

## BEREC-RSPG report on market definitions

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### The impact of technological and market evolution on market definitions in electronic communications: the case of spectrum

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## 1. Overview

In 2008, discussions<sup>1</sup> within the ERG-RSPG joint WG led to identify three main topics, which were preliminary selected as focus areas. These were market definitions, transitional issues and the issue of dominant positions in spectrum. This report deals with the first topic – market definitions and how these can be affected by spectrum issues, while the other two have already been the subject of published reports.

It is against this background that the WG, in the light of the experience gained by a number of NRAs through the market definition and analysis process, has produced this report on the impact of technological and market evolution on market definitions with specific regard to the case of spectrum.

In particular, the report addresses issues of market definitions in relation to infrastructure competition and service substitutability<sup>2</sup>; it examines, within that context, the evolution of fixed wireline networks and spectrum<sup>3</sup> - based networks (such as fixed and mobile networks) and how this could impact market definitions, particularly for broadband markets.

The WG has worked with a view to: a) highlight factors that NRAs have used, within the context of market definitions; b) build on the experience of NRAs which, in the definition of BB markets, have considered amongst other developments the evolution of mobile broadband and decided whether to include or not mobile BB in their market definition.

## 2. Background on market definition

The Explanatory Note of the Recommendation 2007/879/EC<sup>4</sup> and the Recommendation itself provide indications on the substitutability of wireline and wireless services and networks focussing on the (demand and supply) substitution between fixed and mobile services. At the time of the issuance of the Recommendation, [i.e. in 2007] it was concluded that fixed and mobile cannot be seen as substitutes products and networks, thus belonging to different markets. However, as pointed out in Explanatory Note, the definition of

<sup>1</sup> See also RSPG08-242 for a broad recall of the discussion.

<sup>2</sup> Inputs for the report were described, inter alia in [ERG \(08\) 48](#) Final: 1) assess whether we have reached a state of infrastructure competition and what effects this might have; 2) Impact on competition from substitution possibilities between spectrum-based delivery and wired infrastructures (e.g. wireless access vs. fixed copper / fibre); 3) Is there a need to revisit market definitions? 4) Are these services substitutes?

<sup>3</sup> Communication on “*A market-based approach to spectrum management in the European Union*” of 14 September 2005, COM(2005) 400 final.

<sup>4</sup> 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, OJ L 344, 28.12.2007, p. 65 (the “Recommendation”).

relevant markets can change over time as the characteristics of products, services and networks evolve and the possibilities for demand and supply substitution change.

In this respect, taking for granted the existing recommended procedures and that each NRA will duly apply them, the group has produced some additional inputs which may help NRAs in the process of evaluating, in their national markets, the state of infrastructure competition between wireline and wireless networks and what effects this might have in terms of market definition and analysis.

Although no definitive conclusions on the substitutability analysis are drawn at this early stage, this section addresses issues of substitutability and complementarity of wireline and wireless services and networks<sup>5</sup>, paying particular attention to broadband markets.

It is worth to recall that the extent to which the provision of a service or a product in a specific area constitutes the relevant market depends on the existence of competitive constraints on the price-setting behavior of the provider(s) concerned. The two main competitive constraints to consider in assessing price-setting behavior on the market are demand and supply-side substitution<sup>6, 7</sup>. Substitution analysis should be carried out in the first place to define retail markets and secondly to define the corresponding relevant wholesale markets<sup>8</sup>.

## *2.1 Substitutability analysis for market definition<sup>9</sup>.*

With regard to demand substitution of fixed and mobile broadband retail services, the question is whether a relative price increase for fixed broadband services is not profitable, since a sufficient amount of fixed broadband retail customers would in response readily switch to broadband services supplied across a mobile network. A first hypothesis about substitutability can be formed based on prices and product characteristics. However, the value of some product characteristics, in particular mobility, might be difficult to evaluate. Evidence from surveys, price reactions or elasticity estimates might therefore be necessary<sup>10</sup>.

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<sup>5</sup> Including fixed wireless access (FWA).

<sup>6</sup> For detailed information on market definition procedure in electronic communications see point 38 et seq. of the Commission Guidelines (COM 2002/C/165) on market analysis and the calculation of significant market power under the Community regulatory framework for electronic communications networks and services, OJ C 165, 11.7.2002, p. 6.

<sup>7</sup> Another source of competitive constraint on an operator's behavior is potential competition. Its assessment is outside the scope of this report.

<sup>8</sup> Within this document, the focus is on service substitutability (for instance, mobile vs fixed broadband) unless otherwise stated

<sup>9</sup> In the experience of several NRAs, when assessing the markets for mobile termination, the fact that some MNOs – especially latecomers – can only use higher frequencies that are less efficient in terms of coverage and building penetration may lead to taking into consideration different coverage costs. However, this is a specific case and does not necessarily cover or exclude other cases.

<sup>10</sup> However, while price is very important in the substitutability analysis, it also needs to be examined whether there are other factors which should be taken into account in carrying out substitution analysis.

With regard to supply substitution, the question is whether other network providers can readily enter the relevant market in a speedy manner in response to the relative price increase. NRAs should assess whether mobile network operators would be able to provide fixed broadband services in short term and without incurring significant additional costs. This is most likely not the case and, hence, the supply substitution test would be negative.

The existence of any demand and supply substitution can be assessed applying the 'hypothetical monopolist test' also known as 'SSNIP' (small but significant non transitory increase in price); NRAs should consider retail and wholesale customers reactions to a permanent price increase of between 5 to 10 %.

In particular the approach to substitution analysis at retail level might (non-exclusively):

- i) identify products at retail level (i.e. DSL connections, CATV, Mobile BB);
- ii) assess technical characteristics and in general assess preference and perception of products characteristics which can be revealed through a customer survey (for example, a query could cover issues such as capacity/speed/reliability in terms of download/upload, use of secure applications, double/triple play offers, contractual terms);
- iii) measure price differentials and price reactions as well as own- and cross-price elasticities.

This assessment should be carried out in a forward-looking perspective in order to take account of expected technological or economic developments over a reasonable horizon.

With regard to the definition of BB wholesale markets, the substitution analysis at the wholesale level should be based on a sufficiently detailed and robust forward looking analysis with regard to the products which are to be included in the relevant wholesale market. In the assessment of substitutability of wholesale BB services, technological developments appear to be a key element which may lead to changes in the market structures and consequently in the definition of the relevant market. The definition of the BB markets at the wholesale level implies that NRAs should assess demand and supply substitutability in the light of the prediction on the continued substitutability of fixed and mobile broadband services at retail level and NGA roll out.

## *2.2 Criteria to consider in the substitution analysis*

In defining the relevant product market, NRAs might take account of the following criteria:

- the recent past. In certain cases it is possible to analyse evidence relating to recent price variations, for example in terms of substitution between fixed and mobile broadband or in terms of the customer demand of both services;
- the results of specific studies. Elasticity of demand for a product can be assessed by conducting econometric and statistical tests. It is also useful to assess the geographic market in the light of factors which impact on local preferences;
- the views of customers and competitors. The public consultation and ad-hoc hearings with customers and operators could help gathering evidence and estimating their reaction in the event of price variations within the geographic area;
- consumer preferences. Purchasing habits of customers on the relevant market could be contrasted with those of other customers on a separate geographic market in so 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 differentiation. A distinct group of customers may constitute a narrower, distinct market when such a group could be subject to price differentiation;
- the characteristics of the product, taking into account parameters as upload/download rates, latency, quality of service, etc. In this context, the key assumption to validate is whether mobile technologies (including, for example, 3,5 G (HSPA), WiMAX and 4G (LTE)) could represent a real competitor to fixed wireline broadband. Although it may be difficult for these networks to reach the same bit rates and connection speed levels of fiber networks or modernized CATV, mobility might command a premium over speed for some users, especially the “mobile native” or mobile-born users. NRAs at the national level will have to evaluate available data sources to check the geographical availability (coverage and capacity) and actual penetration of fast mobile networks<sup>11</sup>. With regard to BWA networks, their substitutability with wireline networks will have to be evaluated by NRAs.
- depending on what frequencies are being used for, different frequencies may also provide different qualities of service. As an example, take in-house coverage. Different frequencies may have different characteristics in this regard. Then the degree of substitution among them may be diminished, and they may not be adequate substitutes in providing services for all end users. However, it may be

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<sup>11</sup> However, the substitutability assessment of fixed and mobile broadband may focus also on other factors such as the functional and pricing characteristics.

possible, at a price, to find a technical fix, such as the use of femtocells<sup>12</sup>. Secondly, it is widely recognised in competitive analysis that, for a constraint to be imposed on the ability of firms, or (in this case) the owners of an asset, to exercise market power, it is necessary not that every customer be willing and able to switch to another source of supply, but that there exist a sufficient number of switching customers to make it unprofitable for the suppliers to raise their price. These customers may knowingly be switching to a poorer quality and lower-priced service, but provided they do so the power of any supplier is constrained.

- EC's comment letters on NRA's market analyses as well as the Guidelines on market analysis obviously represent a useful source of information for NRAs.
- It should be verified whether widespread geographical availability might enable potential switching between the two products on a sufficiently large scale.
- Finally, in order to correctly assess the substitutability of two different products and with particular regard to fixed-to-mobile substitutability, account should be taken of the different product functionalities used by the end customers. Examples of this come from the analysis of product characteristics, penetration (consumption) and technological development (in terms of network availability and performance). Each NRA, by looking at indicators such as prices, geographic availability, overall quality, product functionality, service availability, download/upload ratio, actual speed vs. nominal speed, form factor ("fixedness"; speed; screen size, earphones, etc.), cost, practicality of use (ie battery life, restriction to use, etc.), latency, network overbooking, package loss, service continuity, customer take-up, price elasticity and switching behaviour should be able to undertake substitutability and complementarity analysis. Some evolutions may have an impact on market definition and subsequently on market analysis.]

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<sup>12</sup> Femtocells provide basic improved indoor coverage, data traffic offload from the macro network (indoor or in hotspots), and "new services", such as "no real-time" upload via mobile. The take up of this particular technology was brought up as an example of those "bridging" technologies (literally) that, time and penetration permitting, might alter market definitions as we know them, essentially by reducing the gap between the (artificial, also taking into account that regulation should be technologically neutral) distinctions of "mobile" and "fixed" networks on which the existing regulation is based. By way of example, Vodafone UK has started its commercial offer in summer 2009, and it is likely that more offers will follow in the various European countries where Vodafone is present.

In Germany, due to the interest shown by all MNOs (T-Mobile, Vodafone, O2, E-Plus) in femtocells, the German regulator (BNetzA) amended all frequency assignments so that MNOs can offer very low power femtocells without additional coordination procedures.

These developments could entail that, in perspective, less money has to be invested to improve coverage inside building (actually the money should come from the customers if the operation is successful) – could part of it go to address potential backhaul problems where and when they exist?

The extent of fixed-mobile service substitution and complementarity has important implications for policy towards fixed network unbundling, fixed-mobile vertical separation, and universal service.

In most countries, fixed and mobile services are not part of the same market.

However, this position may need to be reviewed if it started to be found that mobile services were significantly depressing the use of fixed lines (most research indicates some extent of substitution, but usually at a rather low level, with different elasticities, so that presence or absence of substitutability has to be decided on a case by case basis). Similarly, fixed broadband usage could be affected as more people switch to 3G-3,5G phones; with better videos and higher speed, the form factor becomes less of an issue in providing the end user with a more satisfactory mobile broadband experience<sup>13</sup>. In this context, relevant NRAs should evaluate if artificial limitations of terminal interoperability exist.

NRAs will have to verify, using their national data, whether customers see mobile connections as a complement to the fixed connections rather than as a substitute for it. When thinking of mobile broadband, the physical availability of competitive fixed broadband (i.e. the most commercially interesting areas) has largely matched the footprint for the initial take-up of mobile broadband. Increasingly, however, the footprint for mobile broadband and that for fixed broadband are not coincident. The outskirts of larger cities, areas with seasonal traffic (ski/sea resorts) are typically (and sometimes better) reached by mobile broadband rather than from fixed broadband. However, for the time being the experience points to the fact that substitutability can only be established on a case by case basis.

Additional points (to be taken into account from NRAs when performing the market analysis [market definition?]) might be represented by i) cost of radio access network ;ii) assessment on transport capacity; iii) migration on IP networks (backhaul and core network); iv) migration to 4G networks; v) cross elasticity comparisons between mobile and fixed networks or broadband services

Data from countries with the strongest competitive pressure from mobile to fixed should be observed (Austria, Finland, Italy, UK and others). Also, an evaluation of fixed broadband price (and total cost of ownership) might help in evaluating the pressure of -mobile broadband on fixed BB connections when performing a market analysis.

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<sup>13</sup> By way of example, limitations to “tethering” (i.e. the use of a 3G phone as a modem in connection with a PC, to benefit the user with its larger screen) might hamper interoperability and thus substitutability.



### **3. Market analysis and market definitions: selected NRA's experience in mobile/fixed broadband substitutability and complementarity analysis**

The group has also focused on recent existing analysis being done by some regulators (and the corresponding EC comments on Article 7 FD notifications), to capture some patterns and provide readers of this document with compact indications on the experience matured so far.

When identifying markets potentially susceptible to ex-ante regulation, NRAs would typically start from the retail markets analysis and, only if competition problems arise at that level, or the competition in the retail market results from regulation of the related wholesale market, then examine the overall value chain to identify possible sources of market failure. So far, as market definition is concerned, a demand side and supply side perspective are taken into account.

From the demand-side perspective, it remains to NRAs to assess whether mobile broadband and fixed wireless access services are part of the same market as fixed wireline broadband access.

By looking at indicators such as prices (i.e. higher charge than in fixed services), functional limits (e.g. screen size, resolution, etc.), geographic availability, overall quality, coverage, download/upload ratio, actual speed vs. nominal speed, practicality of use (i.e. battery life, restriction to use, etc.) or more restrictive traffic caps on mobile connection services (i.e. less appeal to "heavy users"), an analysis of substitutability and complementarity can be undertaken.

However, it has to be underlined that the above criteria are only indicative and do not constitute an exhaustive list (see also above on pp. 6-8)

From the supply side perspective, two or more products/services are viewed as effective substitutes, when switching does not entail significant new investments and is possible within a reasonable timeframe.

Taking the above mentioned factors into account, as far as broadband access market is concerned, *mobile wireless access* has usually been excluded from the definition of the market. When considering the supply side, it is worth taking into account whether or not national MNOs are associated with fixed broadband access providers, as this might dictate complementarity rather than substitutability. However, there might be cases where substitutability between fixed and mobile broadband remains relevant even when the fixed incumbent has a mobile arm.

### *3.1 NRAs' experience: fixed/mobile broadband*

The WG has examined recent relevant cases in the realm of market definition and analysis as provided by a few NRAs. The timeframe of observed markets is crucial, as wireless broadband has emerged in these last years.

[This section could be extended (depending on inputs from other countries) and discuss in more detail how substitutability was analysed (and which conclusion was reached).]

#### *Austria*

In what will probably constitute a landmark case the Commission has recently decided on broadband markets in Austria. On February 1, 2010, RTR defined a new wholesale broadband access market, the “wholesale broadband access market for the provision of access to non-residential customers”. This market includes internally and externally provided DSL-lines which are used to provide access to non-residential customers at the retail level. The reasoning behind this market definition was as follows:

First, substitution between different broadband products at the retail level was analysed. The focus here was on substitution between fixed and mobile broadband, since the number of mobile broadband connections had increased significantly (stronger than in any other Member State) in the years from 2007-2009.

To analyse substitution at the retail level, RTR looked at the following indicators:

#### *a. Prices and product characteristics*

The table below gives a comparison of prices and product characteristics between fixed (DSL/CATV) and mobile broadband.

	<b>DSL/CATV</b>	<b>mobile (HSPA)</b>
price per month	€20-€30 (bundle with fixed voice access)	€4/1GB, €9/3 GB, €10/6 GB, €15/15 GB, €19/19GB
download speed	"up to" 8 Mbit/s is the "standard" product	7,2 Mbit/s maximum, ~1 Mbit/s on average (2008)
volume	flat	see above
mobility	no	yes
availability	>95% of population	~95% of population

Mobile broadband has a lower download speed on average but is cheaper and offers the advantage of mobility. Its availability is close to fixed broadband. All important applications (E-mailing, surfing, banking, downloads, games, etc.) can be (and are) used via fixed and mobile broadband (this was a result of the consumer survey, see below). A comparison of prices and product characteristics therefore does not exclude substitutability but is not conclusive on its own.

b. Results from a consumer survey:

3000 residential users (those who decide about the internet connection in their households) and 1000 business users (decision makers) were interviewed by a market research institute in January 2009. They were asked about the following things:

- What broadband technologies are used?
- Has there already been a switch between technologies (e.g. DSL->cable or DSL->mobile, etc.)
- How would the household respond to a permanent 10% price increase of the technology currently in use (switch or no switch, if yes, to which technology)? ("hypothetical monopolist question")
- What applications are used via the broadband connection? (only residential users)

The main results of the survey are depicted in the table.

	<b>residential</b>	<b>business</b>
Share of mobile broadband users	27% (increasing)	15.5%
Share of mobile broadband users having no fixed broadband connection	~75%	~25%
% of users who had switched from fixed to mobile broadband	~10%	very low
Estimated elasticity based on hypothetical monopolist question (critical elasticity: -1.1 to -1.4)	DSL and CATV: -1.5 to -2.5	DSL: -0.7 to -1.8

These results indicate that there are strong differences between residential and business users. While business users predominantly use mobile broadband complementary to their fixed connection, it seems to be a substitute for residential users. The estimated elasticity suggests that it is part of the same market as DSL and CATV.

#### c. Price reactions and price-quantity developments

After mobile operators lowered prices for mobile broadband significantly in the beginning of 2007, the growth of fixed broadband lines slowed down significantly and even went to (almost) zero. Only after fixed network operators reduced prices significantly at the end of 2007, fixed broadband started to grow again. This pattern<sup>14</sup> suggests that there is competitive pressure from mobile on fixed broadband and that the two services are substitutes (at least in the residential segment).

Based on this and further evidence, RTR concluded that there is a residential broadband market at the retail level including DSL, CATV and mobile broadband, and a business retail market including only DSL. It further was concluded that there is effective, sustainable competition at the residential retail market and there is no more need for a bitstream regulation. The wholesale market was therefore defined as a market including only internally and externally provided DSL-lines which are used to provide access to non-residential customers at the retail level.

After looking at the case in detail in course of a phase II investigation, the European Commission withdrew its serious doubts. In its letter, the European Commission noted 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.

The Commission recalls that, in order to correctly assess the substitutability of two different products and with particular regard to fixed-to-mobile substitutability, utmost account should be taken of the different product functionalities used by the end customers, as well as other key factors such as, inter alia, download throughput, upload throughput, latency, network oversubscription, packet loss, service continuity, etc. The speed and quality of mobile

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<sup>14</sup> The pattern of price reactions was also analysed by means of price regressions.

broadband access is normally less predictable and reliable and largely dependent on variable elements such as the distance to the nearest network base station or atmospheric conditions. Customers can consequently be more often exposed to disconnections due to weak signals from a base station, jamming, network overloading, etc. Furthermore, taking into account the rapid pace of mobile broadband take up in Austria, mobile operators may face increased network congestion, which could limit their ability to offer a competitive range of products in the near future. With regard to the potential upgrade of fixed networks and particularly a potential roll-out of high speed NGA networks the above technical differences as to the available bandwidth capacity could increase in the future, especially as the bandwidth for mobile broadband, even in case of the implementation of HSPA+ and LTE technology, may, where the network is shared amongst several users, not reach the same speed levels as upgraded fixed and especially FTTx and DOCSIS 3.0 connections and/or be made available only at higher prices if compared to the fixed network.

Apart from the thorough assessment of the above technical features further characteristics must be taken into account when analysing substitutability of fixed and mobile broadband products. This involves in particular the analysis of whether the two product types lie within a comparable price range so that a consumer could switch from a fixed broadband connection to a mobile broadband connection if a hypothetical monopolist were to increase the price of the fixed broadband connection by a small but significant amount, e.g. by 10 %. Furthermore, widespread geographical availability should enable potential switching between the two products on a sufficiently large scale. Finally, when assessing demand-side substitutability robust evidence must be presented concerning the actual patterns of use of the two types of connections. [...]"

### *Finland*

The Finnish regulator (FICORA) concluded that mobile broadband would not create an indirect competition to fixed broadband on the market for wholesale broadband access (Market 5) within the timeframe of its current market analysis. Mobile broadband is currently the second most common broadband subscription type in Finland, accounting for about 30 % of all broadband subscriptions<sup>15</sup>. However, FICORA noted in its latest market analysis that the price level had not yet created an indirect competition for fixed broadband on the market for wholesale broadband access. Furthermore, it noted that mobile broadband is primarily used to improve availability outside the home and thus currently serves more as a complement than as

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<sup>15</sup>

FICORA's Market Review 2/2009, published on 8 September 2009

a substitute to fixed broadband services. Thus, mobile wireless access has been excluded from the definition of the market<sup>16</sup>.

### *Ireland*

In ComReg Document No. 08/104, ComReg presented its preliminary view that retail broadband products offered over alternative forms of fixed network (such as cable, FWA and direct fibre) are sufficiently similar to DSL based retail products, such that customers would be able, and likely, to switch between products on alternative fixed platforms (where available) given a small but significant increase in price. ComReg's preliminary view was that all forms of retail fixed broadband access belong in the same market. ComReg considered that narrowband internet access, mobile broadband, leased line products would not fall within the same retail market, notwithstanding the observed rate of mobile broadband adoption in Ireland.

As against that, it was argued by an outside party that the product pricing changes made by Eircom (particularly to the 3MB and 7MB broadband products) during the second half of 2008 were made in direct response to competitive pressures being exerted by mobile broadband providers. However, this claim was not backed up by evidence of such substitutability other than the party's view the fall in the growth rate of DSL based broadband was related to an increase in the growth rates of mobile broadband.

ComReg considers that the growth of mobile broadband does not, in itself, imply a significant degree of demand-side substitutability between fixed and mobile broadband. Only one year after the introduction of mobile broadband fixed broadband subscriptions were held by over 80% of all households that had a PC and most businesses. This statistic does not account for the fact that a certain percentage of households with PCs/laptops could not get broadband over a fixed network. Thus, a fall off in fixed broadband subscriptions growth should be expected without regard to what is happening with regard to other issues. It is also important to note that DSL (along with cable) has continued to grow alongside mobile broadband, as was highlighted by Eircom in its recently published Annual Report for 2009.

ComReg's view that mobile broadband is not a substitute for fixed broadband is also consistent with the public comments expressed by Eircom, the principal DSL provider in the State, where it was stated:

*"We [Eircom] don't actually have any direct evidence of customers switching from DSL to mobile broadband..... what we are seeing is customers who previously did not have DSL, but who own laptops, having mobile broadband and some customers who have laptops but*

<sup>16</sup>

Case FI/2009/0900: Wholesale broadband access in Finland. Wireless technologies have been excluded from the market for wholesale physical network infrastructure (Market 4), too, due to functional limitations and a very limited supply

*also prefer to use a fixed connection at home actually having both fixed and mobile broadband together. So it's really very difficult to determine that particular impact. Clearly, mobile broadband is actually trading at something of a discount in certain promotional areas to fixed. And, in areas where there is 3G coverage but no DSL available, that is a natural choice for customers."*

The switching data available to ComReg shows that the majority of customers who switched service provider, tended to move to other fixed broadband platforms other than mobile broadband. Moreover, the level of switching by households of fixed broadband is at a low level with less than 10% of households switching last year. The evidence presented indicates that only a small number of customers have cancelled their fixed broadband connections in favour of mobile broadband connections.

While the headline prices of mobile broadband products are typically cheaper than those of fixed broadband products, apart from the functional differences, the actual price per unit that can be downloaded on mobile broadband networks is significantly higher on average than that of fixed broadband (particularly when factoring in the charges for data in excess of inclusive monthly download limits). Hence, any assessment that pricing between fixed and mobile broadband is similar is not a like-for-like comparison of products, particularly when considered in the context of the products' inclusive download allowances.

Inclusive monthly download allowances for Irish mobile broadband products are more limited in comparison to those offered by fixed broadband providers, and that charges for exceeding these inclusive monthly limits are significantly higher for mobile broadband than for fixed. This has to be seen in light of evidence that ComReg has that in relation to consumer download profiles on fixed and mobile broadband networks, where download volumes are of orders of magnitude higher for fixed networks. Such variance in the level of utilisation is suggestive of different underlying consumer preferences in using fixed broadband networks for more bandwidth intensive applications, in particular, due to their differing technical capabilities.

It has to be considered whether Eircom's retail product changes are a direct response to competition from the introduction and growth of mobile broadband. ComReg has comparatively reviewed the changes that have occurred across Eircom's DSL and mobile operators' mobile broadband products in the period September 2006 to February 2010. The pricing behaviour demonstrated in the market does not support a conclusion that mobile broadband is a substitute for DSL broadband.

## Portugal

In January 2009 ANACOM concluded the analysis of broadband markets – this analysis includes the market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location (market 4 of EC Recommendation) and wholesale broadband access market (market 5).

In order to analyse the wholesale markets, and following the guidelines stated on the explanatory note of EC Recommendation, ANACOM started to define and assess the retail broadband market.

Regarding the definition of retail market, ANACOM has concluded that the conclusions taken from the previous market analysis regarding substitutability were still valid. Therefore, ANACOM understood that broadband access retail market includes broadband access through ADSL, cable modem and optical fibre.

During 2007, the number of mobile broadband accesses (supported by data transmission cards) raised significantly. The evolution of these mobile broadband accesses has mainly been driven by the “e-escola”, “e-professor” and “e-oportunidades” programmes (e-school, e-teacher and e-opportunities), which the Government has been promoting and which involves the provision of computers with broadband Internet connections to important segments of the population on very favourable conditions.

However, splitting down these accesses in terms of speed access, around 75% of these accesses were at speeds of up to 640 Kbps, which is significantly below the maximum speed access for the most representative fixed broadband access offers.

Taking into account the evolution observed in the number of mobile broadband accesses, the focus was to assess the level of substitutability between fixed and mobile broadband.

In order to assess the substitutability on demand side, ANACOM considered, namely, the price and product characteristics.

The price difference between ADSL/Cable modem products and mobile broadband is very significant and this difference becomes higher if one takes into account the speed access of the products. The following table compares the prices of broadband products provided by an operator.

Offers		Speed access		Monthly fee (excluding VAT)	Monthly fee per Mbps
		Download	Upload		
Mobile broadband offers	Banda Larga 384 Kbps	Up to 384 Kbps	Up to 384 Kbps	€ 18,60	€ 48,4



	Banda Larga 640 Kbps	Up to 640 Kbps	Up to 384 Kbps	€ 24,71	€ 38,6
	Banda Larga 3,6 Mbps	Up to 3,6 Mbps	Up to 1,4 Mbps	€ 32,98	€ 9,2
	Banda Larga 7,2 Mbps	Up to 7,2 Mbps	Up to 1,4 Mbps	€ 37,11	€ 5,2
ADSL broadband offers	Duplex ADSL 4 Mbps	Up to 4 Mbps	Up to 512 Kbps	€ 16,45	€ 4,1
	Duplex ADSL 12 Mbps	Up to 12 Mbps	Up to 512 Kbps	€ 24,71	€ 2,1
	Duplex ADSL 24 Mbps	Up to 24 Mbps	Up to 1024 Kbps	€ 32,98	€ 1,4

Additionally, each speed of access is associated to a distinct geographic coverage area and as the speed of access increases the covered areas become smaller.

Other characteristic that limits the level of substitutability between fixed and mobile broadband relates to the traffic limits – mobile broadband offers usually have traffic limits significant lower to those provided on fixed broadband offers.

In conclusion, the main advantage of mobile broadband offers relies basically on mobility that allows the use of the service anywhere (as long as coverage allows).

ANACOM recognized that on the supply side there might exist some substitutability between these offers. However, taking into account:

- The significant price differences;
- The maximum speed access available;
- differences in terms of traffic limits;
- mobility,

ANACOM concluded that the degree of substitutability between fixed broadband offers and mobile broadband offers was still limited, and concluded that mobile broadband offers are

essentially targeted to a specific customer segment (apart from users eligible for the “e-schools”, “e-teacher” and “e-opportunities” programmes), where the users:

- do not require fixed access (for voice communication or television);
- do value mobility;
- do not need broadband access with higher quality, in terms of speed of access;
- are not intensive users.

In other words, this group of users is not yet of a sufficient size to prevent a hypothetical monopolist from the fixed broadband access service maintaining prices at a significantly higher level than would be the case in a competitive market.

Regarding supply-side substitutability, when assessing if mobile Internet access providers (which are not currently broadband service providers on the fixed network) are able to enter the fixed broadband access market quickly and without high costs one concludes these providers cannot impose a constraint on fixed broadband providers – to enter the fixed network broadband access market, a mobile broadband access provider would have to acquire the relevant wholesale inputs or construct its own network. In addition, all mobile operators are included in economic groups which also provide fixed network broadband access services.

In the reverse situation (providers of fixed network broadband access services access entering the provision mobile broadband services) is even more difficult, given the need for spectrum, which is a scarce resource.

Another aspect that could lead to the same conclusion (that on the supply side, the products are distinct) arised from the fact that there are specific offers (from mobile operators) that target customers that bought ADSL services. This fact shows that, to a certain degree the two Internet access services (fixed and mobile) complement rather than substitute each other.

The lack of substitutability on the demand side (for most users) and the view that supply-side substitution is not relevant to this market analysis indicates that the existence of mobile Internet access offers does restrict a hypothetical monopolist from setting a price that is above the level of competition in the provision of the fixed broadband access service.

Therefore, for the time period relevant to this market analysis, ANACOM concluded that fixed broadband accesses and mobile broadband accesses were not in the same market.

### *Spain*

CMT considered<sup>17</sup> substitutability between fixed and mobile broadband access services in the framework of the definition and analysis of markets 4 and 5 of the Recommendation<sup>18</sup>. At that time, 68% of the Spanish population had access to 3G networks at speeds higher than 384

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<sup>17</sup>

Resolución de 22 de enero de 2009.

<sup>18</sup>

See footnote 4 above.

kbps, although the number of mobile broadband connections was still low when compared to the number of fixed broadband accesses (around 10%).

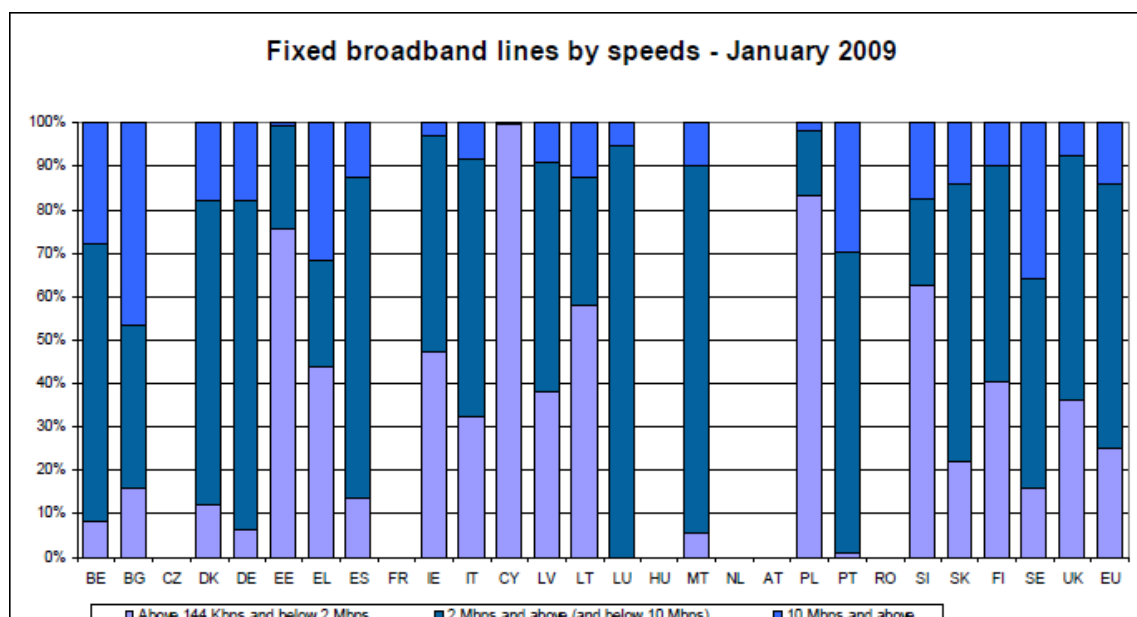
In that context, CMT noted that there were still limitations in mobile broadband accesses that cast doubts on the full substitutability with existing broadband accesses. First of all, it was taken into account that wireless broadband accesses had lower downloading speeds with relatively higher prices. Furthermore, while most of the fixed broadband offers were based on flat rates, the wireless tariffs were dependent on the volume of downloaded data<sup>19</sup>. For those reasons, it was concluded that at the time of the analysis wireless accesses were complementary rather than substitutes. Finally, the decision of CMT mentioned that due to the fast evolution pace of mobile technologies, it is necessary a continuous monitoring of the market in order to ascertain if users will perceive wireless and fixed broadband accesses as substitutes in the near future.

In all cases except the most recent one, i.e. Austria, the conclusion is that, within the horizon of the market analysis there is no effective substitutability –at the time at which these analysis took place. However, looking at the future, faster mobile broadband networks could potentially have good chances to be taken into account. The significant take-up of HSDPA networks (the current benchmark worldwide is 7,2 Mbps) can be explained with the fact that those networks are more likely to provide the average user with a performance more in line with what is experienced by the majority of fixed users' experience in the EU 27. COCOM's data reflected in Figure 1, can confirm that a huge percentage of customers have access to ranges between 144 kbps and 2Mbps, 2 to 10 Mbps while only a minority has access to (nominal) speeds above 10 Mbps. In particular regarding speeds, according to the XIV Implementation Report, 60.8% of reported fixed broadband lines (i.e. about 72% of retail lines available in January 2009) are in the range of 2 Mbps and below 10 Mbps, 25.1% of reported lines are in the range of 144 Kbps and below 2 Mbps, whereas 14.1% of the lines are in the range of speeds beyond 10 Mbps.

Figure 1: EU countries by speeds – retail fixed broadband lines

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<sup>19</sup> There were some offers with a fixed monthly rate, but in those cases the access speed decreased significantly after exceeding a volume threshold



(Source: XIV Implementation Report)

### 3.2 NRA's experience: fixed wireless access ("FWA"<sup>20</sup>)

Some regulators (e.g. ICP-ANACOM, ARCEP, ComReg, NITA) concluded that FWA broadband access products are not included in the wholesale broadband access market due to various issues such as, inter alia, charges, capacity and/or broadband coverage, level of service and functions available, as well as investment costs to build a new FWA.

With regard to those indicators, the Danish regulator, NITA, did not include wireless technologies (FWA, WiMAX, 3G mobile telephony), WLAN (Wi-Fi) in the wholesale broadband markets<sup>21</sup>.

Also the Portuguese regulator, ICP-ANACOM, concluded that FWA products are not included in the market<sup>22</sup>.

In France, ARCEP excluded from the scope of the product market wholesale broadband access services provided by wireless technologies such as WiMAX, whose penetration amounts to a mere 1% of broadband retail access<sup>23</sup>.

In Ireland, although FWA is available in all major metropolitan areas, ComReg acknowledged a limited degree of substitutability in specific circumstances, for example, in sparsely populated areas, but because of higher long term investment costs to build a new FWA

<sup>20</sup> In this paragraph reference is made to fixed wireless access in particular; throughout the paper the reference is to BWA or broadband wireless access

<sup>21</sup> Case DK/2008/0860: Wholesale (physical) network infrastructure access at a fixed location"; Case DK/2008/0862: Wholesale broadband access in Denmark.

<sup>22</sup> In Portugal, only one company, ARTelecom, is expanding its coverage in the cities of Lisbon and Porto.

<sup>23</sup> Case FR/2008/0780: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location; Case FR/2008/0781: Wholesale broadband access.

network, operators would generally not consider FWA investments to be a close substitute for wholesale broadband access (WPNIA)<sup>24</sup>.

In Austria, RTR excluded wholesale broadband access by means of fixed wireless access (WLAN, WLL) from the market definition<sup>25</sup>.

The Finnish regulator, FICORA, included FWA networks in the market for wholesale broadband access<sup>26</sup> ("Market 5" of the 2007 Recommendation), but not in the market for unbundled access<sup>27</sup> ("Market 4" of the 2007 Recommendation). In particular, FICORA noted strong growth and indirect constraints from FWA broadband services in sparsely populated areas due to the availability of a FWA wholesale broadband product implemented in Digita Oy's @450 network<sup>28</sup> network. According to FICORA, the pricing of this FWA-based wholesale product enables competitive retail pricing compared to DSL connections in sparsely populated areas and will be upgraded to provide maximal coverage of Finland.

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<sup>24</sup> WPNIA: Wholesale Physical Network Infrastructure Access.

<sup>25</sup> Case AT/2008/0757: Wholesale broadband access in Austria.

<sup>26</sup> Case FI/2009/0900: Wholesale broadband access in Finland.

<sup>27</sup> Case FI/2008/0839: Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location in Finland.

<sup>28</sup> Flash-OFDM technology = Fast Low-latency Access with Seamless Handoff Orthogonal Frequency Division Multiplexing

#### 4. Competition problems and spectrum

The experience of NRAs in performing the market analyses shows that, while infrastructure competition among wireline and wireless networks is developing, it is not such as to change the market definition provided in the Commission Recommendation on relevant markets subject to ex-ante regulation. However, the Commission Guidelines on market analysis<sup>29</sup> foresee the possibility to identify other relevant markets when justified by national circumstances in order to take account of technological or economic developments which can be specific to each national market. Within this there is the potential for each NRA to consider whether there is a need, based on retail market problems in their particular circumstance, to identify a market which uses spectrum as an input. Identifying a market which uses spectrum as an input does not imply that access to spectrum has to be regulated.

Having defined and identified a possible relevant market the NRA would first need to apply the three criteria test<sup>30</sup> to verify whether any such market would have those specific characteristics that would make it susceptible to ex ante regulation. However, it should be expected that the need for such an intervention should not arise in general, as spectrum authorities in Member States have as one of their goals under the framework the promotion of competition. This enables spectrum authorities to attempt to set up the competitive conditions in terms of access to spectrum rights of use such that competition problems should not arise in the normal course of events. "Access to spectrum rights" does not mean assignment, allocation, or designation of spectrum. When spectrum authorities succeed in their attempt to set up good competitive conditions (eg. by the introduction of spectrum caps), this makes imposition of ex ante remedies unnecessary.

There is a specific regime under the Authorisation Directive for conditions that can be attached to rights of use of radio frequencies. These conditions relate in the main to technical matters but can encompass any commitments made by the undertaking obtaining the usage rights in the course of a competitive or comparative procedure.

The existence of regulatory oversight with regard to spectrum usage rights cannot, of itself, ensure that no competition problem will arise. Such problems are the natural concern of competition authorities.

Although a full enumeration of potential competition problems in relation to spectrum usage rights will be the subject matter of another paper, an obvious concern would be related to

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<sup>29</sup> Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services, (2002/C 165/03)(the Guidelines).

<sup>30</sup> The three criteria are (i) presence of high and non-transitory barriers to entry, (ii) tendency towards effective competition within the relevant time horizon, and (iii) insufficiency of competition law alone to adequately address the market failure(s) concerned.

hoarding. Spectrum rights markets are in most cases markets where transactions are scarce. Identifying patterns or significant shifts in market positions can usually only be done over several years. Examples of competitive problems might come from an unwillingness to trade the spectrum rights of use (or to lease them), in order to prevent or delay market entry, at the expense of would-be competitors or from anti-competitive hoarding.

## 5. Conclusions

This report has covered three issues in particular:

- i) criteria for market definitions;
- ii) NRA's experience and
- iii) an approach to evaluate whether in specific circumstances new market definitions might be taken into consideration.

While the first two points have benefited from the existing knowledge in terms of market definition, it is clear that the third point touches upon subjects which would deserve further work.

Competition problems have the potential to arise in relation to access to spectrum rights. These will normally be addressed by the relevant competition authority. It is thus proposed that such issues, beyond what has been touched upon in this report, will be considered in the joint BEREK-RSPG work on transitional issues.