply traffic management policies to the OTT equivalent of the services provided by the telcos (and their partners). Telcos have strong incentives to favour managed delivery over OTT delivery for their own contents or for their partners' contents. For managed services, they generally get more from revenue sharing rather than compensation for traffic delivery (or often nothing due to free peering).

[143] This is for instance the case for some catch-up TV services in Australia.

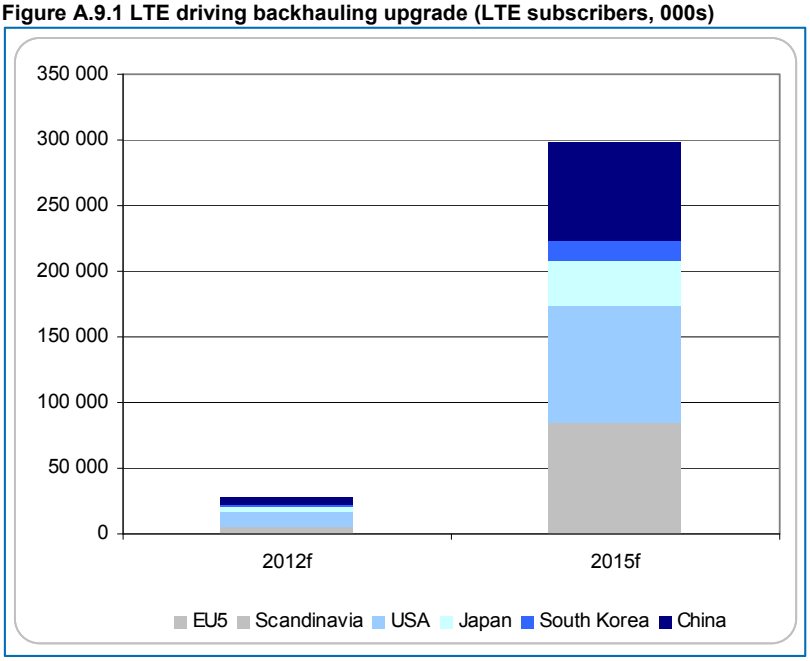
A.9 Mobile backhaul and other issues

A.9.1 Trends

LTE subscribers should reach the 300 million mark at the end of 2015 in the main countries.

We expect close to 536 million LTE subscribers at the end of 2015 (worldwide).

Figure A.9.1 LTE driving backhauling upgrade (LTE subscribers, 000s)



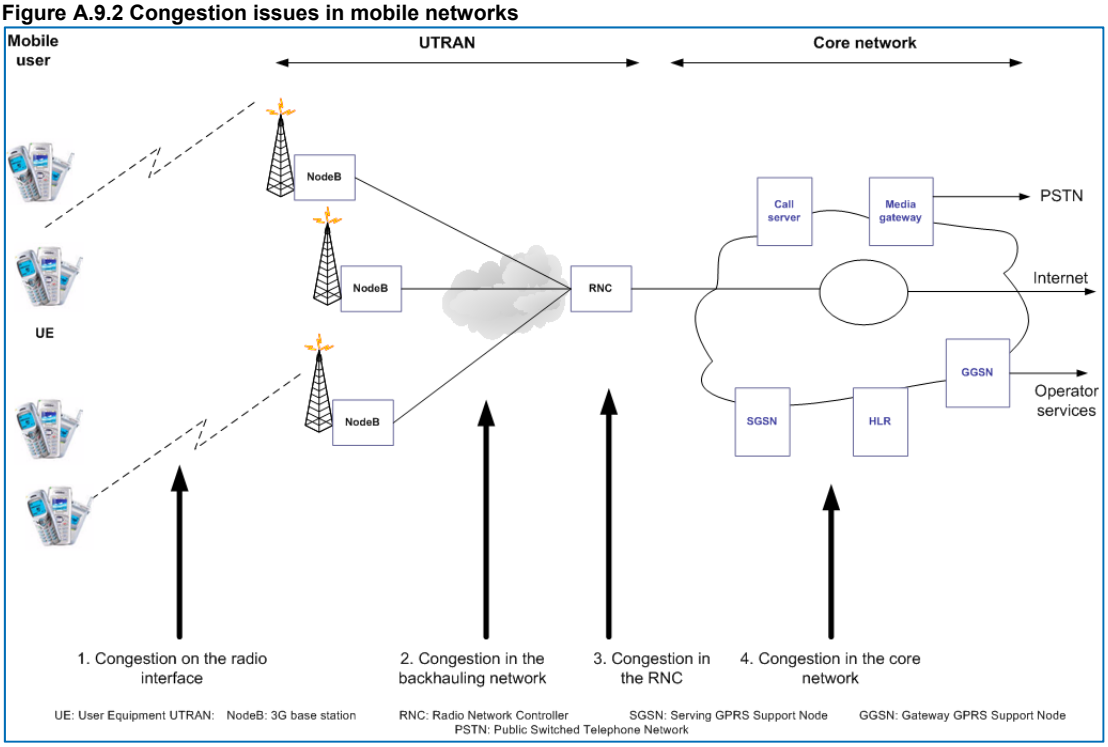
Source: IDATE.

With respect to network design, we expect small cells to represent 90% of the total number of cells in mobile networks in developed countries in 2020.

Operators move from traditional macro base stations to compact-RRH-based small sites:

- Co-existence of (existing) macrocell overlay and micro and picocell underlay;
- Compact BTSs deployed in new sites in order to provide much capacity density; and
- New frequency bands (including reframing) and LTE implementation generate a new demand for FTTA.

Figure A.9.2 Congestion issues in mobile networks



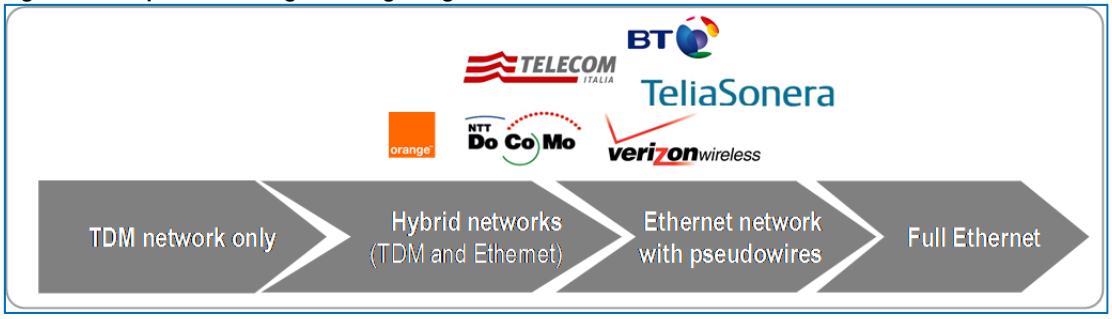
Source: IDATE.

Today, there is a need to migrate the backhaul network to an Ethernet-based infrastructure to handle packet transport. Two physical technologies are really answering to LTE backhaul needs: microwave and fibre in terms of capacity. Operators have to take the decision on the appropriate physical support technologies based on their existing infrastructure, the related cost and degree of urgency of upgraded backhaul provision.

Microwave links provide the lowest cost-per-bit compared to fibre and, in addition, they are easier and faster to deploy. Today, microwave remains the best solution for a rapid migration to meet increasing traffic demand. However, its use depends on spectrum availability, costs and licence acquisition (with different procedures from one country to another).

In the long term, and because of its almost unlimited capacity, fibre remains a key long-term investment supporting both fixed and mobile areas. Furthermore, the reuse of existing FTTx infrastructure is a solution shared and considered by incumbent operators - Verizon and AT&T in the USA and TeliaSonera in Europe - for transporting large amounts of mobile data traffic from cell sites to the core network.

Figure A.9.3 Operator strategies in migrating backhaul networks



Source: IDATE.

More FttCS (Fibre to the cell site) in USA than Europe

In the US, fibre is clearly beginning to dominate especially in high densely populated areas but microwave connections will still be used at short term thanks to its rapid installation and for places where laying fibre is prohibitively expensive. In the EU microwave connections will dominate until the take up of fibre, which is expected to occur in 2015-2016.

FttCS and LTE are correlated: FttCS is bringing enough capacity to support LTE

FttCS is largely being deployed as LTE already is rolled out. LTE is expected to be largely deployed in 2015-2016, so FttCS will be deployed along LTE.

In the long term, considerable synergy between fixed and mobile infrastructure can be anticipated in the years ahead especially. Furthermore, the future RAN architecture with Remote Radio Head implies bridging a long distance of several kilometres of backhaul and, for this, the use of fibre will make sense.

Market characteristics in Europe

Incumbent and large operators will rely mainly on their own backhaul network (FT, DT, VODA) and will deploy FTTx along with LTE roll out. Alternative operators will purchase capacity from another operator. Operators see an expansion of network sharing and/or operator consolidation for the next years.

A.9.2 Drivers

Small cells are seen as the inevitable complementary network infrastructures to macro-cells to meet the mobile broadband capacity crunch

The heterogeneous network will be the mainstream for mobile access infrastructure and especially for LTE deployment. This involves a network composed of macro-cells plus a range of small cell solutions such as picocells, microcells, femtocells and WiFi hotspots. The main interest here is to increase network density by increasing capacity and lightening the traffic load from the clogged macro-cell at a lower cost.

Typically used in urban areas, small cells are characterised by a coverage range of a few dozen metres; they are mainly used indoors and, more recently, have been introduced in aircraft. The key advantages of small cells for lower associated MNO expenditures are:

- Lower capex: Small-cell products cost far less than macro-cells and can be deployed in a matter of days or weeks, whereby carriers can deploy them with a build-as-you-grow strategy. In the case of LTE, one can start out by covering the urban part where the concentration of early 4G adopters will be higher and then move on from there as demand grows;
- Lower opex: Small base stations do not require the expensive real estate of macro-cells; they use far less power, and those deployed indoors will require very little maintenance. To reduce travel time for service technicians, carriers can also use Distributed Antenna Systems (DAS) technology to extend signals out from centrally located base station hotels. Femtocells will definitely be a critical part of LTE network deployments.

Femtocells in LTE deployment

Femtocells are small, low-cost, low-power personal base stations, usually designed for use in residential or business environments. The main advantage of the femtocell is an improvement in the indoor signal. Given the issues in urban areas and the poor indoor penetration of high frequency LTE (2.6 GHz), LTE femtocells can improve the performance of service-provider macro networks.

Beyond the indoor coverage, LTE femtocells can be an acceptable complement to the LTE macro network in high-traffic zones (principally city centres) where the deployment of femto allows a higher wireless capacity. Moreover, by using customer wireline connection broadband as backhaul, the femtocell can provide voice and data services in the same way as a regular (macro) base station and thus off-load the mobile macro network.

Deploying femtocells has the benefits of easy installation at a low unit cost and stronger mobile phone coverage at home. Typically, the cost of femtocells is lower than picocells particularly due the cost of maintenance and installation that must be undertaken by the operator in the case of other small cell types.

Current designs generally support up to four mobile phones in a residential setting using the provider's own licenced spectrum to operate. The femtocell incorporates the functionality of a typical base station but extends it to allow a simpler, self-contained deployment.

For the femtocell, the main challenge in gaining traction has been due to regulatory reasons as well as the unclear value perceived by end-users and operators. However, in October 2010, the Femto Forum published a set of APIs intended to facilitate the interoperability of LTE femtocell semiconductors from different vendors. Within the industry, the chip-maker PicoChip has come out in support of this announcement, which will help operators to quickly and easily extend LTE wireless cellular (and at a lower cost).

Backhauling

The current backhaul model is based on E1/T1 links capable of carrying 1544/2018 Mbps each that corresponds to the capacity required for GSM services. Indeed, this solution was designed to carry 2G and early 3G services but upcoming technologies are now forcing operators to upgrade their backhaul network, as the current model is no longer sustainable. The limitation of the E1/T1 model comes with the capacity required today.

Table A.9.1 Number of T1 links per channel

Technology	Backhaul needs	Number of T1*
GSM	**2 Mbps**	**1 or 2**
WCDMA	**2 to 4 Mbps**	**2 or 4**
HSPA/HSPA+	**8 to 20 Mbps**	**> 8**

Source: IDATE.
*taken into account capacity (70%) and T1=1.544 Mbps.

Typically, the peak LTE theoretical downlink speeds can reach up to 300 Mbps. The actual backhaul capacity needed for an average cell is around 80 Mbps.

Typically, the peak LTE theoretical downlink speeds can reach up to 300 Mbps. The actual backhaul capacity need for an average cell is around 80 Mbps.

The backhaul portion of the network weighs heavily on mobile network operator costs. It is estimated today that 20%-40% of annual mobile network capex is dedicated to backhaul due to high equipment costs. In addition, backhaul costs account for anywhere between 30% and 40% of network operating costs, notably on leased links. Backhaul-related capex is thus significant and can represent up to 40% of total mobile network costs.

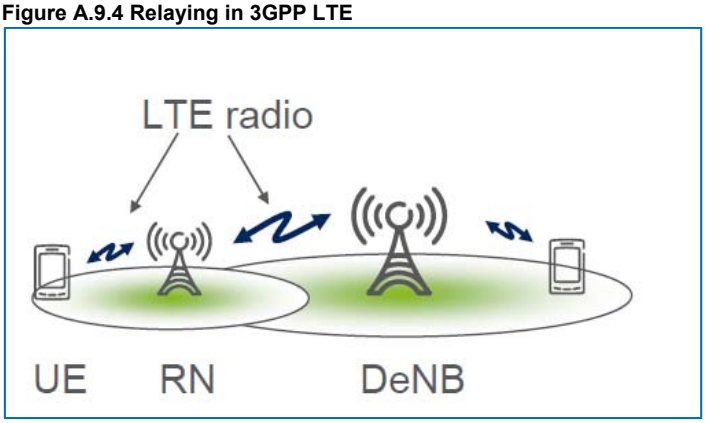
A.9.3 Future developments

Future developments in the radio technology will not so much disrupt the trends described above. However, new network designs with very flexible spectrum usage options.

A.9.3.1 Relay functions in mobile devices

LTE Advanced will see small cells connecting with macro cells, very often via microwave backhaul as opposed to fibre optic links. This wireless connection will improve efficiency and also save fibre CAPEX, as it will not be necessary to invest in expensive fibre optic links. Relay nodes will not only reduce cell sit e acquisition cost but also improve coverage at the edge of the cell as well as the data rates. Relay-nodes operating in-band are doing so without adding any further backhaul costs.

Figure A.9.4 Relaying in 3GPP LTE



Source: Ericsson.

A.9.3.2 Cognitive radios

Cognitive radios represent a relatively large group of radios with different degrees of `intelligent` behaviour[144]. However, all cognitive radios have the fundamental feature of being able to sense their environment (i.e. to monitor transmissions across a wide bandwidth) and, in particular, to exploit frequencies that appear to be currently unused.

Indeed, cognitive radios attempt to make use of spectrum that other spectrum-based services do not need. Hence, the spectrum might be more efficiently used by such enabling technologies and appropriate spectrum management arrangements[145]. These arrangements would be crucially defined on a two-tier level, *i.e.* the overarching spectrum management regime and, with a market-based approach, negotiated access among spectrum users. With exclusive use of spectrum, parties could negotiate ways to make use of vacant frequencies any time a cognitive radio technology senses that parts of the spectrum are available for transmission. Therefore, cognitive radios might also enable dynamic (real-time) spectrum management scenarios.

These negotiations would likely involve, on the one hand, a primary spectrum user - the party who has exclusive rights on the spectrum that becomes temporarily available for further exploitation - and, on the other hand, one (or maybe more) secondary user(s) whose business model does not

144 See QinetiQ “Emerging technologies: definitions, technological trends and timescales”, presentation at the first Sportviews Workshop, Paris, June 2006.

145 See Federal Communications Commission, “Notice of proposed rule making and order. Facilitating opportunities for flexible, efficient, and reliable spectrum use employing cognitive radio technologies”, FCC 03-322, ET Docket No. 03-108. See also Brodersen, R., Čabrić, D., Mishra, S.M., Willkomm, D., and Wolisz, A. (2004), “CORVUS: a cognitive radio approach for usage of virtual unlicensed spectrum”, mimeo.

require continuous access to spectrum, but only requires access to spectrum resources on a frequent (regular) basis, even randomly, as far as arrangements with the primary spectrum user(s) will enable the secondary user to provide a satisfactory service to his or her customers, *e.g.* by assuring customers that data download will be carried out satisfactorily.

However, in some cases it might be difficult for a cognitive radio to find vacant spectrum; hence, the cognitive-radio user may be unable to transmit in bands where the probability of cognitive access falls too low and cognitive access would become of little value to them, thus heavily reducing incentives to trade with primary users. The interest of cognitive radio is therefore limited in heavily used frequency bands.

As negotiations would be crucially based on the capabilities of cognitive radios to sense their surroundings, and transmit accordingly - thus enabling frequency re-use but without interfering with the primary user's operations - the parties would have to address the so called hidden node problem, *i.e.* interference problems arising from the failure of a cognitive radio to spot a legitimate use of spectrum behind a physical obstacle (*e.g.* a building).[146.]

At this stage, the hidden node problem suggests that cognitive radios might best work where the owner of the spectrum provides approval of cognitive radios deployment and broadcasts some form of beacon signal to indicate whether cognitive radios can access the spectrum. By providing licence holders with the right to sub-lease their spectrum, this form of access would become possible[147]. Indeed, sub-leasing is considered by many to be part of the package of rights needed for spectrum trading.

Although frequency users might deploy cognitive radios to further exploit the spectrum resources they are already entitled to access, negotiated spectrum sharing by multiple users is a more challenging deployment of cognitive radios. Therefore, it is crucial whether regulation of spectrum use allows arrangements between parties who seek mutual advantages by frequency trading, based on the opportunities of cognitive radios. However, while a primary spectrum user may be allowed to use frequencies in a more flexible way, in particular by entering agreements with secondary users whose operations can conveniently use cognitive radios, primary users should not be obliged to trade with secondary users, for only spontaneous trades between parties can bring about mutual benefits and efficiency gains. Nevertheless, there may be instances (*i.e.* market failures) where regulators could mandate cognitive access (*e.g.* a cognitive radio might be used in a scenario where a service provider must interrupt his or her operations within milliseconds upon reception of a signal by an emergency service device).

A.9.3.3 Software defined radios

Software defined radios (SDR) are a new generation of agile radios that rely very heavily on software in order to run their operations. Whereas traditional radio functionalities are mainly implemented at the level of hardware, SDR shift the bulk of their operations at the level of software, thus becoming (much) more flexible.

SDR techniques have a potential to support spectrum trading. Indeed, changes in the communications environment that are likely to follow a trade in spectrum, can be more easily taken

[146] See Haartsen, J.C., Wieweg, L. and Huschke, J. “Spectrum management and radio resource management considering cognitive radio systems”, mimeo. The hidden terminal problem might be crucial in future scenarios where cognitive radios are able to determine the most appropriate access to the spectrum without central control such as a base station.

[147] See Federal Communications Commission, “Notice of proposed rule making and order. Facilitating opportunities for flexible, efficient, and reliable spectrum use employing cognitive radio technologies”, FCC 03-322, ET Docket No. 03-108.

into account in a network that deploys SDR by means of software modifications. In fact, SDR will be able to adjust their operations in a relatively short time and more conveniently than traditional radio devices.

SDR could be used in any spectrum management regime. However, their role in supporting spectrum trading has to be appreciated in accordance with exclusive access to spectrum. Here, at least two scenarios could be considered: in the first, SDR are implemented at the level of service provider; in the second, SDR are implemented at the level of each subscriber unit.

There might be a trade-off between complexity and speed of adjustment in these two scenarios, following a spectrum trade. If SDR is implemented at service provider level, the bulk of software adjustments are likely to be necessary at base stations. This might require some time to fine-tune the communications network after the trade, but operations can be expected to carry on without major disruptions, since adjustments to variations could be easily located and monitored[148].

On the other hand, with subscriber units capable of (and allowed to be) determining their own requirements, spectrum trades (with a service provider) could take place almost on a real-time basis, but (very) quick variations in a network might lead to failures in communications, in particular, where systems to continuously monitor such changes are not in place or unable to cope with them.

A.9.4 Impacts on competition and markets

The evolution of mobile networks towards LTE and forthcoming development steps is not without having an impact on the competitive environment in the market. Coping with the fast-rising data demand requires higher backhaul capacity and a greater density of backhaul infrastructure. Operators with existing fixed backhaul and access networks will have a substantial competitive advantage by leveraging these assets. Mobile operators without access to such infrastructures may find themselves unable to compete effectively in the market.

Further innovations in network and spectrum management will facilitate more efficient usage of spectrum but may require very flexible approaches to spectrum management.

A.9.5 Impact on competition and markets

Smaller cell size and WiFi offloading requirements imply the need for a significantly higher capillarity of mobile networks and own or negotiated access to fixed backhaul facilities. Can mobile-only operators compete successfully with integrated players in an LTE-market? Do operators with own fixed backhaul and access networks have SMP in the mobile market?

New radio technologies may provide challenges to spectrum management in the future.

[148] See Harrington, A.S., Hong, C.G. and Piazza, A.L. “Software defined radio: the revolution of wireless communication”, Ball State University, 2004, mimeo. According to the authors, “[t]he adaptation of SDR into networks faces challenges in the economics of its roll out. Until units can be produced in mass, prices will be high. The value for operators is that SDR systems provide flexibility and versatility that can outweigh costs” (p. 42). See also OFCOM, “Technology research programme”, London, October 2005.

A.10 (Pan-European) large business customer market

A.10.1 Trends

As in other sectors of the communications market, circuit-switched analogue and digital services are on the decline as IP-based products have established themselves as substitutes for legacy products. However, similar to the situation in the PSTN market, certain industries such as the financial services sector and government services currently keep using analogue leased lines. While these users may be captive to some extent due to the QoS level of those leased lines, the situation is entirely comparable with captive residential PSTN users, who are lacking the countervailing buying power of large business and government users.

Plesiochronous digital hierarchy (PDH) and Synchronous Digital Hierarchy (SDH) digital leased lines increased the number of available channels and the quality of service of TDM-based leased lines. Nevertheless, those technologies are rather 'old-fashioned' by today's standards.

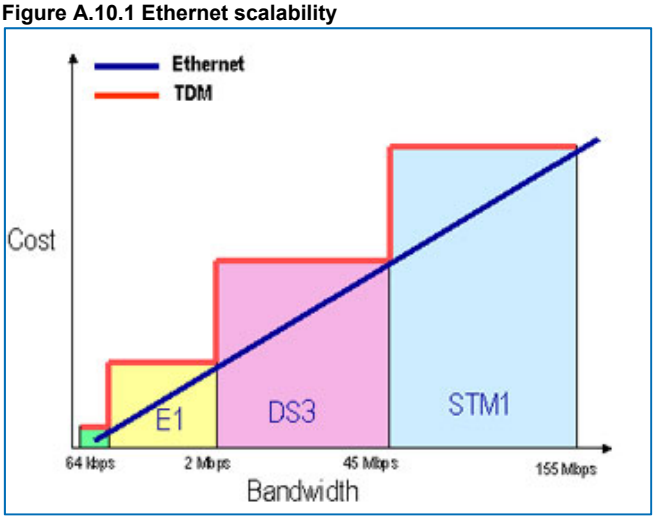
For about 10 years, Ethernet leased line have taken over an important role in the market and have been widely adopted. Similar to residential Internet access offers, the available bandwidth of leased lines is continuously increasing over time. At the lower end of the market, 2 Mbps leased line offers are increasingly being phased out.

A.10.2 Drivers

A.10.2.1 Ethernet

Ethernet leased lines have gained traction in the market for a number of reasons. Leased lines based on Ethernet are cost-efficient to deploy as they can be rolled out over existing copper infrastructure. The product is also highly scalable and no additional ports need to be installed for adding further bandwidth. Ethernet is a widely adopted standard in networking devices, thus facilitating 'plug & play' installation. At the same time, Ethernet offers dedicated bandwidth as well as the QoS and security features of traditional leased lines.

Figure A.10.1 Ethernet scalability



Source: Reliance Telecom.

A.10.2.2 Demand

Business customers have an on-going demand for data services offering high-capacity and high-quality of service across their footprint, also across borders. Subscribing to these services via a single service provider could significantly lower transaction costs and assure a higher degree of homogeneity of service provisioning.

Furthermore, despite the fact that the prices for leased lines have fallen, notably with the adoption of Ethernet leased lines, they remain a relatively costly communication service. Therefore, users that can make some concessions on QoS aspects like latency or guaranteed up time are probably like to switch to broadband services as a substitute if these come with acceptable quality and attractive pricing.

A.10.3 Future development

Over the next years, the deployment of NGA networks will progress, making fibre-based access products more widely available. Fibre to the home/office products offer very high bandwidth and high quality of service while alleviating the contention issue of traditional broadband access lines. Market players rolling out their own fibre infrastructure should therefore in principle be able to compete with leased lines for a sizeable share of the market. In addition to this, Ethernet-based bitstream access products facilitate a higher degree of QoS and product differentiation thereby further increasing the substitutability between leased lines on the one side and broadband on the other.

As LTE Advanced is being rolled to a growing number of homes and businesses, prioritised managed wireless services also have the potential of becoming an alternative to leased lines.

Another element potentially impacting the market for business products, however, is the fact that residential broadband services will also offer better quality of service, as operators are upgrading their networks and starting to offer 'premium' products with differentiated QoS (cf. section on 'pricing). This trend will therefore work toward closing the gap between business and consumer markets.

A.10.4 Impact on competition and markets

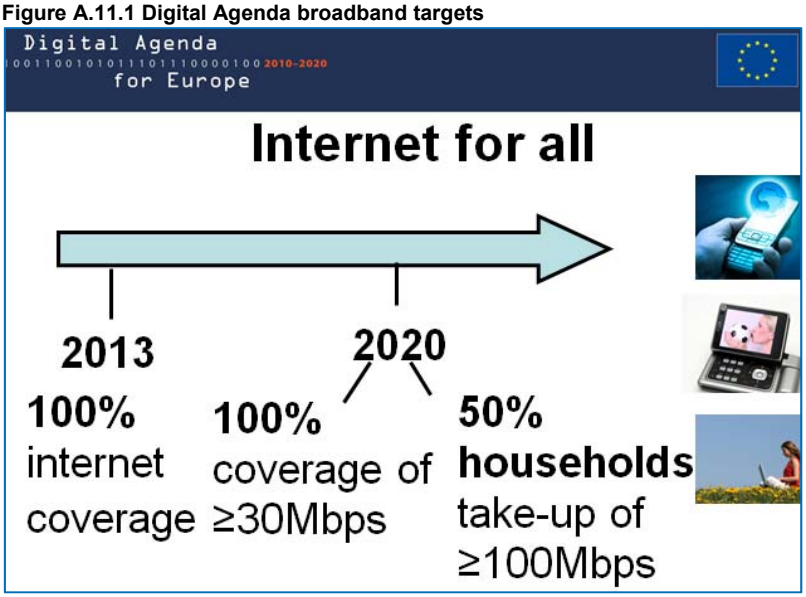
While large companies operate in multiple countries they do not necessarily all have access to the same communications services, due to different QoS levels, SLAs/KPIs, differences in the technical specification of managed IP interfaces, among other factors. Only a limited number of players with infrastructure presence in several countries could offer a one-stop shop service across different countries. However, if there was some degree of harmonisation or a harmonised wholesale access available, a true pan-European market could emerge where operators can compete across the EU for providing seamless and consistent services to customers' sites.

Another element to be considered is the substitutability of broadband services for leased lines. If Ethernet bitstream over fibre is to become a serious alternative to dedicated leased lines, wholesale bitstream access specifications should reflect the needs of business customers. An undifferentiated product tailored to residential customer needs will risk being insufficient for competitors to take on the SMP player in this segment.

A.11 Remark on the Digital Agenda for Europe

In May 2010, the European Commission adopted its Digital Agenda for Europe (DAE) policy programme. It was one of the first flagship initiatives of the EU 2020 strategy. One of the areas for which it sets ambitious targets is broadband. The DAE states a two-fold objective for broadband coverage and uptake across the Union by 2020. All European households shall have access to broadband networks capable of delivering at least 30Mbps downstream. Furthermore, 50% of homes in Europe shall actually have subscribed to a 100+ Mbps Internet service.

Figure A.11.1 Digital Agenda broadband targets



Source: European Commission.

Meeting these targets will entail substantial upgrades of legacy communications networks towards next-generation standards. However, the technical requirements are not the same for both tiers of the 2020 objectives.

In order to effectively and reliably deliver 100 Mbps or more to the user, networks will have to be largely fibre-based. This means at least 50% of all homes (assuming 100% take-up rate) will have to be covered by FttH, FttB or FttLA network infrastructures. Depending on factors such as the length of the local (sub-) loop and the quality of the copper deployed, VDSL vectoring may also contribute to achieving 100Mbps coverage.

While ubiquitous 30Mbps coverage requires network upgrades,, these too can be realised with other technologies, less costly than the 100 Mbps. VDSL and VDSL vectoring will play an important role in this context, as will LTE.

The economics of rolling out next-generation access networks are obviously more favourable in densely populated metropolitan and urban areas than in rural ones. These dense areas therefore naturally benefit from better NGA availability. Yet, with its two-tiered objectives the Digital Agenda for Europe may actually further consolidate the divide between urban and rural areas in terms of technologies deployed and broadband performance.

In the long term, the DAE may therefore increase the need for a geographically differentiated regulation between these areas. As usage patterns evolve and services and applications truly

relying on ultra-fast broadband infrastructures will emerge and integrate mainstream, broadband services in areas with 100Mbps-capable networks may no longer be in the same market as those where only 30 Mbps are available to users. The competitive dynamics and issues will therefore require different regulatory treatment (if such is required) in those areas.

Furthermore LTE Advanced deployments in the digital dividend spectrum can be expected to effectively deliver 30 Mbps to users. This technology can thus be considered a substitute for fixed-line broadband on the demand-side as well as on the supply-side, at least in rural areas. In urban areas, where 100Mbps prevail, the inclusion of LTE Advanced in the relevant product market would seem less straightforward.

Appendix 2 Legal analysis

A.1 A Legal Review of the Relevant Markets Notified in 2008-2012: Trends and Observations

A.1.1 Research objectives and methodologies

This report is part of the project "Future electronic communications markets subject to ex-ante regulation (Recommendation on Relevant Markets)". It forms an important input for the review of the Recommendation on Relevant Markets (2007); more specifically, it forms a basis for a revision of the list of relevant markets. The objective of the study is to provide a quantitative and qualitative analysis of EU electronic communications markets to allow the Commission and the partners in this project to ascertain:

- Whether the boundaries of the relevant markets have to be adjusted;
- Whether all the markets in the current Recommendation (whether or not with adjusted boundaries) still warrant ex-ante regulation or whether regulation should be withdrawn; and
- Whether any new markets can be identified that warrant ex-ante regulation.

In order to fulfil these tasks, this study, based on an empirical approach, reviews the relevant markets notified by national regulatory authorities (NRAs) to the European Commission based on Article 7 and 7a of the Framework Directive and the comments formulated by the European Commission. The period is the last five years, *i.e.* from the beginning of 2008 till the end of 2012. The starting point corresponds to the publication date of the 2007 Market Recommendation that was adopted on 28th December 2007. During this time period, all the notifying NRAs carried out their market analysis based on this recommendation. Within this period, all the notifying NRAs from 27 Member States and 1 region (*i.e.* Gibraltar) submitted 833 notifications to the Commission.[149] As a first step of the quantitative research, the Commission comments letters with regard to these national notifications were analysed with the aim of dividing them into the following three categories: (i) relevant markets within the boundaries of the 2007 Market Recommendation, (ii) relevant markets with modified boundaries of the 2007 Market Recommendation and (iii) relevant markets outside the boundaries of the markets defined in the 2007 Market Recommendation.

Given the nature and objective of this part of the research, we applied a strictly formal and legal criterion in order to distinguish these different categories. All draft decisions on which the European Commission did not make any comment regarding the notified markets definition (*e.g.* because it did not oppose to the proposed market definition, or because the draft measure does not contain any provisions on market definition) were considered to fall within category (i). National draft market definitions that were commented by the European Commission were considered to fall within the second category (ii), while only draft market decisions in which the national regulatory authority performed a national Three Criteria Test were considered not to fall within the scope of the third category (iii).

For reporting purposes, we have drawn together all of this information in an electronic file, for which we took the latest version of the overview of market analyses available through the Commission website as the basis. This spreadsheet contains as rows the different national market analyses

[149] All these Commission decisions are collected from the Commission's website: http://ec.europa.eu/information_society/policy/ecomm/implementation_enforcement/eu_consultation_procedures/index_en.htm.

performed by the national regulatory authorities, while the different columns for each of them contain the following information:

- Column A: Reference towards the unique code of the draft national market analysis;
- Column B: Member State performing the market analysis;
- Column C: Original language of the market analysis;
- Columns D – J: References towards the 2007 Recommendation markets analysed (indicated with "1");
- Columns K – AB: References towards the 2003 Recommendation markets analysed (indicated with "1");
- Column: AC: References towards markets not included in the 2003 or 2007 Recommendation (indicated with "1");
- Column: AD: Short text description of the market(s) analysed;
- Column: AE: Reference towards the Recommendation under which the markets were analysed ("1" indicates a market analysis under the application of the 2003 Recommendation; "2" indicates a market analysis under the application of the 2003 Recommendation);
- Column AF: date of the closing of the procedure;
- Column AG: Short text description of the status of the procedure;
- Column AH: categorisation of the draft market analysis: category (i): market(s) within the borders of a market of the 2007 Recommendation (*i.e.* markets which did not raise comments from the Commission regarding market definition) are marked with "1";
- Column AI: categorisation of the draft market analysis: category (ii): market(s) with modified market delineation compared to the 2007 Recommendation (*i.e.* markets where the Commission in its comments letter did raise comments regarding market definition) are marked with "1";
- Column AJ: categorisation of the draft market analysis: category (iii): market(s) outside the 2007 Recommendation (*i.e.* markets where the national regulatory authority performed a national Three Criteria Test) are marked with "1";
- Column AK: result of the national Three Criteria Test; situations in which all three conditions are met are marked with "1";
- Column: AL: Text summary of the relevant parts of the description of the proposed national draft measure and/or of the Commission comments.

Applying these methods, we were able to deduce some general trends on the issue of market definition by the national regulatory authorities. Overall, 69% of all draft market definitions could be considered as falling within the boundaries of the Recommendation, while the European Commission only in 67 cases (10%) raised comments regarding markets identified by the national regulatory authorities (*i.e.* category (ii), markets with modified boundaries). Finally, national regulatory authorities in 130 cases (20%) identified a market outside the scope of the current Recommendation and therefore performed a national Three Criteria Test. This figure is relatively high, since it also includes draft market analyses that were included in the 2003 Recommendation, but no longer included in the 2007 Recommendation. Moreover, in cases in which multiple answers could be considered correct, we have systematically chosen the most "deviating" option.

In order to generate more reliable figures for each specific market, we have to the maximum extent also disentangled from the Commission's comments letter the different individual markets as they were analysed by the national regulatory authority. The result of this exercise can be found in the columns D to J for the Recommendation 2007, and in the columns K to AB for the markets in the Recommendation 2003: when a notification was considered relevant for one or more of these markets, this market is marked with "1". This approach was not without risk, but allowed us to generate overviews for each specific market under the 2007 and 2003 Recommendation, to provide indicators of possible trends from strictly quantitative point of view which could serve as starting

point for the in-depth qualitative research of the market definitions most deviating from the list of the recommendation. This approach also allowed us to generated overviews for each specific market. For comparability reasons, these additional tabs in the spreadsheet are structured identical to the general overview. For each market, we also calculated the total number of national notifications (*i.e.* mentioned in red at the bottom of column D), as well as the repartition of the draft market analysis over the different categories identified (*i.e.* columns J to L). Important to note is that small difference in numbers and total might occur, as a consequence of the fact that the as well the national notifications as the Commission comments often relate to more than one market. In view of the objective of identifying general trends and serving as input for the qualitative research, these minor deviations do not seem to be problematic.

After this quantitative research, we continued with an in-depth qualitative analysis of 397 of the Commission comments letters in cases where the national regulatory authority proposed a modified market definition (category ii), or a market outside the scope of the recommendation (category iii), although some general guidelines could also be deduced from the approaches of national regulatory authorities as they were not commented by the European Commission (category i). Given the limited importance of the latter category, we discuss it in the following paragraphs together with the second category, *i.e.* relevant markets with modified boundaries of the Market Recommendation. This number of Commission comments letters is lower for two reasons: first, a large number of notifications do not concern market definition *per se*, and contain modifications of remedies of previous notifications and thus are excluded from the scope of this study; secondly, many Commission decisions contains a cluster of NRAs' notifications that are made a market-by-market basis, and accordingly one Commission decision may review several notifications. In any case, this report takes into account the vast majority of the notifications in relation to the definition of relevant markets during the period of 2008-2012.

All those Commission decisions are subsequently clustered according to the seven relevant markets defined in the current market recommendation, and the remaining relevant markets entailed in the first market recommendation. All in all, the latter are considered in 13 categories comprising:

1. Access to the public telephone network at a fixed location;
2. The minimum set of leased lines;
3. Publicly available telephone services provided at a fixed location;
4. Call origination on the public telephone network provided at a fixed location;
5. Call termination on individual public telephone networks provided at a fixed location;
6. Transit services in the fixed public telephone network;
7. Wholesale infrastructure access;
8. Wholesale broadband access;
9. Wholesale terminating segments of leased lines;
10. Wholesale trunk segments of leased lines;
11. Access and call origination on public mobile telephone networks;
12. Voice call termination on individual mobile networks; and
13. Broadcasting transmission services, to deliver broadcast content to end-users.

Afterwards, a comparative study is carried out for every category of notifications. Within the study, both a quantitative and a qualitative approach are taken, with a purpose of identifying, on the one hand, the general practice, and on the other hand, the individual practice, of all the 27 Member States with regard to the definition of every relevant market. This comparative study regarding every relevant market is designed as comprising three components: (1) the description of the recommendation, (2) the general trend and deviations of NRAs as well as the underlying reasons and (3) some personal observations on the future evolvement.

Structure of this report

Based on the methodologies, the subsequent report is structured as follows. Chapter 2 gives a brief introduction to the regulatory framework in the EU electronic communications sector, and then discusses the contents of the first market recommendation and the second market recommendation. Chapter 3-15 respectively reviews the relevant markets proposed by national regulatory authorities, including (Chapter 3) Access to the public telephone network at a fixed location, (Chapter 4) Call origination on the public telephone network provided at a fixed location, (Chapter 5) Call termination on individual public telephone networks provided at a fixed location, (Chapter 6) Wholesale (physical) network infrastructure access at a fixed location, (Chapter 7) wholesale broadband access, (Chapter 8) wholesale terminating segments of leased lines, (Chapter 9) voice call termination on individual mobile networks, (Chapter 10) publicly available telephone services provided at a fixed location, (Chapter 11) The minimum set of leased lines, (Chapter 12) transit services in the fixed public telephone network, (Chapter 13) wholesale trunk segments of leased lines, (Chapter 14) access and call origination on public mobile telephone networks and (Chapter 15) broadcasting transmission services, to deliver broadcast content to end users.

A.2 The Electronic Communications Regulatory Framework

A.2.1 General Introduction

The current EU regulatory framework for the electronic communications sector entered into effect in 2003 and was amended at the end of 2009. It aims to promote sustainable competition in the single market, to contribute to the development of the internal market for electronic communications networks and services, and to promote the interest of the citizens and to insure a high level of consumer protection in the EU.[150]

In order to achieve the three goals, one of the most distinct features of the regulatory framework is the so-called significant-market-power (SMP) regime. This regime requires national regulatory authorities (NRAs) to impose obligations only after designating an undertaking or undertakings with SMP, a concept equivalent to dominance within Article 102 TFEU. Regulation should nevertheless be rolled back when no SMP can be identified. Consequently, SMP becomes crucial to the extent to which it delineates a borderline between regulation and deregulation. In analysing whether an undertaking or undertakings have SMP, the definition of relevant markets is of fundamental importance since effective competition can only be assessed by reference to the markets defined.

Relevant markets within the context of the regulatory framework bear the same set of principles and methodologies as those under EU competition law. The use of this term implies that the description of the products or services that mark up the market and the assessment of the geographical scope of that market. In order to ensure a harmonised application of competition law practices, the European Commission (Commission) is required to adopt guidelines on market analysis and the assessment of significant market power (SMP Guidelines)[151] that summarise related competition law practices. In principle, relevant markets for regulatory purposes comprise two dimensions, product and geography dimensions, which should be defined based on demand- and supply-side substitution. In addition, quantitative approaches, such as the 'hypothetical monopolist test', are also relevant.

Concerns still largely remain that NRAs may interpret those principles in diverging ways. The Framework Directive[152] accordingly requires the Commission to publish a list of recommended markets that may be susceptible to *ex-ante* regulation based on the SMP Guidelines. The market recommendation works as a starting point for NRAs to carry out SMP analyses according to their national circumstances. Moreover, the regulatory framework does recognise the importance of flexibility and thus also allows NRAs to define relevant markets beyond the market recommendation.

When introducing the list of recommended markets, the Commission follows not only the principles of competition law summarised within the SMP Guidelines, but also Recital 27 of the 2002 Framework Directive that ex-ante regulation should only be imposed where EU competition law is

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150 Directive 2002/21 of 7 March 2002 on a common regulatory framework for electronic communications networks and services ('2002 Framework Directive'), O.J. 2002 L108/33, which has been amended by Directive 2009/140 of 25 November 2009, O.J. 2009 L337/37, Article 8.

151 Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services, O.J. C 165/6, 11.7.2002.

152 Framework Directive, supra note 150, Article 15(1).

not sufficient. This has been developed into three cumulative criteria: (i) the presence of high and non-transitory barriers to entry; (ii) a market structure which does not tend towards effective competition within the relevant time horizon; and (iii) the insufficiency of competition law alone to adequately address the market failure(s) concerned. It is the so-called Three Criteria Test. Since the Commission has already taken into account the Three Criteria Test when selecting markets for its recommendation, NRAs do not need to evaluate it again when accepting the recommended markets. However, if they would like to define markets other than those recommended ones, the analysis of the Three Criteria Test becomes obligatory for the national regulatory authority. This is also the case when national regulatory authorities intend to re-evaluate markets that were on the previous Recommendation on Relevant Markets (of 2003), but which are no longer included in the 2007 Recommendation (*e.g.* when they intend to roll back existing obligations because markets have become competitive).

The Three Criteria suggest that relevant markets are as a matter of fact constantly changing, and hence a fixed list of recommended markets, while facilitating harmonisation, may be not always consistent with market realities. In order to compensate this rigidness, the Framework Directive requires the Commission to regularly keep the recommended markets updated. So far the Commission has adopted two successive versions of market recommendations, with the first in 2003[153] (hereinafter: 'the first Recommendation') and the second in 2007 (hereinafter: 'the Recommendation').[154] In comparison with the first Recommendation, the Recommendation removed ten markets from the original eighteen and two other markets were merged. The list of recommended markets fell to seven, and almost all retail markets were withdrawn as wholesale regulation combined with ex post application of competition law has been considered sufficient to protect retail users from abuse of dominant market positions.

A relevant market comprises two dimensions: product and geographic dimensions. The geographical scope of the relevant market has traditionally been determined by reference to two main criteria: the area covered by the network and the scope of application of legal and other regulatory instruments.[155] This corresponds generally to the territory of the Member State concerned. However, investment in alternative infrastructure is often uneven across the territory of a Member State, and in many countries there are now competing infrastructures in parts of the country. Where this is the case, NRAs could in principle find sub-national geographic markets.[156] Sub-national geographic markets allow NRAs to deregulate their whole territories from one region to another.

In addition to the SMP regime that aims to achieve harmonisation from a substantive law point of view, the regulatory framework also establishes another mechanism with the same purpose from a procedural perspective. This is the EU consultation procedure. According to this procedure, NRAs should notify the Commission of their proposal measures following the SMP regime, including the definition of relevant markets. The Commission has the power to approve or to raise serious

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153 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 in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (the first Recommendation), OJ L 114, 8.5.2003.

154 Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex-ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (the Recommendation), OJ L 344, 28.12.2007.

155 SMP Guidelines, para.59.

156 Explanatory Note Accompanying document to the Commission Recommendation on Relevant Product and Service Markets within the electronic communications sector susceptible to ex-ante regulation in accordance with Directive 2002/21 on a common regulatory framework for electronic communications networks and services (Second edition) {(C(2007) 5406)}, SEC(2007) 1483/2 (Explanatory Note to the Recommendation), pp.12-13.

concerns regarding markets proposed by NRAs. In exceptional cases, the Commission can even veto those decisions, following a specific procedure.[157]

A.2.2 Two successive market Recommendations

The Recommendation is also based on demand-side and supply-side substitution.[158] More specifically, its analysis starts from characterizing retail markets over a given time horizon and then moves to wholesale markets. Retail markets concern services that are directly provided to end-users while wholesale markets refer to network infrastructures that are crucial inputs for other providers to deliver such retail products to their customers.

With regard to the characterization of retail markets, two substitution breaks were established within the 2003 Recommendation: (i) services provided at fixed locations are not substitutable with those provided to non-fixed locations and (ii) voice services are not substitutable with non-voice (data) services.[159] These two substitution breaks are still considered valid in the current Recommendation of 2007.[160] The 2003 Recommendation recognized another substitution break that has, nevertheless, been abandoned by the 2007 Recommendation. This substitution break was relevant to the division between services provided to residential customers and non-residential customers.[161] In addition, broadcasting was also considered a distinct service from other electronic communications services. Based on those substitution breaks, the 2003 Recommendation delineated five main categories of services:

1. Public telephone services provided at fixed location;
2. Access to data and related services at fixed locations;
3. Dedicated connections and capacity (leased lines);
4. Services provided at non-fixed location (mobile); and
5. Broadcasting services.

This delineation corresponded to the practices within the competition law domain. After a thorough analysis of the competition situations in general in the EU, the Commission concluded that retail services for access to data and related services at fixed locations, retail services provided at non-fixed location and retail broadcasting services should not be susceptible to *ex-ante* regulation due to their non-fulfilment of the Three Criteria Test. Consequently, the 2003 Recommendation, in conjunction with other elements, defined seven relevant retail markets that were suitable for regulation:[162]

1. Access to the public telephone network at a fixed location for residential customers;
2. Access to the public telephone network at a fixed location for non-residential customers;
3. Publicly available local and/or national telephone services provided at a fixed location for residential customers;

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157 Framework Directive, supra note 150, Article 7.

158 De Streel argued that the recommended list of relevant markets was also due to the carry through of historic regulation and political lobbying. See, Alexandre de Streel, "A New Regulatory Paradigm for European Electronic Communications: On the Fallacy of the 'Less Regulation' Rhetoric", paper submitted to ITS-Europe Regional Conference, Berlin, September 2004.

159 Explanatory Memorandum to Commission Recommendation of 11 February 2003 on the relevant product and service markets within the electronic communications sector susceptible to *ex-ante* regulation in accordance with Directive 2002/21 of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services, OJ 2003 L114/45, (hereinafter: Explanatory Note to First Recommendation), 16.

160 Explanatory Note to the Recommendation, supra note 156, 20.

161 This does not mean that NRAs cannot define markets according to resident or non-resident use, but in order to do so they must comply with the special requirement of the three-criteria test.

162 First Recommendation, *supra* note 153, Annex.

4. Publicly available international telephone services provided at a fixed location for residential customers;
5. Publicly available local and/or national telephone services provided at a fixed location for non-residential customers;
6. Publicly available international telephone services provided at a fixed location for non-residential customers; and
7. The minimum set of leased lines.

Within the 2007 Recommendation, the Commission envisaged that Markets 3-7 in general could not fulfil the Three Criteria Test and therefore removed those five markets. The Commission also admitted that the substitution break between residential and non-residential customers was no longer significant and thus combined Markets 1-2 together.[163] Consequently, in the current Recommendation there remains a single retail market: access to the public telephone network at a fixed location for residential and non-residential customers.[164]

The analysis of wholesale services is based on the delineation of retail services. Even if a retail market is not susceptible to electronic communications regulation, it can still be used to define wholesale services. This can be seen in all NRAs' wholesale-market notifications where retail markets are always delineated first, followed by wholesale markets based on the retail markets. Wholesale services are services that are necessary for alternative providers to operate on the relevant retail markets. This term is not initiated by sector-specific regulation but by competition law. However, the delineation of wholesale markets within electronic communications regulation is not entirely based on the reality of substitution existing on the electronic communications markets. The access-based regulatory obligations are mainly built upon the theory of the ladder of investment. The investment ladder depicts different levels of entry barriers for alternative operators with an aim to facilitate them to ultimately replicate the incumbent's infrastructures. In order to achieve this goal, SMP operators are obliged to supply a list of inputs to alternative operators. Those inputs are referred to as wholesale products.

The wholesale markets within the market recommendation are defined in the subsequent manner.

First, with regard to retail public telephone service provided at a fixed location, the Commission considered that '[t]he main elements required […] are call origination, call conveyance (including routing and switching) and call termination'.[165] In addition, retail public telephone service can also be used for dial-up Internet services. Therefore, wholesale markets corresponding to retail public telephone services may also be considered as wholesale markets in relation to retail (narrowband) data services.[166] Accordingly, three wholesale markets corresponding to retail public telephone service provided at a fixed location were established in the 2003 Market Recommendation:
8. Call origination on the public telephone network provided at a fixed location;
9. Call termination on individual public telephone networks provided at a fixed location; and
10. Transit services in the fixed public telephone network. [167]

Within the 2007 Market Recommendation, the Commission has foreseen that the wholesale market for transit services have been in general effectively competitive in the EU[168] and thus removed it

[163] Explanatory Note to the Recommendation, supra note 156, 22.
[164] The Recommendation, *supra* note 154, Annex.
[165] Explanatory Note to First Recommendation, *supra* note 159, 18.
[166] *Ibid.*, 25-27.
[167] First Recommendation, *supra* note 153, Annex.
[168] Explanatory Note to the Recommendation, supra note 156, 26-27.

from the list of recommended product markets.[169] Nevertheless, the necessity concerning the other two wholesale markets still remains valid.[170]

Second, in order to provide retail access to (broadband) data and related services at fixed locations alternative operators in principle have two economically feasible choices: (1) establishing their own networks through local loop unbundling or (2) obtaining bitstream access from the incumbent.[171] In view of the limited substitution between the two choices both from the demand-side and supply-side,[172] the Commission identified two wholesale services in relation to data services:

11. Wholesale unbundled access (including shared access) to metallic loops and sub-loops for the purpose of providing broadband and voice services; and
12. Wholesale broadband access.[173]

Within the 2007 Recommendation, the Commission confirmed the substitution break between the two markets and the existence of high-entry barriers[174] and, accordingly, maintained that the two wholesale markets should continue to be regulated.[175]

Third, corresponding to retail services of leased lines two wholesale services were identified: the terminating segments of a leased circuit (sometimes called local tails or local segments) and the trunk segments. What constitutes a terminating segment depends on the network topology specific to particular Member States and will be decided upon by the relevant NRA.[176] Accordingly, two wholesale markets were established:

13. Wholesale terminating segments of leased lines (hereinafter WTSLL); and
14. Wholesale trunk segments of leased lines.[177]

Within the 2007 Recommendation, the Commission observed that the entry barriers for wholesale trunk segments of leased lines became relatively low[178] and so removed it from the relevant markets susceptible to regulation. Nevertheless, WTSLL markets remained intact.[179]

Fourth, the 2003 Recommendation identified two retail services in relation to services provided at non-fixed location, mobile voice/data services and roaming services, for the purpose of analysing those derivative wholesale markets. Since the Commission did not find a substitution break between residential and non-residential users, the retail mobile voice/data markets were not further divided, as in the case for fixed telephone services.[180] The key elements required to produce call services, both fixed and mobile, were network access and call origination, call conveyance and call termination. Since call conveyance for mobile calls was based on fixed networks, there was no separate wholesale service for mobile call conveyance.[181] In conjunction with the wholesale service built upon roaming services, three wholesale markets were defined:

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169 The Recommendation, *supra* note 154, Annex.
170 *Ibid.*; and also Explanatory Note to the Recommendation, supra note 156, 24-26.
171 Explanatory Note to First Recommendation, *supra* note 159, 24.
172 *Ibid.,* 24-25.
173 First Recommendation, *supra* note 153, Annex.
174 Explanatory Note to the Recommendation, supra note 156, 31-32.
175 The Recommendation, *supra* note 154, Annex.
176 Explanatory Note to First Recommendation, *supra* note 159, 28.
177 First Recommendation, *supra* note 153, Annex.
178 Explanatory Note to the Recommendation, supra note 156, 38-39.
179 The Recommendation, *supra* note 154, Annex.
180 Explanatory Note to First Recommendation, *supra* note 159, 29.
181 Paul Richards, 'Technical Progress, Market Evolution and the Regulation of the Electronic Communications Sector in the EU', *Competition and Regulation in Network Industries*, 2007, 8(2), 165-214. It is also indicated in some notifications under the EU Consultation Procedures that mobile operators are either customers on the wholesale market for transit services and or even providers of wholesale transit services: *e.g.,* Case PT/2005/0154: Transit services in the fixed public telephone networks in Portugal, Commission decision of 1 April 2005.

15. Access and call origination on public mobile telephone;
16. Voice call termination on individual mobile networks; and
17. Wholesale national market for international roaming on public mobile networks.

Within the 2007 Recommendation, access and call origination on public mobile telephone was considered effectively competitive as there were usually two or three Mobile Network Operators (MNOs) in every Member State and the incumbents did not have considerable market power in comparison with alternative operators.[182] Furthermore, since the regulation of the wholesale roaming market based on the SMP regime turned out to be a failure,[183] the EU adopted a regulation in order to, on the one hand, lower roaming rates and, on the other hand, provide a minimum set of consumer protection measures.[184] However, the regulation on wholesale termination markets was left untouched.[185]

Last but not least, electronic communication networks and services also covered broadcasting.[186] The retail broadcasting transmission service was defined as the delivery of radio and television broadcasting, including free-to-air broadcasting, subscription and paid broadcasting and also the delivery or transmission of interactive services. Competition on this retail market was satisfactory and thus there was no need for regulating the retail market.[187] However, this was not the case with its derivative wholesale market. Therefore, a wholesale market related to broadcasting transmission was defined for the purpose of electronic communications regulation within the 2003 Recommendation:
18. Broadcasting transmission services, to deliver broadcast content to end-users.

Nevertheless, in 2007 the Commission found sufficient platform competition on this market and considered that it could no longer fulfil the Three Criteria Test.[188] Consequently, this market has been removed from the list of the 2007 Market Recommendation.[189]

182 Explanatory Note to the Recommendation, supra note 156, 44-46.
183 This regulatory failure has several origins. First, wholesale roaming prices are imposed by foreign mobile network operators that are not selected by the roaming customers, which results in information asymmetry for those customers. Second, the roaming customer's 'home' NRA has no competence to regulate the wholesale prices of a foreign visited network operator. Third, while business customers that constantly use roaming services may have incentives to negotiate favourable roaming tariffs with their home mobile network operators, residential customers that only occasionally go abroad seldom take into account roaming prices when subscribing to a mobile network operator. The result appears that mobile network operators have no incentives to lower retail roaming prices.
184 REGULATION (EU) No 531/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 June 2012 on roaming on public mobile communications networks within the Union, O.J. L 172/10, 30.6.2012.
185 The Recommendation, *supra* note 154, Annex.
186 Framework Directive, supra note 150, Article 2(a) and (c).
187 Explanatory Note to First Recommendation, *supra* note 159, 36.
188 Explanatory Note to the Recommendation, supra note 156, 49.
189 The Recommendation, *supra* note 154, Annex.

Table A.2.1 A Comparison of Recommended Markets between First Recommendation and current Recommendation

1st Recommendation			2nd Recommendation
Retail access to fixed voice telephone	Market 1/2003	Market 1/2007	Retail access to fixed voice telephone
	Market 2/2003		
Retail fixed voice telephone	Market 3/2003		
	Market 4/2003		
	Market 5/2003		
	Market 6/2003		
Retail leased lines (minimum set)	Market 7/2003		
Fixed voice call origination	Market 8/2003	Market 2/2007	Fixed voice call origination
Fixed voice call termination	Market 9/2003	Market 3/2007	Fixed voice call termination
Fixed voice call transit	Market 10/2003		
Local loop unbundling	Market 11/2003	Market 4/2007	Local loop unbundling
Wholesale broadband access (bitstream)	Market 12/2003	Market 5/2007	Wholesale broadband access
Leased lines terminating segments	Market 13/2003	Market 6/2007	Leased lines terminating segments
Leased lines transit segments	Market 14/2003		
Mobile access and call origination	Market 15/2003		
Mobile voice call termination	Market 16/2003	Market 7/2007	Mobile voice call termination
Mobile roaming	Market 17/2003		
Broadcasting transmission	Market 18/2003		

The description of relevant product markets in the Commission's market recommendation only provides a starting point. NRAs still have to take into account their national circumstances in order to complete the relevant market definition exercise. There are relevant markets to which NRAs are indeed left with little discretion in delineating their scope, for example, the fixed and mobile termination markets. Nevertheless, there are also some product markets for which the scope requires NRAs' discretionary inputs. For example, on the markets of wholesale network infrastructure access and WBA, NRAs must decide whether other technologies, such as TV cable, are also suitable to be included on those markets in addition to the PSTN network of the incumbents.

The analysis of whether a certain product could be considered as falling into one of the relevant markets recommended by the Commission should be strictly based on the demand-side and supply-side substitution. Failure to do so would provoke the Commission's veto. Under the 2003 Recommendation, the Polish NRA, UKE, in Cases PL/2006/0518 and PL/2006/0524 proposed to include retail broadband access into the market for access to the public telephone network at a

fixed location for residential customers and for non-residential customers.[190] In other words, UKE suggested that retail narrowband access and retail broadband access must be considered on the same product market. This significantly deviated from the market recommendations. It was of no surprise that the Commission disagreed and consequently vetoed UKE's proposal by reference to the demand-side and supply-side substitution between the two products. The Commission observed that consumers in general would not switch from a narrowband to a broadband connection for the sole purpose of accessing voice services but primarily for higher-speed Internet services, despite the fact that broadband connections were also capable of facilitating delivery of telephone services. Therefore, broadband access tended to be only partially substitutable with narrowband access from the demand-side. From the supply-side the substitution between narrowband and broadband access was also limited due to the significant investments needed to upgrade narrowband access networks in order to be capable of delivering broadband services.[191]

[190] PL/2006/0518: Retail access to the public telephone network at a fixed location for residential customers in Poland; and PL/2006/0524: Retail access to the public telephone network at a fixed location for non-residential customers in Poland, Commission decision of 10 January 2007, COM(2006)7300 final.

[191] *Ibid.*, 6.

A.3 Access to the public telephone network at a fixed location for residential and non-residential customers (Market 1/2007)

A.3.1 The Recommendation

Market 1/2007 is defined as "the provision of a connection or access (at a fixed location or address) to the public telephone network for the purpose of making and/or receiving telephone calls and related services".[192] This definition comprises two important components: firstly, that such an access is established at a determined geographical location and, secondly, that the purpose is to make and receive telephone calls or related services (*e.g.* fax) that are subject to certain quality requirements. Market 1/2007 is also referred to as fixed narrowband access. It is the only retail market suggested by the Recommendation.

The most traditionally used technology employed is via traditional telephone networks using metallic twisted pairs, or analogue lines (also referred to as PSTN). Those analogues lines have been upgraded into traditional digital lines (ISDN), including ISDN 2 and ISDN 30. Such capacities are sufficient for transmitting voice communications, but remain limited for the delay-sensitive data, such as video files. Incumbent operators, the top concern of the electronic communications regulation, predominantly own both PSTN and ISTN.

Due to technological convergence, the aforementioned access products can also be supplied by several alternative means. The SMP Guidelines require that relevant markets must be delineated based on a substitution test from the demand and supply-side. Consequently, the question whether other alternative technologies can be included on Market 1/2007 depends on whether there is substitution between PSTN and other types of technologies. In the recommendation, the Commission remains open the possibility of substitution of PSTN/ISDN with, such as, fibre networks, cable TV networks offering telephone service, mobile cellular networks that have been adapted to provide an equivalent service to fixed locations or which are confined to a limited radius around a fixed location (*i.e.* wireless local loop), and other wireless-based networks (*e.g.* satellite).[193]

Subsequently, the Recommendation takes a specific look at the possibility of substitution between narrowband access and broadband access. It states that while broadband connections are also capable of facilitating delivery of narrowband services, generally consumers will not upgrade to a broadband service solely for the purpose of accessing voice services. Thus, certain degree of substitution indeed exists. However, while households with broadband connections may be prepared to switch off their narrowband connections, those who are not broadband customers are not likely to switch given the focus of their demand. This one-way substitutability, as established in the Deutsche Telekom decision,[194] is not sufficient to establish that broadband access is a substitute.[195] However, the Commission does not close the door completely. It notices the rapid development of DSL-only offerings (so-called 'naked DSL'), as well as its increased substitution

[192] Explanatory Note to the Recommendation, supra note 156, pp.21.
[193] Ibid, pp.22.
[194] COMMISSION DECISION of 21 May 2003 relating to a proceeding under Article 82 of the EC Treaty (Case COMP/C-1/37.451, 37.578, 37.579 — Deutsche Telekom AG), OJ L 263/9, 14.10.2003, para.77.
[195] Explanatory Note to the Recommendation, supra note 156, pp.22.

with narrowband access. However, the Recommendation does not provide a clear view on how the substitutability test can be implemented.

Moreover, the Recommendation considers that while some forms of dedicated access, such as leased lines, may be used in locations where there is demand for a large number of user connections, leased lines are in general not substitutable with fixed narrowband access. In addition, the non-substitutability may also be established by the fact that leased lines provide only transmission capacity whereas the PSTN/ISDN services are intended to provide voice services.

Last but not least, in the 2003 Market Recommendation a distinction was made between residential and non-residential users. However, the Commission finds that the two may not significantly and systematically differ; therefore the 2007 Recommendation proposes one single narrowband access market for residential and non-residential customers.

A.3.2 General Trends

Between 2008 and 2012 the Commission published 52 decisions related to Market 1/2007 that were notified by 24 Member States, including Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden and the UK. The notifications of Ireland and Portugal only relate to remedies and are thus not examined. Among those Member States, three (*i.e.* Austria, France, Hungary) notified twice. The large majority of these draft decisions do not raise particular issues regarding market definition, while national regulatory authorities in 9 Member-States have in 13 cases defined markets that raised comments from the European Commission. A national Three Criteria Test has only been performed in the Maltese case MT/2009/0980 (later withdrawn) and by the Netherlands. All the notifying NRAs but Finland (which even considers the nationally obliged Three Criteria Test is not met)[196] consider that this market is not effectively competitive and should be susceptible to ex-ante regulation.

The major factors to assess the substitutability are price, functionalities (such as numbering, access to emergency services, ability to receive faxes, ease of use, ability to use standard end-user equipment, etc.) and consumer perceptions. Among those, price remains the most important factors.

General substitution pattern between PSTN/ISDN and alternative technologies can be observed from the subsequent two aspects:

- 20 Member States (excluding Estonia and Greece) consider fibre networks should be included. Estonia and Greece excluded fibre not on the ground that there are not substitutable, but that the roll out of fibre in their territories is too small, only a few hundreds connections in Estonia[197] and 0.1% for Greece;[198]
- 15 Member States (excluding seven Member States, *i.e.* Cyprus, Czech, Finland, France, Greece, Italy and Sweden) consider cable networks should be included. Reasons are nevertheless not presented within the notifications. It may be explained by the fact that cable-based telephone access is not strong is those countries. Accordingly, the inclusion or exclusion

[196] Commission decision concerning Cases FI/2010/1131 and 1132: Market for access at a fixed location and markets for local call services, 15/10/2010.

[197] Case EE/2010/1051: Access to the public fixed telephone network provided at a fixed location for residential and non-residential customers, 17/03/2010.

[198] Commission decision concerning case EL/2011/1226: access to the public telephone network at a fixed location for residential and non-residential customers (market 1) in Greece, 20/06/2011.

of cable does not affect the designation of SMP operators. For example, the taking-up of cable broadband in Cyprus, France, Greece and Italy is among the lowest in the EU.[199] The case in Finland is different. Since the Finnish NRA concludes that Market 1/2007 is competitive and thus the inclusion of cable does matter as it would have made this market more competitive.[200] However, the situations of Czech and Sweden need to be clarified by the countries' reporters, as cable networks are strong in the two countries. The exclusion of cable may possibly overstate the market power of PSTN incumbents.

With regard to the division between residential and non-residential users, only five Member States decided to maintain two separate markets simply due to their different individual demands, *i.e.* Austria, Bulgaria, France, Italy and Latvia. This confirms to the statement in the Recommendation that "the contractual terms of access, in most Member States, do not significantly and systematically differ between residential and non-residential access".

However, another trend has been observed that six Member States (Belgium, Cyprus, Czech, Greece, Malta and the UK) separated Market 1/2007 based on bandwidth, *i.e.* dividing Market 1/2007 into low-capacity access (including PSTN, ISDN 2 and networks with equivalent bandwidth) and high-capacity access (ISDN 30 and networks with equivalent bandwidth). While low-capacity access targets residential users and SMEs and high-capacity access does large business, this type of division involves more economic analysis than simply dividing the market based on user types. Other Member States delineated a single market for Market 1/2007.

Some developments

Some Member States defined relevant markets different from the Recommendation, and received Commission comments. These deviations are mainly the following three.

The inclusion of fixed broadband access

Voice over Internet Protocol (VoIP) is able to compete against telephone services delivered via public available telephone networks. The question remains how to take into account this competitive constraint in the definition of Market 1/2007.

Before reviewing the notification, it should be noted that VoIP can be divided into two types: managed VoIP, or Voice over Broadband (VoB), and unmanaged VoIP (*i.e.* VoIP over internet). The Recommendation makes it clear that unmanaged VoIP for the time being is not a substitute for narrowband access due to quality differences and product characteristics (*e.g.* whether conventional handsets can be used and/or whether a connected computer must be switched on in order to receive calls). Although it also recognises that the differences may disappear over time as the quality of unmanaged VoIP improves and technical features change, no Member States so far include unmanaged VoIP into Market 1/2007.

The question remains largely whether managed VoB should be included in this market. Eight Member States (Austria, Belgium, Germany, Greece, Hungary, Italy, Romania and Slovakia) consider that substitution has already been found in their territories. While it has not vetoed any notification, the Commission expressed its general doubt over including broadband access that is capable of realising managed VoB into Market 1/2007.

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199 Commission Staff Working Document Accompanying the Progress Report on the Single European Electronic Communications Market (15th Report), Part I, pp 25.

200 Commission decision concerning Cases Cases FI/2010/1131 and 1132: Market for access at a fixed location and markets for local call services, 15/10/2010.

The top concern of the Commission is that while traditional telephone access can be provided on a stand-alone basis it is not the case in relation to broadband access providing VoB services. Consumers would not switch to broadband access for the sole purpose of voice services. Consequently, managed VoB stays always in a bundle with other services, such as broadband Internet or IPTV services. Although this may not affect the supply-side substitution between traditional telephone access and managed VoB, it does affect the demand-side substitution. The Commission expressed particular doubt on the substitution on markets where the penetration of broadband is low.[201]

Furthermore, the Commission underlines that the demand-side substitution may be established by examining the following factors: (i) price (tariffs of broadband access realising VoB should be in a comparable range with traditional telephone access product, which should be checked based on a SSNIP test), (ii) functionalities (in terms of numbering, access to emergency services, ability to receive faxes, ease of use, ability to use standard end-user equipment, etc.) and (iii) consumer perception (to what extent consumers have switched, and will switch, from traditional telephone access to managed VoB). So far, no Member State has successfully convinced the Commission of its analysis.

Another question relevant to the discussion of including managed VoB into Market 1/2007 is whether differentiated or no remedies may be imposed upon managed VoB. The Commission articulates that regulatory remedies should be based on the competition problems identified on the relevant market defined, rather than technologies or platforms. Therefore, the same regulatory remedies should be extended to all products and services pertaining to the designated SMP operators within that relevant market, regardless of technologies employed.[202]

The inclusion of wireless connections

Nine Member States (Bulgaria, Estonia, Greece, Hungary, Italy, Latvia, Poland, Slovakia and Spain) decided to include wireless connections that can realise telephone services to Market 1/2007. While wireless connections are defined differently among Member States, they normally include three types of products: (1) wireless local loop, (2) home-zone products[203] and (3) wireless broadband (CDMA, WiMax, WiFi, etc.). Due to the limited mobility of those products, NRAs must consider that they are on the same market as fixed access.

The Commission has never commented on the inclusion of the first two products, *i.e.* wireless local loop and home-zone products. One of the reasons may be that these products are mostly provided only by alternative operators, rather than the incumbent operators, and they have not offered significant competitive constraints. As a result, such an inclusion affects neither the designation of SMP operators nor the imposition of remedies.

The inclusion of public mobile networks

The public mobile networks refer to access networks that are able to deliver mobile telephone calls, which is different from the wireless access product discussed in the above. Only Finland considers

201 Case HU/2010/1095: Retail access to the public telephone network at a fixed location for residential and non-residential customers, 22/07/2010.

202 RO/2009/1001: Retail access to the public telephone network at a fixed location for residential and non-residential customers, 03.12.2009.

203 The so-called Home Zone service, provided via the mobile radio telephone network, using the mobile terminal equipment enables the subscriber - in the mobile radio telephone cell that is intended to provide radio telephone services at the subscriber's permanent residence (apartment, office) - to make calls towards the subscribers of the fixed location network for a fee not significantly different from the tariffs of fixed location calls, by selecting a fixed location number, as well as to receive calls arriving to his/her fixed location geographical number within the cell free of charge.

mobile access is in the same relevant market as traditional fixed telephone access.[204] The substitution between mobile and fixed telephone access is sitting on the background of the fixed-mobile convergence. It has also been noticed by other NRAs, such as France,[205] that promised to monitor the convergence in the near future to see if substitution can actually take place. The fixed-mobile convergence, especially in Member States with very high mobile penetration rate, may have significant impact on the next generation of the market recommendation.

The Commission finally does not oppose to the Finnish NRA's 'serious deviation' from the Recommendation. This suggests that the Commission agrees with the Finnish NRA's analysis. The Finnish NRA bases its analysis on the following facts:

a) Decreasing volume of fixed telephony subscriptions and increasing take-up of mobile services. Since 2005 the volume of fixed subscriptions dropped by 35% (50% in the residential and 10% in the non-residential segment). During the same period, mobile subscriptions increased by 45%;
b) Decreasing volume of calls realised on fixed networks and corresponding increase of calls on mobile networks;
c) Pricing of subscription fees and calls. With regard to one-off and monthly subscription fees, the fixed telephony network is significantly more expensive than the mobile;
d) Customer preferences and usage patterns. In Finland only 1% of households are 'fixed only' households. In the last 2 years, the number of 'mobile only' customers has increased from 70% to 75%.

Finally, the Netherlands apply a specific approach by analysing the Markets 1/2007 and 2/2007 combined and concluding to the existence of three national retail markets that are reflected at wholesale level: (i) PSTN/VoB1 access and calls (single calls market), (ii) ISDN1/ISDN2/VoB2 access and calls (dual calls market) and (iii) ISDN15/ISDN20/ISDN30 access and calls (multiple calls market). OPTA finds access and calls to be part of the same product market since in the Netherlands 98% of customers take the access subscription and call services from one and the same provider. OPTA finds that all access/call services delivered over copper, fibre and coaxial cable networks belong to the same relevant wholesale markets that are national in scope.

A.3.3 Observations

Market 1/2007 concerns in particular the PSTN or digitalised ISDN networks. The underlying idea to subject this market to ex-ante regulation rests on the fear that alternative operators would not reach a specific customer without acquiring certain inputs from the incumbent operators. A full replication of the incumbents' copper lines is practically impossible and has not been observed in the EU. The most reliable way to counteract the incumbents' competitive advantage is to resort to other access products, most importantly four (1) Cable TV, (2) fixed broadband, (3) wireless broadband, and (4) mobile. The issue regarding the first three is that telephone services via those networks are usually bundled with other products, which is different from the fact that telephone services via the traditionally telephone networks can be provided individually. The issue in relation to mobile network is the controversial substitution (or one-way substitution, *i.e.* switch only taking place from fixed to mobile and not vice versa) between fixed and mobile telephone calls. In addition, fibre networks, or next generation access networks, potentially also have an impact on the traditional

[204] Commission decision concerning Cases FI/2010/1131 and 1132: Market for access at a fixed location and markets for local call services, 15/10/2010.

[205] Commission decision concerning Case FR/2011/1234: access to the public telephone network at a fixed location for residential and non-residential customers in France, 11/07/2011.

telephone networks. The problem is that its rollout has so far not been able to establish a significant presence.

Furthermore, the substitution of traditional fixed telephone access with access products based on other technologies, specially fixed and wireless broadband access has an increased relevance. In view of the fact of the strong competition from VoB against traditional telephone, an access obligation on VoB may be imposed either on this market or on the market for wholesale broadband access. As will be discussed in relation to the Market 3-6/2003, VoB can exert important competition constraints on those incumbents with traditional telephone networks, and thus results into effective competition on the Market 3-6/2003 further. In addition, the fixed-mobile convergence may have, to some extent, an impact on the delineation of this market.

A.4 Call origination on the public telephone network provided at a fixed location (Market 2/2007)

A.4.1 The Recommendation

The service of delivering a fixed telephone call or affiliated services (such as fax and dial-up Internet) can be broken into three elements: call origination, call conveyance (including routing and switching) of varying kinds and call termination.[206] Call origination is a service provided by a subscriber's network provider to deliver an outgoing call from the subscriber's termination point to the earliest point that can be taken over by another operator. The Recommendation nevertheless does not specify where that earliest point must be; this is left to the discretion of the NRAs.

Call origination remains a service offered via a network operator's access network. In order to enable an outgoing call for their customers, operators without access infrastructure reaching a given customer must purchase call origination services from that network operator. Instead of buying it as a service, other operators can also realise call origination at the infrastructure level, *e.g.* by building their own access network to a given customer or by sharing the existing access network already established (say unbundled local loop, hereinafter LLU).[207]

The building option is of course preferred. However, the last mile is still considered as a non-replicable part of the electronic communications networks for many reasons (sunk costs to roll out an alternative network, time-consuming process, etc.) and thus involves high and non-transitory entry barriers. Therefore, the Three Criteria Test is (and will be in the next several years) still met. The sharing option, *i.e.* LLU, thus turns out to be the second best choice. The EU has pushed LLU as an obligation since the late 1990s. So far, LLU has taken place in varying degrees in all the Member States. LLU can also circumvent the problem of call origination and thus constitute a possible substitute. However, it should be noted that LLU generally is considered as a different market from call origination. First, a transition from call origination to LLU involves significant sunk costs. Secondly, LLU can realise more functions than telephone calls. In view of this shrinking size of the fixed call market, it is hard to believe that an operator launches LLU for the sole purpose of call origination. These significantly affect the substitution between call origination and LLU from the demand-side.

In addition, wholesale call origination services (originating access or interconnection) can be provided in the form of minutes or in the form of capacity. They may also be supplied together with switching and/or call conveyance services.

A.4.2 General trends

This research collects 80 notifications from 24 Member States plus Gibraltar. In almost all cases (*i.e.* 87%), the national regulatory authorities define their national markets corresponding to the approach of the Recommendation. Six Member-States (corresponding to 8% of the notified analyses of Market 2/2007) proposed markets which raised comments of the European

[206] Explanatory Note to the Recommendation, supra note 156, pp.25.
[207] Ibid, pp.26.

Commission, while only the United Kingdom defined markets respectively wholesale fixed analogue exchange lines markets, case UK/2010/1139; and fixed narrowband services wholesale markets, case UK/2009/0898) in such a way that it required a national Three Criteria Test. All the notifying NRAs propose to keep Market 2/2007 subject to ex-ante regulation and impose obligations on the former monopolist. General trends can be observed in the following aspects.

Segmentation between residential and non-residential customers

No Member States, except for the Netherlands, decides to maintain separate markets of Market 2/2007 for residential and business customers. The Commission is in agreement with the majority in this matter. It comments in the Dutch notification that wholesale call origination services for residential and business customers are functionally identical; an operator providing these services to residential customers could easily switch to provide the same services to business customers and vice versa. Therefore, it thinks that the two should be on the same relevant market. However, since the segmentation does not have any impact either on market analysis or on regulatory obligations, the Commission leaves opens such a deviation from the Recommendation. [208]

The range of call origination

Call origination is defined as a service provided by network operators to convey traffic from network termination points at the subscriber's premises to the nearest (or first) switching point at which another network operator takes over traffic. The nearest switching point is determined on the basis of the technologies as different platforms have distinct first switching points. Romania offers a different definition of Market 2/2007 as its call origination may start from the terminal point of the network (connection to the subscriber's equipment) until a higher network level than the first switching equipment if the interconnection point with the wholesale customer's network is placed at a higher network level than the first switching equipment.[209] Therefore, Romania's definition of Market 2/2007 may also include call transit service, so overlapping the later discussed Market 10/2003. As the Recommendation does not specify the distinction point of call origination and call transition, the Commission does not challenge this definition. Nevertheless, it should be noted that the Commission is not convinced that call origination can be defined in such a broad manner.

Geographic and non-geographic numbers

Call origination is defined by all the Member States to realise call to both geographic numbers and non-geographic numbers and added-value services, such as dial-up Internet and fax. Therefore, it includes managed VoB and excludes unmanaged VoIP.

Different technologies

Call origination is defined on a technological natural way. Consequently, call origination on traditional PSTN/ISDN networks and alternative technologies (most importantly fibre and CATV) are considered on the same relevant market.

Self-supply

Self-supply are calculated by all the notifying NRAs. Nevertheless, Estonia decides to exclude 'on-net calls' (*i.e.* internal traffic which originates and terminates on the operators own network) since the infrastructure used and the expenses of on-net call origination are smaller compared with off-net calls (given that an on-net call usually does not pass a double transit switch).[210] The Estonian regulator, ECA in its draft measure had included in the definition of the relevant market both call origination services provided externally (to other operators) and internally (provided to its vertically

[208] Case NL/2008/0822: Call origination on the public telephone network provided at a fixed location, 05/12/2008.
[209] RO/2009/1002: Wholesale call origination on the public telephone network provided at a fixed location, 03.12.2009
[210] Case EE/2010/1038 – Wholesale call origination on the public telephone network provided at a fixed location, 12.02.2010.

integrated retail arm); *i.e.* it includes self-supply. However, ECA excludes from its market definition any internal traffic which originates and terminates on the operators own network, *i.e.* 'on-net calls' since, in its view, the infrastructure used and the expenses of on-net call origination are smaller compared with off-net calls (given that an on-net call usually does not pass a double transit switch). Among other comments, the Commission raises doubts on the exclusion of 'on-net calls' in the market definition for call origination.

A.4.3 Observations

Based on the notifications, Market 2/2007 shows little prospect of effective competition. In almost all Member States, the SMP operator had more than 80% market shares. The bottleneck regarding call origination can only be tackled by establishing alterative access networks. This may be realised by transforming the existing CATV networks or by rolling out a new access network, presumably NGA. However, with regard to the former, existing CATV networks are usually scattered around the EU; with regard to the latter, the rolling out is slow in the sense that it cannot exert sufficient competition impact within one or two periods of market reviews. In addition, the shrinking size of fixed call markets also make it unattractive for new entrants to enter the markets for fixed calls. Consequently, throughout the EU all the incumbent operators still possess a large amount of market shares; and this situation may not see improvement in the near future.

However, the vigorous development of VoB may be able to change the status quo, which should be paid extra attention in the future review of Market 2/2007. For example, the subsequently provided guidance by Denmark in its notification can offer us a better view on such a possible evolution.[211]

Table A.4.1 Call origination traffic is distributed among the different platforms in Denmark

Distribution of origination traffic	2007	2008	2009	2010	2011	2012
	Year end			Estimate		
PSTN	61%	55%	47%	39%	30%	21%
ISDN	34%	35%	35%	35%	33%	30%
VoB	6%	10%	17%	26%	37%	49%

From the technological perspective, VoB has potential to become a strong substitute for the traditional telephone networks. The launch of VoB should involve significantly less sunk costs than establishing an alternative access network and, thus, constrain the traditional telephone network.

[211] Commission decision concerning case DK/2010/1149: Wholesale market for call origination on the public telephone network at a fixed location in Denmark, 08/12/2010.

A.5 Call termination on individual public telephone networks provided at a fixed location (Market 3/2007)

A.5.1 The Recommendation

Call termination is the least replicable element in the series of inputs required to provide retail call services. Wholesale call termination is required in order to terminate calls to called locations or subscribers. It comprises a call conveyance service that routes incoming traffic originated either from a network operator's own network or from other operators' networks to a fixed network termination point at the lowest possible point of interconnection to an end-user's premise. The Recommendation does define the concept of the lowest possible point of interconnection, and maintains that it may be at relatively high levels in the network, thus in practice including call conveyance.[212]

From the supply-side, call termination of one network operator may be substituted if all (or at least a substantial number of) fixed locations or subscribers in a given geographical area were connected by two or more networks; then alternative possibilities would exist for terminating calls to given locations. Another possible source of supply substitution exists if it was technically possible for calls to a given location or end-user to be terminated by an undertaking other than the one operating the network that serves the given location. Currently, no such supply substitution is possible.[213]

From the demand-side, there are possibilities for demand substitution at the retail level. Examples could comprise any means of communication that constituted a reasonable alternative to making a call to the location or subscriber number concerned. However, the Recommendation does not consider that the alternative possibility leads to an effective constraint on the setting of call termination charges by making it unprofitable for a network to raise call termination charges.[214] Therefore, the Recommendation reaches a conclusion that one network constitutes one relevant market. [215]

Furthermore, the Recommendation underlines that such a market definition does not automatically mean that every network operator has SMP. It suggests that countervailing buying power and other factors (not specified) may counterbalance the 100% market share due to the market definition as such.[216] However, the subsequent explanation to this effect within the Recommendation is rather controversial. It asks NRAs to examine the ability of a given network operator to raise termination rates vis-à-vis the incumbent fixed network operator. However, the Recommendation does not further develop on this point.

A.5.2 General Trends

This report analysed 101 notifications from 24 Member States, plus one region, *i.e.* Gibraltar.

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212 Explanatory Note to the Recommendation, supra note 156, pp.24.
213 Ibid.
214 Ibid.
215 Ibid.
216 Ibid, pp.25.

In 92% of the cases, the market proposed by the national regulatory authority can be considered as within the scope of the Recommendation. The proposed market definition of five national regulatory authorities raised comments of the European Commission. Only the United Kingdom defined markets respectively wholesale fixed analogue exchange lines markets, case UK/2010/1139; and fixed narrowband services wholesale markets, case UK/2009/0898) in such a way that it required a national Three Criteria Test. All the national regulatory authorities follow the Recommendation in relation to the definition of Market 3/2007 that one network constitutes one market, and designate every network operator as SMP operators. It is found that all the notifying NRAs include managed VoB and exclude unmanaged VoB in this market. In case UK/2010/1082 the European Commission commented on the conclusion of OFCOM that indirect competitive constraints stemming from telephony services based on IP-based technologies were likely to remain limited.

While they may not affect the designation of SMP, variances within NRAs' notification can be observed from the subsequent aspects.

The inclusion of managed VoB

The principle of technological neutrality is widely respected by all the notifying NRAs. Consensus exists that all the notifying NRAs consider that incoming calls can be originated both from fixed networks and mobile networks. Moreover, they also concur that networks providing call termination include both traditional PSTN networks and fixed data networks, *i.e.* VoIP, via other technologies, such as cable or fibre. Only managed VoB is relevant here and all the notifying NRAs exclude unmanaged VoIP that fall outside national numbering planning. Furthermore, it is also observed that 6 Member States (Czech, Germany, Italy, Poland, Romania and Slovakia) include wireless data networks (more specifically called the home-zone product[217]) into Market 3/2007. The Commission within the Italian notification provides a long comment to this new phenomenon.[218] It basically agrees that there indeed exists substitution between termination on a geographic number via fixed networks and via mobile networks that impose limited mobility upon users as they both share economic and functional characteristics.

Termination to non-geographic numbers

Second, all the notifying NRAs agree that Market 3/2007 includes calls termination on geographic numbers. However, there are some differences with regard to calls terminated on non-geographic numbers. Non-geographic numbers can be further divided into two types: those providing value-added services and those also providing public telephone services. With regard to the latter, it is clear that the Commission also considers that they should be included into Market 3/2007 on the grounds of similar competitive conditions to the geographic numbers.[219] The difficult case is the first type. Most NRAs exclude call termination on non-geographic numbers providing value-added services from Market 3/2007 due to their diverse (i) functionalities, (ii) network coverage requirements, (iii) costs of providing the service and (iv) competitive conditions. However, divergences exist over non-geographic numbers of public interest, such as 116 for missing children

[217] It refers to mobile voice service at a fixed location. Customers using this service receive a telephone number from the fixed numbering plan, containing the area code of the location where the service is provided. Nevertheless, the network does not allow clients to switch between different cells. Thus, when a client walks outside the range of a base station (usually hundreds of meters), his call will be disconnected. This can be realised both by mobile networks and fixed networks.

[218] Case IT 2008/0777: Voice call termination on individual public telephone networks provided at a fixed location in Italy, 18/06/2008.

[219] Commission decision concerning Case BE/2011/1279: Call termination on individual public telephone networks provided at a fixed location in Belgium, 30/01/2012; Cases FR/2008/0783 and FR/2008/0784: Call origination on the public telephone network provided at a fixed location and call termination on individual public telephone networks provided at a fixed location in France, 25/07/2008; and also Case SE/2009/0967: Call termination on individual public telephone networks provided at a fixed location in Sweden, 01.10.2009.

or 112 for emergency services. Three Member States (Belgium,[220] the Netherlands[221] and Romania[222]) decide to include call termination on those numbers into Market 3/2007. The Commission has never made comments on this aspect, possibly because the inclusion or exclusion of those numbers will not affect the designation of SMP operators and those numbers are subject to regulation to some extent.

The range of call termination

The Recommendation does not specify at which point on a network call termination starts. In practice, it is observed that NRAs take various points, depending on the typology of different networks. Some NRA even defined regional and national termination where operators have only-level network.[223] However, due to its market definition, any components included in Market 3/2007 should be regulated. It becomes a concern that NRAs may unnecessarily expand the scope of Market 3/2007. The Romanian NRA defines Market 9 as the relevant network segment for call termination as that part of the network which runs from *the point of interconnection with the wholesale customer's network* to the end user's premises, rather than the lower level of interconnection. This potentially includes part of wholesale transit service for fixed telephone calls into regulation. Consequently, the Commission initially challenged such a conclusion. The notification was not vetoed because according to the further information provided by the Romanian NRA there was not a viable substitute when terminating calls while using own infrastructure or third party transit services. Nevertheless, the Commission still asks the Romanian NRA to closely monitor the market and, if competitive developments in the transit/conveyance of calls at higher network levels progress more swiftly than at lower network levels, the Romanian NRA should revisit this market and adjust the definition of the terminating network segment appropriately.[224]

Self-supply

The treatment of self-supply (termination for on-net calls) is also different among Member States. Based on the limited information indicated in the notifications, four Member States (Austria, Cyprus, Greece and Malta) include self-supply into Market 3/2007, while three Member States (Bulgaria, Estonia and France) decide against it. The inclusion or exclusion of self-supply has little effect on the calculation of market shares as in any case where a network operator has 100% market share. As a result, the Commission has never commented on this issue.

A.5.3 Observations

After the Commission decision to veto a draft market analysis,[225] no NRAs have ever challenged the definition of Market 3/2007 that one network constitutes one market. Although the Recommendation explicitly states that such a definition does not automatically make a network operator an SMP operator, it is less clear how an operator with 100% market share can be constrained by other forces. In practice, it leads to a situation that all network operators are

220 Commission decision concerning Case BE/2011/1279: Call termination on individual public telephone networks provided at a fixed location in Belgium, 30/01/2012.

221 Commission decision concerning case NL/2010/1079: Call termination on individual public telephone networks provided at a fixed location, 7/06/2010.

222 Case RO/2008/0774: Voice call termination on individual public telephone networks provided at a fixed location, 6/06/2008.

223 *E.g.* Commission decision concerning Case BE/2011/1279: Call termination on individual public telephone networks provided at a fixed location in Belgium, 30/01/2012.

224 Case RO/2008/0774: Voice call termination on individual public telephone networks provided at a fixed location, 6/06/2008.

225 Commission Decision of 17 May 2005 pursuant to Article 7(4) of Directive 2002/21/EC ('Withdrawal of notified draft measures') DE/2005/0144: Call termination on individual public telephone networks provided at a fixed location, Brussels, 17 May 2005, C(2005)1442 final.

designated as SMP operators. Furthermore, so far no evidence indicates that multiple terminations can be found with a substantial number of clients for fixed telephone call services. Thus, it is considered that, at least in a medium term, the monopolies over call termination will be maintained.

A.6 Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location (Market 4/2007)

A.6.1 The Recommendation

In order for broadband access to Internet and related data services to be supplied to an end-user at a fixed location, a suitable transmission channel is required that is capable of passing data in both directions and at rates that are appropriate for the service demanded. A new entrant in principle has two options, building a complete network linking its core network and an end-user's premise, and alternatively building none or some parts of the whole network and obtaining access to the incumbent's network. The first option is more costly than the second. In order to facilitate the entry of new comers, NRAs apply the so-called ladder of investment theory. This theory divides a complete network into components with different levels according to the difficulty and cost of building, which are assimilated into different rungs on the ladder. In principle, SMP operators should ensure that access products are available to the alternative operator. Furthermore, the access obligations should be incentive compatible to the extent that alternative operators, after climbing up to a certain rung, will be incentivised to climb up until a full replication of the incumbent's network is achieved.

Market 4/2007 deals with the second highest rung on the investment ladder, while the highest is a full replication. It refers to the local access, or the local loop in traditional terms, which links an end-user's premise and the local exchange. Local loop is considered to be the least replicable element in the establishment of an access transmission channel to an end-user location is local access or the local loop. There are major obstacles in terms of cost, time and legal barriers to duplicating the incumbent's local access network. Barriers to entering the local loop market are indeed high and non-transitory. Behind the barriers to entry, there is no tendency towards effective competition.[226]

Access to local loops can take different forms, such as fully unbundled (where traditionally telephone service is also unbundled), partially unbundled or shared access (where only data service is unbundled) and unbundled sub-loops (where part of a local loop is unbundled). It should be noted that unbundled local loop also includes unbundling associated facilities, meaning "those associated services, physical infrastructures and other facilities or elements associated with an electronic communications network and/or an electronic communications service that enable and/or support the provision of services via that network and/or service or have the potential to do so, and include, inter alia, buildings or entries to buildings, building wiring, antennae, towers and other supporting constructions, ducts, conduits, masts, manholes and cabinets".[227]

The Regulatory Framework requires that relevant markets should be defined in a technological neutral manner. Within the first market recommendation, Market 4/2007 was defined as wholesale unbundled access (including shared access) to metallic loops and sub-loops for the purpose of providing broadband and voice services. Nevertheless, in view of the increasing development of other access technologies, the term of metallic loops became outdated. Consequently, within the

[226] Explanatory Note to the Recommendation, supra note 156, pp.31.
[227] Framework Directive, supra note 150, Article 2(e).

2007 Recommendation Market 4/2007 is defined in a more technological neutral way as network infrastructure access.

Due to this technological neutral market definition, one of the most important questions for the definition of Market 4/2007 is what types of technologies can be included. The Recommendation has a discussion on two of them: cable and fibre. With regard to cable, the Commission states that while upgraded cable systems have become more widely developed and deployed in some parts of the EU, such systems overall still have a limited coverage. Moreover, the unbundling of cable networks at the time does not appear technologically possible, or economically viable, so that an equivalent service to local loop unbundling cannot be provided over cable networks. However, the indirect constraint exercised by cable networks will need to be taken into account when assessing whether an operator enjoys SMP.[228] The question left by the Recommendation is, nevertheless, how to take into account indirect constraints of cable. Moreover, different from the attitude to access to cable networks, the Commission maintains that access to fibre should in principle be regulated. The main reason is that fibre represents the future of access network, or next generation access (NGA). As networks evolve in most Member States and existing metallic loops are (partially or even fully) replaced by fibre, the existing local loop may become significantly shorter than today's local loops, or even disappear entirely.[229]

Another question relating to Market 4/2007 is its border with Market 5/2007, discussed afterwards. The Recommendation differentiates two wholesale markets: wholesale unbundled access and wholesale broadband access (Market 5/2007). This distinction is two-fold. The first is that Market 4/2007 relates to physical access, whereas Market 5/2007 concerns non-physical access. The second is the functionalities of the two access products. For example, the two services (access to unbundled loops and wholesale broadband access) can frequently be distinguished on the basis of the flexibility they give in supplying the retail service or by means of the location at which access is obtained. Hence, unbundled loops typically give greater flexibility and control over the retail broadband service offered to the end-user and have typically been supplied at the main distribution frame (MDF). In contrast, wholesale broadband access in the form of a bit-stream service typically gives less flexibility over the retail service and may be supplied at higher points in the network (such as regional interconnection points), as well as at the MDF.[230]

A.6.2 The NGA Recommendation

Despite such a principle, the emergence of NGAs may result in practical regulatory challenges in ensuring a level playing field for all competitors. These challenges rest on the fact that the rolling out of NGAs can change the existing structure of the topology[231] of the current network (*i.e.* the copper networks), which nevertheless serves as a significant factor for the remedies imposed by NRAs.[232] Therefore, two questions are of particular relevance: (i) whether the existing obligations based on the copper networks can be immediately and seamlessly applicable to the emergence of NGAs and (ii) how access remedies can be designed to encourage both efficient investment in NGAs and effective competition at the same time. Furthermore, attention should be paid to the different architectures that are (or will be) used to build NGAs, *i.e.* the different extent to which NGAs will wholly or in part replace the existing metallic local loops. The regulatory implications of

[228] Explanatory Note to the Recommendation, supra note 156, pp.32-33.
[229] Ibid, pp.33.
[230] Ibid, pp.32.
[231] For example, the current LLU obligation can be granted at the MDF level. Nevertheless, the MDF will disappear within the deployment of fibre networks.
[232] This suggests that the principle of technological neutrality is not always respected consistently in the regulation of the electronic communications sector.

these different architectures are also different. Two basic types of architectures are identified for this purpose, *i.e.* FttN (fibre to the nodes) and FttH (fibre to the home). For these reasons, the Commission adopted the recommendation on NGA.[233]

According to the NGA recommendation, the existing access obligations imposed in relation to Market 4/2007 should in principle also be extended to an operator with SMP on Market 4/2007 that deploys and operates an NGA network. Nevertheless, the deployment of NGAs does require changes to the current LLU remedies that are based on the copper networks.

Access to civil engineering infrastructure

The civil engineering infrastructure comprises the physical local loop facilities deployed by an electronic communications operator to host local loop cables, such as copper wires, optical fibre and co-axial cables. It typically refers (but is not limited) to subterranean or above-ground assets, such as sub-ducts, ducts,[234] manholes[235] and poles. It may be significant for alternative operators to roll out parallel NGA networks. NRAs should assess the availability of the SMP operator's civil engineering infrastructure for the purpose of allowing alternative operators to deploy their own NGA networks. Nevertheless, since the costs of deploying parallel fibre access networks are very high, it is appropriate for the NRAs to consider the views of all market players and assess the market demand for such access before mandating it. NRAs can use their powers under Article 5 of the Framework Directive to obtain all relevant information. If market demand exists, NRAs should mandate access to civil engineering infrastructure. In addition, NRAs should encourage or, where legally possible under national law, oblige the SMP operator when building its civil engineering infrastructure to install sufficient capacity for other operators to make use of these facilities.

Access to FttH

FttH is more complex than FttN, since it involves a complete replacement of the copper network with a new fibre network. There are two scenarios for FttH: point-to-point FttH (*i.e.* each subscriber is provided with a dedicated optical fibre) and point-to-multipoint FttH (*i.e.* a group of subscribers share one optical fibre through passive splitters). A point-to-point FttH network could be unbundled, since there is a dedicated single optical fibre per end user, which is similar to the system used for the copper local loop. However, a point-to-multipoint FttH network could not be easily unbundled, because of the absence of a dedicated link to each end user. In view of this problem, the most significant change suggested by the Commission is that NRAs should encourage or, where legally possible under national law, oblige operators with SMP to deploy multiple fibre lines in the terminating segment.[236] The installation of multiple fibre lines means that the network operator will deploy more fibre lines than are needed for its own purpose in both the feeder and the drop segments of the access network. Although this costs more than single fibre networks, multiple fibre lines allow each alternative operator to control its own connection up to the end-user and are conducive to the development of long-term sustainable competition. Since multiple fibre lines result in extra (and unused) fibre lines, unbundling of the FttH loop is technically possible, regardless of whether it is a point-to-point or a point-to-multipoint FttH, *i.e.* this is technologically neutral. Accordingly, NRAs can impose obligations to unbundle access to the fibre loop and also other accompanying measures, such as the provision of co-location and backhaul. The Commission stresses that access should be given at the most appropriate point in the network, which is normally

233 Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA), O.J. L 251/35 (hereinafter: 'NGA Recommendation').

234 A duct is an underground pipe or conduit used to house (fibre, copper or coaxial) cables of either core or access networks.

235 A manhole is a hole, usually with a cover, through which a person may enter an underground utility vault used to house an access point for making cross-connections or performing maintenance on underground electronic communications cables.

236 NGA Recommendation, supra note 85, recital 19.

the Metropolitan Point of Presence ('MPoP').[237] Furthermore, NRAs should also mandate access to the terminating segment of the SMP operator's access network, including wiring inside buildings, taking into account the fact that any distribution point[238] will need to host a sufficient number of end-user connections to be commercially viable for the access-seekers.

Access to FttN

Since FttN replaces only part of the existing network and maintains the copper lines from the node to subscriber's premises, copper network-based LLU is not obsolete. Nevertheless, new possible barriers that are created by NGAs, in particular related to co-location and backhaul services,[239] imply necessary changes to the regulatory regime for alternative competitors.[240] Therefore, the Commission requires NRAs to assess the potential demand from operators seeking unbundled access to the copper sub-loop as well as the SMP operator's costs in providing such access, including street cabinet co-location. Having done so, NRAs should impose an obligation to meet reasonable requests for unbundled access to the copper sub-loop. Where necessary, obligations to provide backhaul services and ancillary measures should also be imposed.

A.6.3 General Trends

2008-2012 sees 107 notifications from 26 Member States. Of these notifications, 83% (86 cases) did not lead to any comment of the European Commission regarding markets defined. In 17 cases the Commission raised comments and none of the Member States have defined the market for wholesale (physical) network infrastructure access in such a way it required a national Three Criteria Test. No NRAs consider that their Market 4/2007 should not be subject to ex-ante regulation. In principle, they comply with the methodologies of the Recommendation to define Market 4/2007. However, even though it doesn't show from our strictly quantitative analysis, it should be noted that there are still some differences among those notifications.

Inclusion of fibre

With regard to the question whether to include fibre into Market 4/2007, most Member States follow the Recommendation and thus include fibre. Despite technological and economic divergence among Member States, all broadband architectures using fibre, such as FttN, FttC (fibre to the cabinet), FttB (fibre to the building) and FttH (fibre to the home), are considered on the same relevant market. Nevertheless, five Member States, *i.e.* Austria,[241] Belgium,[242] Bulgaria,[243]

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237 An MPoP is the point of interconnection between the access and core networks of an NGA network operator. It is equivalent to the Main Distribution Frame ("MDF") in the case of the copper access network. All NGA subscribers' connections in a given area (usually a town or part of a town) are centralised to the MPoP on an Optical Distribution Frame ('ODF'). From the ODF, NGA loops are connected to the core network equipment of the NGA network operator or of other operators, possibly via intermediate backhaul links where equipment is not co-located at the MPoP.

238 A distribution point is an intermediary node in an NGA network from where one or several fibre cables coming from the MPoP (the feeder segment) are split and distributed to connect to end users' premises (the terminating or drop segment). A distribution point generally serves several buildings or houses. It can be located either at the base of a building (in case of multi-dwelling units), or in the street. A distribution point hosts a distribution frame mutualising the drop cables, and possibly un-powered equipment such as optical splitters.

239 Backhaul services refer to duct access, dark fibre, wavelength division multiplexing services and managed capacity (Ethernet (L2/L3), SDH): see ERG Report on Next Generation Access—Economic Analysis and Regulatory Principles, ERG (09) (June 17, 2009), 13.

240 Street cabinets represent a barrier to entry because of their scarcity as a place for co-location. Once co-location is possible, alternative operators still need a backhaul link to connect their equipment from the place of co-location to their own transmission networks. However, sometimes it is not economically viable for access-seekers to self-provide the backhaul link.

241 Commission decision concerning Case AT/2010/1084: Market for wholesale (physical) network infrastructure access at a fixed location in Austria, 17/06/2010.

242 Commission decision concerning Case BE/2011/1227: Wholesale physical network infrastructure access at a fixed location, 20/06/2011.

Greece,[244] and Spain[245], decide to exclude fibre. The main reason is that the rolling out of fibre in these Member States is only at an early stage. The Commission maintains that fibre, as the future access network, should in principle be included. However, it does not challenge those notifications, as the small amount of fibre lines would not affect the designation of SMP. The last four years only observe two Member States (Denmark[246] and Spain[247]) changed their views on fibre (initially excluding and later including fibre on Market 4/2007).

Moreover, Germany does not include pure fibre lines serving large business end-users in the market definition.[248] However, the Commission points out that the Recommendation does not distinguish between access lines based on the type of end-user they serve (for example, residential or business users). Consequently, the starting point of any substitutability analysis should be that, in principle, both types of lines are part of the same market. Nevertheless, this does not mean that the Commission refutes the idea that NRAs may define market boundaries that deviate from those set out in the Recommendation as long as NRAs provide sufficient factual evidence. This has been observed in the Dutch notifications of Market 4/2007 where the Dutch NRA considers that FttO (fibre to the office) to business users in business parks with demand specificities that cannot be met by MDF/SDF access is on a different sub-market.[249]

Most remarkably is the attempt of the Lithuanian NRA to define separate markets for copper and fibre (Case LT/2010/1035). While the Commission does not in principle disagree with this idea, it raises the standard to do it. When deciding whether copper and fibre are on separate markets, the Commission requires NRAs to look not only at the demand-side and supply-side substitution based on the current market conditions, but also to adopt a forward-looking perspective. Based on this, the Commission disputes the evidence provided by the Lithuanian NRA in the form of serious concerns, such as (1) 76% of the respondents of copper users would not switch to fibre, (2) the fibre networks are scattered and (3) unbundled access to FttH lines is presumably more costly than unbundled access to copper loops.[250] This forces the Lithuanian NRA to change its original idea.[251]

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243 Commission decision concerning case BG/2011/1165: market for wholesale (physical) network infrastructure access in Bulgaria, 27/01/2011.

244 Commission decision concerning Case EL/2011/1232: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location (market 4) in Greece, 01/07/2011.

245 Cases ES/2008/0804 and ES/2008/0805: Wholesale (Physical) network infrastructure access and Wholesale Broadband access in Spain, 13/11/2008.

246 Case DK/2008/0860: Wholesale (physical) network infrastructure access at a fixed location, 2/02/2009; and Case DK/2012/1339: wholesale market for physical network infrastructure access in Denmark, 9/07/2012.

247 Cases ES/2008/0804 and ES/2008/0805: Wholesale (Physical) network infrastructure access and Wholesale Broadband access in Spain, 13/11/2008; and Commission decision concerning Case SE/2010/1061: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location, 19/04/2010.

248 Commission decision concerning case DE/2010/1122: Wholesale (physical) Network Infrastructure Access at a Fixed Location in Germany, 20/09/2010.

249 Commission Decision concerning Case NL/2012/1407: Unbundled access to business fibre networks in the Netherlands, 21.12.2012. See also Commission decision concerning case NL/2012/1298: Market Analysis on Unbundled Access to Corporate Fibre-Optic Network (ODF Access FttO) – sub-market to market 4 in the Netherlands: Opening of Phase II investigation pursuant to Article 7 of Directive 2002/21/EC as amended by Directive 2009/140/EC, 21/03/2012; Commission decision concerning Case NL/2011/1278: market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location in the Netherlands, 21/12/2011; Commission decision concerning case NL/2010/1041: OPTA's draft decision regarding the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location in the Netherlands, 15.03.2010.

250 Commission decision concerning case LT/2010/1035: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location, 10.03.2010.

251 Commission decision concerning case LT/2011/1197: Wholesale access to the local loop for broadband and/or voice services in Lithuania, 06/05/2011.

Inclusion of cable

The second question concerns whether cable should be included into Market 4/2007. The Recommendation advises against it. At the side of Member States, all but two (Portugal[252] and the UK[253]) exclude cable from Market 4/2007. Regarding Portugal and the UK, neither submitted that CATV could exert direct constraints on PSTN. Their analyses of including broadband over CATV in Market 4/2007 focused on indirect constraints. Both of them assumed that the price of wholesale input occupied a significant part of the retail price (50% in the Portuguese notification and 65-75% in the UK notification). Thus, in case of 10% price increase at the wholesale level there should be more than 5% price increase at the retail level. As a consequence, end-users would switch to CATV-based broadband to an extent that would make the wholesale price increase unprofitable. CATV was accordingly considered on the same relevant market as PSTN.

The Commission disagreed with this analysis in both of the notifications. In particular, it held that it would not be possible for the price increase to entirely be passed on to the end-users of retail broadband access products. This was mainly due to the fact that an LLU price increase could also affect other retail products, such as voice telephony and IPTV. Moreover, it was doubtful that competitors would not be able to partly absorb a 10% price increase in their margins. Nevertheless, the Commission did not veto the notifications. A main reason was that both ANACOM and OFCOM still proposed to designate the PSTN incumbents as SMP operators. Hence, the Commission declared that an exclusion of cable from the definition of Market 4/2007 would not lead to a different conclusion.

Inclusion of other technologies

Furthermore, broadband can also be delivered via other wireless technologies, such as WiFi, wireless local loop, mobile and so on. So far all the Member States but Italy concludes wireless broadband cannot be substitute for fixed broadband and thus exclude them out of Market 4/2007. The Commission does not agree with the Italian NRA's conclusion of including wireless local loop. However, it does not challenge the notification either as the subsequent SMP analysis is not affected in any case.[254]

A specific issue related to remedies: the Virtual Unbundled Local Access (VULA)

In addition, the Recommendation differentiates Market 4/2007 from Market 5/2007 based on whether the access is physical or non-physical. However, the distinction becomes obsolete due to the development of new technologies. Two Member States (Slovakia[255] and the UK[256]) include Virtual Unbundled Local Access (VULA) in Market 4/2007. Although VULA is characterised as an active NGA product, it has many features indicating that, in terms of functions, it is equivalent to local loop unbundling. Moreover, the level of control of the access connection and of the end-user connection provided by the VULA service appears significantly different from the level of control offered by other virtual access products. In particular, VULA should be made available at a location close to the end-customers' premises, similar to LLU. Furthermore, it should allow product differentiation and innovation similar to LLU and thus give access-seekers a sufficient degree of control (including the quality of service) over the local connection to the end-user, even if it does not give the alternative operator the same freedom to offer retail products as those he could offer through a fully unbundled fibre line. All these features distinguish VULA from bitstream access

252 Case PT/2009/0956: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location, 09.09.2009.

253 Commission decision concerning case UK/2010/1064: Wholesale local access market, 1/06/2010.

254 Case IT/2009/0891: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location, 14.04.2009.

255 Commission decision concerning Case SK/2012/1308: Wholesale (physical) network infrastructure access (including shared and fully unbundled access) at a fixed location in Slovakia, 19.04.2012.

256 Commission decision concerning case UK/2010/1064: Wholesale local access market, 1/06/2010.

products, whether regional or national. Thus, the Commission, at least, does not contest the decisions of those two NRAs.

A.6.4 Observations

Based on the notifications of NRAs and the comment of the Commission, it still holds that Market 4/2007 meets the Three Criteria Test. With regard to the substitutable technologies, Market 4/2007 so far only includes two technologies: traditional copper loop and new fibre loop. Fibre, unless its launch is at a very early stage, must be included. Most importantly, the two should be defined on the same relevant market; not on two separate sub-markets.

Moreover, it seems that CATV networks will not be subject to open-access obligations even in the future. The Europe 2020 Strategy expects to improve the average broadband speed for all EU citizens by 2020 about fifty times higher than the current EU average.[257] It thus sets up a clear target to foster the deployment and take-up of fibre networks. Under such a policy it can be foreseen that the current generation access networks, such as PSTN and CATV, will be gradually and persistently migrated to fibre and disappearing in the coming years. Furthermore, the NGA Recommendation considerably increases the consistency of NRAs' reviews of Market 4/2007.

Moreover, the Italian NRA's notification may suggest a further development of Market 4/2007. It proposes to define a combined market for Market 4/2007 and Market 5/2007 (wholesale broadband access). The main reason is that in Italy there is no market for Market 4/2007 as all wholesale local loop are only self-provided. Although the Commission does not raise serious doubts on this notification, it should be noted that the Commission does not support such a conclusion. The Commission in its comments points out that access through Market 4/2007 may exert indirect constraints at the retail level on products based on Market 5/2007. However, this should not be taken into account at the stage of market definition, but instead in the subsequent stage of SMP assessment.[258] This implies that so far the Commission still believes that Market 4/2007 and Market 5/2007 are separated.

[257] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Digital Agenda for Europe, COM(2010) 245, 19.05.2010, pp.19.

[258] Case IT/2009/0890: Access to the public telephone network at a fixed location for residential and non-residential customers, and Case IT/2009/0891: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location, 14.04.2009.

A.7 Wholesale Broadband Market (Market 5/2007)

A.7.1 The Recommendation

Market 5/2007 comprises wholesale bitstream services and equivalent services that enable (i) the transfer of a digital data flow in both directions using the access network, (ii) the transfer of a digital data flow in both directions using the core network and (iii) associated facilities required for the transmission of a digital data flow in both directions using the access and core networks. The Recommendation defines it as the provision of non-physical or virtual network access in order to be differentiated from Market 4/2007. However, as already discussed, the distinction of physical/non-physical access has become obsolete as some Member States have included virtual access in Market 4/2007; and other criteria should be used, such as localness, minimum functions incorporated, service-agnostic and dedicated capacity.[259] Moreover, the Recommendation does not define what it considers as "broadband". While its meaning may evolve over time, it is currently generally accepted throughout Europe that broadband should refer to a downstream capacity of more than 128kbit/s at least.

Bitstream is designed based on the traditional copper networks, and remains the first rungs on the investment ladder for alternative operators providing broadband services. Within copper networks, it includes three types of access at different levels of the networks: (1) IP access, (2) Asynchronous Transfer Mode (ATM) access and (3) Digital Subscriber Line Access Multiplexer (DSLAM) access. The Commission believes that there is a chain substitution within the category of DSL-based services, *e.g.* ADSL, ADSL2, ADSL2+, VDSL or other DSL technologies. Fibre is considered to be the next generation access networks and its roll out is generally based on the typology of copper networks. Consequently, the Recommendation maintains that fibre in principle should be also included into Market 5/2007 due to the direct competitive constraints on copper networks. The NGA recommendation maintains that bitstream access should also be imposed on fibre operators, unless there are clear indications of a break in the chain of substitution.

A most difficult issue related to Market 5/2007 is how to take into account other broadband technologies. According to the Recommendation, the definition of wholesale markets should derive from retail markets. At the retail level, a number of broadband access possibilities at a fixed location exist, such as copper-based DSL, cable TV networks, fibre and various non-fixed technologies (WiFi, WiMAX, mobile data, satellite, *etc.*). The retail broadband market is in general considered to be effectively competitive. While wireless technologies have not exerted sufficient competition on copper and fibre, broadband over cable turns out to be a difficult issue. The Recommendation states that cable at the time could not be unbundled and thus should be excluded from Market 5/2007.[260] Nevertheless, the Recommendation does not close the door completely and adds that the indirect constraints of cable can also be taken into consideration; however not at the stage of market definition but at the stage of SMP assessment.[261]

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259 Commission decision concerning case UK/2010/1064: Wholesale local access market; and Commission decision concerning case UK/2010/1065: Wholesale broadband access market, 1/06/2010.

260 Explanatory Note to the Recommendation, supra note 156, pp.32.

261 Ibid.

A.7.2 General Trends

In 2008-2012 the Commission received 86 notifications from 26 Member States (with no notification from Luxembourg). Only in 69% of the cases national regulatory authorities notified draft measures that did not raise any comment from the European Commission. Similarly to Market 4/2007, none of the draft measures defined markets in such a way that it required a national Three Criteria Test. Market 5/2007 shows a general trend toward effective competition. Although most Member States still consider that it should be subject to regulation, two Member States (Malta[262] and Romania[263]) have decided to deregulate this market due to sufficient infrastructure competition, though for different reasons. Malta has the advantage of small territory and high population density while in Romania the main reason is that the incumbent is a late-comer on the broadband market and never catches up. However, given the generally unsatisfactory situation in the EU, it seems that Market 5/2007 should remain on the recommended list of relevant markets.

Inclusion of fibre

The Recommendation maintains that fibre should be included into Market 5/2007. This is also supported by Member States. As it has been observed, all the Member States include fibre in the market definition. Two divergences are also noticed. First, despite the fact that no distinction is made in the NGA recommendation with regard to different technologies of fibre networks, Austria proposes to exclude FttH and include only FttC and FttB. The main reason is that in Austria there were only 3,500 fibre lines and the incumbent did not launch its fibre network yet. Taking into account the current status of FttH roll out by the incumbent in Austria, the Commission did not veto this notification as the exclusion of FttH-based products from the market definition does not impact the regulatory outcome. However, it urged the Austrian NRA to closely monitor market developments.[264] Second, Spain initially proposed to exclude from the market definition speeds above 30 Mb/s independently of the technology on which they are based due to the substitution break with speed below 30 Mb/s. This invoked serious doubts from the Commission because this substitution break may be considered artificial from a prospective perspective.[265] This forced the Spanish NRA to include all broadband products regardless of the speed.[266] Further, the Commission also commented on the intention of the national regulatory authority of Slovenia to include only access to fibre from the previous incumbent in the market definition.[267]

Inclusion of other technologies

The most discussed issue in the decision of the Commission is what other technologies can be included into Market 5/2007 in addition to copper and fibre. The Commission unambiguously underlines that fibre in principle must be included. This has received general support from most Member States. The proposal of Spain to exclude high-speed broadband higher than 30Mb/s from Market 5/2007 receives serious doubts from the Commission, which made the Spanish NRA revise its motivation.

However, the doubt with regard to other technologies has led to some convergences. Four Member States (Czech Republic,[268] Denmark,[269] Finland[270] and Malta[271]) also attempt to include wireless

[262] Commission Decision concerning Case MT/2012/1375: Wholesale broadband access in Malta, 15.11.2012.
[263] Commission decision concerning Case RO/2010/1102: market for wholesale broadband access in Romania, 6/08/2010.
[264] Commission decision concerning Case AT/2010/1136: Market for wholesale broadband access for the subsequent use of non-residential customers in Austria, 25/10/2010.
[265] Cases ES/2008/0804 and ES/2008/0805: Wholesale (Physical) network infrastructure access and Wholesale Broadband access in Spain, 13/11/2008.
[266] Case ES/2008/805: Wholesale Broadband access ("WBA") in Spain, 26.12.2008.
[267] Case SI/2009/0958: Wholesale broadband access, 11/09/2009.
[268] Case CZ/2012/1322: Wholesale Broadband Access in the Czech Republic, 10/08/2012.
[269] Case DK/2012/1340: wholesale broadband access in Denmark, 9/07/2012.

broadband, which invokes the Commission's doubts. The Commission even vetoed the notification of Czech Republic that intended to include WiFi in Market 5/2007 and, furthermore, gave some guidance on how to account for other technologies based on indirect constraints. [272]

When a Member State considers whether alternative technologies can exert direct constraints, it should give due consideration to the technical, practical and economic feasibility for those networks to offer facilities equivalent to bitstream access.[273] Furthermore, Member States should also assess whether product differences may render it difficult for an ISP to switch from DSL to other networks, independent of the possible technical substitutability. This can be done, for example, by providing evidence that incentives for a wholesale migration are not significantly limited by necessary modem replacements and reconfigurations.[274] In addition, when a Member State intends to rely on the effect of indirect substitution through a SSNIP test, the Commission demands a hypothetical monopolist test. In particular, Member States must demonstrate that:

1. Internet service providers would be forced to pass a hypothetical wholesale price increase on to their consumers at the retail level based on the wholesale/retail price ratio without being able to absorb it;
2. there would be sufficient demand substitution at the retail level to retail services based on indirect constraints such as to render the wholesale price increase unprofitable; and
3. the customers of the ISPs 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.[275]

Furthermore, the Commission considers that the threshold for including a particular infrastructure in a wholesale product market on the basis of indirect constraints and, therefore, in the absence of the possibility of direct substitution at the wholesale level must be high. If the importance of indirect constraints is overstated, this will lead to the definition of a market that is too broad and consequently a risk of type I error in the finding of SMP and the possible imposition of remedies. Hence there is a risk of understating the SMP of the incumbent at the wholesale level by including in the analysis the self-supplied market shares of vertically integrated operators who do not actually constrain the behaviour of the incumbent on the wholesale market.[276] Most importantly, the Commission articulates that indirect constraints, where they are found to exist, should be taken into account in the context of the SMP assessment rather than in the market definition.

However, the inclusion of wireless technologies have not resulted in significant issues since broadband over wireless technology is in general has a slow uptake, therefore an including or exclusion does not affect the market analysis. The most serious discussion takes place in relation to the inclusion of cable.

Inclusion of cable

Broadband over cable has been developed for years in the EU. Although cable has not been able to exert significant constraints on copper and fibre on the retail broadband market due to its limited coverage, in most of the Members, it may exert competitive constraint in the Member States where

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270 Cases FI/2012/1328-1329: Markets for wholesale physical network infrastructure access at a fixed location and wholesale broadband access, 18.10.2012.

271 Commission Decision concerning Case MT/2012/1375: Wholesale broadband access in Malta, 15.11.2012.

272 Case CZ/2012/1322: Wholesale Broadband Access in the Czech Republic, 10/08/2012.

273 See also, Case EE/2009/0942: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location; and Case EE/2009/0943: Wholesale broadband access, 30.07.09.

274 Case DE/2010/1116: Wholesale broadband access in Germany, 6/09/2010.

275 Case EE/2009/0942: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location; and Case EE/2009/0943: Wholesale broadband access, 30.07.09.

276 Case CZ/2012/1322: Wholesale Broadband Access in the Czech Republic, 10/08/2012.

cable is widely deployed. Those Member States comprise Malta, Hungary, Belgium, Portugal and the Netherlands where CATV operators account for over or close to 40% market shares.[277] Furthermore, wholesale broadband access over CATV is currently commercialised in Austria, France, Hungary and the Netherlands. Such a situation makes many NRAs reconsider the competition on Market 5/2007.

There are thirteen Member States in total that decided to deviate from the Recommendation and included cable in Market 5/2007. Those Member States comprised Austria, Czech, Denmark, Estonia, Finland, Germany, Hungary, Latvia, Malta, the Netherlands, Portugal, Slovakia and the UK. When an inclusion of a product, though not agreed by the Commission, does not affect the regulatory outcome, the Commission would raise serious doubts. This has been seen in the notifications from eight Member States, *i.e.* Austria, Estonia, Finland, Germany, Hungary, Latvia, the Netherlands and Slovakia, where the Commission only asks those NRAs to further monitor the market, though not endorsing the market definition. However, the situation in other five Member States, namely Czech, Denmark, Malta, Portugal and the UK, is different as the inclusion of cable may affect the designation of SMP operators.

Thus, a further study is initiated, with a purpose of answering two questions: (i) how those countries established direct constraints between CATV networks and PSTN networks; and (ii) if they did not, why the Commission did not veto their notifications. Since the national circumstances varied in those four countries, the following examination will be carried out on a per-country basis.

As discussed earlier, the Commission raises the standard of proof for sufficient indirect competitive constraints. Based on this principle, the Commission raises serious doubts on the notification from Czech Republic. The Czech regulator proposes to define sub-national markets and thus deregulate geographic areas where cable has a strong presence. The Commission finds that the Czech NRA has not provided sufficient evidence to prove that the required conditions are met.

The serious doubts of the Commission related to two pieces of evidence offered by the Czech NRA: (1) the conclusion is drawn based on the costs of the SMP operator, rather than those of Internet service providers, and the costs of the SMP operators are data collected more than three years ago; (2) the fact that most end-users are locked by a 12-24 month contract suggests that the alteration of retail price cannot produce effect in the short and medium term. Most importantly, the Commission notes the low level of development of alternative offer based on the network of the incumbent (who continues to represent 94.8% of the Czech WBA market on xDSL), whether through physical unbundling or WBA. The Commission considers that it is not likely that the small size of alternative operators on the incumbent's network would constitute a disincentive to increasing prices. On the contrary, the weakness of the WBA competitors would create an incentive for the incumbent to raise wholesale prices in the short term without raising retail prices, with the prospect of excluding xDSL competitors that have not been able to invest in LLU in relatively short time period. Consequently, the Commission vetoes this notification.[278]

This remains the only veto decision with regard to the inclusion of cable. In other cases, the Commission allows the other four NRAs to proceed. In the following, it examines the underlying reasons. In the following paragraphs, we examine the underlying reasons.

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[277] Commission Staff Working Document Accompanying the Progress Report on the Single European Electronic Communications Market (15th Report), Part I, pp 25.

[278] COMMISSION DECISION of 10/08/2012 pursuant to Article 7 (5) of Directive 2002/21/EC (Withdrawal of notified draft measures) Case CZ/2012/1322: Wholesale Broadband Access in the Czech Republic, 10/08/2012.

The notifications that should be examined first are from Portugal[279] and the UK[280]. The two Member States took CATV into account when defining geographic relevant markets, representing a practice similar to the aforementioned Czech notification. Most importantly, the inclusion of cable leads to deregulation of some geographical areas, thus affecting the regulatory outcome. While the Commission does not agree with the two NRAs' analyses, it does not veto the two notifications. The situation in Portugal is different from that in Czech in three respects. First, the share of retail broadband access via cable in Portugal is high (38% in January 2010) ranked fourth among the EU 27 Member States; secondly, the development of LLU is also quite high at more than 60% at the end of 2007; thirdly, the cable operator was formerly part of the incumbent, which puts it at a similar position as Denmark. Thus, even if the indirect constraints were taken into account in the market power assessment rather than in the market definition, this would not have led to a significantly different outcome than that currently being proposed. The same logic also applies to the UK's notification. The Commission notes that OFCOM takes indirect constraints into account in its market definition only for those areas where OFCOM considers their presence capable of exercising a sufficient competitive constraint. Thus, in view of this approach, even if indirect constraints were taken into account in the market power assessment rather than in the market definition, this would not have led to a significantly different outcome. Consequently, the Commission leaves open the market definition in the two notifications.

Secondly, the unique feature in the Danish notification[281] is that it is the only case so far where a Member State has proposed to impose open access obligations upon a CATV operator. Apparently, an exclusion of CATV from Market 5/2007 would mean that the CATV network should have not been regulated, thus making this case distinct from the first group of cases. In Denmark, the broadband market presents a market structure that differs from other Member States in that the incumbent owns both a PSTN network and a CATV network. Before the notification, the Danish incumbent was only subject to access obligations on its PSTN network. However, a market failure was gradually observed as the incumbent began to slow down the upgrade of its PSTN network, and instead made substantial investment on its CATV network that was unregulated. The Danish regulator, NITA, was concerned that DSL-based alternative operators would be left behind by such a circumventing strategy. This was the underlying reason for NITA to include CATV on Market 5/2007.

The Commission, while affirming that it was not convinced by NITA's reasoning to include CATV based on direct and indirect constraints, acknowledged that it was justified to extend the remedies to cover also the incumbent's CATV network and to require it to comply with all reasonable requests for access. In exceptional circumstances, the SMP regime also allows Member States to impose proportionate and justified obligations in an area outside but closely related to the relevant market under review. Therefore, the question of exact market boundaries could be left open. Consequently, it may be argued that the Commission in this case still maintained that CATV networks could not exert indirect constraints on PSTN networks. Its reason to acknowledge the appropriateness of the notification is that the incumbent circumvented the regulation over PSTN based on its ownership of the largest CATV network in Denmark.

Thirdly, in the Maltese notification[282] the direct consequence of including CATV was that no operators were designated as having SMP and the whole market was left unregulated. The

279 Case PT/2008/0850: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location; and Case PT/2008/0851: Wholesale broadband access, 05/01/2009.

280 Case UK/2010/1064: Wholesale local access market; and Case UK/2010/1065: Wholesale broadband access market, 1/06/2010.

281 Case DK/2008/0862: Wholesale broadband access in Denmark, 09.03.2009.

282 Case MT/2008/0803: Wholesale broadband access in Malta, 7/11/2008.

exclusion of the CATV network would turn the PSTN operator into a near monopoly. The special feature of the broadband market in Malta is that it has the best inter-platform competition among all the EU Member States. There are three networks (PSTN, CATV and WiMax), all with fully national coverage, which is probably supported by the fact that Malta is one of the most densely populated countries in the world. In particular, the PSTN operator and the CATV operator in Malta have similar market shares at the retail level. In the decision, the Commission disagreed with the Maltese NRA's conclusion that wholesale broadband access provided over CATV and DSL could form part of the same market. However, it still approved this proposal. The Commission did not explain in its decision why it allowed such a proposal. Nevertheless, a possible explanation may be that even if the CATV network would be excluded from the phase of market definition, its market power must still be taken into account in the second phase, *i.e.* assessing whether the PSTN incumbent could have SMP. Despite the fact that it will not be considered as candidates of SMP operators, the CATV operator with a network covering the whole of Malta may be considered as a constraining force that makes the PSTN incumbent unable to act independently of its competitors, customers or ultimately consumers, and thus no SMP.[283] Since the outcome on SMP designation would possibly remain the same, the Commission approved this notification. Consequently, the Commission here maintained the opinion that CATV networks cannot be included into Market 5/2007.

It is interesting to compare the Maltese notification with the Hungarian notification.[284] The broadband sectors of the two Member States are very similar. First, both have a relatively similar retail market structure between PSTN and CATV. Secondly, broadband over CATV in both countries are the strongest in the EU, with Malta sitting on the top and Hungary following. Last but not least, both Member States decided to include CATV in Market 5/2007 in their regulatory decisions. However, it turns out that Malta concluded that its Market 5/2007 was competitive whereas Hungary designated the three PSTN incumbents as SMP operators. Despite the similarities, there is indeed one major difference between the two countries. In Malta, the CATV network, similar to the PSTN network, belongs to one operator and has footprints all over the country. By contrast, both the CATV network coverage and ownership in Hungary are "scattered or fragmented".[285] They are disadvantaged to some extent by the ubiquitous networks of their PSTN counterparts. Furthermore, alternative operators, when switching to CATV networks, would be handicapped by the fact that they must reach concluding agreements with a large number of CATV operators. Therefore, those CATV operators, though having significant influence at the retail level, are not considered to constrain the PSTN incumbent due to their small size individually.

In conclusion, the Commission holds the opinion that cable should not be included in Market 5/2007. The reason is that broadband over cable cannot exert direct constraints against copper. Furthermore, although it may exert indirect constraints, they should be considered when assessing SMP. Thus, the inclusion of cable by the aforementioned NRAs was only a result of carrying out market power assessment at the stage of market definition. Moreover, the imposition of open access obligation to CATV network in Denmark may be considered as an exceptional circumstance with no general implication.

IP peering and transit

It is observed that Poland tries to define two relevant markets in relation to broadband beyond the Recommendation. The two relevant market are: IP peering and IP transit. IP peering is defined as

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283 Liyang Hou (2008), "The Assessment of Single SMP: Lessons Learned from the First Round of Market Review", *Competition and Regulation in Network Industries* 9(1), pp 49-75.

284 Case HU/2011/1190: Wholesale (physical) Network Infrastructure Access at a Fixed Location in Hungary and Case HU/2011/1191: Wholesale Broadband Access in Hungary, 1/04/2011.

285 Bánhidi, F. & Pápai, Z. (2010). Challenges in the regulation of broadband in Hungary. *paper presented at 21st European Regional ITS Conference*, Copenhagen, Denmark.

the direct exchange of IP traffic solely between the interconnected networks of two Internet Service Providers (ISPs) while The transit model assumes a customer-supplier relationship: one ISP ('the supplier') provides to another ISP ('the customer') a service consisting of transmitting IP traffic between the customer and the other network(s) against payment. The purpose of defining such markets is to regulate the incumbent operator's IP traffic exchange as the regulator considers that for alternative operators, the incumbent operator is unavoidable.

However, the Commission vetoed the draft decision. The Commission points out that for routing their traffic at national level, ISPs with less developed networks can replace direct interconnection with the incumbent with transit services provided by larger alternative Polish ISPs, which are interconnected at the incumbent's private Internet exchange point as well as at public Internet exchange points. The Commission indicates that the conveyance of traffic to the incumbent's network by means of direct or indirect interconnection is functionally substitutable from a demand-side perspective. At least one large Polish ISP (UPC) actually sends all of its traffic to the Polish incumbent through foreign carrier networks, because it apparently does not accept the conditions for direct interconnection offered by the incumbent. Therefore, the Commission considers that the data put forward by the Polish NRA to substantiate the lack of substitutability as well as the substitutability analysis itself are insufficient to demonstrate the existence of two separate markets for IP traffic exchange. Moreover, the evidence at hand indicates that direct interconnection with the Polish incumbent's network is functionally substitutable with indirect interconnection at both national and international level.[286]

Furthermore, the European Commission also commented draft national measures from the point of view of the regulatory treatment of self-supply (*e.g.* case AT/2008/0757, PT/2008/0851, UK/2010/1065, UK/2010/1123, FI/2012/1329) and geographic market definition and segmentation (*e.g.* case AT/2008/0757, FR/2008/0781, IT/2009/0892, FI/2009/0900, UK/2010/1065, UK/2010/1123, FI/2008/0848, PL/2012/1394).

Finally, two other particular national situations are interesting to note. Regarding Germany, Commission commented on the intention to distinguish between respectively Layer-2 and Layer-3 Bitstream access, and on the inclusion of cable into the market for Layer-3 Bitstream access (case DE/2010/1116). Regarding Austria, it is worthwhile mentioning that the European Commission withdrew its serious doubts in a case (AT/2009/0970) against the inclusion of mobile broadband connections in the residential customers retail broadband access market definition.

A.7.3 Observations

The notifications show that Market 5/2007 is still in general not effectively competitive in the EU. In terms of products included in this market, the EU is now experiencing a migration from copper to fibre, though the current broadband market is still dominated by copper. The Commission supports an automatic inclusion of fibre into Market 5/2007. Furthermore, the Commission also makes it clear that competitiveness based on the competition situation between current generation networks, does not exclude regulation of Market 5/2007 in the future. Caution should be taken that a new monopoly would emerge in the migration process to fibre. Consequently, Market 5/2007, even to be found effectively competitive, should be continually monitored by NRAs.

[286] COMMISSION DECISION of 3 March 2010 pursuant to Article 7(4) of Directive 2002/21/EC (Withdrawal of notified draft measures) Case PL/2009/1019: The wholesale national market for IP traffic exchange (IP transit). Case PL/2009/1020: The wholesale market for IP traffic exchange (IP peering) with the network of Telekomunikacja Polska S.A., 3.3.2010.

The issue regarding whether or not to include cable into Market 5/2007 seems to be answered by the Commission. Bitstream over cable, though having been commercialized in some Member States, cannot be considered as a perfect substitute with bitstream over copper and fibre. The main reason is the switching costs. A migration to other technologies is a long-term plan. No operators would like to switch to other technologies by seeing a 10% price increase in the technologies they are current using. Therefore, bitstream over cable cannot exert direct constraints on copper. Furthermore, even if they can impose indirect constraints, they should be considered in the step of SMP assessment, rather than during market definition. This conclusion is also applicable to other technologies, such as wireless broadband.

A.8 Wholesale terminating segments of leased lines, irrespective of the technology used to provide leased or dedicated capacity (Market 6/2007)

A.8.1 The Recommendation

Dedicated capacity or leased lines may be required by end-users to construct networks or link locations or be required by undertakings that in turn provide services to end-users. Consequently, it has a link to some of the markets defined with respect to access at fixed locations and the provision of services at fixed locations. For example, dedicated connections may be an alternative to wholesale broadband access and vice versa in certain circumstances. Also dedicated trunk or long-distance connections may be an alternative to long-distance (transit) call conveyance. Lower-speed leased lines may be replaced in certain instances by standard broadband connections based on DSL or cable modems depending on quality of service requirements.[287]

The Recommendation differentiates two types of wholesale markets for leased lines based the closeness to end-users: wholesale terminating segments and wholesale trunk segments. However, it leaves to the NRAs to specify the exact difference between the two. Neither was specified with regards to what technologies may be included in Market 6/2007, though the principle of technological neutrality is applicable.

Moreover, the incumbent operators have advantages due to its ubiquitous networks on Market 6/2007. This means that it generally does not fulfil the Three Criteria Test and thus is still included in the recommended list of relevant market susceptible to ex-ante regulation.[288]

Finally, the Recommendation also does not make it clear whether and how Member States can further divide Market 6/2007.

A.8.2 General Trends

Under the regime of the 2007 Recommendation, the Commission reviewed 60 notifications from 22 Member States in the period of 2008-2012. Of the proposed markets identified, 86% could be considered to fall within the scope of the Recommendation. The European Commission formulated comments on three notified draft decisions of Hungary, Bulgaria and the United Kingdom. In five cases, a national Three Criteria Test was performed.

The exact range of the terminating segment

The Recommendation does not provide a clear definition of Market 6/2007. Member States also define it in different ways. Most Member States define terminating segments as lease lines between end-users' premises and the closest exchange of a service provider.

[287] Explanatory Note to the Recommendation, supra note 156, pp.38.

[288] Ibid, pp.39.

Nevertheless, for example, the Spanish NRA defines the market boundaries between the terminating and the trunk segment on a demand-based approach, *i.e.* where the demand is on access to connections between a node down to the end-user, the entire connection is part of the terminating segment and where the demand is on access to connection between nodes, the access is part of the trunk market.[289] Moreover, the Estonian NRA defines it as between the client's premises and the closest point of presence of the alternative operator.[290] The Commission notes that this can include both leased lines connecting the end-customer with the closest point of interconnection (at local level) and (in exceptional circumstances) leased lines connecting the end-customer with the Point of Presence (PoP) of the requesting operator situated higher in the network of the leased lines provider (at national level in the transmission network), and thus this definition may influence the border between terminating segments and trunk segments. A clear distinction between the two is considered by the Commission to be important in order to clarify whether a regulated (terminating segments) or a non-regulated (trunk segments) service is subject of a specific access requested by an alternative operator. Consequently, the Commission stresses that the exceptional circumstances could apply only if (i) an access seeker cannot (due to technical limitations) interconnect with the SMP operator at local level and (ii) there is no other provider of trunk segments of leased lines which could provide backhaul service from a national point of interconnection to the local (closest to an end user) network node.

Inclusion of alternative technologies, in particular Ethernet

Member States also have different opinion on the inclusion of alternative technologies. All the Member States include copper and fibre leased lines, as well as analogue and digital leased lines.

Moreover, most Member States find that Ethernet is substitutable and the Commission supports this analysis. The Estonian NRA attempts to exclude Ethernet and is raised doubts by the Commission.[291] The most difficult issue is the substitutability of DSL products. Most NRAs do not include DSL products, as they usually cannot offer symmetric connection as what leased lines do. However, due to technological development DSL products are also able to offer symmetric connections. Portugal[292] and the UK[293] include symmetric DSL also on Market 6/2007.

Segmentation of the market according to the bandwidth of the leased lines

Ten Member States decide to further divide Market 6/2007 based on bandwidth. The purpose of such division is very clear. Traditional leased lines are on a migration to high-speed leased lines. Therefore, the sub-market for low-speed is no longer attractive to new entrants who all focus on the more profitable, high-speed leased lines. Consequently, the sub-market for high-speed leased lines is in general competitive. 8 Member States (Austria, Bulgaria, Czech Republic, Germany, Hungary, Romania, Slovakia and the UK) decide to deregulate high-speed leased lines. However, Member State use different benchmark to differentiate low speed from high speed leased lines. Austria, Czech, Germany, Greece, Hungary, Romania and Slovakia use 2Mb/s as the threshold. Nevertheless, Bulgaria and the UK use 8Mb/s and the Netherlands choose 20Mb/s as it is the highest speed that can be offered via copper networks. In addition, Italy also defines Market 6/2007 based on user types, and defines a leased line market for mobile operators.[294]

289 Case ES/2009/0930: Wholesale Market for Terminating Segments of Leased Lines in Spain, 6/07/2009.
290 Commission decision concerning Case EE/2010/1114: Wholesale terminating segments of leased lines, 6/09/2010.
291 Commission decision concerning Case EE/2010/1114: Wholesale terminating segments of leased lines, 6/09/2010.
292 Commission decision concerning Case PT/2010/1119: Wholesale terminating segments of leased lines, 15/09/2010.
293 UK/2008/0747: Wholesale terminating segments of leased lines in the UK, 26/03/2008.
294 Cases IT/2009/0999-1000: Wholesale national market for terminating segments of leased lines and wholesale national market for trunk segments of leased lines, 04.12.2009.

The relationship with the wholesale broadband access market

The Netherlands combine Market 6/2007 with Market 5/2007, despite the difference between leased lines and high-quality WBA because the contention ratio for leased lines is 1:1, whereas for high-quality lines it could be up to 1:20. However, it considers that both products are used to satisfy the same demand for business network services (as opposed to low-quality WBA, which is primarily used for internet access). From a demand-side perspective, increased capacity in high-quality WBA results in greater substitutability and the price of leased lines has been decreasing, pointing towards competitive pressure from WBA on leased lines despite lower capacity guarantees. Furthermore, the two segments share upload capacity (up to 100 Mbit/s for more than 95% of all services), have similar SLAs, accessibility, are sold by the same commercial sales force and are provided via the same networks.[295] However, the Commission raised serious doubts on this notification. It is not certain that the Netherlands will keep this market definition in its final notification.

A.8.3 Observations

The future of Market 6/2007 is to a certain extent ambiguous. On the one hand, almost all NRAs have concluded that Market 6/2007 should be subject to ex-ante regulation. On the other hand, eight NRAs propose to segment this market according to bandwidth and then to deregulate the part for high-speed leased lines. The reason is that low-speed leased lines are dominated by traditional leased lines while high-speed leased lines are all fibre. New entrants, when deciding to enter this market, prefer investing on high-speed leased lines, which is where most of the profit of the leased line markets comes from. Accordingly, entry barriers for high-speed leased lines seem not particularly high and non-transitory. Given such a situation, it can be observed that in many Member States the incumbent operators still hold many market shares for the low speed part, in general more than 50%, while their market shares are far less, though possibly still exceeding 50%.

Another fact that should be paid extra attention is that low-speed leased lines or, in other words, traditional leased lines are being upgraded to fibre. This suggests that the market power of incumbent operators for the low-speed part is also transitory, though the length of this process needs to be further researched.

In addition, the substitution between leased lines and bitstream products may be also worthy of further investigation. In many Member States, it can be observed that leased lines are used as a substitute for wholesale broadband access. However, the Recommendation has yet to confirm such a substitution. The Netherlands has provided evidence on the substitution between leased lines and bitstream products, though the two may still differ in terms of specific product characteristics, such as guaranteed capacity, quality, symmetric upload and download capacity, Service Level Agreements (SLAs), latency and price. Nevertheless, due to the serious doubts of the Commission it is not clear how the analysis will be finalised.

[295] Commission decision concerning Case NL/2012/1299: Wholesale broadband access (Market 5) and wholesale terminating segments of leased lines (Market 6) in the Netherlands (Opening of Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC), 21/03/2012.

A.9 Voice call termination on individual mobile networks (Market 7/2007)

A.9.1 The Recommendation

Mobile call termination is an input both to the provision of mobile calls (that terminate on other mobile networks) but also to calls that are originated by callers on networks serving fixed locations that terminate on mobile networks. It includes call termination to calls with a number for national numbering plan, irrespective of call types (national or international, fixe or mobile) and technologies.

The special feature of call termination service hinges on the so-called calling-party-pay system. The termination charge is set by the called network and is chosen by the called subscriber and, thus, the calling party in general does not have the ability to affect or influence termination charges. Furthermore, since the called party does not need to pay the termination charges, he may be indifferent to high termination charges. Such a business model allows the terminating operator to raise its prices without a constraint from either party to the call.[296]

Call termination is not substitutable with other services. At a retail level, a call to a given user or user's terminal is not a substitute for a call to another user and this limitation on demand substitution follows through at the wholesale level. In respect of supply substitution, if the supplier of call termination raises its price, it is not easy for alternative suppliers to switch to supply that market because they would need the SIM card details of that user to do so. The Commission claims that although some of potential substitutions could constrain termination charges empirical evidence does not seem to indicate that they actually do so. Therefore the relevant market is at least as wide as termination for each operator. Furthermore, the Recommendation points out that such a definition - that one network constitutes one market - does not automatically imply that every mobile network operator has SMP. However, no further details are provided on how to do so.[297]

In addition, the Recommendation, while suggesting Member States to analyse call termination together, does not oblige them to do so and leaves it open to NRAs to consider defining and notifying an additional separate market for SMS.[298]

A.9.2 General Trends

Between 2008 and 2012 the Commission receives 121 notifications from 26 Member States (excluding Luxembourg) and one region (Gibraltar). All Member States follow the market definition in the Recommendation and define each network as a single market. Moreover, although the Recommendation provides that such a market definition does not automatically lead to the conclusion that every operator is a monopoly, no NRAs conclude otherwise. Therefore, in practice all the operators providing mobile termination services are subject to *ex-ante* regulation.

296 Explanatory Note to the Recommendation, supra note 156, pp.42.
297 Ibid, pp.43-44.
298 Ibid.

Inclusion of MVNOs

One issue that may be paid attention to is that seven Member States (Denmark, Estonia, Finland, France, Latvia, Netherlands and Spain) also include mobile virtual networks in Market 7/2007, and designate mobile virtual network operators (MVNOs) as SMP operators there. When analysing whether to include MVNOs, a distinction should be made between full MVNOs and others. Full MVNOs, though their services are hosted on other operators' networks, can negotiate call termination charges with other mobile operators independent of their hosting operators. Only full MVNOs should be included in Market 7/2007. With regard to remedies, the Commission maintains that symmetric termination rates should in principle also be imposed upon MVNOs, as long as they are on Market 7/2007.

SMS termination (including cross-border SMS termination)

Three Member States (Denmark, France and Poland) and one region (Gibraltar) define a separate market for wholesale SMS termination. The Recommendation, though not clearly specified, implies the existence of a separate market for SMS termination. Therefore, all the four NRAs carry out the Three Criteria Test. The competition concern of SMS termination is basically similar to call termination where network externalities due to the calling party pay principle make the market not able to be self-regulated. Consequently, all four NRAs propose to regulate the wholesale SMS termination market.

However, two issues in relation to SMS termination warrant extra attention. First, the SMS termination includes both traditional SMS and push SMS[299]. The Commission indicates that the take up of mobile terminal equipment, which allows receiving content by means that are substitutable to SMS, such as for example email delivered onto smartphones, may also constrain the provision of wholesale termination services for SMS Push services. Such services could eventually be substituted if service providers send content via email instead of SMS. The further spread of smartphones may influence the competitive conditions of SMS termination for interpersonal SMS to a lesser extent given that both parties would need to use email instead of SMS, which requires relevant equipment on both sides. The provision of content to end-customers of the MNOs, however, is only dependent on the receiving party's equipment. Therefore, the spread of smartphones will, at this stage, have mainly an impact on the means to provide content, and thereby on the conditions to provide wholesale termination for SMS push services.[300]

Second, the Danish NRA defines the SMS termination market as including the SMS termination service regardless of where the SMS originates. However, when imposing remedies, it imposes a price ceiling for SMS termination rates that can only be enjoyed by which compete with Danish mobile operators at retail level, while other operators, *i.e.* those not competing at retail level with Danish mobile operators, would not able to claim the regulated rates. This essentially differentiates termination for SMS originated domestically from those from abroad. The Commission raises serious concerns on this proposal, as it believes that the termination of SMS originating abroad would be characterised by the same bottleneck situation that is identified for national SMS termination services. The Commission maintains that this proposal would lead to indirect discrimination against foreign mobile operators and is thus incompatible with the regulatory

[299] *I.e.* application-originated SMS, not originated on mobile networks but on fixed networks by *e.g.* Internet access providers via a computer. Push SMS allow other players than mobile (virtual) network operators to send SMS or deliver content and services to mobile telephones (*e.g.* for direct marketing, content transmission, message services, closed user groups). See, Commission decision concerning case DK/2010/1100: Wholesale SMS termination services on mobile networks in Denmark, 13/08/2010.

[300] Commission decision concerning Case FR/2010/1094 - Wholesale SMS termination services on mobile networks in Metropolitan France and French overseas territories, 16/07/2010.

framework.[301] The Danish NRA finally applies the same SMS termination rates for all the SMS. Consequently, it seems that the Commission does not support the idea of defining a separate market for cross-border SMS termination.

A.9.3 Observations

Similar to the market for fixed call termination, after the Commission's veto decision[302], no NRAs have ever challenged the definition of call termination that one network constitutes one market. Although the Recommendation makes it clear that such a definition does not automatically make a network operator an SMP operator. It is not clear how an operator with 100% market shares can be constrained by other forces. In practice, all NRAs reach the same conclusion that all network operators are automatically designated as SMP operators.

Mobile virtual networks have been considered by some NRAs and also agreed by the Commission, to be included into Market 7/2007. This has not been clearly indicated in the 2007 Recommendation.

With regard to SMS termination, as indicated by the NRAs' notifications and the Commission's comments, two issues should be kept into mind. First, there should be no separate market for termination SMS originated abroad. Second, when defining the SMS termination market, other means of substitution should also be taken into account, such as push email on smartphones. When the penetration of smartphone is high enough, the monopoly of mobile operator over SMS termination may be decreasing.

301 Commission decision concerning Case DK/2012/1283: Wholesale SMS termination on individual mobile networks - New entrant: Opening of Phase II investigation pursuant to Article 7a of Directive 2002/21/EC as amended by Directive 2009/140/EC, 13/02/2012.

302 Commission Decision of 17 May 2005 pursuant to Article 7(4) of Directive 2002/21/EC ('Withdrawal of notified draft measures') DE/2005/0144: Call termination on individual public telephone networks provided at a fixed location, Brussels, 17 May 2005, C(2005)1442 final.

A.10 Publicly available local, national and international telephone services provided at a fixed location for residential and non-residential customers (Market 3-6/2003)

A.10.1 The Recommendation

This group of markets covers telephones services that (1) provide both outgoing and incoming voice calls or related narrowband services, (2) bear a geographic number and (3) are provided at a fixed geographic location. Substitution breaks were initially proposed by the Commission to exist between local and national and international call;, and between residential and non-residential customers, thus breaking this basket of service into four relevant markets. This group of markets was present in the first market Recommendation, but removed by the second market Recommendation due to the consideration that wholesale remedies, such as Carrier Selection and Carrier Pre-Selection and Wholesale Line Rental, in combination with VoB services, can in principle guarantee effective competition therein. However, the Recommendation also foresees the possibility to regulate those services based on the fulfilment of the Three Criteria Test, in particular where wholesale remedies are only recently imposed.[303] It also means that when an NRA finds that it is necessary to regulate the Market 3-6/2003, an analysis of the Three Criteria Test is a precondition. Only when the Three Criteria are fulfilled is it possible to proceed to the SMP analysis.

A.10.2 General Trends

2008-2012 sees 28 notifications from 18 Member States. As these markets have been removed from the Recommendation, all the notifying NRAs carried out an analysis on the Three Criteria Test after giving the market definition. Overall, it is observed that most Member States consider that this group of markets should not be susceptible to ex-ante regulation. For Market 3/2003 and Market 5/2003, the national regulatory authorities in around one-third of the cases (respectively 33% and 36%) concluded that the Three Criteria Test was met, while this was only the case in around one-fifth of the notifications (respectively 18% and 20%) for Market 4/2003 and Market 6/2003. In particular, all but Bulgaria[304] and Greece[305] decide to withdraw regulation on the market for international calls. Local and national calls markets are regulated in six Member States (Austria, Belgium, Bulgaria, Cyprus, Latvia and Lithuania). One of the most important reasons for those Member States to regulate national calls market is that the wholesale remedies, though having been imposed, have showed limited relevance. The Commission comments all those notifications, and urges those NRAs to promote the efficiency of wholesale remedies than imposing regulating these retail markets.

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303 Explanatory Note to the Recommendation, supra note 156, pp.28.

304 Case BG/2009/0912: Retail public telephone services provided at a fixed location for residential and non-residential customers, 2/6/2009.

305 Greece defines a single market including local, national and international calls. Commission decision concerning case EL/2010/1160: publicly available local and national telephone services provided at a fixed location for residential and non-residential customers in Greece, Commission decision concerning case EL/2010/1161: publicly available call services to non-geographic numbers provided at a fixed location for residential and non-residential customers, 20/01/2011.

A.10.3 Observations

Markets 3-6/2003 are confronted with rigorous competition from alternative competitors either based on their own infrastructures or based on wholesale remedies imposed on other markets. Even if these retail markets would not be considered competitive, NRAs should focus on designing better wholesale remedies, rather than imposing retail regulation.

Most importantly, managed VoB have been steadily growing. Decreasing market shares of the incumbents and reducing tariffs can be observed basically in every Member States. Another important factor to deregulate these markets, as also underlined by many Member States, is the shrinking value of fixed telephone calls in the electronic communication sector. This may explain the stabilised market shares of the incumbents in some Member States as new entrants show less interest in entering these markets.

One phenomenon that may be given attention is that incumbents currently offer fixed telephone calls in a bundle together with other services. Some NRAs have concerns with the ability of offering multiple-play products by the incumbents that may strengthen their market position due to the 'one-stop-shopping' habit of customers.[306] The Commission has not given its opinions on how to analyse the effect of bundled products. Nevertheless, it may be argued that the key for such an analysis is to focus on the components of a bundle that are perceived by consumers as the most valuable. If consumers consider fixed telephone calls only as adding value to a bundle, then serious concern of competition problems should in general not be raised.

Furthermore, neither NRAs nor the Commission consider mobile telephony as competition as a substitute for fixed telephone. Were it considered, the idea should be further strengthened that the Market 3-6/2003 should in principle not be subject to ex-ante regulation.

[306] For example, Case AT/2009/0880: Retail market for publicly available national and international telephone services provided at a fixed location for non-residential customers in Austria, 2/03/2009; Commission decision concerning case EL/2010/1160: publicly available local and national telephone services provided at a fixed location for residential and non-residential customers in Greece, Commission decision concerning case EL/2010/1161: publicly available call services to non-geographic numbers provided at a fixed location for residential and non-residential customers, 20/01/2011; Commission Decision concerning Case LV/2012/1344: Publicly available national/international telephone services provided at a fixed location for residential/non-residential customers in Latvia, 23/07/2012.

A.11 The minimum set of leased lines up to and including 2Mb/sec (Market 7/2003)

A.11.1 The Recommendation

Leased lines provide fixed point-to-point or point-to-multi-point connectivity over dedicated capacity, and are capable of sending either voice and/or data messages from one site to another on a symmetric basis. They may be required by end-users to construct networks or link locations or be required by undertakings that in turn provide services to end-users. Traditional leased line services, which are based on copper networks, have seen the transition from analogue to digital. At present, traditional leased lines are able to offer a minimum capacity of 64 KB/sec and a maximum capacity of 20 MB/sec. Higher bandwidth can only be delivered via other technologies. Hence, traditional leased lines are confronted with competition from other technologies, *e.g.* Ethernet cable and fibre networks.

Leased lines are not defined within the current generation of regulatory framework, but defined in the 1998 Regulatory Framework, specifically the Leased Lines Directive as "telecommunications facilities provided in the context of the establishment, development and operation of the public telecommunications network, which provide for transparent transmission capacity between network termination points and which do not include on-demand switching (switching functions with the user can control as part of the leased line provision)".[307] Article 7 of the Leased Lines Directive specifically required Member States to ensure the provision of a minimum set of leased lines up to and including 2 MB/sec.[308]

The Universal Service Directive, adopted in 2002 and entering into effect in 2003, updated this provision in its Article 18.[309] It stated that retail regulation over the minimum set of leased line services was still necessary until NRAs decided that such provisions were no longer needed after carrying out the SMP analysis.[310]

Due to such a specific provision of Article 18 of the 2002 Universal Service Directive, the first market recommendation included Market 7/2003 as one of the markets susceptible to ex-ante regulation. It also articulated that Market 7/2003 excluded leased lines above 2 MB/sec as a presumption was established that an intervention at a wholesale level would be sufficient to address any problems that arise.

In the Recommendation, adopted in 2007, the Commission extends the idea to leased lines below 2 MB/sec that wholesale regulation, where appropriate, should be sufficient to ensure that there is competitive supply at the retail level[311]; thus eliminating Market 7/2003 from the list of markets susceptible to ex-ante regulation.

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307 Directive 92/44 of 5 June 1992 on the application of open network provision to leased lines, OJ 1992 L 165/27, corr. OJ 1993 L 96/35, amended by Directive 97/51 and by Decision 98/80 of 7 January 1998.

308 Ibid, Article 7 and Annex II.

309 DIRECTIVE 2002/22/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive), OJ L 108/51, 24.4.2002.

310 Ibid, Recital 28.

311 Explanatory Note to the Recommendation, supra note 156, pp.39.

Given such a situation that Market 7/2003 has become in general sufficiently competitive,[312] the Citizen's Rights Directive that amended the 2002 Universal Service Directive, deleting Article 18 of the 2002 Universal Service Directive.[313]

However, it should be noted that the Recommendation does not prohibit the regulation of Market 7/2003. When an NRA finds that it is necessary to regulate the Market 7/2003, an analysis of the Three Criteria Test is nevertheless a precondition. Only when the Three Criteria are fulfilled is it possible to proceed to the SMP analysis.

A.11.2 General trends

There were 26 notifications in relation to Market 7/2003 from 20 Member States. Four Member States (Austria, Germany, Hungary and the UK) submitted two notifications. The second notification of Hungary[314] proposes to deregulate Market 7/2003 that was regulated by its first notification.[315] For the time being, only three Member States (Austria, Greece and the UK) consider that Market 7/2003 is still subject to regulation. Overall, Market 7/2003 is considered as effectively competitive across the EU, since in only 19% of the draft notifications the national regulators come to the conclusion that the Three Criteria Test is met.

In almost all the Member States, the following facts have been observed: (i) the demand for leased lines below 2 MB/sec is reducing; (ii) the price is generally decreasing; (iii) wholesale remedies can overall lower down entry barriers, though structural problems still exist, such as high sunk costs, economics of scale and scope and high switching costs; and (iv) traditional leased lines are facing migration to alternative leased lines, though the extent may vary across Member States.[316]

The reason for those three Member States (Austria, Greece and the UK) to keep this market regulated is that they believe that wholesale remedies are still not sufficient to enforce competition on Market 7/2003. The Commission expresses doubts, though not serious doubts, on the analyses of all of those NRAs.

A.11.3 Observations

When deciding whether Market 7/2003 should be subject to ex-ante regulation, the following deserves special attention. First, wholesale remedies from the market for terminating segments of leased lines should in principle allow alternative operators to be active on the retail market. Member States should focus on designing more efficient wholesale remedies, rather than continuing to regulate the retail market. Secondly, the market size of leased lines below 2 MB/sec has been experiencing stable decrease in the last years, which indicates that they are, and will be, substituted by other technologies. This process goes steadily, though gradually in some Member States. It is not persuasive that the incumbent can abuse their SMP there. Thirdly, the fact that

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312 DIRECTIVE 2009/136/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector, OJ 2009 L 337/11, recital 19.

313 Ibid, Article 18.

314 Case HU/2007/0737: The minimum set of leased lines in Hungary, 09/01/2008.

315 Commission decision concerning Case HU/2011/1270: Minimum set of leased lines, 12/12/2011.

316 *E.g.* Commission Decision concerning Case BG/2012/1361: Leased lines in Bulgaria, 17/09/2012; Commission decision concerning Case EL/2012/1333: Retail market for leased lines up to and including 2 Mbps in Greece, 22/06/2012; Case NL/2008/0824: The minimum set of leased lines, 5/12/2008.

almost all of the incumbents still have large market shares on Market 7/2003 is illusive. Many NRAs report that most, if not all, new entrants build their networks with much higher capacity and focus their business on demand for higher speed of leased lines.[317]

[317] *E.g.* Commission decision concerning Case FR/2010/1050: Leased lines markets in France, 16.03.2010.

A.12 Transit services in the fixed public telephone network (Market 10/2003)

A.12.1 The Recommendation

In addition to call origination and call termination, call conveyance or transit services are sometimes also necessary for alternative operators to complete a call. Transit services involve the transmission and/or switching or routing of calls. The Recommendation defines transit services as comprising conveyance both between switches on a given network and between switches on different networks; including pure conveyance across a third network.[318]

However, the Recommendation does not delineate the boundary of Market 10/2003 clearly and leaves its border with call origination and call termination to the discretion of Member States. This may affect the competitiveness of Market 10/2003 in different Member States. Another issue relates to self-supply or direct interconnection as the two can be substitute for transit services. Alternative operators may choose not to use Market 10/2003 services and build the necessary facilities themselves to directly interconnect call origination and/or call termination. Since their demand is internalised, Member States may find that there is no merchant market and the incumbent operator always has a large amount of market shares. With regard to the question whether or not to take into account self-supply, the Recommendation focuses on the extra capacity of alternative networks that may serve a competitive constraint on the incumbent.[319]

In the context of the Recommendation, the Commission carries out an analysis of the Three Criteria Test. With regard to the first criterion, high and non-transitory entry barriers, the Commission is concerned with thin routes where the volume and value of transactions is relatively small so that they do not support multiple operators, thus possibly routes of natural monopoly. Due to the small demand on those routes, entry is unlikely even in the medium term and alternative operators have to rely on the incumbent's network for Market 10/2003 services. This suggests that the first criterion may be met. However, the development of self-supply can be alternative sources of supply constrains the incumbent's behaviour. Thus, Market 10/2003 may on a case-by-case basis be found not to meet the second criterion In fact, as time progresses the proportion of regulators no longer finding SMP is increasing, indicating a tendency towards effective competition. In any event, since the assessment for the forward-looking period is that this market does not in general satisfy the first criterion, the market for wholesale transit services was withdrawn from the recommended list in 2007.[320]

A.12.2 General Trends

28 notifications from 18 Member States were submitted to the Commission in 2008-2012. Six Member States (Cyprus, Greece, Ireland, Italy, Romania and the UK) decided that it was still necessary to regulate Market 10/2003. The notifications of Ireland are only concerned with remedies.

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318 Explanatory Note to the Recommendation, supra note 156, pp.26.

319 Ibid.

320 Ibid, pp.27.

The conclusion of the Recommendation that Market 10/2003 cannot in general meet the Three Criteria Test has been confirmed by most Member States. In particular, although those Member States have different positions over the first criterion, all of them consider the second criterion, dynamic competition, to be satisfied.

Of the five Member States (excluding Ireland) that decided to regulate Market 10/2003, it is doubtful that the situation on Market 10/2003 in four Member States (Greece, Romania and the UK) is not in general unsatisfactory either. All four consider that the first criterion to be met as there are no other networks that have the same ubiquitous coverage as the incumbent. However, when evaluating the second criterion, all four do not take into account self-supply. The Greek NRA claims that Market 10/2003 is shrinking, which is not commercially attractive and thus new entry into the market is not expected.[321] The Commission comments that this may be the result of the fact that alternative operator mainly uses self-supply by rolling out their own infrastructure; this could suggest that alternative operators can be in a position to enter the merchant market and supply transit services, at least on specific routes, should such provision be profitable. The Romanian NRA also finds that alternative operators' market shares decreased due to the reduced demand for transit services and the increase of the number of direct interconnection agreements. Alternative operators begin to roll out trunk networks so as to mainly satisfy their own needs (self-supply). They are nevertheless not incentivised to provide transit services to third parties.[322] However, once the price is right, it cannot be excluded that they can also enter the merchant market. Consequently, should self-supply be taken into account, the market shares of the incumbent could have been lower, thus affecting their SMP. The same happens to the analysis of the UK NRA, OFCOM. The Commission challenged its conclusion that the incumbent's network is not substitutable since OFCOM does not fully substantiate the switching costs for re-routing geographic traffic.[323]

The other two Member States (Cyprus and Italy) have a totally different market situation. In Cyprus, the incumbent operators have a stable market share of around 100% for many years. The Commission questions whether OCECPR's proposal to maintain the current strict price regulation provides any incentives for alternative operators to invest in direct interconnection or to enter effectively on the merchant market for wholesale district transit or to self-supply their own traffic.[324] In Italy, the Italian NRAs defines a wholesale 'district' transit market (conveyance of calls between switches located in the same telephone districts). This market may be understood as thin routes as alternative operators' transit volumes on those routes have not yet achieved a level sufficient to justify the cost of district interconnection and, for this reason, most operators are interconnected with TI alone even in the districts in which other alternative operators are present.[325] This part of Market 10/2003, as also indicated by the Recommendation, is difficult to deregulate, since it continues to be a bottleneck. With regard to remedies, the Commission, following its comments in the Cypriots notification,[326] states that the remedies should be more effective to give more incentives for alternative operators to invest in interconnection at this lower district level either to enter effectively on the merchant market for wholesale district transit or to self-supply their own traffic.[327]

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321 Commission decision concerning Case EL/2010/1074: Transit services in the public telephone network, 17/05/2010.

322 Case RO/2009/1005: Transit services in the fixed public telephone network, 03.12.2009.

323 UK/2009/0973: Transit services in the public telephone network provided at fixed locations in the UK, 15/10/2009.

324 Commission decision concerning Case CY/2011/1171: Transit services in the public telephone network provided at a fixed location, 31/01/2011.

325 Commission decision concerning Case IT/2009/1027: Transit services in the public telephone network provided at a fixed location, 19.03.2010.

326 Commission decision concerning Case CY/2011/1171: Transit services in the public telephone network provided at a fixed location, 31/01/2011.

327 Commission decision concerning Case IT/2009/1027: Transit services in the public telephone network provided at a fixed location, 19.03.2010.

A.12.3 Observations

Based on those notifications in 2008-2012, it is observed that Market 10/2003 can in general not fulfil the Three Criteria Test.

A.13 Wholesale Trunk Segments of Leased Lines (Market 14/2003)

A.13.1 The Recommendation

The Recommendation defines trunk segments of leased lines as above terminating segments, so to connect two points of operators' core networks. Electronic communications operators can use trunk segments of leased lines to construct networks or link locations with long distance in order to provide services to end-users. Trunk segments of leased lines can be provided over different technologies, such as copper pair, coaxial cable, optical fibre, and even wireless network, such as radio links and satellite. In most cases trunk segments of leased lines pertains to circuits of high capacities, though in some thin routes low-capacity leased lines are also used. Primarily due to its nature of long distance and high-capacity, trunk segments of leased lines are not considered as markets with high and non-transitory entry barriers, and thus not able to fulfil the Three Criteria Test. The Recommendation removes it from the list of relevant markets susceptible to ex-ante regulation.[328]

However, the Recommendation also points out that competition concern may still arise in some thin routs where the volume and value of traffic is lower and thus a network operator has monopoly. Those routes may still fulfil the Three Criteria Test and be regulated. This possibly implies that Member States can define sub-national market for those thin routes, and hold other parts of their territory deregulated.

A.13.2 General Trends

During the period of 2008-2012, 13 Member States submitted 18 notifications. Only six Member States (France, Greece, Poland, Portugal, Spain and the UK) still maintain regulation on this market. All the other NRAs consider this market does not warrant ex-ante regulation any longer and thus withdraw regulation.

Among those Member States, only Greece[329] and the UK[330] define a national market for wholesale trunk segments.[331] The two NRAs consider the market still fulfils the Three Criteria Test mainly based on the ubiquitous networks of the incumbents and their high market shares (about 70% for the Greek incumbent and 58-86% of the UK incumbent). In both notifications, the Commission expresses concerns with such analysis. Although serious doubts are not given, the Commission requires the two NRAs to closely monitor the development on this market.

The other four NRAs (France, Poland, Portugal and Spain) do not define a national market for wholesale trunk segments, but instead define the market based on specific routes. Such approach essentially is a sub-national market definition, in which remedies are only imposed on thin routes where there is only one operator (the incumbent) providing trunk segments of leased lines.

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328 Explanatory Note to the Recommendation, supra note 156, pp.38.

329 Commission decision concerning Case EL/2012/1332: Wholesale market for trunk segments of leased lines in Greece, 22/06/2012.

330 UK/2008/0748: Wholesale trunk segments of leased lines in the UK, 26/03/2008.

331 The UK actually defines the geographic market as the whole territory excluding the Hull area.

A.13.3 Observations

This market is in general competitive across the EU. The only concern remains with regard to thin routes where the traffic is so low that no new entrants can be attracted. A definition of sub-national markets for those thin routes may be a possible solution.

A.14 Wholesale access and call origination on public mobile telephone networks (Market 15/2003)

A.14.1 The Recommendation

As with fixed telephone calls, the transmission of mobile calls can also be broken into access, call origination and call termination. Network access and call origination are typically supplied together by a network operator so that both services can be considered as part of the same market at a wholesale level. These products can be requested by either Mobile Network Operators that do not cover the whole national territory (national roaming) or by Mobile Virtual Network Operators that want to provide mobile services without having to operate a mobile network.

The Recommendation does not differentiate mobile voice from SMS, and it assumes that the two may be part of the same relevant market. Moreover, the Recommendation is also uncertain of the development of mobile data. In particular, no certain competition problems have been identified. Consequently, it leaves mobile data unregulated.[332] With regard to technologies, the Recommendation makes no distinction between 2G and 3G, which are considered substitutable.

Furthermore, the Commission decides that Market 15/2003 can in general not fulfil the Three Criteria Test. It may still fulfil the first criterion, *i.e.* high and non-transitory entry barriers, as the launch of mobile networks depends on the availability of spectrum that is scarce. It is difficult for new entrant to enter this market. Nevertheless, Market 15/2003 can in general not satisfy the second criterion, *i.e.* no dynamic competition. The Commission observes that there are usually three or more mobile operators in each Member State. The incumbents do not possess a large amount of market shares. Since it is presumed that the Market 15/2003 tends towards a competitive outcome, it is removed from the recommended list of relevant market susceptible to ex-ante regulation.[333]

A.14.2 General Trends

By November 2007, market analyses have been concluded in 22 member states. There have been 17 findings of effective competition, and 5 of not. Two of these SMP decisions on mobile access are single dominance (Cyprus and Slovenia) and three are of joint dominance (Spain, Malta and Ireland), one of which (Ireland) has been removed during the national appeal procedure.

Between 2008 and 2012 the Commission reviewed 10 notifications from 6 Member States (Cyprus, Denmark, Italy, Malta, Poland, and Slovenia). Only Cyprus considers that this market still warrant regulation. One of the most important reasons is that there are only two network operators in Cyprus, with the incumbent having 86.4% market shares. After entering this market for four years, the alternative operator has not made significant presence on the market.[334]

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332 Explanatory Note to the Recommendation, supra note 156, pp.46-47.

333 Ibid, pp.45-46.

334 Case CY/2009/0877: Wholesale access and call origination on public mobile telephone networks in Cyprus, 26/02/2009.

With regard to the products included, all Member States believe that 2G and 3G are substitutable, and all of them but Denmark[335] also include mobile call and SMS on the market. Nevertheless, a difference practice is found in relation to mobile data. Some Member States[336] include mobile data and others (Denmark[337] and Slovenia[338]) do not.

A.14.3 Observations

According to NRAs' notifications, Market 15/2003 has become effectively competitive in nearly all the Member States.

The case of Cyprus where Market 15/2003 is regulated may catch attention. Cyprus has only awarded one alternative license in addition to the incumbent. The condition for the third license is five years after the award the second license; or until the second license holder has gained a 25% market share on the retail mobile market. Cyprus submitted its notification in 2009. By now the second alternative operator should be present, and this may change the market situation there.

335 Case DK/2008/0863: Market for access and call origination on public mobile telephone networks in Denmark.

336 Case CY/2009/0877: Wholesale access and call origination on public mobile telephone networks in Cyprus, 26/02/2009.

337 Case DK/2008/0863: Market for access and call origination on public mobile telephone networks in Denmark.

338 Commission Decision concerning Case SI/2012/1360: Access and call origination on public mobile telephone networks in Slovenia, 30/8/2012.

A.15 Broadcasting transmission services, to deliver broadcast content to end-users (Market 18/2003)

A.15.1 The Recommendation

Electronic communications services exclude services providing or exercising control over content transmitted using electronic communications networks and services. The provision of broadcasting content therefore lies outside the scope of this regulatory framework. On the other hand, the transmission of content constitutes an electronic communication service and networks used for such transmission likewise constitute electronic communications networks and therefore these services and networks are within the scope of the regulatory framework.[339]

The Market 18/2003 thus concerns the transmission of broadcasting service, *i.e.* TV and radio, to the public via various broadcasting platforms, such as terrestrial, cable, satellite, DSL and so on. Broadcasting platforms involve a two-sided market and are facing two groups of users with different demand: at one side, content owners (TV channels) that would like their content to be transmitted to views and, at the other side, end-users that receive TV or radio signals at their places. Note should be taken that the electronic communications regulatory framework does not concern the relationship between platform owners and content owners.[340] In some cases, the owners of broadcasting platforms and content owners are the same. This vertical integration characterises the traditional business model of broadcasting, *i.e.* free to air transmission. End user can receive broadcasting signals with appropriate equipment without subscribing to the platform. In other cases, platforms are paid by end users to receive signals. An example of free-to-air platform is terrestrial and examples of pay platforms are cable, DSL and satellite.

In order to render a market susceptible to ex-ante regulation, the Three Criteria Test must be examined. When analysing the Three Criteria Test, the Commission seems to treat all transmission platform substitutable. It thus states that there is evidence of greater platform competition and that many Member States are likely to have three to four competing platforms (terrestrial, satellite, cable and telecom-based) in contrast to two to three analogue platforms.[341] While the Commission recognises that entry barriers still exist,[342] it predicts that the transition from analogue to digital indicate the market dynamics are such that the second criterion is not satisfied. In addition, it is necessary to consider whether potential market power problems can be addressed either by competition law (the third criterion) or indeed by other regulatory measures that are in place, in line with the principle of taking a modified greenfield approach. Therefore, the Market 18/2003 was removed from the Recommendation.

339 Explanatory Note to the Recommendation, supra note 156, pp.47.
340 Ibid, pp.48.
341 Ibid. pp.49.
342 Ibid, pp.48.

A.15.2 General Trends

In 2008-2012, the Commission received 27 notifications from 17 Member States. Only three Member States, *i.e.* Czech Republic,[343] Malta[344] and Slovakia,[345] concluded that the Market 18/2003 should not be subject to regulation any more. All other 14 Member States (Austria,[346] Belgium, [347] Cyprus, [348] Estonia, [349] Finland, [350] France, [351] Germany, [352] Italy, [353] Lithuania, [354] the Netherlands, [355] Poland, [356] Romania, [357] Spain[358] and Sweden[359]) are still regulating this market.

Terrestrial networks

The key issue raised by 12 of those 14 Member States (excluding Belgium and the Netherlands) is terrestrial broadcasting networks, digital or analogue, for the purpose of providing TV or radio. All of them consider that terrestrial networks and other platforms, *e.g.* cable, satellite, are not substitutable. From the view of content owners, those networks are only complementary, since content owners need to reach the biggest group of end-users as possible. Other platforms hardly have the same coverage as terrestrial networks. From the view of consumers, many terrestrial networks are free-to-air transmission platforms and, thus, are considered as different products than pay platforms. Therefore, those 12 Member States conclude that terrestrial networks constitute a separate market from the other platforms.

Three Criteria Test

With regard to the Three Criteria Test, the 12 Member States believe that there are high and non-transitory entry barriers for terrestrial transmission mainly due to limited frequency and difficulty to replicate the masts of the incumbent. In the three Member States (Czech, Malta and Slovakia) where the Market 18/2003 is deregulated, infrastructure competition is indeed identified, as there are many terrestrial network operators that are able to provide nationwide broadcasting. However, competition via other platforms is regarded by all 14 Member States as insufficient to constrain the behaviour of the incumbents. With regard to the second criterion, it is observed that in all the 12 Member States the incumbents still possess large amount of market shares, or in some Member States even of a monopoly.

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343 Case CZ/2009/0907: Radio and television broadcasting transmission services to deliver broadcast content to end users, 20/05/2009.

344 MT/2008/0810: Broadcasting transmission services, to deliver broadcast content to end users in Malta, 13/11/2008.

345 Commission decision concerning Case SK/2010/1075: Radio and television broadcasting transmission services to deliver broadcast content to end users, 19/05/2010.

346 Case AT/2009/0896: Market definition for broadcasting transmission services in Austria, 15.04.2009.

347 Commission decision concerning case BE/2011/1229: Retail market for the delivery of broadcasting signals and access to broadcast networks, 20/06/2011.

348 Commission Decision concerning Case CY/2012/1398: Wholesale Access Services for the distribution of TV content to the end users, 17.12.2012.

349 Commission decision concerning Case EE/2011/1186: Wholesale broadcasting transmission services in Estonia, 22/03/2011.

350 Case No FI/2008/0789: Markets for television and radio broadcasting transmission services, to deliver broadcast content to end users in Finland, 14/08/2008.

351 Commission Decision concerning case FR/2012/1354: Wholesale market for digital terrestrial television broadcasting services, 13/8/2012.

352 Commission decision concerning case DE/2010/1126: Broadcasting transmission services in Germany, 30/09/2010.

353 Commission decision concerning case IT/2010/1157: Wholesale market for broadcasting transmission services in Italy, 22/12/2010.

354 LT/2009/1022: Wholesale broadcasting transmission services, 3/02/2010.

355 Case NL/2009/0873 - Wholesale market for broadcasting transmission services and wholesale access to the broadcasting transmission platform of the individual cable operators Ziggo, UPC, Delta and CAIW, 9.2.2009.

356 Case PL/2010/1056: Market for Wholesale Radio and Television Broadcasting Transmission Services, to deliver broadcast content to end users, 31/03/2010.

357 Case RO/2009/0876: Markets for television and radio broadcasting transmission services, to deliver broadcast content to end users, 23/2/2009.

358 Case ES/2009/0905: Broadcasting transmission services, to deliver broadcast content to end users in Spain, 18/5/2009.

359 Case SE/2010/1032 - Wholesale market for broadcasting transmission of national analogue terrestrial radio to end-users in Sweden, 04.02.2010.

Cable broadcasting

The situation in Belgium and the Netherlands are different as there are few or no terrestrial networks in the two countries. The dominant platform there is cable. Both Belgium and the Netherlands propose to regulate those cable operators. The main reason to regulate cable is similar to those to regulate terrestrial networks. Member States try to consider one platform as one market, although at the retail level, the services offered via different platforms are substitutable to some extent. This is certainly not the case for the wholesale market due to the limit churn and the large customer base of the cable platform.

A.15.3 Observations

Although the Market 18/2003 has been removed from the Recommendation, there are currently still 14 Member States notifying between 2008 and 2021 that considered this market susceptible to ex-ante regulation. Such a situation is considerably different from other removed relevant markets, which can be observed on the following table.

Table A.15.1 Regulatory Situations of Removed Markets

Markets	Number Member States still regulating
Market 3-6/2003	2[360]
Market 7/2003	3[361]
Market 10/2003	5[362]
Market 14/2003	6[363]
Market 15/2003	1[364]
Market 18/2003	14

Even six years after the abolishing of the relevant market from the 2003 Recommendation, it seems difficult to conclude that the Market 18/2003 is in general effectively competitive across the EU.

Another issue that may be paid attention to is that the Recommendation and NRAs have different views on the infrastructure competition on this market. The Commission in the Recommendation believes that infrastructure competition can take place between different transmission platforms. By contrast, NRAs do not think that different platforms can exert sufficient competition constraint on each other. The Commission does not raise serious doubt on NRA's analysis. Therefore, it seems that the Commission also endorses this position.

Last but not least, the different business models between pay platform and free-to-air platform affect also competition. The two may not be on the same relevant market. Free-to-air platforms usually have large customer base, which is valued by content owners that provide advertising minutes to advertisers. In contrast, pay platform usually have a smaller customer base, but which generates profits through, for example, the subscription fees. Thus, advertisers would not consider pay platforms as substitutable with free-to-air platforms. Moreover, the fact that free-to-air platforms do not impose charges on consumers also makes consumers consider that they are different from pay platforms. Consequently, competition between pay platform and free-to-air platform can hardly take place. This has not been included in the current version of the Recommendation.

360 Bulgaria and Greece.
361 Austria, Greece and UK.
362 Cyprus, Greece, Italy, Romania and UK.
363 France, Greece, Poland, Portugal, Spain and UK.
364 Cyprus.

In summary, it is concluded that the Market 18/2003 does not seem to be effectively competitive across the EU, and the special feature of this market has not yet been fully grasped by the Recommendation.

Appendix 3 Methodological note

Methodology for market analyses

This paper sets out the main methodological issues related to market analysis, with specific focus on the identification and analysis of markets under the EU regulatory framework for e-communications. The paper takes stock of existing practice in market analysis, both in the *ex-ante* market analysis performed by National Regulatory Authorities (NRAs) in the past decade, as well as in the *ex-post* analysis of e-communications and other high-tech markets by national competition authorities and the European Commission. At the same time, the paper contains a discussion of potential changes in the way the current framework operates' and which would bring it closer to the current development in economic theories of competition.

The paper is structured as follows. Section 1 below provides an introduction to the European Regulatory Framework for e-communications and briefly addresses the difference between an *ex-ante* and an *ex-post* analysis of e-communications markets. Section 2 reflects on general competition policy tools and their application to the *ex-ante* regulation of e-communications markets, in particular, focusing on the concept of Significant Market Power (SMP), as well as on the issues of platform competition, cluster markets, after-markets and multi-sided markets. Section 3 focuses more specifically on particular problems that emerge in the analysis of wholesale and retail markets, and discusses the potential for a more prospective approach towards SMP. Section 4 starts by reflecting on the future application of the Three Criteria Test currently used (1) by the European Commission in order to pre-select markets to be included in the Recommendation on Relevant Markets; and (2) by NRAs when deciding to identify a new market that would warrant *ex-ante* regulation. Next, it applies the concepts and definitions discussed in this paper to a number of possible revisions of the list of relevant markets (the Recommendation on Relevant Markets) put forward by experts and stakeholders during the recent consultation carried out by the European Commission. The Section also identifies the matters that need to be considered further in Phase 2 of this project in order to reach a view on whether such markets are appropriate for inclusion in the Commission's list of recommended markets. Section 5 concludes by summarizing our findings, recommendations and open questions and outlines some possible scenarios, to be retained for further analysis.

A.1 Ex ante vs. ex post: balancing competition and innovation in the e-communications industry

A.1.1 The Regulatory Framework for e-communications

The Regulatory Framework (RF) is set out in a series of Directives and other legislative instruments, originally dating from 2002 and revised in 2009. The most relevant Directives are the Framework Directive[365] and the Access Directive[366].

Briefly, National Regulatory Authorities are required to define relevant markets, identify positions of Significant Market Power (SMP - equivalent to the competition law concept of a dominant position) and, subject to certain conditions set out in the legislation, impose on the firms with SMP remedies that alleviate market power and/or facilitate the emergence of effective competition. The assessment of SMP is consistent with that used by competition authorities to assess a dominant position. Elements of this assessment are described in Articles 14-16 of the Framework Directive. In particular, NRAs are expected to first define relevant product and service markets and their relevant geographic scope. Next, they are expected to analyse whether or not there is a position of SMP in each of the identified markets. The rules concerning choice of remedies are described in Articles 8-13 of the Access Directive.

The European Commission has issued a Recommendation on Relevant Markets, including the articulation of three generic criteria for identification of e-communications markets suitable for consideration for ex-ante regulation. The Three Criteria Test is in principle the defining feature of the market definition exercise under the regulatory framework and marks the difference between market definition under competition law and the exercise carried out in the ex-ante regulation of e-communications. Currently however, the Three Criteria Test does not always lie at the core of the market definition exercise by NRAs, since NRAs do not have to prove compliance with the Three Criteria if they do not deviate from the list of relevant markets contained in the Recommendation.

NRAs are expected to review markets at least once every three years on the basis of the Commission's Recommendation. NRAs may depart from the Commission's Recommendation, either by adjusting the Commission's definition or by adding or deleting markets, subject to the rules in the Directives, as required by national market conditions. At the same time, it is also fair to assume that the list of relevant markets was also needed to help NRAs in developing their competences in competition assessment and also accelerate convergence of regulatory approaches, at the same time ensuring a degree of control in the hands of the Commission.

The analysis by the Commission and NRAs should reflect the policy objectives of the Regulatory Framework (RF), as stated in Article 8 of the Framework Directive. These include the promotion of competition (para. 2), the achievement of the internal market (including the establishment of pan-European services, para. 3), promoting the interest of European citizens (para. 4, including the

[365] Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services.

[366] Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities.

provision of clear information and transparency of tariffs and prices) and promoting the use of objective, transparent, non-discriminatory and proportionate regulatory principles (para. 5).

The last objective includes a number of features that should be taken into account, most notably:

- Promoting regulatory predictability by ensuring a consistent regulatory approach over appropriate review periods;
- Safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure-based competition;
- Promoting efficient investment and innovation in new and enhanced infrastructures;
- Accounting for geographical differences; and
- Imposing ex-ante regulatory obligations only where there is no effective and sustainable competition and relaxing or lifting such obligations as soon as that condition is fulfilled.[367]

Given the aim of stimulating competition so that ex-ante regulation of competition will ultimately no longer be necessary, the identification of a set of markets that typically experiences competition problems across Europe should be taken with a view to constraining the list at any stage to those markets where ex-ante regulation to support and promote competition remains necessary. While in principle the scope of the Recommendation should be reduced over time, reflecting increasing competition, it is not ruled out that new markets may be inserted into the Recommendation, where new competition concerns have arisen that can best be solved via ex-ante regulation. Consequently, the Relevant Markets Recommendation needs to be reviewed from time to time to test its continuing relevance and suitability to the purpose.

[367] On this objective, it can be argued that Directive 2002/21 can be read both as advocating a decrease of regulation over time or as calling for regulation only when competition law has been proved to fail.

A.2 General competition law enforcement principles and techniques

This section discusses come of the general tools used in the enforcement of competition law, such as market definition and dominance, as well as their application to the *ex-ante* perspective adopted in the e-communications framework.

Section 2.1 explores the technicalities of market definition, including the tools and methods for defining of the relevant product and geographic market.

Section 2.2 illustrates the notion of Significant Market Power, its definition in the case law and the relevance of competitive pressure exerted by players located along the value chain, such as application and service providers.

Section 2.3 focuses on platform competition and on the concepts of markets with high switching costs, after-markets and cluster markets.

A.2.1 The theory of relevant markets

In competition law, market definition is often considered an essential step in the assessment of dominance: in the mainstream view of antitrust enforcement, a finding of dominance is not substantiated without a clearly delineated relevant product market and a clearly delimited relevant geographic market. This view is certainly the one adopted in the application of EU competition law. The European Commission has issued a specific Notice on the Definition of the Relevant Market for the purposes of the application of EU competition law back in 1997, in which it used the following definition of relevant product market:

> "A relevant product market comprises all those products and/or services that are regarded as interchangeable or substitutable by the consumer, by reason of the products' characteristics, their prices and their intended use."

In addition, the Commission also stated that:

> 'The relevant geographic market comprises the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of competition are sufficiently homogeneous and that can be distinguished from neighbouring areas because the conditions of competition are appreciably different in those area`.

Later, in the Guidelines on market analysis and the assessment of Significant Market Power issued with specific regard to the application of the 2002 RF, the Commission added:

> “The extent to which the supply of a product or the provision of a service in a given geographical area constitutes the relevant market depends on the existence of competitive constraints on the price-setting behaviour of the producer(s) or service provider(s) concerned”.[368]

[368] See Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services Official Journal C 165, 11.07.2002 pp. 6-31.

These definitions standing alone would still be too vague to represent an operational tool for the competition law enforcer or the *ex-ante regulator*. More specifically, based on the 'hypothetical monopolist test' (see below), the relevant market can be defined as the smallest group of products for which a hypothetical monopolist would find it profitable to increase prices by 5% to 10%, starting from prices at a competitive level.

Against this background, the extension of the relevant product and geographic market depends on two main types of competitive constraints:

- *Demand-side substitutability*, *i.e.* the extent to which customers would be prepared to substitute other services or products for the service or product in question; and
- *Supply-side substitutability*, *i.e.* whether suppliers other than those offering the product or services in question would switch in the immediate to short term their line of production or offer the relevant products or services without incurring significant additional costs.

A third source of competitive constraint recognized by competition authorities is *potential competition*, referring to the likelihood of entry of new players in the market over a longer time span and even with sunk costs, contrary to what occurs in supply-side substitution. The 1997 Notice, however, clarifies that

> "The third source of competitive constraints, potential competition, is not taken into account when defining markets, since the conditions under which potential competition will actually represent an effective competitive constraint depend on the analysis of specific factors and circumstances related to the conditions of entry".[369]

Accordingly, as in Padilla (2001), the effectiveness of potential competition as a competitive constraint depends on factors such as the likely timing and volume of entry, the degree of product differentiation between old and new products, etc. Potential competition is then considered at a subsequent stage, normally in the analysis of possible dominance[370].

All in all, the concept of relevant market has never been given an unequivocal meaning and definition in the history of antitrust, to the extent that many commentators have started to question the usefulness of this concept over the past few years, especially in light of the emergence of complex value chains and interactive digital platforms (see Section 2.1.2 below). Antitrust practice and case law in the past decades have revealed that the market definition exercise can be complex, time consuming and at the same time decisive for the outcome of the case.

In the US, for example, cases such as *U.S. v. General Dynamics Co.* (1974), testify to the difficulty and arbitrariness of market definition: while the U.S. Antitrust Division had defined the *product market* as 'coal', the Court rejected this definition and replaced it with a more overarching relevant market for 'energy' that included oil, gas, nuclear and geothermal power (Ghoshal 2012). Similarly, the Antitrust Division had defined the *geographic market* narrowly, relatively regional; whereas the Supreme Court broadened it considerably arguing that the market area should be defined in terms of the transportation networks and freight charges that determine the cost of delivering coal and other energy.

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369 Commission Notice on the definition of relevant market for the purposes of Community competition law, OJ C 372, 9.12.1997, pp. 5-13.

370 See Padilla, A.J. (2001), The role of supply-side substitution in the definition of the relevant market In merger control, Report for the European Commission; and Ghosal, V. (2012), Assessing Potential Competition in Antitrust Markets (August 9, 2012). Available at this link.

Similarly, in the famous US and EU *Microsoft* cases the definition of the relevant product market differed: while for US authorities the market in which MS Windows operated was that of operating systems for 'Intel-based personal computers' (and thus did not include other OS such as Apple iOS), the European Commission defined the market more broadly, which included also Apple's OS. Examples are countless: suffice it to recall the different ruling in two *Coca Cola* cases in Italy and Spain by NCAs (AGCM and Tribunal del Defensa de la Competencia) mostly due to different market definitions: the market for "colas" in Italy, as opposed to the market for carbonated beverages in Spain).

Also in light of the degree of discretion attached to the market definition exercise, antitrust scholars and competition authorities have often stated that market definition is by no means a scientific exercise, and only aims at placing the alleged anticompetitive conduct (or the prospective effects of a merger) in its context[371]. Former Competition Commissioner Mario Monti defined market definition as "a cornerstone of competition policy, but not the entire building", adding that: "Market definition is a tool for the competitive assessment, not a substitute for it"[372]. In academia Grimes (1999), for example, states that *"market definition is, of course, merely a surrogate for determining whether the defendant possesses market power"*, whereas Harbord and von Graevenitz (2000) argue that if the purpose of market definition is to identify those firms which are potentially able to exercise 'market power,' then it is a redundant step in competition policy investigations, which leads to logical absurdities, and should be eliminated"[373].

It is very important to keep this in mind when discussing the role that market definition has been given in the 2002 e-communications regulatory framework: although competition authorities normally rely on market definition when instructing their cases, in recent cases they have had substantial problems in coping with market definition, especially when facing high-tech markets, to the extent that some commentators have cast doubts on the need for such an exercise, at least in the context of the new economy (see Section 2.2.4 below). That said, it is undoubtedly true that in competition law practice market definition possesses many virtues, not least that it allows the calculation of market shares, *i.e.* a simple but powerful first indicator of dominance, as well as the fact it seems to work reasonably well in most cases. In addition, the pre-selection of relevant markets through the Three Criteria Test makes it simpler for NRAs to apply the RF and for the commission to monitor its implementation.

A.2.2 Tools and Methods

In order to specify more precisely the boundaries of relevant markets, competition authorities have started to use more analytical tools since the 1980s. In particular, substitutability criteria have been operationalized through a number of tools that are encompassed by the 'umbrella' concept of a 'hypothetical monopolist test'. In other words, these tests aim at identifying the relevant product and geographic market by assessing whether a hypothetical monopolist would find it profitable to sustain supra-competitive prices in that market. The most common of these tests is the SSNIP test, described below; subsequent sections deal with Critical Loss Analysis, UPP tests and econometric techniques. These are briefly described below.

371 See Notice on the definition of the relevant market, *supra*, note 5.

372 Speech by Mario Monti, "Market definition as a cornerstone of EU Competition Policy, Workshop on Market Definition, Helsinki Fair Centre, 5 October 2001.

373 "Market Definition in Oligopolistic and Vertically-Related Markets: Some Anomalies" by David Harbord and Georg von Graeventiz. Published in the European Competition Law Review, 21:3, March 2000.

A.2.2.1 Qualitative analysis

According to the European Commission's 1997 Notice on the definition of the relevant market (par. 26), the initial phase of market definition entails a preliminary analysis, in which the Commission attempts to define the product market by investigating whether product A and product B belong to the same market. The Commission also tries to determine the geographic market by producing an overview of the breakdown of the market shares held by the parties in question and by their competitors, the prices charged and any price differentials.

Once the product market and the geographic market have been defined in a preliminary fashion, the Commission carries out a more detailed analysis based on the concept of substitutability. Firms in a competitive environment are subject to two major constraints: demand substitution and supply substitution. A market is competitive if customers can choose between a range of products with similar characteristics and if the supplier does not face obstacles to supplying products or services on a given market.

The substitutability criterion enables research to be targeted at any substitute products, thus making it possible to define the relevant product market and geographic market with a greater degree of certainty. Only in the final stage is the relevant market analysed to determine the degree of integration in the markets of the European Union (EU).

However, this criterion of interchangeability does not take into account the conditions in which the firms in question operate. Therefore it is necessary, for instance, to examine the conditions of access to the market thus preliminarily defined. In this connection, the Commission carries out an assessment of product dimension and the geographic dimension of the relevant market, taking account of:

- The **recent past**: in certain cases it is possible to analyse evidence relating to recent price variations, for example in terms of substitution between two products or in terms of the customer response;
- The results of **specific studies**: econometric and statistical tests can be conducted to assess the elasticity of demand for a product. It is also useful to assess the geographic market in the light of a series of factors (such as culture, language, etc.) with an impact on local preferences;
- The **views of customers and competitors**: the Commission may contact the main customers and competitors of the firm in question with a view to gathering factual evidence and estimating their reaction in the event of price variations within the geographic area;
- **Consumer preferences**: the Commission may ask the firms in question to commission market studies before launching a product on the market or fixing its price. It may also contrast the purchasing habits of customers on the relevant market with those of other customers on a separate geographic market in as far as the conditions are the same;
- **Barriers** (regulatory or others) and **costs** associated with switching demand to other products or areas;
- Different categories of **customer and price discrimination**: a distinct group of customers may constitute a narrower, distinct market when such a group could be subject to price discrimination.

A.2.2.2 The 'SSNIP' test

The most commonly used test for market definition (first used in the US since the 1982 Merger Guidelines, and in Europe since the 1997 Notice on Market Definition) is the 'Small but Significant and Non-Transitory Increase in Price' (SSNIP) test. Based on this test, a market is defined as the narrowest possible product sphere in which a hypothetical monopolist could profitably sustain a

small but significant increase in price (in the range of 5% to 10%), starting from competitive prices. The various phases of a SSNIP test are as follows.

First, the product market should be tentatively defined by selecting the smallest group of products that may be perceived by consumers as reasonably substitutable. At the same time, the geographic market must be pre-defined in terms of competitors' market shares, prices and price differentials.

Second, a more detailed analysis of demand-side and supply-side substitutability must be conducted by:

- Determining the degree in which customers would switch to substitute products in response to a small (5% -10%) increase in price (the SSNIP). If the price increase would be profitable, this means that the alternate products considered are not sufficiently substitutable with the product at hand, and the product by itself constitutes a relevant market (at least from the supply-side). If, on the other hand, a sufficient number of customers would switch to substitute products, this would make the SSNIP unprofitable. The relevant market is then broader and includes one or more of the substitute products. When this happens, the SSNIP test must be performed again by assuming that a single undertaking would monopolize the starting product and the most likely substitute; thus increasing the price of the starting product above its competitive level. If such SSNIP is profitable, then the two products are deemed a relevant market; otherwise, a new round of the SSNIP test would be needed with the next substitute;
- Once the group of products to be included in the relevant market on the basis of demand-side substitutability is finalised, the degree of supply-side substitutability should be assessed. The central question is whether an existing supplier of a related product or service would be able and prepared to switch to the production of one competing product - without incurring significant additional costs or risks in a short time period - if prices were to increase above the competitive level by a SSNIP. In this case, supply-side substitution would lead to adding more products to the relevant market.

Once these rounds of analysis are complete, the relevant market is defined, although more qualitative arguments can always be used to refine the set of products and the geographic extension of the market.

Critical Loss Analysis and indirect competitive constraints

Within the context of the SSNIP test, Critical Loss Analysis is often used to determine whether a given price increase would be profitable given the elasticity of demand faced by the producer. Critical Loss Analysis asks quantitatively "just how elastic demand must not be, for the candidate market to be an antitrust market" (Farrell 1998); it typically assumes that products are symmetric in price and cost, and studies only a uniform SSNIP imposed on all products.

Three steps are normally followed to perform a Critical Loss Analysis:

1. The first step identifies, for any given price increase, the amount of sales that can at most be lost before the price increase becomes unprofitable ('Critical Loss'). This means estimating the so-called 'incremental margin' (*i.e.,* the price-cost margin assessed by using observations about price and variable costs);
2. The second step considers what the level of sales would actually be lost due to the price increase ('Actual Loss'), based on available demand data, including elasticity estimates for the relevant market being tested;
3. The final step is to compare the Critical Loss and the Actual Loss: if the Actual Loss is greater than the Critical Loss, then the price increase will be unprofitable, indicating that the set of products considered still does not represent a relevant market.

Examples of CLA application in the RF are the following:

- The Hungarian NRA used Critical Loss Analysis to find out whether triple play would constitute a separate relevant market. In this case, a survey showed that between 5.5% and 10.2% of the customers would have broken up the bundle in case of a 10% price increase ('Actual loss'), compared to a 'Critical Loss' of 9.1%. If AL ends up being smaller than CL, then the triple play bundles can be said to be a separate market[374];
- Dutch NRA OPTA used CLA *i.a.* to test indirect competitive pressure between two wholesale markets - the regulated market for wholesale broadband access to copper infrastructure and the unregulated market for wholesale broadband access to cable infrastructure. OPTA addresses the question whether a SSNIP of the wholesale market from a hypothetical monopolist of WBA via DSL would lead to significant substitution at the retail level from DSL to cable, such that the wholesale price increase will not be profitable. OPTA argues that retail margins in the Netherlands are low, the share of WBA prices in the retail prices is high and that retail elasticity between DSL- and cable products is high[375]. OPTA concludes that based on this retail demand elasticity a wholesale price increase of 10% will not be profitable, because the actual loss of KPN would be higher than the Critical Loss;
- UK regulator OFCOM has used CLA by means of a survey, to assess whether there the market for broadband Internet access services would constitute a separate relevant market. The survey results suggested that around 11% of broadband users would stop using broadband given a 10% price increase. Since this actual loss is much smaller than what OFCOM considered to be the "lower bound of the Critical Loss range", the regulator concluded that a SSNIP would likely be profitable, and that this "in turn suggests that it is likely that there is a separate market for broadband Internet access services"[376];
- Portuguese NRA ANACOM addressed the question of whether a SSNIP on the wholesale market from a hypothetical monopolist of wholesale broadband access via DSL would lead to significant substitution at the retail level from DSL to cable, such that the wholesale price increase will not be profitable. ANACOM explained that the percentage of the wholesale price of the wholesale bitstream offer 'Rede ADSL PT' in the retail price varied between 60% and 70%, and argued that if the WBA price were to increase by 10%, this would lead to an increase of 6% to 7% of the retail price. ANACOM further argued that the elasticity of the demand at the retail level is high, and that the barriers to switching are low; and that there was a tendency for increased retail competition between DSL and cable-based broadband offers following the spin-off of the main cable operator, ZON Multimedia, from the PT Group. Therefore, the NRA considered that a price increase at the wholesale level for DSL would turn out to be unprofitable, hence offers supported on ADSL and cable can be included in the same market[377]. The Commission resisted this view on the basis of concerns that the pass-though rate of the hypothetical wholesale price increase was over-estimated by ANACOM, and also that competitors might have been able to at least partially absorb the 10% price increase in their margins.

These examples suggest that in performing a Critical Loss Analysis, estimates of the pass-on level of cost-changes are an important factor; and also that critical losses are dependent on cost structure. Against this background, the volume loss at the retail level following an increase of the wholesale price depends on four factors: (i) the price increase of the wholesale based retail product

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374 See Pápai, Zoltán; Lőrincz, László; Édes, Balázs (2011): Triple play as a separate market? Empirical findings and consequences to broadband market definition, 22nd European Regional Conference of the International Telecommunications Society (ITS2011), Budapest, 18 - 21 September, 2011: Innovative ICT Applications - Emerging Regulatory, Economic and Policy Issues, http://hdl.handle.net/10419/54352.

375 It is worth mentioning that OPTA used the demand elasticity value calculated for Austria (-2.545) as a benchmark.

376 See the Consultation document at this link.

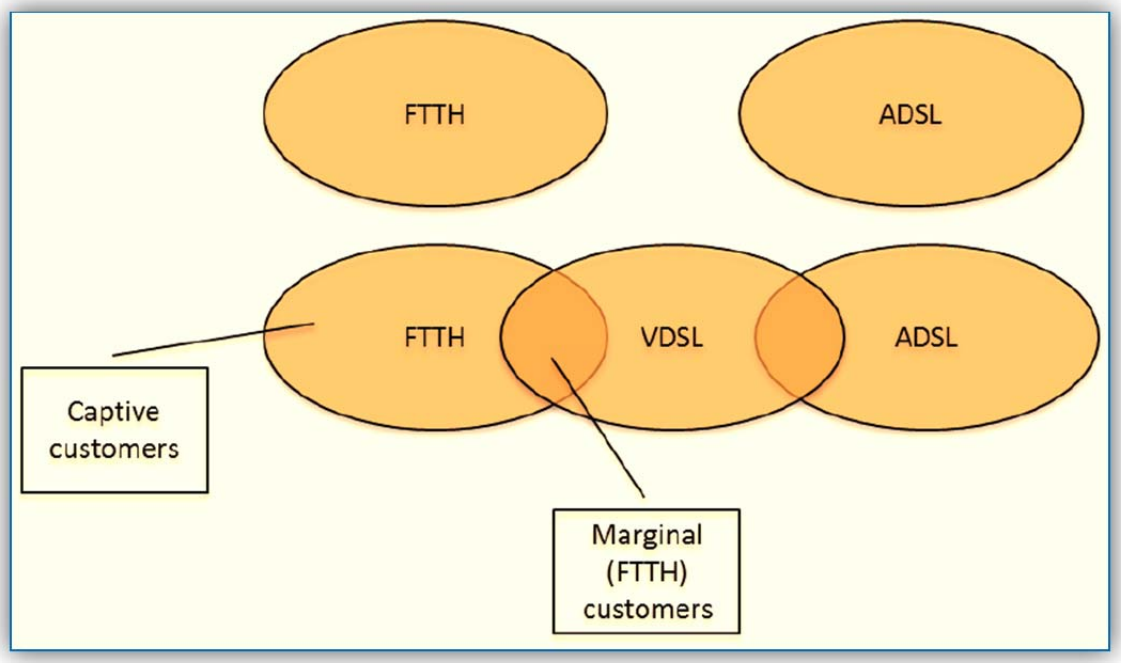
377 See case PT/2008/0850: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location.

determined by the SSNIP at the wholesale level; (ii) the price elasticity of demand for the wholesale based retail product; (iii) the retail margin; and (iv) the share of end-users that would switch to the supplier of the wholesale input. Factors that have to be included in the analysis are therefore the wholesale share of the end-user price, the retail elasticity of demand, the extent of the retail margins and the extent to which customers would switch back to the incumbent's retail operator in case of a price increase in competing operators' retail offers induced by a wholesale SSNIP.

Chains of substitution

An additional issue in market definition, when determining demand-side substitutability, is that of "chains of substitution". These occur whenever services that are not obviously close substitutes form demand-side substitutes for each other through the chain substitution effect, indicating that they belong to the same relevant market. This might imply that product A is found to be substitutable with Product B, and the latter (but not A) is substitutable with product C. The figure below (Koboldt, 2012) illustrates the problem graphically: in the figure, a VDSL network provides speeds that fall between those offered by FttH those of ADSL. Although FttH and ADSL would not be considered substitutes under a standard SSNIP test, there might be enough switching from FttH to VDSL, and from VDSL to ADSL, such that all three types of networks are indeed considered part of the same market.

Figure A.2.1 The chain substitution effect



Source: Koboldt (2012).

Chains of substitution have been referred to in the past by NRAs, including the Belgian NRA, among others. In the recent consultation on the review of the recommendation on relevant markets, one cable operator has observed that:

> "there is no need to separate market 5 for wholesale broadband access into two separate product markets depending on the speed, *i.e.* a low and high-speed broadband access market. There is no evidence of any break in the chain of substitution in terms of network speeds. Broadband services provided over copper and NGA networks are viewed as substitutes by end-users. Even if the two networks may not be directly

substitutable from the perspective of any user, they may be part of the same market if they are linked by a chain of substitution."[378]

Problems with the Hypothetical Monopolist Test

Implementing a SSNIP test in a strictly quantitative way is far from easy, and many problems arise when the test is applied in practice. These include the following:

- *Need to collect solid data* as regards cross-price and own-price elasticity of products included in the relevant market;
- *Need to simulate market effects based on the 'competitive' price* that might prove difficult to calculate in practice and very often is not well approximated by any measure of marginal cost. In addition, the Commission Guidelines on Market Analysis and the Assessment of Significant Market Power observes that "where consumer choice is influenced by considerations other than price increases, the SSNIP test may not be an adequate measurement of product substitutability"[379];
- *If it is not easy to locate a reference competitive price, or the analyst fails to look for it, there is a concrete risk of incurring the so-called 'Cellophane fallacy'*, as described for example by Schmalensee (1987), Fisher (1987) and Canoy and Weigand (2012). If the product in question is being supplied by a monopolist - and a monopoly price is being charged for it - starting from that price would lead to finding substitutes that would not have been substitutes if the SSNIP test had started with a lower (competitive) price: this might lead to an excessively wide definition of the relevant market, and consequently to a dilution of the market power held by the monopolist;
- *At the other extreme, the literature has also identified the 'oligopoly problem'* as being a risk incurred by those that run the SSNIP test: put briefly, failure to capture the oligopolistic nature (and interactions) of many markets might lead the SSNIP test to define markets too narrowly, and often dominant groups as monopolists rather than oligopolists. Harbord and von Graevenitz (2000) explain that the 'oligopoly problem' is related to the 'Cellophane fallacy', save that the fallacy is in the opposite direction. Put simply, a monopolist of product A could well be found to have profitably increased the price of A by a SSNIP. However, in an oligopolistic market such price increase would lead also competitors to respond by raising price: assuming "the terms of sale of all other products" constant, we would infer that the producer of A is a monopolist. This would ignore the competitive constraint on Firm A's prices imposed by the pricing behaviour of Firm B. In other words, *the SSNIP test must be used as a tool to define the relevant market, not to define market power;*
- *The 'hypothetical monopolist' assumption also faces significant challenges when markets are characterized by a high degree of product differentiation*, especially due to the fact that, once two products have been included in the same market, subsequent iterations have to assume SSNIPs over a 'competitive price' of the initial product considered, but nothing is said about what would be the competitive response of the alternate products already included in the relevant market. In other words, when Product B is added to the relevant market together with Product A, the competitive response of B to a SSNIP in A is relevant since it reduces the profitability of the SSNIP. However, once added to the relevant market, in the next SSNIP round, the same competitive response will cause the increased demand that substitutes to that particular product to accrue to the hypothetical monopolist – therefore, the HM does not regard such demand substitution as a loss any longer and will impose the SSNIP regardless of any competitive response by the alternate product already included in the relevant market. Another

[378] See Response of Ziggo N.V. to the Public Consultation on the Revision of the Recommendation on Relevant Markets, 8 January 2013.

[379] See the "Reports on market definitions in the media sector", Chapter 1, available at this link. In reality, the SSNIP test can also be carried in other dimensions than price: e.g. by assuming a decrease in quality that is equivalent to a 5% to 10% increase in price. However, this is very uncommon in practice.

reason why the SSNIP test is indeed problematic in circumstances with a high degree of product differentiation is that it does not take account of the 'closeness' of competition, *i.e.* that some products market are closer substitutes to each other than to other products in the relevant market;

- The debate on Critical Loss Analysis is still ongoing in the literature, and several variants of CLA have been identified in the literature, also based on the fact that the US Horizontal Merger Guidelines the EU's Notice on Market Definition and Guidelines on the Definition of the Relevant Market in e-communications give slightly different definitions. The two main versions are commonly called the 'break-even' and the 'profit-maximising' versions of CLA. The latter, more used (but not always) in the US, considers the largest reduction in quantity that a profit-maximization firm would accept with regard to a given price increase[380]. Although potentially more in line with economic theory, since it models what a monopolist *would do* rather than what a monopolist *could do*, the profit-maximising variant of CAL is mode data-intensive, since it crucially depends on the shape of the demand curve.

These problems have been spotted in the literature, which make the SSNIP test a useful reference, but often a problematic tool for market definition, especially when carried out in a strictly quantitative way. To be sure, the tool becomes a very useful conceptual framework especially when used in a more qualitative way, as guidance for asking the right questions to assess competition[381]. As will be explained more in detail in the following sections, problems become even more challenging when the *ex-ante* regulatory perspective and the multi-sided platform nature of most broadband markets are taken into account.

A.2.2.3 Variants of the hypothetical monopolist test

Given the many problems associated with the use of the hypothetical monopolist test, competition authorities sometimes resort to alternative tools to define the relevant market, especially in assessing merger cases. These tools can be very demanding in terms of data availability, but often allow a more accurate implementation of the SSNIP test. They include the following:

- Price correlation analysis, used by the Commission in merger cases such as *Arjowiggins/M-real Zanders Reflex* and *Arsenal/DSP* (see Donath 2009);
- Natural experiments (see for example Coate 2012) used in famous merger cases such as *Lufthansa/SN Airholding*; and
- Demand estimation and sophisticated modelling of consumer characteristics (*e.g.* Boshoff 2011), implemented in cases such as *Unilever/Sara Lee*, and *Kraft/Cadbury*);
- In merger cases, the Upward Pricing Pressure (UPP) test is being proposed in the United States to assess the possibility that a merged entity will end up raising prices (see Farrell and Shapiro 2010)[382]. The European Commission has already declared that variants of this

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380 Gregory J. Werden, "Demand Elasticites in Antitrust Analysis" Antitrust Law Journal, 1998 and Michael G. Baumann and Paul E. Godek, "Could and Would Understood: Critical Elasticities and the Merger Guidelines," Antitrust Bulletin, 1995. See Gregory J. Werden, Beyond Critical Loss: Tailored Application of the Hypothetical Monopolist Test, 4 COMPETITION L.J. 69 (2005), and Gregory Werden, Beyond Critical Loss: Properly Applying the Hypothetical Monopolist Test, 2(2) CPI ANTITRUST CHRONICLE, (2008) available at https://www.competitionpolicyinternational.com/beyond-critical-loss-properly-applying-the-hypotheticalmonopolist-test/. Janusz Ordover & Robert Willig, Economics and the 1992 Merger Guidelines: A Brief Survey, 8 REV. INDUS. ORG. 139 (1993). Malcolm Coate & Joseph Simons, Critical Loss vs. Diversion Analysis?, 12(1)CPI ANTITRUST CHRON.(2009),available at *https://www.competitionpolicyinternational.com/critical-loss-vs-diversion-analysis-clearing-up-theconfusion/*. Michael Katz & Carl Shapiro (2003), Critical Loss: Let's Tell the Whole Story, ANTITRUST, 49-56, (Spring, 2003) available at http://faculty.haas.berkeley.edu/shapiro/critical.pdf, and Daniel O'Brien & Abraham Wickelgren, A Critical Analysis of Critical Loss Analysis, 71 ANTITRUST L. J. 161.

381 In the 2005 Discussion Paper on the application of Article 82 (now 102 TFEU) to exclusionary abuses, which admittedly has no legal value, the Commission had backed away from insistence on SSNIP alone, presenting SSNIP and 'product characteristics and use' (the qualitative test) as two alternative approaches.

382 Farrell and C. Shapiro (Volume 10): Antitrust evaluation of horizontal mergers: An economic alternative to market definition, THE B.E. JOURNAL OF THEORETICAL ECONOMICS, article 9, 2010.

analysis have been used in the past at the EU level, but that such approach cannot substitute the hypothetical monopolist test approach to a full extent.[383]

A.2.2.4 Market definition: some reflections

In the theoretical economic literature, the debate over the definition of relevant markets in antitrust is still ongoing despite the fact that it has been applied for several decades. The current debate is articulated across several streams:

- *Some authors argue that defining relevant markets is not useful*, especially as antitrust law is moving towards a more economic approach, and the combination of a finding of market power and proof of actual or likely consumer harm would constitute sufficient evidence of anticompetitive conduct, regardless of any definition of a relevant market (*e.g.* Kaplow 2010);
- *Other authors claim that the current methods used to define markets are, at best, unclear and would deserve thorough revision.* This more constructive view of market definition normally considers that concept of an 'antitrust market' as a very volatile one, and thus one subject to arbitrary application. For example, Lemley and McKenna (2012) argue that a relevant market defined for the purposes of antitrust might be completely different from a relevant market defined for the purposes of IP litigation; and Canoy and Weigand (2012) expressly state that "the determination of the relevant market still plays a dominant role in EC Competition Law, but both theoretical and practical arguments indicate that it not so clear how to define the relevant market";
- *Other experts believe that relevant market definition is becoming a useless concept in high-tech markets*. This general statement encompasses a myriad of opinions expressed over the past decades: from Judge Posner's idea that antitrust is simply too slow to cope with the new economy (Posner 2000); to Dick Schmalensee's idea that "market definition is in any case unlikely to be critical to a proper assessment of monopoly power and its fragility" (Schmalensee 2000); and Roland Cass' view that "while the concerns over network effects are dynamic, the principal tools for antitrust analysis – especially respecting definition of the relevant market – are static"[384]. These ideas are often coupled with increasingly sceptical views with regards to the suitability of antitrust rules in a constantly changing environment such as the modern Internet ecosystem (see *i.a.*, Eisenach 2012). Among the most widely recognized problems are:
  - The fact that, due to network externalities and learning effects, in many circumstances individual products will become relevant markets by themselves, which makes the assessment of dominance (or monopoly power) straightforward and probably not very useful;
  - The fact that competitive pressure is often exerted by competing platform operators that in principle do not necessarily belong to the relevant market as they produce non-compatible products, or entirely different goods (*e.g.* operating systems vs. browsers). The "competition for eyeballs" problem in modern IP-based platforms would probably force competition authorities to define a very heterogeneous relevant market for 'eyeballs', in which a variety of players offering apparently different products would be included (e.g. Google, Apple, Amazon and Facebook).

Section 2.2.5 below clarifies further the problems that emerge when market definition tools are used in the Internet ecosystem.

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383 See the OECD report on the roundtable on market definition, at this link, page 340.

384 Cass, Ronald A., Antitrust for High-Tech and Low: Regulation, Innovation, and Risk (August 22, 2012). Journal of Law, Economics and Policy, Forthcoming. Available at SSRN: http://ssrn.com/abstract=2138254.

A.2.2.5 Market definition in the Internet era

In addition to the many difficulties already faced by the hypothetical monopolist test in competition law, more challenges seem to have emerged in applying this tool to high tech markets, especially in the Internet ecosystem, *i.e.* in the broader competitive environment in which telecom companies, application providers, Over-The-Top firms and content producers operate[385]. As a matter of fact, the past decade has witnessed a transition in the telecoms and IT fields that can be described as a multiple convergence scenario, including a blurring of the boundaries (and increased competition) between fixed and mobile communications, but also convergence between the telecommunications and the IT and media domains, and convergence between the infrastructure layer and higher layers of all-IP networks. In more detail:

- *Convergence between fixed and mobile telecommunications is finally becoming a reality*. The use of femtocells and the remarkable speed of imminent 4G networks suggests that the substitutability between fixed and mobile broadband access will be on the increase in the months to come. Recent reports and academic papers confirm this trend[386];
- *Convergence between telecommunications and IT* is fully realized by the migration towards an all-IP infrastructure, which is bringing new business models, the creation of multi-layered platforms where applications and services dominate user experience, and constantly changing competitive dynamics. Not only fixed broadband platforms are increasingly integrated into the Internet, but also cloud computing is shifting most of the computing capacity into centralised storage servers that will be made accessible from both fixed and mobile devices. The success of the App stores created by Apple and Google Android promises to revolutionise also the way in which we use computers, not only smartphones. Moreover, this form of convergence is triggering *convergence between the infrastructure layer and higher layers of IP architectures*, such as the logical layer, the application layer and the content layer in the (simplified) OSI representation (see figure 3 below); and
- *Convergence between the media world and the Internet world* is disrupting traditional business models in the content industry, leading to a growing unbundling and re-aggregation of content in different formats and in more online-user-friendly ways. This has led to a significant shift of users' attention from traditional media to Internet-published news, which in turn shifted advertising investment and market power to online content aggregators. This is particularly important since control of advertising revenues is a key success factor for modern broadband platforms, and is also currently a very concentrated market that led antitrust. Authorities in some legal systems to start investigating the extent of competition and market openness in this domain.

As stated, for example, in OECD (2009), with convergence broadband platforms become much more than simple communications networks, and can be considered as ecosystems that comprise "different elements that use high-speed connectivity to interact in different ways"[387]. The term 'ecosystem' refers to the combined physical and biological components of an environment. When applied to the Internet, this term refers to all the hardware and software that composes the Internet, plus the various players that populate the Internet environment and the complex web of rules and relations that affect them. This also means that the Internet ecosystem includes both the physical architecture and cyberspace.

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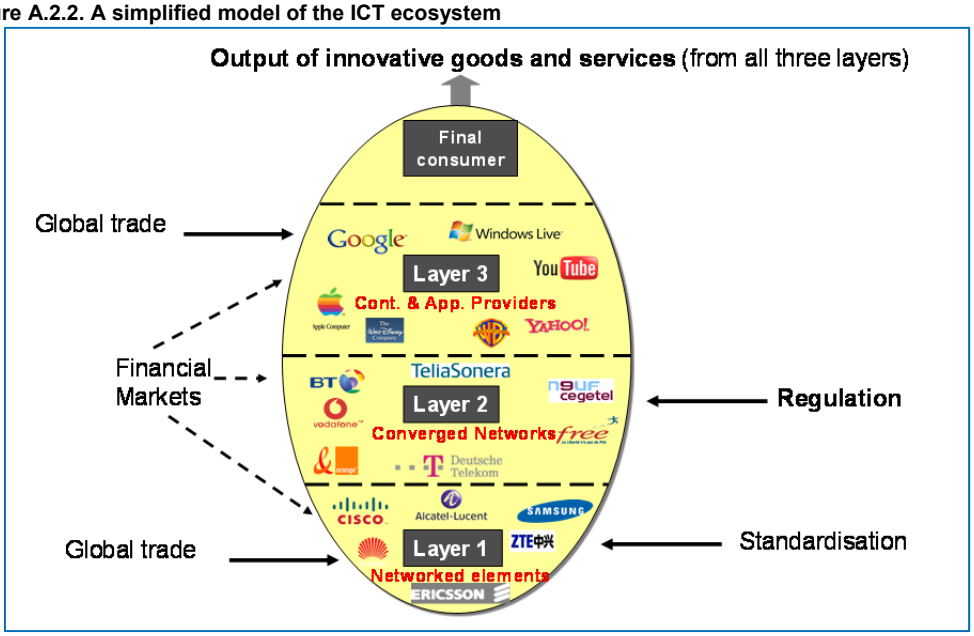
385 See *i.a.* Renda (2010).

386 See *i.a.* Analysys Mason (2010).

387 See OECD (2010), *The economic and social role of Internet intermediaries*, OECD, Paris. And OECD (2009), What role should governments play in broadband development?, Report by InfoDev, OECD: Paris. And also Edwards, L., *The Role of Internet Intermediaries in Advancing Public Policy Objectives Forging Partnerships for Advancing Policy Objectives for the Internet Economy*, Part II (June 22, 2011). Available at SSRN: http://ssrn.com/abstract=1875708 or http://dx.doi.org/10.2139/ssrn.1875708.

Perhaps one of the most potential theoretical concepts developed to analyse and advance ICT and information society is the concept of The New ICT Ecosystem, pioneered by Martin Fransman (see figure 2.2 below).

Figure A.2.2. A simplified model of the ICT ecosystem



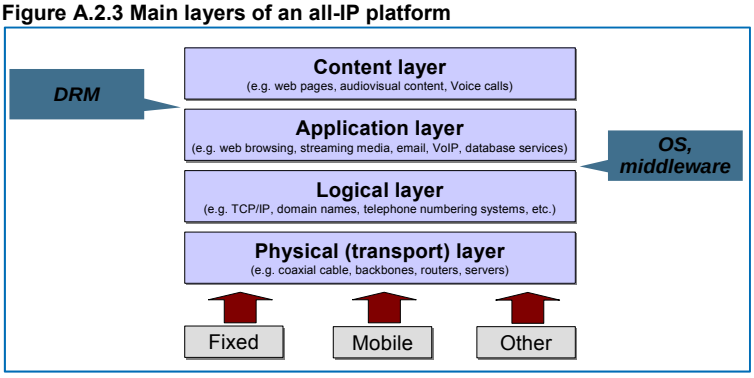
Source: Fransman (2010).

Although originally built upon originally technical layer model, the New ICT Ecosystem model includes social, economic and technological aspects and describes how they relate to each other. It is modular, hierarchically-layered system that consists of four layers that are overlapping and interdependent and are:

1. Layer 1. Networked elements (including switches, routers, servers, PCs, phones, etc.);
2. Layer 2. Converged Communication and Content Distribution Networks (Including mobile, fibre, copper, cable, satellite);
3. Layer 3. Platforms, Content and Applications (including Internet content & Application Providers, such as eFulusi mobile banking); and
4. Layer 4. Final Consumers.

One of the most important features of the Internet ecosystem is its layered architecture that exists since the early days of ARPANET, later evolving into the Internet as we know it today. Figure 2 below shows the various layers of the Internet ecosystem in the classical OSI form. In economics, it is widely acknowledged that modern broadband platforms exhibit the features of two-sided, also called multi-sided markets.

Figure A.2.3 Main layers of an all-IP platform

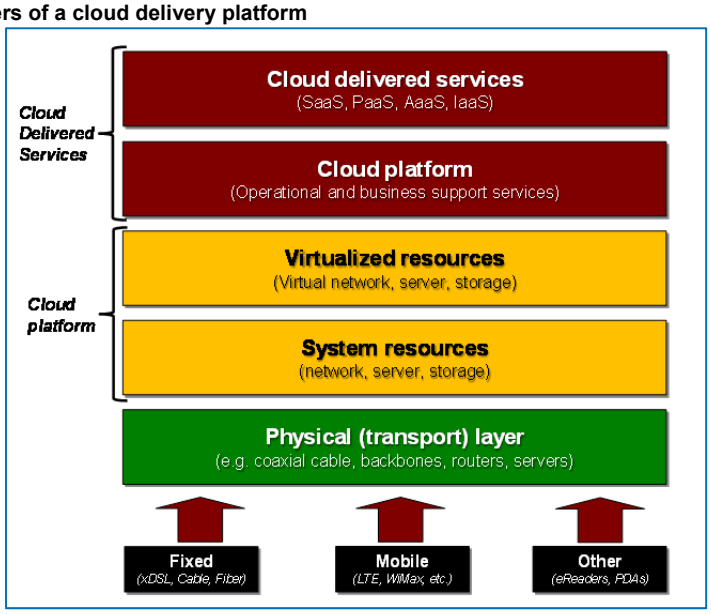


Source: Renda (2008).

Understanding the competition economics of cyberspace is made more difficult by the fact that the architecture and business models that prevail in this fluid world change constantly. And, as the attention of end-users shifts upwards towards less tangible uses, the sources of market power also shift upward in the value chain, with the creation of more filters and gateways that help end-users reach the application and content they want in the cheapest and most effective way they can. All this, together with the development of communication technologies and broadband platforms, has led to the emergence of clouds of applications that anticipate what will soon become the dominant paradigm of cloud computing.

Compared to the layered architecture shown in figure 2 above, cloud computing proposes a system design that shifts computing resources and software applications to the network and data storage centres, and organises delivery along different modalities, which entail different degrees of control by the customer. The provision of platform as a service (PaaS), for example, leaves more control of the configuration to the client that mere application as a service (AaaS) or software as a service (SaaS) modes. At the same time, private clouds are certainly more customized to the client's needs than hybrid or public clouds, that however enjoy clear economies of scale.

Figure A.2.4 Layers of a cloud delivery platform



Source: Renda (2010).

The difficulty of applying competition tools in these types of markets is due to a number of features that make price-based tools such as the SSNIP, CLA or UPP less useful. These include the following:

- *High fixed costs, negligible marginal costs*. In many ICT markets prices have to depart from marginal costs due to the fact that fixed costs are comparatively very significant. The ordinary SSNIP test would therefore be difficult to apply, although the difficulty can be overcome through better guidance and accurate modelling of competitive constraints. The extreme is reached when a SSNIP test is applied to a product that is given away for free. Evans (2011) observes that "the SSNIP test becomes inoperable when the basic price is zero", quoting examples such as Internet explorer, Google's search engine, etc.;
- *Network externalities and tipping effects*. The presence of positive network externalities can make short-term switching prohibitive even in the presence of significant price increases. Although it is true that for infrastructure layer services the effect of direct network externalities on switching costs might be negligible due to network interconnection and interoperability, this is not necessarily true in the era of broadband platforms and especially 4G-enabled mobile platforms: there, compatibility effects and lock-in might lead to limited switching across

platforms, even when the dominant platform operator decide to increase price. This, however, does not necessarily mean that the undertaking at hand is not subject to competitive constraints: on the contrary, when firms compete "for" the market, competition might take the form of a sequence of quasi-monopolies, always characterized by fierce competition for the next product generation. A static look at the market through a SSNIP test would, then, lead to define very narrow markets, to an extent that in some cases a single product will be the whole market;

- *Two- and multi-sided effects*. In two- and multi-sided platforms, prices are normally unrelated to underlying cost levels, and are – to the contrary – a function of the direction and intensity of indirect network externalities. Platform operators with a degree of market power will end up setting their price in a way that is functional to the success of the platform, but not looking at cost levels *per service*. This makes the SSNIP test very difficult to use to define an antitrust market (see Filistrucchi 2008). The same applied to CLA that is dependent on and observation of price-cost margins[388];
- *Platform competition*. Locating competitors through the hypothetical monopolist test becomes misleading under multi-sided platform competition: in the Internet ecosystem, often competition occurs between players that do not offer exactly the same product, but rather a competing platform for applications (e.g. Windows vs. Netscape Navigator). Even if companies do not exactly produce the same type of product, with the same intended use, they exert competitive pressure on each other. Similarly, looking for search engines as the only competitors to Google would fall short of capturing real competition, which certainly includes other players that do not specialize in searches, but potentially compete for the same eyeballs and advertising sources (*e.g.* Facebook, Amazon, etc.);
- *Multi-product firms and competition for eyeballs*, e.g. software giants, might decide to price products low or zero in order to attract device manufacturers, application developers or online advertisers to their platform. This, in some cases, leads to a competition between free products, for which revenues are recovered through the sale of ancillary or related products (Evans 2011);
- *Vertical and conglomerate dimensions*. In modern IP architectures, such as that of broadband platforms, defining markets requires adequate attention to vertical, 'lateral' and conglomerate issues such as the existence of platforms at higher layers, the extent of inter- vs. intra-platform competition, and the degree of freedom (in both price and conditions of sale) that operators enjoy vis-à-vis downstream or upstream platform operators. These issues overlap, of course, with the conditions that have to be considered in assessing market power: however, they are also useful in defining whether a given relevant market should be limited to intra-platform or extended to inter-platform competitors.

Defining retail broadband markets

When defining retail broadband markets, NRAs might face a number of specific problems that are worth being highlighted here, although briefly:

- *Bundling and demand-side substitutability*. As convergence is leading customers to access several services on the same IP-based architecture, with different bandwidth requirements, NRAs will have increasing problems in defining whether two retail broadband offers can be said to belong to the same market or segmentation of the relevant market should be used (e.g. as in cars, cigarettes or beer markets, to quote standard textbook examples). It all would depend on a case-by-case analysis of the extent to which a "sufficient" number of customers would switch if the price of the (bundled) service would increase above the competitive level[389]. This cannot be

[388] Again, it might be stated that multi-sided effects are limited in telecommunications. However, telecoms are not anymore an isolated, stand-alone market, but rather a piece of a broader, layered puzzle. When multi-sided platforms run on top of telecom networks, and even more importantly when they are alternative platforms to be launched from mobile devices, multi-sided effects crucially affect the price that is set also at the infrastructure layer.

[389] For example, The Irish NRA ConReg identified "A national market for lower level retail narrowband access, including access via analogue exchange lines and ISDN BRA carried over copper, cable or FWA; and A national market for higher

done on an *ex-ante* basis, but should be the subject of an *ad hoc* analysis by the NRA. The regulator should also assess, from a more forward-looking perspective, whether the current market segmentation is likely to persist in the future, as bandwidth becomes gradually cheaper. As recognized by the European Commission in its 2007 Recommendation, "the definition of relevant markets can and does change over time as the characteristics of products and service change";

- *Captive vs. non-captive customers*. Analysis of customer demand entails identifying those customers who are "captive" (e.g. because there is no alternative offer that really matches their requirements, or because they are "trapped" into a long term contract with high exit/switching costs), and those that aren't. Only the latter ones can lead an alternative offer to belong to the same relevant market. As in Koboldt (2012), it is important to ensure that any SSNIP test accounts for the possibility of price discrimination between captive and non-captive customers by the supplier – a possibility that is not remote;
- *One*-way (or "asymmetric") *substitution*. Again Koboldt (2012) and BEREC(2012) refer to cases in which customers are found to be ready to upgrade to more bandwidth, but not to downgrade their service. Behavioural issues are relevant here, including the so-called "prospect theory" developed by Dan Kahnemahn and Amos Tversky: to put is simply, given the relevance of the endowment effect on consumer choices, once consumers have been used to having high-speed, they would attach a large value to a degradation of the quality of their connectivity: this would imply that a user's willingness to pay (WTP) for a service that the user still does not have access to would likely be lower that the willingness to accept (WTA) compensation in case the user is deprived of a speed and quality it used to have[390]. Finnish regulator FICORA has found that "retail fixed access for voice services was fully substitutable with mobile access services, but not the other way around [391]";
- *Competing retail bundles*. Broadband retail markets are increasingly the realms of triple- and quadruple-play bundles, and mobile broadband platforms offer clusters and clouds of applications and services that, altogether, compete for the end-user's demand (and attention). Assessing the conditions under which the relevant market should comprise a single product, a sub-set of the bundled services, or the full bundle is inevitably a case-by-case exercise that depends on the specific features of the products at hand, as well as the characteristics of the demand. Figure 1 below shows an example form a recent analysis carried out by Irish NRA ComReg, which led to the conclusion that the general trend towards households and businesses purchasing product bundles including voice and broadband and/or TV, and the actual evidence of narrowband FVA customers switching to managed VOIP services, suggests that a substantial proportion of end-users consider broadband with managed VOIP to be a suitable product substitute despite only being available in a bundle with broadband and/or TV. On that basis, ComReg proposes that on a forward-looking basis broadband connections used to deliver managed VOIP services are likely to fall just within the boundary of the same relevant market as narrowband FVA over the timeframe of the current market review.

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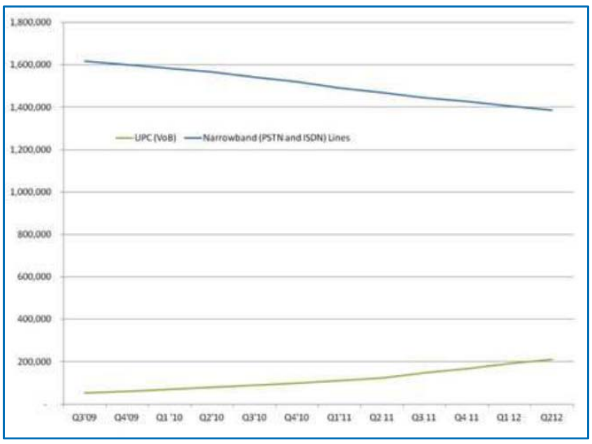
level retail rrowband access, including access via ISDN FRA and PRA". See http://www.comreg.ie/_fileupload/publications/ComReg12117.pdf.

390 For an illystration, see Daniel Kahneman; Amos Tversky (1979), Prospect Theory: An Analysis of Decision under Risk, Econometrica, Vol. 47, No. 2. (Mar., 1979), pp. 263-292.

391 See the BEREC report on impact of fixed-mobile substitution in market definition, BoR(11)54, at this link.

Figure A.2.5 Competing bundles and evidence of substitution between narrowband voice and VoIP

Platform	Product name	Price
Narrowband	telephone access (narrowband)	€25
Narrowband and DSL	Telephone access (narrowband), Broadband	€40
Cable (UPC)	Broadband/telephone access (managed VOIP)	€44
	TV/telephone access (managed VOIP)	€33
FWA	Broadband/telephone access (managed VOIP)	€30 (Digiweb and Imagine)
Fibre	Broadband/telephone access (managed VOIP)	€39.95 (Magnet)



Source: ComReg (2012).

Wholesale broadband markets: specific problems

When looking at wholesale broadband markets, the fact that some specific tools are used more often than others in the ex-ante regulation of e-communications becomes more apparent. As a matter of fact, there is reason to doubt that the initial 18 relevant markets pre-defined by the European Commission in 2003, of which 11 were wholesale markets, would all have been defined as stand-alone relevant markets by a competition authority. However, the real purpose of that exercise was to allow NRAs to open up the incumbents' network to new entrants, thus allowing more competition also at the retail level and making it possible, for NRAs, to implement a "ladder of investment" approach.

The most important issues, in broadband, are four:

- *Are these really separate relevant markets?* Since the investment ladder concept is based on substitutability between access points based on access price changes, the theory by itself seems to exclude the possibility that market 4 and 5 be considered separate relevant markets (Renda 2010). To put it with Koboldt (2012), "[t]he definition of separate wholesale markets for bitstream access and unbundled loops would seem to be difficult to reconcile with the standard principles of market definition if these services are substitutable for each other". To the extent that a sufficient number of customers (*i.e.* the access-seeking operators) would decide to climb up one rung of the ladder if the regulator imposed a SSNIP on access prices at a given rung of the ladder, then the (even if this required some adjustment or additional investment), the two rungs would need to be included in the same relevant market. This is not always going to be the case, of course, since bitstream access and ULL are only imperfect substitutes: but it ought to be considered before a NRA proceeds to the application of the investment ladder concept;
- *To what extent could we consider different technologies as separate relevant markets*? (DSL, Cable, 4G, etc.): competitive pressure can be exerted by alternative technologies, even if in the short term a customer might find it difficult to abandon the specific investment costs already borne to deploy part of, say, a DSL network. However, it might be the case that aggressive retail competition would make it impossible for a wholesale DSL access provider to profitably increase prices over the (regulated) competitive level. As a matter of fact, with a competitive retail market service, providers would have no choice but to pass on to end consumers any SSNIP: if cable competes with DSL at the retail level, this would lead the SSNIP test to demonstrate that DSL and cable should be included in the same wholesale market. The Commission has however traditionally argued, on the basis of its own (still debated) reading of past case-law, that DSL and cable cannot be in the same market as a consequence of the fact that cable companies do not in practice offer a wholesale bitstream service (and may indeed find it impractical to do so, because of technical considerations);

- *Indirect constraints*. If NRAs find that (i) ISPs would pass a hypothetical wholesale price increase completely on to their customers 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) customers of the ISPs 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, then indirect constraints are sufficient to avoid any exploitation of market power at the wholesale level. An issue that often arises in competition and regulatory assessments of markets where there may be indirect constraints is whether assessment of these constraints should be factored into the market definition stage or deferred to the assessment of market power or the effects on competition. Both approaches have been used in competition law around the world, although some commentators have argued that the former approach (indirect constraints in market definition) introduces an element of "artificiality" in the definition of the relevant market, by "broadening the upstream market horizontally to reflect constraints at the downstream level and inferring upstream market shares from the downstream market"[392]. In the broadband layered architecture, one must also consider indirect constraints arising due to reaction in upstream markets, especially in mobile markets, and by dominant platform operators and OTT players;
- *New markets and new technologies.* One related problem in competition assessment of fast-changing markets such as broadband is the extent to which new and emerging technologies can be said to compete with current technologies. For example, fibre is currently rolled out. At the initial stage the number of fibre connections are too small to be a serious competitive constraint. However, this may change over time as the numbers of fibre connections increases. What should the NRA do in market definition? Include only current substitutes, or adopt a more long-term view? Following the Commission's position on potential competition – which is a different concept, but incorporates a similar longer-term view – one might tend to conclude that such additional competitive constraint should be assessed during at later stage, in the assessment of SMP. However, this has not been fully clarified to date, to the extent that the legal provision dedicated to emerging markets in the RF has remained unapplied.

Evidence of increased competition at the retail level between DSL, fibre and cable technologies is acknowledged also by the European Commission that recently observed that "in the second half of 2011, the number of new broadband lines based on xDSL was almost equal to the number of new lines based on alternative technologies sold both by new entrants and incumbents, indicating a shift towards other technologies closely linked to Next Generation Access Networks (NGAs) and capable of providing faster speeds."[393]

Other examples of decisions on the wholesale market affected by the competitiveness of the retail market include the Austrian NRA's decision to remove regulatory obligations to provide bitstream access for service providers seeking to supply residential customers with fixed broadband services based on its finding that "there is a residential broadband market at the retail level including DSL, CATV and mobile broadband" whereas there is a DSL only business retail market. This meant that "there is effective, sustainable competition at the residential retail market and there is no more need for a bitstream regulation." Consequently, the relevant wholesale market was defined "as a market including only internally and externally provided DSL-lines that are used to provide access to non-residential customers at the retail level."[394]

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392 See CRA International, *Indirect Constraints and Captive Sales*, report for OFCOM, available here.

393 See the Digital Agenda scoreboard 2012.

394 (BEREC, 2010).

Also for what concerns retail substitution between fixed and mobile networks, and in line with the Austrian regulator's inclusion of mobile broadband together with DSL and cable, a case-by-case analysis seems to be needed, as acknowledged – though not enthusiastically – by BEREC in its latest report on the issue (May 2012).

Geographical market segmentation

One key issue to be addressed in the definition of relevant markets, especially in broadband, is that of geographical segmentation. As is well known, the European Commission has traditionally defined telecoms markets as inherently national, and only recently has started to develop a first orientation towards NRAs' attempts to define geographically differentiated markets.

Following Houpis et al. (2012), such orientation can be said to entail that (i) de-regulation of sub-national markets is based on the evaluation of sound and evidence-based criteria; (ii) the conditions of competition within each proposed market are sufficiently homogeneous and different from neighbouring markets (especially looking at the evolution of market shares, evidence of differentiated pricing, other supply and demand characteristics, etc.); and (iii) market boundaries are sufficiently stable to identify those areas where de-regulation could be justified.

Besides these conditions, geographical segmentation is also subject to the implicit application of so-called 'indirect constraints' that mostly refer to the 'disciplining' effect that would be exerted over an SMP wholesale operator by aggressive competition at the retail level. Examples of NRAs that have defined geographically segmented broadband markets notably include the Portuguese, UK and Austrian NRAs[395].

The effect of geographic differences in supply conditions can indeed have complex effects on competition. When customers buy retail services in bundles where the competitive conditions surrounding any necessary wholesale inputs vary significantly amongst the different inputs, lack of competition in the supply of any of the inputs will generally imply lack of competition in the retail bundle. In the case of business services where the bundle may cover different geographic locations as well as different services, the significance of appropriate geographic market definition is increased. It would be easy to construct a hypothetical example where there is a monopoly supplier for every multi-site firm, even though the Head Offices are all situated in areas of multiple supply. Real markets will not exhibit such extreme behaviour; nevertheless, the effectiveness of competition is likely to be over-estimated by a geographic analysis that concentrates only on the location of Head Offices.

The issue of geographic segmentation appears still very controversial in the EU context: to be sure, the Commission seems more inclined to accept NRAs' proposals as regards a geographical differentiation of remedies, rather than relevant markets. The problem is very complex for the following reasons. First, NRAs (especially the smaller and less skilled ones) do not have a strong incentive to engage in serious geographical segmentation, since this would significantly complicate their market analysis exercise. Second, identifying areas where facilities-based competition is feasible, and distinguishing areas where unbundling is a practical solution from the remote ones where one single network and one single operator (perhaps, wireless or satellite) should operate is an exercise that can easily become circular: Simply observing how many players are currently operating in a given area might lead to incorporating past regulatory practices (and mistakes) into

[395] In Portugal, Anacom received approval from the EC to deregulate parts of the wholesale broadband access market on a geographical basis in 2009. In 2008, as part of the market review process, the Austrian regulator proposed to address different competitive pressures in different regions by applying differentiated remedies. In the same year, OFCOM's "Review of the wholesale broadband access markets" defined 4 different WBA markets, one of which was defined as competitive and thus de-regulated.

the analysis. Third, while fixed telecoms is a location-specific service, mobile is location dependent as far as network coverage is concerned, but within the coverage region, it is location-independent. And nomadic services or so-called 'over the top' applications, if included in one of the relevant markets, provide an even less location dependent alternative. This can make it impossible to engage in geographical segmentation by simply counting the operators – some choice is always going to exist, to the extent that a good Internet connection is provided to end-users and VoIP and messaging services can offer (regardless of through neutrality or traffic management arrangements) sufficient quality of service.

Taking all these elements of complexity into account, it might be useful to imagine that the European Commission (in cooperation with BEREC) provides a default analysis of geographical segmentation to NRAs, *i.e.* a 'map of Europe' in which black, grey and white areas are pre-identified, thus facilitating the work of NRAs unless they can prove that the preliminary analysis is wrong. We will get back to this issue in Section 5 below.

Sequencing and combining retail and wholesale market analysis: how many shades of grey?

One very important issue that has emerged during the past decade of implementation of the regulatory framework for e-communications in the EU is the fact that NRAs should try to follow a logical sequence when analysing markets. The European Commission already addressed the issue in mandating that NRAs follow a 'modified greenfield approach', which means that existing SMP remedies that apply to the market under consideration, or to downstream markets, should be set aside. That is, the analysis should be conducted under a hypothetical scenario where the relevant existing SMP regulation does not exist.

In terms of sequencing of analysis:

- *It makes economic sense for NRAs to start from the observation of the state of competition in retail markets*, in order to assess the extent of inter-technology and inter-platform competition to the benefit of end-users. The underlying idea for this widely acknowledged principle should be that, if there is effective competition at the retail level, then there must be no SMP regulation being imposed at the wholesale level. If SMP regulation is already imposed at the wholesale level, the NRA should find out whether such regulation is needed, or whether absent this regulation retail competition would still remain. Also, in scrutinising the need for regulation at the wholesale level the NRAs should start from the market that is most upstream in the vertical supply chain and, taking into account the *ex-ante* regulation imposed on that market (if any), assess whether there is (or would be) still SMP on a forward-looking basis on the related downstream market(s).This preliminary phase is also useful to establish to what extent NRA should engage in:
  - *Geographical segmentation of retail markets*, based on differing competitive conditions;
  - *Description of the retail competitive landscape as involving bundles of products or individual products/services;*
  - *Assessment of competition between facilities-based players, alternative operators and nomadic players;*
  - *An analysis of the source of pricing and competitive conditions offered to consumers.* Prices and conditions might be selected by the ISP or by the platform operators at the application and service layers (*e.g.* Apple or Google).
- As a second step, NRAs should identify only those geographic areas in which retail markets exhibit competitive problems, and consider (not automatically impose) the impact of wholesale regulation of those markets. This does not mean that those retail markets should be regulated upfront: to the contrary, NRAs should look at the corresponding wholesale markets to assess if SMP exists, and if any remedy available to them is likely to restore sufficient competitive conditions in the retail (sub-)market at hand. This latter assessment should take into account

specific geographical issues, such as the density of population (or of businesses, as appropriate) in the area considered:

- If a 'potentially black' or '2.x'[396] area – *i.e.* one that allows for competing infrastructure-based operators – features one player with SMP, then the NRA should assess the reasons for the absence of competing investors, and should refrain from imposing access to the SMP player's network unless other circumstances suggest that the player is somehow responsible for the failure of facilities-based competition to emerge (e.g. strategies to lock-in customers at the retail level). These circumstances might include *i.a.* the existence of network management practices such as access-tiering[397]: as shown in Kocsis and De Bijl (2007), with a small number of networks (e.g. DSL and cable), the effect of access-tiering could be that competition is softened due to horizontal differentiation, while consumers find it more difficult to match their individual preferences to the portfolios (with differentiated content profiles) offered by the networks[398];
- If a 'potentially grey' or '1.x' area – *i.e.* an area that can accommodate only one fixed network, plus mobile – a finding of SMP might lead the NRA to inquire whether the competitive problems emerged in the retail market *could* (rather than *are*) be attributed to some form of strategic, anticompetitive behaviour on the side of the SMP operator. In this latter case, the NRA might decide to impose remedies in order to restore competitive conditions in the identified area;
- In the case of 'white' or '0.x' areas, there should be no mandatory access (also since there is no network);

- As a final step, if wholesale regulation is found not to be useful in restoring competitive conditions, then retail regulation should be considered by NRAs if:
  - It is found to be efficient, effective and not disproportionate;
  - It would be ineffective or otherwise unsatisfactory to rely on other available approaches, in particular on the *ex-post* application of competition law.

A.2.2.6 What role for market definition in ex-ante telecoms regulation? A reflection on the governance of the e-communications framework

Whether competition is between bundles, between nomadic players and telcos or between fixed and mobile is inevitably a question that only the NRA would be able to solve on the field. In order to make sense of the inclusion of pre-selected relevant markets in a future Recommendation, it is helpful to recall what the function of the list of relevant markets is in the e-communications regulatory framework.

First, the list of relevant markets played an important role in *harmonizing regulatory approaches across EU Member States*. Although this has not led to the emergence of a real Single Market goal (*e.g.* Pelkmans and Renda 2011), it has contributed to a common wisdom on e-communications regulation throughout the EU.

Second, *including a market in the list* makes sense whenever at least a critical mass of Member States (or better, sub-regions in Member States) present characteristics that are likely to warrant

396 Black areas are defined as areas in which facilities-based competition is economically feasible. The '2.x' – or '2.5' – concept was developed by Eli Noam a few years ago, and indicates areas in which there are, or can be, at least two fixed networks, plus mobile operators.

397 Access-tiering is the practice of offering to end-users different QoS levels at different prices, and thus amounts to a form of price discrimination. Although this practice might in principle be welfare enhancing since it eliminates part of the cross-subsidization between heavy users and light users of the bandwidth, in some circumstances it might lead to quality degradation of competing services.

398 Kocsis, Viktoria and De Bijl, Paul W.J., Network Neutrality and the Nature of Competition between Network Operators. International Economics and Economic Policy, Vol. 4, No. 2, 2007.

ex-ante regulation. The extent of this critical mass is touched on in section 2.2.6.1 below and might significantly affect the content of the next Recommendation.

At the same time, if one agrees that many markets increasingly need case by case scrutiny and possibly geographical segmentation, *it should not be made too difficult for NRAs to depart from the Commission's list*, which appears increasingly to be a starting point, rather than carved in stone, especially in the broadband era.

Likewise, *excluding a market from the Recommendation does not mean automatically de-regulating that market.* Rather, it poses a heavier burden of proof to the NRA, by imposing a more careful and detailed application of the Three Criteria Test.

Moreover, whatever incentives are given to NRAs as regards the list of relevant markets, it must be clear that, to the extent possible, relevant markets should be technology-neutral, and cannot discriminate on the basis of technology as was the case in 2003. In particular, the exclusion of cable from wholesale broadband markets appears not always grounded in economic theory, especially when retail markets are significantly competitive (but see above, our treatment of indirect competitive constraints).

Against this background, the list of relevant markets becomes something more than purely a matter of *'ex-ante* competition policy'. However, the time is ripe to address a key issue. If one assumes that the list was needed to fill gaps in NRAs' competences and accelerate convergence of regulatory approaches, at the same time ensuring a degree of control in the hands of the Commission, then some of its initial rigidities (including the embedded bias towards pre-selected markets and no geographical differentiation) might well have been justified. The Commission has also shown awareness of the need to remove some of the markets in 2007 to phase out regulation from several, mostly competitive, national retail markets.

However, in 2013 the architecture and scope of the list appear in need of a revision: does the Commission still need to "educate" NRAs? Is convergence of regulatory approaches really a Single Market issue? Are the benefits of a more standardized practice of market definition now more-than-compensated by the costs of creating 'false positives' in many national and (most notably) regional markets?

Threshold for including a market on the Commission's list of recommended markets

There is an issue, not previously much discussed, about how widespread across Europe a competition problem needs to be before it justifies consideration for inclusion in the Commission's Recommendation. The Recommendation is addressed to all NRAs and is therefore expected to be applied across Europe. It is accepted that there may be national circumstances why a particular market on the list should not be regulated in one or more Member States. Equally, there may be solid justification for regulation of markets not on the Commission list in certain Member States. In theory, therefore, any NRA should be able to put in place ex-ante regulation of the optimal set of markets, taking full account of national circumstances, irrespective of whether the market is recommended by the Commission or not.

This theory may not however be a realistic indicator of actual national decisions. Some national transpositions of the Directive more-or-less 'hard-wire' the list of recommended markets into the national legislation. If so, notwithstanding the discretion built into the Framework, the NRA would not be able to depart from the Commission's Recommendation, Even where this is not the case, NRAs seem very likely to face an increased burden of proof to justify identification for regulation of a market which has been 'rejected' – or has simply not been pre-selected – by the Commission. In

such cases, a rational NRA, usually facing significant resource constraints, could not be blamed for de-prioritising consideration of any market not on the list, even if some of them objectively justified regulation. There is a superficial policy attraction in reducing the list of Recommended Markets to the bare minimum of markets that are problematic almost everywhere in Europe. But such a practice would give rise to a real risk of leaving consumers unprotected in any Member State market where competition was below typical European levels.

These arguments suggest that it would be appropriate for the Commission to recommend analysis of any markets that satisfy (and will continue to satisfy over the next few years) the standard criteria **in a significant number of Member States or regions of Member States**, even if the market is broadly competitive in some others. There is no exact science to determine the "correct" threshold. A pragmatic implementation of the policy would be to include a market on the list where there is doubt that this is deserved.

In our opinion, rather than a technical regulatory issue, the criteria to be followed to determine whether a given relevant market should be included or excluded must be decided after careful consideration of the balance to be struck in the design of the regulatory framework. To anticipate an issue that we fully address in Section 5 below, one might consider the following alternatives:

- ***Be under-inclusive*** in the list of relevant markets, at the same time providing more guidance to NRAs in identifying and regulating markets that deserve regulation at national level despite being not included in the list (including e.g. competing bundles), and facilitating the finding of SMP and selection of remedies for the few markets included in the list;
- ***Be over-inclusive*** in drafting the list, but then strengthen the NRAs' burden of proof by (a) asking them to give full demonstration of why they think the Three Criteria are met; (b) requiring that they follow a specific set of broad guiding principles in assessing the competitive conditions in that market; (c) provide a pre-selected geographical segmentation scheme; (d) asking NRAs to condition the finding of SMP to a reasoned description of the anticompetitive practices that might emerge otherwise – whereas such practices would need to be analysed based on antitrust tests such as the anticompetitive foreclosure test; and (e) requiring that NRAs provide a more detailed impact assessment of the remedies selected, including an in-depth analysis of their proportionality.

Of course, some of these options (e.g. option *d* above) would entail more workload for NRAs, and a more sophisticated set of skills would need to be employed. Other options (e.g. option *e*) might be introduced only through a revision of the regulatory framework, which is something more for the medium term than for the short term.

Alternatives to SMP Regulation

One of the ideas behind the SMP Framework was that it would provide the regulatory tools of choice for dealing with competition problems widespread across Europe in cases where reliance on competition law was ineffective. However, this is a good moment to consider how far this idea should reasonably be pursued. Other ways of dealing with competition problems have been employed by NRAs in recent years. For example:

- In awarding new spectrum licences for communications purposes, national authorities sometimes attach conditions to the award of the licence with the intention of pre-empting competition problems. Provided that the conditions are objectively justifiable, this may well be a preferable approach to subsequent use of the SMP Framework to deal with the arising problems. In those markets for which it is feasible, it will definitely tend to promote legal certainty and efficient use of limited NRA resources;
- Wholesale international roaming was initially identified as a market susceptible to SMP regulation. This was a faulty analysis and a bespoke Regulation was introduced to deal with the

consumer detriment identified. While roaming is in some ways a special case (although there are cases which have significant similarities – see section 4.7), there are other competition problems which cannot reasonably be left to competition law and which would arguably be more effectively or efficiently regulated using approaches outside the current SMP Framework. This means either making more extensive use of the powers in the Universal Service and Consumer Rights Directive (which are broader than they used to be) or introducing new powers outside the Framework While this may seem a cavalier suggestion, in that it might lead to the replacement of a form of regulation that is understood and has a clear philosophy with something unknown, such a risk is probably fairly small in practice. Any new European legislation needs approval by Council and Parliament. This is sufficiently resource-intensive that it is not going to be undertaken lightly. The principle candidate for this approach discussed in this paper is that of regulation of termination markets but some other possibilities are also discussed in Section 4.

A.2.3 Concluding remarks

This section has highlighted a number of important features of the market definition exercise in the e-communications framework, and notably the following:

- *Market definition is a problematic step in competition law,* although it is recognized as a very useful tool by competition authorities;
- *Market definition becomes more problematic in high-tech markets*, given the strong presence of externalities, the breath-taking pace of change and the emergence of platform competition;
- *Market definition is even more problematic in regulation* for a number of additional reasons (as regulation is a different legal instruments than competition, with objectives which are not identical to antitrust);
- *The practice of the NRAs show clear links, and sometimes blurred boundaries, between market definition and SMP assessment* (see for instance the issue of cable inclusion in market 5/2007) as well as between market definition and remedies (see the issue of geographical segmentation of market vs. geographic differentiation of remedies. Those links are more problematic in regulation than in antitrust because of the power of the Commission on the different steps of the analysis are different (veto on market definition and SMP, but not on remedies);
- *Geographical segmentation is a crucial exercise for the success of the framework* and might require action at the EU level to facilitate NRAs in approaching the problem at local level; and
- *For the future, in order to strengthen the economics behind the regulatory framework and at the same time preserve balance between depth of analysis and ease of implementation, it is possible to imagine a number of scenarios,* which might require an 'over-inclusive' or and 'under-inclusive' approach to the list of relevant markets and a more prominent role of the (possibly revised) Three Criteria as the distinctive feature of the RF compared to ex-post competition law enforcement.

A.3 Assessing competition problems in telecommunications markets

Once markets have been identified, the key task of the NRA is to assess whether, and to what extent, any of the players operating in those markets can be said to hold Significant Market Power (SMP). In the EU e-communications framework, SMP explicitly follows the definition of dominance that is used in EU competition law. However, SMP has to be assessed in the absence of any evidence of an abuse, whereas in competition law (and especially in abuse of dominance cases) dominance is being assessed based on an allegation of anticompetitive behaviour. This confers to the SMP assessment a more 'forward-looking' character that makes it to some extent similar to the assessment of (change in) market power performed by NCAs when scrutinizing mergers[399].

Section 3.1 introduces the problem of SMP assessment, whereas Section 3.2 looks at the definition of SMP through the lens of the economics of modern broadband platforms. In addition, Section 3.3 briefly summarizes the types of conducts that SMP operators might engage into, thus distorting competition. We do this briefly since a finding of abuse is not a necessary step for NRAs wishing to regulate markets. At the same time, we cover this issue since NRAs need to understand the necessity and proportionality of possible remedies against the background of expected distortive behaviour by the SMP player.

A.3.1 Competition problems: assessing SMP

Under the Commission Guidelines, and recalling the definition of dominance given by the EU Court of Justice decision in *Hoffman-La Roche*, a firm has significant market power if, either individually or jointly with other firms, it has a position that allows it to behave in a way that is appreciably independent of its competitors and customers[400]. The Guidelines identify a range of factors to consider in determining whether a firm has significant market power:

- *Market share*. Substantial market share is generally needed for a firm to have market power. Though possible, it would be very unusual for a firm with a market share below 25% to have significant market power. The courts have usually found that firms with market shares of 50% or more have a dominant position;
- *Potential competitors that could enter the market*. If barriers to entry are low, the possibility of entry may prevent a firm increasing its price despite having a high market share. If barriers to entry are high, the firm is more likely to have the ability to substantially increase its prices;
- *Control of essential infrastructure that cannot be easily duplicated*. If a firm controls essential network infrastructure such as the main local telephone exchange, it may be able to impede competition;
- *Absence of customer buying power*. If a firm has many small customers it is less likely to have the ability to negotiate than if the firm has a several large customers;
- *Economies of scale*. An established firm may be able to achieve substantially lower per-unit costs than a competitor could that may act as a barrier to entry;
- *Economies of scope*. An established firm may manufacture several products at the same time, and thus achieve lower costs than a competitor with a smaller product range;

[399] A major difference might be that NRAs normally possess more knowledge on past behavior of the regulated undertakings, whereas inmerger control themerged entità is not yet on the market.

[400] Hoffmann-La Roche & Co. AG v. Commission of the European Communities. Case 85/76, February 1979.

- *A highly developed distribution and sales network*. A well-established firm may have exclusivity agreements with distributors, making it difficult for competitors to enter the market.

Recently, in its guidance document on the treatment of exclusionary abuses under Article 82 TEC (now 102 TFEU), the European Commission has further clarified the factors that have to be taken into account in order to assess whether a given undertaking can be said to be dominant: These are very much in line with the factors listed in the Commission Guidelines:

- Constraints imposed by the existing supplies from, and the position on the market of, actual competitors (***the market position of the dominant undertaking and its competitors***). Here, the Commission specifies that its "experience suggests that the higher the market share and the longer the period of time over which it is held, the more likely it is that it constitutes an important *preliminary indication* of the existence of a dominant position and, in certain circumstances, of possible serious effects of abusive conduct" (*emphasis added*); and that in general market shares below 40% are considered to be incompatible with a finding of dominance. This, in turn, means that the 2008 guidance document takes a different approach compared to the Guidelines on SMP mentioned above, in which the low-end "minimum" threshold for a finding of dominance was set as low as 25%;
- Constraints imposed by the credible threat of future expansion by actual competitors or entry by potential competitors (***expansion and entry***). Barriers to expansion or entry can be legal barriers (e.g. tariffs or quotas), advantages specifically enjoyed by the dominant undertaking (e.g. economies of scale and scope, an established distribution and sales network), switching costs faced by suppliers, or barriers created by the dominant undertaking's own conduct;
- Constraints imposed by the bargaining strength of the undertaking's customers (***countervailing buyer power***). If countervailing power is of a sufficient magnitude, it may deter or defeat an attempt by the undertaking to profitably increase prices.

Once SMP has been established, NRAs can choose among a list of available remedies provided by the Access Directive as amended in 2009:

- Obligations of transparency in relation to interconnection and/or access requiring operators to make public specified information such as accounting information, technical specifications or network characteristics;
- Obligations of non-discrimination to ensure that operators apply equivalent conditions in equivalent circumstances to undertakings providing equivalent services;
- Obligations of accounting separation in relation to specified activities concerning interconnection and/or access;
- Obligations of access to, and use of, specific network facilities. Operators may be required inter alia;
- To give third parties access to specified network elements and/or facilities, including unbundled access to the local loop;
- To negotiate in good faith with undertakings requesting access;
- Not to withdraw access to facilities already granted;
- To grant open access to technical interfaces, protocols or other key technologies that are indispensable for the interoperability of services;
- Obligations to provide co-location or other forms of associated facility sharing; and
- Obligations to give access to associated services such as those related to identity, location and occupation;
- obligations relating to cost recovery and price controls, including obligations for cost orientation of prices and obligations concerning cost accounting systems;
- obligations relating to functional separation, according to which vertically integrated undertakings must place activities related to the wholesale provision of relevant access products in an independently operating business entity in order to supply access products and

services to all undertakings, including to other business entities within the parent company, on the same timescales, terms and conditions, including those relating to price and service levels, and by means of the same systems and processes.

That said, in practice many NRAs have been mostly applying the full list of remedies upon a finding of SMP. This means that light-handed measures (e.g. accounting separation, obligations of transparency and non-discrimination) to more intrusive remedies (mandatory access obligations, price controls, even functional separation).

In the application of the regulatory framework for e-communications NRAs often infer market power from the observation of high market shares. This is to some extent justified in "traditional" telecoms markets, but may become difficult when it comes to the layered Internet ecosystem, dominated by "Schumpeterian" markets where the winner takes all, a feature that often exerts significant influence over the market conduct of players located at the infrastructure layer. In this context, the assessment of SMP can become prohibitively hazardous due to the difficulty of capturing the dynamics of platform competition, as well as the emergence of market power along the value chain. We turn to these two issues below.

A.3.2 Capturing the dynamics of competition in oligopolistic, multi-product markets

Electronic communications are a textbook example of markets with strong direct network externalities, already at the infrastructure layer. Two ongoing convergence processes are now bringing into this sector significant indirect network effects:

- *Convergence between fixed and mobile telecommunications is becoming a reality*. This is certainly happening, though slowly, in Europe, as confirmed by a recent decision adopted by the European Commission that authorized the definition of a common fixed-mobile relevant market for retail broadband in Austria. The Commission recalled that "[…] fixed and mobile retail broadband services are normally not belonging to the same market. However, on the basis of the following circumstances closely related to the specificity of the Austrian market, the Commission accepts the inclusion of mobile and broadband connections into the retail residential market for the purposes of the present notification." Further prospects in this direction came from a recent document jointly elaborated by the BEREC and the Radio Spectrum Policy Group (2010) that discuss the main conditions for defining joint fixed-mobile markets. However, whether or not fixed and mobile belong to the same relevant market depends primarily on how many customers actually regard them as genuine substitutes. This is not only determined by the relative capacities, but also by reliability (for example indoor) and prices. Recent developments such as cable operators offering mobile telephony by using Wi-Fi spots, in order to avoid the roll out of "normal" mobile networks, pose challenging questions to the NRAs;
- *Convergence between telecommunications and IT* is fully realized by the migration towards an all-IP infrastructure, which is bringing new business models, the creation of multi-layered platforms where applications and services dominate user experience, and constantly changing competitive dynamics. Not only fixed broadband platforms are increasingly integrated into the Internet, but cloud computing is shifting most of the computing capacity into centralised servers, which will be made accessible from both fixed and mobile devices[401]. The success of the App

[401] In non-technical terms, cloud computing can be defined as location-independent computing. It implies that end-users' applications and contents are stored in a data centre, and the user can access them remotely from anywhere. Of course, it requires an always-on connection to the Internet; at the same time, it potentially generates enormous savings in terms of

stores created by Apple and Google Android promises to revolutionize also the way in which we use computers, not only smartphones. This form of convergence is triggering also the *convergence between the infrastructure layer and higher layers of all-IP architectures*, such as the logical layer, the application layer and the content layer in the (simplified) OSI representation (see Figures 2 and 3 above).

The application of the e-communications framework, and particularly the assessment of SMP, can become more challenging when we look at the features of emerging markets, for the following reasons.

First, the emerging substitutability between fixed and mobile might affect the nature of essential facility often attached to the incumbent's fixed network. Even when reasonably substitutable fixed networks are not available, the existence of wireless solutions falling in the same relevant market can clash with one of the conditions for a finding of essential facilities, such as the impossibility to technically or economically replicate the service. If replicability is considered to be feasible from a technology-neutral perspective, mandatory unbundling as a remedy seems to be way less justified.

Second, the assessment of market power is becoming increasingly complex due to (i) "horizontal" competition coming from players that operate in the same relevant market of the fixed-line incumbents (facilities-based cable or fibre entrants, wireless broadband operators, consortia of municipalities, etc.); (ii) "vertical", "intra-platform" competitive pressure exerted from players that provide competing services in a nomadic way (*e.g.* Skype or Google voice for VoIP services); and (iii) "inter-platform" competition by players that propose themselves as platform operators, even if they come from different relevant markets (*e.g.* Apple's iPhone or iPad, Google Android, Nokia Ovi, and many other nascent platforms). The literature has summarized these dynamics of competition – and especially the latter one – by referring to 'competition for eyeballs' that is animated by competing platforms that try to conquer the attention (and the bill) of the end-user. Cloud computing can do nothing but exacerbate this form of competition, with several private cloud managers offering closed, semi-open or fully open cloud services.

Third, a related, procedural problem for regulators and competition authorities is how to define the relevant market. The links between system layers and the lack of fully interoperable standards creates hidden provinces in cyberspace, where substitutability between platforms or platform 'complementors' is indeed limited, warranting narrow market definitions. Antitrust authorities have already had their way into this quagmire. For example, in the US Microsoft case the relevant market for Intel-compatible Operating Systems was considered as separate from the relevant market for Mac-compatible OS. The FTC went even further in a famous case, *Intel vs. Intergraph*, by defining Intel as a monopolist for Intel processors, something that should have at least rung a bell, also since following developments have shown that other products could start competing with Intel processors, at least in the medium term[402]. The fact that in the ICT world, "the license is the product" (Gomulkiewicz, 1998), and "the product can become the market" (due to network externalities and tipping, see Rohlfs, 1974; Arthur, 1984; Katz and Shapiro, 1985; Shapiro and Varian, 1999) suggests that the notion of relevant market, interpreted the way we have done outside the ICT world, may become less useful in modern broadband platforms: if one product is a relevant market by itself, then market definition and the assessment of dominance end up inevitably overlapping, such that competition authorities would better focus directly on the latter.

IT equipment and software, which can be "rented" remotely by businesses or private users without upfront fixed costs of acquisitions, and only for the time needed.

[402] Under certain circumstances, it is possible that one product becomes one relevant market. But the market shoulr normally be defined in a generic way, not based on a specific brand (e.g. the market for Intel processors).

Fourth, as recalled above for wireless platforms, it is now widely acknowledged that modern broadband platforms (in absence of interconnection or interoperability/compatibility at the application layer) exhibit the features of two-sided, or better multi-sided markets (see for example Rochet and Tirole, 2003, 2006; Evans and Schmalensee, 2007, 2008; Gawer, 2009). No player can succeed to conquer the attention of new users in those markets without good network connectivity, a large participation of application and content providers, one or more compatible device producers, and of course an established population of users (Poel *et al.,* 2009; Renda, 2010). This peculiarity creates also problems in terms of the selection of appropriate remedies, as well as in other areas. In particular, cost-based pricing is in most cases inappropriate for these types of markets (Wright, 2003), and even asymmetric regulation - *i.e.* imposing stricter regulatory obligations only to *some* market players – can create problems, since behaviours that may be erroneously considered as monopolization strategies are in fact replicated by all players in the market, regardless of their market power. In the current framework, NRAs might not be fully exposed to these problems, although in particular mobile platforms and fibre/mobile/TV bundles can feature pricing patterns that depend on the specific business models adopted at the higher layers of the IP layered architecture.

Where does this leave network unbundling practices? The theoretical foundations of unbundling, as described above, are likely to be severely jeopardized by the existing developments. In particular, policymakers will be forced to identify those elements of modern broadband platforms, the replication of which would be absolutely uneconomical, such that mandatory access is the most appropriate, proportionate and effective pro-competitive remedy.

As a matter of fact, for the infrastructure layer these elements seem to be heavily dependent on the "where" (geographic area), the "what" (some technologies are way more difficult than others when it comes to unbundling, *e.g.,* GPON) and the "how" (how to arrange the migration to the new ladder for LLU operators, whether to opt for access to in-house wiring, wavelength unbundling at the ODF, access to ducts, dark fibre, etc.). As of today, elements that may be difficult to replicate certainly include passive infrastructure (ducts, masts) and – under more restrictive circumstances – bit-stream or sub-loops.

However:

- This reasoning is valid only in "1.x" regions, *i.e.* areas where there is only one fixed-line broadband network, together with wireless (up to 3G). With more facilities-based competition, replicability is already proven in practice, and the economic justification for unbundling is much weaker;
- Other equally important bottlenecks may be found in other layers – for example, the operating system; the DRM system; killer apps; privileged/discriminatory access to a dominant cloud; key content; billing/charging functions and even IPR-protected business methods can be seen as candidates for mandatory access policy. To be sure, however, this cannot be tackled under the current framework: if anything, existing bottlenecks should factored into the assessment of SMP, and in particular in the assessment of competitive constraints exerted by upstream and downstream markets on the behaviour of allegedly dominant players in the market under scrutiny.

An additional policy problem that is very often underrated or ignored, is that when we discuss essential facilities in regulation or competition policy, we are normally talking about something that is already in place – be that a press distribution system (*Bronner*), an operating system (*Microsoft*) or even a ski resort's facilities (*Aspen Skiing*). Here, we are attaching the essentiality label to facilities that have to be built – no surprise that the competition-investment trade-off becomes even more urgent: knowing in advance that a facility to be built will be considered "essential" and as such

subject to mandatory sharing regulation might stifle operators' incentives to deploy the facility in the first place.

A.3.2.1 "Buyer" and "platform operator" power in the fixed and wireless broadband value chain

As a corollary of what described in the previous section, it is important to consider buyer power. Past competition cases have shown that the degree of market power held by a given undertaking that operates with a distribution chain also depends on the degree of bargaining strengths of players located upstream or downstream on that same chain. For example, the extent to which Coca Cola can dictate conditions and seek discrimination of its rivals in supermarkets can change significantly depending on the degree of concentration and related market power of retailers that display those products. If Coca Cola sells, say, 70% of its products through Carrefour, and represents only 2% of Carrefour's revenues, then it is unlikely that Coca Cola can exploit its prominent position in its relevant market – more precisely, if a competition authority concludes that no significant portion of customers of Carrefour would switch to other retailers if Carrefour discontinued selling Coca Cola, then Coca Cola is likely to have limited bargaining strength vis-à-vis Carrefour.

Similarly, in defining SMP NRAs increasingly will have to account for the existence of broadband platforms (especially in mobile broadband) which are mostly controlled by players that operate in other layers of the value chain, be they device producers or application giants, or both. In this case, despite evidence of a large market share, the extent to which these platform operators can behave "to an appreciable extent" independently of competitors, suppliers and customers would have to be gauged mostly looking outside, not inside the relevant market. This is why NRAs should be advised not to rely too heavily on market shares as proxies of market power, especially when looking at wireless broadband platforms, but also, increasingly, at fixed-line triple and quad-play bundles. Rather than buyer power, in this case we would rather call this phenomenon 'platform operator's power' that is very closely linked with the nature and business model characteristics of multi-sided platforms.

A good example is certainly Apple's entry into the mobile market since 2007. Apple was able to radically change the revenue model applied in the mobile ecosystem: while the first iPhone was not subsidized by the operators and was thus priced very high, Apple managed to negotiate a 20% to 40% split of the data traffic revenues generated by their handsets and started signing exclusive contracts with operators, to encourage them to use the iPhone as a competitive differentiator. Today, Apple is not allowing mobile operators to offer the iPhone 5 as an LTE device unless they pass the vendor's own, independent tests for LTE network performance. Against this background, it is at least reasonable to observe that NRAs should look at the degree of independence that wireless operators enjoy in their business strategies, based also on what happens at the platform level.

Two- and multi-sided platforms

Completely unknown in the literature until the late 1990s, two-sided markets are now increasingly acknowledged also by competition authorities and regulators across the globe, even if the exact implications for competition policy have not fully been clarified to date in the literature. A two-sided market is essentially a market in which a platform operator manages two distinct sets of users that need each other in order to successfully use the platform. This is the case *i.a.* for callers and receivers on mobile platforms, readers and advertisers in media outlets and directories, merchants and cardholders in credit cards, buyers and sellers on eBay, etc. broadband platforms are normally more complicated than this: they normally feature multi-sidedness, meaning that platform operators

have to ensure substantial participation of users, device manufacturers, advertisers, application developers and content producers (or IPR holders).

Platform success crucially depends on the operator's ability to secure adequate access to dominant infrastructures, access to premium content, competition in the production of hardware devices, and a large customer installed base, such as to attract advertising investment. It is worth reminding that in the Internet ecosystem, everybody can become a platform operator, and this is the most aggressive form of competition seen today. For example, Nokia – a mobile phone manufacturer (OEM) – has launched its Ovi platform that competes on the market with Apple's and Google's as well as, potentially, platforms developed by fixed-line network operators and mobile operators (e.g. Vodafone).

This emerging inter-market competition creates a number of teething problems for NCAs and NRAs, which often have to cope with industry practices in which the concept of market is blurred, some apparently anti-competitive practices are efficiency-enhancing, and vice versa. As a general remark, the main challenge such authorities have to face in dealing with convergence is how to create a level playing field, enabling technological neutrality and entry of new players in different (but competing) markets. This also implies removing asymmetric regulation and a careful approach to interoperability. In addition, inter-market competition creates a number of challenges for policymakers when it comes to defining the boundaries of IP rights. Examples are the right to deny interoperability, the right to impose DRM protection, whether to allow for transmission of IPR-protected content on more than one platform (for example, rights on football league matches already acquired by sat TV broadcasters but then licensed also to digital terrestrial TV operators and triple-play mobile service providers), and finally whether and to what extent to allow self-protection against p2p file sharing.

The emerging competition between platform operators in the Internet ecosystem is a very complex battlefield that exhibits the typical features of a multi-sided market[403]. The successful platform operator will be the one that strikes the most optimal balance between the interests of all the players involved, including of course end-users. The first series of steps is the development of the operator's competitive capacity, including the content and applications that will be available on the platform, the needs of target end-users and the overall assembling and marketing features of the product itself. Related steps are also the choice of a system architecture, and in particular the degree of openness that the market allows for – end-users always call for more openness, all other things being equal; but end-users may also require more safety and less malware, as well as more speed and quality of service when using certain applications and services. This is why management of user expectations is a very important part of the process.

IT platform operators often depart from standard cost-based pricing rules when setting the price of their multiple services. As highlighted by the economics literature, regardless of market power, a platform operator has, first and foremost, to balance the interests of the various platform users involves, and confront with competition and with the various users' willingness to pay. Accordingly, mobile operators use forms of metering by reducing the upfront payment for smartphones through handset subsidies, and then charging flat fees for phone usage that allow for reaching the break-even. Similarly, Google does not charge users but organises auctions for placing ad spots in the

[403] See *i.a.* Evans, D. S. & R. Schmalensee (2007), *The Industrial Organization of Markets with Two-Sided Platforms*, in: Competition Policy International, Vol. 3 (1): 151-179; Rochet, J. C.; Tirole, J. (2003): *Platform competition in two-sided markets*, Journal of the European Economic Association, ISSN 1542-4766, Bd. 1 (2003), 4: 990-1029; Rochet, J. C. and J. Tirole, (2006): *Two-sided markets: A progress report*, The RAND Journal of Economics, Vol. 37, No. 3 (Autumn, 2006): 645-667; Roson, R. (2005): Two-sided Markets: A tentative survey, Review of Network Economics, Vol. 4, Issue 2, June 2005: 142-160; and Hagiu, A. 2009. *Two-Sided Platforms: Product Variety and Pricing Structures*, Journal of Economics & Management Strategy, 18(4): 1011-1043.

paid advertising part of its search page. Examples are virtually endless, and echo earlier strategies adopted in more traditional markets, e.g. Gillette's pricing policy of bundling razors with blades, or selling razors for free to charge slightly more for the blades. The economic justification for metering has been explored by several authors, also in the case of handset subsidies[404]. The tendency towards adopting a non-cost-based, carefully designed combination of flat fees and usage-based or app-based micropayments seems to become stronger for many fixed-line and mobile platforms.

More generally, a viable pricing strategy for multi-sided platforms under competitive conditions may well include both price discrimination and versioning, i.e. differential pricing. Price discrimination, in this respect, entails charging different prices for similar services to different groups in order to extract users' willingness to pay – this is the well-known case of Ramsey pricing in economics. At the same time, differential pricing implies the provision of different services at different prices, with the aim to better match the heterogeneous preference of end-users when it comes to specific characteristics of the service. For example, some consumers wishing to purchase an Internet subscription may be more interested in high-QoS services and willing to pay more for them, whereas other users – perhaps more oriented towards simpler uses, e.g. email and surfing to read the news – may be more interested in having a low-cost, low-QoS broadband connection. As in all markets, competition and the erosion of margins in the Internet ecosystem is expected to lead to more tailoring of platform offers for different types of end-users[405]. For example, Google offers different conditions to advertisers wishing to appear in different places of the search page; pay-TV channels offer different pricing packages for different content packages; etc.

The possibility for platform operators to differentiate their offers and version their products can lead to what has been termed 'confusopoly', *i.e.* a multitude of available offers with non-standardized fees and conditions of use, such that end-users have difficulties in actually comparing bundles. This might give the impression of a competitive market: however, when consumers do not understand the menus, or find it difficult to make comparisons, the downward pressure on prices is significantly reduced.

All these complex and plastic features of business strategies in multi-sided broadband platforms make the life of NRAs and NCAs very complex, as the traditional proxies used to detect market power (e.g. market share, or the Lerner index, *i.e.* the extent to which price stands above a measure of cost) become completely useless. In these cases, the competitive dynamics of a given broadband market and the relative possession of SMP by any of the players involved should be captured by looking at the whole picture, and the whole value chain, and sticking to the original definition of "independence of behaviour".

Platform competition highlights: 'captive' markets, cluster markets, after-markets

When one looks at e-communications markets from the lens of platform competition, some potential challenges in market definition clearly stand out. Below, we observe three potential theoretical approaches that can guide NRAs in understanding the dynamics of competition in those platforms.

- *Switching costs.* For a market to function well, consumers have to be able to switch. Switching can be made difficult by firms that differentiate their services or otherwise tie their consumers to them. Platform competition can create incentives for product differentiation that then leads to monopolistic prices and profits. When differentiation substantially inhibits consumers from

[404] See, *i.a.,* Littlechild, S.C. (1975), *Two-Part Tariffs and Consumption Externalities*, *Bell Journal of Economics*, Vol. 6, 661-670. And Parker and Van Alstyne (2005), *Two-Sided Network Effects: A Theory of Information Product Design*, Management Science Vol. 51, No. 10, October 2005, pp. 1494–1504 at http://people.ischool.berkeley.edu/~hal/Courses/StratTech09/Lectures/TwoSided/ParkerVanAlstyneMgmtSci2005.pdf.

[405] For a recent treatment of the difference between price discrimination and differential pricing, see Weisman, D. and R. B. Kulick (2010), *Price Discrimination, Two-Sided Markets, and Net Neutrality Regulation*, Available at SSRN: http://ssrn.com/abstract=1582972.

switching supplier, the market becomes a so-called 'captive' market. The fact that consumers have switched easily in the past is no guarantee that the market has not become captive over time. Switching trends can stagnate, showing that some consumers are not able to switch. Even though the market was considered competitive in the past (due to the large switching potential), the danger looms that those consumer that cannot switch are eventually bled dry (at least in the short run);

- *Cluster markets*. When firms are multi-product, they tend to sell a number of core products, plus ancillary, additional services that are either not very differentiated across platforms (e.g. the ISP's own email service), or are not entirely subject to stand-alone demand, but rather complement the demand for the core product. Once the choice has been made as regards which core product to buy (e.g. which ISPs is chosen for broadband subscription), some of the additional services provided cannot be entirely counted as a stand-alone source of demand. In these cases, economists sometimes rely on the notion of "cluster" market (Ayres, 1985) to capture the essence of broadband platforms: whenever measuring market power and price-cost margins for a given product X would not make sense, absent adequate consideration for other products sold together with X, and all players in the market produce all those products, then the relevant market to be considered should be a cluster or products, rather than X alone;
- Although not clearly stated in the literature, the difference between competing bundles and cluster markets are that, in the latter case, products included in the cluster do not need to be always separate products, potentially subject to stand-alone consumer demand if sold separately. Cave Valletti and Stumpf (2006) clarify that "*[c]luster markets exist when products are offered for sale as a bundle, even though they are not "tied" to each other, that is, there is no requirement that all of the products must be bought from one single supplier. Despite this lack of tying, regulators and courts still might regard the cluster as constituting one relevant product market.*" Cluster markets can emerge due to both supply-side (economies of scope) and demand-side (transactional complements, one-stop-shop effects) purposes. Henry Ergas (1985) has observed that:

> "A cluster market arises when the economies of scope are such as to require firms to compete not on individual items but rather on a set of items taken jointly … Thus, to say that good A and good B form a cluster is to imply that a firm selling only A or only B would not be able to compete with one selling both A and B – either because the supply cost of producing A and B jointly is substantially below that of producing them separately, and/or because consumers incur additional costs when they purchase A and/or B separately as against purchasing them jointly."[406]

- Although evidence in support of using clusters in market definition is not decisive, and very similar to that in support of defining bundles of products (plus ancillary services) as relevant markets, we conclude that NRAs should pay attention, when looking at pricing behaviours and patterns of competition in given markets, to the fact that markets are very often a piece of a much larger puzzle of services and products being offered all at one by each and every competitor, and that business models adopted by competing players might lead them to price differently for different services, in order to differentiate their offer;
- *After-markets*. Another way of conceptualising the issue of multi-service platforms is that of after-markets. This concept had been used in antitrust cases mostly to describe markets for spare parts and after-sales services in the case of durable goods. A famous example is the *Kodak* case decided by the US supreme court in 1992, in which Kodak was found to have illegally tied the sale of its photocopiers with after-sales maintenance services and the provision of spare parts, even if the company had a mere 3% market share in the market for

[406] H. Ergas, Cluster Markets: What are they and How to Test for Them, Centre for Research in Network Economics and Communications, University of Auckland, 1985, p. 3.

photocopiers[407]. Based on this view, a platform operator could be considered as a monopolist for all services that are offered to consumers *once they have subscribed* to the platform, particularly when switching costs are considered to be too high for a consumer to easily move to a competing platform (e.g. long-term contracts based on handset subsidies).

- The concept of after-market has, so far, been used only for cases o durable goods and consumables (e.g. *Kodak*, or *Hilti*). In broadband platforms, a key difference is that the end-user's decision to subscribe to a given bundled offer might depend more on the services provided by app-layer operators, rather than by those offered by the broadband access provider in the first place. Also many of the services at hand are not offered directly by the platform operator, but by third parties through the platform. Accordingly, the concrete application of the literature on after-markets to the case at hand might be limited.

These concepts are important for our purposes mostly for one reason: when looking at the level of SMP of a given e-communications operator, it is important to assess whether, due to market power held in various ways by platform operators at different layers of the IP architecture, the operator at hand can be said to have enough leeway in setting prices and conditions vis à vis consumers.

A.3.3 Competition problems in telecommunications

This section looks more specifically at the type of conduct that SMP operators might put in place in order to stifle the competitive process that would amount to an abuse of dominance. This assessment is often not needed for NRAs, who by definition look at SMP and impose remedies also in the absence of evidence of an abuse. However, we argue that the assessment of SMP should be made (increasingly) conditional upon the NRA's prospective assessment that the SMP operator would be likely to engage in the anticompetitive conducts mentioned below, absent *ex-ante* regulatory intervention.

A.3.3.1 Exclusionary abuses

Most of practices at hand belong to the family of "exclusionary abuses" in competition law, and are therefore addressed under Article 102 TFEU. Importantly, the European Commission has explained since 2008 that foreclosure practices are not to be considered as anticompetitive *per se*, but only if they lead to 'anticompetitive foreclosure', which means (i) the actual or likely exit or weakening of 'as-efficient' competitors; and (ii) consumer harm[408].

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[407] Eastman Kodak Co. v. Image Technical Services, Inc., et al., 504 U.S. 451 (1992). For useful comments and references on this case and its aftermath, see i.a. Hovenkamp, H., Market Power in Aftermarkets: Antitrust Policy and the Kodak Case, UCLA Law Review, Vol. 40, 1992-1993, p. 1447-1459; Klein, B., Market Power in Antitrust: Economic Analysis After Kodak, 3 Sup.Ct. Econ. Rev. 43 (1993). Lande, R. H., Chicago Takes it on the Chin: Imperfect Information Could Play a Crucial Role in the Post-Kodak World, 62 Antitrust L. J. 193, 1993-1994; Peritz, R. J. R., Doctrinal Cross-dressing in Derivative Aftermarkets: Kodak, Xerox and Copycat Game, The Antitrust Bulletin, Vol. 51, No.1/Spring 2006; Salop, S. C., The First Principles Approach to Antitrust, Kodak and Antitrust at the Millennium, Antitrust Law Journal, Vol. 68, 2000-2001; Shapiro, C. & D. J. Teece, System Competition and Aftermarkets: An Economic Analysis of Kodak, Antitrust Bulletin, Spring 1994. Shapiro, C., Aftermarkets and Consumer Welfare: Making Sense of Kodak, Antitrust Law Journal, Vol. 63, 1994-1995.

[408] It will be important to observe if, in the near future, the Legal Service of the European Commission and the Court of Justice will follow the Commission's Guidance paper by looking for anticompetitive foreclosure. Recent Court of Justice decisions such as *Post Danmark* seem to move in this direction as the CJEU judgment states that *"not every exclusionary effect is necessarily detrimental to competition. Competition on the merits may, by definition, lead to the departure from the market or the marginalisation of competitors that are less efficient and so less attractive to consumers from the point of view of, among other things, price, choice, quality or innovation".* Case C-209/10. See also Opinion of AG Mengozzi in Case C-209/10, para.121.

The most important exclusionary practices for the purpose of our analysis are refusal to deal, tying and bundling, and margin squeeze. We briefly define and analyse them below.

Refusal to supply and margin squeeze

The European Commission has consolidated its approach to refusal to deal over the past decade through cases such as *Bronner, Magill*, *IMS Health* and *Microsoft*. The current enforcement approach of the Commission is enshrined in the Guidance document issued in December 2008, in which the Commission observes that refusal to supply covers a broad range of practices, such as a refusal to supply products to existing or new customers, refusal to license intellectual property rights, including when the licence is necessary to provide interface information, or refusal to grant access to an essential facility or a network. The latter case is typically what NRAs have to deal with on an *ex-ante* basis when coping with wholesale fixed markets (but also, to some extent, wholesale wireless markets).

It is important to recall that the Commission considers a refusal to supply as anticompetitive only if it leads to actual or likely exit of "as efficient" competitors (including their inability to expand) and leads to consumer harm. As efficient competitors are defined as competitor that display similar cost levels compared to the dominant operator, or that are likely to develop similar cost levels over time (so-called "not-yet-as-efficient competitor").

Consumer harm, at the same time, can be construed as loss of customer choice over time (as interpreted by the Commission in *Microsoft*, for what concerned the refusal to grant full client-server OS interoperability). Once approached in this way, it becomes quite straightforward to conclude that exclusion of a competitor has led to loss of variety and thus consumer harm.

That said, according to the current Commission practice a refusal to deal will lead to anticompetitive foreclosure if the following conditions are met:

- the refusal relates to a product or service that is objectively necessary to be able to compete effectively on a downstream market;
- the refusal is likely to lead to the elimination of effective competition on the downstream market; and
- the refusal is likely to lead to consumer harm.

In the Guidance document on the treatment of exclusionary abuses, the Commission also adds that it does not regard it as necessary for the refused product to have been already traded: it is sufficient that there is demand from potential purchasers and that a potential market for the input at stake can be identified. Likewise, actual refusal on the part of a dominant undertaking is not necessary; 'constructive refusal' is sufficient. Constructive refusal could, for example, take the form of:

- unduly delaying; or
- otherwise degrading the supply of the product; or
- involve the imposition of unreasonable conditions in return for the supply.

Likewise, the Commission considers it equivalent to a refusal to supply a behaviour by a SMP undertaking, which entails charging a price for the product on the upstream market which, compared to the price it charges on the downstream market, does not allow even an equally efficient competitor to trade profitably in the downstream market on a lasting basis (a so-called '**margin squeeze**'). A firm that is vertically integrated and controls an essential input to the retail service implements a price squeeze if a) the price the firm demands makes it impossible for an equally-efficient downstream competitor to operate profitably (or even survive) given the level of retail prices, and b) the firm does not charge its own downstream operation this high price. In margin squeeze cases, the Commission has clarified that the cost benchmark to be adopted as

reference is the long-run-average-incremental cost (LRAIC) of the downstream division of the integrated dominant undertaking: an equally efficient competitors that is forced by margin squeeze to price below LRAIC will be considered as victim of an exclusionary abuse in the form of a margin squeeze. However, the CJEU judgment in *Telia Sonera* has rejected the Commission's view (and the AG Mazak's view) that margin squeeze does not belong to the more general category of refusal to deal abuses; and that an abusive margin squeeze can occur under EU competition law without the need for the wholesale price to be excessive or for the retail price to be predatory; indeed, the wholesale product need not even be indispensable to the retail product. Whether this divergence will be reconciled in the future, is too early to say.

The refusal to supply has long been under the spotlight also due to the important differences existing between the US and the EU approaches in this field, as emerged mostly in *Microsoft*, *Trinko*, and *linkLine*. The underlying theme is mostly related to the EU's reliance on the so-called 'essential facilities' doctrine, which in the US has always been downplayed by the Supreme Court as, if anything, an 'elaboration of lower courts'[409]. This mostly affects the first of the criteria listed above, whether the asset at hand is 'objectively necessary' or 'indispensable' for as-efficient competitors to viably compete in the downstream market. In this respect, the Commission recalls that it "will normally make an assessment of whether competitors could effectively duplicate the input produced by the dominant undertaking in the foreseeable future [...]. The notion of duplication means the creation of an alternative source of efficient supply that is capable of allowing competitors to exert a competitive constraint on the dominant undertaking in the downstream market".

Of course, the more other access points available to new entrants, the more alternative technologies exist for the provision of the same service in the same geographical market; and the more other infrastructure players exist on the market, then the stronger the business case for investment in own facilities; the less likely it will be that a given asset will be found to be 'essential'.

From the *ex-ante* perspective of a NRA, this means the following:

When looking at a given wholesale market, NRAs should first assess whether SMP exists based on a thorough analysis of direct and indirect competitive constraints. Once this has been established, the selection of remedies should depend on whether the NRA can convincingly establish that absent regulation, those players might end up behaving strategically with, or refusing to supply, as-efficient competitors that will be forced to exit (or not to enter) the relevant market, to the detriment of consumers.

Bundling and tying

Tying of services occurs where a service provider makes the purchase of one product or service over which it has market power (the 'tying good') conditional on the purchase of a second, competitively supplied, product or service (the 'tied good'). Tying is usually distinguished from another similarly widespread cross-selling strategy, named pure bundling. Pure bundling occurs when none of the package components is available separately, and the components are offered in fixed proportions. Pure bundling is in fact the simultaneous sale of two or more products only as bundle, not individually. The main difference concerns the proportions requirements. Pure bundling implies fixed proportions, while tying involves variable proportions and – most often – two distinct sales. The incentives to bundle are higher when the number of items produced by a firm is high enough to achieve high costs savings (distribution, etc.) and better price coordination (*i.e.*, internalisation of complements cross-price effects) through the bundle. If products are also sold on

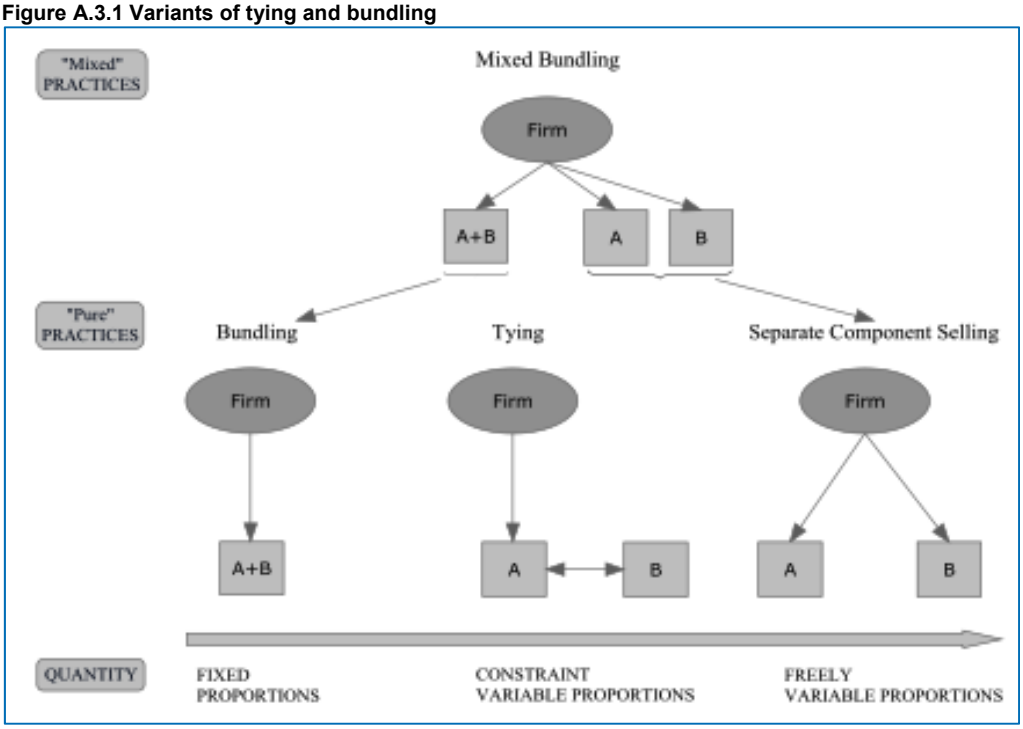
[409] As in *Trinko*. See Renda (2010) o Telecommunications Policy.

a stand-alone basis, the practice is defined as ‘mixed bundling’; in this case the bundle is usually sold at a discounted price (multi-product rebate) compared to the sum of the prices for the bundled goods when purchased separately.

From a competition policy perspective, several different variants of tying practices have been considered. For example, the purchase of a product with the requirement to buy consumables linked to that product from the same seller. Another typical example of tying is the cross-selling practice to tie the purchase of a ‘Blockbuster’ movie to the purchase of a less famous one (*i.e.* block booking). In this case, although consumers can buy variable proportions of the tied product itself, they must buy the tying product with the tied movie (at least one copy). The variability of the quantity proportions is ‘complete’ for the tied product (consumer can decide to take two or more copies of the tied product and one or none of the tying movie) and ‘fixed’ for the tying product (one to one). Other examples are usually related to durable goods, which need consumables from the same supplier and so on.

On the contrary, a newspaper is a pure bundled product since consumers access different kinds of topic-specific news sold together, without any possibility to buy just the ‘sports’ section or to decide how much ‘sport’ they want in that specific newspaper (fixed proportions). There is a clear economical and practical justification to this solution, since selling a newspaper in different sections is generally more costly for distributors and consumers. However, in other cases these justifications may be less clear, so raising legitimate objections on the impact of the practice on consumers and competition in general. Other bundled products are cars, radio, shoes and so on.

Figure A.3.1 Variants of tying and bundling



Source: Renda and Valiante (2010).

The Commission normally acknowledges “tying and bundling as common practices intended to provide customers with better products or offerings in more cost effective ways”. However, in some cases The Guidance paper however also cautions that, in some circumstances, tying or bundling can have anti-competitive foreclosure effects.

A first step in any bundling case is determining whether the allegedly tying and tied products should be regarded as distinct products or whether they should instead be treated as part of integrated system (single product). The distinct product test acts as a screen for non-problematic cases before the detailed assessment of whether anti-competitive foreclosure exists.

The Guidance paper proposes the following formulation of the distinct product test (para. 51):

> "two products are distinct if, in the absence of tying or bundling, a substantial number of customers would purchase or would have purchased the tying product without also buying the tied product from the same supplier, thereby allowing stand-alone production for both the tying and the tied product."

This test is also useful since it explains the difference between tied products and a cluster market, although in practice such difference is often very subtle (see above, Section 3.2.1).

Once the 'separate products test' has been passed, the subsequent steps include the assessment of whether the conduct is likely to lead to anticompetitive foreclosure of as-efficient competitors, which also entails an assessment of the prospective replicability of the tying conduct, and consumer harm – which in the case of tying, is sometimes very difficult to prove.

All in all, it is possible to conclude that, for the purposes of SMP designation:

> When looking at a given e-communications market, NRAs should first assess whether SMP exists based on a thorough analysis of direct and indirect competitive constraints. Once this has been established, the selection of remedies should depend on whether NRAs can convincingly prove that absent regulation, those players might end up engaging in tying of two or more separate products, in a way that does not allow replication by actual or potential competitors, and which leads to exit of those competitors from one the relevant markets to the detriment of end consumers.

A.3.3.2 Exploitative abuses

Excessive pricing

The most typical and apparently straightforward example of exploitative abuse in EU competition law is the charging of excessive prices by a dominant firm. The Commission has recently recalled that, according to commentators, tackling exploitative abuse, and excessively high prices in particular, was the original intent of Article 86 of the Treaty establishing the European Community (now 102 TFEU)[410]. Article 102(a) states that abuse may consist in "directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions." According to the Commission, action against excessive prices is also perfectly in line with the goal of EU competition policy, *i.e.* protect consumer welfare. Finally, such action would be justified also since in some cases, relying on exclusionary abuses would provide an incomplete toolkit vis-à-vis certain conducts that can help non-dominant companies acquire dominance, *e.g.* "the charging of excessive royalties by a company who has obtained its dominant position as a result of not disclosing its patent when it was involved in discussions on setting a standard for the industry" (as in *Rambus*).[411].

However, when should a price be considered excessive is a very challenging question. Past competition cases such as *General Motors* (1975) and *United Brands* (1978) have led the Commission to challenge "setting prices which are excessive in relation to the economic value of

[410] See P. Akman, Searching for the Long-Lost Soul of Article 82 EC, Oxford Journal of Legal Studies, Vol. 29, No. 2 (2009), p. 267-303.

[411] European Commission (2011), Contribution to OECD roundtable on excessive prices.

the service provided and which has the effect of curbing parallel imports"[412]. Many years later, the Commission referred to the same concept in *Deutsche Post* by observing that DP had charged prices that exceeded by more than 25% the economic value of the service[413]. In general, a two-tier test applies to these cases, which entails assessing (i) whether the difference between the costs actually incurred and the price actually charged is excessive; and, if yes, (ii) whether the price is either unfair in itself or when compared to the prices of competing products.

Cases on excessive prices have remained quite rare in the past decades. To be sure, action against excessive prices is considered to be possible only after a finding of high and non-transitory barriers to entry in the market (which matches the second of the Three Criteria, see Section 4 below). In addition, in many cases this form of exploitation is considered as a complementary allegation to those of exclusionary abuses. In this respect, very high prices might even be considered as an additional piece of evidence in support of a broader conclusion that the firm at hand has abused its dominant position to the detriment of consumers.

When it comes to broadband platforms, challenging a given pricing conduct as a form of exploitative abuse can be even trickier than in other markets. Not only – as in other markets – can high prices be the result of product innovation, high fixed costs, superior efficiency: here, they can be the result of a specific business model in multi-sided platforms, or in a multi-service offer that contemplates, *e.g.*, handset subsidies. It is therefore important to ensure that this possibility is subject to very specific and exceptional conditions, and dependent on a full analysis of existing business models and platform competition, as well as the relative efficiency of the various operators competing in the relevant market.

Discrimination

Besides exclusionary abuses, expected abuse of dominance can also take the form of exploitative abuses such as price and non-price discrimination. Price discrimination can take place in different ways:

- By charging different prices to different customers according to their willingness to pay (first degree price discrimination);
- By offering variants of a product or incentive schemes, so that customers self-select themselves by signalling their willingness to pay (second-degree price discrimination);
- By making price dependent on customer attributes (third degree price discrimination.

For example, a given wholesale access provider might, absent regulatory intervention, decide to engage in first- or third- degree price discrimination in order to squeeze out of each transaction the highest possible surplus. In absence of alternatives, this access providers would then be able to capture the whole surplus on the value chain.

In e-communications, an even more important issue is that of non-price discriminatory practices, which have led some NRAs to eventually decide to impose harsh remedies such as functional separation.

The literature identifies various forms of non-price discrimination:[414]

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412 General Motors Continental NV v Commission Case 26/75 [1975]; United Brands Co. v Commission Case C-27/76 [1978].

413 Commission decision COMP/36.915 – Deutsche Post AG – Interception of cross border mail [2001].

414 Vickers (1995) analyses welfare effects of a vertically integrated upstream monopolist who provides price regulated upstream services and simultaneously acts in the retail market. Furthermore, he assumes the regulator to be imperfectly informed about upstream costs. This fact allows the monopolist to select a wholesale price from a set of prices. Vickers shows that due to information asymmetry, upstream regulation cannot completely prevent discrimination incentives. Sappington (2006) extends Vickers' setup by including economies of scope and non-price discrimination. He confirms previous findings concerning higher retail prices due to vertical integration. Mandy and Sappington (2006) consider an

- *Strategic use of information*: There are basically two ways for a provider with SMP to use information strategically. First, the provider with SMP has information needed for using the access service. By not sharing this information with downstream competitors, the opportunities for downstream competitors to provide access are limited or even nullified. Second, an SMP operator obtains information about downstream competitors by offering the wholesale access service. This is often competitively sensitive information. The provider with SMP can use this information to gain competitive advantage on the relevant retail markets;
- *Improper use of information*. Improper use of information regarding competitors occurs when a provider with SMP uses the information he obtains from offering an access service to third parties in order to gain competitive advantage on the relevant retail markets. For example, the provider with SMP can deduce the of downstream competitors on the retail market from the decrease in wholesale access services. In some cases, the provider with SMP can even identify individual end-users of its competitors and approach them with targeted 'win-back' activities;
- *Delaying tactics*. Delaying tactics aim to prevent external parties from timely buying wholesale services or from timely adjusting the terms of the wholesale contract. In this way an SMP provider can ensure that the retail service of a downstream competitor is not operational within time and/or not operational at all;
- *Unreasonable conditions*. By setting unreasonable conditions to the delivery of a wholesale access service, an operator with SMP is able to hinder and even prevent the launch of competing downstream services;
- *Quality discrimination.* By means of quality discrimination an operator with SMP can prevent downstream competitors from offering the same quality of service;
- *Strategic design of products, services or technology.* By strategically designing wholesale services, a provider with AMM can frustrate wholesale access by downstream competitors at the advantage of its own retail daughters. An example that is currently often debated is the choice of operators to invest in VDSL (Fibre-to-the-Node) thereby setting all LLU access seekers back to bitstream. A similar discussion is going on about fibre network architectures: PON vs. P2P. The latter allows for physical access, whereas the first has an architecture that only allows for virtual access. Incumbents obviously prefer PON architecture.

alternative approach of non-price discrimination with an upstream provider able to influence not only competitor's costs, but also demand, by reducing the product quality. The authors show that both cost-increasing discrimination and quality-reducing discrimination are profitable under Cournot competition. However, only cost-increasing discrimination is profitable under Bertrand competition. More generally, see the literature surveys by Armstrong, M. (2006), *Recent Developments in the Economics of Price Discrimination*, in Advances in Economics and Econometrics: Theory and Applications: Ninth World Congress of the Econometric Society, ed. by R. Blundell, W. Newey, and T. Persson. Cambridge University Press, Cambridge, UK.

A.4 Adding new markets to and removing markets from the existing list

This section considers the process of revising the Recommendation. First, it examines the Three Criteria and how they should be interpreted in practice. In doing so, it considers the case for modification of the Criteria.

Second, it proposes a process to be followed in the second phase of this project for defining markets, starting from the existing recommended list. Third, it makes an initial analysis of a number of suggestions for additional markets made by stakeholders during the Commission's recent consultation. The purpose of this analysis is not to arrive at definitive conclusions in this paper. Rather, it is to identify the issues that would need to be resolved before final conclusions could be drawn.

A.4.1 The three-criteria test

The Commission identified the following Three Criteria that are applied cumulatively to each candidate market. All must be satisfied by the candidate market to be considered suitable for consideration for ex-ante sectoral regulation and, in consequence, worthy of a place on the Commission's list of recommended markets. The criteria are, as formulated by the Commission:

- High and non-transitory barriers to entry;
- A lack of dynamic towards effective competition;
- Insufficiency of competition law to deal with the problem.

The Commission provided guidance on the interpretation of the criteria that it used itself in developing its list of Recommended markets and to assist NRAs in assessing markets not on the recommended list.

The analysis should proceed on the basis of the "modified greenfield approach" described in section 2.2.5.4. The Three Criteria must therefore be assessed on the basis of any relevant exogenous regulation but ignoring any previously applied regulation in the market itself or upstream markets. If a market is analysed at the time of a new decision to apply remedies in an upstream market, the anticipated effects of those remedies are taken into account.

There is a degree of overlap between the three tests and (for an NRA) between assessment of the Criteria for a proposed new market and assessment of SMP in that market. Such overlap does not matter unduly. The Criteria are a means to the end of identification or "market selection", in a consistent manner across Europe, of markets susceptible to ex-ante regulation. Analysis of the Criteria should not be regarded as an end in itself.

There is no definitive guidance as to the time horizon over which the three Criteria should be assessed. For NRAs faced with a 3-year cycle of Market Reviews, the lifetime of the review in question (normally 3 years from the date of completion of the review) is the natural horizon. This logically means that the markets selected ***for inclusion on the recommended list*** should be those that appear to satisfy the 3 Criteria now, taking a forward view of the state of competition over roughly the next 3 years.

A.4.2 Purpose of the Three Criteria

The Commission's original intention was to identify a set of markets that justified regulation in most, if not all, Member States. This was at a time when most NRAs had relatively little experience in application of competition law methodology. Without a clear steer from the Commission, there would have been a risk of considerable divergence of approach across Europe. The Three Criteria Test provided a sound rationale for the inclusion of markets on the recommended list. The Commission considers that where an NRA defines a market on the list, there is no need for it to apply the Three Criteria Test. However, where it defines a different market or proposes not to analyse a market on the list, it should apply the test in order to justify its decision.

However, the original rationale deserves re-examination in a world where competition has increased, but not in a uniform way across Europe. Consequently, in some markets, deregulation has occurred in some Member States (or regions) but not elsewhere. In such cases, it is far from clear that it is meaningful to attempt a single centralised assessment of the Three Criteria. The test would be better applied by the NRAs. To avoid reinventing the same wheel very many times in the case of some markets, it could nevertheless remain useful for the Commission to publish an analysis of the Three Criteria, market by market. But, where the Commission reaches a conclusion that is presented as applying to the whole of Europe, in practice (even if not in theory) this increases the height of the barrier to be crossed by any NRA whose national circumstances depart from the European norm considered by the Commission. An alternative approach with significant advantages, would be for the Commission to identify the factors that need to be weighed by NRAs in assessing each Criterion, but not generally to reach a conclusion; except in cases where there is no real doubt about what would be found. Following this approach (and in particular, insisting that the NRA should perform the Test), there would be little cause for concern that inclusion of a market on the Commission's list would in practice lead to unjustified regulation of markets.

A.4.3 Interpretation of the Three Criteria

A.4.3.1 High and non-transitory barriers to entry

At this point it is useful to distinguish between structural barriers and legal barriers. Structural barriers may result from characteristics of demand or from technology and the resulting cost structures. When these characteristics result in asymmetric conditions between incumbents and new entrants they may impede or prevent market entry. High structural barriers are, for example, found to exist when the market is characterised by substantial economies of scale, scope and density in combination with high sunk costs[415]. Legal or regulatory barriers are not based on economic or technological conditions, but result from policy or NRA measures. These barriers may induce circular causation when markets are found to be not functioning properly as a result of poor policy choices or bad regulatory practice. An NRA should thus demonstrate that it has done its utmost to minimise regulatory barriers before they are accepted as a reason to make a market susceptible to ex-ante regulation.

De Streel (2008) argues that markets satisfying the first Criterion fall into two types. They may have the characteristics of a natural monopoly as a consequence of externalities. The best-known examples are the call termination markets where competition is minimised as a consequence of the externalities resulting from the *calling party pays* principle. In de Streel's view, the other types of market to be considered "cover non-transitory and non-strategic entry barriers that are mainly of an

[415] See *i.a.* Heger, D. and K. Kraft (2008), Barriers to Entry and Profitability. ZEW - Centre for European Economic Research Discussion Paper No. 08-071.

economic nature and that are so high that only one operator (save in exceptional circumstances) is viable in the market". This seems too stringent a test on two counts. First, markets do not necessarily segment into those that can support one operator and those that can support many. Markets exist which can realistically support one, two or three operators but not more; and by no means all oligopolies give rise to effective competition. Moreover, de Streel appears to exclude strategic, as opposed to structural or legal, barriers on the basis that these can be dealt with effectively under competition law. This may sometimes be the case in theory although there are some strong arguments discussed below concerning the efficacy of competition law in the e-communications sector, which would not lead to that conclusion. In any case, the efficacy of competition law can be explicitly tested under the third criterion.

The height of the barrier is an important issue. Experience in other countries of where entry has or has not taken place in similar circumstances and competition has, as a consequence, intensified or not will provide persuasive (although not necessarily sufficient) evidence for assessment of the Criterion. In the absence of useful benchmarks of this kind, Cave, Stumpf, and Valletti (2006)[416], having analysed a number of practical problems with more complex approaches, propose a test of sufficiency (or rather insufficiency) of barrier height as follows:

> "A barrier is not high enough if it can be shown that a firm as efficient as the incumbent can enter ….at an acceptable level of risk"

This presumably starts from a monopoly and again appears to assume implicitly that any duopoly would be competitive. It also begs the question of what it means to be "as efficient as the incumbent" given that the incumbent can usually draw on economies of scale not available to any entrant in any reasonable timescale.

These contributions to the debate therefore provide some interesting ideas although they may have been more relevant to an earlier phase of liberalisation when there was doubt over whether there would be entry or not. In practice, very few de facto monopolies remain while by no means all the non-monopolised markets enjoy effective competition. Therefore, the relevant question is not whether there will be further entrants but rather:

- Are there already sufficient entrants that, in principle, effective competition should be achievable; or, if not
- Are the barriers to further entry sufficiently high and enduring to prevent effective competition from being reached within a reasonable timescale.

The first Criterion should be interpreted along these lines.

When performing a market analysis of vertically integrated markets, a point of attention is that structural barriers at the retail level may be found to be considerable in the absence of regulation of wholesale markets. However, in case wholesale regulation has been introduced, the structural barriers in the retail market may be considerably smaller and even disappear.

The impact of innovation on structural barriers needs to be considered carefully. Such barriers may tend to disappear whenever there is innovation that will allow an established service to be delivered in a different way. Where the market power of a player controlling an entry barrier is undermined in this way, it may be incentivised to adopt a more liberal entry policy so as to maximise use of its network. On the other hand, while new customers are normally served using the most efficient

[416] Cave, M. U. Stumpf and T. Valletti (2006), A review of certain markets included in the Commission's Recommendation on Relevant Markets subject to ex-ante Regulation, report for the European Commission.

technology (which may give rise to a new market definition), significant numbers of existing customers may be unwilling or unable to switch. This may lead to entrenched SMP in the existing market as the (presumably declining) size of the addressable market is unlikely to attract new entrants. At the same time, the market for the new or enhanced version of the service could become highly competitive.

A.4.3.2 A lack of dynamic towards effective competition

The presence of high barriers to entry alone is not enough to justify *ex-ante* regulation. Where it is the objective of the RF to guide the market towards effective competition, the NRAs are required to recognise trends that may lower entry barriers in the (near) future (e.g. convergence of markets or the prospects to disruptive technologies). Such prospects may affect the current behaviour of established firms by e.g. lowering prices to anticipate potential entry.

De Streel (2008) argues that, "regulators should assess whether the market would deliver the results of dynamic competition (*i.e.* innovation) despite high entry barriers, or in other words, whether the market would deliver the benefits of Schumpeterian creative destruction. For instance, this may sometimes be the case if there is ex-ante competition for the market, although there is no more ex-post competition in the market." While this may appear sound in theory, it is likely to be difficult to apply in practice, given the practical difficulties for regulators (or, indeed, anyone else) in assessing the extent and benefits of future innovation and of the timescale over which such benefits may be delivered. Competition law enforcement in cases such as *Microsoft* has so far suggested that the Commission seems to believe more in product variety and an 'Arrovian' view of competition as a stimulus for innovation, than to the "Schumpeterian" view of dynamic competition. Perhaps there is room to alter this tendency in the review of the list of relevant markets, also because it is exactly in ICT markets that the tensions between these two views reach a peak.

In principle, the emphasis of the analysis should be on how competition is likely to develop in practice rather than on what *might* happen in theory. Evidence of what has actually happened in the past (or in similar circumstances elsewhere) should be taken fully into account, at least to the extent that it remains relevant to the future.

Sometimes, market conditions may allow for entry of niche players whose business plan is to address particular customer segments. Such niche players may be able to grow their businesses slowly or even survive on very low market shares for a significant period. However, that does not guarantee that there will be sufficient entry of players expecting to achieve sufficient scale in a sufficiently short period to alter the competitive landscape significantly. For that to happen, it will be a necessary condition for the entrants to have sufficient confidence that there will be an opportunity to build scale over time, assuming in particular that necessary regulation will be in place for a sufficiently long period. A theoretical growth in the number of entrants (or significant increase in market share of recent entrants) will only be translated into reality if there are credible viable business plans to achieve that effect.

Some markets (the so-called "emerging markets") are in such a state of rapid evolution that it would be difficult, if not impossible, to assess SMP over a typical time horizon. However, this phenomenon is more likely to affect the markets nearest to the end-user and not normally considered to be suitable for ex-ante regulation. The question of emerging markets, which often generates much heat in discussions amongst market players, is therefore not especially relevant to the Commission's task of reviewing its Relevant Markets Recommendation.

A.4.3.3 Insufficiency of competition law

Compared with the first two criteria the third criterion is distinctively different. Whereas the first and second criteria measure and identify structural patterns of market failure possibly inherent in telecommunications, the third criterion asks whether general competition law can be effective to remedy these aspects of market failure. It is not an economic criterion but an efficiency test regarding the adequacy of the existing set of rules under general competition law.

Never and Preissl (2008)[417] argue that "since general competition law is subject to changes of time, the third criterion should be interpreted dynamically. [For example], the development of the essential facilities doctrine and their integration into European and national general competition law has led to a different assessment of the efficiency of general competition law regarding certain competition problems. […] Due to its fundamental importance and its potentially changing nature, it is very important that the conditions for evaluating the sufficiency of the third criterion are made very clear. […] The Commission gives only rather general examples as to when general competition law is considered to be insufficient: necessary remedies cannot be imposed under competition law; extensive compliance requirements exist; frequent or timely intervention is indispensable; creating legal certainty is of paramount concern." Never and Preissl rightly ask the questions "what exactly do phrases like extensive compliance requirements, frequent and timely intervention, and legal certainty mean? And why can they not be met by general competition law."

In an attempt to answer these questions, we reflect on specific market features that warrant ex-ante regulation as opposed to ex-post regulation. We notice that compliance costs, frequency and timely interventions, and legal uncertainty are closely related in this context because ex-ante regulation is mostly justified in innovative and high investment industries that have a constant tendency towards natural monopolies.

Markets with features of a natural monopoly (like network industries) that are characterised by fast developing technologies (like telecommunications) are likely to be affected to a greater extent than other sectors by regulatory uncertainty.[418] Regulatory uncertainty may stem e.g. from the absence of detailed rules on pricing. Under these circumstances network companies have to judge what level of prices would be regarded as abusive by the authorities. This involves an assessment of the competition authority's likely view of "reasonable" network access prices. While detailed reasoning by the competition authorities in each particular case may eventually establish precedents that can be applied in other cases, the widespread application of such precedents may be subject to legal interpretation. Particularly, in sectors with long-lived and very large fixed cost assets, like network utilities, the level of "reasonable" prices is subject to much academic debate and disputes on practical implementation.[419] Sector-specific rules provide much clearer guidance to regulated companies with respect to the boundaries of acceptable behaviour.

The previous is of particular relevance to sectors that are highly dynamic (like telecommunications) and where technologies and associated cost structures rapidly change, increasing the frequency of interventions. Furthermore, in dynamic markets that tend towards natural monopolies, also the timeliness of interventions is of vital importance and reduces uncertainty. Firms need a reasonable degree of certainty to enter markets. Where incumbents in an unregulated market have the

[417] Never and Preissl (2008), "The Three-Criteria Test and SMP: how to get it right", *International Journal of Management and Network Economics*, 2008, vol. 1, issue 1, pages 100-127.

[418] T. van Dijk, General or specific competition rules for network utilities?, Journal of Network Industries, Volume 2, no 1 (2001): pp. 93-111.

[419] For an overview of the academic literature, see J.J. Laffont and J. Tirole (1994), "Access Pricing and Competition", EuropeanEconomic Review 38: 1673–1710. And more recently, Armstrong, M. (2001), "The theory of access pricing and interconnection," MPRA Paper 15608, University Library of Munich, Germany; and Mandy, D. (2009), "Pricing inputs to induce efficient Make-or-Buy decisions", Journal of Regulatory Economics, Springer, vol. 36(1), pages 29-43, August.

incentive and opportunity to render the business cases of entrants non-viable, entry is unlikely even if the incumbent business practices in question could in theory be prohibited. Ex-post investigation may offer certainty after a period of Court cases that eventually lead to precedents. But while these cases are analysed by lawyers, the business case of innovative challengers may have already died. In any cases, such investigations only deliver certainty in respect of the particular behaviour under consideration. Moreover, national legal precedents apply only in the legal jurisdiction in question and would not be binding on other jurisdictions.

Ex-ante regulation is able to offer the required certainty and potential consistency across Europe much sooner. Ex ante regulation allows the regulator to commit to the methods he will adopt for much longer periods. Notably, the regulator can use sector-specific rules to specify in advance how he will respond to developments in the regulated utility's business. Such sector specific rules are often not possible under general competition law (even if competition law remains applicable anyway in Europe). Moreover, while promotion of consistent approaches by regulators across Europe is no trivial task, it is in principle more likely to be achievable than reliance on consistency of the various national legal decisions, at least on matters of significant detail.

On the basis of these considerations, it is arguable that there are few or no e-communications markets that satisfy the first 2 Criteria but fail the 3rd.

A.4.3.4 Review of the Three Criteria Test

The fundamental reason for having a Three Criteria Test in the first place is to address the risk of regulatory failure. NRAs are frequently accused of having a natural tendency to over-regulate. This tendency is not necessarily born out of an institutionally driven survival instinct, but also because it is very hard for regulators to oversee the dynamic consequences of regulation, making them biased towards static welfare gains of regulation.

In addition to market functioning, regulatory and administrative efficiency may play a role in the decision between ex-ante and ex-post regulation. One advantage of sector-specific ex-ante regulation is that it ensures a large number of similar cases to be dealt with quickly and efficiently.[420] Moreover, it is efficient from an administrative point of view to establish a sector-specific framework of regulation if assessment of any case requires the collection of a large volume of sector-specific information. Collecting such information incurs a cost (for the regulatory authority and for the companies providing it). Although it is possible to collect all the necessary information for each case, it is usually less costly to set up regular systems for collecting data that is likely to be needed in the event of a dispute. It is worthwhile incurring the cost of setting up such (sector-specific) data collection schemes if the authorities anticipate a lot of disputes requiring the same information.

The test formulated by the Commission is based on two market features at the heart of the choice between ex-post and ex-ante regulation. As discussed earlier, we conclude that this choice is largely driven by the tendency towards natural monopoly and the frequency and speed of innovations. However, the current criteria are not wholly aligned with the above considerations. While they may provide a reasonably efficient filter between those markets that justify SMP regulation and those that do not, it is justifiable to look for a more efficient filter. On the other hand, the Criteria are now familiar to both regulators and market players. Too great a departure would risk giving rise to significant regulatory uncertainty which could well have adverse effects on market

[420] See van Dijk (2001).

development and, therefore, on consumer interests. That argues more for minor adjustment than for major surgery.

Problems which can be addressed by adjusting the Criteria

We have identified one generic issue that is relevant here. NRAs have always operated with resource constraints. The situation is especially acute at the moment. Market-analysis is a resource-intensive business, at least if performed to the standard required to survive scrutiny by national courts. It is only justified to deploy such resources if:

a) There is a reasonable prospect that consumers will benefit to a sufficient extent from any appropriate regulation; and
b) There is no more efficient or effective way to deliver a similar consumer outcome.

Sufficiency of consumer detriment

The first indent is about consumer detriment. It may be the case that consumers are experiencing detriment in an unregulated market that could be removed or reduced by appropriate regulation of an SMP player. But where that detriment is small and the consequential benefit of regulation also small, the case for regulation is weak.

Even without such a test, there is an argument that NRAs should consider the purpose of regulation and should not take disproportionate action. But this is not really a question of proportionality. It is about whether the benefits of regulation are sufficient to outweigh the costs. Expressed bluntly, NRAs should not deploy resources on investigating issues that do not matter much. SMS termination (analysed below) may be a relevant example. But at present, there is no such test in the Regulatory Framework, either explicit or implicit.

The consumer detriment issue can also easily be linked to our treatment of SMP in Section 3 above. If regulation should take place whenever it is likely that, absent such intervention, SMP players might engage in exclusionary abuses leading to anticompetitive foreclosure, then consumer harm inevitably becomes part of the analysis.[421]

Efficiency of regulation

The ideal world outcome would be the delivery of perfectly designed regulation at minimal resource cost. But in the real world that is rarely achievable. For some markets, there may however be an opportunity to deliver good regulation at much lower resource cost and which delivers a similar level of consumer benefits. Such an opportunity would be worth grasping, except for the fact that the Regulatory Framework currently provides no opportunity to opt out.

The historical case that illustrates this point is that of international roaming. With the benefit of hindsight, it is clear that assigning the problem to NRAs to deal with under the SMP rules (original Market 17) was not the right solution. Any analysis of the case shows that it cannot be dealt with effectively without strong European co-ordination that led to similar wholesale prices across Europe. That might have been achievable, given sufficient commitment by the Commission and the NRAs. However, experience shows that it would not have been sufficient to solve the problem. But there was in any case a more fundamental problem.

Wholesale regulation, as originally envisaged by the Commission, would have required 27 national market analyses, each delivering a finding of collective SMP. It is inconceivable that this result

[421] As recalled in Section 3 above, the concept of anticompetitive foreclosure in the European Commission 2008 Guidance paper on the treatment of exclusionary abuses requires two conditions: the actual or likely foreclosure of as-efficient competitors; and (b) actual or likely consumer harm.

could have been achieved in any reasonable timescale, given the extreme practical difficulty of crossing the necessary threshold of proof. Even though the underlying problems are not yet solved, few today would argue for Market 17 to be restored to the Commission's list.

Eventually, the unsuitability of the SMP Rules for dealing with the problem was recognised and the Commission proposed a bespoke Regulation. However, in the meantime, a number of NRAs, believing the Framework gave them no real option, did expend resources on undertaking a futile market analysis.

The above arguments might lead to a conclusion that Market 17 would have failed the consumer detriment test. This could be debated. But the point argued here is that performance of 27 separate market analyses with the objective of imposing a common price constraint is very unlikely to be an efficient solution. The solution eventually enacted (The Roaming Regulation), while open to criticism on various grounds, has materially addressed the perceived problems at much lower resource costs to the NRAs than could have been achieved via SMP analysis (even putting to one side the significant uncertainty surrounding whether ex-ante regulatory control would even have been possible by that route).

International roaming, although it possesses unique features, is not the only market where the efficiency of SMP analysis could be questioned. Voice call termination is examined on this basis below.

There may also be instances where an NRA considers that, in its national circumstances, there are more efficient ways of dealing with an issue identified than via the SMP analysis. For example, there may be national legislation in place that allows the issue to be addressed in a different way. Obviously, it is not useful to articulate further what the circumstances might be; it would be for the NRA to make the case, on its merits, to the Commission. The point is that at present, the Framework procedures do not allow for such a case even to be made.

A revised Third Criterion?

Balancing these considerations, a revised 3rd Criterion is proposed. To be an improvement on its predecessor it has to be capable, as the current version scarcely is, of rejecting SMP regulation for markets that satisfy the first two criteria. The suggestion here is to replace the criterion with a test under which the issue at hand "can be dealt with most effectively and appropriately using SMP Regulation" rather than ex-post competition law.

As argued in section 4.3.3 above, it is a reasonable presumption that, for e-communications markets, the original Third Criterion will be satisfied whenever the first two are satisfied. The new test should then be interpreted as follows.

Whenever the first two Criteria are satisfied, the revised Third Criterion should be presumed to be satisfied unless:

1. There are special reasons to believe that any problems arising in the relevant market can be effectively left to competition law to resolve; or
2. There is objective justification to consider that any problems arising in the relevant market can be dealt with more effectively using other regulatory approaches; or
3. There is objective justification that the consumer benefits expected from regulation are insufficient to justify the resource costs, not only of the NRAs but those which would need to be committed by market players to support regulation.

When applying the test to any new markets they are analysing, NRAs should consider the full range of regulatory alternatives. They might for example consider accepting legally binding undertakings or deal with issues using other regulatory instruments at their disposal. For example, transparency measures can be imposed under the powers deriving from the Universal Service Directive and/or from generic European or national consumer legislation.

The third leg can be used to rule out markets where a competition problem is evident but the potential detriment to consumers appears to be small. This is a 'de minimis' test that will need to be assessed case by case, but supported as far as reasonably possible by a quantified analysis.

A.4.4 The process for constructing the revised list of recommended markets

One of the tasks of the second phase of this project will be to make a proposal for a revised list of recommended markets. It seems a natural first step to start from the existing list of markets and ask the question “does the Commission’s analysis in 2007 still hold, given market developments since then and those which can reasonably be foreseen over the next few years?”

Prospective developments should be taken into account only to the extent that their effect is reasonably predictable. Describing the future can never be an exact science but it would be unsound to base analysis on speculation, promises or even political targets.

The most likely outcome of such an analysis may well be that competition has improved to a much lesser extent than would have been hoped at the time that Recommendation was published. That would in any case be the superficial conclusion from an examination of the results of NRA market analyses where there has been little significant deregulation of the markets identified in the 2007 version of the Recommendation.

It is proposed that there should be two variants of the analysis, first in accordance with the original set of Three Criteria and second using the proposed revised Third Criterion. The incremental work necessary to apply the alternative test should be fairly modest. This alternative approach may provide for some deletions from the list (in favour of more effective and/or less resource-intensive regulatory approaches) that cannot be justified on the basis of the original Three Criteria.

In responding to the Commission’s consultation, stakeholders have made a number of suggestions for changes to the list. Deletions would in any case fall to be considered in reviewing the existing set of markets. The following sections attempt an initial review of the suggestions made by stakeholders for adding to the list of recommended markets. The purpose of this preliminary analysis is to identify the analysis that will be needed in the second phase in order to assess the case in full. As for the existing markets, it is worthwhile to assess these cases against both the original and revised Third Criteria. It is indeed possible that new issues have arisen that have not been extensively considered before. For some, SMP regulation might be the only plausible route to any justifiable remedies; for others, different approaches might be possible.

A.4.5 A market for civil infrastructure

A.4.5.1 The proposed market

The market would be for access to physical infrastructure (ducts, poles, exchange buildings, street furniture) and passive components of electronic communications networks (dark fibre, unused copper) for the purpose of delivering electronic communications services. There would presumably

be an inbuilt geographical restriction or segmentation (e.g. local access network, trunk network) as the propensity of such facilities to amount to bottlenecks is generally different in different areas

A.4.5.2 The stakeholder case

At least two distinct arguments were made for such a market. One stakeholder (a mobile network operator with growing interests in fixed services) noted that at present, MNOs rely heavily on microwave links to provide network connectivity. However, they foresee that the available spectrum will soon become exhausted and that they will need to make much heavier use of fibre connections. Claiming that leased lines are not always priced competitively, they argue for the introduction of a civil infrastructure market. Where SMP is found in such a market, remedies such as compulsory leasing of dark fibre or access to unused duct capacity could be imposed.

An alternative network operator had a different argument. It noted that its NRA had imposed a 'virtual unbundling' (VULA) remedy on the incumbent with the intention of facilitating competition in very high-speed broadband services. However, in the Altnet's view, the defined VULA remedy did not work properly and in particular gave the incumbent a lot of scope to delay and degrade competition. In contrast, if the Altnet had access to duct and/or dark fibre, it would be in control of its own service specification and would be much better able to compete.

Whatever the strengths of the specific cases considered by these stakeholders, it can be readily accepted that the market power of fixed line incumbents does ultimately derive from their ownership of physical infrastructure. Moreover, the assessment of the Three Criteria in the next downstream market (unbundled access, leased line terminating segments, leased line trunk segments) would be likely to be identical or near identical to that for the corresponding physical infrastructure market. On that basis, it seems that it would be possible to define one or more physical infrastructure markets that satisfy the Three Criteria.

The question therefore is whether it adds value to define a physical infrastructure market either instead of the existing markets (4 - local unbundled access and 6 - wholesale leased line terminating segments) or in addition.

A.4.5.3 Pros and cons

This proposal seems to go with the flow of regulatory philosophy. It has been considered sound to analyse markets as far upstream as the source of the market power and to start by imposing any necessary remedies at that level. Only if remedies relating to that level cannot solve the identified competition problem effectively, should an NRA consider imposing remedies further downstream. Where there is market power, the source would usually be at the physical layer.

However, the Commission has so far confined the scope of its recommended markets to electronic communications services. This does not appear to be a necessary restriction and the reasons for it may be historical rather than fundamental.

However, at first sight, there appears little to be said for **adding** such markets to the list. Where an NRA did reach the conclusion that access to civil infrastructure would be an effective and proportionate remedy to deal with an identified competition problem, it does not appear necessary to define a civil infrastructure market to achieve that outcome. For example, to deal with SMP in Market 4, then copper loop unbundling, fibre loop unbundling, access to dark fibre, access to unused duct capacity are all remedies which are within the scope of the remedies which may be

imposed under Article 12[422], Access Directive. Moreover, NRAs are required to make choices of remedies that will deal effectively with the competition problem identified. If in a particular case that requires multiple remedies (for example, unbundled loops plus access to duct), these should be imposed. Equally, if hypothetically access to duct or dark fibre should properly be considered a more effective remedy than unbundled access or provision of wholesale leased lines, NRAs should impose such remedies in pursuance of the most effective regulation possible It appears therefore that adding civil infrastructure markets to the list delivers no added value but inevitably requires more resources.

The arguments against **replacing** either or both of Markets 4 or 6 by infrastructure markets appear equally powerful. On the basis of the above arguments, the same SMP players would be designated and the same set of remedies could be imposed. However, regulatory certainty would be reduced as an analysis of a "new market" would be more likely to face a legal challenge.

A.4.5.4 Analysis required in Phase 2 of the project

The main steps needed to verify the above preliminary analysis are:

a. Confirmation that the analysis of the Three Criteria would be essentially the same for the infrastructure market and its counterpart immediately downstream (unbundled access and wholesale leased lines);
b. Confirmation that SMP designations would be unlikely to change, as between the infrastructure market and its counterpart immediately downstream.

If those matters are confirmed, then the problems identified by stakeholders can apparently be solved by adjustments to the current sets of remedies imposed by the NRAs in question in Markets 4 and/or 6.

A.4.6 Merging Markets 4 and 5?

A.4.6.1 The proposed market

According to the Commission guidance, Markets 4 and 5 should be reviewed at the same time because of the close links between the markets. To the extent that remedies applied as a consequence of SMP in Market 4 deal with any problems at the retail level, in accordance with the modified greenfield approach, there should be no need to apply further Market 5 remedies. Nevertheless, several stakeholders argued for a "single market" to replace the existing Markets 4 and 5. There are at least three interpretations of this suggestion.

The first appears to be looking for NRAs to define one market encompassing both unbundling and bitstream services, rather than two. This would be a market for wholesale unbundled or bitstream access to end-users at local, regional or national levels. Since the fundamental source of market power in for either set of services rests with those who control physical access, the SMP assessment should be the same as for the current Market 4.

The second variant would lead to one "market group" being identified in the Recommendation encompassing the scope of both Markets 4 (wholesale unbundled access) and 5 (wholesale broadband access) but with the expectation that NRAs would define a vertical segmentation and therefore still analyse 2 relevant markets. This would provide some flexibility for NRAs to define the

[422] Some NRAs, including ANACOM (Portugal) and OFCOM (UK) have imposed access to passive infrastructure as a Market 4 remedy.

boundary in a way which best took account of national network topologies and market circumstances. The identity of SMP players would presumably remain as under the present segmentation.

The third scenario would lead to the analysis of a traditional Market 4 (or a close relative). Assuming that the traditional Market 4 Remedies would not deal with the competition problem identified at retail level, the traditional next step would be to analyse Market 5, with the intention of imposing further remedies on bitstream services. In the absence of a Market 5, it would be necessary to impose bitstream remedies as a consequence of the SMP in Market 4. Philosophically, this seems acceptable since it is difficult to conceive of SMP in Market 5, which does not derive from SMP in Market 4. It needs to be confirmed that there are no legal objections. The SMP assessment would be as for the current Market 4.

A.4.6.2 The case for change

Arguments for change put forward by industry stakeholders appear to be largely based on a perception that a change would favour their commercial position and to have little substance. Nevertheless, it is appropriate to consider whether such a change could lead to more effective regulation (or, if appropriate, deregulation).

A.4.6.3 Pros and cons

One issue which seems to require a change to the definition of some kind arises from the roll out of fibre in the local access network (usually by only one network operator in a particular location) and the need to provide for some kind of wholesale access to that fibre if monopolisation of very high-speed broadband services is to be avoided. In principle, where there is a case for unbundling copper loops, there is very likely to be a broadly equivalent case for unbundling fibre loops. But this may not currently be a practical option (in particular, where the access network is configured as a passive optical network (PON)). In consequence, some NRAs have imposed a virtual unbundling (VULA) remedy where SMP is found in Market 4.

Some argue that the current definition of Market 4 (which refers to ***physical*** access) precludes imposition of a VULA remedy, which provides for 'electronic unbundling'. This reasoning appears to be faulty; there seems to be no insurmountable obstacle under the Framework to imposition of a remedy, which relates to a service in a market that might properly be considered to be downstream of the market analysed (or, indeed upstream – such as access to passive infrastructure – see above). Indeed, the Commission has accepted such remedies. Nevertheless, several NRAs maintain the view. There is at least a problem of perception.

First variant – Unification of markets 4 and 5

The first variant has not seriously been considered previously because the unbundling and bitstream services appear to have a natural vertical relationship. However, despite this, a new entrant without its own access network has a choice between using unbundled loops or bitstream services. The services are not substitutes in the technical sense as an unbundled loop gives more scope for configuring the retail service according to the needs of the service provider. Interconnection is also likely to take place at a different point of the network so the investment requirements are different. Moreover, the business cases are likely to vary from one service provider to another; for unbundling to be cost-effective for the service provider, it normally has to believe that it will be able to achieve significant scale within an exchange area or contiguous group of such areas. By contrast, use of bitstream services can be viable with far lower percentage market shares.

However, for service providers that intend only to supply a standard broadband service to the mass market, the extra configurability of the unbundled loop may be of no real consequence. In that case, it is possible that the two services are, to a material extent, mutually substitutable. Indeed, there are actual examples of a service provider switching from bitstream to unbundled loops as it chose to climb the ladder of investment. Others have made the reverse switch in instances where they were unable to achieve sufficient scale to make unbundling cost-effective.

This approach, assuming that it could be justified on the basis of empirical evidence, would appear to be less resource-intensive than the traditional approach. Regulated SMP players could be expected to favour it, on the basis of the superficially attractive argument that two sets of remedies (unbundling and bitstream) should not be imposed when only one market is defined. Competing service providers might be expected to oppose it for the same reason. That argument has no substance however (since, under the Framework, there is no such numerical test – all necessary remedies are required to be imposed) and should not be a factor in deciding for or against the approach.

To obtain a correct assessment of market power, it seems that the modified greenfield approach would have to be further modified. This is because market shares for bitstream services are heavily influenced by the regulated supply of unbundling. It is certainly possible to correct for this but there is plenty of scope for argument and dispute about how to do it.

Second variant – flexibility over vertical segmentation of Markets 4 and 5

This scenario would tend to make unimportant the differences of view between NRAs as to whether VULA is really a bitstream remedy or an unbundling remedy. The main benefit is that it would reduce the burden of proof on those NRAs that felt that the current Commission segmentation was inappropriate to their national circumstances. It would probably lead to a superficial divergence in market definitions and possibly to applied remedies. This could be of concern to the Commission. It could be alleviated by development of guidance on how the boundary was to be defined – which would obviously require additional resource. On the other hand, it seems equally possible that broadly the same remedies would be applied across Europe in similar circumstances, sometimes as a consequence of SMP in Market 4, sometimes as a consequence of SMP in Market 5. Such a divergence would be of no real significance.

Third variant – only Market 4 defined (with the possibility of applying both bitstream and unbundling remedies – where objectively justified – as SMP remedies)

As for the other variants, the main advantage would be that the precise boundary between the current Markets 4 and 5 would not be an important issue In this case, the analysis of market definition and SMP should proceed more smoothly and with perhaps less risk of legal challenge than for either of variants 1 or 2. The consequences could be unpredictable however. Even if there are no legal barriers under the Framework, some may have arisen from national transpositions. Whatever the strength of the legal arguments, incumbents would be inclined to challenge any attempt to impose bitstream remedies in addition to unbundling remedies as a consequence of SMP in Market 4. This may lead to delays in regulation in some Member States and the possibility of inconsistent outcomes. Guidance of the utmost clarity issued or approved by the Commission would seem to be necessary to minimise this risk.

There may also be a material saving of NRA resources on market analysis (although, as noted above, there is a risk that this advantage could be negated by additional resources required to deal with appeals). On the face of it, analytical effort needed by NRAs would be reduced since only one market has to be analysed rather than two. In substance, the difference between this approach and the traditional approach would be relatively modest as a rigorous analysis of the necessity and

proportionality of additional bitstream remedies requires something close to an SMP analysis of Market 5. Now that the Commission has the ability to express serious doubts about proposed remedies as well as proposed market definitions and SMP assessments, it might be prepared to consider the approach.

A.4.6.4 Analysis required in Phase 2 of the project

The choice amongst these options (or between any of them and the status quo) depends on both economic and legal considerations. Not all of these can be resolved during the course of this project. But progress can certainly be made on others.

There are two 'one-market' options (Variants 1 and 3) and two 'two-market'" options (the status quo – or something like it and Variant 2). It may be convenient to characterise the choice as being first between one or two markets and then between the different variants in each category.

The traditional approach is to define two markets. The first question therefore is whether, on balance, it is compelling to move to a one-market approach. This would certainly require that such an approach could be implemented without significant incremental legal risk. This in turn requires:

a. In the case of Variant 1, that such a market definition would be consistent with competition law methodology, as required by the Framework Directive;
b. That guidance could be developed within a reasonable timescale on the novel analytical features which would be required (modification of the Modified Greenfield Approach for Variant 1; the appropriate approach to remedies for both variants); and
c. That there is no legal obstacle to imposition of "downstream" remedies in Market 4 (assuming these are objectively justified).

Even assuming these issues can be dealt with satisfactorily, a "two-market" solution is probably preferable unless:

d. There would be a material resource saving accruing from a 'one-market' solution; or
e. A 'two-market' solution could not be made to work without undue risk of unjustified divergences in regulatory practice across Europe.

As between the 'two-market' solutions, the issues to be considered are:

1. Whether there are sufficient national differences to justify the incorporation of flexibility in the vertical segmentation into the Commission's list of recommended markets. For example, the Commission might specify a benchmark segmentation but note explicitly that national circumstances (which could usefully be exemplified) would tend to justify variations. Justification could perhaps be based on differences in network topologies or in technologies deployed;
2. Whether, in the event of a fixed or benchmark segmentation, there are good reasons to adjust the current segmentation between physical and electronic access. For example, a segmentation between access with high configurability (physical and virtual unbundled access) and access with low configurability (traditional bitstream access) might allow for a cleaner match to the needs of purchasers.

A.4.7 Business-focused markets in the area defined by Markets 5 and 6?

A.4.7.1 The proposed market

Leased lines are sold almost exclusively for business use and consequently the corresponding wholesale services of Market 6 are business-focused. The bitstream services of Market 5 may be inputs to a retail business service or to a retail service sold to the mass-market. Small businesses in

particular may find mass-market services fully satisfactory for their needs. Larger businesses, however, particularly those with multiple sites, will tend to require higher specification products. The distinction may be in the technical specification (for example the dedicated capacity of a leased line as opposed to a highly-contended mass-market bitstream service). Or it may be in the service wrapper – such businesses tend to require strong guarantees of reliability and very quick repair times, for example.

According to a study published recently by ECTA, such businesses have a strong tendency to purchase their retail services in a small number of bundles (sometimes only one), encompassing data and telephony needs across their entire network. While the bundles almost inevitably include high specification services mentioned above, they would also tend to include mass-market services (for example, standard DSL connections for branches or homeworkers whose activities are not business-critical).

There is therefore a case for segmenting the retail market according to customer segment. Multi-site businesses tend to buy large bundles of high-specification and standard specification services. Other customers may or may not buy bundles but tend to be satisfied with standard-specification services. The difference in specification is not the only potential difference between the two groups. There are inevitably fewer suppliers to the multi-site market. The customer support requirements are completely different between the two segments. Not all suppliers have the kind of customer support organisation suitable for dealing with the high-specification needs of multi-site businesses. And there is a need to be able to supply services to any geographic location. Only the incumbent will typically have infrastructure everywhere; other suppliers will need to be able to procure wholesale access services to compete in the retail market. Those suppliers who cannot supply all elements of the bundle required by a particular customer are unable to compete for its business.

If this case stands up, there will be consequences for wholesale market definition. Consideration will be needed as to whether to split Market 5 between standard specification and high specification services. If that is done, there may well be a case for merger between the high specification segment and market 6. In many cases, end-users would find it satisfactory to substitute a low contention bitstream service with high service quality for a dedicated leased line. For example, OFCOM has taken broadly this approach by defining markets for ‘symmetric broadband origination’, which include both dedicated leased lines and high specification symmetric bitstream services.

The geographic market considerations will also tend to differ between the standard specification and high-specification data services. Competition for the former will tend to be most intense in areas of medium to high population density. As OFCOM found, these will not necessarily correspond to natural administrative regions of the member state. Instead, the areas of intense competition will comprise a national patchwork of local areas. The extent to which pricing varies between these areas of high competition and other areas will be an important factor in deciding whether or not there should be a single national market.

For supply of high-specification services, there is often a good level of competing infrastructure in districts of high business intensity and on major trunk routes. However on regional and local routes there may be little or no alternative to the incumbent infrastructure. Many retail leased lines will need to be based on a wholesale part-circuit of the retail supplier and a wholesale part-circuit of the incumbent. Similarly, where connectivity is supplied using bitstream services (in particular, Ethernet or DSL), a competing retail supplier will in many cases need to interconnect its service with that of the incumbent.

NRAs may therefore need to define sub-national markets depending on where network competition is satisfactory and where it is minimal or non-existent. If there is competitive supply for sites over the majority of the territory of a Member State, although with relatively little competing infrastructure elsewhere, it might nevertheless be tempting to define a national market and conclude that there was no SMP. For those multi-site firms with sites in the "light infrastructure areas" however (which would be expected to be a much higher proportion than those with Head Offices in such areas), they might be faced with the prospect of monopoly supply.

A.4.7.2 The stakeholder case

The principle stakeholder arguments for change in this area have come from ECTA and INTUG. ECTA argues that NRA practices in relation to Market 5 take insufficient account of the needs of multi-site and multi-national businesses. In effect, ECTA and INTUG believe that assessments of competition focus in practice on the mass-market. In addition, differences in NRA approaches are said to lead to differences in the availability of products which are key to competition for supply to customers with high-specification needs (in particular multi-site and multi-national businesses).

A.4.7.3 Pros and cons

Certainly, there are differences in NRA approaches to these markets. For example, the OFCOM approach is:

- Geographical segmentation of Market 5;
- Inclusion of some high specification bitstream services in Market 6;
- Continued regulation of some parts of the incumbent's trunk network infrastructure for delivery of leased lines;
- Continued regulation of the legacy service of low-bandwidth analogue retail leased lines.

This approach is some way removed from an approach by other NRAs that follow to a much greater extent the detail of the Recommendation. It is possible of course that such differences arise from the specifics of the UK market. But such an argument is hard to rationalise. Why should trunk network infrastructure require continued regulation in the UK whereas it has been deregulated through much of Europe following removal of the original Market 11 (Leased lines trunk segments) from the list of recommended markets at the last revision? UK appears well-provided with competing infrastructure so it seems odd that OFCOM (with something of a reputation for deregulation in other areas) should impose heavier regulation in this area than most. On the other hand, OFCOM has segmented Market 5 geographically and deregulated a significant part of the UK (the most densely populated urban areas) since it believes that the availability of the Market 4 remedies (in particular unbundling) is sufficient to deliver effective retail competition. It does not appear credible that such an argument is valid only in the UK.

The purpose of this example is not to argue that OFCOM is right or wrong – rather, that there is a *prima facie* case of different approaches by different NRAs which do not derive from national differences. There are indeed other national departures from the Commission specification. For example, in the Netherlands, Opta has distinguished between high-speed and low-speed bitstream markets. The extent to which these approaches can be applied more widely is ultimately an empirical matter.

A.4.7.4 Analysis required in the second phase of the project

The need is to review NRA variations from the standard Commission formulation and consider whether there might be a case for wider adoption of such approaches. In particular, what are the criteria for determining:

- If there is a case for definition of wholesale 'high specification' and 'low specification' data markets, rather than the current technology-dependent definitions of Markets 5 and 6?
- Whether the approaches taken to retail market definition allow consistently for differences in the conditions of competitive supply between different categories of customer to be identified;
- If there is consistency in the geographical segmentation between trunk and terminating segments of the infrastructure used to deliver leased lines?
- If there is consistency in the approaches used to decide whether or not to geographically segment the low specification market (Market 5)?
- If there is consistency in the approaches used to decide whether or not to retain regulation of legacy services not benefiting from competitive supply?

A.4.8 Voice call termination

A.4.8.1 The proposal

The case for continuing to regulate termination markets via a price control intended to bring charges into line with efficient costs still seems strong. Under a 'calling party pays' regime, this will remain so while the great majority of calls use traditional circuit-switched telephony. No change has been proposed to the existing market definition.

However, viewed across Europe, the analytical regime to achieve this result seems very burdensome. The analysis needs to be done to a very high standard to avoid the risk of successful legal challenge. Even so, the regulated players have a very significant incentive to mount a challenge. Even a small chance of achieving a delay in reducing termination charges or a smaller reduction than proposed by the NRA is worth the legal cost.

Consequently, the Commission is believed to be considering whether there are more efficient alternatives that deliver much the same consumer benefit. The most obvious ones to consider in order to avoid the analytical burden are:

1. A bespoke Regulation specifying the maximum price to be charged (there might be a small number of variants dealing with different types of network);
2. The imposition of "bill and keep", probably again via a Regulation although it might be possible to avoid the need for this.

A Regulation would need to be negotiated in Council and Parliament following the same procedure as for the Roaming Regulation. The text of the Regulation would however be much more straightforward than in the case of roaming.

There is at least one possible route under the SMP regime to avoid a Regulation. Having found SMP, NRAs could impose a remedy along the following lines:

- Bill-and-keep for all national traffic;
- Requirement to offer bill-and-keep on a reciprocal basis for all international traffic; in the absence of reciprocity, the current termination rate would be unchanged.

The effect of this would be (subject to agreement within BEREC to standardise on this approach) that bill-and-keep would apply to termination of all intra-European traffic. By commercial negotiation or parallel action by foreign regulators, it might apply on some routes outside Europe.

A.4.8.2 Pros and cons

The main advantage of either of the above new approaches is clearly the avoidance of the analytical burden. There are a number of arguments against which need to be weighed.

Imposition of a standard pan-European charge clearly would not permit cost differences between networks to be fully reflected, by contrast with a detailed costing analysis. This is clearly true although a Regulation could attempt some rather broad-brush differentiation (e.g. between densely populated countries and thinly populated countries). One question to be addressed is whether the cost differences are material, given that termination rates are now at very low levels, especially for fixed networks. A second question is the extent to which current differences in termination charges reflect real differences in costs as opposed to differences in assumptions or regulatory philosophy. A third point is that national market reviews are inevitably unsynchronised (further complicated by appeal proceedings of different lengths and complexity). At any stage, there is only an imperfect relationship between costs and charges therefore while any cross-border distortions fluctuate according to national market review timetables. Putting these issues together, it could very well be that a move to a standard European charge (or small set of standard charges) would be at least as consistent with the Single Market as the current approach.

The most obvious costing differences have historically been between fixed and mobile networks. It needs to be considered whether significant differences will endure. If so, a bill-and-keep regime might work for fixed to fixed and mobile to mobile traffic but would be less obviously fair for fixed to mobile and mobile to fixed.

The effect of traffic imbalances also needs to be considered. This effect reaches its maximum extent under a bill-and-keep regime. The question is whether that maximum extent is material.

The main legal issue seems to be whether a Court would consider bill-and-keep to be a disproportionate SMP remedy. No doubt this would be fully tested by MNOs and the outcome is not certain. However, assuming a sound economic case, then on the basis of a strong Common Position by BEREC, underpinned by a Commission Recommendation, the chances of an unwanted court verdict appear fairly small. If the rules (either for a small positive charge or for bill-and-keep) were imposed via a Regulation, there is little prospect of a successful legal challenge.

Turning to institutional matters, a Regulation requires significant negotiation resource, even for an essentially simple Regulation. However simple the original construction, it would inevitably be subject to lobbying by special interest groups which would tend toward the introduction of greater complexity (but not necessarily greater fairness). There would be less risk of this in the case of a “bill and keep Regulation”.

The “co-ordination by BEREC” approach to bill-and-keep (variant (b) above) could work well in practice, provided there is a good majority for such an approach. It is self-enforcing in that if a particular NRA were unable (or unwilling) to impose such a regime, current rates would remain in force, ensuring that any current cross-border distortions do not grow. Moreover, such an NRA would undoubtedly face pressure from the Commission to move into line in its next review of the Market.

A.4.8.3 Analysis required in Phase 2 of the project

Some of the above issues cannot realistically be considered during this project, for example what would be the attitudes of BEREC and the Commission. Of those where progress might be made, the most significant are:

- An assessment of the materiality (on MNO finances) of a move to a standard termination charge or to bill-and-keep. In the case of bill-and-keep, this needs to be assessed separately for the four categories of fixed/mobile to fixed/mobile traffic;
- Whether a reasonable legal case can in principle be made for imposition of bill-and-keep as an SMP remedy; and
- Whether there is any legal problem with the semi-reciprocal nature of the suggested bill-and keep remedy under SMP regulation.

A.4.9 SMS termination

A.4.9.1 The proposed market

At first sight, SMS termination gives rise to the same kind of bottleneck as voice call termination. Most aspects of a competition analysis would be identical. A market could be defined along analogous lines to that for voice traffic. Indeed, while the Commission has not unambiguously recommended to NRAs that they analyse SMS termination, its Recommendation certainly provides encouragement to those NRAs that consider it appropriate to regulate.

A.4.9.2 The stakeholder case

The pressure to include SMS termination in the Recommendation comes mainly from two quarters. The first is from those NRAs that currently regulate. However, this is only a small number. The majority remain unconvinced of the case for regulation. Given that SMS revenues are a small fraction of overall MNO revenues and that the market is expected to decline as different forms of messaging service become prevalent, it is easy to see that this could be a low priority area for most NRAs. The second call comes from some MNOs that experience material revenue outflows as a consequence of differences in termination rates across Europe.

A.4.9.3 Pros and cons

The basic intellectual arguments in favour of regulation are much the same as for voice regulation and barely need to be rehearsed. Putting to one side for the moment the detail of what remedies to impose on SMP operators, any benefits to consumers from regulation are clearly of a much lower order than those that accrue from voice call termination. MNO revenues from SMS (however this is measured – not a straightforward issue considering the prevalence of retail bundled tariffs) are clearly much smaller than those from voice (or data). The main argument against regulation would therefore be the lack of materiality. In terms of the proposed revised 3rd Criterion, there is doubt as to whether SMS termination would pass the 'consumer detriment test'.

Moreover, it is often said that newer forms of messaging implemented and charged as a data service will, sooner or later, replace the legacy service of SMS. This reinforces the above argument. Even if consumer detriment were judged to be material now, it should decrease.

On the other hand, these arguments really only carry weight in the event of the imposition of a traditional SMP price control. If one of the alternative regimes were chosen for voice call termination, it could be extended to SMS at very little incremental resource cost.

This is particularly the case because SMS termination has historically been mainly a mobile-to-mobile service. Moreover, traffic between networks tends to be balanced, especially by virtue of the tendency of customers to react to an SMS by replying. Perhaps for this reason, termination rates tend to be reciprocal, in which case the level of the rate should be of no significance for the

purposes of MNO finances. Moreover, network operators can usually set retail prices well below the termination rate, if they wish, in the knowledge that any losses on outgoing SMS will tend to be balanced by profits on SMS received.

There appear to be two economic arguments in favour of regulation. Customer service and marketing SMS often originate from retailers across the economy on platforms attached to fixed networks. These services can in principle be priced at the monopolist's profit-maximising level, relatively unconstrained by other services.

Moreover, it is common practice to set differential charges for domestic and international SMS termination. Given that there is no longer such a strong expectation of balanced traffic (since a portion of international SMS activity arises from roaming customers and such traffic is often unbalanced), the termination rate does matter to the originating MNO. If all NRAs chose to define the market and constrain all termination rates to reasonable (and similar) levels, the cross-border issue would of course be resolved.

A.4.9.4 Analysis required in Phase 2 of the project

An analysis of materiality is needed. This needs to consider in broad terms:

- The extent of consumer detriment at present;
- The extent of economic distortions caused by differential international SMS termination charges and whether regulation in some Member States and not in others reduces or adds to any such distortions;
- Whether any detriment identified is likely to endure, given market developments that can be reasonably foreseen.

A.4.10 Mobile origination

Mobile origination used to be a candidate for regulation (Original Market 15). However, in most Member States the market is oligopolistic in nature, some way removed from the world of fixed networks where some markets remain dominated by the incumbent. It is debatable whether these markets are always competitive in an economic sense. Nevertheless, very few NRAs found SMP when the markets were first analysed, unsurprisingly so, given the extremely high burden of proof required to establish collective SMP. Most NRAs appear to have concluded that any attempt to establish collective SMP is more or less doomed to fail.

Nevertheless, despite the unpromising history, several stakeholders called for regulation in this area.

A.4.10.1 Mobile origination for national telephony

The proposed market

The market is the original Market 15, call origination from mobile networks. It is a service that MNOs supply to themselves and to any MVNOs hosted on their networks.

The stakeholder case

MVNOs are now common in many national markets. However, it is arguable that they have not made a significant contribution to increased competition everywhere. In some Member States they have little or no market share. In others, the terms on which they have been able to gain access

allow for survival but not for significant undercutting of the prices charged by the host network operator. BEUC reported that in the Czech Republic, the network operators were all sister companies of foreign MNOs who all charged significantly less in their home markets. There is good reason to believe that prices are not yet close to the competitive level throughout Europe, despite the difficulty in establishing SMP, either at retail level or in Market 15. This is consistent with the relevant economic theory which finds that in oligopolistic markets there are often multiple equilibriums whereby access may be offered either at cost, or at a high price or not at all. In consequence, MVNOs may have little economic room to compete vigorously.

Moreover, some stakeholders argue that consumers are increasingly buying telephony in bundles that include both fixed and mobile services. If that form of supply were to predominate in future, any retailer that does not have access to a mobile network would have to withdraw from the market. This raises the possibility that the imperfect competition currently observed in some mobile markets would be transferred to all retail services in future.

Analysis required in Phase 2 of the project

While these arguments need deeper consideration before they could be close to constituting a strong case for intervention, it is worth re-emphasising that there appears to be no practical way to deal with them under the Framework. It is an odd state of affairs that the Framework is capable of dealing with ineffective competition in mobile ancillary services (see below) but not with the potentially much more significant problem of ineffective competition in basic national telephony (including, potentially, fixed telephony).

In the light of this analysis, it does not seem worthwhile to spend material effort during Phase 2 in considering whether or not the Three Criteria are satisfied. However, it would be worthwhile to consider an analysis of consumer detriment resulting from allegedly high mobile prices and, in particular, whether any such detriment is tending to decrease over time. It would be beyond the scope of this Project to assess whether or not retail prices are cost-oriented. Nevertheless, it might be possible to review comparative metrics of national prices and other possible indicators of the state of competitiveness of retail markets. This could provide a view of whether or not the stakeholder view that a problem exists is justified or not, albeit that it appears impossible to solve it under the Framework.

A.4.10.2 Mobile origination for ancillary services

The proposed market

For the purposes of analysis, a working definition could be mobile origination to non-geographic numbers from individual networks. The significant point for market definition is that, on the basis of evidence from consumer surveys, retail competition between mobile service providers typically focuses on high-visibility services, especially calls, subscription charges and (in some Member States) subsidy of handsets. The surveys have shown that other (ancillary) services barely figure in consumers' choice of service provider. It is not surprising therefore that retail prices of ancillary services are often very high by comparison with the costs of provision. Once they have made their network choice, consumers are locked in to the network for any ancillary services they use, as it is at best inconvenient, and at worst impossible, to access the service in any other way. There is a de-factor near-monopoly for origination for ancillary services. Roaming is one such set of services with these characteristics. International calls and SMS and calls to non-geographic numbers are others.

The precise market definition would need care and might depend both on national retail tariff principles, on which services are included within popular bundles. In a typical case, the retail

revenue is shared between the consumer's network operator, the mobile service provider (if different) and the provider of the ancillary service. The precise split no doubt varies. But a typical arrangement is for the service provider to receive its standard mark-up for calls while the network operator retains a wholesale origination mark-up that may sometimes exceed by a significant margin the retail mark-ups of the respective service providers.

The stakeholder case

Consumer groups complain about high retail charges for mobile ancillary services and, sometimes, consequential bill shock. Third party providers of mobile ancillary services complain that they suffer price discrimination in comparison with similar services provided by network operators. In effect, network operators are said to be charging a high origination mark-up that rises further in the case of calls to third-party ancillary services. Such behaviour tends to suppress competition amongst providers of ancillary services.

Pros and cons

In effect, the logic expounded by stakeholders leads to the definition of aftermarkets for such services, at both retail and wholesale levels, segmenting origination services according to whether the retail service in question amounts to basic national telephony or an ancillary service of some kind. As far as the aftermarket is concerned, the first and second criteria appear to be satisfied, at least for as long as it is not practicable for consumers to bypass the high retail prices charged by their service provider.

The (revised) third criterion needs closer consideration. There appears little problem with satisfying the original version of the third criterion. The prospects of applying price control under competition law for such ancillary services do not seem high. The second and third legs need consideration.

SMP regulation is not the only possible route under the Framework. Some NRAs have taken advantage of their powers to regulate tariff principles to require service providers to adhere to rules on how the retail charge is constructed. Depending on how this is implemented, this could both improve transparency for consumers and reduce problems arising from discrimination.

Consumer detriment also needs consideration. While irritation at experiencing apparently very high prices for ancillary services is natural, the aggregate amounts spent on such services may nevertheless constitute a small part of a typical consumer's mobile spend.

Analysis required in Phase 2 of the project

The aspects to be considered are:

- Do there appear to be sufficient grounds to define an aftermarket?
- What proportion of retail mobile revenue is accounted for by these ancillary services (possibly low)?
- To what extent do high prices suppress consumption of these services?
- To what extent do high origination mark-ups deter potential retailers from introducing new services?
- Can the problems of high prices, lack of transparency and discrimination be dealt with effectively using other NRA powers under the Framework.

This would in particular require review of actions taken under these headings by certain NRAs.

A.4.11 Markets related to increasing use of 'over the top' applications

This section examines the case for defining markets for data interconnection. Two issues are examined. The first concerns market power which may be used by the terminating network operator to block or degrade 'over the top' applications for Information Society services. The second concerns suggestions of under-investment by terminating network operators as a consequence of inability to recover from Information Society SPs contributions applications.

A.4.11.1 Data termination markets

The proposed markets

The relevant markets are the markets for origination and termination of data arising from over the top applications on individual networks.

The stakeholder case

Some stakeholders claim that their applications are blocked (or seriously degraded) on particular networks because they are perceived to compete with services offered or promoted by the NO itself. For example, consumer use of VOIP reduces traditional telephony revenues.

Popular applications such as YouTube or Facebook are unlikely to experience such treatment. Too many consumers would switch network and the blockage would be unprofitable. However, applications that were only of modest popularity might expect this experience, especially if the services undermined NO revenues.

Pros and cons

The argument for an individual network definition is that, to be viable, the target customer base for applications must be as large as possible. Customers may switch in response to non-availability of a popular application but will not switch in response to the non-availability of the great majority of applications.

On the other hand, inability to serve customers of one single network is unlikely to make or break a business case if others can be served. Therefore, there is an argument that only an individually dominant network, or collection of networks that are dominant together, could effectively exert market power. This undermines the case form individual market definition.

The following section considers the other side of the coin, whereby network operators may be unable to recover their investments as a consequence of market power of certain Information Society SPs. This further undermines the case for the market defined above.

Moreover, consumers use data services for many different purposes, notably including web browsing and email. Use of over-the-top applications accounts for only a proportion of the data traffic. In only a proportion of the cases, does the NO have a commercial incentive to block. And in a proportion of those cases, the Information Society SP has sufficient countervailing buyer power to make a blocking strategy ineffective. The markets introduced above seem likely to account for only a small proportion of the data traffic on any network, the rest of which would be subject to competitive forces.

The market so defined is a form of aftermarket. If the definition were broadened to include all data flows, on the basis of the arguments above, a definition confined to individual networks would not be viable.

Analysis required in Phase 2 of the project

Further consideration is required of whether the definition of an aftermarket in this case would be consistent with competition law methodology. If it is consistent, then the First Criterion is easily satisfied. The Second Criterion hinges in practice on the expected extent of any such blocking. The key points of the (revised) Third Criterion are whether there is sufficient consumer detriment to justify regulation and whether there are alternative ways of dealing with the issue (*e.g.* a published BEREC Opinion).

A.4.11.2 Data transit markets

The proposed markets

The relevant markets are the markets for data interconnection between a pair of network operators.

The stakeholder case

A number of stakeholders pointed out that applications and services which sit 'over the top' of electronic communications services often create huge demands for network capacity and generate a considerable amount of revenue for the service providers. (There is an enormous range of such services including the well-established examples of video services, electronic banking and unmanaged VOIP.) Yet the providers of such services make no contribution towards the costs of the capacity of the networks to which end-users are attached. Many of the service providers appear to dominate their own service markets. To the stakeholders, it seems unfair that they are regulated while the service providers are not.

While the network operators would naturally wish to share in the profits of services run over their networks, transfer of profits from one set of stakeholders to another is not a sufficient reason to consider regulation. One issue that needs to be addressed before regulation could be justified is whether consumers are suffering any detriment. The only possible argument in this context seems to be that network operators might invest more in upgrading and extending their networks if they were able to share in the profits of the over-the-top services. Without careful investigation, this argument is speculative although it cannot be dismissed as totally implausible.

As discussed in the previous section, at first sight, the terminating network operators appear to enjoy market power since their networks represent a bottleneck to the delivery of services to their customers. However, blocking of the most popular and (presumably) profitable applications is hardly likely to be a successful commercial strategy. In practice, terminating network operators may have no option but to accept the ever-increasing customer usage of such applications with consequential increases in demand for network capacity.

That is not to say that network operators are powerless to manage their problem. First, they can recover investment costs from their customers. They can and do segment their tariffs so that their customers with heavy data usage pay more for premium access than customers with lighter data usage. Second they can cache popular content near to the customer, minimising the load on their trunk network.

Neither of these techniques allows network operators to capture any of the profits enjoyed by the application providers. But they do allow them to alleviate their investment problem. So the question to be addressed is whether this is enough to allow consumer interests to be protected or whether a problem remains.

Pros and cons

The case for regulation appears hugely problematic. If there is indeed consumer detriment (in the form of network under-investment), the source of the problem is that network operators cannot generally obtain contributions from the service providers that would fund additional investment. The service providers are in general providing Information Society services rather than electronic communications services and are consequently outside the scope of regulation under the Framework.

What might be possible under the Framework in some circumstances would to regulate pairs of data interconnection agreements so that the network which was the net exporter paid a net interconnection fee. (Commercially negotiated agreements may have this effect or they may not.) This does not really solve the problem but simply shifts it elsewhere. If no data traffic originated outside Europe, then the problem would eventually be shifted back to the networks that are net originators of data. By such a mechanism, the service providers could, in effect, be made to contribute not only to the extra capacity required in the originating network but that required in transit and terminating networks. However, in the case of significant downloads of non-European content, the “hot potato” could be shifted within Europe only as far as the last European operator before the connection to the global Internet.

In any case, network operators generally have a choice of transit operator. Data transit markets have not previously been serious candidates for regulation – and for good reason. To regulate the relationship between transit and terminating operator, it would probably be necessary to find an argument that any transit operator is able to exert market power over a terminating operator where the transit operator is a net exporter of data to the terminating operator. Strong arguments in favour of such a proposition are not immediately apparent.

In short, a case has not been made yet that there is significant consumer detriment. It is not clear that it is possible to define a relevant market under the Framework where a company other than the terminating operator has SMP. Even if these steps (and other elements of the Three Criteria) can be satisfied, it is not clear that a remedy can be imposed which is effective and does not give rise to collateral damage.

Analysis required in Phase 2 of the project

This case appears so unpromising that it is not recommended for a lot of effort during the second phase of the project. However, it would be appropriate for the second phase team to review the analysis above and consider whether any of the arguments are doubtful. In summary, the main points of argument above were:

- Significant consumer detriment cannot be established;
- There is no prospect of direct regulation of the Service Providers under the Framework;
- The data transit market probably does not satisfy the Three Criteria;
- There is no strong argument for defining pairwise transit markets in which a net exporting operator might be found to have SMP;
- The remedy would at best be only partly effective. To some extent, the burden might be shifted indirectly to the providers of Information Society services who might be considered responsible for its development. But it would also be shifted to some extent from terminating operators onto transit operators that do not have end-users from which to recover their additional costs.

A.5 Conclusion and main scenarios

This paper is aimed at setting the stage for the future steps of a research project that will have to recommend a revision of the list of relevant markets. We have taken the liberty to adopt a slightly broader approach, by looking at the competitive dynamics of current e-communications markets, and at the Three Criteria Test that underlies the list of relevant markets. In this final section we draw some conclusions that should hopefully inspire the subsequent steps of the research.

Our paper shows that **market definition is not an easy exercise**, especially due to ongoing convergence between services and segmentation of end-users: thus, a pre-selection of markets such as the one included in the Recommendation cannot be taken at face value, and should be coupled with in-depth competition assessment. Currently, the methodology adopted to identify and analyse relevant markets lacks a sound justification and can be applied in arbitrary ways, and therefore, it can lead to arbitrary outcomes. Thus policy makers maintain a high level of discretion when defining markets.

However, **the list of relevant markets has been, and will continue to be useful for NRAs and also for the Commission**, which uses it as a default scheme that enables monitoring of the implementation of the framework over time. The list might have been even more useful in the first ten years of implementation of the framework, since it made the application of the framework easier especially for those NRAs that had little experience with competition tools: this justifies the introduction of an embedded bias in the implementation of the framework, based on which NRAs that stick to the pre-selected markets do not have to prove that the Three Criteria are met. Today, after a decade of implementation, and also in light of our discussion of the increasingly complex nature of competition in e-communications markets, perhaps the time is ripe to abandon this choice and restore the need to prove that the Three Criteria are met, regardless of whether the market identified belongs to the list, or not. During our discussion with the research team it has emerged, convincingly, that the number of relevant markets should be small and somewhat flexible to account for (i) convergence; (ii) technological progress; and (iii) for the fact that the approach of delineating markets often tries to eliminate symptoms at a local level (namely within the narrowly defined market where an abuse of market power is established), but tends to lack a welfare diagnosis that looks at the root cause of the problem[423].

This led us into a discussion of the **substance of the Three Criteria Test**. The criteria can be considered as the main distinctive feature of the framework compared to *ex-post* competition law enforcement. Accordingly, it is important that they are placed in a more central role in the framework, and also that they are refined in a way that puts them in line with economic theory. Our discussion has led to the conclusion that all Three Criteria might deserve substantiation, and in particular that the third criterion should be revised in order to make it useful at all. Our current proposal revises the third criterion to transform it into a cost-benefit analysis of an *ex-ante* regulatory intervention, based on a careful assessment of whether *ex-ante* regulation can produce better outcomes than *ex-post* competition, for example by removing undue exploitations of first mover advantages in very fast-moving markets; and at the same time, that *ex-ante* regulation does not produce undesirable and uncontrollable side effects such as stifling investment incentives for the SMP payer, for new entrants, or both.

[423] See memo by Paul de Bijl.

In addition, there is reason to believe that SMP assessment should be based on a careful analysis of inter- and intra-platform competition, buyer power exerted by players located at different layers of the value chain and other, often neglected sources of competitive pressure. Two suggestions that have emerged from our research are that (i) SMP assessment could be made dependent on a general set of guiding principles, such as preservation of innovation incentives, consumer choice, etc.; and (ii) that SMP assessment could be made more dependent on an assessment, by the NRA, of the likelihood that the alleged SMP player successfully engages in anticompetitive conduct.

Finally, **the selection of remedies should be more in line with "better regulation" principles**, *i.e.* NRAs should not be automatically led towards the imposition of the full menu of remedies, but should provide a proof of the proportionality of the remedies imposed. A useful reference in this respect could be the impact assessment required for an imposition of functional separation under the new Article 13a of the regulatory framework, introduced in 2009. This article requires NRAs that wish to impose functional separation as an exception al remedy to provide, for example, a reasoned assessment that there is no or little prospect of effective and sustainable infrastructure-based competition within a reasonable timeframe; an analysis of the expected impact on the regulatory authority, on the undertaking at hand and on the e-communications sector as a whole; and an analysis of the reasons justifying that this obligation would be the most efficient means to enforce remedies aimed at addressing the competition problems/markets failures identified.

This leaves us with a number of choices to make, which in our opinion should be addressed altogether, by adopting a holistic view of the instruments adopted in the regulatory framework. To summarize, we see the following alternative options for each of the steps of the analysis identified here:

- *List of relevant markets* can be made under-inclusive; or over-inclusive;
- *The Three Criteria Test* can:
  - Remain as it is or feature a revised third criterion (either based on a rebuttable presumption, or on a cost-benefit analysis test);
  - Remain as is or be placed more at the centre of the regulatory framework.
- SMP assessment can:
  - Remain as it is today; or
  - Be made more dependent on the a general set of guiding principles, such as preservation of innovation incentives, consumer choice, etc.; and/or
  - Be made more dependent on an assessment, by the NRA, of the likelihood that the alleged SMP player successfully engages in anticompetitive conduct.
- The selection of remedies can:
  - Remain as it currently is today; or
  - Become more subject to an impact assessment and a proportionality test.

Below, we outline four main scenarios that we argue would deserve discussion in the months to come.

A.5.1 Possible scenarios

Table 1 below provides a default scheme for the identification and assessment of alternative scenarios, intended as combinations of options. As clearly emerges from the table, there are several combinations of the available options, which could potentially become the subject of a more accurate discussion during the future study for the European Commission. Below, we select four possible scenario that might deserve future analysis.

A.5.1.1 Scenario one: status quo, plus a new set of general principles

The underlying idea of this scenario would be that in order to reconcile the application of the framework with its overall policy goals, the NRAs should be asked to include in their identification of SMP and remedies an assessment of how this regulatory intervention complies with a number of general principles. A preliminary list of such principles (which we owe to Paul de Bijl) includes the following:

- *Effective consumer choice*. This principle is closely related to SMP and competition issues, and could be usefully referred to in the analysis of mobile markets, both in origination (given consolidation in mobile markets), and termination markets (where SMP assessment is almost useless since all players end up having SMP in the whole termination of calls on networks they own). The principle of effective consumer choice could also lead to devising new power of the NRAs to act in case of 'confusopoly', *i.e.* cases in which the business strategy of operators at the retail level (especially in the case of competing bundles) makes it impossible for consumers to compare offers. Again, it would be difficult to implement this option under the current framework – accordingly, this should be introduced either as an additional piece of regulation, or in the future revision of the regulatory framework;
- *Openness*. This principle implies that openness and interoperability reduce barriers to entry in the market and minimize the possibility of foreclosure. Openness is also said to allow for an explosion of innovation, unrestricted by vested commercial interests.[424] However, it must be recalled that new markets in their infancy sometimes feature more closed architectures;
- *Elimination/reduction of transaction costs*. Take the example of mobile call termination, where underlying marginal costs are close to zero anyway. Why not fix termination rates at zero? This would eliminate a big chunk of the regulatory and lobbying efforts and, at the same time, would be close to a welfare-maximising outcome. It would make life easier for operators as well, although some of them would of course be worse off due to the loss of rents[425];
- *Technological neutrality*. Market developments (such as technological convergence due to the application of the Internet Protocol) calls for technologically neutral regulation. It helps policy makers to prevent that static, segmented market definitions conflict with the reality of convergence and technological progress. The market evolves so rapidly that "market boundary assessments will always lag behind"[426]; and
- *Regulatory simplicity*. Ease of implementation and reduction of transaction costs can also be interpreted as the application of a general principle of avoiding undue complexity in the framework, by selecting remedies that can be more effectively enforced and implemented.[427]

A.5.1.2 Scenario two: status quo + a revised Three Criteria Test

In this scenario, the current implementation of the framework would be supplemented by a revision of the Three Criteria Test, aimed at putting it more at improving its overall application.

As already explained above, there are at least two possible ways of improving the existing third criterion:

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424 On the possible need for access regulation in a situation of facilities-based competition and on the benefits of openness for bottom-up innovation, see Viktoria Kocsis & Paul de Bijl, (2007), "Network neutrality and the nature of competition between network operators", International Economics and Economic Policy, Springer, vol. 4(2), pages 159-184, August.

425 See De Bijl et al. (2005), "Interconnected Networks", TILEC Discussion Paper 2005-2007, http://ssrn.com/abstract=871391.

426 See De Bijl and Peitz, Telecommunications Policy 32(11), 2008, on the need for adapting the regulatory framework due to convergence and technological progress.

427 Gruber, H. and P. Koutroumpis, *Competition enhancing regulation and diffusion of innovation: the case of broadband networks*, Journal of Regulatory Economics, April 2013, Volume 43, Issue 2, pp 168-195.

- *Scenario 2a* would imply that the third criterion is revised to put it in the form of a rebuttable presumption. This means that the first two criteria remain unaltered, whereas it is clarified that where the first two criteria are met, it can be assumed that the third criterion is also met;
- *Scenario 2b* implies that the third criterion becomes a sort of cost-benefit analysis test aimed at checking whether *ex-ante* regulation would provide more benefits than costs, including externalities, spillover effects; and that *ex-ante* regulation would have more net benefits than *ex-post* competition policy. This would only be possible under specific guidance given by the European Commission.

A.5.1.3 Scenario three: over-inclusive list of markets, but heavier burden of proof for NRAs in market definition, SMP and remedies

Scenario three entails that the balance between the need to preserve the ease of implementation of the framework and the need to align it with more sound economics is struck by retaining in the list all markets that would comply with the Three Criteria Test in a "minimum" number of Member States. This pre-selection of markets, however, would not anymore exempt NRAs from the obligation to demonstrate that at national or local level, the market identified complies with the Three Criteria: however, for markets already deregulated, a presumption should exist in favour of not analysing these markets further. Likewise, NRAs would need to prove that SMP is found only whenever a concrete risk of abuse can be demonstrated. Finally, NRAs would need to provide evidence of the proportionality of the remedies chosen.

A.5.1.4 Scenario four: under-inclusive list of markets, but easier burden of proof for those markets in SMP assessment and remedies

One alternative scenario would entail that the Commission decides to remove from the list of relevant markets all those markets for which compliance with the Three Criteria is not easily presumed in all Member States. For those markets (e.g. termination markets), more market-specific guidance would be given to NRAs in order to facilitate their regulatory activity, and possibly achieve real convergence in SMP assessment and the selection of remedies.

For all other markets, the Commission would simply provide guiding principles to NRAs on how to approach market identification, without providing a list. Under these conditions, there might be a greater risk of divergence in regulatory practices than under the current framework. This is why this scenario would probably have to be combined with Scenario one, in which guiding principles are used to guide NRAs in their *ex-ante* regulation. And it is also easy to combine with the provision, by the Commission and BEREC, of a preliminary scheme that identified already black, white and grey areas. Also, the Three Criteria would become more central in the regulatory framework, as market definition by NRAs would have to be guided essentially by those principles.

All in all, this scenario would entail an increase in the workload of NRAs for each relevant market (with the exception of the few markets retained in the list): at the same time, such a scenario might lead to a more precise application of competition law tools to e-communications markets.

Table A.5.1 – List of alternative scenario

Item	List of relevant markets			Three criteria test *Third criterion as*				Additional guidance		SMP assessment		Remedies for mkts in the list	
Options / *Scenarios*	*As it is*	*Over-inclusive*	*Under-inclusive*	*As it is*	*Must prove also for markets in the list*	*3rd crit. as presum-ption*	*3rd crit. as cost-benefit test*	*Guiding principle*	*Geog. segmentation*	*As it is*	*Likely abuse?*	*As it is*	*Impact assessment*
Baseline *no policy action*	▲			▲						▲		▲	
Scenario 1 *status quo + set of general principles*	▲			▲				▲		▲		▲	
Scenario 2a *Status quo + revised Three Criteria Test*	▲						▲			▲		▲	
Scenario 2b *Status quo + revised Three Criteria Test*	▲					▲				▲		▲	
Scenario three *Over-inclusive list of relevant markets + heavier burden of proof*		▲			▲		▲				▲		▲
Scenario four *Under-inclusive list of relevant markets + lighter burden of proof for selected markets*			▲	▲				▲	▲	▲		▲	

Appendix 4 Business review

We conducted a series of interviews with business users across the EU in order to verify whether the recognised themselves in the description of business demand as we present it in chapter 8. We interviewed a consultancy firm, a police organisation, an organisation of national Courts, two supermarkets and global multinational in food and household products.

Consultancy firm

- Organisation of:
  - > 500 employees;
  - 24 offices globally (16 in the EU);
  - two central data centres and offline back-up data centres.
- We demand a connection – the connectivity services we do in house;
- The head office is also the data centre. It is connected with an uncontested symmetric fibre line and a second copper line as redundancy (a second fibre line from the same operator would have has little function: if one fails, the other is likely to fail as well – a second fibre line from the alternative operator is too expensive). Our main assurance for being online is that have within the hour repair times;
- The 2nd main office (in another country) is similarly connected, but using a local operator;
- While selecting a supplier we choose one that has its own network running to our datacentres. This then also determines the operator we choose for the other offices (but for these locations we don't require own infrastructure) but the offices have a back-up line from another operator;
- Other offices are connected with a medium to high bandwidth connection with low contention ratio's (1/8). The back-up lines have a similar contention ratio;
- Other quality aspects that we value are availability, download rates, contention ratios, repair time, and business grade helpdesk (not 24/7 that is too expensive). We have one service level agreement for all connections in the contract;
- We buy voice services from the same supplier as the broadband services. Phone access is on the basis of Ethernet (SIP environment). We also maintain a traditional line for the alarm system and for the electronic payment in the cafeteria;
- Having a one-stop-shop for all the connectivity services is important otherwise every complaint results in a blaming game between operators.

- All in all, the description of the mid-range user applies very much to us.

Police organisation

- Organisation of:
  - 60-70 thousand employees;
  - 800 locations nationally;
  - 50 are critical, 1 national datacentre, 6 regional datacentres, 24/7 operational. Other locations are not so critical and not 24/7 operational.
- We demand a connection – the connectivity services we do in house;
- The data centres are connected with an uncontested symmetric fibre line and a second fibre line for redundancy (from a second operator);
- These lines have an increased service level in terms of availability, repair times, symmetric up- and download rates;
- The 50 critical locations are connected with broadband lines with low contention ratios and for the rest similar service levels as the uncontested fibre lines;

- The 750 less critical locations are connected on the basis of a mass market type broadband connection;
- While selecting a supplier we choose one that has its own network running to our datacentres. This then also determines the operator we choose for the other offices;
- We buy phone services from a different supplier than the broadband services. Phone access is on the basis of PSTN and ISDN and we may move to Ethernet (SIP environment);
- Having a one-stop-shop for all the broadband connectivity services is important otherwise every complaint results in a blaming game;

- All in all, our profile differs from the ones given by Ecorys in the sense that we rely more on mass market products.

Public Courts

- Organisation of:
  - > 10.000 employees;
  - 10 central locations, each having multiple sites;
  - A central data centre and a back-up data centre;
  - Service and information windows inside city halls;
- We demand a full package comprising of connectivity products and communication services;
- We value that the realised quality of the product reflects the promised quality (here quality is defined in terms of availability, download rates, Jitter, and so on). I.e. that the offers are transparent;
- The need for transparency is not only related to a potential nuisance at times that quality is below level, but it is also about investment decisions: if jitter is too high in your fully digital environment, the interconnectivity with e.g. old-fashioned fax systems may fail. The transparency about jitter is essential for making a full switch to a digital environment or (if jitter is too high) maintaining some traditional lines in case the old-fashioned fax is still business critical;
- Having a one-stop-shop for all the connectivity services is a blessing. Surely we don't want to split the service from the connection while tendering because if you do and there is a problem somewhere, you already know that both parties are going to blame each other and we as end-user will be left un-served.

- All in all, the description of the mid-range user applies very much to us (except that we have much more then 50 employees).

Multinational

Procurement staff within multinational firms (in chemicals, energy or nutrition) find it difficult to specify their own need for connectivity in terms of the connections. They rather define it in terms of functionality and outsource the details of the entire IT service and the underlying technology to specialised companies. Sometimes these are part of the holding of a telecom operator (e.g. Getronics being a subsidiary of KPN in the Netherlands) and sometimes they become a telecom operator (e.g. CapGemini has acquired a telecom-license in the Netherlands). We refer to these as IT integrators.

IT integrators

Interviews with one of these specialized IT integrators revealed the following feedback:

- The distinction between residential and small business is indeed often no more than a chamber of commerce number in the application; they often take the same services;
- The focus in the profiles is on broadband access but many individuals and companies still take PST/ISDN telephony as a separate service, not everyone has switched to VoIP. In addition,

also access electronic payment systems (EPS) and emergency services are important for small and medium sized business, also those services are not always delivered via broadband;

- SMEs often make use of services offered by third parties such as hosting, email, and cloud services. Companies with less than 50 employees often outsource the intranet as well. In all these cases a secure access is important in those cases;
- Not many companies require a 24/7 helpdesk but settle for support during business hours, often because of the price but also because they have no people themselves available outside office hours;
- A second low speed connection as back-up only makes sense if the networks are truly separate. In that case a 2nd provider is more reliable. The probability that the provider has problems is greater than the probability that the connection goes out. However, the probability that the in-house router fails or that power supply fails is significantly larger than the probability that the broadband connection fails. Only big companies and corporates have separate routing, all other companies are (like a private individual) connected to a single cable. In those cases it is an option to take a mobile backup connection in order to keep critical issues going (eg EPS and alarm);
- The requirements for functionality are also highly dependent on the type of business. A bank branch / ATM shuts down completely when the connection is gone; similar for a retail outlet if the electronic payment system fails. Only a construction site probably has no problems (but I am not sure about that);
- Finally, business demand is very inelastic. A business user would never switch just to save a 50 euro's per month. You can lose that in only one hour of being disconnected.

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