

# Study on the Options for addressing Competition Problems in the EU Roaming Market

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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.**

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## Executive Summary

This is the Executive Summary for the **Final Study Report** for a “Study on the Options for addressing Competition Problems in the EU Roaming Market”. The study was conducted in the second half of 2010 by WIK-Consult GmbH on behalf of the European Commission.

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

The study’s terms of reference asked us to assess:

- How the European mobile roaming environment for voice, SMS and data evolved since the first Roaming Regulation was enacted in 2007.
- Whether regulation of mobile roaming would still be necessary when the amended Roaming Regulation expires in 2012.
- The potential effectiveness of a range of potential alternatives to the current regulation.

The study reflects numerous interviews with a range of stakeholder experts. Some work for Mobile Network Operators (MNOs); others work for National Regulatory Authorities (NRAs); others are academic experts; still others are consumer advocates. We integrated this input with data provided by BEREC, with a substantial body of desk research, and with our own prior background in the subject matter. We then assessed the implications of various paths forward, keeping in mind that the Commission will ultimately be conducting an Impact Assessment and that they have already launched a separate, second study to assist them in doing so.

This Executive Summary provides (1) a review of the Roaming Regulation; (2) a discussion of the mobile roaming environment and its evolution since the Regulation came into force; (3) a review of the major costs and benefits associated with the Roaming Regulation; (4) an assessment of whether changes in the roaming marketplace might warrant withdrawal of the Regulation; (5) a list of the options that we considered; and (6) the options that in our view are most promising for consideration by the next study team.

## The Roaming Regulation

Prior to the Commission’s Roaming Regulation of 2007 and its amendment and extension in 2009, retail and wholesale mobile roaming charges for voice, data and SMS were widely felt to be excessive in comparison to the underlying costs of providing the respective services, and equally excessive when compared to equivalent domestic prices. Moreover, the high prices were not justifiable on the basis of true underlying

costs. Many Europeans avoided using their mobile phones when travelling outside of their home Member State in order to avoid incurring mobile roaming charges.<sup>1</sup> This behaviour was rightly viewed as an impediment to the European Single Market.

The wholesale rates charged by mobile operators clearly contribute to these high prices, but the mark-ups on retail prices compound the problem (even though the retail mark-ups are not necessarily higher in percentage terms than those on other retail mobile services).

The Roaming Regulation, together with its amendments, seeks to protect consumers, preserve competition among MNOs, and further the benefits of the European Single Market by a number of measures.

- It requires European MNOs to establish a *Eurotariff* default retail tariff for mobile voice roaming, together with a *Euro-SMS* default retail tariff for mobile roaming SMS, with defined maximum usage-based prices.
- It establishes per-minute maximum wholesale *Inter-Operator Tariff (IOT)* prices that the *visited network* can charge the *home network* for roaming voice, SMS, and data, respectively.
- It imposes per-second retail billing for mobile voice roaming.
- It implements a number of measures to increase the consistency and transparency of billing for these services, and to reduce the risk of “bill shock”.

## The evolution of mobile roaming in Europe since 2007

The European mobile roaming environment has evolved in important ways since the Roaming Regulation was put in place. Nonetheless, many problems remain.

We assessed (1) the ease with which users could substitute alternative services for mobile roaming services; (2) the degree to which consumers are aware of and responsive to the prices of these services (i.e. the degree to which their *demand* for mobile roaming is *elastic*); and changes in the wholesale and retail pricing environment. The following sections of this Executive Summary consider each of these in turn.

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<sup>1</sup> Eurobarometer (2006), *Roaming Summary*, Special Eurobarometer no. 269, based on data from September to October of 2006. 63% of respondents in the EU-25 used the same SIM card when travelling, but used the mobile phone less than when at home. Based on other responses, this behaviour was clearly a response to inflated prices.

## Substitution

There are numerous potential substitutes, each of which has its adherents under suitable conditions, and each of which has its limitations. The use of WiFi (i.e. wireless hot spots) to provide Internet access and *Voice over IP* (VoIP) was felt by most respondents to be the most practical all-around substitute; however, it requires effort and some level of knowledge on the part of the user, it is available only when one is within range of a hot spot, and it is not truly mobile.

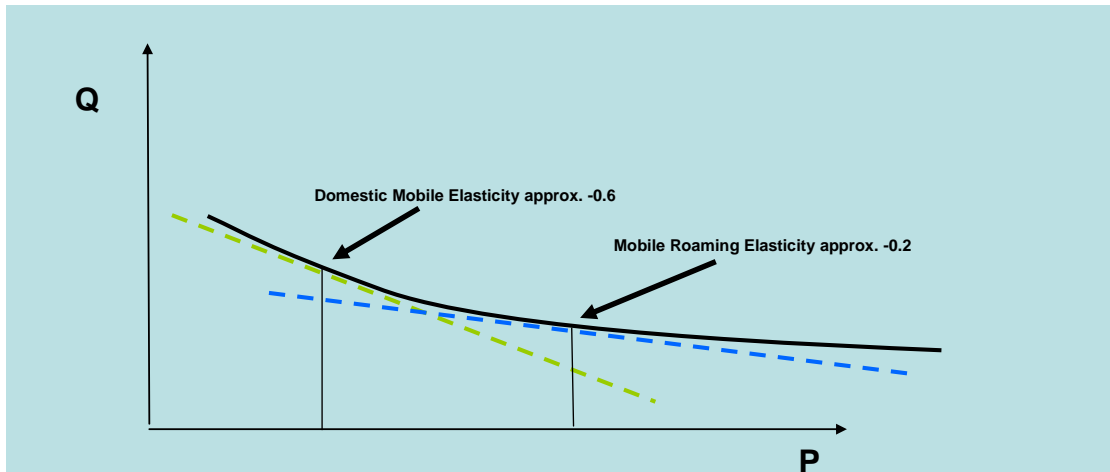
Otherwise promising solutions that are specific to a single visited country (for example, purchase of a local SIM) tend to impose substantial search costs on the user, who must become knowledgeable about country-specific service offerings and prices, and may need to be able to conduct the transaction in the local language.

Consumers, especially those who travel for business, can benefit from substitutes today if they are sufficiently motivated, knowledgeable, and determined. It is clear, however, that the substitutes individually and collectively do not represent a general solution for the average consumer, and that substitution options are not sufficient on their own to substantially alter the character of mobile roaming in Europe.

## Elasticity of demand

Demand elasticity has two dimensions: the degree to which consumers choose their MNO in response to price (subscription elasticity), and the degree to which the number of calls they place or SMSes that they send reflects the unit price charged (usage elasticity). Stakeholders regard both forms of elasticity to be low, and not much changed by the Roaming Regulation.

Little rigorous quantitative work has been done to estimate the demand elasticity of mobile voice roaming. Based on a study conducted by the Spanish CMT, an analysis done on behalf of the European Parliament, and also based on inspection of recently published BEREC data, it is clear that usage elasticity of mobile voice roaming is low – we consider a plausible range to be between 0 and -0.4, and conjecture that it might be in the neighbourhood of -0.2. We further conjecture that, if the price of mobile voice roaming were similar to that of normal domestic mobile-to-mobile voice, the long term demand elasticity would also be similar to that of domestic mobile-to-mobile voice (which we have estimated in previous work to be in the range of roughly -0.6).



Source: WIK-Consult



At current levels of usage demand elasticity, it is rational for MNOs to take high mark-ups over the wholesale IOT for mobile voice roaming. The marketplace for mobile voice roaming is unlikely to organically correct itself under current conditions.

Less is known about the demand elasticity of mobile SMS roaming and data roaming. Limited data is available to date on the effects of the amended Roaming Regulation on SMS and data. The volume of data roaming is increasing, but the increase is not necessarily a response to lower retail prices.

## Wholesale prices

The average wholesale IOT rates for voice and SMS are only marginally below the regulated caps; however, the average wholesale rate for data is considerably below the cap, a promising finding. Many have interpreted these results for voice, SMS and data as signifying that the wholesale market for mobile roaming is just as problematic as when the Roaming Regulation was first put in place.

We have a somewhat more optimistic interpretation as regards the wholesale level. Interviewees consistently indicate that the IOT rate that is negotiated between two MNOs is in many cases the rate for *unmatched* minutes – it thus reflects the degree to which one MNO's customers are more likely to roam in the other's territory than vice versa. These IOT rates for unmatched minutes can sometimes be as much as 40% less than the regulated caps, which represents a substantial discount in our view. These discounts are not obvious in BEREC data because not every transaction is on that basis, because not every MNO is able to negotiate discounts, because they apply in

only one direction, and because they are mixed in with a large number of matched minutes that are nominally exchanged at the rate of the IOT cap.

Nonetheless, the rate for unmatched minutes is potentially quite important because it sets the effective price floor below which MNOs are unlikely to be willing to price at retail.

The market has also evolved with further development of MNO groups covering multiple European countries, and with the development of roaming hubs. These are positive developments, but they are apparently insufficient to cause a substantial and sustainable change in the European mobile roaming marketplace.

## Retail prices

Based on BEREC data, it is clear that retail prices for voice calls placed and received and for SMS messages sent are only marginally below the levels of the Eurotariff and the Euro-SMS. In the case of mobile data roaming, wholesale prices are well below the regulated cap, but retail prices nonetheless remain stubbornly high.

Many interviewees opined that retail prices would be unlikely to increase, even if retail obligations under the Roaming Regulation were to be lifted; however, we see no indication that further reductions in IOTs, whether achieved through regulation or through negotiations among the parties, would necessarily lead to reductions in the retail price of mobile roaming.

## Costs and benefits of regulation

Regulation of roaming imposes a range of costs on MNOs and on society. Among them:

- There are efficiency losses to MNOs and to consumers to the extent that MNOs cannot make the differentiated retail offers that they would otherwise make.
- Administrative burdens are imposed on MNOs, on NRAs, and (perhaps to only a small extent today) on consumers.

There is also a substantial *transfer* of welfare from MNOs to consumers. This is in principle neutral in terms of overall societal welfare.

The regulation also provides a range of benefits:

- The avoidance of excessive pricing reduces *deadweight loss*, which is a net loss to society.
- Consumers benefit from increased transparency as regards pricing and service plans.

- To the extent that consumers and businessmen can treat all of Europe as a single region for business purposes, and to the extent that economic distortions are avoided, there are macroeconomic benefits and economies of scale that benefit all. European competitiveness is strengthened, particularly relative to integrated regions such as the U.S. and China. These Single Market indirect benefits probably dwarf the direct benefits of deadweight loss reduction.

## Is regulation still warranted?

All of the factors that led the European institutions to implement the Roaming Regulation in 2007, and to amend and extend it in 2009, are still relevant. The market has changed and evolved in a number of ways, many of them positive, but these changes are not sufficient in our view to justify the withdrawal of regulation in 2012. Specifically:

- Substitutes continue to be of limited effectiveness.
- Demand elasticity still appears to be low, thus limiting the motivation of MNOs to price aggressively to increase market share or usage of the roaming service.
- Wholesale IOT levels for voice, SMS and data show some positive signs; however, there is nothing to suggest that MNOs are willing and able to translate these improvements into positive benefits for consumers, or for the European economy at large, in the absence of regulation.

## Options assessed

We assessed numerous options. Recognising that our study will serve as an input to the Commission's Impact Assessment, we included a baseline "no change" option, where the Roaming Regulation is maintained with little or no change, and a "no intervention" option, where it is allowed to lapse when it expires in 2012. The options considered thus included:

- Maintain the current rules
- Amend the current rules
  - Implement wholesale regulation and transparency measures, but no regulation of retail prices.
    - Implement wholesale regulation and transparency measures, but implement a price basket rather than a glide path and price cap.
    - Maintain the current rules, but make the Eurotariff and Euro-SMS opt-in rather than default.



- Provision of reasonable and fair access on a non-discriminatory basis and/or equitable reciprocal conditions:
  - Approaches that allow achieving prices and conditions similar to those prevailing in the market of the visited network including obtaining prices from the different operators in the market of the visited network
  - Decoupling of roaming from mobile services bundles
  - Transparency measures and consumer awareness only
    - Connecting directly to the visited network
    - Temporary number portability, CS and CPS
  - Spot-trading of wholesale roaming
  - Ease certain transparency obligations for pre-paid users
  - Impose limits on the retail price for mobile data roaming
- Withdraw the current rules.

### **Options warranting further consideration**

Few of the various options that we assessed appeared likely to be both effective and efficient. Some seemed unlikely to achieve the stated goals of the Roaming Regulation. Others seemed to impose unattractive burdens on consumers in terms of searching for offers in the visited country, or in terms of ordering separately unbundled components. The full report provides a much more detailed assessment.

We recommend that the following four clusters of options be considered by the study team that will advise the European Commission in connection with the Impact Assessment for the Roaming Regulation.

- Maintain current regulations (Section 5.1). We assume that IOT charges, and the maximum level of the Eurotariff and Euro-SMS, would continue to decline.
- Making the Eurotariff and Euro-SMS opt-in instead of opt-out (Section 5.2.1.2). Eliminate the notification of pre-paid customers when € 50 of charges have been incurred (Section 5.2.7). Once again, we assume that wholesale and retail price levels continue to decline.
- Pricing at the level of domestic mobile services in the home network (Section 5.2.3.2). We assume that regulated limits on wholesale IOT charges decline markedly, but that retail roaming prices are permitted to exceed domestic retail by roughly the difference between regulated wholesale IOT charges and

average wholesale MTR charges. Regulate data roaming in the same way (Section 5.2.8)

- Withdraw the current rules (Section 5.3).

Maintenance of the current Roaming Regulation with little or no change appears to be superior to most alternatives. The Regulation is intrusive, but it has proven to be effective, and it has not prevented MNOs from making a range of alternative pricing plans.

Continued downward movement of wholesale and retail price using the current mechanism (given that IOTs continue to be well in excess of true underlying cost) might not only help to achieve Single Market benefits, but should eventually bring prices into a range where demand elasticity is more substantial, and where the structural changes to the marketplace thus become more self-sustaining.

We do not advocate withdrawal of the current Regulation in 2012, but for reasons of methodological rigor the option should be among those assessed in the next study. Withdrawal would likely lead to some upward movement in wholesale IOTs, especially in those charged to smaller, disruptive MNOs (i.e. those most likely to price aggressively to win market share). At best, retail prices might not increase; more likely, IOT increases would eventually put upward pressure on non-Group retail prices.

There could, however, be value in making it easier for MNOs to make differentiated retail offers, if that could be achieved without undermining the achievement of the objectives of the Regulation. A full withdrawal of retail obligations would, in our judgment, be counterproductive, but other options could be considered. We would also note that the Regulation does not prevent MNOs from offering alternative retail plans today, but it may arguably impose certain barriers.

The most promising of the options that we considered in terms of offering retail relief to MNOs would be to change the Eurotariff and the Euro-SMS from default, opt-out arrangements into optional opt-in arrangements. As long as customers are fully informed (as the Regulation requires), the Eurotariff and the Euro-SMS should still maintain downward pressure on retail roaming prices. Nearly every MNO that we interviewed, including large players and small, entrenched MNOs and disruptive players, noted that it was difficult and expensive to get customers to move away from the default Eurotariff and Euro-SMS. Changing them to opt-in might still preserve most of the benefits of the current system (perhaps with some loss in effectiveness), while making it easier for MNOs to introduce new retail offers. This might potentially serve both to increase overall economic efficiency, and also to make it easier for disruptive players to introduce new disruptive retail offers.

Interviews have strongly suggested that some aspects of the Regulation – for example, transparency obligations for pre-paid data customers – may have been inappropriately burdensome and disproportionate on MNOs. Any relaxation at this point in time would, however, have to be carefully weighed, since any change might imply once again requiring MNOs to modify billing and other Operational Support systems. We have specifically suggested removing notifications to pre-paid customers when they exceed € 50 in roaming charges (see Section 5.2.7), since most pre-paid customers do not carry more than a € 50 balance on the pre-paid account in any case. As far as other ways to simplify current arrangements without inappropriately detracting from their effectiveness, we think that this is a suitable question for the Commission’s forthcoming public consultation on mobile roaming.

Given that mobile data roaming retail prices remain high, even though wholesale prices have demonstrated a healthy decline, we think that retail controls need to be considered. At the same time, we note that only a few quarters of data are available since the amended Roaming Regulation came into effect, and worry that the imposition of controls may prove to be premature. We suggest that the consulting team for the next study consider this.

We also suggest that the next study consider an alternative equivalent to the “home market” principle, where prices would not be permitted to exceed the price of an MNO’s domestic mobile voice service by more than some defined amount (which, however, will necessarily be large as long as IOTs are large). This has the apparent advantage that the structure of prices would then be linked to presumably competitive domestic mobile prices. We provide some guidance on this option in Section 5.2.3.2, suggesting in effect that the permissible difference should be in the general range of the difference between the regulated IOT and the European average MTR. We note, however, that this option would be of far greater interest than it is today if the difference between the regulated IOT and average MTR were far less than it is today, i.e. if the IOT rate were lowered considerably.



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## 1 Introduction

This report is the **Draft Final Study Report** for a “Study on the Options for addressing Competition Problems in the EU Roaming Market”. The study was conducted in the second half of 2010 by WIK-Consult GmbH on behalf of the European Commission.

### 1.1 Motivation for this study

The Commission moved proactively in 2007, and again in 2009, to implement a Regulation to directly address excessive charges for mobile roaming. These initiatives served to benefit European consumers, and to strengthen the European Single Market overall. The Regulation, and its subsequent Amendment, were appropriately crafted so as to require the Commission to conduct periodic reviews, such that the Regulation would “sunset” if and when it were no longer needed. This study represents a major input to the review required by 30 June 2011. It also represents a major input to a second study, not yet awarded by the Commission, that will assist the Commission in performing an impact assessment of alternative means of addressing competition problems in the European roaming market.

### 1.2 Methodology

The methodology employed to generate this study includes both desk research (Section 1.2.1) and a series of interviews with stakeholders (Section 1.2.2). The identification of regulatory options is based primarily on desk research, supplemented by WIK expertise and stakeholder feedback obtained in the course of the interviews. The assessment of the regulatory options will be undertaken in the form of a (largely non-quantitative) impact assessment, as described in Section 1.2.3.

#### 1.2.1 Desk research

Desk Research represents an important source of information for this project. WIK has relied primarily on publicly available data from ERG/BEREC<sup>2</sup>, national regulatory authorities and other organisations such as the OECD, complemented by WIK’s own data and research.

#### 1.2.2 Interviews with stakeholders

The Tender Specifications required us to “...consult relevant stakeholders”, including national regulatory authorities. We have formally interviewed knowledgeable experts from among a variety of stakeholder groups, including five large mobile network operators or international groups, seven smaller mobile network operators and/or

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<sup>2</sup> International Roaming, ERG Data Benchmark Reports for different years.

disruptive market players, three consumer advocates, six national regulatory authorities, the BEREC, and four noteworthy economists. Many of these sessions involved multiple experts, and most lasted more than an hour. In a number of instances, these individuals provided additional in-depth responses to detailed, follow-up questions as our work progressed. These formal interactions were supplemented with a great many informal discussions, drawing on our network of contacts, especially technology experts.

We would like to take this opportunity to thank all of those who agreed to be interviewed. We were particularly impressed with the high quality of the experts whom market players made available to us for lengthy, in-depth interviews.

The interviews were based on a series of detailed questionnaires, as agreed with the Commission, and covered the following topics:

- Characteristics of the roaming market
- The Roaming Regulation
- Developments of the Roaming Market since the introduction of the Regulation
- Substitution
- Competitive Pressures in the Roaming Market
- Regulatory Options

### 1.2.3 Identification and assessment of alternative regulatory options

The Tender Specifications require us to consider advantages and disadvantages of alternative regulatory options in comparison to the base case of maintaining current regulation, and whether these alternatives are able to meet the general aims of the regulation set out in paragraph 1 of article 1(1).

We have built a number of options to maintain, amend, or withdraw the current Regulation, and have analysed them against the current and likely future state of competition in the market based on the current Regulation. Stakeholder consultation responses have contributed to the quality of our results.

An evaluation of the different options has been conducted as far as possible at this stage based on the criteria of effectiveness, competition, efficiency, consistency, and coherence, as required in the Tender Specifications. This is set out in Section 6. The Commission's methodology for impact assessment (as specified in the Commission's Impact Assessment Guidelines 2009 (SEC(2009)92)) provides the conceptual framework within which we are conducting the assessment.

### **1.3 Structure of this report**

The report is structured as follows:

Section 2 provides the background to roaming, detailing the structural characteristics of the roaming markets and the regulatory context. Section 3 presents competitive pressures and substitutes of the roaming service based on emerging technologies and recent market developments such as internalisation and localisation. Section 4 provides an assessment of developments that have emerged or are likely to emerge in roaming markets, and includes a discussion of price elasticity of demand and the relationship of retail prices to wholesale IOTs. Section 5 sets out the different regulatory options, the likely impacts of which are assessed in Section 6. Section 1 provides our findings and recommendations.

## 2 Background

This section provides general background on the challenges of mobile roaming regulation. Section 2.1 provides general background on market challenges with mobile roaming, while Section 2.2 provides the context on mobile roaming regulation in Europe in terms of its motivations and its initial effects.

### 2.1 Structural Characteristics of Roaming Markets

In order to assess whether market mechanisms are sufficient at present to resolve the competition problems in the EU roaming market, it is crucial to understand how the international roaming markets for voice, data and SMS work in terms of demand- and supply-side mechanisms and market structure at both the retail and wholesale level.

The special characteristics of international roaming markets have been studied in a number of reports and research papers such as Stumpf (2001); a formal mathematical model of the market is presented in Salsas and Koboldt (2004)<sup>3</sup> and further extended in Lupi and Manenti (2006) and (2008)<sup>4</sup>. A detailed report was prepared by the OECD Working Party on Communication Infrastructures and Service Policy on “International Mobile Roaming Charges in the OECD Area”, which was published on 21 December 2009, followed by an OECD report on “International Mobile Roaming Services: Analyses and Policy Recommendations” of 29 March 2010.

Stakeholder interviews conducted for the purposes of this study have further informed the views presented in this section.

#### 2.1.1 Description of the roaming service for voice, data and SMS

Retail roaming services rely on wholesale roaming services that are the services offered by a domestic mobile network operator (“MNO”) providing access and capacity to a foreign MNO for the purpose of enabling the subscribers of the latter to make and receive calls while on another operator's network abroad. The relevant retail roaming services for voice and SMS include the following:

- Scenario 1: Calls and SMS made inside a visited country (domestic calls)
- Scenario 2: Calls and SMS made from a visited country to the subscriber's home country
- Scenario 3: Calls and SMS made from a visited country to a third country

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<sup>3</sup> See Roaming Free? Roaming Network Selection and Inter-Operator Tariffs. Information Economics and Policy, 16:497-517.

<sup>4</sup> See Lupi, P. and Manenti, F. M. (2006). Roaming The Woods Of Regulation: Public Intervention Vs Firms; Cooperation In The Wholesale International Roaming Market. University of Padua - Dept. of Economics, WP n. 16/2006 and “Traffic Management in Wholesale International Roaming: Towards a More Efficient Market?” Lupi and Manenti 2008.

- Scenrio 4: Calls and SMS received in a visited country

The same applies in principle to data, but there tends to be little focus on the destination of data, in part because no termination fees are relevant.

Mobile roaming tends to be somewhat more costly to provide than a typical domestic mobile call. The components that contribute to the cost of international voice roaming include mobile origination, mobile / fixed termination, international transit, and costs associated with billing and accounting.

Historically, MNOs have charged both a wholesale and a retail premium for mobile roaming services. This premium served as a means of recovering these additional costs, but has tended to be well in excess of any reasonable estimate of the costs.

Figure 1 graphically depicts the flow of payments for voice calls *originated* when a user from country A is roaming in country B. The roamer's *home network* in country A makes a wholesale *Inter-Operator Tariff (IOT)* payment to the visited network in country B. The wholesale IOT payment is formally defined as a tariff scheme between mobile network operators, charged by the visited network operator to the home network operator for calls, SMSes or data originated on the visited network.

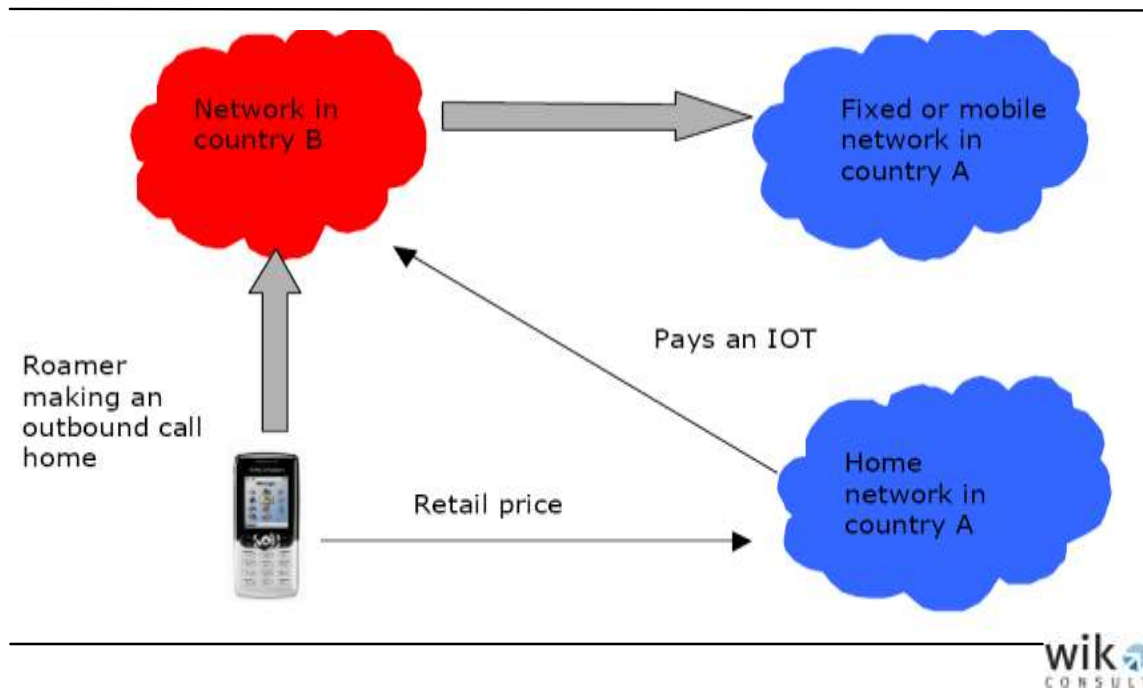
The visited network in country B is responsible for providing the call, and typically pays a termination fee to the fixed or mobile terminating network (whether it is in country A, B, or some third country C) if the call is not on-net.

The roaming individual makes a retail payment to his or her home network in country A. The retail tariff can be viewed as reflecting a mark-up to foreign IOTs that, prior to regulation, was typically in the range of 10-35%<sup>5</sup>.

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<sup>5</sup> Ibid, p.13.

Figure 1: Typical flow of payments for voice calls originated while roaming

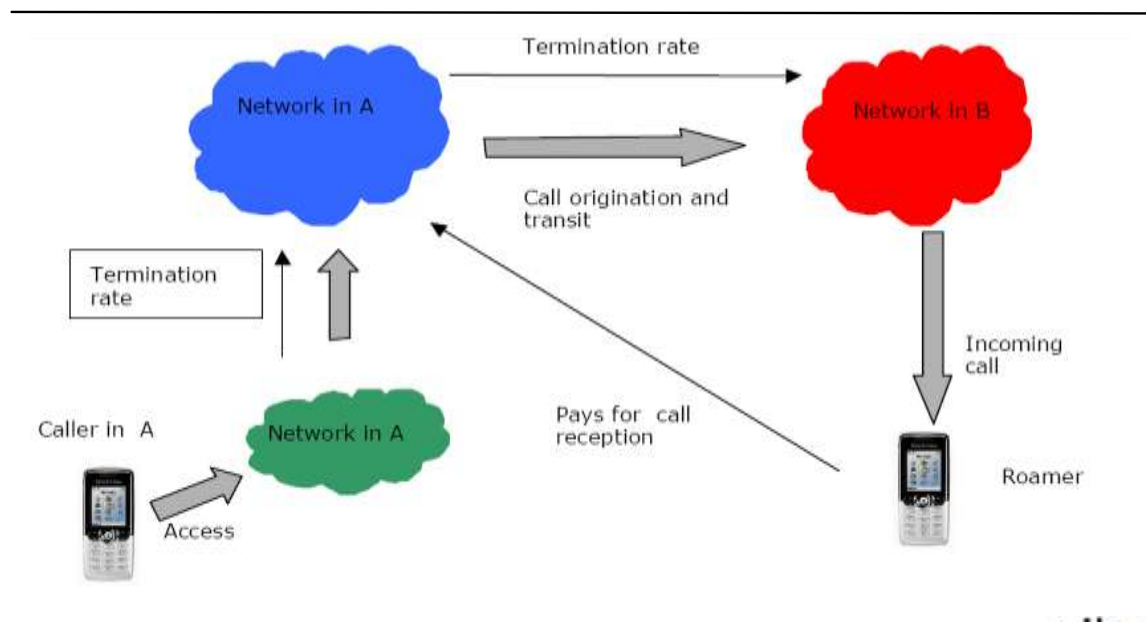


Source: ARCEP, The Market for International Roaming, February 2006

Figure 2 graphically depicts the flow of payments for voice calls *received* when a user from country A is roaming in country B. A caller in country A typically pays the normal domestic price to his or her fixed or mobile network operator, which is appropriate since the caller does not necessarily know that the called party is outside of country A. A caller in some other European country would generally pay the international price for a call to country A.

The roaming individual makes a retail payment to his or her home network in country A. This is unusual inasmuch as it is one of the few instances where the *recipient* of a normal voice call is obliged to pay to receive it. The home network in country A is responsible for completing the call in this case. No wholesale IOT payment is applicable to calls received while roaming; however, the home network typically pays a mobile termination fee to the visited network (and receives a mobile termination fee from the caller's network if the call is not on-net).

Figure 2: Typical flow of payments for voice calls received while roaming



Source: ARCEP, The Market for International Roaming, February 2006

Mobile Network Operators (MNOs) conclude international roaming agreements with selected MNOs from different countries. These MNOs do not necessarily operate in the same geographic markets. The technical and commercial aspects do not differ greatly between voice, SMS and data. Generally, operators send as much as possible of their voice, SMS and data traffic to one or two preferred network partners in each country based on a general agreement for voice, SMS and data. Agreements with more than one MNO in a single country address any gaps in geographic coverage.

Mobile network operators have a significant incentive to find roaming partners and to enter into bilateral wholesale agreements on a commercial basis in every market in which their users are likely to travel and in which their competitors have agreements; also, operators do not want to forego the opportunity to generate revenue from the customers of other operators roaming in their own country of operation. The bilateral roaming agreements are based on common principles developed by the *GSM Association (GSMA)*.<sup>6</sup>

Mobile markets in Europe continue to be primarily national in scope. MNOs compete with MNOs from other Member States for the same customers to only a limited extent, because IOTs, through their effect on roaming retail prices, make it effectively impossible for an MNO to win domestic mobile customers in a Member State where it cannot offer domestic prices.

<sup>6</sup> See Stumpf 2001, p. 5.

The most important GSM network components used to provide call routing and roaming capabilities when roaming internationally are the *Home Location Register (HLR)*, the *Visiting Location Register (VLR)*, and the *Mobile Switching Centre (MSC)*. In addition, signalling is needed to establish communication between the different network components to complete a roaming call. In a GSM network, the signalling system used is *Signalling System 7 (SS7)*.

### 2.1.2 Structural issues affecting the competitiveness of roaming markets

In the past, a number of structural issues were identified that caused mobile retail and wholesale roaming markets to be not effectively competitive, and which initially motivated regulation at the wholesale and retail levels. A key question for this study is the degree to which these are still relevant in light of the evolution of the market (see especially Section 2.1.3); beyond that, the study considers what the European market would look like today in the absence of a Roaming Regulation.

Well before the imposition of the Roaming Regulation, the following issues were felt<sup>7</sup> to contribute to excessive prices for mobile roaming:

#### Demand-side issues

- Lack of (or substantial imperfections in) retail roaming substitutes. Customers had no effective means of substituting for the roaming service.
- Inelastic demand for roaming services for a significant part of the customer base: only few subscribers chose their operator based on the roaming charges offered, because customers purchase roaming services as part of a bundle together with domestic subscription and domestic mobile services (SMS, MMS, handset subsidies, international calls), so that roaming charges make up only a relatively small part of the total price paid by a mobile subscriber.
- Lack of tariff transparency: If users are unaware of the actual prices, price reductions will not lead to a higher demand. Customers are only marginally aware of roaming charges, because the roaming share of customers' bills is intermittent and is unlikely to be high relative to the year's total bill. Also, customers lack timely and readily available information to enable cross-operator comparisons. Another characteristic of roaming services is that they involve use of many different visited networks, so even high volume users may gain only a minor benefit by reductions in wholesale roaming charges on the part of a particular operator (if passed through).

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<sup>7</sup> Cf. Stumpf 2001.



## Supply-side issues

- Natural oligopoly structure, which fostered low intensity of competition.
- Imperfect wholesale roaming substitutes: Limited alternatives to roaming relationships other than call-back applications, which by-passed the roaming agreement framework.
- The absence of targeted traffic redirection until 2003<sup>8</sup>: Home MNOs had no control over visited network selection, which rendered demand for roaming price-inelastic and disincentivised home operators to negotiate preferred roaming status or to grow roaming traffic (the lack of the ability to attract traffic by lowering the interconnection charges is a core cause of high roaming charges). Consumers were unlikely to manually choose the MNO in the visited country due to ignorance of roaming prices and conditions.

Section 2.1.3 considers whether any key structural changes have occurred in the market that changed the characteristics of the roaming market.

### 2.1.3 Key structural changes that have occurred in roaming markets

A number of key changes have taken place that have affected both the demand and supply side in the past few years. We have attempted to carefully assess the relevance of these changes individually and collectively for this study. Many of the changes are discussed in greater detail in later chapters.

Considering the structural issues identified above one by one, we could observe:

- Mobile markets are somewhat less concentrated than they once were. Europe has dozens of mobile operators today. Many Member States have three or four MNOs.
- A number of (highly imperfect) roaming substitutes have emerged at the retail level such as VOIP telephony, WiFi hotspots, dual SIM handsets, and local, regional and “global” SIM cards, which have enabled (some) consumers to bypass high roaming prices. Awareness of such services, however, is not widespread among consumers, and substantial complexity is associated with the use of any of these alternatives.

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<sup>8</sup> See OECD Report 21 December 2009 “International Mobile Roaming Charging in the OECD Area”, p.9.

- Technological improvements have greatly enhanced the ability of the home network operator to steer traffic to alliance partners in other countries (notably with the ability to program SIM cards over-the-air). This development has facilitated / enabled the creation of mobile network operator groups or alliances, and has thereby led to internalisation of high wholesale roaming costs. This development may have benefited larger operators more than small ones.
- Market players indicate that traffic steering has led to more intensive negotiation over IOTs between large MNOs. We think that incentives in these negotiations are different for roaming net out-payers in comparison with those of net receivers, which may coincide with a North/South split into low- and high-tourist destinations. Whereas net out-payer MNOs may view roaming as a net cost, and therefore might pursue a reduction in wholesale rates through bilateral negotiation or internalisation, net receivers will tend to prefer high wholesale rates.
- Roaming Hubs such as Vodafone Roaming Services and Telefonica Roaming Services have emerged at the wholesale level, which have enabled smaller operators to outsource the administratively costly and burdensome roaming service completely. The implementation of roaming at the wholesale level exhibits strong economies of scale, so that a smaller operator faces higher unit costs.
- Wholesale roaming substitutes have emerged such as internalisation (e.g. Vodafone's Passport, Hutchison's "3 at home"), and localisation (global MVNOs such as Truphone); however, the effectiveness of substitutes overall appears to still be limited.
- Inelastic demand, especially for voice and SMS, is still an issue for consumers. Data demand is probably somewhat more elastic. The elasticity differs between large corporate customers, some of whose employees are frequent roamers, and residential customers, who only occasionally roam depending on their travel. There are also differences between pre-paid and post-paid consumers, with the latter showing a lower elasticity.
- Transparency in Europe has been greatly enhanced by the Roaming Regulation.

These structural changes have contributed to somewhat improved conditions in roaming markets. Nonetheless, many of the conditions that led to the initial roaming regulation – including a lack of effective substitutes to the roaming service, and low consumer demand elasticity – remain.

## 2.2 Regulatory Context

This section provides regulatory context. Section 2.2.1.1 describes the motivation for the Roaming Regulation; Section 2.2.1.2 summarizes the Regulation (as amended).

### 2.2.1.1 Rationale for the Roaming Regulation

Prior to the Commission's Roaming Regulation, retail and wholesale mobile roaming charges for voice, data and SMS were widely felt to be excessive when compared to their underlying costs of provision, and equally excessive when compared to the retail price of domestic mobile voice calls, data, and SMS. They were also felt to be excessively high in comparison with international non-roaming charges for international calls, data and SMS from the fixed and mobile networks. Moreover, the high prices were not justifiable on the basis of true underlying costs.

Many Europeans tended to avoid using their mobile phones when travelling outside of their home Member State in order to avoid incurring mobile roaming charges.<sup>9</sup> This behaviour was rightly viewed as an impediment to the European Single Market.

The Commission's 2007 Roaming Regulation, together with its extension in 2009, has resulted in a very substantial reduction in these prices; nonetheless, prices continue to be high in comparison with domestic mobile prices, even with the Roaming Regulation in place.

The wholesale rates charged by mobile operators clearly contribute to these high prices, but the mark-ups on retail prices compound the problem (even though the retail mark-ups are not necessarily higher in percentage terms than those on other retail mobile services). The OECD Report on International Roaming Charging finds that the wholesale roaming rate makes up around three quarters of the retail rate in OECD countries, amounting to two to three US\$ per minute and sometimes in excess of four US\$.<sup>10</sup> (Roaming prices within Europe under the Roaming Regulation as amended are, of course, much less.) Given that the wholesale price is enormously in excess of cost, the retail mark-up also bears little relation to the true underlying cost.

Consequently, retail and wholesale roaming charges have been on the agenda of regulatory authorities for some time, not only because prices are high but also because regulation of international roaming is more complicated than regulation of other telecom services. Simple inclusion of mobile roaming among the markets susceptible to *ex ante*

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<sup>9</sup> Eurobarometer (2006), *Roaming Summary*, Special Eurobarometer no. 269, based on data from September to October of 2006. 63% of respondents in the EU-25 used the same SIM card when travelling, but used the mobile phone less than when at home. Based on other responses, this behaviour was clearly a response to inflated prices.

<sup>10</sup> See OECD Report on International Mobile Roaming Charging in the OECD Area, December 2009 (DST/ICCP/CISP(2009)8/Final).

regulation when the European regulatory framework was initially put in place in 2003 was insufficient to address distortions in the mobile roaming market, because Member State NRAs were not individually able to demonstrate SMP at national level in this complex and inherently trans-national market.

#### 2.2.1.2 The Roaming Regulation

With the aim of reducing roaming rates at both wholesale and retail, the European Roaming Regulation came into force in June 2007. It was subsequently amended and enhanced with Regulation (EC) No 544/2009 of 18 June 2009, which came into force on 18 July 2009. The regulation as amended comprises the following elements for voice, SMS, and data services:

- MNOs must offer a Eurotariff with per-minute charges only for roaming within Europe as the default roaming plan. The retail charge (excluding VAT) of the Eurotariff may not exceed EUR 0,49 per minute for any call made or EUR 0,24 per minute for any call received. The price ceiling for calls made decreased to EUR 0,46 and EUR 0,43, and for calls received to EUR 0,22 and EUR 0,19, on 30 August 2008 and on 1 July 2009 respectively. The Eurotariff price ceiling for calls made shall further decrease to EUR 0,39 and EUR 0,35 and for calls received to EUR 0,15 and EUR 0,11 on 1 July 2010 and on 1 July 2011 respectively. (Article 4 (2))
- The average wholesale charge that the operator of a visited network may levy from the operator of a roaming customer's home network for the provision of a regulated roaming call originating on the visited network, inclusive of origination, transit and termination costs, may not exceed €0,30 per minute. Maximum wholesale charges decreased to €0,28, €0,26, €0,22 and €0,18 on 30 August 2008, 30 August 2009, 1 July 2010, and 1 July 2011, respectively.
- With effect from 1 July 2010, home providers were not permitted to levy any charge from their roaming customers for their receipt of a roaming voicemail message. (Ibid)
- With effect from 1 July 2009, the average wholesale charge that the operator of a visited network may levy from the operator of a roaming customer's home network, for the provision of a regulated roaming SMS message originating on that visited network, was not permitted to exceed EUR 0,04 per SMS message. (Article 4a)
- With effect from 1 July 2009, MNOs must provide a Euro-SMS for roaming within Europe as the default roaming plan. The retail charge (excluding VAT) of the Euro-SMS tariff may not exceed EUR 0,11. Home providers are not permitted to levy any charge from their roaming customers for their receipt of a roaming SMS message within Europe. (Article 4b)

- The Regulation also establishes a number of transparency obligations. When a customer enters a Member State other than that of his home network, the home MNO must provide the customer, automatically by means of a Message Service and without undue delay and free of charge, with basic personalised pricing information on the roaming charges (including VAT) that apply to the making and receiving of calls and to the sending of SMS messages by that customer in the visited Member State (unless the customer has notified his home provider that he does not require this service). (Article 6)
- From 1 July 2009 at the latest, the home provider must provide an automatic message when a customer enters a Member State other than that of his home network and unless the customer has notified the home MNO that he does not need this service, to inform the roaming customer that he is roaming and to provide basic personalised tariff information on the charges applicable to the provision of regulated data roaming services to that roaming customer. To this end, the home provider must make available one or more maximum financial limits for specified periods of use, provided that the customer is informed in advance of the corresponding volume amounts. One of these limits (the default financial limit) must be close to, but not exceed, EUR 50 of outstanding charges per monthly billing period (excluding VAT). As of 1 July 2010, the default limit must be applicable to all customers who have not opted for another limit. (Article 6a)
- With effect from 1 July 2009: (a) the average wholesale charge that the operator of a visited network may levy from the operator of a roaming customer's home network for the provision of regulated data roaming services by means of that visited network shall not exceed a safeguard limit of EUR 1,00 on 1 July 2009, EUR 0,80 on 1 July 2010 and EUR 0,50 on 1 July 2011 per megabyte of data transmitted. (Ibid)

### 3 Competitive Pressures and substitution

Since 2003, the roaming market has undergone significant change. While at the retail level, a number of imperfect substitutes emerged such as VOIP telephony over mobile phones, WiFi hotspots, and global and regional SIM cards, the wholesale level has seen the emergence of internalisation and localisation.

One of the most important drivers of wholesale level internalisation has been over-the-air SIM programming, which enabled mobile operators to steer traffic to a preferred network partner and thus to direct their roamers toward the visited network with the lowest wholesale rates. (Market players claim that traffic steering is in practice 90-95% effective; it cannot be 100% effective, because there are typically gaps in the visited network's coverage.) MNOs claim that traffic steering has introduced some competitive pressure into the wholesale market.

Most of these developments were already visible in the market prior to the introduction of the Regulation, but they may have developed further in the intervening years.

A key question for this study is whether the developments in the roaming market in recent years are sufficient to justify a different approach to regulation.

#### 3.1 Substitution at the retail level

Our interviews made clear that a small group of price-sensitive consumers use a number of different means to make local and international calls while travelling, as the development of alternative calling procedures for roaming based on new emerging technologies are becoming more seamless; however, all interviewees felt that current alternative means of substitution were less than fully effective as mass market solutions.

As set out in Table 1, substitute services that have experienced some market exposure to date include fixed line phones such as a hotel phone or a payphone, often in connection with an international calling card. An increasing number of consumers make VoIP calls using a free WiFi hotspot. Some may have subscribed to an on-net pre-pay or post-pay roaming service (such as "Passport", "Like Home", or "One Network").<sup>11</sup> Consumers can purchase a local SIM card while travelling in a particular country, or they can take up a service offered by a global or regional MVNO.

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<sup>11</sup> This can have a significant effect on smaller operators or operators without an extensive network of foreign affiliates.

Table 1: Substitutes for international roaming services<sup>12</sup>

1	Public Telephones (pay phone, phone in hotel etc.)
2	International Calling Cards (used on fixed or mobile phones)
3	VoIP using free WiFi hotspots
4	Local Prepaid SIM Cards
5	Regional SIM Cards
6	Global SIM Cards with or without local numbers
7	Dual SIM Cards enabled Handsets or Adapters
8	Non-voice alternatives such as prearranged messaging
9	Satellite Roaming

The experts whom we interviewed did not rate the substitutes as viable alternatives overall. Even though these services are only imperfect substitutes, uptake (albeit limited) suggests that there are price sensitive consumers with elastic demand for such services.<sup>13</sup>

The main inhibiting factors for uptake of alternative roaming services (in particular global and regional SIM cards) are lack of consumer awareness, complexity of usage for customers, language barriers, and low brand recognition among consumers as regards the service providers. Indeed, a general problem with any substitute that has to be purchased in the visiting country is that it imposes high *search costs* on the consumer – the consumer is effectively obliged to become knowledgeable about prices and services *in each visited country*.<sup>14</sup>

In order to determine whether existing and potential roaming substitutes are able to constrain the international roaming service enough to render continued regulation unwarranted, it is important to understand the characteristics of the mobile roaming service, which is by its nature always available (except when the network is down), relatively stable (low drop rates – this is network-dependent), and convenient (accessible everywhere, provided that there is network coverage and that a roaming partner agreement is in place between operators). A further advantage is that the mobile user can be called or SMSed on the usual number, even when out of the

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<sup>12</sup> See OECD Report 21 December 2009 “International Mobile Roaming Charging in the OECD Area”, pp.85-93.

<sup>13</sup> Ibid., pages 31-34.

<sup>14</sup> See Ana Amante and João Varela, “Improving consumer mobility in telecoms markets: a comprehensive set of remedies”, presented at ITS 2010 in Copenhagen. They define search costs as “...the set of costs faced by a consumer when trying to identify and understand alternative offers’ characteristics. They result from a lack of information transparency and from the consumers difficulties when comparing offers terms and conditions.” Their survey results found that these costs are among the highest faced in changing a fixed, mobile or broadband service.

country, and that the caller (who does not necessarily know where the called party is) does not pay a premium to make the call. Mobile Network Operators felt that none of the listed alternatives could be viewed as fully effective substitutes.

We discuss IP-based substitutes in Section 3.1.1, substitutes based on calling arrangements or SIM cards in the visited country in Section 3.1.2, global or regional SIM cards or solutions in Section 3.1.3, and conclude with a brief summary in Section 3.1.4.

### 3.1.1 Substitutes based on the Internet Protocol (IP)

The only alternative that was consistently associated with real growth potential was the use of WiFi hotspots in connection with data and VoIP; however, this is a substitute only where WiFi is available, it typically requires the user to arrange payment for the WiFi service, it requires some sophistication on the part of the user, and it is not a truly mobile solution.

In the medium to long term, and on purely technical grounds, one should logically expect VoIP to replace conventional voice in mobile networks, and IP-based messaging to replace conventional SMS. To date, MNOs have been reluctant to move in that direction, presumably because it potentially calls their revenue model into question.<sup>15</sup>

Users can, of course, implement VoIP services in smart handsets themselves, if they are not intentionally blocked by the MNO. With the increasing prevalence of smart handsets, this option is potentially available to more and more consumers. Research on the effects on consumer behaviour is at an early stage, but one recent empirical study found no tendency for mobile Internet use to depress the use of mobile voice, and only a small (but statistically significant) tendency for it to reduce SMS usage.<sup>16</sup>

There might possibly be scope for targeted policy initiatives that seek to improve the effectiveness of VoIP as a substitute. Some MNOs historically made it difficult for the user to implement VoIP in handsets (especially in subsidised handsets), although our perception is that this has become less prevalent in recent years. In any case, policy initiatives to strengthen the rights of consumers to run VoIP and messaging applications in handsets capable of doing so could be considered, either in the context of the review

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<sup>15</sup> See Marcus et al., *The Future of IP Interconnection: Technical, Economic, and Public Policy Aspects*, March 2008, a study prepared for the European Commission, available at: [http://ec.europa.eu/information\\_society/policy/ecom/doc/library/ext\\_studies/future\\_ip\\_intercon/ip\\_int\\_ercon\\_study\\_final.pdf](http://ec.europa.eu/information_society/policy/ecom/doc/library/ext_studies/future_ip_intercon/ip_int_ercon_study_final.pdf).

<sup>16</sup> Torsten J. Gerpott, "Impacts of mobile Internet use intensity on the demand for SMS and voice services of mobile network operators: An empirical multi-method study of German mobile Internet customers", *Telecommunications Policy*, Volume 34, Issue 8, September 2010.



of the Roaming Regulation, or alternatively by the Commission or the NRAs under the authority provided in paragraph 4(g) of Article 8 of the Framework Directive.<sup>17</sup>

The attractiveness of VoIP over the mobile data roaming service might also tend to increase if data roaming prices continue to decline, and provided that MNOs do not block this option. Data roaming prices are likely to continue to decline, with or without regulatory action.

Even under the best of circumstances, however, it is unlikely that many consumers would tend to prefer IP-based alternatives over mobile roaming. In the case of voice, the service simply works everywhere, no special setup is required, and users can rely on consistent voice quality. The same is not true for VoIP-based services.

The case against email as a substitute for SMS is perhaps even more compelling. In Europe, the user can expect SMS to work with no special setup whatsoever, and to interoperate with all networks. The user need not be concerned with whether the recipient's phone is capable of displaying HTML-formatted messages, or whether it is the same brand as that of the sender. Even for a user with an email-capable phone and a mobile plan that includes data, setting up the email service the first time (if the user has not already done so) can be quite complex.

This is arguably becoming easier over time thanks to the increasing availability of touch screen mobile phones, wizards for major email providers, and pay-per-day data plans; nonetheless, for most users, the simplicity of tapping out a message to any friends whose mobile number one knows is hard to beat.

Japan provides an interesting counterexample; however, it might be viewed as the exception that proves the rule. Japan was one of the first countries to deploy SMS capability, but email has almost completely replaced SMS there. One interviewee suggests that Japan differs from Europe because (1) SMS is *not* ubiquitously effective – the MNOs have stubbornly refused to support SMS messages to and from other networks; and (2) smart handsets with email capability are in almost universal use.

### 3.1.2 Solutions specific to the visited country

It is apparent that services such as public telephones, calling cards, or VoIP using WiFi are only imperfect substitutes, as they do not display the characteristics of always available, stable and convenient. Most importantly, none of them are truly mobile.

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<sup>17</sup> This 2009 text lays down the objective of "... promoting the ability of end-users to access and distribute information or run applications and services of their choice."

The purchase of a local SIM tends not to be a perfect substitute, as customers incur the real and transaction costs of making the purchase, keeping the SIM current, and having to deal with a new number. They also have to deal with one of several inconveniences: physically swapping the SIM, carrying an extra (typically unlocked) handset, or purchasing a dual SIM handset.<sup>18</sup>

A number of interview respondents felt that a local SIM was a quite reasonable substitute for data-only roaming, and we do not disagree. In that case, the user need not concern himself with a phone number; however, the user still needs to understand the available offers, and associated prices, in any country where he wants to avail himself or herself of a data-only SIM.

With regard to new technology-based services, the most practical potential substitute is a dual SIM card enabled handset, which allows the user to make use of a second mobile network without paying roaming fees and without the need to carry a second handset. Some interviewees felt that dual SIM enabled handsets were a potentially attractive option; however, MNOs do not choose to offer them, precisely because there is no incentive for them to do so. The main advantage of the dual SIM handset is the ability to effectively cannibalise the MNO's revenue stream. Given that handsets other than dual SIM tend to be subsidised, the consumer is disincented to acquire a dual SIM enabled handset. Consumers may also be understandably reluctant to have two (or more) different providers of wireless services. Today, dual SIM enabled handsets would tend to be of interest primarily to sophisticated consumers who have either high roaming bills or else a strong need to benefit from on-net off-net price discrimination in more than one network. This will tend to be especially true for consumers or businessmen who travel primarily in just one or two Member States.

Dual SIM handsets are used to a greater degree outside of the EU, not only for purposes of combining private and business phones, but also for purposes of providing affordable roaming services – Mayfri Mobile (a subsidiary of Mayfri Consulting)<sup>19</sup> launched its Free Roaming Dual SIM Card with a UK and USA number into the Nigerian market on 31 December 2009; UK-based Travel SIM offers international free roaming to a number of countries.<sup>20</sup> While dual SIM handsets initially required the user to manually switch from one SIM to the other, technological developments now enable switching automatically between the two SIMs, which makes the dual SIM service more seamless and less disruptive for the consumer.

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<sup>18</sup> This option is, of course, not new. Eurobarometer (2006) found that only 3% of Europeans purchase a new SIM card when travelling in another Member State.

<sup>19</sup> see: <http://www.prlog.org/10471375-free-roaming-dual-sim-card-launched-in-nigeria.html>.

<sup>20</sup> see: <http://www.travelsim.co.uk/>.

### 3.1.3 Global and regional SIM cards

Other developments include global MVNOs that offer always-on roaming services, which operate with the help of software on the basis of least-cost routing “global” SIM cards. Global SIM cards are pre-paid SIM cards specifically designed for international mobile roaming users. They provide consumers with relatively less expensive outbound (and often free inbound) calls through an automated call back process. A local network identity is assigned to the travelling user such that the user is logged onto the network with a local identity rather than with an identity of the home network. This is a service that bypasses relatively high prices for international calls made from mobile networks. It represents a substitute that bypasses the roaming system and its attendant IOT payments.

There are a number of variations as regards global SIM cards, many of which are used in conjunction with a call-back technique for outgoing calls. Global SIM providers such as MAXroam<sup>21</sup> may also provide the customer with a local fixed number for the country within which the user is roaming, to which the user’s mobile number is forwarded. This enables the roaming customer to receive local calls, and enables callers to be charged local fixed call charges for making a call to the global SIM user. Other options include issuing local numbers for a variety of different countries to the user – Truphone offers a “Local Anywhere”<sup>22</sup> service, which allows customers to have one SIM card and provides local prices for roaming services with the possibility to add multiple “home” destinations at local rates (see Section 3.2.2).

There are also regional SIM Card offers, which cover a number of countries and issue one local number per country, enabling the user to make local calls in all the countries that he or she subscribes to, making calls at local charges and receiving calls for free. Incoming calls may be coupled with a time limit, in excess of which there is a per minute charge.

A number of these international or regional SIM solutions are based on *multi-IMSI SIM cards*. It is possible for a SIM to support more than one subscriber identity (IMSI), such as a UK and a US identity. A multi-IMSI SIM can offer roughly the same advantages as a dual-SIM handset, without the inconvenience of purchasing and carrying a special handset. There are clear advantages to this approach, but the user still needs to carefully consider which phone number to give to which associates, and under what circumstances, and whether to forward his or her other mobile numbers (if any).

Given that the service provider typically needs to make arrangements for each country, these arrangements are typically on offer only in a limited number of countries, and may offer different discounts in different countries (see also Section 3.2.2).

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<sup>21</sup> see: <http://www.maxroam.com/>.

<sup>22</sup> see: <http://localanywhere.truphone.com/country.aspx?page=/Default.aspx>.

Each of these solutions can be attractive for users who have a particular profile of roaming requirements, but each of them suffers from significant initial *learning* and *search costs*. The plans are relatively new, and have not yet established well known, trusted brands. The user needs to understand his or her own roaming pattern – does the user travel mostly in one or two countries, or does he or she travel unpredictably in a great many? The user presumably needs to understand which plans are available, for which visited countries, with which features, and at which prices. They need to understand how those prices compare (in each visited country) to the prices routinely available from their domestic provider, and also how the prices and practicality compare to other alternatives. They may need to understand what handsets are supported for a particular global or regional plan, since some of these capabilities are not exactly standard. They may have to download special applications to their handset.

For certain sophisticated users, these global or regional SIM approaches are becoming increasingly practical and promising. For most users, however, we think that the complexity is probably too great. In addition, the uncertainties in understanding what one is likely to pay in a given scenario are likely to be daunting for the typical consumer; however, we do not rule out that these alternatives might become progressively more effective over time.

#### 3.1.4 Overall assessment

Our assessment is consistent with that of nearly all of the stakeholders whom we interviewed: Substitutes at the retail level to-date are imperfect, and are used by only a small subset of primarily price-sensitive and sophisticated users. These alternative calling procedures are unlikely to serve as widespread mass-market substitutes. Consumer awareness, brand recognition, and user-friendliness would have to increase significantly, and consumer search costs would have to decrease, for any of these alternative calling procedures to become a credible overall mass market substitute for the roaming service.

### 3.2 Substitution at the wholesale level

As regards developments at the wholesale level, a number of changes have taken place that are noteworthy. The emergence of internalisation and localisation present first developments that have had an impact on the level of IOTs, and the first that have introduced some competitive pressure into the wholesale roaming market. Otherwise, callback applications are still the closest substitute to wholesale roaming. Callback is still imperfect, as it is of limited value for mobile-originated calls to destinations outside of the subscriber's home country.

### 3.2.1 Internalisation

Prior to 2003, customers roaming away from their home country were almost randomly distributed over all of the visited country's mobile networks, a technical condition which was hardly conducive to competition. Due to the adoption and introduction by European MNOs of more sophisticated traffic steering techniques, enabling them to direct the traffic generated by their customers abroad to a mobile network of their choice in the visited country (typically the operator requiring the lowest IOT), operators achieved a greater degree of control regarding the apportionment of outbound traffic to foreign networks.<sup>23</sup> This has exerted some competitive pressure in terms of directing roamers toward the network with the lowest wholesale rate, which in turn incentivised home operators to negotiate preferred roaming status. This has led to the formation of roaming alliances such as “Free Move”, “Starmap” and “Bridge Alliance”<sup>24</sup> and preferred roaming partner agreements. It should be noted that internalisation has been of particular interest to large mobile network operators that are net out-payers (at least on some routes), given that roaming represents a cost to them rather than a source of revenue at the wholesale level. In our view, the character of these negotiations is important in terms of understanding the likely future evolution of the roaming marketplace; consequently, we take a harder look at them in Section 4.

Where operators have achieved lower IOTs, either by means of alliances or by means of negotiations on a bilateral basis, they could potentially pass (some of) these savings along to consumers in the form of discounts at retail level; however, our assessment is that the incentives to pass the savings along to consumers are weak (see Section 4.3).

Roaming alliances mainly formed in response to Vodafone, with its high network presence across the globe, and to Vodafone's introduction of “Passport”<sup>25</sup>. Competitive responses include T-Mobile's “Smart Traveller”, and Hutchison 3's “3 Like Home”, which enabled subscribers to roam on Hutchison 3's shared ownership networks at home rates but without a fixed per call fee. These offers proved very successful with customers (Passport has since acquired 25 million customers). Other operators followed suit; however, a number of MNOs, including net-receivers, did not follow suit (or perhaps were not able to due to lack of scale). These operators typically offered discount plans instead based on bilateral IOT negotiations.

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<sup>23</sup> Interviewees felt that traffic steering today is 90 – 95% effective.

<sup>24</sup> “FreeMove” and “Bridge Alliance” are alliances between MNOs that did not have an extended international network presence. The main aim of the alliances are to negotiate volume discounts on the IOTs to partnership members. FreeMove includes 32 countries across Europe, the United States, and Brazil whereas Bridge Alliance comprises operators of the Asia-Pacific region.

<sup>25</sup> Passport is a roaming service offered by Vodafone since 2005, where customers pay a set-up charge per call of 70 cents and then incur per-minute fees based on their home tariff.

A relatively new development is the establishment of roaming hubs by larger operators (e.g. such as Vodafone and Telefonica) to achieve economies of scale and to streamline technical and administrative processes related to wholesale roaming. Roaming activities for the whole group of companies are centralised and jointly managed by one entity. This includes all technical (i.e. routing of signalling traffic, quality of service monitoring) as well as commercial aspects such as wholesale contract negotiation of basic roaming agreements, as well as other management services. Many mobile groups feel that centralised negotiation of IOT discounts provides greater bargaining power.

Roaming hubs offer wholesale roaming services to smaller operators, who, due to the high administrative cost burden, decide to outsource wholesale roaming completely. Given that roaming is not a key business (even though it has high profit margins), in particular for smaller operators where roaming accounts for an even smaller proportion of revenue than for larger operators, the administrative cost burden is relatively higher. Moreover, small MNOs may have only limited prospects (for reasons of network coverage or quality) of serving as a visited network and thus collecting substantial IOTs. The costs of bilateral negotiations and of subsequent changes to hundreds of contracts are approximately the same for larger and smaller operators, thus presenting a much higher unit cost burden on smaller operators.

### 3.2.2 Localisation

The need to negotiate better IOTs on the part of home network operators has also become more important due to *localisation* trends or the emergence of *global MVNOs*. “Global” in this sense may not be truly global. A global MVNO has access to networks in different countries on local terms and conditions based on domestic wholesale agreements or MVNO regulations. They rely on the cooperation with MNOs, whether based on commercial arrangements or on regulated access conditions. They typically use their own infrastructure to interconnect their customers at local terms and conditions, thereby bypassing the IOT system. Thus, localisation refers to the situation where service providers such as MVNOs offer international call services under local conditions, typically by assigning to their subscribers local identities (numbers) for each country the subscriber plans to travel in, provided that the MVNO has a local presence there (or an arrangement with another MVNO). As previously noted, the underlying wholesale arrangement is independent of the expensive IOT system, since global MVNOs simply pay domestic wholesale rates rather than wholesale roaming rates. At the retail level, this enables local pricing for roaming services. Services offered by MVNOs do not constitute a roaming service, strictly speaking, but they substitute for the roaming service.

One example is Truphone<sup>26</sup>, a company that offers a service called “Local Anywhere” to business customers. Truphone offers a domestic call origination and termination service, with Truphone’s customers being hosted on an MNO’s MVNO platform and being allocated local IMSIs. This is a service that provides subscribers with local rates in all Truphone countries, and with competitive roaming rates in non-Truphone countries. The subscriber gets a mobile number for his home country as standard, and can add local country numbers to his SIM for £5 or \$8 or €5 a month. The subscriber can be reached on these numbers wherever he is. Current home countries available are the UK and USA. A number of other countries are due to be added during 2010, including Australia, Spain, Hong Kong, and the Netherlands<sup>27</sup>. Truphone also provides Truphone applications. The website does not provide detailed information about what the subscriber is required to do in terms of taking up a Truphone service, but it appears that it currently works in combination with a limited number of (unlocked) handsets, including iPhone, iPod Touch, iPad, Nokia, Android and Blackberry.

Global MVNOs target a niche market of mainly business customers and subscribers, who then have to accept and pass on different numbers to business associates for each country they travel to. Given this level of inconvenience, it is unlikely that global MVNOs will develop into a fully effective roaming substitute for the mass market of residential users; however, global MVNOs might become popular with businesses whose employees travel often to same locations.

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<sup>26</sup> <http://www.truphone.com/local-anywhere/about.html>

<sup>27</sup> <http://www.truphone.com/business/services.html>

## 4 Assessment of roaming market developments

While Section 3 provided an overview of competitive pressures in the form of substitutes at the retail and wholesale level, this section sets out our assessment of the roaming market developments, including developments in wholesale and retail charges for the provision of voice, SMS and data roaming services, as well as an assessment of the introduction and take-up of roaming packages regarding the regulated Eurotariff and Euro-SMS as well as alternative roaming offers available in the market.

### 4.1 Review of BEREC statistics

The Body of European Regulators for Electronic Communications has released its fifth report on international roaming on Europe's public mobile telephone networks. This study, which covers the period between 1 April and 31 December 2009, reveals a high level of compliance with the Regulation of roaming services (Regulation EC No. 717/2007 of 27 June, subsequently amended by Regulation 544/2009 of 18 June) in all the Member States of the European Union.

#### 4.1.1 Current market situation

The information compiled by BEREC indicates that all EU consumers have access to the new Eurotariff. Under the Eurotariff, the maximum price of intra-EU roaming voice communications is capped, in terms of communications received and communications made, by the regulation published on 27 June 2009. Since 1 July 2009, consumers have also had access to the Euro-SMS tariff, under which the price of an SMS sent using intra-EU roaming has also been capped, pursuant to the regulation.

The graphs below are taken from the BEREC Benchmark Data Report for the period April 2009 – December 2009<sup>28</sup>. All three figures show that the average price per minute for retail voice calls made and received, as well as the average price per minute for wholesale non-group<sup>29</sup> calls has come down since the introduction of the Regulation in 2007. Both the Eurotariff and the non-Eurotariff averages are below the Eurotariff cap; however, they are only marginally below the cap, suggesting that MNOs are not motivated to lower prices substantially below the level of the cap.

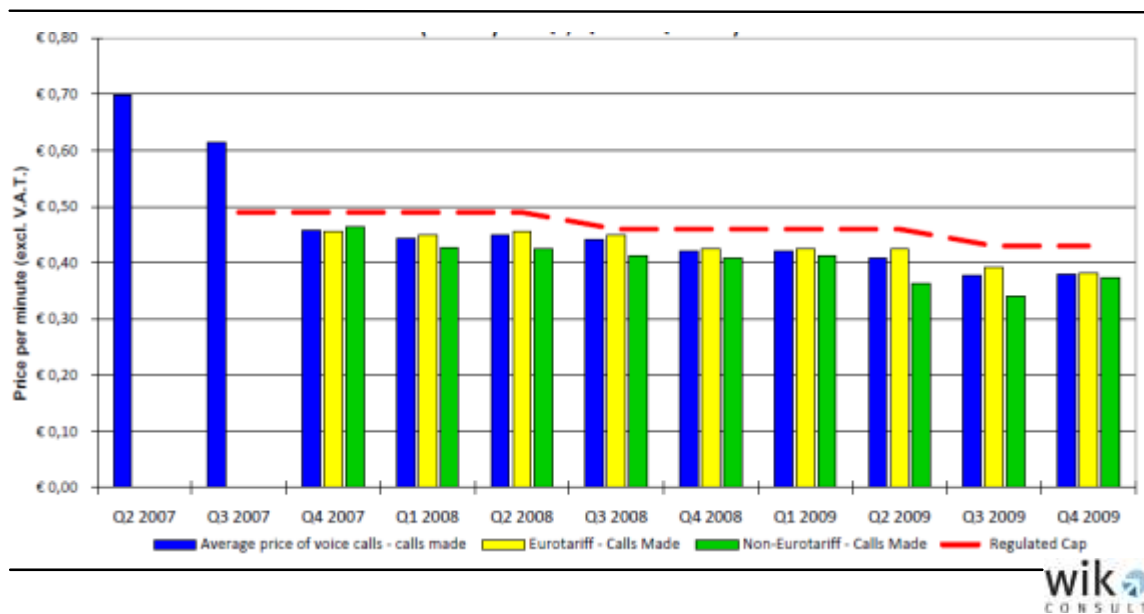
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<sup>28</sup> BEREC, *BEREC International Roaming Benchmark Data Report for April 2009 – December 2009*.

<sup>29</sup> These are roaming calls placed or received through a mobile network operator that is not part of a group with mutual agreements to restrict wholesale prices to one another.

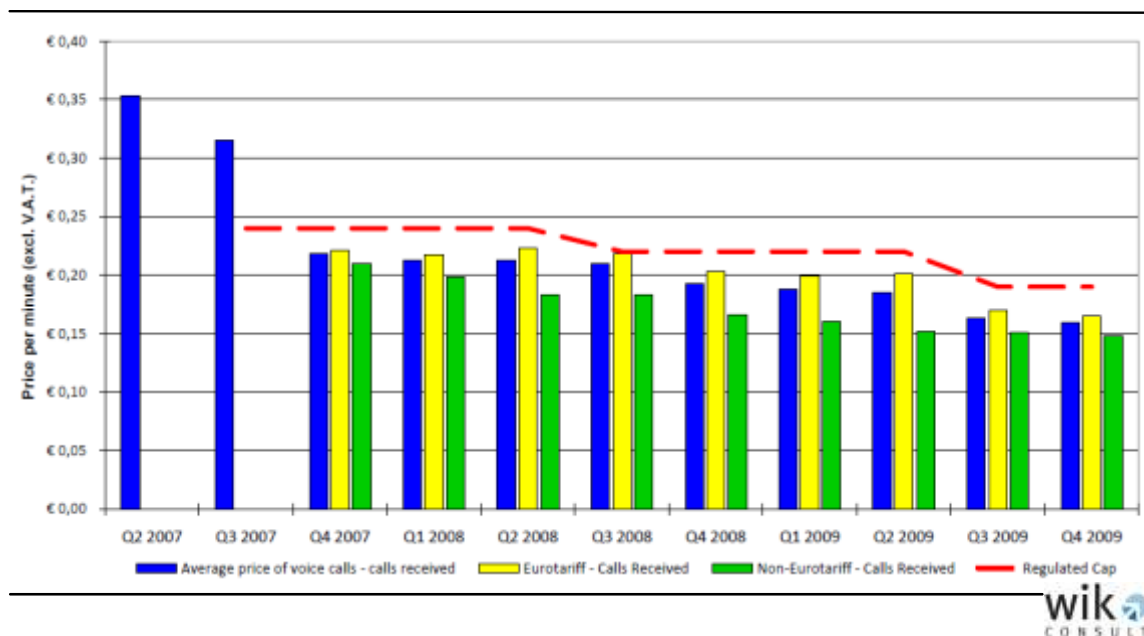


Figure 3: EU/EEA average prices per minute for retail voice calls made<sup>30</sup>



Source: BEREC International Roaming Benchmark Data Report for April 2009 – December 2009

Figure 4: EU/EEA average prices per minute for retail voice calls received<sup>31</sup>

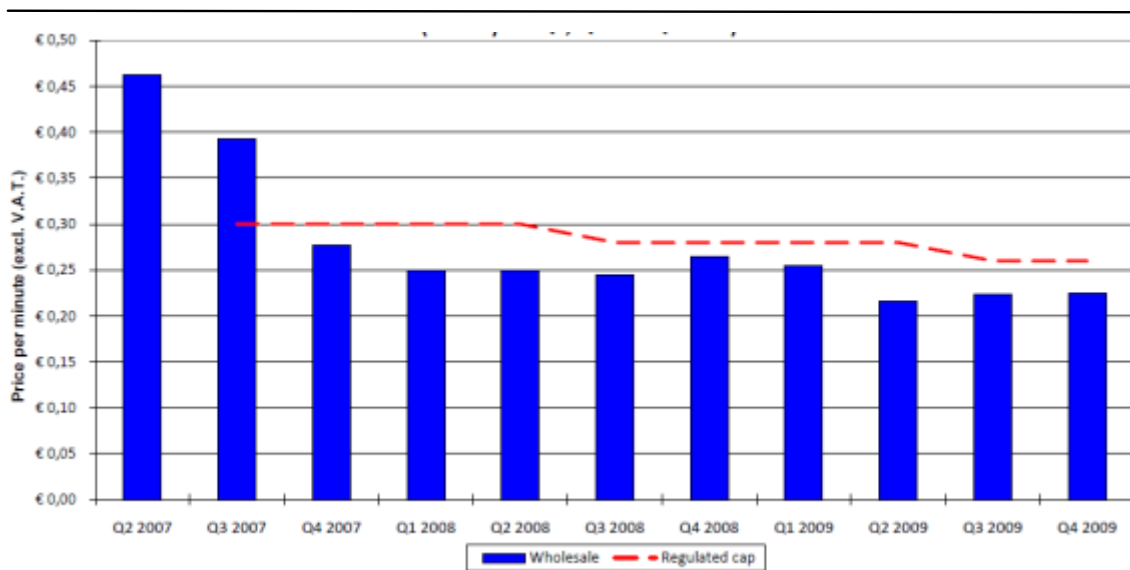


Source: BEREC International Roaming Benchmark Data Report for April 2009 – December 2009

<sup>30</sup> EU only for Q2 through Q4 of 2009.

<sup>31</sup> EU only for Q2 through Q4 of 2009.

Figure 5: EU/EEA average prices per minute for wholesale non-group calls<sup>32</sup>



Source: BEREC International Roaming Benchmark Data Report for April 2009 – December 2009

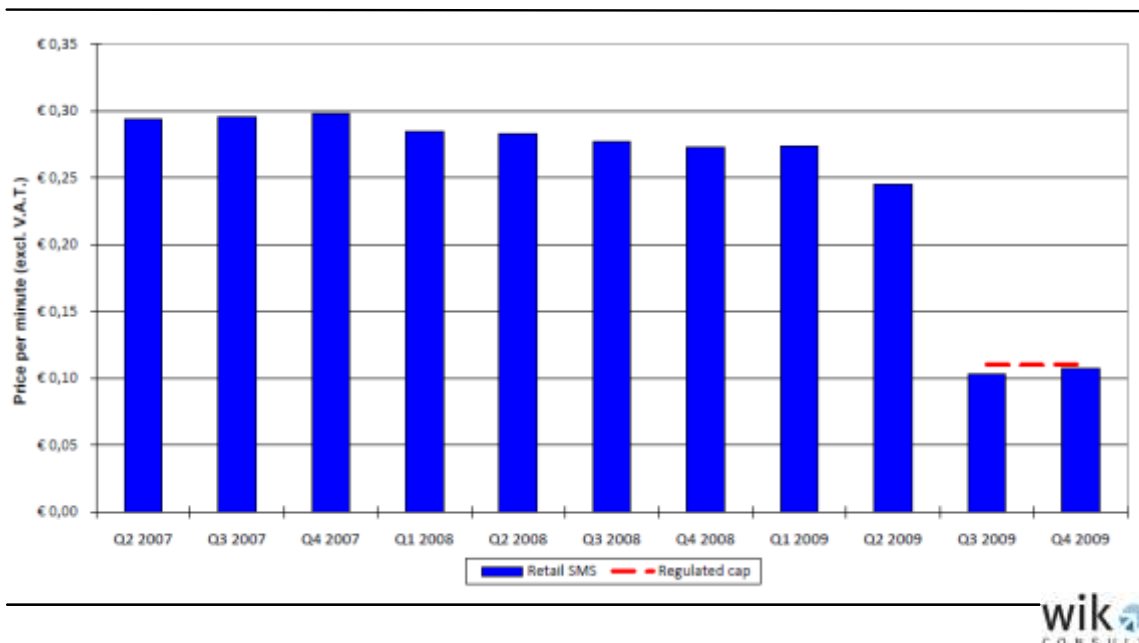
In terms of calls made, the European average of the Eurotariff (calculated using the data of all the EU countries which responded to BEREC's questionnaire) fell from 0.425 euros per minute in the second quarter of 2009 (compared to a cap of 0.46 euros per minute then in force under the Eurotariff) to € 0.381 in the fourth quarter of 2009 (compared to a cap of 0.43 euros per minute currently in force under the Eurotariff). In terms of calls received, the European average of the Eurotariff fell from 0.201 euros per minute in the second quarter of 2009 (compared to a cap of 0.22 euros per minute then in force under the Eurotariff) to € 0.165 in the 4th quarter of 2009 (compared to a cap of 0.19 euros per minute currently in force under the Eurotariff).<sup>33</sup>

Figure 6 shows that the average price of sending an SMS while roaming fell dramatically in response to the entry into force of the amended Regulation, and the introduction of the Euro-SMS. The average price fell to approximately 0.10 euros/SMS in the last two quarters of 2009, slightly below the cap of 0.11 euros/SMS established in the Regulation. With only two quarters of data subsequent to the revised Regulation having come into effect, it is somewhat premature to attempt to assess demand elasticity; however, it is fair to say that there is no indication to date of any market dynamic beyond that imposed by the price caps established in the revised Regulation.

<sup>32</sup> EU only for Q2 through Q4 of 2009.

<sup>33</sup> BEREC, *BEREC International Roaming Benchmark Data Report for April 2009 – December 2009*.

Figure 6: EU/EEA average price per retail SMS<sup>34</sup>

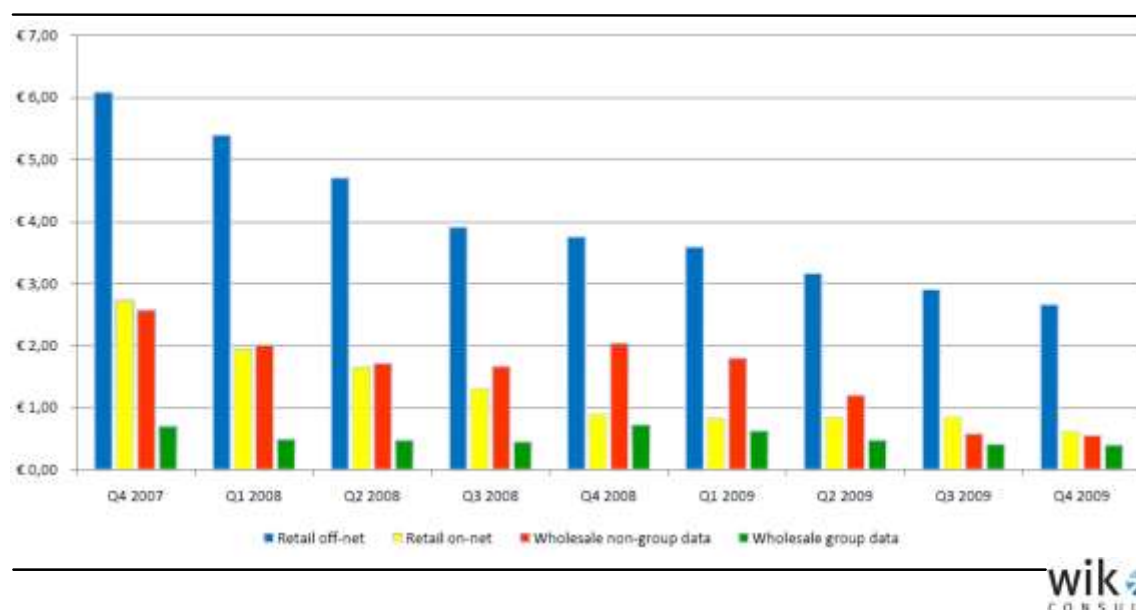


Source: BEREC International Roaming Benchmark Data Report for April 2009 – December 2009

Regarding roaming data services, Figure 7 reflects the response of the wholesale non-group rate to regulation, but the average wholesale non-group rate is substantially below the regulated maximum. At the same time, the average non-group retail prices (i.e. prices charged where the home network and foreign host network are not owned by companies within the same group) fell to € 3.165 in the second quarter of 2009, and to € 2.668 in the fourth quarter of 2009.<sup>35</sup> This is a complex picture – on the one hand, the decline in wholesale data prices is a clearly positive development; on the other hand, retail prices remain surprisingly high in the face of these declines in underlying costs.

<sup>34</sup> EU only for Q2 through Q4 of 2009.

<sup>35</sup> *ibid.*

Figure 7: EU/EEA retail and wholesale averages for data<sup>36</sup>

Source: BEREC International Roaming Benchmark Data Report for April 2009 – December 2009

Indeed, even though the retail off-net price has continued to decline, the ratio between the retail off-net price and the wholesale non-group charge for data has visibly *increased*. Phrased differently, this means that the spread between retail price and underlying wholesale cost has actually increased in percentage terms, implying once again that the linkage between cost and price for roaming services is surprisingly weak.

With this in mind, regulation to establish a maximum retail price for mobile data roaming could be considered, and indeed we have reflected this among the options discussed in Section 5 and 6 of this report. At the same time, we would caution that this is still a market that is relatively young, and rapidly evolving.

Once again, it would be somewhat premature to attempt to assess demand elasticity with only two quarters of data subsequent to the revised Regulation having come into effect. Unit price is declining, usage is increasing, but the increased usage reflects many factors – increased take-up of smart handsets may have more to do with increased mobile data usage than does the price per megabyte.

Overall, the BEREC data demonstrate good compliance with the Roaming Regulation. At the wholesale level, the tariffs defined between operators for roaming voice communications are in line with the caps established in the regulation, as is the case with wholesale tariffs applicable to the transfer of SMS and other data communication

<sup>36</sup> EU only for Q2 through Q4 of 2009.

services. In terms of voice communications, in the third and fourth quarters of 2009, following publication of the new regulation, the average wholesale tariffs were 0.223 euros/minute and 0.224 euros/minute respectively, compared to the new cap established at 0.26 euros/minute. In terms of SMS, it is noted that in the third and fourth quarters of 2009, the average wholesale tariffs in the EU were 0.042 euros/SMS and 0.039 euros/SMS, compared to the cap of 0.04 euros SMS. The average wholesale tariff applicable to data communications was 0.554 euros /Mb in the fourth quarter of 2009, compared to the cap of 1.00€/Mb.<sup>37</sup>

In summary, retail and wholesale tariffs have declined in line with the price caps and operators have complied with the regulation. Beyond that, some alternative tariff offerings to the Eurotariffs for voice and SMS and data are emerging and are offered by operators, as set out in Section 4.1.1.1, Section 4.1.1.2, and Section 4.1.1.3.

#### 4.1.1.1 Alternative voice and SMS retail tariffs

Some operators offer alternatives to the default Eurotariffs and Euro-SMS tariffs. The best known tariffs are those offered by large operators such as Passport<sup>38</sup> by Vodafone, or Smart Traveller<sup>39</sup> by T-Mobile, or “3 like home” by Hutchison<sup>40, 41</sup>. There are between one and seven operators per country that offer alternative tariffs, as shown in BEREC’s report on alternative Retail Voice and SMS Roaming Tariffs and Retail Data Roaming Tariffs.<sup>42</sup> Most of the alternative tariffs offered are per-unit voice-only tariffs, or bundles of per-unit voice and SMS.

In relation to the Eurotariffs, the level of alternative tariffs can be lower and the value to customers higher, depending on customer usage patterns and factors such as:

- magnitude of subscription or call set-up charge;
- billing units;
- average call duration;
- peak- and off-peak use; and
- travel patterns.

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<sup>37</sup> *ibid.*

<sup>38</sup> [http://online.vodafone.co.uk/dispatch/Portal/appmanager/vodafone/wrp?\\_nfpb=true&\\_pageLabel=templateBlank&pageID=OS\\_0100](http://online.vodafone.co.uk/dispatch/Portal/appmanager/vodafone/wrp?_nfpb=true&_pageLabel=templateBlank&pageID=OS_0100)

<sup>39</sup> <http://www.t-mobile.de/business/smarttraveller/0,19592,21899-,00.html>

<sup>40</sup> [http://www.drei.at/portal/de/privat/service/3\\_like\\_home/3\\_Like\\_Home.html?utm\\_source=Startseite\\_Small&utm\\_medium=Banner&utm\\_term=int\\_3\\_Like\\_Home&utm\\_campaign=int\\_3\\_Like\\_Home](http://www.drei.at/portal/de/privat/service/3_like_home/3_Like_Home.html?utm_source=Startseite_Small&utm_medium=Banner&utm_term=int_3_Like_Home&utm_campaign=int_3_Like_Home)

<sup>41</sup> This service is no longer available for UK customers on the UK 3 Network. See [http://wapedia.mobi/en/Hutchison\\_3G](http://wapedia.mobi/en/Hutchison_3G)

<sup>42</sup> [http://www.irg.eu/streaming/BoR%20\(10\)%2013%20BEREC%20report%20on%20alternative%20roaming%20tariffs.pdf?contentId=546821&field=ATTACHED\\_FILE](http://www.irg.eu/streaming/BoR%20(10)%2013%20BEREC%20report%20on%20alternative%20roaming%20tariffs.pdf?contentId=546821&field=ATTACHED_FILE)

Operators also offer bundles of mobile roaming minutes with SMS included for a fixed fee and a specified period, such as daily, weekly or monthly offers. Such offers represent approximately one third of all alternative offers. Many would view them as being more customer-friendly than the Eurotariff, given that the unit of payment (i.e. daily, weekly, or monthly) is more intuitive than per-minute charges.

The BEREC Report shows that only a small proportion of pre-paid users use alternative offers, but usage varies greatly among the Member States. Take-up by pre-paid customers of alternative offers is about 37% in Iceland, and about 26% in Germany, both of which are far above the EU average of about 7%<sup>43</sup> in 2009. The BEREC report also notes that there seem to be fewer alternative tariffs for pre-paid users than post-paid customers, which may be due to the fact that pre-paid customers use and spend less than post-paid customers.

As regards post-paid customers, the EU average overall proportion of subscriptions to alternative roaming tariffs increased slightly from 13% in 2008 to 14% in 2009, with Bulgaria, the Czech Republic, Greece, Iceland, Ireland, Malta, the Netherlands and the UK each above 20% of subscribers.

#### 4.1.1.2 Data roaming retail tariffs

As regards data roaming tariffs, the variety of tariffs offered is much larger than for voice and SMS. More than 40 operators that responded to BEREC's questionnaire reported more than 170 data-only tariffs. Most of the tariffs offered are bundles comprising data-only tariffs as well as roaming bundles including data services. There are also still linear (or metered) tariffs mainly for pre-paid users. Bundles offered include:

- daily, weekly, or monthly bundles,
- holiday bundles;
- larger bundles for mobile broadband, or
- specific smaller bundles for smartphone users.

The first to introduce non-linear tariffs was Vodafone. Vodafone has been offering daily, weekly and monthly data bundles since 2008 to prevent bill shock, as an alternative to per MB pricing. T-Mobile UK introduced a new roaming model to boost demand in March 2010, which moves away from a per MB price, and instead focuses on daily, weekly and monthly allowances for both handset Internet and mobile (e.g. dongle) broadband. Such packages are more intelligible to the customer, and they reduce the risk of bill shock.

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<sup>43</sup> See Figure 3, p. 7 of the BEREC report on Alternative Retail Voice and SMS Roaming Tariffs and Retail Data Roaming Tariffs.

As regards prices for data roaming, there are quite significant differences among the Member States, depending on the types of data services offered (such as mobile broadband, mobile Internet, or mobile email). As might be expected, larger bundles designed for mobile broadband and mobile Internet offer lower prices per MB than smaller bundles (provided that all the volume included in the bundle is used). Prices for one MB within a data-only bundle were lowest at €0.10/MB. Two-thirds of all data-bundles were priced between €0.10 and €1 per MB, again presuming that the bundled capacity is fully used.<sup>44</sup>

As a rule, post-paid tariffs are cheaper than pre-paid tariffs, and on-net tariffs (i.e. within the group) are generally cheaper than off-net tariffs on a unit price basis. Data-only bundles are generally targeted at mobile broadband and mobile Internet. Linear (usage-only) tariffs tend to be the most expensive, where the least expensive costs around € 1 per MB and is a post-paid offer, while the more expensive pre-paid tariffs charge € 10 per MB and more. The most expensive tariffs tend to be old, and were targeted at mobile email or WAP use.

#### 4.1.1.3 Retail roaming bundles

Operators also offer retail roaming bundles that include voice, SMS, MMS and data. These services may be offered on usage-based charges, or they may entail bundles of roaming voice minutes, SMS and data. Operators offer daily, weekly or monthly bundles. Rates for such bundles may be cheaper where the customers roams on the group's networks (i.e. where operators have presence in a number of countries) or on a preferred network (i.e. where operators have alliances in a number of countries), or where such bundles are restricted to be used on alliance or home networks only. As with voice-only tariffs, whether these bundles are cheaper depend on a number of different factors as set out in Section 4.1.1.2.

#### 4.1.1.4 Group tariffs

Some operators offer group tariffs to only to post-paid customers, i.e. the customers can obtain cheap rates only when roaming on a partner network. One example of such a group tariff is Vodafone's Passport, where customers pay a set-up fee for the call and can then talk at home rates per minute, possibly using domestic minutes that are included in their flat rate package. Cheap group tariffs are mainly achieved through internalisation of roaming wholesale costs.

Some operators also offer alternative roaming tariffs that can be used for both group and non-group calls.

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<sup>44</sup> See: BEREC report on Alternative Retail Voice and SMS Roaming Tariffs and Retail Data Roaming Tariffs, p.11. One could question the assumption that all minutes in the bundle are used, but it provides a basis for assessment and comparison.

#### 4.1.2 Likely future developments in the absence of a regulatory change

It is useful to distinguish between volume trends and price trends.

As long as the current Regulation (or an equivalent successor) is in place, little is likely to change with regards to voice and SMS roaming *prices* other than a gradual reduction in retail and wholesale charges in line with the price caps effectively imposed by the Regulation. As regards data roaming, MNO interviewees predict more downward movement in prices, with new innovative tariffs being introduced.

Traffic volumes are influenced primarily by factors other than the Regulation, and do not appear to be very sensitive to the regulated price (see the discussion of demand elasticity in Section 4.2.2). The tendency to date has been for voice volumes to grow at only a glacial rate, while data and SMS volumes grow rapidly. All show substantial seasonal variation, presumably because Europeans travel more during July and August than at other times of the year.

This section deals with likely changes under a continuation of the current environment. Likely changes in the event of a change in the regulatory arrangements for roaming are dealt with in Section 6 in connection with each possible change.

Section 4.1.2.1 discusses likely changes in traffic volume, while Section 4.1.2.2 deals with retail behaviour and Section 4.1.2.3 with wholesale behaviour.

##### 4.1.2.1 Voice, SMS, and data volumes

Roaming traffic is derived from the demand for travel, and this depends to a significant degree on the economic situation of the home country. The BEREC data demonstrate strong seasonal variation in traffic volumes, again due to differing levels of (vacation) travel. These changes are presumably independent of electronic communications regulation.

As regards traffic growth, operators do not believe that lower retail prices for voice roaming will lead to much of an increase in the volume of voice roaming traffic. This is equivalent to saying the mobile voice roaming is subject to *low price elasticity of demand* (see Section 4.2.2.1). SMS roaming traffic is growing, but apparently for reasons largely independent of its price.

The growth in demand for mobile data is pronounced, and again does not appear to be strongly linked to price. Mobile data roaming places greater demands on network capacity requirement than do roaming voice or SMS.

Some interviewees expressed concern that the growth in mobile data demand might slow down if mobile networks cannot adequately address current problems of network congestion.



#### 4.1.2.2 Retail price levels

Under the current regulatory regime, we do not expect major changes in prices at the retail level (other than those imposed by the Regulation itself) for voice or SMS. Little is likely to change due to (1) the low consumer demand elasticity for voice and SMS roaming services, which is likely to remain low in the near future and which depends more on the demand for travel than on the price of the service, and (2) the limited competitive pressure from imperfect substitutes that are taken up only by a small, price-conscious sophisticated group of customers.

MNOs do not expect to see roaming tariffs move upward again, and a number argued that retail price controls are counter-productive today. Many of the mobile network operators whom we interviewed expressed interest in boosting the use of roaming services, and a number have experimented with lower priced plans; in general, however, they do not see much consumer response to lower prices.

A number of alternative tariffs to the Eurotariff have emerged, and some MNOs have offered a Eurotariff at rates less than the maximum regulated rate. The alternative tariffs may cost less than the Eurotariff, and may provide better value to customers, depending on their usage patterns. Consumers may actually pay more on average for some of the alternative tariffs, but it may well be that the alternative plans offer convenience or predictability that consumers desire. So long as consumers are making an informed choice, we see nothing wrong with charging a premium for a pricing model that consumers desire.

Due to awareness campaigns and transparency measures, customers are now more aware of roaming as an available service with a price tag. For the mass market, this seems to have little influence on consumer behaviour, but businesses whose employees travel may be motivated to negotiate for somewhat better prices for mobile roaming. Consumer advocate interviewees told us that even today, businesses seem to be able to obtain only small discounts for mobile roaming.

Interviewees viewed mobile data as the roaming market with the greatest potential for downward price movement at both retail and wholesale levels, thanks to the growth of demand and to the responsiveness of customer demand to price. BEREC data demonstrate a steady decline in retail price (which is not regulated), and wholesale prices that are substantially below the regulated caps (see Section 4.1.1); nonetheless, the retail price for mobile data roaming remains surprisingly high (see Figure 7).

#### 4.1.2.3 Wholesale level

Many MNO interviewees contended that competition at wholesale level was already emerging before the regulation (at least between large mobile network operators) due to the use of traffic steering to a preferred or partner network, and that it has become more intense in recent years. We find some support for this view.

MNOs generally use standard contracts for their overall roaming provisions at the wholesale level for voice, SMS and data traffic. Large MNOs often negotiate additional bilateral agreements that establish discounts from the regulated rates. MNO interviewees tell us that these negotiations can be intense.

End-customers have only limited influence on the choice of network in the visited country for voice, data and SMS.<sup>45</sup> Substantially all traffic goes to a preferred network<sup>46</sup> based on the contractual relationships between home and visited network operators. MNO interviewees told us that traffic steering is 90 - 95% effective today.

Many mobile operators noted that there is a North-South divide in Europe between high-tourism southern locations (e.g. Spain, Italy, Greece) and low-tourism northern locations (e.g. the UK, Germany, the Netherlands). It is clear that this net balance of payments should influence an MNO's negotiating posture, although it is by no means the *only* factor in the negotiation. Mobile network operators in northern locations are net roaming out-payers, who regard roaming at the wholesale level as a cost rather than a source of revenue, and tend to seek to direct the majority of their traffic to the network with the lowest wholesale IOT roaming rates. Net receivers, on the other hand, would favour keeping wholesale rates higher, and might be reluctant to enter into alliances.

Table 2 provides an estimate, based on BEREC data (based on the sum of billed group and billed non-group minutes) for Q4 2009, of the degree to which each European country is a roaming net out-payer versus a net receiver at the wholesale level. For each country / Member State, the numerator of the ratio is the number of wholesale minutes sold; the denominator is the number of retail roaming minutes sold to customers of the same country. Thus, a ratio in excess of 1.0 means that the country is a net beneficiary of mobile roaming at the wholesale level; conversely, a ratio less than 1.0 means that the country is a net payer.<sup>47</sup> Not surprisingly, Germany, the UK, and the Netherlands are net payers, while Malta, Spain, France, Austria, Bulgaria, the Czech Republic, Hungary and Greece are among the net recipients at the wholesale level. Perhaps surprisingly, Italy was in balance in this sample of BEREC data.

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<sup>45</sup> The handset may enable the user to choose a visited network, but we think that few consumers realise this. Even for those who do, the search costs to identify the least expensive visited network (with adequate quality, and with coverage of the right type) are substantial.

<sup>46</sup> There may, however, be more than one preferred network in order to ensure full geographic coverage.

<sup>47</sup> The BEREC data were not intended to be used in this way, and may reflect slight biases. For example, not all Member States report retail usage data for all MVNOs. Thus, the retail minutes may be under-reported in comparison with the wholesale, but probably by just a few percent.

Table 2: Ratio of wholesale minutes sold to retail minutes sold

Country	Ratio of wholesale IOT minutes to retail minutes
Austria	1.54
Belgium	1.12
Bulgaria	1.59
Cyprus	1.23
Czech Republic	2.12
Denmark	0.85
Estonia	0.53
Finland	0.67
France	1.49
Germany	0.79
Greece	1.16
Hungary	1.63
Iceland	1.06
Ireland	1.07
Italy	1.00
Latvia	1.47
Lithuania	0.87
Malta	3.23
Netherlands	0.60
Norway	0.64
Poland	0.90
Portugal	1.64
Romania	1.02
Slovakia	0.94
Slovenia	0.94
Spain	1.49
Sweden	1.17
Switzerland	1.04
United Kingdom	0.65

Data source: BEREC 2010

Several of the MNOs whom we interviewed spoke at length about their efforts to negotiate lower IOTs, and we have no reason to doubt them. In fact, we find it highly plausible that, in any voice roaming negotiation, (1) one MNO will tend to provide more minutes at wholesale than the other; (2) both MNOs will know this; (3) the rate that really matters, then, is the IOT rate for *unbalanced* or excess minutes (which, we are reliably informed [as further explained later in this section], is *different from and lower than the rate for balanced minutes*); and (4) this implies that the interests of the MNOs in the negotiation *are not aligned* – the MNO that expects to sell more minutes will tend to seek a high rate for excess minutes, the MNO that expects to buy more minutes will tend to seek a low rate.

The balance of minutes is only one factor of many in a negotiating game that would appear to be fiendishly complex. Other factors which appear to be likely to enter into the negotiation include:

- The minutes of roaming traffic that each party is able to steer to the other. For certain large MNOs, this may well be the dominant factor in the negotiation.<sup>48</sup> For smaller operators, however, this exchange of minutes may play less of a role, both because (1) smaller MNOs have fewer minutes to offer, and (2) smaller MNOs may be less able to offer nationwide roaming service due to gaps in coverage or service quality.
- For multi-country MNO groups, the traffic ratio is not a single scalar quantity. It varies from one country pair to the next, and from one corresponding MNO to the next. Thus, a single negotiation between two MNO groups over rates might mix some country pairs where one MNO is a net payer to the other, with other country pairs where it is a net receiver.

All told, the negotiations at wholesale level appear to be *significantly more effective* than most have assumed. Various MNOs inform us that discounts from the regulated *IOTs can be as great as 40%*. Yet this naturally begs the question: If this is so, why is the aggregate effect of IOTs discounts not more visible in the BEREC data on wholesale payments?

To answer this question, we think that it is necessary to consider the negotiating game among the MNOs in more detail. As we understand it, two MNOs operating in two countries will have a certain number of roaming minutes that balance out (i.e. are *matched*). The regulated IOT rate normally applies to these minutes – since the number of minutes is the same, and the rate is the same, the rate is altogether irrelevant.<sup>49</sup>

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<sup>48</sup> Cf. Tony Shortall, “A Structural Solution to Roaming in Europe”.

<sup>49</sup> For reasons that we explain later in this section, the *balanced* rate should not affect the retail price. This represents a subtle difference between the IOT and an MTR.

They are likely, however, to negotiate intensely over the IOT rate for the unmatched minutes, i.e. those in excess of the matched quantity.<sup>50</sup>

Consider the following hypothetical case:

- Operator a in country A makes an agreement with operator b in country B.
- The matched rate is € 0,25 (to simplify); the unmatched rate is € 0,15.
- In a given time period, a's customer consume 1,000 roaming minutes on b's network in country B. b's customers consume 1,500 minutes of mobile roaming on a's network in country A.
- a pays b  $1000 * € 0,25 = € 250$  for matched minutes (payment #1).
- b pays a  $1000 * € 0,25 = € 250$  for matched minutes (payment #2).
- b pays a an additional  $(1500 - 1000) * € 0,15 = € 75$  for unmatched minutes (payment #3).
- There is no payment from a to b for unmatched minutes, because all minutes from a to b are matched.
- Since the matched payments (payment #1 and payment #2) net by definition to zero, the overall net payment from b to a is € 75.

The lower negotiated IOT rates may have less influence than expected on the overall effective IOT rate because the negotiated rates apply only to the unmatched minutes. The BEREC data reflect all three payments, which is entirely appropriate; however, the negotiations relate only to payment #3, which represents only a small fraction of the total wholesale revenue. In our example, unbalanced minutes represent only a third of minutes consumed in country a, only 23% of wholesale payments to country a, and no minutes at all in country b. Traffic imbalances between country pairs can be as great as 10:1, according to the MNO experts whom we interviewed. The *average* imbalance per country might, however, represent as little as about one third of the traffic – in Table 3, no country had a traffic balance less than 0.60, and only a few had more than 1.60. The BEREC data do not allow for a definitive statement, because these national averages might mask traffic imbalance between individual country pairs, or between MNOs within a country pair, that are substantially greater. Still, all things considered, we conjecture that at least half of all roaming minutes are balanced across Europe as a whole.

With all of that in mind, the descriptions that MNOs provided of the negotiating process do not appear to be inconsistent with the BEREC data. For discounts from the nominal, regulated wholesale rate to be as great as 40% is plausible, when one considers that (1) the discount relates only to the unmatched minutes, (2) not every negotiated rate will

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<sup>50</sup> According to stakeholders, negotiated arrangements take on many different forms.

reflect a discount as great as 40%, and (3) smaller MNOs may have less bargaining power than large MNO groups.

We have dwelled on the issue of the negotiating game because we think that it is crucial to a proper understanding of the European mobile roaming marketplace. We believe that *it is the lower, negotiated IOT rate that sets an effective lower bound on the retail price.*<sup>51</sup>

From the policymaker's perspective, the fact that the negotiations over these rates is more effective than had been assumed represents both good news and bad. It inevitably raises the concern that the spread between the retail prices that are on offer, and those that MNOs (at least those MNOs or MNO groups who are able to negotiate better rates) should in principle be able to offer in light of underlying costs might be even greater than has been assumed.

One additional development in regard to wholesale price is worth noting. Hubbing of roaming traffic appears to be increasingly significant, both as a means of increasing efficiency for large MNO groups and as a service that the offer to smaller MNOs.

Given the economies of scale in wholesale roaming, large operators such as Vodafone and Telefonica have established roaming hubs that consolidate all of their European and world-wide wholesale roaming activities. They have also tended to consolidate their bilateral commercial negotiations, as well as management and technical aspects such as routing of signalling traffic and quality of service monitoring.

These groups can use roaming hubs to offer wholesale roaming to smaller operators, who can outsource their wholesale roaming requirements. Several large mobile network operators predicted that roaming hubs are likely to grow in significance as an offering from larger MNOs to smaller MNOs. Hubbing will tend to be more attractive to smaller MNOs because the administrative and technical cost burden is the same for small and large operators, and thus higher in unit cost terms for smaller operators.

## 4.2 Price elasticity of demand

Consumer *demand elasticity* is of fundamental importance to roaming. Elasticity has two distinct aspects: One relates to the consumer's *selection* of a service, while the other relates to the consumer's *use* of the service (e.g. minutes of use per month/per travel) once he or she has selected it.

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<sup>51</sup> This case appears to be somewhat different from that described for example in Laffont and Tirole's *Competition in Telecommunications* (2000), where the MTR influences the retail price even if *on average* it nets to zero. In that case, the network operator had to guard against termination deficits. In this case, the rate for matched minutes is by definition *never paid*, and thus can never be associated with an IOT deficit. Only the rate for unmatched minutes can lead to an IOT deficit.

As previously noted, the demand for roaming is a derived demand that depends crucially on a consumer's demand for travel. Factors that influence the consumer's overall demand for travel (e.g. seasonal variations, and changes in overall economic prosperity) might influence consumption of roaming services more dramatically than the price of the service.<sup>52</sup>

To the extent that consumers were to reduce the volume of calls that they place as a response to high roaming prices, one might expect MNOs to respond; however, historical experience suggests that this constraint is limited. One could imagine that MNOs find it more profitable to charge an inflated oligopoly price on a small volume of mobile roaming calls, than to charge a market-clearing price on a larger volume.<sup>53</sup> A more likely explanation, however, is that prices are high because the MNOs detect very little consumer response to the retail price.

Elasticity is probably not the same for all classes of mobile users. It is likely that there are substantial differences between pre-paid and post-paid users, and between residential consumers in comparison with business users. Businesses whose employees travel extensively may be more sensitive to these prices than consumers, and they may be better equipped to monitor mobile roaming prices and to negotiate over their level.

A number of estimates are available for the demand elasticity of mobile voice roaming (see Section 4.2.2.1), although we would not consider them to be definitive. We are not aware of any publicly available reliable estimates of the demand elasticity of roaming services for roaming SMS or data. There are many technical challenges in computing the usage elasticities for demand for roaming services; however, these should not be insuperable with good econometric methodology. Historically, usage data were not available; however, BEREC has been collecting good quarterly data at the Member State level for at least six quarters. These data are available only at the Member State level, not at the MNO level; nonetheless, it is likely that enough data is available to compute a statistically reliable result. A further set of challenges relates to interrelationships and feedback loops among the many factors that are relevant to demand, such as overall changes in economic welfare (e.g. GDP changes). Sorting out the impacts of multiple factors is a routine challenge for econometrics, and does not appear to pose unique technical challenges in this case. Interaction and feedback loops can be particularly problematic to the extent that they might imply *endogeneity* problems. Again, we are of the view that these challenges could be resolved with careful design and methodology, but doing so is well beyond the scope of this project.

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<sup>52</sup> Business users appear to have a substantially different willingness to place calls while travelling, but the propensity to travel for business purposes is still largely linked to the overall business cycle.

<sup>53</sup> Indeed, it cannot be excluded that mobile roaming prices might be above the monopoly price due to double marginalisation (separate, uncoordinated monopoly mark-ups by both home and visited MNO).

Section 4.2.1.1 discusses elasticity in relation to the selection of the roaming service, Section 4.2.1.2 examines elasticity in general in relation to the use of the roaming service, and Section 4.2.2 discusses what is known quantitatively of the elasticity of demand for voice, data and SMS roaming services.

#### 4.2.1 Consumer Behaviour

Elasticity in the mass market for the mobile roaming service at subscription time is still low. Although international roaming is an important service used by a large group of customers, most subscribers use this service only occasionally. A 2006 Eurobarometer survey found that 44% of Europeans had visited another European country for private purposes within the previous twelve months;<sup>54</sup> nonetheless, the choice of mobile roaming service seems to have less influence on the behaviour of individual consumers than do other elements of the mobile services bundle.

The OECD report on mobile roaming (2009) finds that consumers bear some responsibility for the lack of competition in the provision of international roaming. Most users do not take the cost of roaming into account when choosing a mobile provider, but instead make the choice based on domestic service bundles. A survey conducted by Copenhagen Economics in 2005 in Finland found that only 4% of users considered roaming prices before traveling.<sup>55</sup>

Operators make a distinction between business and residential users and find that businesses with an international footprint or significant international travel are conscious of roaming services when selecting a provider. Mobile operators could choose to provide special targeted discounts, based on the projected amount of traffic that would be generated by the customer. Some interviewees considered this negotiation to be effective; others felt that business customers were only marginally effective in negotiating discounts.

Additionally, pre-paid customers are generally more price-conscious than post-paid customers, and show a lower spending pattern. The comparison between pre-paid and post-paid customers may be difficult, given that the roaming services offered naturally differ.

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<sup>54</sup> Eurobarometer (2006), *Roaming Summary*, op. cit. By contrast, the OECD found that 33% of Europeans roam internationally at least once a year. OECD Working Party on Communication Infrastructure and Services Policy, *International Mobile Roaming Charging in the OECD Area*, December 2009.

<sup>55</sup> See "Study on international Roaming in Mobile Telecommunications Networks", 21 December 2006, p. 20.



#### 4.2.1.1 Selection of the Roaming Service

As mentioned above, at least for the majority of residential customers, the roaming service is part of a domestic mobile bundle and is not consciously chosen by customers as a separate service. Roaming services can be viewed merely a component of a bundled mobile package, much like SMS. Moreover, roaming demand is a derived demand of the demand for travel and amounts overall to only a very small proportion of a typical customer's average spend on mobile telecommunications. Therefore, the sensitivity to the price of roaming services at the time a mobile service is selected tends to be low. This applies to voice and SMS alike. Mobile data may have a higher elasticity at the time of service selection, given that a number of data applications such as Internet-based online check-in, car rental, hotel booking, and Google maps / GPS applications are considered to be useful travel applications that can be accessed via the Internet from mobile handsets or laptops.

There are differences in relation to residential and business customers, and also between post-paid and pre-paid customers. While large corporate customers with international footprints and substantial international travel take roaming into consideration when choosing a service provider, residential customers are more likely to accept the default Eurotariff without exploring alternatives. Even so, BEREC data suggest that a bit more than a third of consumer roaming minutes are non-Eurotariff.

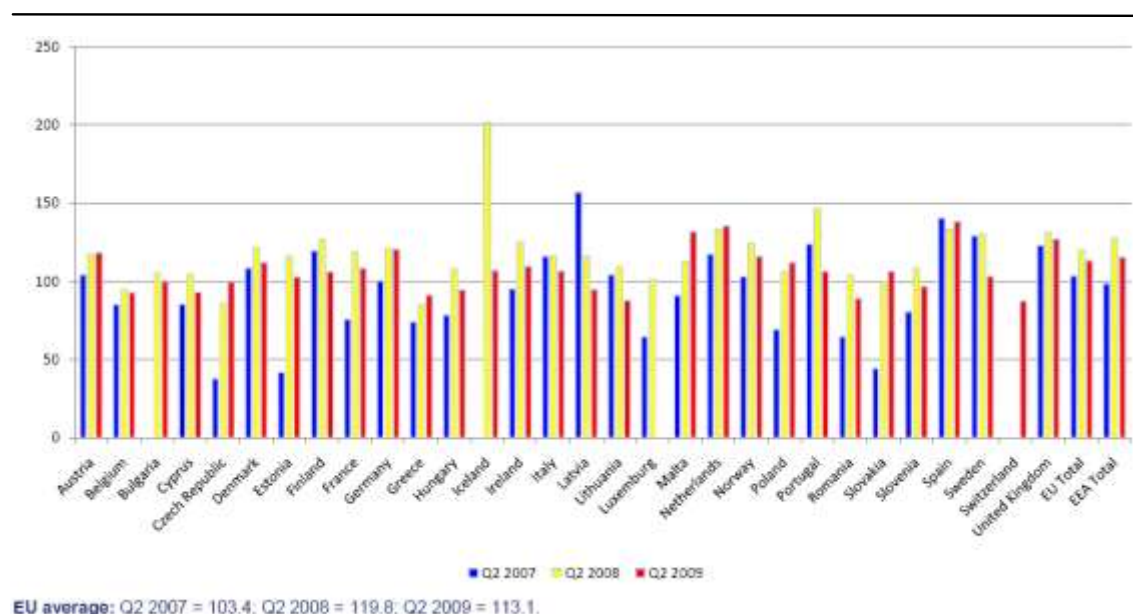
#### 4.2.1.2 Use of the roaming service

In terms of actual use of the roaming service while travelling, the amount of voice traffic that is generated by customers while travelling has not been found to increase much since the introduction of the Roaming Regulation. Between Q2 2007 and Q2 2009, retail prices for calls made (see Figure 3) declined from roughly € 0.70 to € 0.41, a decline of some 41%. If demand were fully elastic (i.e. if were equal to -1.0), then usage should have increased 70% (i.e.  $1 - (1 / (1 - 41\%))$ ). A cursory glance at BEREC data (see Figure 8) make it clear that no such increase occurred. For Europe as a whole, in fact, the Q2 2008 data are 20% higher than those for the subsequent Q4 of 2008; however, that is a result of seasonal variation, not of negative growth. Strikingly, Q2 2009 usage is 7% less than Q2 2008 usage.<sup>56</sup> Note that the data are scaled such that the corresponding number of minutes for Q4 2008 = 100.

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<sup>56</sup> This decline cannot be explained based on seasonal variation, since the two observations correspond to the same season; however, it might well be a function of the global financial crisis.

Figure 8: Volumes of EU/EEA calls made in Q2 (all consumers excluding special corporate)



Source: BEREC International Roaming Benchmark Data Report for April 2009 – December 2009

One interviewee indicated that they had internally estimated a demand elasticity for the voice service of about -0.25 once GDP was factored in, i.e. a 4% reduction in price would generate about a 1% increase in consumption of minutes. All things considered, this is entirely plausible.

There may be multiple explanations for this apparently low elasticity of demand:

- Roaming is a derived demand from demand for travel. The number of holiday trips that a customer makes is constrained by the customer's income and is unlikely to vary greatly year-on-year for the average customer. Moreover, it may be the case that more customers are going to non-EU destinations.
- Business customers are likely to have much higher and more frequent roaming voice call usage (1) because they have to make work-related calls, (2) because business travel is a routine daily situation, and (3) because private calls substitute for face-to-face after-work social interaction when abroad. These calls are paid for by the employer and do not affect the business traveller's personal budget.
- The demand of residential consumers for placing phone calls while travelling may differ from their normal demand to place domestic calls precisely because they are on holiday, are not in their daily routine.

- Several of our interviewees plausibly suggested that current price levels for roaming, even after the imposition of regulation, are still so high that most consumers avoid making roaming calls unless absolutely necessary. For business customers, paradoxically, demand is also fairly inelastic because they make the calls that they need with little consideration for the price. This suggests that if prices were more nearly comparable to those of domestic mobile calls, one might expect a more elastic response.

#### 4.2.2 Measures of Elasticity

There are few robust estimates of elasticity for roaming services; however, the majority of respondents felt that the elasticity of demand differs between voice, data and SMS, between frequent and infrequent users, between business and residential customers, and between pre-paid and post-paid customers.

Most interviewees who had a view about demand elasticity felt that it was:

- For voice, significantly less elastic than -1.0, possibly between -0.2 and -0.3;
- For SMS, possibly different than for voice but difficult to assess; and
- For data, higher than for voice – this is the market with the highest growth potential.

##### 4.2.2.1 Voice

Demand elasticity of mobile voice services in general (i.e. not just for the roaming service) have been analysed many times by many experts. Individual network operators occasionally have higher demand elasticities, but it would be quite unusual to find a country average demand elasticity for mobile calls as great as -1.0. (The negative sign denotes that, as price goes down, usage expressed in minutes per month goes up.) Our own recent analysis<sup>57</sup> found a short term elasticity (response in the same quarter) of about -0.1, and a long term elasticity of -0.5 to -0.6. This is generally consistent with other results in the literature, including a study by Haucap and Dewenter (2008) based on extensive Austrian data.<sup>58</sup>

There is some uncertainty as the price elasticity of demand for mobile voice roaming services. A number of knowledgeable interviewees suggested that price elasticity for

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<sup>57</sup> J. Scott Marcus, Christian Growitsch and Christian Wernick, "The Effects of Lower Mobile Termination Rates (MTRs) on Retail Price and Demand", a research project for the German BNetzA, available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1586464](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1586464).

<sup>58</sup> Ralf Dewenter and Justus Haucap, 2008. "Demand Elasticities for Mobile Telecommunications in Austria," *Journal of Economics and Statistics (Jahrbuecher fuer Nationaloekonomie und Statistik)*, Justus-Liebig University Giessen, Department of Statistics and Economics, vol. 228(1), pages 49-63, February..

mobile voice roaming might be in the range of -0.2 to -0.3. Some suggest, based on comparisons of the change in international roaming voice minutes versus the change in European roaming voice minutes in 2009, that demand elasticity is even less than that. On the other hand, a well-conceived study by the Spanish CMT<sup>59</sup> found a price elasticity of demand of -0.36, and they cite a study conducted for the European Parliament's Committee on Internal Market and Consumer Protection (IMCO) that found an elasticity of between -0.35 and -0.44. These figures seem to us to be at the uppermost end of the plausible range, given current BEREC data.<sup>60</sup>

Based on the figures that appear in the BEREC 2010 report, as shown in Figure 8, we consider a demand elasticity between 0 and -0.4 for mobile voice roaming to be plausible. We have assumed elasticity to lie in the middle of this range, at -0.2.

By contrast, the data in Figure 8 appear to be flatly inconsistent with the demand elasticity of -1.0 or -1.2 that the Commission assumed as "optimistic" estimates in previous Impact Assessment analyses for the Roaming Regulation.

We conjecture that elasticity of roaming is not utterly different from elasticity for normal mobile calls. For example, in the US, historically domestic roaming was expensive (and circa 1998 constituted 14% of all mobile revenues<sup>61</sup>); today, however, prices are uniform across the U.S., and we doubt that consumers think of a domestic roaming call as being different from any other domestic call. *This does not mean that there is no difference; rather, it means that the difference in price is fundamental to the fact that we think of mobile roaming as being different from other calls in the first place.*

The demand function for mobile roaming is probably non-linear. Moreover, it is likely that the demand elasticity (i.e. the *slope* of the demand function) is itself not uniform at all levels of unit price.

We conjecture that demand elasticity was quite low at the (very high) levels of price that pertained before regulation, and that it is only marginally higher at current regulated prices. Intuitively, consider that for a tourist, the pre-regulation price per roaming minute was so high that the tourist would tend to make as few calls as possible. At today's regulated prices, even though they are much lower, it is likely that a typical tourist still views the price as being unacceptably high, and still makes as few mobile roaming calls as possible.

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<sup>59</sup> CMT, "Report on the Analysis of the International Roaming Service in the Spanish Mobile Telephone Market", 2008.

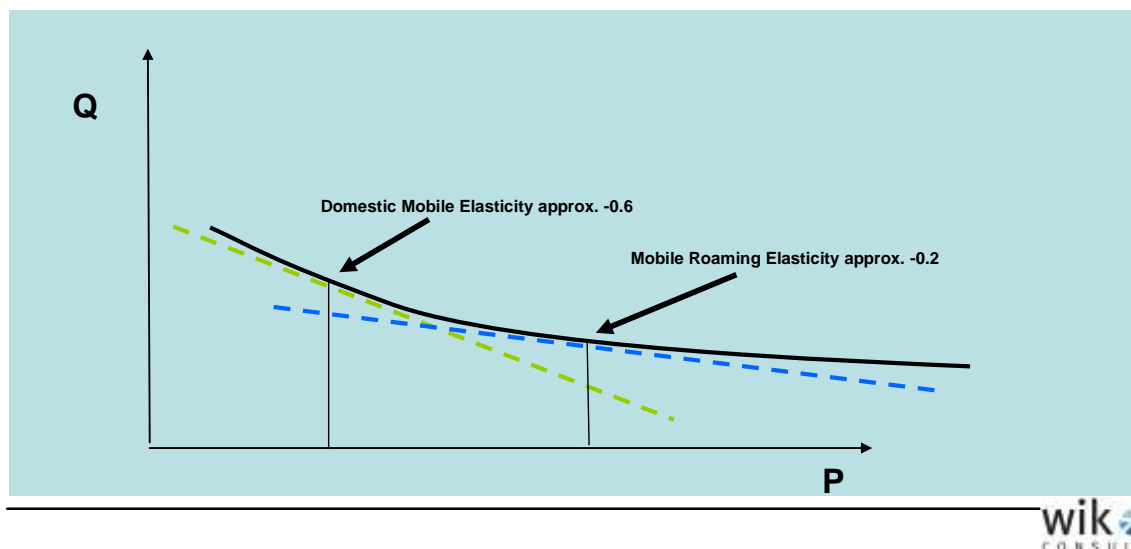
<sup>60</sup> The BEREC data seem to suggest a lower elasticity; however, that might reflect the ongoing effects of the global financial crisis, in contrast to the CMT's 2008 analysis.

<sup>61</sup> Based on semi-annual statistics from the U.S. CTIA.

If prices were to come down to levels comparable to domestic calls, then consumer preferences would likely sort themselves out over time, and demand elasticity would likely also be similar to that for similarly priced normal domestic calls.

If this conjecture is correct, it would imply (1) that the demand elasticity, if prices were to become low enough, is known from multiple studies, and that long term elasticity would likely be roughly -0.6; (2) that the demand elasticity at present price levels is indeed low, perhaps in the range of -0.2; and that (3) demand elasticity at intermediate price levels lies somewhere in between. Figure 9 depicts a non-linear demand curve with these slopes; however, the graph is intentionally unscaled.<sup>62</sup>

Figure 9: Demand elasticity of mobile call initiation (domestic versus roaming)



Source: WIK-Consult

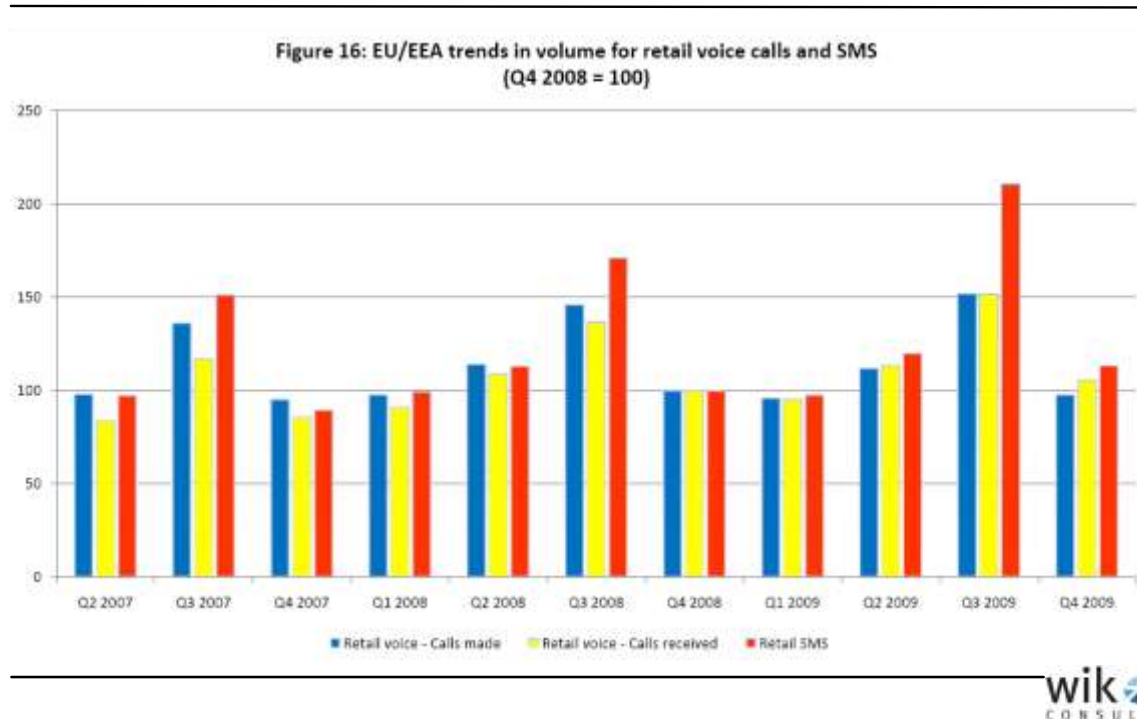
#### 4.2.2.2 SMS

Most interviewees saw SMS roaming as being relatively inelastic, and thus somewhat similar to voice roaming. BEREC data show annual spikes in SMS usage in the third quarter of each year (i.e. during the vacation season), and the spike in 2009 (just after the Euro-SMS came into effect, with a dramatic reduction in the retail price of roaming SMS) is impressive; however, whether this is a response to price or to other factors is

<sup>62</sup> We would caution the economists that we have intentionally reversed the axes in comparison with the more common depiction since the time of Marshall, because our intent here is to depict quantity as a function of price. Note, too, that in this discussion we have ignored the fact that demand elasticity for individual consumers is likely quite different from that from business users,

not altogether clear.<sup>63</sup> Typically, one would expect more of a lag before seeing such a response to a retail price change in mobile services.

Figure 10: EU/EEA trends for retail voice calls and SMS<sup>64</sup>



Source: BEREC International Roaming Benchmark Data Report for April 2009 – December 2009

With only two quarters of data subsequent to the revised Regulation having come into effect, it is somewhat premature to attempt to assess demand elasticity; however, it is fair to say that there is no indication to date of any market dynamic beyond that imposed by the price caps established in the revised Regulation.

#### 4.2.2.3 Data

BEREC (2009) notes: “ERG [previously] identified some arguments to support the proposition that market forces would be stronger for data roaming than had proved to be the case for voice and SMS. Subsequent data collections tend to confirm the validity of this analysis, although it is not clear how effective these forces will be in further reducing prices in future, especially in some countries. In its consultation response, ERG also noted that it would be difficult to assess the extent to which threats of regulatory intervention had stimulated the price cuts.”

<sup>63</sup> It would be premature to leap to a conclusion on the basis of a single observation. “A single swallow doth not a summer make.”

<sup>64</sup> EU only for Q2 through Q4 of 2009.

Most interviewees felt that roaming mobile data was a less problematic market than either roaming voice or roaming SMS. They noted that usage is growing rapidly, although it is not altogether clear whether this growth is more a reflection of increasing take-up of smart phones or a reaction to price, which continues to decline.

Some sources suggest massive growth of overall mobile data in the years to come. A white paper from Cisco Systems, for example, predicts that global "...mobile data traffic will double every year through 2014, increasing 39 times between 2009 and 2014. Mobile data traffic will grow at a compound annual growth rate (CAGR) of 108 percent between 2009 and 2014, reaching 3.6 exabytes per month by 2014."<sup>65</sup> By contrast, Rupert Wood of Analysys Mason thinks that this conventional wisdom is overblown, and plausibly suggest that "...all the hard evidence we have seen so far from Europe indicates far slower growth than this – perhaps 35% growth in Europe – and points to a further slowing of the rate of growth over at least one more year."<sup>66</sup>

BEREC has provided information on the volume of roaming data in 2009; however, since their data represents a single year, it is not yet feasible in our view to distinguish between seasonal variation versus annual increase. Even if it were, the increase in the volume of mobile roaming data might well have more to do with the increasing take-up of smart phones than with any consumer response to declining unit prices.

### 4.3 Relationship of retail prices to wholesale IOTs

Between any pair of MNOs, there is likely to be a non-zero *net payment* at wholesale. This net payment is likely to be considerably less than the product of the number of minutes of use times the IOT; in fact, if traffic is balanced, the net payment might be fairly close to zero.

One might well wonder why it is necessary to pay so much attention to wholesale IOT rates, if they are likely to cancel out to some degree?

The first, and most obvious, answer is that these payments do not always cancel out. Countries like Spain, France, Greece, and Austria attract large numbers of vacationers; consequently, their MNOs collect substantial IOT revenue. To the extent that Spaniards and Greeks spend fewer vacation days in other EU/EEA lands than the residents of other EU/EEA lands spend in Spain or Greece, their MNOs tend to profit. If IOTs are well in excess of real costs, even after regulation, then the profit is substantial.

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<sup>65</sup> Cisco Systems, "Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2009-2014", at: [http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white\\_paper\\_c11-520862.html](http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html).

<sup>66</sup> Rupert Wood, "The mobile data explosion: myths and reality", 11 November 2010, at: <http://www.analysismason.com/About-Us/News/Insight/The-mobile-data-explosion-myths-and-reality/>.

IOTs matter for another, subtler reason. Even if payments tended to be in rough balance, the level of IOTs would tend to influence the level of retail prices.<sup>67</sup> An MNO normally establishes retail prices above the usage-based wholesale cost in order to avoid the risk of an imbalance. If they fail to do so, they risk attracting too many customers who place too many roaming calls, and thus running a deficit. As long as the usage-based retail price exceeds the usage-based wholesale cost, the MNO avoids this risk.

As we explained in Section 4.1.2.3, MNOs frequently negotiate two distinct IOT rates: the regulated IOT cap is usually charged for matched minutes, while a lower IOT rate governs the payment for unmatched minutes. Where this is the case, we believe that *it is the lower IOT rate for unmatched minutes that sets an effective floor on the retail price*, because where both rates are present there can never be a deficit payment associated with the matched minute rate.

Retail price is thus unlikely to be set at average levels less than that of the unmatched minute IOT (assuming that the IOT is too great to ignore); however, there is nothing today (other than regulation) to prevent retail prices that are considerably greater than the IOT. If the market for mobile roaming were more competitive, or if the price elasticity of demand for mobile roaming were greater, MNOs might be motivated to set retail prices at levels more closely linked to real costs.

In other words, there is no assurance (absent regulation) that any further reductions in the wholesale cost associated with the IOT would be passed through to consumers in the form of reduced retail prices.

#### **4.4 Welfare implications of the Roaming Regulation**

In assessing the socio-economic costs and benefits of the Roaming Regulation, demand elasticity plays a key role.

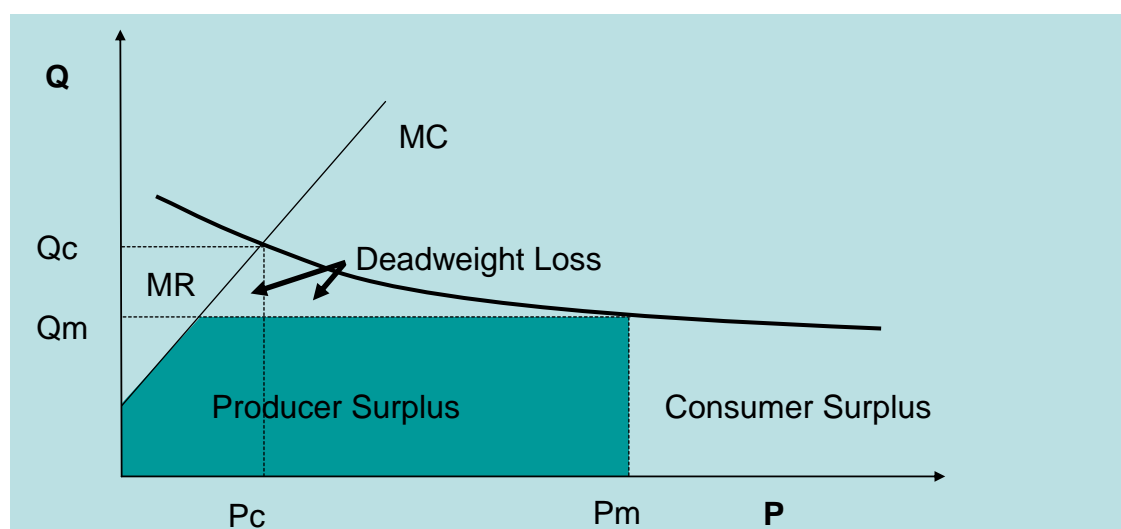
The welfare effects of monopoly (and also of price caps) are often analysed by means of *Harberger's Triangle*. Mobile roaming does not exactly constitute monopoly market power, and Figure 11 consequently does not exactly correspond to mobile roaming, but there are strong parallels to the extent that market distortions associated with roaming result in inflated prices and depressed consumption.

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<sup>67</sup> See Jean Tirole and Jean-Jacques Laffont (2000), *Competition in Telecommunications*, MIT Press. They make the point about call termination rather than about roaming, but the logic is the same.



Figure 11: How a classic monopolist affects consumer and producer surplus<sup>68</sup>



The Harberger triangle for a monopoly reflects the expectation that the monopoly results in inflated prices, and thus reduced consumption; equivalently, the monopolist reduces supply in order to be able to increase its price. The increase in price (from  $P_c$  to  $P_m$ ) results in a reduction in consumption (from  $Q_c$  to  $Q_m$ ). Two rather different effects result:

- first, the producer surplus is increased, at the expense of consumer surplus (i.e. some of the consumer surplus is expropriated by the producer); and
- second, a deadweight loss is incurred, where services that otherwise would have been consumed are not.

Both are problematic, but not in the same way. The deadweight loss is a true net cost to societal welfare. The welfare *transfer* is not a net cost to society; nonetheless, it can be regarded as being objectionable.

In this case, we have drawn the demand curve to reflect the assumptions that we made in Section 4.2.2, and thus to track with Figure 9: a non-linear curve, with an elasticity of roughly -0.2 for mobile voice roaming at current price levels, and an elasticity of roughly -0.6 if prices were to decline to current domestic mobile voice levels.<sup>69</sup> If the demand elasticity were indeed -0.2, then the deadweight loss would also be low. Graphically, if

<sup>68</sup> Source: Wikipedia, article on “Monopoly”, provided pursuant to Creative Commons licence.

<sup>69</sup> We again caution the economists that these curves are meant to show quantity as a function of price; consequently, the price and quantity axes are flipped in comparison to the orientation that has been customary since the time of Marshall. The orientation shown here was customary in earlier work.

the slope of the demand curve in Figure 11 is nearly horizontal, then the Harberger triangle for deadweight loss will not enclose much area.

If the deadweight loss were high, then there would be a strong social welfare argument for the Regulation based solely on the direct effects of the resultant price reductions in mobile roaming services. To the extent that the deadweight loss is smaller than might have been assumed, then the *direct* socio-economic benefits of the Regulation are also correspondingly less, but still positive.

We think that the *indirect* welfare benefits of the regulation are probably more important, especially the benefits association with furthering the European Single Market. There are, to be sure, further positive effects of the Roaming Regulation, including pricing transparency and consumer protection benefits, but we think that the Single Market captures the most noteworthy benefits.

The Single Market was the basic rationale for the formation of the European Union and its predecessor organizations from the first. The fragmentation of Europe into multiple countries and language groups was felt to introduce diseconomies of scale that would render European less competitive than it should be in comparison with its global trading partners. The European Union seeks to capture economies of scale, while preserving cultural pluralism. By operating as a larger trading area, regional specialization is facilitated (thus enhancing macroeconomic efficiency), and competition within the EU is enhanced. All of these tend to enhance overall societal welfare. Among the EU's key specific initiatives are:

- A customs union, where there are no charges on the flow of goods from one Member State to another;
- Measures to ensure the free movement of goods, and more recently of services;
- Measures to ensure the free movement of capital;
- Measures to ensure the free movement of individuals, especially of workers;
- The Schengen Agreement, which eliminates border controls between participating countries; and
- The Euro Zone, which establishes a common currency for participating Member States.

In an ideal world, public policy initiatives would be *Pareto optimal* – some of those affected would be better off, and none would be worse off. Pareto optimality is rarely achievable in practice. Most of the EU initiatives noted above enhance overall welfare, most Europeans tend to be better off overall, but a few might be worse off.

As a concrete example of the macroeconomic benefits of the Single Market in a different sector, one could consider the *Single European Payments Area (SEPA)*. For

the 32 countries that participate in SEPA, all electronic payments are treated as if they were domestic. No difference between national and intra-European cross border payments are permitted. There are costs (to the banks, for instance), to be sure, but the macroeconomic benefits in the form of scale economies at European level are manifest, and probably greatly exceed the costs.

The European Regulatory Framework for Electronic Communications already recognises the importance of the Single Market when it lays out the objective, in Article 8 of the Framework Directive, of "... encouraging the establishment and development of trans-European networks and the interoperability of pan-European services, and end-to-end connectivity ...". The real value of the Roaming Regulation lies, then, not in reducing market distortions, nor simply in reducing prices to consumers, but rather in promoting the evolution of the European communications environment toward a truly European environment, and in the macroeconomic benefits that flow from that degree of European integration.

#### 4.5 Lessons from the United States

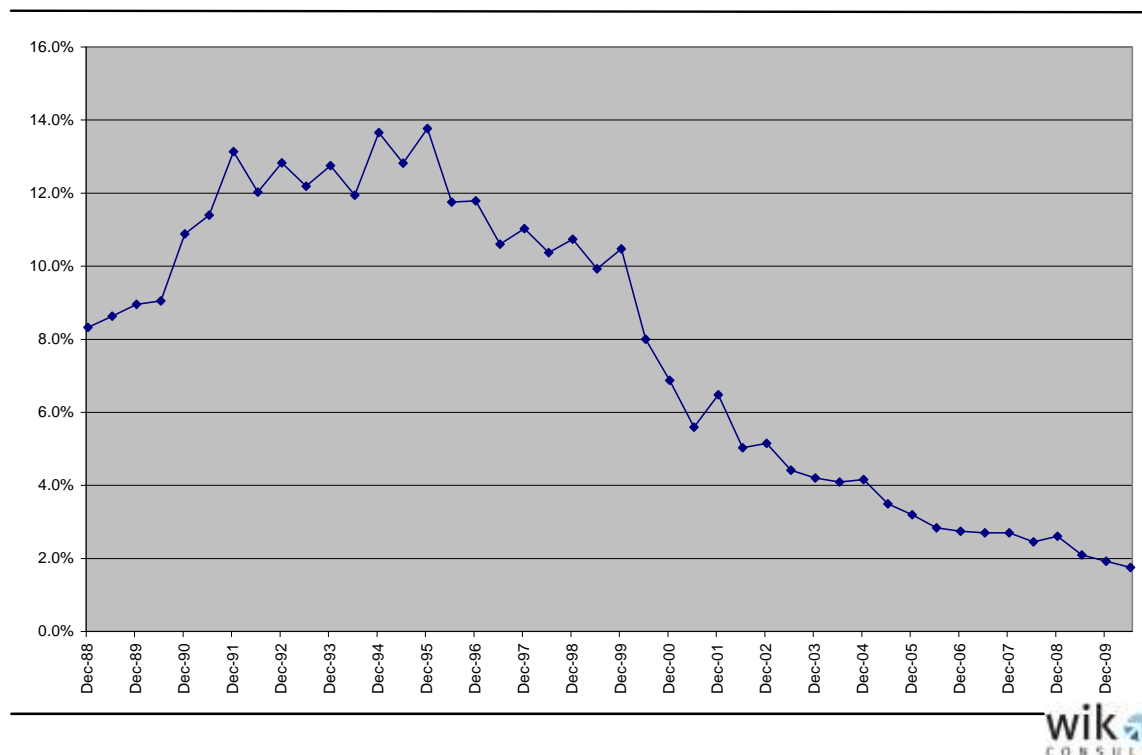
The U.S. experience with domestic roaming sheds useful light on the situation in Europe.

Roaming within the United States was once a significant portion of the revenue structure, representing some 14% of MNO revenues in the U.S. in 1998. The introduction of Digital OneRate by AT&T Wireless in 1998, however, transformed the industry. Digital OneRate provided for the first time a nationwide flat rate package at an affordable price. There were no per-minute usage charges, no long distance charges, and no domestic roaming charges. Domestic U.S. roaming – which is somewhat comparable in scope to roaming within Europe – has steadily declined in economic significance ever since, as can be seen in Figure 12.

Digital OneRate led to a dramatic gain in AT&T Wireless's market share. It is worth noting that AT&T Wireless had a nationwide footprint when most of its competitors did not. It also had the mentality of a disruptive market player, inasmuch as AT&T had purchased the former industry maverick McCaw Cellular Communications. It is said that, to accomplish anything in life, one needs both resource and motive. AT&T Wireless had both the *motivation* and the *ability* to shake up the prevailing arrangements in the U.S., and to profit from doing so.

After introduction of Digital One Rate, MNOs that lacked U.S. nationwide scale were effectively compelled to merge or form alliances in order to compete. The U.S. had no impediments to U.S.-wide mobile operators. The net effect has been that domestic roaming was effectively subsumed into flat rate packages. The remaining roaming revenue is presumably associated with international roaming.

Figure 12: Roaming as a percentage of total service revenues of US MNOs



Source: WIK, based on the US CTIA Semi-Annual Wireless Industry Survey

AT&T Wireless already had a nationwide footprint. Competitors who did not were forced to make acquisitions or alliances.

With that said, it is natural to ask: Why has Europe not witnessed a similar phenomenon?

There are two possible reasons. First, the Digital OneRate package included not only domestic roaming but also domestic mobile calls in general, and domestic long distance in particular. In the past, it would have been exceptionally difficult for a European MNO to put such a package together as long as mobile termination rates (MTRs) were quite high. With the rapid decreases in MTRs that we are now witnessing, this may no longer be a blocking problem.

A more significant problem, in our view, is that Europe appears to lack MNOs that have both motivation and ability to make such an offer. Some have European scale, but have no motivation to cannibalise their own revenues by offering a highly disruptive Europe-wide retail plan. Others – Hutchison being a noteworthy example – are disruptive players, but lack the pan-European scale that would be needed to make such an offering effective. In other words, some MNOs have the motivation, other MNOs have the ability, but no European MNO seems to have both.

The European regulatory framework recognises the need for “...encouraging the establishment and development of trans-European networks”, but trans-European networks are still not fully in place. The lack of cheap, ubiquitous roaming is one aspect of a lack of scale and fragmentation that places Europe at a substantial disadvantage in global competition with large, integrated regions such as the U.S. and China.

## 5 Regulatory Options

This section sets out a set of regulatory options, including the base case of maintaining the current regulatory system. The fundamental question that this study addresses is whether to maintain, amend or withdraw the current rules for voice, SMS and data roaming.

We have identified the following list of options, taking into account the options put forward by the interviewees.

- Maintain the current rules
- Amend the current rules
  - Implement wholesale regulation and transparency measures, but no regulation of retail prices.
    - Implement wholesale regulation and transparency measures, but implement a price basket rather than a glide path and price cap.
    - Maintain the current rules, but make the Eurotariff and Euro-SMS opt-in rather than default.
  - Provision of reasonable and fair access on a non-discriminatory basis and/or equitable reciprocal conditions:
  - Approaches that allow achieving prices and conditions similar to those prevailing in the market of the visited network including obtaining prices from the different operators in the market of the visited network
  - Decoupling of roaming from mobile services bundles
  - Transparency measures and consumer awareness only
    - Connecting directly to the visited network
    - Temporary number portability, CS and CPS
  - Spot-trading of wholesale roaming
  - Ease certain transparency obligations for pre-paid users
  - Impose limits on the retail price of mobile data roaming
- Withdraw the current rules.

Our assessment of these options has greatly benefitted from the interviews that we conducted with many well-qualified experts.

## 5.1 Maintain the current rules

By “maintaining the current rules” we mean to leave the current regulation in place as is, including retail and wholesale price regulation coupled with transparency measures. The Regulation would not be extended in any of the relevant areas, including data. The rationale for maintaining the current rules would be that if the market is found not to be sufficiently competitive, and no less intrusive alternative would be suitably effective, then the maintenance of the current regulation may be the most appropriate option.

Mobile network operators have not expressed great concern regarding leaving the current rules in place, i.e. “the damage has been done”. It is apparent that the current Regulation has achieved its goal of reducing prices and will continue to achieve this goal going forward in a predictable and realistic manner. Transparency measures have been accepted as necessary measures to increase awareness and also to potentially boost take-up of roaming services; however, transparency measures have also been complicated, time-consuming, and costly to implement, which has created significant opportunity costs. For example, one large MNO chose to scrap pre-paid data roaming rather than implementing the transparency measures, because the implementation costs would have been unacceptably high given the relatively small number of pre-paid data roaming customers.<sup>70</sup>

## 5.2 Amend the current rules

This group of options constitutes going forward with some amendment to the regulatory rules currently in place.

We have considered a number of alternative regulatory options and other policy interventions to assess whether any might be more effective than current arrangements. Any suggestion to amend the current rules should consider that mobile network operators have already incurred significant costs to make changes to IT and billing systems in order to comply with the 2007 Regulation, and have made additional changes to accommodate the amendments as introduced by the 2009 Regulation. Moreover, the dedication of resources for regulatory compliance tied up resources that could have otherwise been used to further the development of new, targeted and innovative services. Thus, the benefits that the Regulation generated for consumers need to be weighed against possible negative effects on the mobile market as a whole. Vodafone spent €60 million as a Group to accommodate the Roaming Regulation, not counting the opportunity costs of foregone alternatives.

Whether those costs were warranted was an impact assessment question at the time. Today, those costs are largely sunk, but the costs and benefits of any new policy interventions should be reflected in a new impact assessment going forward.

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<sup>70</sup> A higher proportion of customers that use data roaming is on post-paid contracts.

### 5.2.1 Wholesale regulation and transparency measures only

By “wholesale regulation and transparency measures only”, we mean the complete removal of retail price caps (including Eurotariff and Euro-SMS obligations), but the maintenance of wholesale price caps coupled with the maintenance of transparency measures such as price indices; publishing of basic pricing information for voice, SMS and data usage; cut-off and warning limits for data usage; and making real time expenditure information available.

The use of wholesale price caps, together with transparency measures, might be the most appropriate option to achieve the goal of lower roaming rates and competition if (1) wholesale rates were regulated or negotiated down to a reasonable level, and (2) MNOs were likely to set retail prices at levels that reflected costs, including the level of IOTs. Some experts believe that the most appropriate wholesale price level would be cost-based. Mobile network operators tend to have a different view.

Transparency measures have already been implemented, and those costs have already been incurred – they represent sunk costs. Many of the operators whom we interviewed expressed the belief that transparency measures are overall a good thing for their respective businesses. Some of the transparency were unduly burdensome to implement, and questions could be raised as the customer friendliness of some of the transparency measures; however, a fairly consistent message from the MNOs (and generally reasonable in our view) is that they do not wish to be burdened with the additional cost of implementing further “enhancements”.

In general, retail price caps represent a fairly severe form of intervention. Under the general terms of the European regulatory framework, retail price regulation would typically be initiated only in cases where there were clear indications of significant consumer harm, and where wholesale regulation alone was not likely to successfully address that harm.

A key concern with retail regulation is that it typically introduces market inefficiencies. Market players are better placed to craft retail plans than are regulators. They have a better understanding of the needs, and the willingness to pay, of actual and prospective customers. They are better positioned to define feature sets, and to design efficient quality and price discrimination. For all of these reasons, it is generally best (assuming that markets are reasonably competitive), in terms not only of producer welfare but also of consumer welfare, for providers of products and services to design their own price plans.

At the same time, we observed that certain MNOs already implement many different price plans for mobile roaming. The Roaming Regulation establishes the Eurotariff and Euro-SMS as *de facto* defaults, but they do not prevent alternative plans. This begs the



question: In terms of implementing new pricing plans, what exactly does the current Roaming Regulation prevent MNOs from doing?

On closer questioning, it appears that MNOs can and do introduce alternative roaming plans at the retail level. If the Regulation represents an impediment, it is that few consumers have been willing to consider alternatives to the default Eurotariff and Euro-SMS. The sales and marketing costs of alternative plans consequently tend to be high in comparison with the take-up of alternative plans.

In this case, the elimination of retail regulation would not necessarily result in an increase in average retail prices. Most interviewees felt that retail prices were unlikely to increase in the absence of retail regulation (although it is likely that retail prices would stop declining). Some felt that this reflected changes in consumer expectations; others felt that the MNOs would not increase prices because they did not wish to risk more intrusive regulation.

There are, in our view, bounds to the degree of confidence that can be placed in this expectation that prices would not increase. If the expectation is primarily grounded in the fear of re-regulation, as many respondents suggested, then it might well be that the fear would dissipate over time, and that retail roaming prices would indeed creep upward again.

It should be noted that while most (smaller) operators offer only one roaming service at or just below the Eurotariff, a number of larger operators such as Vodafone, T-Mobile, Orange, Hutchison and E-Plus already offer alternative roaming tariffs that tend to be (for some users) somewhat below the Eurotariff.<sup>71</sup> These are, for example, Passport and Smart Traveller, which customers can opt into instead of the Eurotariff. Both tariffs entail a call set-up fee of approximately €0,70 and allow customers to talk at their home rates. The products differ in that T-Mobile offers Smart Traveller linked to the domestic package (i.e. inclusive domestic minutes can be used). Hutchison UK also offered “3 at Home”, a similar tariff to Passport; however they are said to have withdrawn the service in the UK in 2009.

The current Regulation requires MNOs to provide the Eurotariff, and also the Euro-SMS, and these plans are effectively default; however, MNOs are free to provide other plans (which may be superior to the Eurotariff, depending however on the customer’s usage patterns). Thus, the removal of retail regulation would not radically transform the regulated environment for mobile roaming:

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<sup>71</sup> Whether they are actually less expensive than the EuroTariff is heavily dependent on the customer’s usage characteristics.

- The withdrawal of the Eurotariff would provide MNOs with the possibility of increasing retail prices. Price increases would not necessarily follow, but the possibility cannot be excluded.
- Further retail price reductions would not be mandated. If IOT rates were to continue to decline for whatever reason, retail prices would not necessarily track those declines.
- MNOs would be free to offer other retail plans – which, however, is already the case today.
- Administrative burdens on MNOs might be somewhat reduced in comparison with the situation today.

In the course of our study, two variants were suggested that we also considered in some detail: the use of price baskets instead of the current Eurotariff and Euro-SMS (Section 5.2.1.1).; and making the Eurotariff and Euro-SMS opt-in instead of an opt-out default (Section 5.2.1.2). Each represents some relaxation of retail controls, while maintaining wholesale controls and transparency measures. Each has the potential to address some of the concerns implicit in a simple elimination of retail controls.

#### 5.2.1.1 Price basket instead of Eurotariff / Euro-SMS

When we asked one MNO expert if he had any thoughts as to ways to avoid intensive regulation, he suggested that we might consider the introduction of a price basket instead of the current price cap and glide path. A “price basket” means an average (not maximum) price cap across a number of services akin to the CPI-X approach.<sup>72</sup> Operators would be allowed to price above or below the price cap, which represents an average price of differently priced selected services. In general, one introduces a price basket in order to provide more flexibility for operators to target different customer groups more appropriately based on more differentiated services.

This is an interesting thought; however, given that MNOs are already free to offer other retail pricing plans as long as the Eurotariff remains available, it is difficult to see what flexibility a basket would provide that is not already available under the current regime. In comparison with the Roaming Regulation today, this approach would appear to entail increased complexity, without providing meaningful additional flexibility.

#### 5.2.1.2 Making the Eurotariff and Euro-SMS opt-in instead of opt-out

When we asked one MNO what inhibits them from introducing alternative roaming pricing plans today, they responded that the difficulty of persuading consumers to even

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<sup>72</sup> As first introduced in the UK in the 1980s to control retail prices and allow tariff rebalancing (line rental and local calls).

consider an alternative to the Eurotariff resulted in rather high marketing costs, and in low take-up of alternative plans, even in cases where the alternative plans might have been expected to benefit consumers.

This leads naturally to the thought that the Eurotariff and Euro-SMS might be left in place, and that MNOs would be required to make consumers fully aware of them (as is already the case under the regulation today), but that MNOs would not be required to sign consumers up for Eurotariff and Euro-SMS if the consumer fails to make an election one way or another.

This small change might have positive net effects overall. It seems to be somewhat preferable to outright withdrawal of retail controls. It preserves the ability to put downward pressure on retail prices through the Eurotariff and Euro-SMS, although these mechanisms might be somewhat less effective in regulating retail prices than they are today.

It potentially makes it easier to introduce new retail plans. Doing so would tend to be more efficient for MNOs, to the extent that they could more efficiently price discriminate. It is not necessarily bad for consumers – consumers might or might not pay somewhat more than under current arrangements, but they would tend to have more of the choices that they want in terms of pricing plans.

This option might well be (modestly) advantageous overall for large established MNOs, for small disruptive MNOs, and for consumers. Large MNOs would be better able to price discriminate, thus increasing revenues from customers who are willing to pay a premium. Small disruptive MNOs would be better able to offer aggressively priced plans in an attempt to win market share. Consumers might benefit from a broader palette of pricing and service offerings, some of which might better meet their needs than the plans available today. It might seem counter-intuitive that all can benefit, but this is not a zero sum game – the net savings come from a gain in societal efficiency, and a reduction in deadweight loss.

Phasing in of this option would need to be done with some care, and the details might perhaps be an appropriate study topic for the BEREC. We would suggest that existing contracts should remain in force, unless informed consumer chose to opt out of them. At contract renewal time, however, MNOs would not be compelled to treat the Eurotariff as default, provided that consumers were fully notified that the Eurotariff is available (as is already required in the Roaming Regulation).

### 5.2.2 Provision of reasonable and fair access on a non-discriminatory basis and/or equitable reciprocal conditions

This option entails obligations on European MNOs to provide wholesale mobile roaming to competitors on the same terms and conditions, including price, on which they provide

it to themselves and to affiliated MNOs. This option appears explicitly in Recital 51 of the Roaming Regulation as amended.

Similar obligations were imposed on Vodafone at the time of acquisition of Mannesmann, and we understand that there is still earlier precedent in the Telia/Sonera and Telia/Telenor arrangements.

Most interviewees felt that such an obligation would be completely ineffective. If an MNO were obliged to provide wholesale mobile roaming on a non-discriminatory basis, it could always simply choose a high but non-discriminatory wholesale IOT price. The transfer price within an MNO is neutral to its profitability. The internal price to affiliates in other European countries might have tax significance, but is otherwise neutral to an international group of MNOs.

MNO interviewees also noted that they are already required by their corporate tax departments to use transfer prices based on market price to their group affiliates in other European countries. Once again, they argue that this obligation would be ineffective, in this case because it reflects what is already their normal practice.

Vodafone took a significantly different view. They felt that such an obligation would work against roaming alliances and roaming groups that have formed, and also against roaming hubs and arrangements with smaller operators. Moreover, it would increase the complexity of the already complex system of bilateral negotiations over IOTs. They viewed this as a worst-case scenario that should be avoided at all cost. Given that Vodafone has experience with similar non-discrimination obligations (for example, as a merger undertaking in conjunction with the Mannesmann transaction), we take their concerns seriously.

Finally, we note that this option addresses only wholesale arrangements. The degree to which retail prices would reflect declining IOT rates remains unclear (see Section 4.3).

### 5.2.3 Approaches that allow achieving prices and conditions similar to domestic prices

There are two variants to this option. Roaming charges would be either at (1) the pricing level of comparable domestic services of the home network (possibly with a reasonable mark-up); or at (2) the pricing level of comparable visited network services.

#### 5.2.3.1 Pricing at the level of the visited network

Most interviewees had difficulty in seeing how the second option could work, and we share their concerns. First, it is not clear *which price* should provide the benchmark for the visited network. Second, it is difficult to see how such a system could be made

transparent and comprehensible to consumers, since they would experience different prices in each visited country.

If the intent were to ensure that the price of domestic calls while roaming in the visited country were not significantly greater than the price of *domestic* calls using a domestic service in the visited country, that would be fairly easy to achieve; however, it is not the service that most consumers need when roaming. Consumers are more likely to want to place a call to their home country, or perhaps to some third country, than to call a destination in the visited country. If these calls were subject to the same rates as *international* calls in the visited country, they might be more expensive today than roaming calls.

#### 5.2.3.2 Pricing at the level of domestic mobile services in the home network

The first option is easier to understand, and easier to implement. The MNO itself controls the price level, both for domestic mobile use and for mobile roaming. The key new constraint would be that the two prices could not differ by an “unjustifiable” amount, however defined.

This is similar to the “home market” concept that was discussed when the Roaming Regulation was first introduced in 2007, and is fully in line with the Commission’s “Europe 2020” declaration. It is also consistent with statements by Commissioner Kroes.<sup>73</sup>

The first option (that prices correspond to those of comparable domestic services of the home network, possibly with a reasonable mark-up) raises complex challenges of its own. First, there is the risk that wholesale IOT rates in some Member States might be higher than the home network’s price for domestic mobile service, even after application of a reasonable mark-up. That would probably result in mobile roaming not being available for that combination of home country and visited country.

A second concern is more complex. If the mark-up is small enough, and if wholesale IOTs are low enough to support a low mark-up, it would be possible from an MNO from country A to compete head to head with MNOs in country B for *domestic mobile service*, even if the country A MNO does not have any network assets in country B. This might at first blush seem to be a dream come true – it instantly enables cross-border network competition, and fosters the availability of truly pan-European services.

It is difficult to foresee all of the consequences of such arrangements, but it seems to us that there are scenarios in which this dream could potentially turn into a nightmare.

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<sup>73</sup> Quoted in *Euractiv*, 24 September 2010, in “Kroes calls for lower roaming charges”. “We will not be proposing another barrier, and nor will we propose endless tweaking of the current price capping arrangement without adding anything new. I want the gap between roaming and domestic prices to approach zero.”

First, investment incentives would not necessarily be efficient. Normally, an MNO invests in its own network in order to serve its own customers. In this scenario, an MNO in country A could compete in countries B, C, and D without ever having directly invested in infrastructure in them. This will be efficient only to the extent that wholesale IOTs truly reflect incremental usage-based costs in the visited country; however, to the extent that this implies in turn a linkage between *wholesale* costs in one country and *retail* prices in another, the risk of mismatches would appear to be large. There are, to be sure, certain parallels to precompetitive options such as Local Loop Unbundling (LLU), but the risk of unforeseen and unfortunate consequences seems to be much greater in this case.

A second risk is that a non-European MNO could acquire a single small European MNO, and would then immediately be able to offer domestic mobile service in all Member States with no further investment<sup>74</sup> – thus, there is an apparent risk that the creation of a European Single Market for mobile services might immediately export its benefits outside of Europe. Again, this risk is less of a concern if IOTs are set at levels that appropriate reflect costs in the visited network; and again, it is difficult to see how to ensure that the wholesale costs in the visited country are never greater than the retail prices in the (possibly low-priced) home country.

The various pronouncements of the Commission and of Commissioner Kroes are consistent with the notion that the retail price could be somewhat greater than the domestic price. In comparison with the price of a domestic mobile-to-mobile call in the home market today, one might reasonably expect the cost of a non-group roaming call to a mobile phone in the home market to cost more by (1) the difference between the IOT charged by the visited operator and the home operator's cost of origination plus the MTR charged by the terminating operator in the home country; plus (2) any additional costs of international transit, and of accounting, billing, and otherwise administering international mobile roaming arrangements. Today, the IOT is greatly in excess of an MTR, and MTRs are moreover in the process of a rapid decline as a result of the Commission's 2009 Recommendation on fixed and mobile termination rates. For the price of a mobile roaming call to the home country to approach the cost of a domestic M2M call, the price of the IOT would presumably have to approach that of the MTR in the home country.

The particular strength of this option is that roaming prices would somehow track domestic mobile prices, which are set by the MNOs in a presumably competitive marketplace.

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<sup>74</sup> This is a bit analogous to the schemes that appear in a series of papers by Marius Schwarz and David Maleug. See for instance "International Telecom Settlements: Gaming Incentives, Carrier Alliances and Pareto-Superior Reform", 2001.

This linkage would, however, appear to be of limited value as long as IOTs exceed MTRs by something like € 0.15, as is the case today. This option would become much more interesting if it were coupled with a concerted move to massively lower IOTs.

#### 5.2.4 Decoupling of roaming from mobile services bundles

This option refers to two distinct possible implementations:

- The separate sale of roaming services for voice, SMS and data, so that customers have a choice as to their service provider for each of the roaming services; and
- A roaming capability akin to carrier selection (“CS”) or carrier pre-selection (“CPS”), where the subscriber could choose a mobile roaming provider on a call-by-call basis, or could pre-select a mobile roaming provider.

MNOs interviewed for this study have argued that this option would increase transaction costs for the customer, and would entail significant implementation costs for the MNO. First, implementation of any of the proposals potentially raises significant technical complexities, including in the case of the CS or CPS solutions an apparent requirement to modify the GSM standard (see Section 5.2.4.2). Second, each of these options burdens the customer with complexity, especially if the plan is specific to the visited country. Third, MNOs argue that consumers are not demanding a separate service, but rather want a bundle of services for convenience purposes (one network operator, one bill ...).

##### 5.2.4.1 Separate sale of roaming services

By “separate sale of a roaming service” we mean that the domestic bundle no longer includes a roaming service by default. Customers would be able purchase domestic and international voice, SMS and data services separately from international roaming services. Thus, a customer would have to make an active choice among different providers at the point of purchase of his or her mobile service bundle.

As with Section 5.2.1.2, we assume that existing contracts would remain in force until and unless informed users chose to opt out of them; however, at the time of a new contract or of contract renewal, consumers would have either the option or the necessity of choosing one or more roaming providers. If this option were chosen, the detailed implementation might represent a suitable study topic for the BEREC.

The objective would be to achieve more market contestability, and thereby to reduce mobile roaming retail prices through increased competition.

In principle, the separate sale of roaming services could be implemented in either of two ways:

- A customer purchases a separate roaming service in the *home* country – other domestic or Europe-wide MNOs offer roaming services to domestic customers; or
- A customer purchases a separate roaming service in the *visited* country – visited MNOs sell roaming services to foreign customers.

The separate sale of roaming services would require some technical mechanism to enable the decoupling of the service. Temporary number portability has been proposed as one mechanism which would enable the subscriber to choose a different provider temporarily for roaming services only.

Some MNOs interviewed for this study viewed the option of the separate sale of roaming services as a good idea from a regulatory perspective as a structural solution for purposes of enhancing competition. In this regard, one operator strongly believed that enabling customers to choose another domestic provider for roaming services would also have a very positive effect regarding competition at the national level. However, a number of operators also stated that unbundling the roaming service would introduce diseconomies of scope, and would not necessarily reduce the cost of providing the mobile service bundle to the customer; consequently, the combined cost of the two services to the customer might well be greater than the cost of the integrated service today.

Regarding technical implementation and cost, most MNOs interviewed had serious doubts as to the viability of this option, in light of potentially significant additional costs to be incurred for system changes to enable, for example, temporary number portability. Yet, operators conceded that technical challenges would have to be studied carefully and in depth in order to reach a firm conclusion as to the viability of this option. The costs could be strongly dependent on the particular approach taken; however, there are a large number of potential options, none of which has been studied in any great depth. Thus, there is considerable uncertainty as to actual implementation costs.

Several respondents felt that the most promising solution in this group would be based on the use of multi-IMSI SIMs. The *International Mobile Subscriber Identity (IMSI)* is a 64 bit code that is stored within the SIM, and that serves to uniquely identify a subscriber. For a subscriber to be served by two different MNOs, one for national service and the other for roaming, the natural solution would entail the use of two different IMSIs to the same subscriber.

Multi-IMSI SIMs already exist, and are used in a number of the schemes used to substitute for the mobile roaming service for voice, SMS and data; however, the degree to which a specific handset supports a given multi-IMSI SIM application can vary greatly. This can depend, notably, on the degree to which the SIM itself implements the intended application, versus depending on the handset to do so.



An approach along these lines would require an existing subscriber to replace the SIM with a new dual-IMSI SIM, which represents an impediment but perhaps not a blocking problem. Still, there could be complexities when the user changes either the national MNO or the roaming MNO, since information for both is in a single SIM, and it is not clear which would provide the SIM, nor whether they would be motivated to cooperate. One respondent suggested that it might be possible to assign a “virtual IMSI”, thus avoiding the need to physically switch the SIM.

We asked in greater depth about the standards changes that would be required to support such a solution. For *origination* of voice calls and SMS, in principle no changes should be required – the user would simply have an alternate identity when roaming, would be billed by the domestic MNO responsible for his or her roaming service, and would receive whatever price the domestic roaming MNO offered (which would surely depend on the IOT that the domestic roaming MNO was able to negotiate in the visited country).

Termination is significantly more complex than origination. For the subscriber to seamlessly receive voice calls on the customary phone number while roaming, it would be necessary to route the calls (which would go to the MNO for national service) to the MNO for roaming service, but only in the event that the subscriber is roaming. One MNO that has studied the matter in depth presented a fairly detailed analysis of a possible solution, where a new HLR-HLR protocol would be required. A Routing Number (RN) plus MSISDN (effectively a phone number) would be provided to the MNO for national calls when the user was roaming. The call would then be forwarded to the MNO for roaming in a process more-or-less akin to number portability.<sup>75</sup>

This solution for termination is easy enough to describe, but it involves numerous practical challenges. First, the GSM standard would have to be expanded to allow for this new HLR-HLR exchange – respondents indicate that the ability to obtain this change is by no means assured. One of the key GSM protocols – the Mobile Application Part (MAP) protocol – would have to be modified. Accounting would need to be implemented between the national MNO and the roaming MNO. Usage of the roaming MNO for national calls might somehow need to be blocked if separation is to be maintained. Traffic steering mechanisms, and any number of other mechanisms that are currently taken for granted, would need to be reviewed.<sup>76</sup>

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<sup>75</sup> Details might vary from one Member State to another, to the extent that number portability implementations themselves differ.

<sup>76</sup> A somewhat similar approach has been studied at a more academic level. Jörn Kruse considered the use of *domestic* roaming to address the domestic all termination monopoly. His approach would depend on changes to the GSM standard to enable more than one MNO to terminate calls to the same handset in the same country. A similar technical solution might possibly be relevant to international mobile roaming, but the Kruse paper does not elaborate the technical approach. See Kruse, Jörn, “Mobile Termination Carrier Selection”, Helmut-Schmidt-Universität / Universität der Bundeswehr Hamburg, Discussion Paper number 79, April 2008.

A similar mechanism could serve for SMS, but a different component (the *Short Message Service Centre*, or *SMSC*) would be used instead of the Gateway MSC, thus involving some additional implementation effort.

A multi-IMSI SIM approach could also be used for data, but the routing aspects would once again be somewhat different. Data traffic is normally routed through the home MNO for a variety of reasons, including the need to serve email (which presumably would remain on the network of the national MNO rather than the roaming MNO). Wholesale and retail billing and accounting mechanisms would need some re-thinking.

There would also be commercial implications. If the national MNO were actively involved in forwarding the call to the roaming MNO, as would be the case here, we assume that the national MNO would expect some payment.

A number of respondents plausibly suggested that, with the migration to IP-based networks under LTE, and particularly as voice and SMS become purely IP-based services, the mobile roaming problem will eventually be easy to solve. They may be right, but this migration is unlikely to be far enough advanced within the planning horizon for this study.

Some operators noted that if current price regulation were to be continued with a new glide path, and if any potential structural solution regarding the separate sale of roaming were to be pushed into the future, then the commercial viability of the separate sale of roaming services would be eroded due to dwindling margins (because the price of the service with which it competes will be declining rapidly).

Most MNOs felt that procuring a separate roaming service when in the visited country would entail prohibitively high search costs for the consumer. The option would probably be unpopular due to language barriers and the added complexity and hassle of purchasing a roaming service upon arrival on holiday in a foreign country. One respondent suggested that the customer might instead make payment to the home MNO, rather than the visited country roaming MNO; this, however, would require new mechanisms to synchronise accounting and charging, and potentially quite substantial complexity, and would also be subject to a range of limitations.

#### 5.2.4.2 Roaming capability akin to CS and CPS

By “roaming capability akin to CS and CPS”, we mean that a customer would be able to pre-select (CPS) an operator who provides the entire customer’s roaming requirements when the customer is abroad, or would be able to select the roaming operator on a call-by-call (CS) basis. The difference between this option and that discussed in Section 5.2.4.1 is that a roaming call would be routed via a prefix onto the provider’s network. For call-by-call prefix (CS), the prefix would be manually entered; for pre-selection, the

prefix would be automatically entered. This option does not require temporary number portability; however, it might require changes to the GSM standard.

There is little clarity and certainty as to the technical implications, requirements and additional costs of CS and CPS roaming solutions at this stage, however it appears likely that significant technical changes would have to be made.<sup>77</sup>

It would be necessary to consider whether CS and CPS access should be mandated in the home or in the visited country. CPS could possibly be offered by MNOs in either the home or the visited country, but CS would have to be offered by the visited MNO. Once again, any solution that had to be ordered in the visited country would pose significant complexities for the customer, who would for example need to be informed of CS prefixes when abroad.

### 5.2.5 Transparency measures and consumer awareness only

This option implies that *both retail and wholesale price caps would be removed completely*, and that transparency measures would be the only obligation on providers.

In addition to roaming price transparency measures, consumers still have only limited awareness of potential roaming substitutes. This option would continue to provide price transparency measures as currently in place, and would in addition seek to provide consumers with better information about roaming substitutes.

This option seems to us to be nearly equivalent to full withdrawal of regulation. Our assessment is that transparency measures alone would be insufficient to prevent increases in wholesale IOTs (which are not visible to consumers), and that IOT increases would eventually result in increases in retail prices.

We considered two variants of this option, one of which concentrates on overall consumer awareness of substitutes (Section 5.2.5.1), the other specifically on awareness of dual SIM handsets (Section 5.2.5.2).

#### 5.2.5.1 Consumer awareness of substitutes

The sophisticated user knows and uses roaming substitutes such as international calling cards, use of local networks, email, local and regional and global SIM cards (unless prevented by SIM-lock), and the use of WiFi for VoIP and data (if the handset is capable of doing so). The average user typically does not know about these potential

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<sup>77</sup> As previously noted, the issue of carrier selection was examined by Jörn Kruse in "Mobile Termination Carrier Selection" in 2008, primarily as a means of addressing the call termination monopoly and obviating the need to regulate MTRs.  
<http://www.econstor.eu/dspace/bitstream/10419/38726/1/586158154.pdf>

substitutes, and does not use them. Making consumers more aware of these options might have some positive effect.

The Australian Parliament recommended that consumers should have more information on alternatives to roaming, which the Australian Communications and Media Authority (ACMA) then added to their roaming fact sheet. BEREC has also considered this issue.

Several interview respondents have taken the view that a small group of sophisticated and price-sensitive users use roaming substitutes, but that these alternatives represent imperfect substitutes. The closest and probably most successful alternatives are the use of WiFi for data and VoIP; however, even these substitutes are not available everywhere, are not truly mobile, and involve complexity for the user.

Raising awareness of roaming substitutes could increase uptake of some of these alternatives; however, mobile roaming is a much more convenient service, and most customers are likely to continue to be willing to pay a higher price for roaming from their mobile phones while travelling. Several interviewees suggested substitution alternatives are likely to remain a niche product rather than a mass market product as long as the customer would need to obtain complex information to use the substitute, and as long as problems such as language barriers when purchasing e.g. local SIMs, or handset SIM-lock, get in the way. All of this suggests that there might be scope for customer education, but that it is unlikely to be a panacea (i.e. a cure-all).

#### 5.2.5.2 Consumer awareness of dual SIM-Card handsets

Most consumers are unaware of the existence of dual SIM-Card handsets, which enable the use of two SIM cards either. Historically, the user needed to manually switch from one SIM to the other, but today's handsets can do this automatically. Many interview respondents felt that dual SIM handsets could potentially represent a relatively effective substitute. Dual SIM handsets could be used by consumers when travelling instead of installing a local SIM in their regular mobile phone, or in a second mobile phone carried solely to bypass roaming charges when travelling.

To date, there is little information available to the average consumer regarding the availability and usability of dual handsets. MNOs typically do not offer these handsets because it is not in their interest to make it easy for consumers to bypass their network and services. The average retail outlet does not promote the use of dual SIM handsets.

Nonetheless, dual SIM handsets are available in many parts of the world, and prices are not prohibitive. The use of dual SIM handsets is increasing in China and India and a number of other regions. Dual SIM handsets can also be useful to consumers who want to combine work and personal use of a single phone. Thus, active promotion and awareness raising of such handset may increase uptake.

As with other roaming substitutes, problems such as added complexity and language barriers when purchasing a local SIM could negatively impact take-up. Today, dual handsets involve extra cost, they are sold in speciality shops, MNOs do not provide them, and current handset subsidy schemes would work against the wide-spread dissemination of such devices. SIM lock could pose an additional constraint; however, given that MNOs do not generally offer dual SIM phones, we conjecture that most dual SIM phones in use in Europe today are unlocked. All considered, it is unlikely that an unsophisticated user would use a dual SIM-enabled handset today.

In addition, a dual SIM-enabled handset does not necessarily solve all of the problems associated with mobile voice or SMS roaming. Using a second SIM card (of the visited country) enables the user to save money only for calls received and calls made to the visited country. As previously noted, what the user typically is seeking to do is to call his or her home country, or perhaps some other country. In either case, the call is billed as an international call, which will not necessarily cost less than a mobile roaming call.

An obligation on MNOs to provide dual SIM handsets might be effective, but it seems inappropriately burdensome. Short of such an obligation, it seems unlikely that improved customer education alone would be sufficient to ensure mass market take-up of dual SIM handsets.

#### 5.2.6 Spot-trading of wholesale roaming

In a recent informal white paper,<sup>78</sup> Tony Shortall argues that competition problems in mobile roaming in Europe are largely a result of the negotiating game whereby MNOs determine IOTs with one another. He argues that the negotiation tends to centre on the number of roaming minutes that a home MNO can deliver to a visited MNO, rather than on the wholesale price at which mobile roaming is offered. As a result, the negotiating game fails to converge to the lowest wholesale IOT price; indeed, the negotiating MNOs may have perverse incentives for the price to be significantly higher than perceived marginal cost.

Mr. Shortall suggests that trading roaming capacity on a “spot exchange” would separate the offer to supply a given number of roaming minutes in a given visited country from the offer to purchase a given number of roaming minutes. He notes that spot exchanges have been used successfully in a number of other network industries, especially energy.

We feel that the analysis is interesting, and that Mr. Shortall has made an important contribution to the discussion by placing a focus on the negotiating game for IOTs. We would also note that market players effectively confirm Shortall’s assertion that the

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<sup>78</sup> Tony Shortall, “A Structural Solution to Roaming in Europe”, 2010.

number of minutes that the home network can offer to direct to a visited network plays an important role in the negotiation over IOTs.

We think that this contribution warrants serious thought; however, we have numerous questions and concerns, both about the diagnosis and about the proposed cure.

A first set of issues has to do with his description of the negotiating game itself. The argument is that both MNOs will focus more on the number of minutes delivered than on the price at which those minutes are served. This is plausible up to a point, and is surely linked to the fact that the cost of providing the mobile roaming service is much less than the IOT rate. The difference between the IOT will tend to dwarf the retail mark-up that is permitted above the level of the IOT. Thus, it is far more profitable to provide wholesale minutes, than to sell retail minutes to consumers. All of this is consistent with Shortall's description; however, it also raises the possibility that the relative balance might change if the relative levels of wholesale and retail charges were to change.

Second, we think that it oversimplifies the negotiating game. The relative balance of roaming traffic surely plays a substantial role, as do the coverage and performance of each of the networks. And the negotiations among groups serving multiple European countries likely involve complex trade-offs, reflecting among other things the roaming situation pair wise among the countries served. Finally, the tendency to negotiate a rate only for unmatched minutes, rather than for all minutes, likely introduces subtleties into the game as well.

Third, we think that there is considerable uncertainty as to whether the proposed decoupling is sufficient, in and of itself, to assure an efficient negotiated outcome at appropriate IOT rates.

Fourth, we would note that correcting over-pricing problems in the wholesale IOT does not, in and of itself, necessarily correct for the distortions at the retail level. There has always been uncertainty as to whether MNOs would pass IOT reductions through to consumers in their retail prices for roaming calls made (see Section 4.3). Further, roaming calls received are not affected at all by the IOT rate. Having said this, we acknowledge that similar concerns are relevant to many of the other options discussed in this section.

Fifth, we see a number of practical problems with the proposal to use spot exchanges for roaming. First, the MNOs themselves express reasonable concerns that roaming minutes are not fully fungible – different networks have different degrees of coverage of the national territory, and provide different capabilities (e.g. 2G/3G) and levels of service quality. Second, our understanding is that current roaming exchanges do not provide for sophisticated negotiation of price; rather, a small network that uses the roaming hub generally gets the nominal regulated IOT rate for roaming, not a more favourable negotiated rate.

Finally, while we see no problem with roaming exchanges per se – they are already in use – it seems to us that *mandating their use* would be heavy-handed and possibly disproportionate.

### 5.2.7 Eliminate certain transparency obligations for data roaming for pre-paid services

A number of MNOs reported that implementation of the transparency obligations of the amended Roaming Regulation had proven to be unexpectedly burdensome. In particular, they found that implementing warning messages as charges approach € 50 required significant effort, and that the effort for pre-paid was not less than for post-paid. At least one large MNO discontinued the data roaming service for pre-paid customers as a result.

Several MNOs credibly argue that their customers only rarely have balances in excess of € 50 available on their pre-paid cards. Thus, the protections against bill shock would already be adequate in nearly all cases, even in the absence of the transparency obligations of the amended Roaming Regulation.

A simple removal of this obligation should be seriously considered. Perhaps a warning message could be sent for a period of one year after the change comes into effect, notifying the user *not* to expect a warning message when € 50 of charges have been incurred. Again, it might be appropriate for BEREC to consider implementation details.

### 5.2.8 Imposing limits on the retail price for mobile data roaming

As previously noted (see Sections 4.1.1 and 4.2.2.3), the retail price per megabyte for mobile data roaming has stubbornly remained quite high (in comparison to domestic data prices, and in comparison to the wholesale cost per megabyte), even though the wholesale charges have declined substantially. To date, the retail price for off-net data has not declined nearly as rapidly as the regulated wholesale price.

This apparent lack of linkage from wholesale cost to retail price inevitably suggests structural problems in the marketplace for roaming data. In consequence, it is natural to consider whether retail price controls might be appropriate.

At the same time, we have some concern that it may be too early to reach a firm judgment. We have only two quarters of data available since the amended Roaming Regulation went into effect. It may be a bit too early to infer a reliable trend – as Aristotle said, “One swallow does not make a summer, nor does one day ...” The team that conducts the next roaming study for the Commission will have more data available.

We also observe that mobile data is still a fairly new service, and that there may well be risk in prematurely imposing retail controls.

The retail price limit could be implemented through a Euro-data tariff, similar to the existing Eurotariff and Euro-SMS. If implementation were coupled with a decision to implement a shift to opt-in for the Eurotariff and Euro-SMS, presumably the same should hold for a Euro-data tariff.

Alternatively, if there were a decision to implement roaming at prices that did not unjustifiably differ from domestic prices (see Section 5.2.3.2), then mobile data roaming could if desired follow the same general approach.

### **5.3 Withdraw the current rules**

If the market were found to be sufficiently competitive, and likely to remain so even in the absence of regulation, then withdrawal of regulation (i.e. choosing not to renew the Roaming Regulation when it lapses in 2012) would likely be appropriate.

Most mobile network operators naturally sympathised with this option, presumably because it might tend to increase their profits over time.

Most interviewees felt that retail prices are unlikely to increase if regulation were withdrawn. We can see two possible reasons why this might be true. First, the market is somewhat more dynamic than it was a few years ago. Second, and probably more important, the MNOs are concerned that a price increase would lead to re-regulation.

Many of the MNOs whom we interviewed argued that negotiations over IOTs are already competitive, and would remain so in the absence of regulation. We largely support this view, but it seems to us that it is insufficient to ensure healthy Single Market outcomes at retail level (see Section 4.3).

Some interviewees expressed concerns that wholesale IOT prices would increase if regulation were lifted. Under this school of thought, retail prices are not likely to rise in the near term, because they are highly visible; however, IOTs are not visible to the public, and would likely gradually increase in the absence of regulation. If the IOT were increased enough, retail increases would necessarily follow.

An unfortunate consequence of stabilising or increasing IOT rates is that they would likely lock in the current retail pricing levels. Smaller and/or more aggressive MNOs, who might otherwise be motivated to price aggressively at retail in order to gain share, would be unable to do so in the face of high wholesale costs. Larger MNOs would have no incentive to cannibalise their own revenues in the absence of effective retail competition.

Our feeling is that the European public policy should continue to ensure downward movement in wholesale IOT rates. For voice and SMS, this movement is unlikely in the absence of some form of regulation.



## 6 Impact assessment of different regulatory options

The Tender Specifications have clearly identified the evaluation criteria that we are to use in order to identify the most appropriate option. For this Draft Final Report, we are using them as abstract criteria to assess each option. Our methodology draws on the general format of an Impact Assessment, but, knowing that the Commission has already launched another study to assist it with a formal Impact Assessment, this study provides only a brief qualitative assessment.

The evaluation criteria that we are using are:

- Effectiveness – the extent to which the options achieve the main objective of reducing the mobile roaming charges towards competitive levels.
- Competition – the extent to which the options improve competition on the mobile market and strengthen competitive pressures.
- Efficiency – the extent to which the objectives can be achieved the least costly. The cost of any proposed measure would include inter alia administrative costs, compliance costs for mobile operators (e.g. cost of implementing regulatory measures).
- Consistency – the extent to which the options provide for a harmonised outcome and prevent market fragmentation in the EU.
- Coherence – the extent to which the options are coherent with overall EU policy, the general principles of the electronic communications regulatory framework, and EU law in general.

With that in mind, our assessment of alternative regulatory options appears as Table 3.

Based on this assessment, we suggest that the consulting team that the Commission has retained to assist them with the Impact Assessment for the Roaming Regulation consider the following options:

- Maintain current regulations (Section 5.1). We assume that IOT charges, and the maximum level of the Eurotariff and Euro-SMS, would continue to decline.
- Making the Eurotariff and Euro-SMS opt-in instead of opt-out (Section 5.2.1.2). Eliminate the notification of pre-paid customers when € 50 of charges have been incurred (Section 5.2.7). Once again, we assume that wholesale and retail price levels continue to decline.

- Pricing at the level of domestic mobile services in the home network (Section 5.2.3.2). We assume that regulated limits on wholesale IOT charges decline markedly, but that retail roaming prices are permitted to exceed domestic retail by roughly the difference between regulated wholesale IOT charges and average wholesale MTR charges. Regulate data roaming in the same way (Section 5.2.8)
- Withdraw the current rules (Section 5.3).

The options could, of course, be mixed in ways other than those that we show here.

In an Impact Assessment, there must always be a baseline “no change” case, and it is generally appropriate to have a “no intervention” option. The rationale for the two other options appears in our recommendations in Section 7.2.

Table 3: Assessment of alternative regulatory options

Option	Effectiveness	Competition	Efficiency	Consistency	Coherence
<b>Maintain the current regulations</b>					
<b>Maintain current regulations (Section 5.1)</b>	✓✓✓ Effective in that prices are reduced in accordance with the price caps to a predictable level.	✗ Unlikely to lead to a dramatic increase in competition at the retail level; however, wholesale voice IOTs will continue to decline, data IOTs may decline considerably, and elasticity may increase if the retail price becomes sufficiently low.	✗ Regulatory and administrative operational costs remain fairly high.  Implementation costs are already sunk costs.	✓ Consistent in that all MNOs are subject to the same obligations.	✓ Consistent with EU 2020 goals if prices are reduced sufficiently.  Retail intervention is suitable as a last resort if wholesale regulation is found not to suffice (as appears to be the case here).
<b>Amend the current regulations</b>					
<b>Implement wholesale regulation and transparency measures, but no regulation of retail prices (Section 5.2.1)</b>	✓ ✗ Further reduction in retail prices is not guaranteed; in fact, retail prices might well increase.	✓ Might generate modest improvements in competition, because MNOs would have full freedom in offering alternative plans, and consumers might have greater choice.	✓ ✗ Administrative burdens are somewhat reduced.  Implementation costs are already sunk costs.	✓ Consistent in that all MNOs are subject to the same obligations.	✓ ✗ Inconsistent with EU 2020 goals.  Avoids retail intervention, which is normally chosen as a last resort if wholesale regulation is found not to suffice.
<b>Price basket instead of Eurotariff / Euro-SMS (Section 5.2.1.1)</b>	✓ ✗ No obvious effect has been identified.	✓ ✗ No obvious effect has been identified.	✗ Somewhat higher administrative costs than at present.	✓ Consistent in that all MNOs are subject to the same obligations.	✓ ✗ Moot.

Option	Effectiveness	Competition	Efficiency	Consistency	Coherence
<b>Making the Eurotariff and Euro-SMS opt-in instead of opt-out (Section 5.2.1.2)</b>	✓✓ Economic efficiency gain. Possibly slightly less effective than current arrangements for reducing retail prices.	✓ Might generate modest improvements in competition, because MNOs would have greater freedom in offering alternative plans, and consumers might have greater choice.	✗ Regulatory and administrative operational costs remain fairly high. Implementation costs are already sunk costs. Trivial to implement.	✓ Consistent in that all MNOs are subject to the same obligations.	✓✓ Consistent with EU 2020 goals. Reduces the intensity of retail intervention, which is normally chosen as a last resort if wholesale regulation is found not to suffice. Thus, slightly more coherent than current arrangements.
<b>Access on a fair, reasonable, non-discriminatory and reciprocal basis (Section 5.2.2)</b>	✗✗✗ Likely to be ineffective.	✗✗✗ Not likely to improve competition.	✗✗ High regulatory and administrative implementation costs; monitoring of non-discrimination is difficult.	✓ Consistent in that all MNOs are subject to the same obligations.	Moot.
<b>Pricing at the level of the visited network (Section 5.2.3.1)</b>	✗✗✗ Difficult or impossible to implement. High search costs and complexity for consumers.	? Unclear.	✗ Possibly high regulatory and administrative implementation costs.	✓ Consistent in that all MNOs are subject to the same obligations.	✗✗✗ Difficult to justify this intensive retail intervention.
<b>Pricing at the level of domestic mobile services in the home network (Section 5.2.3.2)</b>	✓✓✗ Price regulation might eventually become self-enforcing. Significant challenges to implementation.	✗ Possibly major Single Market gains, but substantial risks.	✗✗ High regulatory and administrative implementation costs.	✓ Consistent in that all MNOs are subject to the same obligations.	✗✗✗ Consistent with Europe 2020 goals. Difficult to justify this intensive retail intervention.
<b>Decouple roaming from mobile service (Section 5.2.4)</b>	✓ Might drive down retail prices somewhat.	✓ Likely to introduce moderate competition at the retail level.	✗✗✗ Technically challenging. Burdensome for consumers.	✓ Consistent in that all MNOs are subject to the same obligations.	✗✗✗ Difficult to justify this intensive retail intervention.

Option	Effectiveness	Competition	Efficiency	Consistency	Coherence
<b>Transparency measures and consumer awareness only (Section 5.2.5)</b>	*** Further reduction in retail price unlikely. Increases in wholesale prices are likely.	* Possibly negative effects on competition compared with present.	✓ Reduced regulatory and administrative implementation costs.	✓ Consistent in that all MNOs are subject to the same obligations.	✓ If retail regulation is withdrawn, may increase coherence.
<b>Spot-Trading / Exchange (Section 5.2.6)</b>	*** Not likely to be effective. Substantial uncertainties and risks.	* Effects on competition are unclear.	*** Technically challenging. Retail regulation still required.	✓ Consistent in that all MNOs are subject to the same obligations.	*** Intrusive structural wholesale intervention. Retail regulation still required.
<b>Eliminate certain transparency obligations for data roaming for pre-paid services (Section 5.2.7)</b>	✓✓✓ Effective in that prices are reduced in accordance with the price caps to a predictable level. May slightly increase effectiveness if MNOs that currently do not offer mobile data roaming to pre-paid customers now do so.	* Unlikely to lead to a dramatic increase in competition at the retail level; however, wholesale voice IOTs will continue to decline, data IOTs may decline considerably, and elasticity may increase if the retail price becomes sufficiently low.	✓* Slight reduction in regulatory and administrative operational costs. Implementation costs are already sunk costs. New implementation costs are trivial.	✓ Consistent in that all MNOs are subject to the same obligations.	✓ Consistent with EU 2020 goals if prices are reduced sufficiently. Retail intervention is suitable as a last resort if wholesale regulation is found not to suffice (as appears to be the case here).
<b>Imposing limits on the retail price for mobile data roaming (Section 5.2.8)</b>	✓✓✓ Effective in that prices are reduced in accordance with the price caps to a predictable level. Possibly more effective than current arrangements, in that a loophole is closed.	* Unlikely to lead to a dramatic increase in competition at the retail level; however, elasticity may increase if the retail price becomes sufficiently low.	** Regulatory and administrative operational costs remain fairly high. Introduces some new implementation costs in addition to current sunk costs.	✓ Consistent in that all MNOs are subject to the same obligations.	✓* Consistent with EU 2020 goals if prices are reduced sufficiently. Introduces retail intervention for a new service.
<b>Withdraw the current regulations</b>					

Option	Effectiveness	Competition	Efficiency	Consistency	Coherence
<b>Withdraw the current rules (Section 5.3)</b>	<p>xxx</p> <p>Further reduction in retail price unlikely. Increases in wholesale prices are likely.</p>	<p>✓x</p> <p>Provides operators with more flexibility as to their retail offers, which may improve competition.</p> <p>May undermine competition from smaller MNOs.</p>	<p>✓✓✓</p> <p>No further costs are incurred by operators.</p>	<p>✓x</p> <p>All operators are free to do as they please.</p>	<p>✓x</p> <p>Inconsistent with EU 2020 goals.</p> <p>If retail regulation is withdrawn, might increase coherence.</p>

✓✓✓ - highest rating

xxx - lowest rating

Note that all ratings (other than for the baseline) are relative to the baseline case of maintaining the current Regulation.

## 7 Preliminary findings and recommendations

This section of the report provides our findings (Section 7.1) and recommendations (Section 7.2) to date.

### 7.1 Findings

It is not specifically our task to evaluate the Roaming Regulation, but our view is that the Regulation is for the most part working as intended, and the interviews tend to support this. IOTs and retail prices have come down, as desired. The transparency measures were in some cases more intrusive than expected, but they have been effective and have indeed served to increase the transparency of pricing and to reduce the risk of bill shock. The standardisation of the billing “clock” has also served to increase the transparency of billing.

Aside from that, we have developed findings in regard to the state of wholesale and retail markets (Section 7.1.1), whether there is a basis to withdraw the Roaming Regulation when it comes up for renewal in 2012 (Section 7.1.2), and which of several options should be prioritised for further attention going forward (Section 7.1.3). Since the Commission has already launched a second consulting study to assist with the Commission’s Impact Assessment of these options, we felt that it might be counterproductive for us to narrow the choice down to a single recommended option at this time.

#### 7.1.1 Assessment of the wholesale and retail markets

All MNOs argue that wholesale IOTs are now subject to a robust negotiation process, and that they are bringing out an impressive array of competitive retail offers. We think that there is, in fact, positive movement on both fronts, but IOTs are still rather expensive.

As noted in Section 4.1.2.3, the negotiating game among MNOs has turned out to be more complex than expected, more so in fact than had been identified in the literature to date. We are of the view that the IOT negotiating process is significantly richer and more promising than many had assumed. The IOT rate for *unmatched* roaming voice minutes can represent a substantial discount, sometimes as much as 40% off of the regulated cap. For a variety of reasons, however, this translates into a relatively small discount on the overall average IOT rate.

Still, we find little indication that the mobile roaming market has become truly competitive. The observation that retail offers for voice and SMS are only marginally below Eurotariff and Euro-SMS levels (see Section 4.1) would seem to suggest otherwise.

There are numerous partially effective economic substitutes for the roaming service, but no fully effective substitute. Mobile roaming is expensive, but it is simple and ubiquitous. All of the substitutes appear to involve some mix of complexity for the user, search costs to identify options in each visited country, uncertainty as to the true price and quality of the offer, and/or language issues.

The degree to which demand for the roaming service is elastic with price is a key to understanding the likely evolution of the roaming marketplace. Unfortunately, indications are that subscription choices respond relatively little to the price of the service. There is some uncertainty as to the elasticity of roaming SMS and data; for roaming voice, however, it is clear from BEREC data that elasticity is low, perhaps in the neighbourhood of -0.2. We conjecture that, if the price of mobile voice roaming in Europe were to decline to be at roughly the level of domestic mobile voice, the long term demand elasticity would also be in the range of mobile domestic voice service, which is probably in the range of roughly -0.6.

We think that the U.S. experience with domestic roaming sheds useful light on the situation in Europe. Charges for domestic roaming were high in the U.S. in the late nineties, but have practically disappeared due to the emergence of a flat rate nationwide package from a disruptive MNO that had both the *willingness* and the *ability* to shake up the system. A key challenge in Europe today is that we appear to have some MNOs who have willingness to depart from existing arrangements in order to expand their market share, but not the ability, while others have the ability but not the willingness. We do not appear to have an MNO that has both. This places Europe at a substantial disadvantage in global competition with large, integrated regions such as the U.S. and China.

### 7.1.2 Should the Roaming Regulation be withdrawn?

Complete withdrawal of the Regulation in 2012 (i.e. failure to renew it when it expires) would seem to be premature, since most of the problems it was intended to correct would still be present in the absence of regulation. It is clear that retail prices are high, and that they bear little relation to the *true* underlying cost of delivering the service.

In light of the low demand elasticity, the total welfare loss associated with mobile roaming may be somewhat less than the Commission estimated in previous Impact Assessments (see Section 4.3); however, we believe that the Roaming Regulation contributes in important ways to the Single Market, and that the overall macroeconomic benefits provide strong justification for continued regulation for the foreseeable future.

Few interviewees have claimed that retail prices would increase in the absence of retail regulation (possibly because consumer preferences have settled at the current level, possibly because the MNOs would not want to risk re-regulation); however, retail prices for voice roaming would be unlikely to decrease in the absence of regulation, even if the underlying wholesale IOT cost were to increase.



### 7.1.3 Our assessment of the options

We reviewed a variety of options in Section 5, and provided a tabular assessment in Section 6. Consistent with standard Impact Assessment practice, as documented in the Commission's 2009 *Guidelines*, we have distinguished between:

- A baseline of business as usual case denoting continuation of the Roaming Regulation more or less as it is. Other options are measured against this one.
- An option where the Commission would no longer intervene (i.e. would allow the Regulation to lapse when it comes up for renewal in 2012).
- A range of possible modified versions of the regulation, some representing small changes, others representing substantially new directions.

For reasons already noted in Section 7.1.2, we do not feel that withdrawal is the appropriate option; nonetheless, methodological rigour demands that the next study consider it.

None of regulatory alternatives is altogether ideal, but we identified two options that are in our view suitable for consideration by the next study. We discuss these in the next section, where we provide our recommendations.

## 7.2 Recommendations

The current Regulation is intrusive, but it is effective.

We do not recommend withdrawal of the Regulation (by allowing it to lapse in 2012). The reduction in IOTs and retail prices have likely had positive effects overall, the improvements in billing transparency have been beneficial, and the significant costs of initial implementation have already been incurred (i.e. they are sunk costs). There are net reductions in deadweight loss thanks to the Regulation, and there are probably larger macroeconomic benefits, with more to come as the price continues to be reduced, from enhancing the European Single Market.

Interviews have strongly suggested that some aspects of the Regulation – for example, transparency obligations for pre-paid data customers – may have been inappropriately burdensome and disproportionate on MNOs. Any relaxation at this point in time would, however, have to be carefully weighed, since any change might imply once again requiring MNOs to modify billing and other Operational Support systems. We have specifically suggested removing notifications to pre-paid customers when they exceed € 50 in roaming charges (see Section 5.2.7), since most pre-paid customers do not carry more than a € 50 balance on the pre-paid account in any case. As far as other ways to simplify current arrangements without inappropriately detracting from their effectiveness, we think that this is a suitable question for the Commission's forthcoming public consultation on mobile roaming.

Other than that, we think that there is a fairly strong argument for continuing the Roaming Regulation in more or less its current form. It is, as previously noted, rather intrusive, but it has proven to be highly effective. We also feel that a revised Roaming Regulation in whatever form should continue the downward movement of wholesale and retail prices.

Continued downward movement of wholesale and retail price using the current mechanism (given that IOTs continue to be well in excess of true underlying cost) might not only help to achieve Single Market benefits, but should eventually bring prices into a range where demand elasticity is more substantial (see Section 4.2.2), and where the structural changes to the marketplace thus become more self-sustaining.

There could be a basis for some relaxation of the retail controls in the current Regulation. In general, retail controls are appropriate only as a last resort. A full withdrawal of retail controls might not result in an increase in retail prices; however, it would more or less guarantee no further reductions in retail price, which is inconsistent with the Commission's Europe 2020 goals, and also with Single Market objectives.

Based on our interviews, we are not convinced that the MNOs require more flexibility *per se* at retail level – they are already able to make quite varied offers. Interviews suggest, however, that the current default status of the Eurotariff and Euro-SMS<sup>79</sup> results in high barriers to new pricing plans. We think that simply making Eurotariff and Euro-SMS *opt-in rather than opt-out* is a simple change that might enable MNOs to make a wider range of retail plans available. If smaller and/or more disruptive MNOs are better able to introduce new retail plans, it might enhance the competitive dynamic somewhat. This must be weighed against the risk that, even though MNOs would still be obliged to make customers aware of the Eurotariff and Euro-SMS, they might become less effective going forward in constraining retail pricing for mobile roaming.

Given that mobile data roaming retail prices remain high, even though wholesale prices have demonstrated a healthy decline, we think that retail controls need to be considered. At the same time, we note that only a few quarters of data are available since the amended Roaming Regulation came into effect, and worry that the imposition of controls may prove to be premature. We suggest that the consulting team for the next study consider this.

We also suggest that the next study consider an alternative equivalent to the “home market” principle, where prices would not be permitted to exceed the price of an MNO's domestic mobile voice service by more than some defined amount (which, however, will necessarily be large as long as IOTs are large). This has the apparent advantage that the structure of prices would then be linked to presumably competitive domestic mobile prices. We provide some guidance on this option in Section 5.2.3.2, suggesting in effect

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<sup>79</sup> The Regulation is perhaps not altogether clear on this point, but MNOs regard the Eurotariff as an opt-out default.

that the permissible difference should be in the general range of the difference between the regulated IOT and the European average MTR. We note, however, that this option would be of far greater interest than it is today if the difference between the regulated IOT and average MTR were far less than it is today, i.e. if the IOT rate were lowered considerably.

We considered numerous other options, but none of them impressed us as being worthy of further study; however, the study team responsible for the helping with the Impact Assessment might perhaps identify options of their own, or might find reasons to further refine options that in our view did not “make the cut”.