

International Mobile Roaming Regulation

BEREC Report

December 2010

Section 1

Summary

A. Introduction

1. This Report contains the advice of the Body of European Regulators for Electronic Communications (BEREC)¹ on the functioning and possible extension of regulation of international mobile roaming services.
2. The amended Roaming Regulation (EC) 544/2009 requires the Commission to conduct a review of the functioning of the Regulation and, following public consultation, to report to the European Parliament and the European Council by 30 June 2011. The Commission is asked to evaluate in particular whether the objectives of the Regulation have been achieved, and to assess methods other than price regulation for creating a competitive internal market for roaming. In doing so, the Commission is required to have regard to an independent analysis by BEREC. On the basis of this assessment, the Commission will make appropriate recommendations.
3. To inform its review, BEREC has already made available to the Commission certain factual evidence on:
 - trends in roaming prices and volumes
 - compliance with the Regulation
 - availability of alternative retail tariffs to the Eurotariff and Euro-SMS tariff, and of data roaming tariffs
 - the incidence of inadvertent roaming
 - the quality of roaming services
4. Further updates in each of these areas will be published before the Commission finalises its own position on its Review.
5. This Report reflects the additional work done by BEREC to assess:
 - Prospects for competition in roaming services
 - The effects of current price regulation on the mobile market
 - Roaming prices and the underlying costs

¹ BEREC comprises the National Regulatory Authorities (NRAs) of the 27 Member States of the European Union: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. NRAs from EEA States and EU candidate countries have observer status: Iceland, Liechtenstein, Norway, Switzerland, Croatia, the Former Yugoslav Republic of Macedonia and Turkey.

- Trends in domestic prices
 - Interpretation of the EDA target on international roaming ('the difference between roaming and national tariffs should approach zero by 2015')²
 - Future regulatory options
6. Further to this Report, BEREC looks forward to assisting the European Commission during the coming months on developing its review of Roaming Regulation (EC) 544/2009, and on the detail of any regulatory proposals. BEREC also makes itself available, on request, to provide advice to the European Parliament and European Council in accordance with Regulation (EC) 1211/2009.

B. Prospects for competition in roaming services

7. BEREC's analysis suggests that there are structural problems at both the wholesale and retail levels, which dampen competition and tend to support prices.
8. In the wholesale roaming market, the majority of deals are reciprocal, so that purchasers buy and sell wholesale roaming from the same counterparty. Where the trade is intra-group or traffic is relatively balanced, in practice the unit price is of little consequence. For non-group trades, the volume of roaming sold may be of much greater commercial significance than the purchase price. In addition, the advent of traffic steering has meant that operators generally try to identify various preferred partners (in order of preference) to which the bulk of their traffic is directed. There appears to be a tendency to balance traffic as far as possible. There will usually be agreements for residual traffic with other operators to ensure good network coverage for their roaming customers. In effect, it is only this residual traffic which is subject to strong competition. Even so, for relatively small volumes of residual traffic, there is not much incentive to compete vigorously on price, especially for larger operators.
9. It has been suggested that the data collected by BEREC on wholesale prices is misleading as it aggregates deals for both balanced and unbalanced traffic. The argument goes that the average for unbalanced traffic would be considerably lower, demonstrating greater intensity of competition on price than had previously been considered to be the case, for that residual traffic. Meanwhile, the rest (balanced traffic) is simply swapped so that any revenues and volumes net out. BEREC statistics on wholesale prices already exclude intra-group traffic which should reduce any such inaccuracy. Nevertheless, BEREC intends to analyse further the price and volumes of unbalanced non-group traffic, with results in early 2011.
10. In the retail market, the focus of competition is on domestic services, due to consumer preferences. Based on the consumer research results obtained to date (further results are due this winter), roaming does not seem to be given much weight by a customer choosing a network provider. Therefore it is not sufficiently significant for most customers to be a factor which might cause them to switch supplier.

² Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 'A Digital Agenda For Europe, [Http://Eur-Lex.Europa.Eu/Lexuriserv/Lexuriserv.Do?Uri=Com:2010:0245:Fin:En:Pdf](http://eur-lex.europa.eu/Lexuriserv/Lexuriserv.Do?Uri=Com:2010:0245:Fin:En:Pdf)

11. Moreover, the (limited) evidence we have on price elasticity suggests it is low for voice and SMS roaming services (data roaming may be higher), although some smaller MNOs argue that the tipping point would come if roaming prices were much closer to domestic prices. We have limited experience of this with a few special roaming offers (where the roaming price was similar to the domestic price). In these cases, volumes by existing customers grew significantly, but not to domestic levels. It is unclear if that is because consumers have different demands when travelling and/or still perceive roaming as 'expensive' and something to be rationed, which might change if prices nearer the (familiar) domestic level were the norm. In addition, the special offers did not cause an overall increase in domestic subscriber numbers, as hoped. These features provide little incentive to retail suppliers to compete aggressively on roaming tariffs.
12. There are also unbundled alternatives which can be purchased from other suppliers (e.g. a global SIM). While none of these appear to be sufficiently convenient or user-friendly to appeal to most customers, they can provide a reasonable option to price-sensitive intensive users.
13. The above analysis applies mainly to voice and SMS roaming. For data, there are partial substitutes for retail roaming (for example WiFi access where available, pre-pay local dongles for laptops), which each provide a competitive constraint. This in turn exerts pressure to reduce the wholesale price. On this basis, there have been reasons to believe that data roaming could one day be provided reasonably competitively. Certainly prices have fallen considerably, both at wholesale and retail levels. The threat of regulation may play a role as well, although prices have fallen further for data than they did for voice and SMS pre-regulation. In some Member States, retail roaming prices are at many times typical domestic levels³. In all cases, roaming prices are at many times the costs of provision. The fact that MNOs have a single preferred partner for all types of roaming according to criteria like the quality and coverage best suited to voice roaming, may also have limited the pressure on wholesale data roaming prices. Given that data roaming has been a relatively novel service but has recently been expanding in volume at a high rate and growing importance is attached to quality issues like speed and network capacity for data, this may change. In any case, wholesale data roaming is the one regulated service where average prices have been well below the cap.
14. Except in the case of wholesale data roaming, the current wholesale prices remain very close to the price caps. BEREC's work to estimate the costs of roaming services indicates that costs are significantly lower than the caps, giving room for lower prices. Therefore, price reductions for voice and SMS services are mainly attributable to regulation rather than competitive pressure.
15. Since market forces do not (wholesale data apart) appear to be applying downward pressure on prices, in the absence of some form of regulation there is a risk that prices would rise once again, especially for mass market consumers with little buyer power. At best, they might stabilise around current levels. This reasoning provides a strong rationale for continuing with some form of regulation designed to control prices. Given that the legislators considered that there were sufficient objective reasons to impose

³ Some have suggested that current domestic prices may be unsustainable as network utilisation increases and will be raised to attempt to prevent congestion

regulation in the first place, little that has happened in the market subsequently provides evidence for a change of view.

C. The effects of current price regulation on the mobile market

16. Small network operators have at an overall level been positively affected by the introduction of wholesale price regulation. The Regulation has enabled such operators to get better deals when buying wholesale inbound roaming. This has improved their competitive situation as suppliers in downstream markets, such as terms of the wholesale resale roaming that they can offer to MVNOs hosted on their network, and in the retail market. MVNOs may have experienced reduced retail margins since they are bound by retail price regulation but have no rights to benefit from wholesale price regulation; their wholesale access deals arise from commercial negotiations.
17. The possibility that domestic services may have been indirectly regulated through the current price regulation of roaming services seems limited. Using roaming services as a substitute for national services will often include a less “consumer friendly” solution. However, the lower the price on roaming services compared to domestic services, the more attractive roaming services would become for the consumer to use as a substitute for domestic services.
18. The Roaming Regulation also does not seem to have had a significant impact on the pricing of other mobile services. Any waterbed effects would be expected to be small due to the fact that roaming revenue is a small part of overall mobile revenue (EU average of 4.2% in 2009). An increase in prices due to the EU Regulation will be difficult to find empirically. For example, providers may have chosen instead to limit any decreases or to keep prices the same. The risk of a waterbed effect may be higher for less-used services like roaming outside of the EU, rather than for commonly used domestic services, due to competitive pressures. However, the BEREC Benchmark Data Report on International Roaming does not show a significant increase in the retail price paid for roaming outside the EU⁴.

D. Roaming prices and the underlying costs

19. The question of what would be the “market prices” in the event that wholesale and retail roaming were effectively competitively provided services is unanswerable, but we can compare prices to the underlying costs. Initial cost estimates are compared with the current regulatory caps in Table 1 below. The methodology used to derive these cost estimates is set out in Section 5. It should be noted that costs data was not available for all Member States, and that it takes a conservative and forward-looking approach, as explained further below.

Table 1: Roaming costs and prices

	Estimated upper bound of cost € (2012)	2011/12 price cap €
Wholesale voice	10 per minute	18 per minute

⁴ For data up to Q2 2010, see http://erg.eu.int/doc/berec/bor_10_50.pdf

Retail calls made	15 per minute	35 per minute
Retail calls received	3 per minute	11 per minute
Wholesale SMS	3 per SMS	4 per SMS
Retail SMS	5 per SMS	11 per SMS
Wholesale data	15 per Mb	50 per Mb
Retail data	22 per Mb	Unregulated Q2 2010: 130.3 per Mb ⁵

20. For voice roaming, the work suggests that the 2012 estimated upper bound wholesale cost of provision is less than half the level of average wholesale prices for voice roaming (around 0.21€ per minute) in Q1-Q2 2010, while expected reductions in termination rates and increases in network utilisation could cause the unit cost to halve again over the next few years. At the retail level, prevailing wholesale prices currently permit a mark-up per minute of about 100 percent for voice calls made (larger, if the theory mentioned earlier about the “effective” wholesale price is correct), while the incremental unit cost is very small.
21. The evidence of the last few years suggests that for voice and SMS, without a structural change to the market, prices will tend to cluster around the price caps (if they remain in place) and that movement towards the cost floor will be small. Since no significant disruptive changes to the market can be foreseen by 2012 - 2015 in the absence of regulation, further material price reductions can therefore only be achieved by regulatory intervention which, directly or indirectly, puts considerable pressure on prices.
22. The cost of data roaming has up to now been poorly understood. However, the evidence emerging from the latest generation of network cost models suggests that, at the wholesale level, average costs are only a fraction of the current typical deals (which are themselves running at under half the level of the regulatory price cap). At the retail level, comparing average prices in Q1-Q2 2010 with the prevailing wholesale charges, there is an average mark up of several hundred percent, compared with a very small incremental cost.
23. BEREC’s approach to cost relies on a mix of prudent (a) and forward looking assumptions (b).

(a) The approach entails conservative assumptions in many cases. For instance, for outgoing calls, it is assumed that all calls terminate as off-net calls to mobile networks. However, in practice a share of these calls would terminate either on-net or on fixed networks and the cost of termination for such calls would be lower than the termination rate paid for terminating off-net mobile calls. Such assumptions tend to result in cost estimates that are slightly higher than in reality, but it is reasonable

⁵ Average of prepaid and postpaid, on and off-net.

to make such assumptions because the share of on-net calls and of calls to fixed networks could vary a lot from one mobile operator to another.

(b) The approach aims to be forward looking, because costs need to be estimated for the period 2012-2015, rather than for today. It is difficult to predict costs in the medium-term, because robust data points are very scarce. The approach therefore relies on using proxies for what cost would be in the near future. For instance, for outgoing calls, termination rates for the period 2012-2015 have been estimated by using the actual incremental cost of termination in 2009. This is consistent with the EC Recommendation on termination rates⁶ (stating that termination rates should be set at incremental cost levels by 2012) and remains prudent because termination costs are likely to decrease further over the coming years (so the actual cost of termination in 2009 is likely to be higher than actual cost of termination in 2012 or in 2015).

24. Nine NRAs have provided detailed inputs on network costs for voice, SMS and data services (some providing only partial inputs), based on their existing cost modelling work. The number of respondents may seem small, but this does not prevent us from having confidence in the results:

- The range of countries that provided data points includes countries that are likely to be representative of the variety of geographic and market situations in Europe: countries with low population density (Norway), large countries with some mountainous areas (France), small countries with extended mountainous areas (Slovenia), small countries with rather flat geography (Denmark)...
- It is reasonable to believe that efficient network cost would not vary more than a few cents per unit of service from one European country to another. European mobile operators use fairly similar technologies, all buy their equipment from a small number of the same providers and should have similar utilisation rates for their equipment. This leaves scale/density effects and geographies as the two main factors that could have an impact on costs, but as seen in point (a) above, the likely resulting range of variance has already been taken into account in this cost estimation exercise. On the basis of the lowest figures reported by certain NRAs, the upper bound values above are conservative.

25. While further data points would clearly allow more precision of estimation, BEREC believes that the figures in Table 1 give an adequate conservative estimate of the upper bounds on costs around the year 2012.

E. Trends in domestic prices

26. BEREC and the European Commission commissioned a study of domestic price trends for comparative purposes. This provides another benchmark for roaming prices (having made an appropriate allowance for the cost differences between provision of domestic and roaming services). As noted above, we are mindful of the argument that domestic

⁶ Commission Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU,
http://Ec.Europa.Eu/Governance/Impact/la_Carried_Out/Docs/la_2009/C_2009_3359_En.Pdf

data prices may be in some cases below cost so should be wary of using them as a benchmark. On the other hand, not all NRAs consider that their national retail mobile markets are reasonably competitive. So the benchmark needs to be viewed against those reservations.

TABLE 2: COMPARISON OF DOMESTIC AND ROAMING RETAIL RATES IN Q2 2009

	Outgoing calls (€/min)	Incoming calls (€/min)	SMS (€/SMS)	Data (€/Mb)
Highest domestic average	17.4 (Netherlands ⁷)	NA	11.7 (Spain)	10.2 (Belgium)
Lowest domestic average	3.2 (Lithuania)	NA	1.0 (Lithuania)	0.8 (Lithuania)
European domestic average	9.7	NA	4.4	4.8 ⁸
European roaming average⁹	40.8 (39.6)	18.5 (16.8)	24.5 ¹⁰ (10.6)	179.8 ¹¹ (130.3)

Sources: Domestic rates from an unpublished study commissioned from Analysys Mason. Roaming rates from the BEREC Benchmark Data Report on International Roaming

F. The need for future regulation

27. On the basis of the analysis summarised above on competition, effect of past regulation, costs of provision and domestic prices, BEREC believes that there is a strong case for continuing with regulation of the roaming services which are currently regulated – wholesale and retail voice and SMS and wholesale data. That does **not necessarily imply** continuation of price caps along the current lines. Other forms of regulation need to be assessed.

28. In its work on the last review of the Roaming Regulation in 2008, BEREC noted the theoretical arguments for expecting competitive pressures to moderate retail data roaming prices. That led BEREC not to support regulation of retail data roaming in that Review. Unfortunately, recent evidence on average roaming prices indicates that any such pressures may not be sufficiently strong to bring prices down to a reasonably competitive level. Retail prices have fallen, but the rate of decline has not matched that of wholesale data roaming. In the first half of 2010, retail prices hardly moved, on average, despite a significant fall at the wholesale level. Prices are of the order of fifty

⁷ Figures include handset subsidies where they are part of the monthly subscription (as opposed to an initial payment). This may unduly affect the figures for countries where recovery of handset subsidies accounts for a significant portion of the monthly subscription.

⁸ Pre-pay figures are significantly higher

⁹ Q2 2010 figures in parentheses

¹⁰ Pre-regulation of SMS roaming.

¹¹ Average of prepaids and postpaid, on and off-net.

times corresponding domestic levels (although there is debate about the relationship between current domestic prices and costs, especially in areas where networks are fairly full). There remains very high variation in retail prices across Europe. (See 6th BEREC Benchmark Data Report for details¹².)

29. BEREC considers therefore, that significant reductions in retail prices to levels decision-makers might consider more reasonable will not take place without regulation of some form. As for voice and SMS, it is appropriate to consider both price controls and other measures which have potential to reduce prices indirectly.

G. Regulatory objectives

30. The current approach to price regulation benefits all consumers when they roam. Many consumers do not travel/use roaming very much, so that their total annual spend is not very high (subject to bill shock protection). At the other end of the spectrum, very large business users tend to have sufficient buyer power to negotiate attractive special terms. There is an intermediate group where roaming usage is high but not sufficiently large to be able to negotiate a special tariff. These are mostly but not exclusively business customers and are referred to below as “intermediate frequent roamers” to distinguish them from very large businesses.
31. BEREC believes that it would not be considered politically acceptable for roaming prices to rise again materially for any customer segment at either wholesale or retail level (a “no losers” policy). At a minimum therefore, there needs to be some mechanism that acts as a safety net to prevent this. But some of the regulatory options considered below by BEREC (for example, those labelled “roaming carrier select”) may bring price reductions which are more significant for frequent roamers than for infrequent roamers.
32. In considering whether or not regulation should be focused on the needs of a particular consumer segment, there seem to be two possible approaches. Regulation could be designed to promote price reductions particularly for the *intermediate frequent roamers*. This is the group where the detriment from high prices is greatest. Price reductions will benefit this group but also, by reducing business costs, give rise to (unquantifiable) benefits in the wider economy. Alternatively, regulation could be designed to produce reductions in prices for mass market consumers. This group has virtually no buyer power, given the state of competition for retail roaming. Individually, however, because they make relatively little use of roaming services, they experience low detriment from high prices.
33. Any increase in retail competition is likely to benefit frequent roamers first. Mass market consumers might or might not also experience price reductions. Lower prices for the mass market would of course also benefit the *intermediate frequent roamers*.
34. Designing regulation to focus benefits on frequent roamers could be justifiable if it were considered that mass market prices were now “satisfactory” or if it were considered disproportionate to achieve further price reductions across the board. However, so far BEREC and the EU legislators have taken the view that regulation should bring about a

¹² BEREC Benchmark Data Report on International Roaming, January 2010 – June 2010, http://erg.eu.int/doc/berec/bor_10_50.pdf

reduction of unit roaming prices for all users. On balance, BEREC continues to prefer this approach.

35. The traditional rationale for regulating roaming prices has been to prevent excessive pricing, bearing in mind typical price levels for domestic services. Much has been achieved in curbing the highest prices and reducing average prices significantly by means of wholesale and retail price controls. But as noted above, there remains a considerable gap between domestic and roaming prices.
36. The Commission now advocates a significant development of this approach. The 2010 European Commission Communication 'A Digital Agenda for Europe' sets out a specific target for international roaming, that 'the difference between roaming and national tariffs should approach zero by 2015'¹³. Since this approach has not yet been formally adopted, or defined in further detail, BEREC has carried out its analysis on the basis of two alternative broad scenarios:
- The traditional approach to roaming prices would be retained, to prevent excessive prices. This would imply measures which prevent roaming prices from rising once again and might apply further moderate downward pressure
 - An approach which sought to achieve the EDA target, understood as 'the difference between roaming and national tariffs should approach zero by 2015'
37. BEREC's analysis can therefore be applied to whichever pricing objective is preferred by legislators.
38. The concept of the EDA target is clear but the detail is undefined. Longer-term, based on the analysis of the future regulatory options set out in this Report, various regulatory approaches discussed later in this paper could be considered if policy-makers decide to adopt the EDA target. The suitability of each approach varies, depending on exactly how it is defined, for example regarding the extent of the approximation between roaming and domestic prices.
39. Another ambiguity in the target concerns the identity of the domestic services that are used as the benchmark for comparison with roaming prices. There are various dimensions to this. In the case of voice and SMS does it mean national services or international services or a mix of both? BEREC believes that it is natural to benchmark against national services. The underlying cost of provision of international services (i.e. assuming all inputs are available at "competitive" prices) is little different but the prices are often very considerably higher. Having identified the class of services, it is also necessary to define the class of users whose domestic tariffs are to be compared with roaming. Should this be done on a user-by-user basis? Should it relate to users in the home country or the visited country? Should the benchmark be a European average? BEREC has considered all three options. (There are indeed a number of further ambiguities. For example, does the target relate to off-net, on-net prices or does it reflect both? Does it refer to pre-pay or post-pay?).

¹³ Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 'A Digital Agenda For Europe', <http://Eur-Lex.Europa.Eu/Lexuriserv/Lexuriserv.Do?Uri=Com:2010:0245:Fin:En:Pdf>

H. Future regulatory options

40. As noted above, there are structural problems with the wholesale and retail roaming markets, which lead to the ineffectiveness of market forces at controlling prices. This is unlikely to change much in the near future.
41. In the longer term, retail data roaming could become a reasonably competitive market, given that there are partial substitutes (e.g. via WiFi access), which provide competitive pressure. Networks are also expected to transition to LTE. If that happens and assuming growth in use of VoIP, outgoing voice could also become competitively provided. SMS roaming could be substituted by e-mail or instant messaging, although these substitutes are not perfect. While retail data roaming seems relatively unlikely to become competitive during the Commission's time horizon (up to 2015), it is a reasonable longer-term expectation.
42. The choice of future regulatory option (if any) depends on the favoured objective. There is little prospect of achieving the EDA target without some fairly intensive regulation. Some of the possibilities would have a market impact well beyond roaming. See, for example, MVNO access to any network on cost-oriented terms, outlined in Part I below.
43. If, however, policy-makers consider that the regulatory options to meet the EDA target would in practice go too far (e.g. because the impact on MNOs would be disproportionate or the distributional impact on consumers as a whole too severe), a variety of options is available, which BEREC recommends. On the basis of the BEREC's assessment of the pros and cons of the future regulatory options, the following combinations of measures seems most plausible:

Options designed to achieve the EDA target (subject to further definition)

<u>Combination</u>	<u>Wholesale measure</u>	<u>Retail measure</u>
1.	<i>Average price cap as at present, with cap based on the estimated efficient costs of the highest cost operator</i>	<i>Maximum price caps on default Eurotariff and Euro-SMS tariff, as at present. New price regulation for retail data. Caps based on domestic prices, with an allowance for efficient roaming-specific costs</i>
2.	<i>As above</i>	<i>Roam like at home pricing coupled with retention of the default Eurotariff and Euro-SMS tariffs with caps frozen at 2012 levels, plus price regulation of retail data, all as a safeguard</i>
3.	<i>As above</i>	<i>Roam like a local pricing coupled with retention of the default Eurotariff and Euro-SMS tariffs with caps frozen at 2012 levels, plus price regulation of retail data, all as a</i>

safeguard

Options designed to prevent excessive pricing, reflecting the objectives of the current Regulation

<u>Combination</u>	<u>Wholesale measure</u>	<u>Retail measure</u>
1a.	Average price caps as at present, with caps chosen to be consistent with the retail price cap	One of the carrier select options, coupled with retention of the default Eurotariff and Euro-SMS tariffs with caps frozen at 2012 levels, plus price regulation of retail data, all as a safeguard
1b	Compulsory exchange trading, coupled with freeze in the average wholesale caps at 2012 levels	As 1a
2a	As 1a	Retention of the default Eurotariff and Euro-SMS tariffs with a continuation of the current glide path, plus price regulation of retail data
2b	As 1b	As 2a

44. It is possible of course to use different options for different services (for example, BEREC believes that the “carrier select” options might have more impact for data than for voice and SMS).

Regulatory pricing considerations

45. Before looking in detail at different alternatives, there are some general considerations about regulatory pricing which are worth highlighting. As a general principle, prices which are set by the market players in a competitive market are to be preferred to ones set by regulators or legislators. At present, the prospects for achievement of a competitive roaming market in the medium term look poor, whatever action legislators might take. It is therefore worth considering how any distortions resulting from regulatory pricing decisions could be minimised. There are various factors which the legislator needs to consider, including in particular, uniformity of pricing and choice of reference point:

Uniformity of pricing

47. A uniform European approach to pricing has the great virtue of simplicity and transparency. There is no great variation in the benefits, as between the typical consumer in one Member State and another
48. However, there are downsides. This is not necessarily a "market-oriented" solution. With few exceptions¹⁴, consumers in a market economy do not all pay the same price for the same goods or services. Indeed, fairly wide variations are normal, even in a competitive market with no great variations in the costs of provision. Where efficiently incurred costs are different, uniform pricing leads to distortions or discrimination between different players. For example, if implemented in conjunction with a requirement that the roaming price equals the European average domestic price, roughly half of European consumers would pay less for roaming services than for domestic services. This seems a rather bizarre outcome.

Choice of reference point

49. Cost-oriented pricing is often used by regulators to allow providers in non-competitive markets to recover costs and make a reasonable return (including an element reflecting the commercial risks borne) while avoiding excessive profits. The (large) theoretical advantage is that it is fair both to the buyers and sellers of a service and, from that viewpoint, could be preferable to uniform pricing. The problem in practice is that regulators lack the perfect information necessary to make perfect judgements. There is therefore a risk of regulatory failure, which is especially acute in circumstances where there is a degree of competition in the market and the prospects of further competition.
50. Retail minus pricing is sometimes used to set wholesale prices by reference to retail prices. It works best when the retail market is competitive or prospectively competitive. If used to set national wholesale rates by reference to national retail rates, it would be a reasonable precondition that the national retail services are priced at a similar mark-up over costs as one another. If not, this method would tend to benefit network operators in less competitive markets more than those in more competitive markets. This would be regarded as unfair.
51. Otherwise, an exogenous reference point could be chosen. Domestic prices provide a natural possibility. The approach provides more flexibility than cost-oriented pricing. It can be "tuned" to allow any desired mark-up, large or small, over costs. Having said that, where the benchmark chosen is not well-correlated with costs, significant discrimination can result.

I. Critique of alternative approaches

52. In addition to the current form of price regulation, BEREC has considered the alternative regulatory approaches discussed in depth in Section 4. A few general points emerge. First, the analysis is pessimistic about the prospects for increasing significantly competition in roaming. Effective actions can be taken to reduce retail roaming prices so that they 'approach' domestic prices (EDA target). In all cases, these require a significant regulatory intervention in the market at both wholesale and retail levels. In some cases there are wider effects such as the facilitation of a genuine single market for mobile

¹⁴ For example, terrestrial broadcasting services free at the point of delivery.

telephony. It is no surprise that the more intense interventions have the quickest and/or furthest reaching effects.

53. BEREC has discarded about half of the options either as a consequence of serious technical, commercial or regulatory disadvantages or because they seemed unlikely to deliver significant benefits. The remainder were assessed against a number of criteria listed below and discussed in depth in Section 4:
- Bringing lower roaming prices (either to prevent excessive pricing or to enable the difference between roaming and national tariffs to approach zero, to capture the EDA target subject to further definition)
 - Increasing competition
 - Increasing transparency
 - Regulatory burden
 - Potential impact on national markets
 - Consumer friendliness
 - Feasibility (enforcement and implementation)
 - Avoidance of regular reviews
54. BEREC has considered whether it should recommend one or two of the alternatives as being clearly superior to the rest and concluded that it could not make such a choice for the longer term. All the alternatives have pros and cons. Those for which the disadvantages are modest are likely to have only a modest effect. Those which are likely to have a significant effect also give rise (at least at this stage, pending further analysis) to significant concerns. However, in an attempt to narrow down the choice to focus future discussion, BEREC has provided a value judgement on the relative merits. BEREC has also identified that two of the options cannot be expected to have a significant effect on their own but could be considered as complements to other measures.
55. For the medium-term, BEREC believes that no option is definitely superior to the approach which has been followed so far and the alternatives all have material downside risks.
56. Legislators may wish to give special weight to one or two of the criteria for assessing the regulatory alternatives. Effectiveness is obviously of paramount importance, as is consumer-friendliness (which is closely correlated with simplicity). Whereas roaming prices have been of concern, it has been straightforward for consumers to use the service. Measures which made roaming more complex from a consumer viewpoint than the current state of affairs therefore seem unlikely to be favoured. One criterion which is less obviously a top priority but very much worth stressing is technical feasibility. The lesson to be drawn from the work necessary to implement measures to control bill shock is that technical development work can deter innovation. Companies have limited resources to implement significant technical and systems changes. A regulatory

requirement can easily give rise to an exercise of sufficient scale to prevent implementation of any commercial initiatives to introduce innovative tariff options. Before embarking on an approach which requires significant technical development, it would therefore be wise to be very clear that the scale of benefits justifies it.

57. The choice of alternatives of course depends on which pricing objective is being pursued. Some measures could definitely not be relied on to achieve the EDA target but could make a contribution to preventing excessive prices. Others are more natural candidates for the purpose of achieving the EDA target. Some can be “tuned” to have a stronger or weaker effect. This is brought out in the discussion below. Finally, some of the alternatives could increase competition in roaming services, which is an objective on which many policy-makers lay considerable stress.
58. Before looking at each of the options in more detail, there are some further general points to make. At the wholesale level, BEREC has significant doubts about whether there is a realistic option to control prices, other than a price cap. This is explained below in the discussion on the options that operate at the wholesale level. If the EDA target were to be adopted, a transitional period would be necessary, with a continuation of a glidepath in the regulated caps during the transitional period.
59. From the competition analysis, it seems clear that, whichever objectives are chosen, wholesale and retail measures must be well matched to one another. If a measure were chosen to have the effect of reducing retail prices sharply, intensive wholesale price regulation would be necessary. Without it, there would be too much risk of creating a regulatory margin squeeze. The design of any regulation should not generate margin squeeze situations for any operator, including MVNOs.
60. The normal philosophy under the EU Regulatory Framework suggests that retail regulation should be imposed only to the effect that wholesale remedies are ineffective. It is generally considered that, in most markets, effective wholesale regulation is sufficient to enable market forces to lower retail prices, thereby achieving a good outcome for end-users. Some stakeholders have suggested that if wholesale roaming prices were reduced to cost-oriented levels, it would be possible to include roaming within consumers’ bundles.
61. However, the conclusion from experience of the Roaming Regulation is that pass-through of wholesale roaming price reductions to the retail level, in whole or at least to a significant extent, cannot be guaranteed. Typical retail prices have relentlessly hovered just below the retail caps, even though the BEREC costing analysis shows that a considerable margin is available to retail providers that wished to reduce prices. Most of the few operators that have experimented with significantly lowering roaming prices to domestic or near-domestic levels have discontinued offers, apparently where they have not led to a significant increase in domestic subscriber numbers. Equally, retail regulation in the absence of effective competition in the wholesale market risks margin squeeze, to the detriment of consumers. That leads to the conclusion set out in the current Regulation that regulation should be imposed at both retail and wholesale levels to protect the interests of roaming customers. The wholesale and retail price caps can then be set on a consistent basis to achieve the desired effect on retail prices, without unduly favouring the providers at one level or the other.

Carrier-select options – rated “unsuitable for achieving the EDA target but otherwise worthy of consideration”

62. There are 3 distinct alternatives with varying pros and cons. From a commercial and technical point of view, the 3 alternatives are very different. From the point of view of the customer, they are more similar. The rationale for all of them is to provide the consumer with a reasonably user-friendly method of choosing a provider of roaming services different from his normal service provider, thereby introducing real competitive pressure on roaming prices where there is little at present. From the customer perspective, the main differences concern the identity of the provider and the method of billing, as follows:
- Roaming provided by a provider from the visited country, services billed by the home provider
 - Roaming provided by a provider from the visited country, services billed direct
 - Roaming provided by a different provider from the home country
63. Each of the alternatives should be relatively painless to use by a price-sensitive and aware consumer. BEREC believes however that their impact is likely to be limited by a number of factors, including:
- (α) customer inertia
 - (β) a degree of disinclination amongst larger players to start a price war by trying to “poach” the customers of other large players
 - (χ) the likelihood that smaller players (who may have the incentive to be disruptive) will design their tariffs to appeal mainly to frequent roamers or higher volume requirements, for example by offering bundles, rather than undercutting rivals' unit prices
 - (δ) customer reluctance to contract, especially by providing credit card details, with a company which is unfamiliar to them
 - (ϵ) language problems, either in the sign-up process or in seeking customer service
64. For that reason, these measures look rather unlikely to lead to a significant reduction in retail prices, except perhaps for price sensitive frequent roamers. On the basis that a “no losers” policy is adopted, retail price caps would have to be retained, at least on a transitional basis, to guard against price rises for those who opt to stay with their normal provider.
65. There are two qualifications to the above conclusion. The option to take service from a local provider would be natural for many laptop users, who are already used to taking service from Wi-Fi providers, fixed lines in hotels and so on. Therefore this option could be considered as an alternative to retail price control of data roaming. BEREC is considering what prevents small disruptive operators with apparently little to lose by way of retaliation from offering such a service at the moment. There does not appear to be a

significant technical impediment. But either of the following could in principle be a problem:

(a) the additional traffic expected to be generated from new customers might not be sufficient to justify the marketing costs that would be necessary, especially given language barriers

(b) commercial constraint, perhaps arising as a consequence of existing commercial agreements or lack of the necessary range of wholesale roaming agreements¹⁵

(c) unwillingness to act unilaterally, for fear of reprisals by the home network operator, which may also be present as an MNO in the visited country¹⁶

66. The second qualification relates to the “unbundling” of retail roaming from other mobile services, whereby the customer contracts (on a long-term basis) with a different provider from the home country. Not all of the above concerns apply to this option. This should be the most customer-friendly of the carrier select options as the customer needs to make a choice only every time he wants to switch roaming provider, rather than once for every country visited (or possibly for every trip). Because customers would contract with a provider from their home country, customer unfamiliarity with the alternative provider should not generally be a problem, and nor should language. However, its success relies on the assumption that providers will compete vigorously to attract one another's customers for roaming. Customers are unlikely in practice to make an active roaming choice at the time they choose a service provider and will need to be persuaded to change later. Finally, this option appears to require a significant amount of technical development to enable customer registration, authentication and billing by the roaming provider. As this is not a standard procedure, significant implementation activities would be required, backed by standardisation. In addition, it is unclear how the current level of security could be maintained. It also adds considerable complexity to the commercial arrangements (in particular, three market players have a part in the provision of roaming services rather than the normal two), including three-way billing.

“Roam like at home” – rated “not suitable for 2012, to be reconsidered in subsequent review of regulation for post-2015”

67. This approach links the roaming price by the individual customer to the domestic price for national calls by that same customer. It aims to achieve the EDA target, subject to how that is further defined. We consider here the variant “RLAH+X” (that is, the roaming price is an amount greater than the corresponding domestic price). In principle, the roaming premium covers two things. First, it allows recovery of the genuine (albeit small) additional costs of provision of roaming. Second, it aims to deal with issues that arise from price differences across Europe. It could be very harsh to impose RLAH+0 because some retail operators might thereby be subject to margin squeeze, or alternatively wholesale operators might be required to sell service below cost.

68. The option only delivers tariffs “like at home” if the value of X is indeed sufficiently small. This requires two preconditions:

¹⁵ In particular, this may be prohibited by the roaming agreement
¹⁶ Mechanism for reprisals unknown at present

- a. Wholesale prices very close to cost-oriented levels; and
 - b. Broad similarity in domestic tariffs across Europe.
69. If the conditions permit X to be set at a sufficiently small value, i.e. including low wholesale roaming prices, providers might take the commercial decision to offer “Single Europe” tariffs where the price of a call, for example, was the same wherever the customer was situated, i.e. in their home country or another EU Member State.
70. Under those conditions, the option is the most consumer-friendly since the customer does not experience any kind of bill shock in using services abroad. Subject to the size of the mark-up, consumers would face charges for roaming services closer to domestic ones. The “roaming price” would no longer be a material consumer issue. A ‘welcome SMS’ could be retained to ensure tariff transparency, especially where the customer has a bundled or ‘unlimited’ domestic tariff, given that a small payment (roaming supplement) would apply when abroad.
71. While doing nothing to promote competition in the provision of roaming services (indeed, it would probably make it less likely), the method ensures that the benefits of domestic retail competition are automatically passed through to roaming users.
72. If the above conditions do not hold, X would need to be higher so that roaming tariffs may no longer bear much resemblance to those experienced “at home”. In particular, there is no realistic prospect of those conditions holding by 2012. For example the business model of including handset subsidies in monthly subscription prices still varies widely across Europe, affecting per unit charges for mobile services. BEREC estimates that, for 2012, the value of X might well need to be around 10c per minute for outgoing voice calls in order to avoid margin squeezes. While this would lead to lower prices than are typical at present for some consumer segments, overall the option would lose all its advantages compared to Eurotariff price caps (assuming European average prices are the same in each case), as regards bringing roaming prices closer to domestic ones for all consumers.
73. Moreover, at these kinds of levels, another factor becomes significant. The option plainly brings more benefits to consumers in countries with low domestic prices (and allows a smaller retail mark-up to the retail providers) than to those in countries with high domestic prices. As can be inferred from Table 1, in 2012 this would be a significant issue. If condition b above applies, the issue can be disregarded for practical purposes.
74. For these reasons, while “Roam like at Home” could be an interesting option in a future where wholesale prices are near cost and there is relatively little diversity of domestic prices between one Member State and another, it is not a serious candidate for the moment.

“Roam like a local” – rated “not suitable for 2012, to be reconsidered in subsequent review of regulation for post-2015”

75. In this approach, the roaming price is linked to the price paid for national domestic calls in the visited country (as opposed to the roamer’s home country). Again, it could be seen as a method of reaching the EDA target, depending on how that is further defined.

This method also requires adoption of a mark-up to avoid at least some of the problems mentioned above. The size of the mark-up can be “tuned” so that roaming prices approach domestic prices to a lesser or greater extent, according to the policy objective.

76. This method has some of the characteristics of “Roam like at home” but also some significant differences. On the positive side, the linkage of roaming prices to domestic prices in the visited country significantly reduces the scope for margin squeeze. On the other hand, the measure is less consumer-friendly. The consumer would pay a different price in each visited country (unlike at present). Most would have little idea in advance what they will be paying (unless they take the trouble to search for the information). For those who disregard the welcome SMS messages, they will have little idea of the charge until they receive their bill. The method would also necessitate a significant statistical exercise, probably annually, to establish and calculate a benchmark rate for each visited country, increasing significantly the regulatory burden for industry and regulators as regards implementation and compliance.
77. One interesting feature of “Roam like a local” is that it allows the possibility of retail minus pricing of wholesale roaming, which would avoid margin squeeze situations that appear in other options if the lowest retail prices are higher than the wholesale cap. This would be reasonable (and fair to all) where variations in prices mainly arise from variations in costs. Where they arise from variations in the state of competitiveness of national markets, the method is unfair since it punishes operators in the more competitive markets. It would not be a good option for 2012 but could be considered for 2015 if the market conditions are right.
78. To sum up, although the analysis is somewhat different, the conclusion is much the same as for “Roam like at Home”, subject to the question of regulatory burden. It could be an option worth considering for 2015. But we are not at present in a position to say whether the necessary preconditions will be in place or not.

Wholesale access on “cheap” regulated terms – rated “possible but unlikely”

79. Although this measure operates on the wholesale market, the rationale is to promote the entry of new players at retail level who will add competitive pressure to drive down the retail roaming price. In effect, it would give any organisation the right to become an MVNO in any country, gaining network access to originate calls on regulated terms. Customers of such MVNOs could be issued with a multi-IMSI SIM, in effect making them a domestic customer in each visited country. Such pan-European MVNOs (who could be MNOs, full MVNOs, light MVNOs or service providers) would have the ability to offer attractive pan-European tariffs. Obviously, the attractiveness of the tariffs would be limited by the generosity of the regulated wholesale terms. BEREC presumes that a single European cap would be set. If set at a level close to costs (i.e. the costs of the operator with the highest efficient costs), very significant reductions in retail roaming tariffs would be possible. The measure amounts, more or less, to cost-oriented regulation of the old “Market 15” without any finding of Significant Market Power. Some believe this could raise significant legal issues.
80. It is plainly a very tough measure and there is a question about whether an equally tough retail measure would be necessary to complement it. Perhaps not, since it might require

only a few disruptive players to enter the market to stimulate other market players to start competing vigorously.

81. The implications of this measure however go far beyond roaming as any additional competition generated could revolutionise competition in domestic markets (or at least, those national domestic markets where competition is muted), leading ultimately to a genuine Single European Market for retail mobile telephony. For these reasons, BEREC is inclined to the view that the measure would be regarded as disproportionate, given that the problem to be solved is high roaming prices.

Wholesale spot market – rated “possible but unlikely”

82. This idea is to require wholesale roaming services to be bought and sold on a spot market. Trading rules would be prescribed to require blind trading, to break the current link between buying and selling of roaming services which is believed to encourage balancing of traffic between counterparties and therefore minimise competitive pressure on prices.
83. A transaction and auction platform for roaming already exists. It seems that companies (including some significant companies) use it to reach deals for destinations from which roaming traffic is light and which therefore do not justify deployment of much effort in negotiation. There are however currently no intra-European deals on the platform. BEREC is investigating how easy or effective it would be to adapt and “scale up” such a platform to handle intra-European traffic as a spot market.
84. Concerns have also been expressed that roaming cannot be regarded as a standardised commodity, as necessary for a spot market solution. Buyers will have particular needs in terms of network coverage and quality, especially for data. Standard parameters would need to be defined and applied to the offers.
85. This measure, if it works, would reduce wholesale prices but would do nothing to increase the number of retail competitors. There is no good reason to believe that any price reductions would be fed through to the retail level, particularly for voice and SMS. A suitable complementary retail measure would be required.
86. There are however doubts about how effective it would be. After the first “round” of trading (and perhaps before), the identities of the buyers and sellers may well become fairly transparent in practice. Therefore, if the competitive pressure is generated by “blindness” in practice, this may not last long. The effectiveness also depends on the presumption that wholesale rates for unbalanced traffic are significantly less than those for balanced traffic. BEREC is currently collecting data to test this hypothesis and the impact that it may have on negotiated roaming wholesale prices.

J. Critique of approaches which cannot have a major impact but which could be considered as complementary to other measures

Unbundling wholesale roaming services

87. At present, outgoing European wholesale voice roaming is normally bought and sold as an “end to end” service, bundling origination, transit and termination. In theory, requiring the services to be sold separately should reduce the total price. The reason is that the

seller charges a standard price, irrespective of the (European) destination network. It may therefore add a margin to protect against the risk that the average termination charge it faces is higher than expected, as a consequence of patterns of calling.

88. The downside of this approach is that the buyer now has either to negotiate a large number of transit agreements between each individual pair of countries or set up new billing arrangements (not needed for other services at present) with all terminating networks. The economic gains could possibly be dwarfed by the additional systems costs.
89. On balance, this may have a marginally beneficial effect but could only be considered as a complement to other measures. It is worth noting however that there is no obvious reason why the market should not have arrived at this solution by itself, if there were material benefits to be realised from it.

Regulation of the wholesale resale roaming charges paid by existing MVNOs

90. Under the current Roaming Regulation, MVNOs are bound by retail price caps but are not protected by wholesale regulation. Commercial negotiations may not leave much margin to MVNOs for stimulating competition through lower prices. There may well be a strategic interest of MNOs in restricting the margins available to MVNOs to a level which minimises the risk of undercutting of its own roaming prices. In that case, MVNOs are simply unable to intensify competition for roaming services, unless they are prepared to offer such services at a loss.
91. This could lead us to consider a much less severe version of the wholesale regulation discussed above, where no new rights of network access would be created. MNOs would be required to resell wholesale roaming to the MVNOs hosted on their networks at a small mark-up to the regulated wholesale price.
92. At present, only a few MVNOs specialise in attracting customers who are frequent roamers. However, if the regulation progressively allowed for additional margin, more MVNOs might use the opportunity to compete on the roaming segment by offering lower retail prices.
93. On balance, it is unclear that the effect of a price reduction for MVNOs (and a revenue reduction for MNOs) arising from a measure of this kind would flow through to lower prices for mass market consumers. Some BEREC members believe that this regulation may be necessary at some point.

K. Retention of the price caps (rated “best option for 2012-15”)

94. All of the above retail options (with the possible exception of “Roam like a local”) would require the retention of the existing Eurotariff price caps, frozen at 2011-12 levels, to ensure that no customer experience a rise in roaming prices. However, this should be unproblematic. It may be possible to dispense with this safety-net at a later stage, if the replacement measures prove effective.
95. Similarly, in the event that compulsory use of the spot market were considered to be the preferred wholesale option, it would seem necessary to retain the wholesale price cap (at a level not greater than 2011-12 levels). This is because the spot market cannot be

guaranteed to avoid price rises, especially for smaller players. Given that this alternative requires potentially disruptive changes from the way wholesale deals are achieved at present, this calls into question the viability of this option.

96. However, BEREC recommends that none of the alternative measures has sufficient advantages to outweigh its disadvantages. We propose that the current price cap approach should be retained and a price regulation measure applied to retail data roaming, with the caps set at appropriate levels to reflect the pricing objective, taking account both of costs and of corresponding domestic prices.
97. The price cap approach could be either less or more consumer-friendly than “Roam like at home”, depending on which gives rise in practice to a greater gap between domestic and roaming prices. This will vary between countries and between consumer segments. On the other hand, the single price for all European roaming destinations makes it more transparent to consumers than “Roam like a local”.
98. Margin squeeze is a potential concern, but less so than for “Roam like at home” as the margin between domestic price and European average is less than the margin between the prices in the two States with highest and lowest prices.
99. The extent to which price caps can be reduced is limited by the need to avoid margin squeeze on the one hand and wholesale pricing below cost on the other hand. However, the cost analysis shows that this still gives considerable scope for reductions
100. Finally, it is necessary to analyse the consistency of this approach with the EDA target, if the legislators decide to adopt that. There is no problem at all in using the approach as a transitional measure en route to the EDA target. And if the EDA target is expressed in terms of a European average domestic price, the Eurotariff cap would be suitable for the longer term also.
101. However, if the EDA target is expressed in terms of domestic prices paid by individual customers, it is not an ideal long term solution as it tends to lead to near-uniform prices.

L. Impact

102. The following tables below use this scoring methodology to assess the regulatory options. See Section 4 for further detail:

Score	Definition
---	Very poor
--	Poor
-	Mediocre
o	Neutral
+	Reasonable
++	Good
+++	Very good

EFFECTS OF “PROBABLE” MEASURES FOR MODERATING WHOLESALE PRICES

Measure	Compulsory exchange trading	Average price caps
Criterion		
Potential to prevent excessive wholesale pricing	+	+++
Competition	++	0
Transparency	++	0
Regulatory burden	--	++
Potential impact on national markets	0	0
Feasibility	--	++
Avoidance of regular reviews	--	--

EFFECTS OF “PROBABLE” MEASURES FOR MODERATING RETAIL PRICES

Assessments generally relate to the situation in 2012. Where a difference can be expected in 2015, this is indicated in parentheses

Measure	Carrier select – local provider with billing by home provider	Carrier select – local provider with direct billing	Carrier select – alternative home provider	Roam like at home	Roam like a local	Maximum price caps on default roaming tariffs
Criterion						
Potential to prevent excessive pricing	+	+	+	++ (+++)	++ (+++)	+++
Potential to achieve the “EDA target”	-	--	-	0 (++)	0 (++)	+
Competition	+	+	++	0	0	0
Transparency	0	0	0	++	-	++
Regulatory burden	++	++	--	---	---	---
Potential impact on national markets	0	0	0	- (--)	0	0
Consumer friendliness	-	-	+	+++	++	++
Feasibility						
Commercial					0	
Technical	-	-	--	++	-	++
Regulatory compliance					--	
Avoidance of regular reviews	-	-	-	0 (++)	---	-

M. Medium-term and long-term considerations

103. On the basis of the above analysis, BEREC considers that there is no alternative regulatory approach for the years 2012-15 which is superior, on balance, to the current regime of price caps. None can be identified now and BEREC does not expect that the situation will change materially over the next 12 months. However, several of the alternatives retain promise for the longer term. BEREC considers that another review in (say) June 2014 will be necessary to set the regulatory framework from July 2015.
104. BEREC therefore recommends that price caps continue in place, at levels which are consistent with the longer-term pricing objectives chosen by legislators. If legislators wish to achieve the EDA target in 2015, a continuation of the downward glidepaths (at a steeper rate of decline than so far) would be natural to allow market players time to adjust. If the EDA target were to be considered too aggressive by legislators, shallower glidepaths could be adopted.
105. BEREC recognises that its conclusion that the best medium-term approach is a further period of regulation along the same lines (with a review in 2014) will be disappointing to many decision makers who hoped that a permanent solution to the “roaming problem” could be put in place in 2012. Nevertheless, the conclusion is reinforced by the consideration that data roaming could one day become a genuinely competitively provided service, as new technological developments get rolled out. The benefits of such a development should flow through to voice and SMS. However, the timescale for such a development cannot be predicted.
106. Moreover, BEREC intends to consider further the feasibility of introducing one or more structural solutions at an early stage. Even though these might not by themselves allow legislators’ goals to be achieved, they may be worth considering as a complement to price control measures. While having a limited effect in the short term, they may nevertheless become an element of a longer-term structural solution. BEREC recognises that the costs and benefits arising from imposition of such structural measures would need careful consideration, given the expected limited short-term impact.

N. Retail data prices

107. At present, there is no control of retail data roaming prices. As is evident from Table 1, this is the service where the gap between domestic and roaming prices is greatest. Moreover, the 6th BEREC Benchmark Data Report showed that while wholesale data roaming prices fell significantly over the first half of 2010, corresponding retail prices barely moved.
108. BEREC is aware of several recent commercial price initiatives on data roaming which offer consumers in some countries very substantial price reductions. These may be followed by competitive responses over the coming months. Nevertheless, such improved tariffs are not available to consumers in many Member states. Moreover, for the most part, consumers will still pay prices significantly above costs and above the prices they pay for domestic data services. On balance, BEREC assumes therefore that legislators will not be content to leave to the market the issue of data prices. While there are hypothetical reasons for expecting that data roaming prices would be subject to more

competitive pressure than corresponding voice and SMS services, from other delivery routes, any such effect seems hard to detect in practice. Data services can no longer be regarded as emerging. In addition to conscious use, for example for web-surfing, users of smartphones are continuously making use of mobile data services in many cases without realising it.

109. In principle, the same choices are available for regulating data roaming as for voice and SMS roaming. BEREC has considered whether any of the measures is more suitable for data than for the other services and concludes that the pros and cons are much the same. The “Carrier Select” options are simpler to implement for data since there are no incoming voice calls or SMS to manage. But the concerns about how much effect any of the options would have in practice still applies. Indeed, it probably applies to a greater extent to a data-only carrier select regime because this will provide a less attractive business case to prospective competitors than a regime which required carrier select for all three services.
110. BEREC therefore believes that the conclusions which apply to voice and SMS apply equally for data. Wholesale and retail caps seem to be the best options for the period up to 2015 although “Roam like” options could be viable in 2015, subject to a review of the market. Indeed, competition through other means of delivery could have grown sufficiently by 2015 that wholesale and retail regulation of data will be found to be superfluous. BEREC’s further work on structural solutions will of course cover data, as well as voice and SMS
111. If retail price regulation of data roaming services is chosen, there seem to be three obvious methods to implement it:
- A “Eurodata tariff” with a specified uniform maximum price, by analogy with the situation for voice and SMS
 - A cap on the average roaming price charged by each provider to its customers, separately for pre-pay and post-pay customers
 - An average cap, coupled with a “safeguard” cap on the price charged to any one customer .
112. The first option has the merit of simplicity and consistency with the remainder of the regulation.
113. The second option was previously considered for voice regulation but rejected. There were 3 stated objections. First, it was thought that companies would choose to give much lower rates to frequent travellers or to business customers at the expense of mass market consumers. This objection rests on the assumption that it is arithmetically possible to charge occasional roamers more than a few cents more than an average cap. BEREC does not have reliable information on the proportion of calls (for example) made by “frequent roamers” which would be necessary to test this assumption. However, to guard against this possibility, the third option could be employed.

114. The second objection to average rate retail caps is they provide no transparency for the consumer. This objection is not so valid for data since few consumers have any real idea what it means to consume 1Mb.
115. The third objection is that it imposes a non-trivial compliance burden on both market players and NRAs.
116. The merit of the second or third options is that they provide flexibility to providers to devise a range of tariffs to fit different customer needs and usage patterns, as they do for other mobile services.
117. If a retail price cap for data is decided upon, BEREC prefers on balance the “Eurodata Tariff”, partly for simplicity and partly for consistency with the approach for voice and SMS. It would be advisable to ensure that any such regulation did not disincentivise the emergence of other forms of tariff (e.g. roaming bundles or “Roam like ...” tariffs) which many consumers may find attractive

O. Implications of the EDA target

118. In this section, BEREC sets out the various implications which would follow from adoption of the EDA target, without attempting to reach a view, one way or the other, on the merits of adoption of the target.
119. A strict interpretation of the EDA target (i.e. roaming prices extremely close to domestic prices) could create concerns. There is a real danger that some providers would be required to sell roaming services at levels that do not allow them to earn an adequate return on their activities (and possibly to sell below incremental cost). This arises for two reasons:
- (a) there are genuine (though relatively small) additional costs which arise from the provision of roaming services;
 - (b) genuine cost differences across Europe gives rise to distortions where an element of common European pricing is imposed (e.g. a single wholesale cap). This appears to be the dominant concern at present but its magnitude can be expected to reduce over time as efficient costs both reduce and tend to converge.
120. BEREC therefore recommends that the EDA target should best be interpreted as allowing roaming prices to be slightly greater than corresponding domestic prices. Indeed, this is consistent with the wording of the target – the difference in prices should “approach” zero. It is difficult to assess what size of minimum “gap” would be needed in 2015. It is possible it could be small enough to be disregarded but this could be established in the review proposed for 2014. But, by way of contrast, a similar calculation for 2012 would seem to require a minimum gap for outgoing voice calls of about 10c per minute. This suggests strongly that, if the EDA target is adopted, it would not be reasonable to apply it before 2015.
121. The natural choice of measure for implementing the EDA target depends on how the target is formulated. To match roaming and domestic prices user-by-user, “Roam like at home” is the natural measure. To match with users in the visited country, the chosen measure would be “Roam like a local”. To match a European average, the natural

approach is to retain the existing approach of price capping the Eurotariff and Euro-SMS tariffs (the caps would have to be reduced sharply). In the latter case, it would be necessary to consider whether a Eurotariff for data should be introduced. (Of course, this analysis assumes that the market conditions are suitable for deployment of “Roam like” options, as mentioned above. If not, it would be necessary to consider which approach was most suitable on balance.) BEREC does not consider that any of the other alternative retail measures it analysed would be suitable for reaching the EDA target.

122. All of these options would require tough wholesale price regulation that would probably be implemented as a maximum wholesale price set at a level near to the wholesale costs (including reasonable return) of the operator whose efficient costs are highest. A reduction in prices to levels consistent with the achievement of the EDA Target would seem to require price cuts of around 75% for voice at both wholesale and retail levels, somewhat less for SMS, greater for data. Using a ballpark figure of 75% reduction (since voice is the dominant revenue for roaming services) there would be a direct reduction in gross MNO revenue (i.e. excluding waterbed, elasticity or spill over effects and also market growth) of about 4.5% although this ranges from around 3% (Spain) to around 9% (Malta and Cyprus). The reduction in gross revenue as a consequence of retail roaming price reductions to achieve the EDA target would be about 3%. This may be a more relevant figure for the industry as a whole since wholesale price reductions have no net effect on the industry as a whole. However, they do obviously have a differential effect, both between operators in different countries and different operators in the same country, depending on the balance between inbound and outbound traffic.
123. The pros and cons of the various options for addressing the EDA Target do vary considerably, as discussed above. In broad terms, the pros and cons of the price cap option are intermediate between those for the two “Roam like a ...” options.
124. Any disadvantages need to be considered against the obvious benefits of favouring the EDA target as a long-term goal (subject to further definition). Provided the required conditions are met in wholesale roaming prices (near cost) and domestic retail prices (narrow spread across Europe), it could reduce significantly the margin between domestic and roaming prices, consistent with the established political objective of creating a Single European Market. Under those circumstances, as illustrated above, it would for most consumers lead to very significant price cuts.

P. Non-price issues

125. Following implementation of the Regulation, consumer and operator comments have made BEREC aware of some areas that it considers should be looked at in any future regulation.
126. In particular, BEREC recommends that policy makers look at the treatment of Value Added Services (VAS) as regards price regulation and transparency measures; MMS, Machine to Machine (M2M) and prepaid data roaming services under the bill control facility; compatibility of regulatory requirements with new devices and market players (e.g. e-readers, where digital book sellers may have a direct relationship with the customer for the provision of mobile data services); and the exchange rate applicable to

any regulated caps outside of the Eurozone, in light of the current economic climate and currency fluctuations against the Euro.

127. Such a review should have the aims of ensuring that all consumers benefit from regulation and from roaming services, that prices are transparent and the bill control facility is available wherever needed, and that requirements reflect developments in technology and business models and technical and commercial feasibility in the period 2012 – 2015.

Q. Policy conclusions and recommendations

128. This section summarises the conclusions and recommendations set out earlier in the paper.

Overall
1. BEREC considers that some form of regulation designed to moderate prices would be necessary after the expiry of the current Regulation in June 2012. This would need to cover voice, SMS and data at the retail level. Appropriate wholesale regulation would also be necessary.
2. Measures can be designed to fit well with a vision of the regulatory approach beyond 2015. But BEREC considers that it is not realistic now and will not be realistic in 2011 to identify a regulatory approach which will undoubtedly be suitable for 2015 and beyond. It is appropriate therefore to put in place measures for the period July 2012 - June 2015 and review the situation again by (say) June 2014.
3. Very close alignment of roaming prices with domestic prices (whatever domestic price is chosen as a reference – i.e. home country, visited country or European average) will cause disruption to the market (margin squeeze at retail level and/or requirement to sell below cost at wholesale level) unless 2 preconditions are satisfied: <ol style="list-style-type: none"> a. Wholesale prices are close to cost-oriented levels b. Average domestic retail prices are not significantly different throughout Europe
4. These preconditions will not be in place by 2012. Wholesale regulation can address condition (a) by 2015 but it is not clear whether or when condition (b) will be satisfied.
5. BEREC believes that, whatever form the wholesale and retail regulation takes in future, a “no losers” policy is desirable, so that all consumers benefit and none are worse off than under the current Regulation.
Retail
6. BEREC considers that regulation should not be focused mainly on the needs of any particular customer segment (e.g. frequent roamers). All customers should expect to benefit from the continuation of regulation.
7. BEREC recommends continuation with the Eurotariff and Euro-SMS tariff for a further 3 years after June 2012 as the most practical measure for the next

<p>period. This recommendation holds both for the scenario where the legislators decide to decrease significantly the gap between domestic and roaming prices (i.e. progress towards the EDA target) and for the scenarios where the legislators decide on a moderate or zero rate of price decrease. At this stage, while some of the alternative forms of regulation have advantages, they do not appear sufficient to outweigh the disadvantages.</p>
<p>8. BEREC believes that regulatory options which seek to avoid price controls are unlikely to be effective at controlling prices for mass market customers during that period. BEREC will nevertheless investigate further the feasibility of introducing one or more structural solutions which have the potential to have a significant longer-term effect and which would be complementary to price controls in the shorter-term.</p>
<p>9. BEREC believes that retail data roaming prices available to all European consumers are unlikely, over the next few years, to fall to levels considered reasonable by legislators without price regulation.</p>
<p>10. If legislators decide to impose retail price controls on data roaming, three alternatives would naturally be considered:</p> <ol style="list-style-type: none"> a. A “Eurodata” tariff, with a cap on the price per Mb b. A cap on the average revenue per Mb for data roaming charged by any provider, separately for pre-pay and post-pay customers c. An average cap as above coupled with a “safeguard” cap on the maximum price paid by any one customer to guard against very high individual prices <p>On balance, BEREC would prefer the “Eurodata” tariff, for reasons of transparency and consistency with the approach to voice and SMS.</p>
<p>11. If legislators aim to address the EDA target by reducing the gap between domestic and roaming prices, the best approach would be to choose a suitable glidepath of price caps as a transitional measure with the intention of reviewing (in 2014) the viability of introducing alternative measures using the scenario analysis carried out in 2010 as a starting point.</p>
<p>Wholesale</p>
<p>12. BEREC believes that a wholesale price cap is the only realistic method currently available for controlling wholesale prices</p>
<p>13. Since there has been no evidence so far that wholesale price reductions will automatically be fed through to the retail level for the benefit of end users, the approach to wholesale regulation needs to be chosen to reflect the retail approach adopted. Wholesale and retail price caps should be set on a consistent basis, without unduly favouring one level or the other. At present, the margin available at retail level is greater than that available at wholesale level, without objective justification in light of continued low retail competition.</p>
<p>Non-price Issues</p>
<p>14. In the event of further regulation, BEREC recommends that the legislators look at the treatment the following services:</p> <ul style="list-style-type: none"> • Value Added Services (VAS) as regards price regulation and transparency

measures;

- MMS, Machine to Machine (M2M) and prepaid data roaming services under the data bill control facility; and
- the compatibility of any regulatory requirements with new devices and market players.

This should ensure that all consumers benefit from regulation and from roaming services, that prices are transparent and the bill control facility is available wherever needed, and that requirements reflect developments in technology and business models and technical and commercial feasibility in the period 2012 – 2015.

15. BEREC also recommends that legislators review the frequency of re-setting the exchange rate applicable to any regulated caps outside of the Eurozone, to increase stability and certainty in light of the current economic climate and currency fluctuations against the Euro.

Section 2

Market Developments

2.1 Industry Stakeholder Analysis

This section seeks to identify and analyse any commercial, technical or regulatory barriers to competition and innovation in roaming services. It then considers likely developments in networks, services, business models and consumer behaviour affecting delivery of roaming services in 2011 – 2015.

A. Barriers to competition and innovation

This section looks at the supply side of the international roaming market. We analyse whether market players on the supply side (i.e. providers including MNOs and different types of MVNO) can compete freely on roaming services or whether there are any obstacles that prevent them from doing so. Barriers to competition restrict competitive market conduct and reduce incentives to innovate. Where competitive conduct is restricted, market players are prevented from offering or buying services at a competitive price.

Since barriers to competition affect a market player's incentive to innovate, generally they can be regarded as barriers to innovation as well. However, this might not be the case for international roaming services, because to a large extent significant innovations in international roaming (rather than in mobile services in general) might just be made up of different combinations of existing services (bundles) and various pricing models. As a result, significant innovations as such are likely to stem from new business models, for example global MVNOs.

With the exception of WiFi hotspots, where available, new technologies have not provided substitutes to traditional ways of providing international roaming services so far, but it is appropriate to ask whether that could change in the future. That would influence trends in both supply and demand for roaming services, which in turn would affect competition.

Barriers to competition and innovation include any *commercial, technical or regulatory* barriers – by industry / market segment and type of service.

Market structure

This section looks at the following questions:

What does the relevant market structure look like and what services are in place (retail and wholesale level)?

Which market players are present and may be affected by any barriers to competition and innovation?

What services do they offer at the retail level, with regard to voice, data, SMS?

What services do they offer at the wholesale level, including the origination and termination, transit and routing of voice, data and SMS?

What services do providers purchase at the wholesale level, e.g. origination and termination, transit and routing of voice, data and SMS?

What services do MVNOs purchase?

What characterises the geographic availability of retail and wholesale roaming services?

Market players

(a) MNOs own mobile access and a fixed core network including all parts necessary for operating the network, including base transceiver stations (BTS), mobile switching centres (MSC), home location register (HLR), own sales channels, and number porting capabilities.

With regard to international roaming, we can further distinguish the visited MNO, where international roaming services are terminated or originated, as soon as roaming customers enter the visited country and demand international roaming services. Home MNOs are the end user's usual network, located in the home country of the end user.

(b) MVNOs are located a little further down the value chain. They don't operate a mobile access network, i.e. they don't run BTS, but do typically run a fixed core network. MVNOs have to purchase access network services from MNOs.

This section considers the situation of different types of MVNOs:

- Service Providers, which resell the products and services of their MNO partner, only adding their own branding and distribution.
- Light MVNOs, which also have their own customer management and billing systems, providing flexibility in end-user pricing and service packaging.
- Full MVNOs, which also have their own core network and application platforms, providing full control of pricing, service creation and introduction, and full customer ownership (own switches, HLR, IMSI numbers, SIM cards and numbering systems, giving the power to switch host MNO and to negotiate wholesale rates). They receive MTRs. The only difference with an MNO is that they do not have their own access network.

With regard to international roaming services, both service providers and light MVNOs have to buy wholesale services from their host MNO. Most commonly, they buy wholesale resale roaming services from their host MNO in the home country, to provide standard retail roaming services to their customers abroad. However, some seek a hosting agreement in various countries, so that they can buy wholesale domestic services and offer retail services at near-domestic prices to customers travelling there (see examples below). Meanwhile, full MVNOs are able to enter into their own roaming agreements with visited networks or hubs because they have their own IMSI including a Mobile Network Code (MNC), which enables a visited network to identify the home network of a roaming customer. On the other hand, in general MVNOs are not thought able to resell wholesale resale roaming (service providers and light MVNOs) or to sell wholesale inbound roaming (full MVNOs) as they don't have their own radio access network (RAN). This means that their network cannot be identified by inbound roaming mobiles. However, it is reported that it is technically possible for full MVNOs to resell minutes on their host MNO's network to other full MVNOs, where the minutes are tied to the IMSI range of the MVNO reselling the minutes. Such a solution would

require the use of dual IMSI SIM cards and the transmission of the roaming IMSI and security information with over-the-air signalling.

Therefore, MNVOs falling into the above groups may also be:

- Global MVNOs operating in e.g. various EU countries including the home country of the end-user. The global MVNO may purchase wholesale resale roaming services from the host MNO to provide retail roaming services and/or it may have wholesale domestic access agreements with MNOs in more than one country, enabling it to offer retail services to end-users travelling there at prices nearer to the domestic level of that country.
- Regional MVNOs covering a certain area in the EU, most likely the end-user's home country and one or more neighbouring countries. As above, the regional MVNO may purchase wholesale resale roaming services from the host MNO and/or wholesale domestic access from an MNO in the visited country.
- Small MVNOs operating in one country only. This group certainly makes up the highest number of mobile operators competing with MNOs in the international roaming market, which makes it necessary to mention them here separately. We have seen that new entrants are not new MNOs (depending on available frequencies) but MVNOs located in different parts of the value chain. The majority of new entrants are small; some of them try to cover a niche and so differentiate themselves from the bigger MVNOs.
- Furthermore, there are MVNOs launched by incumbent MNOs and by alternative MNOs, as well as fully independent MVNOs. Some independent MVNOs have been set up by well-known companies operating in other sectors, e.g. supermarket brands.

(c) MVNEs supply infrastructure to mobile operators that do not operate a network. MVNEs have similar infrastructure to full MVNOs in that they purchase airtime from MNOs but own some core network infrastructure (HLR, billing platforms and switching capability) but do not offer retail services. Instead, they resell their services to MVNOs or branded resellers who offer and market the retail services to end users. MVNEs facilitate faster MVNO rollout as the MVNO does not need to get through a direct agreement with the MNO.

Roaming products and services within the relevant market

It is also necessary to define which products / services we are looking at, i.e. find out what elements are included in the relevant market. Like lots of other products and services, first of all roaming can be divided into wholesale and retail roaming. The wholesale level can be further subdivided into two wholesale markets.

(a) Wholesale inbound roaming:

Wholesale inbound roaming services are supplied by visited MNOs to home MNOs and, in some cases full MVNOs. Light MVNOs and some full MVNOs purchase wholesale inbound roaming via their parent MNOs. Wholesale inbound roaming is also available via roaming hubs / brokers, which are used by a number of operators.

Hubs may be run by an independent organisation or by/ in partnership with a large MNO. Operators choose the services they wish to receive: the hub offers a broking service that deals with the negotiations and contract details of setting up roaming agreements,

interconnections and testing and billing (data and financial clearing and settlement). It can enable operators using different versions of technologies to connect. The hub's roaming partners may roam on any other networks connected to the hub, as well as maintain bilateral connections outside the hub. The level of the IOT and traffic steering may be agreed and run bilaterally. Large MNOs belonging to a group often use roaming hubs to conclude low volume traffic contracts, e.g. with small countries. Some have set up their own hub, as a means to centralise the group's roaming agreements and interconnections with other operators, reducing costs and enabling them to pool their roaming traffic to increase their buying power. Small operators also use hubs in order to access several countries without incurring too many negotiation and implementation costs, especially in order to be able to provide roaming services quickly when they first start up. They may subsequently change to bilateral negotiations on higher traffic routes, where they may be able to access lower rates.

Wholesale inbound roaming includes the origination, transit and termination of outgoing voice, SMS services and data roaming services.

(b) Wholesale resale roaming:

Here the home MNO resells the wholesale inbound roaming that it has purchased from the visited network to the MVNOs hosted on its home network. As above, it includes the origination, transit and termination of outgoing voice, SMS services and data roaming services.

(c) Retail roaming:

Home MNOs and all kinds of MVNO supply retail international roaming services to end-users. Some only provide voice roaming, or voice and SMS roaming.

Analysis

Barriers to competition comprise all elements that influence a market player's conduct in the market and their market performance (prices, service, quality, output, availability of services, innovation). From the point of view of market players already present in the market, barriers to competition enable them to protect themselves from competitive pressure. On the other hand, potential entrants view barriers to competition as costs, which reduce their expectations of profits. To include potential entrants as well we would have to include barriers to market entry, i.e. barriers that restrict the market entry of potential entrants (and which are costs borne by the entrant), and barriers to market exit, i.e. barriers which prevent market players already present in the market from exiting the market without generating sunk costs. Barriers to competition can either be structural or strategic. They can occur at the retail and wholesale levels as well as being identified by industry/market segment and type of service.

For practical reasons and due to similarities regarding its effects, barriers to innovation are included in the analysis of barriers to competition. Generally barriers to competition are also likely to hinder innovation, which in turn impedes competitive activities.

Structural barriers

Structural barriers are set externally, i.e. determined by either the production size of an undertaking and/or the technology it uses. In economic theory, structural barriers traditionally

can arise due to economies of large scale, absolute cost advantages (costs related to an exclusive power over resources, technical knowledge etc.) of established undertakings over potential entrants, or product differentiation advantages (cost savings related to meeting diverse consumer preferences).

Some of these cost savings appear in the mobile roaming market as well:

(a) First mover MNOs experience economies of large scale compared to new (smaller) entrants, because they are the first ones reaping the biggest share of the market. Smaller entrants only get the smaller share of total market demand, and therefore do not get enough shares to exhibit economies of scale. Compared to MVNOs, MNOs can be said to have more economies of scale for the above reasons, although an exception could apply to MVNOs that spin off from incumbent MNOs or conglomerate undertakings.

(b) Incumbent MNOs are also likely to save costs due to product differentiation. As owners of the (access) network infrastructure, it is easier and less costly for them to come up with a variety of products to meet consumers' needs than for smaller MNOs and MVNOs. These cost savings can include extensive marketing. This concept goes beyond economies of scope, i.e. it captures the possibility of undertakings to differentiate and in addition it might enable them to save costs via economies of scope.

(c) Absolute cost advantages relating to favourable terms for loans can be attributed to larger MNOs and MVNOs. But some smaller entrants may also benefit, where they are backed up by incumbent operators located in other Member States.

Additionally, structural barriers also include technical and other barriers:

(d) Technical barriers to competition in the mobile market are being encountered if interconnection cannot take place due to the incompatibility of technical devices between operators. In the case of international roaming, interconnection agreements are necessary for home MNOs that want to offer international roaming services, as well as full MVNOs that have invested in infrastructure equipment. This is of less importance for service provider or light MVNOs since interconnection with the visited MNO is done by the home MNO. Technical barriers would occur in the event that technical standards deviate between Member States. If the degree of interconnection is determined by market players, this would be a case of erecting strategic barriers to competition. The ability to make distinctive offers at the retail level also highly depends on the availability of interconnection with other operators, the application of compatible technical standards and the competitive conduct of the interconnection partners. Nonetheless, such technical barriers seem very unlikely at EU level, since there is a high degree of harmonisation regarding the use of frequencies and technologies. This uniformity is based on recommendations and decisions by standardization bodies (Electronic Communications Committee, European Telecommunications Standards Institute, International Telecommunications Union). In addition, MNOs can choose to connect through hubs in order to overcome the use of

different technologies between operators, e.g. different versions of CAMEL¹⁷ used for pre-pay roaming.

(e) Network infrastructure: once operators have invested in infrastructure (i.e. climbed up the ladder of investment) the overall investment costs can pose barriers to market exit depending on the size of the undertaking and its financial resources.

Strategic barriers

Strategic barriers refer to barriers erected by specific market conduct, including a limit price strategy, building excess capacity, product differentiation strategy and vertical tying.

(a) Limit price strategy refers to setting nearly predatory prices, i.e. prices at a level such as to make market entry or competing unprofitable. Since roaming prices are rather high across Member States compared to the underlying costs, low limit prices in roaming markets do not seem to be set by operators so as to primarily impede competition or to prevent market entry.

(b) Building up excess capacity enables operators to meet additional demand faster. Incumbent players could possibly do this cheaper than a newcomer or a smaller competitor could. For roaming, this could be related to overall network capacity. Where an operator has a significant amount of spare capacity, it would have a low marginal cost for selling wholesale roaming and immediately respond (dump capacity) if a competitor tried to offer a lower price.

(c) A product differentiation strategy could hamper market entry, because potential entrants would have to serve multiple markets in order to compete at the same level. Even for smaller market players that are already present in several markets, generating profits could become a problem. As already mentioned, product differentiation does not necessarily come from technological innovation – instead, it could relate to innovation in tariff structures. For roaming, product differentiation should not be a barrier for smaller MNOs, if these have equal access to wholesale inbound roaming services at the same prices as large MNOs. Service providers and light MVNOs may face some problems, if wholesale resale products do not allow them to differentiate.

Product differentiation may not be easy when it comes to roaming, as these services are by nature homogeneous but can be product differentiated by tariff level and structure. However, product differentiation could be advantageous for those operators that include international roaming services into product bundles as compared to those operators that do not include international roaming services in their bundles.

In addition, commercial barriers can be erected by market players, which can also be assigned to strategic barriers.

(d) It is interesting to look at commercial agreements. This is particularly necessary here as wholesale roaming services are mostly commercially exchanged via bilateral agreements. Commercial agreements are negotiated between the home MNO or full MVNO

¹⁷ Customised Applications for Mobile network Enhanced Logic (CAMEL), is used when the subscriber is roaming, allowing the home network to monitor and control calls made, and providing services such as prepaid roaming, fraud control and short codes, e.g. for voice mail.

and the MNO of the visited country, either entirely bilaterally or using a hub. Further commercial agreements may then be reached regarding wholesale resale roaming between the home (host) MNO and service provider and light MVNOs. Additionally, MVNOs may seek a hosting agreement in various countries, to buy wholesale domestic services to provide retail mobile services to customers travelling there at nearer domestic prices. Basically all services requiring negotiations are prone to strategic conduct. Market power can be exerted on competitors in order to manipulate terms and conditions.

Looking at international roaming agreements, it does not need strategic thinking to exclude competitors from concluding agreements. Bilateral roaming agreements are based on traffic volumes exchanged by the two parties as well as on the associated price, and network coverage and quality criteria. Because the price nets out for balanced traffic, MNOs often prefer to negotiate with partners that offer a certain amount of traffic in exchange, most preferably at least the same amount that they themselves will offer. Traffic imbalances between operators could lead to uneven bargaining positions, with small operators disadvantaged even where they offer a keener price, as they are unable to offer large volumes of return traffic. In particular, full MVNOs cannot offer any return traffic. This could result in higher prices for wholesale inbound roaming, because competition is focused on the residual, unbalanced traffic.

(e) Margin squeeze for MVNOs: They are subject to strategic conduct by MNOs as they do not operate an access network. Service provider and light MVNOs depend on buying wholesale resale roaming from network operators, which are vertically integrated. MNOs supply wholesale resale roaming to these MVNOs, but at the same time they compete with them at the retail level. MNOs could margin squeeze MVNOs by pricing wholesale resale roaming at the same price level as they sell their retail services, so that MVNOs would have to resell retail packages at a higher price in order to gain some profit margin. Under the current Regulation for voice and SMS, this might mean MNOs selling wholesale resale roaming at or close to the level of the regulated retail roaming price caps, so that MVNOs cannot offer competitively priced retail roaming services.

(f) Strategic conduct may also restrict competitor's ability to make distinctive retail offers. If wholesale resale roaming services offered by MNOs are not well designed in terms of distinction (tariff structure) and prices, MVNOs would not be able to make the same range of retail offers supplied by MNOs.

The last two types of market barriers show how operators can act especially when they are vertically integrated. But here it is not vertical integration itself that is a market barrier (vertical integration being a structural element), but an operator's conduct (which gives the strategic element).

Other barriers

There are also barriers, which are set by laws or regulations. In this case, market players may face obstacles, which do not lie within their own scope of action. For instance, it could be argued that patent laws and licensing regimes somehow restrict market players' conduct or, on the other hand, encourage costly investment and innovation, e.g. in the pharmaceutical markets.

(a) In mobile telecommunications markets, regulation policy - i.e. the Roaming Regulation itself - may create a regulatory burden for operators. The Roaming Regulation sets certain rules which mobile operators are supposed to abide by. Operators may argue that complying with the regulations requires costs and resources, which might otherwise be used for innovation and investment. In addition, operators could view these rules as barriers to competition such that, for instance, they cannot freely set their prices for voice and SMS services at the retail level, but are subject to a cap instead, which they could regard as restricting their scope of pricing. However, operators are free to offer alternative international roaming tariff plans alongside the default, regulated tariffs. MNOs could also set less favourable terms and conditions for MVNOs negotiating measures for providing consumers with specific information to increase transparency. Yet these transparency provisions benefit competition since they increase consumer awareness, which in turn could lead to increased consumption.

(b) Bundling a variety of mobile services at retail level including international roaming could act as a market barrier (i.e. the consumer receives all services from its chosen domestic network). This could hamper competition in the event that some of the services offered in a bundle cannot be replicated by competitors in technical terms as well as with regard to prices. Consumers typically purchase mobile bundles according to their strong preferences for domestic services. International roaming is usually not high on the consumer's list of priorities when deciding which bundle to choose (see the summary of consumer research, later in this section). Competitors need to have access to the same range of wholesale domestic and roaming services in order to being able to compete at retail level.

(c) Another constraint arises where there is relatively inelastic demand for roaming services compared to domestic services, which makes it difficult to attract new domestic subscribers on the basis of a roaming offer. There is an absence of perfect or reasonable substitutes for voice and SMS roaming services in particular. Many substitutes (global SIM, local pre-pay SIM) mean the loss of the customer's phone number for incoming calls, and rely on the adoption of call forwarding services, which are not yet mass market. Therefore, customers are likely to pay roaming charges rather than use alternatives that do not serve the same needs, i.e. are not positioned at the same level of convenience (preference). On the other hand, reasonable substitutes exist for retail data roaming in the form of WiFi, where available, and local pre-pay dongles. As such, elasticity may be higher for data services than for voice and SMS. Technological change may have an impact on the availability of alternatives. The effects of innovation will be dealt with below.

B. Market players' view

The theoretical approach outlined above was discussed with market players. Two stakeholder questionnaires were designed to clarify the market players' views on barriers to competition, and if there were any, whether these actually impact market conduct and market performance. The questionnaires were mostly accompanied by meetings between the operators and the relevant NRA, to gather further input.

The outcome of this survey is set out in this section.

BEREC received 44 answers to the questionnaires. Some national operators belonging to the same group gave separate responses and some group responses were provided. Taking this into account, 26 answers were received from nine different countries from all over the EU/EEA. Eight answers were submitted by independent light MVNOs and service providers, of which one was a light 'global MVNO' covering 5 countries. Furthermore, one answer was provided by an independent full MVNO, three answers by MVNOs owned by MNOs and eight by MNOs with very limited footprints (most of them were an MNO in one country but operated as MVNOs in other countries).

MVNOs

Looking at the different types of operators, it is clear that MVNOs face several challenges, such as access to the mobile network (access to wholesale inbound roaming agreements for full MVNOs and wholesale reseller agreements for service provider / light MVNOs), commercial conditions or access to distribution channels (which in some Member States are managed largely by incumbent MNOs). The extent of these challenges depends on how much MVNOs have invested in setting up the infrastructure required to offer domestic mobile services and international roaming. Service providers and light MVNOs have to buy the whole range of wholesale services in order to offer all retail services, including international roaming (light MVNOs have their own billing services). Meanwhile, an MVNO wanting to offer domestic services in countries other than its home country would need to conclude a hosting agreement with MNOs in each country.

Roaming products

(a) Wholesale inbound roaming:

MNOs report no technical or commercial restrictions with regard to offering wholesale inbound roaming to foreign operators, including full MVNOs. Some MNOs said that they have not approached domestic or global MVNOs. On the other hand, full MVNOs seem not to have shown much interest in contracting wholesale inbound roaming directly with visited MNOs. It is not perceived as a common practice. It appears that MNOs would not exclude agreeing a wholesale inbound roaming agreement with full MVNOs. Some MNOs said that they would offer the same terms and conditions to full MVNOs as to MNOs.

On the other hand, one light MVNO reported that MNOs will not allow it to use its own IMSI codes and hereby become a full MVNO, able to directly contract wholesale inbound roaming agreements with visited MNOs.

There are quite a few MVNOs trying to set up a roaming business case based on multi IMSI application, so that they can provide a local number in each visited country, with near-domestic rates. At the wholesale level, this means reaching a hosting agreement with an MNO in the country in question. One MNO stated that it sells wholesale inbound roaming directly to a foreign full MVNO, and other MNOs said that they are in negotiations with full MVNOs about such a solution. However, we understand that other negotiations in several countries have failed so far, with a lack of willing MNO hosts or unattractive terms. Also, a multi IMSI solution is perceived as a technical challenge as it requires the customer to have a recent handset that will support multi IMSI applications.

MVNOs also report that they cannot become members of GSMA, since the GSMA requires proof of valid licenses to operate a mobile network and supporting frequencies. Being excluded from the GSMA is seen as an obstacle for full MVNOs seeking agreements on wholesale inbound roaming, and reducing transparency of wholesale prices paid by their host MNO to service provider and light MVNOs. When asked whether full MVNOs can become members of the GSMA, the GSMA said that they are currently concluding a license to allow MVNOs access to the STIRA documents, suggesting that membership is not possible. This seems to reduce transparency for full MVNOs when buying inbound international roaming directly from a visited MNO.

There are also full MVNOs owned by MNOs, which buy wholesale inbound roaming via their parent MNO rather than wholesale resale roaming from their host MNO.

As mentioned above, a third option to purchase wholesale inbound roaming is to use roaming hubs or MVNE. Reference was made to a web-based auction platform, which MNOs and MVNOs could use to find roaming partners. This approach can reduce negotiation and implementation costs especially for new entrants and full MVNOs for which more attractive prices may not be available through bilateral negotiations.

Prices for wholesale inbound international roaming depend on volumes exchanged as discounts to the standard IOT are negotiated.

Regarding the possibility of reselling wholesale inbound roaming, MNOs are not aware that MVNOs would want to resell this service. Some current MVNO agreements do not allow reselling of wholesale inbound roaming. Some MNOs argue that it would not make any commercial sense as MVNOs would resell exactly the same service as offered by the home MNO, which would not benefit competition to foreign operators but would just be more costly. Above all, there are technical barriers as mentioned before. An exception is that, apparently, it is technically possible for full MVNOs to resell minutes on their host MNO's network to other full MVNOs, where the minutes are tied to the IMSI range of the MVNO reselling the minutes. Such a solution would require the use of dual IMSI SIM cards and the transmission of the roaming IMSI and security information with over-the-air signalling.

(b) Wholesale resale roaming:

It is standard practice that wholesale resale roaming is a part of the contract between the MNO and the MVNO hosted on its network. While MVNOs are subject to the retail price caps under the current Regulation, the wholesale caps do not apply. Prices for wholesale resale roaming seem to be usually set based on the MNO's retail price, minus a percentage, or the MNO's IOT with the visited network, including some volume discounts (the MNO and MVNO volumes are bundled for these purposes), plus a margin.

Some MVNOs claim to be unable to negotiate good wholesale resale roaming rates with their host MNO. One operator states that MVNOs at best buy resale roaming at a price 5 percent below the standard retail price of the MNO. MVNOs do not have access to wholesale inbound roaming prices (IOT) and only see the wholesale resale prices they agree with their home MNO. The MVNOs in general have difficulty estimating the difference between the prices they pay, and the price of buying wholesale inbound roaming services directly from the visited network. One MVNO however expects its wholesale cost (wholesale prices paid) would decrease by 20% if it could directly negotiate wholesale inbound roaming

with the visited MNO and decrease by 50% if it bought domestic services directly from an MNO in the foreign country, under a hosting agreement.

Some MVNOs said that the regulation of wholesale resale roaming rates would facilitate negotiations with MNOs and would enable the introduction of low cost cross-border services. They find it difficult to offer competitive retail roaming rates to customers under the current conditions. Others did not see such cross-border services as commercially viable.

(c) *Retail roaming:*

Retail international roaming is not offered by all operators in the EU. For example, one MNO in Poland does not supply retail roaming and an MVNO only supplies retail roaming to business customers.

Otherwise, traditional international roaming is part of the product portfolio of most operators. In addition, some operators offer alternative roaming services. Six operators said they offer call back solutions (so that a roaming voice call made is charged at the price of a roaming call received, apart from the set up call), one said it offers VoIP and three operators said they provide multi/dual IMSI.

Barriers to competition

(a) *Roaming specific costs as barriers to competition:*

MNOs report facing costs as barriers to competition. These costs are said to be roaming-specific, such as costs for traffic steering (tools, software, monitoring), platform costs, signalling costs, costs for GRX, costs for testing of roaming services, costs for data clearing and billing, fraud management and administration, network costs, maintenance of network roaming partners including ongoing negotiations, subscriber acquisition and retention costs, and costs for GSMA membership.

Regarding technical equipment, some MNOs distinguish costs for implementing technical roaming and billing devices (e.g. CAMEL) from costs for providing standard roaming services. MNOs argue that in countries with a large inflow of tourists in holiday peak times, network capacity has to be provided to cope with the increased traffic. Some MNOs view bilateral negotiations as time consuming. Some view roaming-specific costs as rather modest and report having significant economies of scale. Meanwhile, other MNOs have not been able to give reliable estimates of the roaming specific costs.

MVNOs view costs for implementing international roaming obligations as significant. Roaming-related costs are made up of access to HLR/VLR/MSC and transaction costs (e.g. setting up links with MNOs). Brand recognition is viewed as a challenge for new entrants as well. Roaming-related costs make up a substantial part of total costs. Roaming costs are also regarded as non-recoverable.

(b) *Agreements/STIRA:*

As outlined in the theoretical section above, commercial agreements can obstruct market conduct and market performance for late entrants or small operators.

Nearly all bilateral roaming agreements use the STIRA as a template. The STIRA can only be applied by members of the GSMA. The STIRA is said to be a standard template allowing adjustments subject to negotiations. Prices, volume discounts, length of contract, penalties and other terms and conditions are not included in the STIRA and therefore are negotiated bilaterally. Some MNOs report that the deviations are kept to a minimum. Discounts are negotiated bilaterally and usually discounts are not disclosed. Price levels are determined by actual volumes, commitment for volumes and settlement terms. Technical preconditions have to be met such as own switches, HLR and certain local identifiers (MNC/MCC and IMSI range). There are only a few cases where a unilateral STIRA is signed, as confirmed by the GSMA.

MNOs claim to regard prices, commitment to buy large volumes, balance of traffic (traffic volumes in return), network coverage and capacity, and quality of service as being equally important when negotiating agreements. Quality of Service is partly understood as a mixture of network coverage, capacity and other technical issues. MNOs state that the most important factor when first entering the roaming market was to get agreements in as many countries as possible and with a high degree of coverage. When this is secured, alternative roaming partners, traffic volumes and price become more important. Therefore, some MNOs still view prices and traffic volumes as the most important elements. Network capacity, coverage and other aspects of network performance are also considered important by operators focusing on promoting the use of mobile data. While quality criteria in negotiations are determined in relation to voice services, this might change in the future. Besides, MNOs also listed customer demand, number of customers, affiliates and geography as important factors.

Some MVNOs argued that they do not have bargaining power with their host MNO or other MNOs due to their low traffic volumes. Small MNOs face similar problems. They claim to hardly receive discounts and have difficulty attracting inbound roaming traffic. MNOs are reported to be reluctant to break previous relations, presumably due to balance of traffic arrangements. As regards negotiations, some small MNOs said they had been treated with low priority and thus negotiations had taken more time than necessary. Some of the large group MNOs confirmed that they prioritise negotiations based on expected revenue and costs, and that prioritisation is necessary due to the high number of interconnection requests. Small operators added strategic reasons in this context. Some new entrants said they had been unable to reach agreements with overseas affiliates of some EU MNOs.

Large group operators do not face these obstacles when negotiating. Agreements are negotiated either at group or national operator level. Specifically, some large group MNOs are moving towards negotiating at group level and/or setting up a roaming hub so as to aggregate all the group's roaming traffic for negotiating purposes, giving greater buyer power and the ability to leverage the better rates they can acquire for high traffic routes against those offered for less frequented routes. A hub also enables them to simplify interconnection with other operators as a single interconnection applies to the whole group, and to reduce the number of negotiations, agreements and testing. Thus they create a platform where all roaming related activities are managed for group companies, and may also be provided to other operators on a commercial basis (one-stop-shop). MNOs of all sizes view roaming hubs as making market entry easier for new entrants.

Traffic steering clearly plays a major role among MNOs. Group operators sometimes prefer to steer traffic within the group so as to internalise wholesale costs as far as possible. It seems that large MNOs then prefer to steer traffic between themselves in order to balance volumes as far as possible, meaning that the unit price mostly equals out. Large MNOs may also be able to offer higher network coverage. Only a small amount of residual traffic is left for competition on price, making it more difficult for smaller, independent MNOs to compete (lower return traffic to offer and potentially lower network coverage, which they are unable to fully overcome by offering to provide wholesale inbound roaming at a lower unit price than the large MNOs). This dampens competition. Retail customers may be able to manually select a different visited network but the price for all off-net roaming is usually the same (lower retail prices may apply to roaming on group networks).

Some small MNOs said that separating the buying and selling of wholesale inbound roaming could put smaller operators in a better position to compete with large group operators, for example if this option was available alongside bilateral deals under a spot market option. This could also help full MVNOs.

(c) *Demand for international roaming / price elasticities:*

Respondents to the questionnaire generally view international roaming as having inelastic demand, particularly for voice and SMS roaming services, no matter which consumers (frequent travellers, pre or post pay, high or low spending) are looked at. Demand for roaming has not increased in light of reduced prices introduced by the Regulation. According to consumer research conducted by an MNO, most consumers do not take interest in international roaming prices. However, they are interested in having lower roaming prices when it comes to travelling during the summer. Business customers as frequent travellers with higher spending are viewed as being more sensitive towards price changes. Pre-pay customers are presumed to have a higher elasticity than post-pay customers.

One MNO reported that it gave its customers 60 roaming minutes within the EU for free, but only 10 percent used up the allowance. However, one operator study found out that their new customers increased their use of international roaming services by 30 to 50 percent compared to their usage before they changed operator. The operator claims to have prices 50 percent lower than its competitors.

Some small MNOs said they had noticed increasing elasticity of demand due to greater consumer awareness regarding bill shock, as well as an increasing demand for data roaming.

Indeed, various MNOs (small and large) believe that elasticity for data roaming is higher than for voice and SMS. Demand for data roaming is increasing apparently due to an increase in domestic demand for data, linked to the growing take-up of new devices like smartphones and reducing domestic data prices. They made no distinction by consumer segment. MNOs also considered that, unlike for voice and SMS, travellers might find significant (even additional) need for data roaming when travelling, for example to use location-based services, check reservations, whether information, and a non-intrusive means of staying in touch. This was leading them to review the structure and level of their data roaming tariffs, more than for voice and SMS roaming.

Compared to data, the markets for voice and SMS are considered to have reached saturation. Nevertheless, elasticity for SMS is presumed to be more noticeable compared to voice. The proportion of SMS traffic increase is still much lower than the reduction of unit prices. However, operators noted that SMS and voice traffic and prices broadly go in the same direction, indicating that they could be substitutes.

Finally, some operators argued that prices do not determine demand but rather parameters lying outside operator's power, such as the economic downturn.

(d) Ability to make distinctive retail offers:

In general, MNOs consider themselves free to make distinctive retail offers so as to respond to consumer preferences. However, some operators report that high wholesale prices for data roaming prevent them from making attractive data offers to end users, for example prices nearer to the domestic level or inclusion of data roaming in domestic bundles.

MVNOs said they would like to make distinctive retail offers but feel restricted in doing so, because they can only offer what they get under the wholesale resale roaming agreement with their host MNO. This seems also to be the case when contracting with roaming brokers, where wholesale roaming prices for MVNOs could be higher than the regulated wholesale rates available to MNOs. Some wholesale resale prices are suspected to be nearly equal to MNOs' retail prices, which do not leave enough room for margins. MVNOs would seek to offer a wider variety of services (such as flat rates) and lower retail prices if they could contract wholesale inbound roaming at the rate available directly to MNOs. Some MVNOs said they would like to target frequent travellers or design cross-border offers, which they currently cannot.

(e) Bundles:

Retail international roaming services are mostly provided together with domestic (including international) services when the customer chooses a domestic network, for reasons of convenience and transparency for consumers as well as technical feasibility and efficiency. Services are supplied to enable seamless connection. Retail prices are part of a mixed calculation as most customers have a monthly subscription and therefore are financially committed. Operators have limited incentives to lower prices for retail roaming since they find most consumers do not respond to lower prices enough to make up for the reduced revenue per unit. It is possible to block or disable international roaming. Meanwhile, in some Member States international roaming offers are part of licence obligations.

There are several MVNOs and MNOs which offer international roaming as a single service as well as in a bundle with other mobile services. One of the reasons for offering stand-alone international roaming is mainly commercial. One of the MVNOs argues that it would technically be more complicated, if it offered retail international roaming in a bundle with domestic services. Another MNO is currently preparing to offer unbundled retail international roaming. On the other hand, some MVNOs argued that offering retail international roaming as a single service (i.e. without domestic services) would not be possible in technical terms.

At the wholesale level, most MNOs argue that it would not be efficient to unbundle wholesale inbound roaming voice or SMS services into origination, transit and termination but would rather increase complexity. If origination was sold alone, this would require indirect routing,

as all traffic from the visited network would have to be routed to the home network. Origination and transit could be sold together to overcome this, but in both cases the home operator would have to set up multiple billing arrangements for the same call. One MNO said that it does sometimes buy unbundled voice roaming services, in that it prefers to bundle its volumes of roaming transit with international transit, to be able to negotiate a better price. The same visited network is used to provide all roaming services (i.e. voice, SMS and data) – it is not possible to steer a handset to different networks for different services.

(f) *Delays in market entry:*

Some MNOs say that roaming is typically launched with a certain delay following market entry since the business is focussed on larger traffic, which is usually generated by domestic services. Some delay is also caused by the fact that a significant amount of testing and systems integration is required in order to offer retail international roaming, which may mean that roaming in some countries is not offered from the outset. It is presumed that some issues might have come up with regards to prioritization and waiting lists to conduct negotiations with foreign networks. Some MNOs reported no delays.

Smaller MNOs report having limited resources and therefore still do not offer comprehensive coverage for retail roaming services. On the other hand, some MNOs argue that MVNOs (and small MNOs) do not face any problems since they could use services offered by roaming hubs to accelerate and simplify their route to market.

For MVNOs using dual IMSI codes to offer international roaming based on a series of domestic hosting agreements in different countries, delays may arise for technical reasons (e.g. interface between handset and SIM card is not standardized). Lack of branding is also viewed as an obstacle to market entry.

(g) *Regulatory burden:*

Some MNOs said that it is difficult to isolate the impact of the Roaming Regulation. A number of operators perceive some provisions in the Regulation as a burden. In particular, some MNOs report difficulties in implementing certain provisions of the Regulation for technical reasons. Some of them are considered costly to employ, which has led to the termination of certain services, e.g. a few operators have blocked retail data roaming for pre-pay customers rather than invest in developing the bill control facility. Some MNOs reported making increased investments in order to comply with some provisions of the Regulation.

Smaller MNOs said they suffered from a reduced ability to price differentiate due to lower wholesale prices and the regulated retail tariffs for voice and SMS, which are applied as the default requiring extra marketing activities to inform customers about any alternative offers, despite lower prices from alternatives from the larger MNOs. The Regulation is also perceived as impeding innovation in that resources were diverted to ensure compliance with the Regulation.

Some MNOs argued that incentives for competing in voice and SMS markets have been eliminated.

MVNOs experience lower margins and thus lower capacity for investment. Some MVNOs also reported reducing their range of services (e.g. late call forwarding) in order to comply with some provisions in the Regulation.

Some operators said that they experienced significant revenue losses at the wholesale and retail levels resulting from the Regulation. Some claimed that investment decisions were been delayed due to falling roaming revenues, and some said that prices for RoW destinations, or other services, were increased to compensate for reduced roaming revenues within the EU. However, on the basis of regular BEREC data collections, few operators did this as the average prices are very stable. On the other hand, some other operators said they did not experience material revenue reductions. Some small MNOs believe that the regulation increased competition, because it has narrowed the gap between wholesale inbound roaming prices and the underlying costs of providing wholesale roaming services. Nevertheless, wholesale inbound roaming costs are still higher, especially for data roaming.

Impact on competition

Barriers to competition increase a market player's ability to avoid competitive pressures. As a result, competition will not work properly in the market, to the detriment of both suppliers and consumers. Smaller market players' scope of conduct could easily be restricted in terms of pricing, output or diversity of offers. In the worst case scenario, smaller players may be forced to exit the market, thus leading to a further decrease in competition due to an increase of market concentration and prices.

On the other hand, barriers to competition allow players already in the market to innovate by giving them the possibility to recover innovation costs. However, with regard to international roaming, it is highly unlikely that innovations need to be protected by specific regulations. Innovations in roaming markets are currently mostly confined to new tariff structures like bundles for different kinds of already existing services, rather than new technologies. Even if new technologies substitute international roaming services, excessive innovation costs are not likely to be linked to roaming.

Combining the theoretical arguments put forward with the outcome of the stakeholder questionnaire, it is evident that there are barriers to competition in the international roaming market both at the wholesale and retail levels. Barriers can be found before even entering the market as well as after having entered the market.

Before market entry

Several operators - mainly MVNOs and small MNOs - find access to the international roaming markets difficult. However, there are operators that have not used all possibilities of concluding wholesale roaming agreements.

Since prices for wholesale resale roaming are reported to be higher than prices for wholesale inbound roaming – as they are calculated via retail-minus or wholesale inbound roaming plus mark-up – MVNOs inevitably have a smaller profit margin at the retail level compared to MNOs, thus making it difficult for them to price differentiate at the retail level or to compete on prices with MNOs regarding roaming services.

Furthermore, wholesale resale prices are not transparent. MVNOs do not know whether prices are reasonable and how close resale prices are to wholesale inbound international roaming prices, which typically include volume discounts. This non-transparency reduces competition.

An alternative to wholesale resale roaming could induce competitive pressure. However, there are very few examples of wholesale domestic services being used to substitute wholesale inbound roaming in practice. There are some examples of global MVNOs, which use domestic resale services and multi IMSI solutions. But they have only been able to reach domestic hosting agreements in a small number of countries, and on terms that imply, for example, a monthly subscription charge at the retail level which is unlikely to be attractive to mass market, relatively infrequent travellers. This could may act as a material constraint on competition.

Another obstacle to competition comes from MNOs apparently denying the MVNOs that they host from becoming global (full) MVNOs, using their own IMSI codes. Since a multi IMSI solution is already in use between one European MNO and an American MVNO, the reason for prohibiting own IMSI codes for hosted MVNOs seem strategic rather than technical. Inhibiting its use forces MVNOs to purchase wholesale resale roaming or resale domestic services. Even in the event that a multi IMSI solution is perceived as a technical challenge for MVNOs, they consider that should be their own commercial decision to make and not be imposed by their host.

As noted above, roaming hubs may be a substitute for full MVNOs only, to buy wholesale inbound roaming services from foreign networks.

Post market entry

(a) The impact of bilateral agreements on competition:

Having accessed the international roaming market, there are several other obstacles that operators face. It is interesting to note that all operators at some point encounter barriers to competition. However, the impact differs significantly depending on the size and particularly on the negotiating power that operators have.

As assumed, it seems that market conditions are imbalanced such that large operators have an advantage over small operators, network operators over MVNOs, and group MNOs over independent MNOs and MVNOs. The outcome of the stakeholder questionnaire shows that negotiating powers between mobile operators are not equal. This the principal obstacle at the wholesale level. In the international roaming market, bilateral agreements dominate the way wholesale roaming products are exchanged. As outlined above, bilateral agreements are much more prone to strategic conduct, limiting competition than if products were exchanged on a unilateral basis.

The specific conditions tied to the agreements pose an obstacle in themselves. A wholesale inbound roaming agreement largely depends on traffic volumes exchanged between operators, and determines discounts and agreed prices. Operators having less traffic volumes – i.e. no footprint at all or just a small one – are always in a weaker position, and are more likely to be treated differently by large group operators. This is not necessarily happening with the intention to drive competitors out of the market, but partly due to group

policy of choosing preferred roaming partners with whom they can balance their traffic and ensure good network coverage. The preferred partner is someone that can offer a similar amount of traffic in return. Within large groups, the preferred partner is typically the MNO belonging to the same group, followed by other large MNOs. The footprint therefore seems crucial for concluding roaming agreements.

Other factors such as network coverage, capacity and quality of service are presumed to gain importance, especially in the light of growing data services. Smaller operators will have to ensure that they meet the standards set for supplying retail international roaming if they want to compete with the large operators.

It is difficult to say if the STIRA serves as an obstacle to competition. It offers a standard template that lowers the cost of reaching a roaming agreement between parties, and is said to allow individual adjustments on the fundamental parameters such as prices and discounts. However, as a standard it might lock in the operators in a paradigm where contracts are looked at from a bilateral perspective.

(b) The impact of roaming specific costs:

Although operators report that there are roaming specific and unrecoverable costs, which according to some operators make up a significant part of total costs, it seems that these costs do not specifically pose a barrier to competition. Some costs are viewed as a challenge but do not seem to be an obstacle preventing them from offering competitive prices at retail level. It rather seems that costs stemming from purchasing wholesale resale roaming are considered more severe than the costs related to roaming specific technology and customer service.

(c) Do all operators have the ability to make distinctive offers?

It seems that competition conditions with regard to the ability to make distinctive retail offers are not equal. MVNOs report that they only replicate the services that they are offered via the wholesale resale agreement with their host MNO. Apparently wholesale resale roaming does not leave enough room for operators to product differentiate compared to wholesale inbound roaming. As a result, MVNOs cannot properly compete on prices and on services, which they would need to distinguish themselves from large MNOs, and also in order to generate some significant traffic. This can plainly be regarded as impeding competition at the retail level.

It is also clearly problematic when MVNOs pay higher wholesale resale rates than offered by the MNO at retail level. In this situation there is no chance to create a profitable and competitive offer that consumers would find attractive.

(d) The impact of bundles on competition:

It is interesting to note, that international retail roaming is usually supplied in a bundle with domestic mobile services when the consumer chooses a domestic network. However, existing technology such as CAMEL and dual IMSI SIMs would allow roaming services to be sold separately from domestic services, although this raises the question of convenience for consumers and the likely demand.

Wholesale roaming is a bundled product such that it includes origination, transit, termination and routing. In this regard, operators demanding wholesale roaming can offer retail roaming easily as they can replicate at the retail level what they get at the wholesale level. MNOs argue that it would not be efficient to unbundle wholesale roaming.

(e) The impact of delays in market entry:

Delays were reported, mostly because operators directed their effort on domestic services rather than on international roaming. This is a self-imposed selection of priorities that cannot be attributed to other operators. Technical requirements such as testing also caused some delays, which however seems a normal procedure when several networks are connected. Some operators reported that it would become discriminatory, if such testing periods took much longer than needed. Disadvantages such as limited resources due to size or small scale does account as a market barrier, but does not harm competition as long as large operators do not abuse their market power in this regard so as to obstruct competition.

(f) The impact of regulatory burden:

Operators blame the Regulation for impeding competition. Operators feel that they cannot price and product differentiate as they would like. MVNOs are likely to be more affected than MNOs, because the wholesale resale prices they pay are typically higher than the wholesale inbound roaming rates, leaving them with a lower margin compared to MNOs. Obstacles from technical developments required by the transparency and bill control provisions of the Regulation impact all operators. Even those operators that own just a few network parts such as service provider MVNOs or light MVNOs had to make necessary adjustments to their roaming systems.

Nonetheless, competition has not been obstructed in so far as no operators had to exit the market and there has not been an increase in market concentration linked to the Regulation. However, some roaming services ceased to exist in some Member States due to technical and commercial challenges, which leads to the conclusion that technical and commercial feasibility always has to be considered as a priority when designing provisions or taking any such measures.

(g) The impact of demand for international roaming / price elasticities

Unfortunately, BEREC did not receive any empirical evidence from stakeholders that price elasticity for international roaming was low although this seems apparent, at least at current price levels, from studying the price and volume trends in the regular BEREC data collections. Data roaming is perceived to have higher price elasticity than voice and SMS. Assuming that stakeholder's notion about price elasticities of voice, SMS and data is correct, we can conclude that operators are likely to compete more on data roaming.

Conclusions

Barriers to competition can be found in the international roaming markets both at the wholesale and at the retail level. The findings of the stakeholder questionnaire show that the main barrier comes from bilateral negotiations on wholesale inbound and wholesale resale roaming. These negotiations dominate the exchange of wholesale services and in the end

impact retail roaming prices. In contrast to other markets, market share and market power is very closely linked to the volumes traded. This is not always the case in other markets, where undertakings are found to have significant market power despite having a low market share. It seems that current roaming hubs do not put enough competitive pressure so as to impact bilateral trading, as lower prices are often available through bilateral agreements. The current hubs are not comparable to OTC and spot market trading e.g. of electricity and gas, where price levels are quite similar on and off the spot market.

All other barriers are more or less similar to those that market players encounter in other markets, such as low price elasticities, costs or regulations.

C. New technologies affecting roaming

This chapter analyzes whether and how new technologies may affect market players and competition in the roaming market in the period 2011 - 2015. Generally economic theory perceives innovation to have a positive impact on competition. In monopolistic markets innovation can lead to breaking down a monopoly, thus enabling innovators to enter the market and capture a part of market demand that was formerly solely supplied by the monopolist. In polypolistic or oligopolistic markets innovations may also lead to putting competitive pressure on market players and thus leading to more competition among them. Usually innovations increase availability of supply, either complementing or substituting existing technology. New technologies also create new demand and thereby new markets for suppliers. Innovations therefore can lead to decreasing prices, thus benefitting consumers. However, new technologies can also lead to shielding a niche within a market with a rather damaging impact on competition.

New technologies are likely to have positive impact on market performance in the international roaming markets and therefore on consumers as well. However, we have to see whether innovations in international roaming stem from just bundling existing services, creating new pricing models, creating new market players thus resulting in new services, or whether innovations stem from new technologies. As we currently can observe, new technologies in international roaming are not in place yet or do not have significant take-up (mobile VoIP and WiFi), but are growing and could play a major role in the future.

Supply and demand structure with regard to new technologies

In order to analyze the impact of new technologies on roaming markets, we look at the supply structure, i.e. at already existing technologies in order to find out which new technologies could eventually substitute international roaming or whether these new technologies complement international roaming. Following this, we also look at the present structure of market demand in order to identify which devices and applications consumers may regard as relevant for travel and daily life.

New technologies and new business models

The supply side provides various new technologies, which can be used for international roaming as well. These include networks such as LTE, WiFi and WiMax, devices such as dual SIM handsets, VoIP enabled mobile handsets, smart phones, notebooks/tablet PCs, and applications such as VoIP, social networking etc. While new technologies mostly work in domestic mobile markets, the question is whether these also work when travelling abroad.

The question is raised with regard to agreements between home and visited operators, as well as with regard to the technical availability in the Member States, as technology has developed differently. For most technologies we can assume that these can be used while roaming where they are available domestically.

(a) *Networks:*

- *WiFi*

WiFi allows wireless access to the internet to end-users and thus may act as a substitute to traditional international roaming (for data and also voice through VoIP and SMS through instant messaging or e-mail). WiFi access may be provided free of charge or on a charging model. This depends on the customer having a computer or smartphone.

Looking at the level of substitution, services over WiFi are available as an alternative to traditional roaming in certain scenarios because of coverage limitations, and for certain types of customers due to device limitations. In addition, at present, VoIP and instant messaging seem likely to be used by the most technically-savvy customers only. Additionally, VoIP is not included in some mobile data bundles, especially lower priced ones. In addition, it is important for consumers to be aware of when they are connected to WiFi and when to mobile data, as the price implications may be quite different.

On the other hand, due to congestion in mobile networks, operators are increasingly looking at off-loading mobile data traffic onto WiFi networks where available, for example in large cities where congestion is highest, especially at certain times of day. This is likely to increase in our time period 2011-2015.

- *LTE:*

As a new mobile technology, LTE is different from current 2G and 3G networks and requires operators to roll out a new network. Since LTE is supposed to allow much faster transfer rates, it will have some features, which may change the international roaming market.

New licences, which will partly be used for LTE, are likely to be granted to existing MNOs. In this case it would be necessary to enter into agreements with the same operators as for 2G and 3G roaming. Operators are therefore likely to face the same market barriers. Additional barriers may arise from connecting LTE networks with 3G networks and switching from 3G to LTE. This is likely to happen since MNOs will not roll out and switch services over to LTE at the same time. In particular, voice is likely to continue to be run over legacy networks during our time period, while some operators are likely to start offering data services over LTE. For voice, this is to prevent the cannibalisation of voice revenues from VoIP, and is likely to continue while 3G networks remain efficient to run and maintain. For data, as LTE permits higher speeds than 3G, operators may offer differentiated tariffs with higher price tariffs giving access to higher (LTE) speeds and lower price tariffs continuing on 3G, at least while the technology remains 'new'. However, the higher spectral efficiency of LTE means that in the long run data access over LTE will be cheaper than data provided over 3G (i.e. network rollout costs aside, the more data you can offer over the same spectrum, the cheaper each unit may be sold).

Technical barriers may also be greater than switching from 2G to 3G as there will be a need for international standardization of modules. It depends on the pace of negotiations on technical standards how fast seamless international roaming can be implemented. Mobile phones would require supporting both 2G / 3G and LTE (such as tri-band or quadruple band handsets) so as to allow end-users to roam between countries, where different technologies still exist.

- *WiMax:*

WiMax is a wireless access technology allowing long-range coverage across many kilometers compared to WiFi. WiMax was supposed to compete with LTE as it permits high speed data transfer. As a matter of fact, these two technologies are very similar. The idea was to cover areas with WiMax where coverage with DSL was considered too costly. However, WiMax has not evolved as originally planned. It is assumed that WiMax will survive as a niche technology. Some others think that it will develop further.

(b) *Devices:*

- *Single SIM cellular phones, smartphones, laptops, tablet computers*

Demand for mobile services including international roaming is growing especially for data. There is an increase in the take-up of smartphones and tablet computers like the iPad. All devices allow WiFi connections as well, so that alternative applications to roaming such as VoIP can be utilized on the devices (more on this see below).

- *Dual SIM handsets*

Dual SIM handsets allow for bypassing international roaming charges. Stand-by dual SIM handsets support two SIM cards, but only allow switching from one network to the other. With active dual SIM, the two SIM cards allow the customer to connect to the home network and to the visited network at the same time, so that consumers can receive calls on their usual number (one SIM) and receive and make calls using a local number on the other SIM. Dual SIM cards can also be used via a dual SIM card adapter, which can be inserted into the handset, thus allowing it to hold two SIM cards at the same time.

Nonetheless, dual SIM handsets do not completely substitute traditional international voice roaming since calls can also be received on the domestic SIM. For those calls, the called party would still have to pay incoming roaming charges. Callers would have to know which number to dial and whether the called person is roaming and be willing to pay the price of an international call instead of a domestic one.

Redirection services may prevent the called party from putting the cost of being abroad on the calling party. In this case, the roaming party would redirect incoming calls to its local SIM and pay the price for outgoing international calls for receiving calls, instead of paying incoming roaming call charges.

Currently the number of dual SIM enabled handsets is still very limited and they do not benefit from subsidies by the operators. Besides, operators may not want to share their customers with other operators. Some operators lock handsets belonging to their network, which makes it impossible to use a local SIM.

*(c) Applications:**- VoIP telephony*

VoIP supposedly allows the consumer to bypass international roaming charges. In order to benefit from this, the data connection has to be either charged zero or lower than if the call was made via traditional international roaming. Some handsets may have to be unlocked for VoIP by MNOs as well. However, obstacles appear when the costs for using these services are too high such that substituting traditional roaming does not generate benefits. Some MNOs charge an extra monthly fee for enabling VoIP over their mobile networks. Substituting international roaming services via VoIP therefore depends on additional recurring costs.

VoIP blocking by MNOs can sometimes be circumvented by using a VPN data connection (which would make the MNO blind to what type of traffic is included inside the VPN connection). However, VoIP could also be blocked on the handset, which would not allow substituting traditional international voice roaming (such restrictions do not apply to laptops).

If VoIP telephony should substitute international voice roaming, we can for the moment assume that this works only for outgoing calls. Generally all alternatives that work only for outgoing calls should also be technically feasible fully or in part for incoming calls as well – maybe via forwarding incoming calls. However, incoming calls might be (a) costly for the consumer, (b) a hassle to set up, (c) with loss of caller ID, and (d) for non-mobile alternatives there will still be loss of incoming calls when the customer is not connected to the non-mobile network via WiFi. VoIP services in any case rely on data roaming and demand would very much be influenced by the quality of the data connections and user-friendliness of the setup process. VoIP quality would have to be as high as that of traditional international voice roaming. Otherwise, there would not be much take-up of VoIP telephony. The quality of a VoIP call is affected to a large extent by the radio access technology used. WiFi can provide sufficient data rate and latency (delay) characteristics for high quality voice calls. 3G technology on the other hand is not generally considered adequate to support high quality VoIP. Future technologies such as LTE and WiMax would lift this limitation, making VoIP telephony available while on the move. At present, however, VoIP cannot be considered a good substitute to mobile roaming.

*(d) Other:**Global MVNOs*

Some mobile operators across EU Member States have currently teamed up to perform as single pan-European operators, involving merging of the companies. Technically this means connecting switching equipment in each Member State as well as centralizing service platforms and applications. Global MVNOs can then use the full range of infrastructure throughout the EU and save costs. This way they can circumvent some market barriers they would face if they were a stand-alone company.

- Roaming plans

Operators from different countries could collaborate specifically targeting international roaming services. These offers could include lower charges for outgoing calls and free

incoming calls when customers roam on visited networks participating in such kind of cooperation. However, for this to arise operators would need commercial incentives to disrupt the status quo, in particular consumer demand for roaming services that would lead consumers to switch their domestic network.

Demand for new technologies

Looking at the demand side helps us to find out which mobile applications are relevant for consumers when they travel. These applications refer to mobile office applications (e.g. access to email and office servers) as well as applications like music streaming and keeping up with social networks while abroad. If traditional roaming was substituted, travellers would want to have the same convenience, i.e. overall availability, seamless connection or using the domestic mobile number. In addition, any substitutes would have to at least generate the same costs, if not lower.

Innovations at wholesale and retail level

New technologies affect both the wholesale and the retail level. Although some may target the wholesale level only, in the end the impact will be fed through to the retail level. This section tries to relate the above elaborated technology developments to the wholesale and retail level.

(a) Wholesale level

At the wholesale level, we find alternative networks such as LTE, WiFi and (less relevant) WiMax. The purpose of network set-up is to supply the operator's own downstream arm as well as providing access and use (interconnection and transit) of its network to operators competing at the same level.

(b) Retail level

At the retail level, technology developments at network level are relevant as well as devices and applications. As briefly mentioned, innovations can also stem from bundling different services or new pricing schemes. Due to lack of real technical innovations at present, it may be much easier to come up with new pricing schemes, since pricing offers various possibilities. In any case, the most important feature of new product bundles and pricing schemes is that these at least appear new to the market and hereby can capture market demand.

Another possibility stemming from market performance level would be if carrier pre-selection was introduced to the international roaming market. This could also bring about a change in market structure as new types of operators could enter the market (in the event that the incentives are large enough in terms of consumer demand).

D. Market player's view

MNOs maintain that current technology developments fail to provide the same convenience as the "traditional" international roaming product, and that substitutes to traditional roaming are therefore not likely to come up soon. Alternative solutions are considered too complicated in technical terms and require additional effort to purchase, or involve the loss of

services such as incoming voice calls and SMS to the mobile phone number. Quality of service also does not live up to the standards of traditional roaming.

(a) *Networks:*

According to market players, WiFi is expected to be the most significant development in the near future, but at present it is too early to estimate its impact. WiFi is perceived as a complementary to traditional roaming rather than as a substitute. It could put some pressure on competition in the international roaming market.

A couple of operators also mention WiMax as a threat, especially on data roaming.

3G, LTE and possibly WiMax are presumed to be the only credible alternatives for a wide coverage with mobile broadband services.

(b) *Devices:*

Operators see a significant growth of data due to increased usage of smart phones, tablet computers, dongles etc. These devices are expected to change communication structures such that people will communicate via email or social networks instead of making voice calls. Moreover, they enable location-based services like directions, recommendations and local promotions, and access to other travel-relevant information like timetables, event tickets, weather, and on-line banking.

(c) *Applications:*

Market players argue that VoIP is currently not a substitute. VoIP over mobile can be and is presumably impeded by MNOs. VoIP over WiFi on smartphones is regarded as a fixed voice service. Some operators state that, in the longer term, VoIP can affect the roaming market significantly. Only one operator mentioned call back solutions as a way to reduce roaming costs even though call back is used by several providers. Some operators state that the increased use of data services is expected to change the roaming market, as above.

E. Impact on competition

Which new technologies affect roaming and competition? How do substitutes or complementary services affect roaming and competition?

New technologies are expected to impact competition by expanding the market and attracting new end-users. Operators can capture market demand and increase market share. Generating profits in turn provokes market entry or provides an incentive for players already in the market to come up with more innovations. Any new technology that replaces existing technology creates competitive pressure on market players with regard to prices and quality of services. Consumers receive new products and services, and at the same time may experience reduced prices for services that have been substituted by the new services. Prices for international roaming could decrease in light of new technologies as well, while at the same time consumers get a wider choice of alternatives.

Generally, consumers expect to use the same applications and have the same level of convenience while travelling abroad as they have at home. If new technologies led to

reasonable alternatives to traditional international roaming with similar convenience, it is likely that end-users would substitute traditional roaming and competition could occur.

The outcome of the stakeholder questionnaire shows that operators currently do not see that any of these new and upcoming technologies are capable of substituting traditional international roaming. The main reason brought forward is the lack of convenience for end-users. Some technologies are perceived as being too complicated. Quality of service can also not keep up with traditional roaming at the moment.

(a) *Networks:*

In terms of networks, at present only WiFi could supply partial substitutes for traditional international roaming. It is interesting to note that WiFi networks may be operated by companies other than MNOs or MVNOs, which may put some pressure on MNOs and MVNOs if coverage of WiFi networks is increased. Players present in both the fixed and mobile markets often operate WiFi, and provide offers to their mobile customers. In this way, MNOs seek to offload some mobile data traffic onto the WiFi network, to reduce congestion. WiFi networks are currently found as single spots only, which cover a small area. As long as WiFi networks do not provide full coverage such as a mobile network, WiFi will not fully substitute mobile networks, but just partially.

LTE is just another mobile technology and therefore it cannot in itself be considered as a substitute to traditional international roaming. However, increased data usage on domestic markets as a consequence of low cost high speed data networks (LTE) could have an impact on the services demanded when travelling.

WiMax could in the future serve as a substitute for especially data services. However, the development of WiMax network is unclear.

(b) *Devices:*

Devices are expected to develop along the increase of data consumption. Operators noticed a considerable growth of data usage, which is presumed to be due to an increased take-up of new devices. For exerting competitive pressure on international roaming markets it is necessary that devices are easy to handle. In case of dual SIM handsets, competitive pressure could indirectly come from handset manufacturers such that they team up with certain operators. However, operators see reluctant for commercial reasons to offer dual SIM handsets (i.e. to avoid allowing access to their customer by another provider), so that we cannot expect significant growth in take-up.

It is evident that technology developments at the retail level impact the wholesale level. Growth of data usage will require expanding capacity of networks. Wholesale agreements may have to be renegotiated in light of capacity constraints and quality of service considerations.

(c) *Applications:*

VoIP could in the future have a significant impact on the competition in the roaming market for at least outgoing voice calls. However, for VoIP to impact the roaming market for outgoing voice a relatively cheap access technology has to be present. This could either be WiFi hotspots, WiMAX networks or relatively cheap mobile broadband connections. The

competitive impact of VoIP is therefore uncertain. Call back services may be able to generate competitive pressure on traditional roaming outgoing calls. Nevertheless, the technology is already present and not that many consumers have picked it up, on grounds of convenience.

(d) *Other:*

Global MVNOs may affect competition in international roaming markets, because they are present in several countries. However, unless MVNOs get reasonable deals on access to networks either through roaming or domestic markets, they cannot be expected to create a significant competitive pressure on the market.

F. Conclusion

New technologies generally put pressure on market players and stimulate competition. However, In light of these findings significant competitive pressure is not to be expected to come from technology developments in the international roaming market in the near future. None of the technologies listed above could be considered as full substitutes for roaming services at present. They rather complement international roaming services. Competition will in the near future have to rely on traditional ways of putting pressure on market players rather than through technology developments.

2.2 Consumer attitudes and behaviour regarding roaming services and transparency measures

This section summarises the results of research commissioned by five NRAs into the attitudes and behaviour of consumers regarding roaming services, and the transparency measures set out in the EU Regulation. Four surveys focused on roaming (Ireland¹⁸, Great Britain¹⁹, France (two surveys)) while two were part of wider consumer surveys on electronic communications by the NRA (Sweden, Denmark, Portugal).

The broad trends from these surveys may be summarised as follows. The points were not covered by all of the surveys:

- Many mobile users do not take roaming prices into account when choosing a mobile network
- The most popular way to communicate when roaming is SMS, followed by voice calls
- Many consumers use their mobile less when roaming than when at home. The main reason is cost, although reduced need and privacy are also cited
- Around a third of roamers had found that roaming services had cost more than they expected (Ireland and Britain)
- Using SMS instead of voice calls is the most popular method to keep roaming costs down, followed by buying a SIM in the visited country

¹⁸ For the full Report, see <http://www.comreg.ie/fileupload/publications/ComReg1097a.pdf>

¹⁹ For the full Report, see <http://stakeholders.ofcom.org.uk/market-data-research/telecoms-research/>

- The main reasons given for not using a method for reducing roaming costs are the 'hassle' involved, and not travelling often enough to make it worthwhile
- Around half of consumers say that roaming is becoming cheaper, it is easier to find price information, or that they have received price information

A. Overview of the methodologies used:

	Ireland (ComReg)	Great Britain (Ofcom)	France (ARCEP)	Denmark (NITA)	Sweden (PTS)	Portugal (ANACOM)
Sample size	1,007 mobile owners/ users (personal and business use) aged 15+	2,012 mobile users (personal use) aged 16+	<i>Residential survey:</i> Mobile users (personal and business use). Residential consumers: 2,011 aged 18+ and 219 aged 12-17 <i>Business survey:</i> 3,005 very small firms (0-49 employees), 800 small and medium sized firms (50-499 employees) and 200 large firms (500-4,999 employees)	4,000 individuals aged 16 – 74. 3,800 mobile users (personal and business use)	4,000 individuals aged 16-75. 2,168 mobile users (personal and business use)	3016 individuals aged 15+. 2640 mobile users (personal use)
Scope of questions on roaming	EU plus Norway and Iceland	EU plus Norway and Iceland	EU	EU	EU	Worldwide (except question on the Eurotariff: EU/EEA)
Survey type	Face to face interviews in a dedicated survey	Face to face interviews, as part of a consumer omnibus survey	<i>Residential survey:</i> Face to face interviews in a dedicated survey <i>Business survey:</i> Phone questionnaire (CATI)	Letter sent to consumers, inviting them to respond by phone (CATI) or Internet	Letter sent to a random sample of consumers, inviting them to respond to a questionnaire by mail or Internet (55% response rate, of which nearly 1/3 used the Internet to respond)	Face to face interview as part of a wider consumer survey
Controls	Quota controls for gender, age, social class,	Quota controls and weighting at the analysis stage, to ensure	<i>Residential survey:</i> Population separated in 8 regions. Inside regions,	Effort to include answers from individuals who	Random sample, later weighted to ensure population	Quota controls and weighting at the analysis stage

	region according to JNLR data Sept 2009 – Oct 2010	population representativeness (gender, work status, postal area, presence of children)	quota controls to ensure representativeness (gender, age, profession and urban area size) <i>Business survey:</i> Quota controls to ensure representativeness (firm size, number of firms, sector, region)	are normally difficult to reach (e.g. non-natives)	representativeness (gender, age and region)	(geographic distribution, sex, age, education level, work)
Fieldwork dates	22 Sept. – 8 Oct 2010	8 – 12 Sept. 2010	June 2010	April 2010	Aug. and Sept. 2010 (weeks 34-39)	6 Nov. - 20 Dec. 2009

B. Reasons to choose a mobile network

In line with previous research, customers in Ireland and Great Britain are unlikely to spontaneously identify roaming prices as a reason for choosing a network. When asked specifically, the proportion of mobile users taking roaming prices into account when choosing a network increases to around 20-30% for roaming in general in Denmark and France and, for voice and SMS roaming, around a 20-30% in Britain and Ireland.

In Ireland, when asked to spontaneously name the reasons for choosing a network, the cost of domestic voice calls was cited by 43% and SMS by 39%. The cost of domestic calls and texts to family and friends on the same network (around 30%) and the amount of calls and texts included in a package (around 25%) were also considered. The cost of MMS and data were only identified by 3% and 2%, respectively. In comparison, around 9% spontaneously identified the cost of making voice calls or sending SMS abroad as a reason for choosing their network. 6% did so for receiving voice calls. This fell to 1% for sending MMS and data roaming, respectively.

When prompted with a list of different factors that could be considered when selecting a network, the cost of roaming calls, texts and mobile internet/ data were identified by a higher proportion – 17% and 14% for making and receiving voice calls, 19% for SMS, 6% for MMS and 5% for mobile internet/ data.

All mobile users were then specifically asked about the importance of roaming prices when choosing a network. 33-34% said it was important for calls made and received, 36% for SMS, 12% for MMS, 8% for Internet browsing and downloading on a phone, and 9% for using mobile e-mail on a phone. For mobile users who have used their phone abroad (personal and business use), this rose to 45%-47% for roaming calls, 50% for SMS, 17% for MMS, and 11%-12% for data.

In Great Britain, similar trends were found, although the proportion of mobile users taking roaming prices into account when selecting a network was lower. As discussed in the next section, travel and use of mobile roaming was also lower in Britain than Ireland.

Cost was the main driver for choosing a network for GB mobile users, with 42% spontaneously giving a cost-related response. The reasons spontaneously identified most often were the general cost of calls/texts (24%) and the amount of minutes/texts included in a package (20%). But there has been no shift in proportion considering the price of using a mobile abroad, with just 1% of users spontaneously identifying this as a reason for selecting their network, as in a similar Ofcom survey conducted in 2006.

When prompted with a list of different factors that could be considered when selecting a network, there was very little change in the results; the cost of roaming calls, texts and mobile internet were identified by 4%, 3% and 2% of mobile users.

Mobile users who had not previously identified the cost of roaming services as a decision-making factor either spontaneously or when prompted, were then specifically asked how important it was to them. Of these, 22% claimed the cost of roaming calls was very or fairly important when they chose their network (or around 50% of those who said they use their mobile in Europe for calls). For these mobile users, the cost of roaming calls was more likely to be important for 25-34 year olds (31%) than 55+ year olds (16%). The cost of roaming

SMS was also considered very or fairly important by 22%, and especially by 16-24 year olds (27%). Other trends were similar to voice. A lower number overall (13%) claimed that mobile internet costs abroad were an important factor when choosing a network, but this rose to 48% among those who use mobile internet roaming in Europe. Again, those aged 16-34 (19%) attached most importance to this.

In France, out of residential mobile users who have travelled in the EU in the last three years, when specifically asked about the importance of roaming when choosing a network, 22% said it was fairly or very important.

For business users, only 3% of very small firms with a mobile contract have a special roaming tariff and 11% a standard roaming tariff, compared to 15% and 19% for small and medium sized firms and 24% and 16% for large ones. Nonetheless, very small (52%) and small and medium-sized companies (60%) attach much greater importance to roaming prices during negotiations, compared to just 12% of large companies.

In the Danish survey, when asked specifically about the importance of roaming prices when choosing a mobile network for personal use, 37% of mobile users said that this was at least somewhat important (of which 20% said it was very important).

The Swedish and Portuguese surveys didn't include questions on this point.

C. Use of mobile abroad

In the Irish survey, 62% of mobile users said they had travelled to Europe within the last year. The majority travel once (41%) or twice (26%) a year. 25% are 'frequent travellers' who travel to Europe at least 4 times a year. For their last trip, 31% had travelled to Spain, 25% to Great Britain and 4% to Northern Ireland. 91% had travelled for leisure. Trips were most commonly for a week to ten days (44%).

For mobile users who had travelled to Europe in the past year, by far the most popular way to communicate when abroad was SMS, with 75% using it on their most recent trip, of whom 60% said they used SMS the same amount or more often than when at home, and 14% said they had used only SMS on the trip.

Meanwhile, 66% said they had made personal voice calls, but 54% said they had used the service less than when at home. Only 9% had used MMS, and 9% mobile Internet (rising significantly to 34% among smartphone users). Of that 9%, 67% had used the mobile internet more or about the same as when at home. Of those who had used the mobile Internet less or not at all, 74% said it was because they rarely or never use the Internet on their phone anyway; 16% said it was too expensive in Europe.

In Great Britain, mobile users travel less, and less often, than in Ireland. Use of roaming services was also lower with the exception of mobile Internet, which was slightly higher. 53% of personal mobile users travel in Europe. The majority travel once (54%) or twice (25%) a year. 91% travel for leisure. ABC1s were the most likely to travel in Europe (64%), while C2DEs (39%) and over-65s (46%) were least likely. Of those who travel in Europe, 61% have used at least one roaming service. Text messaging was used the most (54%), followed by voice calls (47%) and mobile internet (13%). 17% used all three roaming services.

Around three quarters said they make fewer calls when roaming (around half 'a lot less'), and a similar proportion keep calls shorter. The main reasons were that it is too expensive (44%, and 60% of those aged 16-24), there is no need to make calls when abroad (21%, and 35% of those aged 65+), and wanting privacy when on holiday (15%). Of those who use roaming SMS, 62% text less due to cost (36%), lack of need (23%), or privacy on holiday (16%). For mobile internet, 56% said they used it less when roaming (33% a lot less), 28% about the same, and 14% more. Consistent with calls and texts, cost (29%) and lack of need to use (28%) were the two main reasons, with privacy at 13%. Around 14% of over 55s and prepaid customers said they are unable to use mobile internet services when roaming.

In Denmark, mobile users are less likely to use roaming services in Europe, and more concerned about the cost. 85% of mobile users (personal and business use) have taken their phone to another EU country, of which 67% have done so in the last year. 14% used their phone more or about the same amount as in Denmark, while nearly 80% used it less. 6% did not use it at all. Of those who use their mobile less or not at all, 67% said it is too expensive, and 15% said they don't know the price, but worry that it would be too expensive.

In Sweden, 61% of respondents who use a mobile phone for personal purposes stated that they had travelled abroad during the previous year (inside and outside the EU). Consumers most commonly used roaming SMS in the EU – 80% said they often or sometimes used it, and consumers in the younger age groups were more likely to communicate by SMS instead of voice, compared to older age groups. More than seven out of ten (74%) said they often or sometimes used roaming voice calls in the EU. On the other hand, 20% said that they use roaming MMS (the highest level for that service among the surveys) and 10% said they surf the Internet, download data and/or use mobile e-mail when travelling in the EU. Overall, consumers were slightly more likely to use their mobile phone when travelling in the EU compared to farther afield, while overall usage patterns were similar.

In France, 83% of the population are mobile users, of which 41% had travelled in the EU in the past three years for personal or business reasons. Young people aged 12-24 (around 53%), people with a master's or a bachelor's degree (60%) and households with a high monthly income (>€3.100) (63%) were most likely to have traveled in the EU.

Out of mobile users who have travelled in the EU in the last three years, 52% have travelled 1-2 times (i.e. on average less than once a year), and 30% 3-5 times (on average at least once a year). Nearly 10% have travelled more than ten times (on average 3-4 times a year). The older age groups and households with the highest income were the most frequent travelers.

Overall, 52% of this group (18% of the population) had actually used their mobile phone when traveling. This was most common among managers and the liberal professions (61%). The great majority made and received calls less than in France (80% and 75%) or not at all (around 5%). For SMS, 54% sent and 51% received them less than in France, while 25% and 17% did not send or receive any SMS. This was even more marked for data and e-mail, where 9% and 5% said they had used these services less and 88% - 90% had not used them at all. The main reason for less or no use was the cost (45%), followed by lack of need (24%). 11% said they had not activated roaming, and 10% said they had no knowledge of the prices.

The majority of this group (65%) said that they would make more roaming voice calls if this service was included in their contract; especially young people aged 12-24 and households with less than €1,500 income per month. If making a roaming call was the same price as a domestic call but out of bundle, intention to make more roaming calls fell to 38%.

In the Portuguese survey, of those with a mobile phone for personal use, 14% said that had used international roaming services in the preceding 12 months.

D. Awareness of roaming prices

In Ireland, around one third of those who had used their mobile in Europe in the preceding year said that service had cost more than they had expected. 59% said that SMS had cost about what they expected or less, with 54% for personal voice calls, 50% for MMS and 48% for mobile internet.

When asked, only around one third said they were aware of the Eurotariff and Euro-SMS tariff caps, with younger, prepaid, light travellers, and travellers to Northern Ireland and Great Britain the least likely to say they are aware. 68% thought that some charge applied to receiving SMS. Only 12% had actually used data roaming abroad, although 18% claimed to understand data roaming charges. Of these, around two thirds actually had a low understanding of the data required for different functions. 43% that it has become easier to find information on roaming prices (26% neither agreed nor disagreed)

Regarding the incidence of 'bill shock' among mobile users who have travelled abroad in the past year, almost 30% had experienced bill shock, primarily after making personal calls (85%).

In Britain, 40% of those who use their mobile abroad and had used voice roaming felt that it had cost about what they had expected, 30% more than expected and 11% less. For SMS, this was 47%, 24% and 10%. Mobile internet costs more closely met consumer expectations, with 55% of users stating that they had paid what they expected. 27% had experienced higher than expected costs. When shown a statement, 45% agreed that roaming has become cheaper over the last couple of years, compared to 14% who disagreed. 54% agreed that it has become easier to find information on prices, and 46% agreed that it is generally easy to find information.

In France, nearly 40% of mobile users who have travelled in the EU in the past three years thought that roaming prices were stable while 20% thought they were decreasing. 20% thought they were increasing.

In Sweden, of mobile users who had travelled abroad in the previous year, almost half said they had received information or studied the prices of different mobile operators. The proportion is higher (fifteen points) compared to the 2008 survey. Of those travelling in Europe, the proportion that said they received tariff information in a 'Welcome SMS' from their operator had significantly increased (from 16% in 2008 to 39% in 2010), while the proportion that had looked for information on prices was 12%. A relatively high proportion (48%) said they had not sought any information on mobile roaming prices.

In the Portuguese survey, of those with a mobile phone for personal use, 36% said they do not know what international roaming services are about. Out of the users who had heard of international roaming services (regardless of whether they had used them in the last 12 months), 61% said they had not heard of the 'Eurotariff'.

The Danish survey did not contain questions on this subject.

E. Attitudes towards roaming prices

For Ireland, out of mobile users who have travelled in the EU in the past year, 75% said they were concerned about the cost of using their mobile when in Europe. 48% said it has become cheaper to roam in Europe in the past few years (and 19% neither agreed nor disagreed). For each of the mobile services, at least 30% of those who had used their mobile abroad in the past year had found it cost more than expected. Between one third and half found they cost about what they had expected.

In Great Britain, of mobile users who use their mobile in Europe, 61% agreed with the statement that they are concerned about the cost of using their mobile in Europe (26% strongly agreed).

In France, of mobile users who have travelled in the EU in the last three years, the vast majority considered roaming to be 'very' (50%) or 'rather' (40%) expensive.

In the Portuguese survey, of those with a mobile phone for personal use who had heard of international roaming services (regardless of whether they had used them in the last 12 months), 34% said that roaming prices were high; 12% said that they were too high; 20% said they were either accessible, pretty accessible or regular and 33% did not know/did not answer when questioned about their perception of international roaming prices (the remaining 1% is due to round-ups/downs).

The Danish and Swedish surveys did not contain questions on this subject.

F. Actions to reduce roaming costs

In Ireland, for those who had travelled in Europe in the preceding year, SMS was the main way to reduce costs. 67% were aware of the option, 54% had used it and 56% intended to it. The next most popular choice was to buy a SIM in the visited country (41% awareness, 15% actual use, 20% intended use), followed by changing to another mobile network offering cheaper rates in Europe (30% awareness, 9% use, 11% intended use), using an international SIM (26% awareness, 8% use, 11% intended use) and using VoIP services (17% awareness, 9% use, 9% intended use). Among those who have used mobile Internet roaming in Europe, 23% have used a local WiFi hotspot to reduce costs, while only 7% have chosen a data roaming add-on, 5% have turned off automatic updates and 7% have chosen a monthly or daily rate.

On the other hand, 31% said they will not consider any cost-reducing methods when next travelling in Europe. Of those, 40% said they don't travel enough to make it worthwhile, 21% said it would be too much hassle or they can't be bothered, 17% said the options sound too complicated, and 14% said they aren't at all bothered about roaming prices or don't tend to think about them.

For Great Britain, among consumers who use their mobile in Europe, two thirds were aware of at least one method of reducing roaming costs, from a list of alternatives. The most recognised method was sending an SMS instead of making a call (42%), but by a lower proportion than in Ireland, followed by buying a SIM card in the visited country (25%), changing tariff with their existing network (16%), turning off automatic data updates (15%), using an international SIM (13%), a local WiFi hotspot (11%), using VoIP (10%) and changing to another UK network (10%). A third of roamers were not aware of any of the methods shown, rising to 44% in those aged over 55.

Respondents who were aware of cost-reducing methods were also asked if they had used them, and if they planned to use them again in the future. 80% of those who were aware of any of the methods had used one in the past, and 84% said they would consider using any of the methods next time. In particular, 80% had used SMS and 73% claimed they would consider using it in the future. Despite the fact that a quarter said they were aware of the ability to purchase a SIM card in the country visited, just one in ten had actually done so. Double this number said that they would consider it in the future (21%).

Of the respondents who claimed they would not consider any of the methods for reducing roaming costs, 37% said it would be too much hassle, 16% said they do not travel abroad often enough to make it worthwhile, and 10% said they would not make enough of a saving.

In addition, all personal mobile phone owners were asked about their awareness of the mobile internet cut-off limit, which was automatically applied to all consumers from 1 July 2010, in accordance with the EU Roaming Regulation. This was only one-two months before the research was conducted. 15% said they were aware of this facility, doubling to 30% among those who had used mobile internet roaming. Awareness was correlated to the proportion of mobile users who travel in Europe on a particular network – reaching around 25% for the network with most travellers. Only 3% claimed that they were aware of it and had also experienced it while abroad.

Of those who were aware of the limit, more than half (56%) said they were satisfied with it, just over a quarter (26%) of whom stated they were 'very satisfied'. Satisfaction was highest among 16-34 year olds (67%). Only 1% claimed they were quite dissatisfied and no-one claimed to be very dissatisfied.

The reasons given for satisfaction were varied (this was an open-ended question). The most common responses were that it 'stopped large bills' (11%) and 'overspending' (10%), 'it's a good idea' (9%) and it 'keeps customers informed' (9%).

A further 43% had no opinion one way or the other about the facility, although the main reason was because they didn't use mobile internet abroad (53% of those aware of the cut-off limit).

In Denmark, 50% of mobile users that have taken their phone to another EU country have use SMS as a means of saving money on roaming, and 46% make fewer calls. Those aged 16-34 are most likely to take cost-saving measures, and most likely to use alternative technologies like fixed telecoms or VoIP over WiFi. 18% said they take no measures at all.

The Swedish, French and Portuguese surveys did not contain questions on this subject.

Section 3

The case for regulation post-2012

What competitive roaming services might look like and initial application of this hypothesis to the current situation

A. Introduction

The objective of this section is to identify the key aspects characterising a hypothetical competitive and innovative roaming market, as well as an initial assessment of how these conditions are fulfilled in the existing situation for roaming services in the EU, both at the wholesale and the retail levels. The conclusions obtained in this task will be used as a reference, in order to identify suitable regulatory measures to be applied for roaming wholesale and/or retail services, in the event that further regulation is considered necessary.

According to the EC recommendation on relevant markets²⁰, the most important issues when assessing the competitiveness of the roaming market are related to barriers to entry (structural, legal or regulatory) and the market structure, although prices and pricing trends are relevant as indicators of lack of or limited competition in the market.

The amendment of the Regulation on roaming services, in the case that it is imposed, should be driven by two factors:

- Solving competition problems identified both at the wholesale and retail levels, with the aim of removing potential barriers to competition and helping to implement a per se competitive roaming market at the European level.
- Political concerns, such as the implementation of a common European market and incentives for citizen mobility in Europe, are also relevant issues to be considered when assessing regulation in the roaming market. These issues are not addressed in this paper, which is oriented to assess competition based on the structure of the roaming market only.

B. Structure of a Competitive and Innovative Roaming Market

This section defines the main structural characteristics that the roaming market should exhibit both at the retail level and the wholesale level in order to be considered competitive. These characteristics are defined based on the main issues considered in the EC recommendation on relevant product and services market in order to assess competition in national markets. Once each characteristic for a competitive roaming market is described, an initial assessment of the actual situation in the market for that characteristic is also included.

Actors offering international roaming services: Market shares

²⁰ Commission recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:344:0065:0069:en:PDF>

General considerations

In a competitive and innovative market, we should identify different operators providing services in both the retail and wholesale levels. Although important, the number of actors is not the only indicator when assessing the competitive panorama regarding operators offering services. These operators should compete to obtain subscribers and revenues, and this competition should be based on the specific characteristics of the service as well as quality aspects and prices. Competition among operators should be dynamic, showing an evolution in market shares over time.

At the retail level

All or most of the operators offering domestic mobile services should also offer roaming services, as most users consider that mobile services should be available when travelling abroad. There could be special cases for niche markets focusing their offer on users with no need for this type of services (for example, low cost pre-pay services or Machine-to-Machine services with a local scope), but the vast majority of the mobile operators supplying domestic services will provide roaming services to their clients. If there are domestic service providers that are not allowed to offer roaming services due to refusal of wholesale inputs, the retail market would not be a competitive one due to a problem in the wholesale market. In the event that a retail cap is established by regulation, the prices in the wholesale market should allow an efficient operator to provide regulated roaming services below the safeguard cap prices.

The presence of niche actors, focused on roaming services, may be a good signal of competition, for example global MVNOs managing roaming clients as local users by means of wholesale access agreements in different countries, actors offering call-back services, or MVNOs focusing on specific consumer segments.

Another indicator of a competitive market is that the market shares for the actors offering the service. The market should not be concentrated around one of the operators and/or market shares might show changes over time. Under this criterion, market dynamics in terms of consumer switching and differences between the market shares for domestic services and roaming services are probably the best indicators of a lively and competitive market.

ASSESSMENT OF THE ACTUAL SITUATION:

- Actors offering roaming services: All MNOs and MVNOs not focused on specific niche markets are providing roaming services.
- Global MVNOs: There are global MVNOs operating at a European level, such as GeoSim²¹ or WorldSim²², although they enjoy a limited market share, and focus their offer on roaming-intensive clients.
- Roaming market shares: Probably the retail roaming market shares are similar to domestic market shares both in the size of the market shares and in their dynamic

²¹ <http://www.globalsimcard.co.uk/index.php>
²² <https://www.worldsim.com/>

evolution²³. We can find probably not significant differences regarding market shares in players focusing on the elastic part of the roaming market (ex. Vodafone Passport).

At the wholesale level

Wholesale inbound roaming

At least two visited network operators supplying national coverage in each country should provide wholesale services for home mobile providers in order to enable competition in providing wholesale services. Ideally, all or most of the MNOs present in each national market should offer wholesale services.

At the wholesale level, it is also important to have roaming brokers and intermediary hubs with multiple roaming arrangements, which could offer a small MNO the possibility to have access to different countries by means of a single agreement.

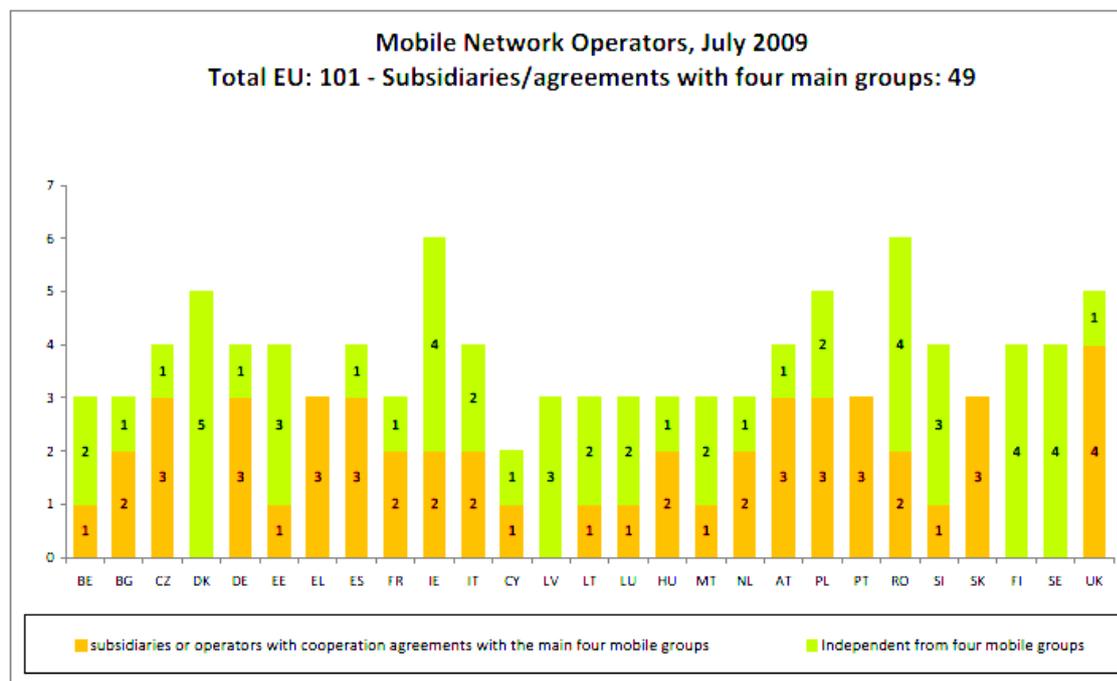


Figure 1: Total number of MNOs and number of MNOs integrated in mobile groups in the European Union (July 2009). Source: XV Implementation Report, EC.

Wholesale resale roaming

Most of the MVNOs use the wholesale roaming service provided by their host MNO, and the market shares for resale of wholesale roaming corresponds to the market shares for wholesale domestic market 15 in each country. As analysed in next subsections, it is not easy for MVNOs to arrange directly wholesale inbound roaming agreements with foreign providers due to high agreement establishment cost together with additional difficulties derived of not being full members of GMSA.

²³ Existing data gathered provided by some NRAs points to this situation, but a more comprehensive set of information will be obtained from more NRAs in order to confirm this issue.

ASSESSMENT OF THE ACTUAL SITUATION:

- Number of inbound wholesale providers: According to BEREC reports, all MNOs are providing wholesale roaming services and, for all countries except Cyprus (two MNOs), there are at least three MNOs offering roaming services.
- Market shares: A significant part of the roaming wholesale services in the EU are provided under an intra-group scheme (a subsidiary of one group provides the wholesale service in the visited country to another subsidiary of the same group in the home country). Nearly half of the operators in the European Union (48.5%) are integrated in one of the four main telecommunications groups operating in Europe. In 2009, around one third of the roaming voice traffic and SMSs at a European level was “on-net” (meaning that the retail provider and the wholesale provider are part of the same group), while nearly two thirds of roaming data traffic was “off-net”²⁴. Regarding wholesale roaming services, MVNOs typically agree wholesale roaming services from their host MNOs for domestic services.

C. Operator selection based on roaming quality and prices.***At the retail level***

In a competitive market, the buying decision should be based mainly on the characteristics of the international roaming products (price and quality), and not on the characteristics of other products in the domestic market, as the price and quality of national calls supplied by the providers. If there are alternative good substitutes for the traditional roaming services not bundled to domestic services, this condition can be fulfilled. If not, it depends on the weight of roaming as part of a bundle of goods for mobile services (domestic + roaming). For instance, occasional travellers are conditioned by prices and quality for the domestic services, as these domestic services account for most of their mobile communications expenses. The application of this criterion of availability of close substitutes can render different results when applied to international roaming traditional voice and SMS services compared to international roaming data services, as there is a strong link between domestic and roaming services for voice and SMS (same user id number, reception of incoming calls/SMSs and calling number id for outgoing call/SMSs). For data services, the user Id is not relevant (even mobile IP addresses are usually assigned in a dynamic way).

ASSESSMENT OF THE ACTUAL SITUATION:

- Voice and SMS: Existing empirical evidence shows that there are no perfect substitutes for traditional roaming services and there is a limited market for imperfect substitutes, such as global SIMs or VoIP in case of voice. The competition in roaming is strongly conditioned by the competition in the domestic market, as users select roaming service providers based mainly on the offers of domestic service

²⁴ According to data gathered by BEREC, in the period from April to December 2009, 33% of the intra-EU roaming voice minutes, 30% of the roaming SMSs and 58% of the roaming data traffic was managed by visited country operators that were part of the same group as the home operator.

- **Data Services:** There is not such a strong link to the domestic market as in the case of voice and SMS, especially for data services using dongles/datacards connected to laptops, because WiFi connections in hotels, coffee shops and other venues provide a similar service, where available, and users can buy a local pre-pay dongle/datacard to access mobile broadband. For data connections using a mobile terminal, there is an increasing availability of WiFi radios in smartphones. Competition from local mobile providers supplying mobile data services is still not developed, although for laptops it is not limited by the ID used in domestic services as is the case for voice and SMS. (For smartphone users, it would entail the above number ID problem for the voice and SMS services).

At the retail level, operator selection for voice and SMS roaming services by users is strongly conditioned by the characteristics of domestic services, such as national tariffs, quality and coverage. Voice and SMS roaming services supplied by different actors than domestic providers are still not perfect substitutes to roaming services provided by domestic providers.

For data roaming services, the buying decision is not as strongly conditioned by domestic service offers. WiFi, although not a perfect substitute in all situations due to coverage issues and the availability of basic terminals, exerts some competitive pressure for international roaming data services. Local pre-pay dongles/datacards could also be considered a reasonable option for laptop users.

At the wholesale level

In a competitive market, operators should select the wholesale provider based on the characteristics of the wholesale services (prices, quality and coverage) provided specifically for supporting roaming services and not on other extrinsic issues.

ASSESSMENT OF THE ACTUAL SITUATION:

Wholesale inbound service

The buying decision for inbound wholesale services is conditioned by issues other than to price, coverage and QoS:

- First of all, transnational groups arrange the wholesale service within the group, reducing the size of wholesale market for roaming services. As highlighted above, nearly a third of voice and SMS traffic and nearly two thirds of data traffic is managed by visited country providers that are part of the same group of the home operator.
- For the rest of the operators, discounts on IOT tariffs are arranged mainly based on the net balance between both operators' wholesale traffic. The bilateral nature of the wholesale agreements affect competition among wholesale providers, as price, QoS and coverage are not the only factors considered when selecting the preferred network.

Wholesale resale service

In the case of MVNOs, wholesale resale services are usually contracted with the host MNO for domestic services at non-regulated prices based on prices and quality for both, domestic and roaming services. As most of the revenues and competition comes from domestic services, the weight on the buying decision is strongly based on domestic services. Although

it is possible to arrange one contract for domestic wholesale service with one provider and contract with other provider wholesale resale service²⁵, for MVNOs it is more convenient and cheap to arrange together wholesale domestic and roaming services.

At the wholesale level, a relevant part of the traffic is not negotiated in the market and the contracting decision for the rest of the market is conditioned by the bilateral nature of the agreements, pointing to decisions not based exclusively on price and quality, but also on the volume of roaming traffic in both directions. MVNOs usually buy together wholesale domestic and roaming services from its host MNO provider, being the prices and quality for domestic wholesale services the key factors considered in its buying decision, as the domestic market accounts for most of the revenues of MVNOs.

D. Barriers to entry

General considerations

In order to focus the analysis and address the relevant barriers to entry regarding the provision of both retail and wholesale international roaming services, it should be assessed whether a potential new entrant would face specific and significant barriers, *additional* to those that are common to the provision of mobile services, i.e., the analysis will be centred on differences with barriers to entry for domestic mobile services. Therefore, the following barriers to entry will not be taken into account in this section:

- Absolute barriers arising from limited access to the spectrum needed to act as an MNO providing both domestic and roaming services.
- Structural barriers arising from: economies of scale and scope, and sunk costs that are caused by the roll-out of a mobile network; the provision of more than one wholesale/retail service over the same infrastructure (common and/or joint costs) and advertising.
- Strategic barriers (first mover advantages) arising from switching costs and network economies that are caused on the one hand by the brand name, loyalty programmes and minimum contract periods, and on the other hand by the size of the customer base and on-net/off-net price discrimination.

Specific barriers to entry for roaming services could be created by on high switching costs at the retail or wholesale levels, as well as by difficulties in accessing the wholesale market. For small MNOs or MVNOs, the latter would make making it difficult to obtain adequate wholesale prices to compete in the retail market or even prevent access to wholesale roaming inputs.

ASSESSMENT OF ACTUAL SITUATION:

At the wholesale level

Wholesale inbound service

²⁵ This is the case of at least one of the MVNOs, part of an European group. This MVNO uses market 15 services from an MNO in the country where it operates and using a dual IMSI SIM, when the user is abroad, uses the wholesale resale roaming service from its parent company.

The provision of international roaming services consists of MNOs in different countries buying and selling wholesale roaming services to each other to enable the provision of international roaming services in the retail market. For that purpose, they need to establish roaming agreements with mobile network operators in other countries. These agreements are bilateral and subject to negotiation between the participating operators.

The GSM Association sets the framework for roaming agreements (that is, the technical and economic conditions for international roaming services) based on Standard International Roaming Agreements (STIRA) and the Inter-Operator Tariffs (IOT) regime. The IOT is formally defined as a tariff among mobile network operators, and it is charged by the visited network operator to the home network operator for the origination, transit and termination of the roaming services used by the roaming customer.

In general, there are no specific legal barriers for MNOs to sell wholesale inbound services, as they are all part of the GSMA association.

New entrants small MNOs that are not integrated in a trans-national group, exhibit a low bargaining power as they wish to buy relatively small volumes of wholesale roaming services. In the event that only a retail cap is imposed, there exists a risk that the prices that these actors can obtain could lead to margin squeeze situations.

Wholesale resale service

Until now, access to the wholesale roaming market had been restricted to licensed network operators, who are members of the GSM Association. Additionally, roaming hubs, although they are not licensed operators, operate in the wholesale market as they are also members of the GSM Association. Roaming hubs act as brokers managing access and billing among mobile network operators. Due to the large number of bilateral roaming agreements that an MNO would have to engage with, roaming brokers/hubs can reduce billing and overhead costs by providing a single roaming dealer that can immediately connect the MNO to several other operators.

The current institutional framework can act in practice as an additional barrier for full MVNOs, making it more difficult to conclude international wholesale agreements directly with visited MNOs in other countries, as MNOs usually ask for GSMA membership when closing wholesale agreements. The reasons for this barrier are: the lack of GSMA Association membership (MVNOs can join the GSMA Association paying a relative high fee, but only after fulfilling a number of technical requirements, which not all of the MVNOs, especially small ones, can meet). However, according to the GSMA, this organization is currently concluding a licensing agreement to allow MVNOs access to the documents, such as the STIRA documents to provide the ability to set up roaming relationships with MNOs without the need to go through a host MNO.

An additional problem for MVNOs shared with small MNOs not integrated in a trans-national group, is that they exhibit a low bargaining power as they wish to buy relatively small volumes of wholesale roaming services and, in the case of MVNOs, cannot make an offer on return traffic. In the event that only a retail cap is imposed, as happens with small MNOs, there exists a risk that the prices that these actors can obtain could lead to margin squeeze situations.

The standard situation today in Europe is that host operators are reselling roaming services to their MVNOs. Having its own roaming relationships (commercial & technical) can be valuable for an MVNO only if it is a very important part of its business because establishing roaming contracts and discount agreements needs dedicated human resources.

Switching costs can also act as a relevant barrier in the wholesale market. The contractual terms for wholesale services should allow a dynamic market in terms of low switching costs (duration, exclusivity, etc.). Also, the costs for implementing the wholesale roaming agreement (transport and signalling, as well as IT Systems coordination) should be low enough to allow providers to change wholesale provider when better contractual conditions are obtained with other providers. Long-term contracts with penalty fees for contract withdrawal, high initial costs for establishing the contract or deploying the technical infrastructure would act as a barrier to competition in the wholesale market.

At the wholesale level, the main barrier to entry would come from the high costs for MVNOs to participate in the wholesale market, as well as the low bargaining power of these operators.

In a competitive roaming market it would be desirable that MVNOs were not excluded from reaching wholesale roaming agreements with a foreign MNO under reasonable terms. In the case that retail caps are imposed, it is important to ensure that operators with low bargaining power can obtain adequate wholesale prices and avoid margin squeeze situations.

Entry and exit switching costs should be low enough to allow providers to change wholesale provider when there is a significant reduction of costs or enhancement of QoS.

At the retail level

As highlighted above, international mobile roaming services are sold by mobile operators together with domestic mobile access, national and international voice calls and SMS, handset subsidies, etc. Due to the absence of indirect access (for example, through carrier selection) end users cannot acquire all of those services from a different mobile provider over the same access, i.e. keeping the same mobile number for voice and SMS. Consequently, consumers do not make separate decisions regarding domestic and roaming voice and SMS services.

This situation causes switching costs to be higher compared to a scenario where domestic and roaming services were sold on a separate basis. In the current scenario, a consumer willing to switch roaming services provider (because of high prices, and/or low quality) would be forced to also switch provider of domestic services. As a consequence of this requirement, a consumer would be less keen on switching, especially when: (i) the buying decision is made mainly based upon price of domestic services' prices and (ii) the roaming share of the customer's mobile expenditure is generally intermittent and low (with respect to the year's total bill).

At the retail level, the main barriers to entry would come from the high *switching costs* due to the need to change at the same time the provider of roaming services and domestic services in order to get a perfect substitute.

E. Market transparency

At the wholesale level

Wholesale inbound service

Within GSM Association, STIRA has been established with the aim of standardising the roaming agreements between MNOs and facilitating the process of concluding these agreements. Among other issues, STIRA would contain the price (IOT) on which both parties have agreed for the exchange of roaming services. An IOT is valid for at least 6 months and changes should be announced to other operators 60 days in advance. As this is done by means of the GSMA's Infocentre Website where all IOTs are published, changes can be monitored easily.

Based on the rules of the GSM Association, the IOT is a non-discriminatory tariff. Any GSM member can obtain without bilateral negotiations wholesale roaming services from any other member at a price equal to the IOT level. Theoretically, the IOT rates of a certain MNO would be accessible to all MNOs, except to its national competitors.

The presumed high degree of transparency in IOTs is only altered by the discounts resulting from bilateral negotiations. In this sense, STIRA does not consider possible discounts on IOTs and the latter must be arranged separately by MNOs in an annex to the contract. This effective price with the preferred network at a rate below the IOT level would not be publicly available as the discounts are not included in the STIRA.

The publication of IOTs increases transparency of the wholesale market for international roaming services, subject to the agreement in practice of confidential volume discounts. This transparency is a factor that could facilitate tacit collusion among member of GSMA and price rigidity if other conditions were met.

In a sufficiently competitive wholesale roaming market it would be desirable, although not a necessary condition, that individual price discounts were widespread in order to facilitate competition at the retail level.

Wholesale resale service

The agreements between MVNOs and host MNOs are confidential and prices and conditions in general for these are agreements are not known by other actors.

ASSESSMENT OF THE CURRENT SITUATION:

Available information on Standard International Roaming Agreements (STIRA) and the Inter-Operator Tariffs (IOT) for operators points to enough market transparency for MNOs contracting services at the wholesale level. However, a large part of the wholesale traffic is contracted under bilateral agreements applying commercial discounts that are not public and are highly dependent on traffic balance. Also, agreements between MVNOs and host MNOs are confidential and other actors on the market do not have access to information about reference prices. Although there is not perfect market transparency, this issue is not as important as others regarding potential problems in the structure of the market for obtaining a competitive and innovative market.

At the retail level

The adequacy of information provided to consumers about prices is a necessary condition for retail international roaming services to be considered competitive enough. The provision of sufficient information on prices would lead to better informed consumer decisions.

However, even with all the transparency measures adopted in the Regulation, consumer behaviour seems to show low price awareness. The fact that for many consumers international roaming makes up a small part of their total spend (infrequent travellers), together with relative high transaction cost of using alternatives compared with the convenience of traditional roaming provided by the domestic operator, may explain this situation.

ASSESSMENT OF THE ACTUAL SITUATION:

The measures included in the roaming regulation regarding transparency on prices can be considered enough to address this issue. Additional information about the availability and price of roaming substitutes could further promote competition in the retail market.

F. Bilateral negotiations and trans-national groups or alliances (wholesale)*Wholesale inbound service*

As MNOs act as both providers and customers of wholesale roaming services, negotiations take place in a two-way access scenario. Generally, MNOs negotiate their international roaming agreements and exchange roaming traffic on a bilateral basis for most traffic-intensive countries. Thus, these agreements are usually reciprocal in terms of access.

However, effective roaming prices would not necessarily have to be reciprocal. There might be scope for price differentials between both parties depending on their discounting strategies. The amount of discounts will rely on both of the MNOs' bargaining power, linked to the traffic volumes they can buy and sell. An MNO with a large customer base and/or a customer base with a high level of expenditure on roaming would be entitled to obtain bigger discounts than a small MNO or a big MNO with a high percentage of customers who do not travel or make few calls when roaming.

Effective traffic steering techniques should favour price discounts and lead to more competition. As home providers steer traffic to the visited country MNOs, the visited country MNOs have strong incentives to lower (by means of discounts) their wholesale prices in order to attract traffic from those home providers that generate high volumes of international roaming traffic.

These traffic steering techniques and discounts have been especially used within trans-national groups or alliances. The traffic is directed towards the MNOs of the same group or alliance where they obtain the corresponding wholesale discount. The advantages for MNOs belonging to a group/alliance are clear. MNOs have complete control over wholesale roaming costs and can offer attractive tariff plans (on-net prices) as they avoid the double-marginalization problem inherent to non-integrated firms (higher wholesale roaming

prices)^{26,27}. This constitutes the potential basis for offering lower on-net retail roaming prices to end-users when travelling abroad. However, due to low competitive pressure from other operators (caused by operator selection based on domestic issues and lack of complete substitutes for roaming services) and low elasticity of demand for occasional users, the retail prices offered by these transnational groups are similar to the prices offered by other operators, notwithstanding a few, temporary, special offers with roaming prices nearer to domestic prices.

In this situation, the scope for intense price competition at the wholesale level may be diminished. As a consequence of these structural links, the choice of supplier in a certain country would be determined by the presence of a partner and not so much by the discounts an alternative visited MNO could offer. Other relevant issue pointed out by some small operators is the trend to arrange traffic steering agreement between large trans-national groups covering several countries. Based on the particular national circumstances²⁸, the traffic that would be left to open competition in some countries might be residual.

Additionally, members within a group/alliance would not feel the full pressure to compete with the wholesale offers of alternative independent MNOs. Their wholesale prices would rather be determined by their pricing strategy at the retail level in the home market, where the same non-group MNOs may also be present.

ASSESSMENT OF THE ACTUAL SITUATION:

The overall impact of group/alliances on competition both at retail and wholesale levels seems ambiguous. While it can benefit consumers by enabling more attractive retail roaming tariff plans, it could also foster concentration or at least more alliances that may lead to a higher stability in market shares and a reduction in the residual demand that independent MNOs could meet in the wholesale roaming market, and a reduction in independent MNOs' ability to make 'disruptive' wholesale and retail offers.

G. No explicit nor tacit collusion

In a competitive market there should not be evidence of explicit collusion and the structural market characteristics should not lead to tacit collusion among providers, both in the retail and the wholesale markets.

Market structures pointing to opportunities for collusion show characteristics such as mature markets with stagnant or moderate growth on the demand side, low elasticity of demand, operators with similar cost structures and market shares, high barriers to entry, lack of potential competition, and the existence of retaliatory mechanisms among the operators.

At the retail level

²⁶ It is worth to mention that this risk would be less likely in a two-way scenario. The ability/incentives of an MNO to increase the wholesale price of the roaming IN traffic generated by a visiting MNO are lower when taking into account the reciprocal relationship. An increase in wholesale revenues may be offset by an increase in wholesale costs of its roaming OUT traffic.

²⁷ In addition, they can offer other advantages as the possibility of using short codes

²⁸ (i) Number of competitors in a national market that belong to trans-national groups/alliances; (ii) size of the groups/alliances, that is, number of countries where they are present.

In a competitive roaming market the prices for retail roaming services would neither be based on collusion agreements among operators offering wholesale services on prices nor in structural characteristics of the retail market strongly conditioning the application of similar prices to all actors providing the service.

INITIAL ASSESSMENT OF THE ACTUAL SITUATION:

At the moment, no evidence of explicit collusion has been found in any country for roaming retail services only. However there has been an example of collusion at the mobile retail level in general²⁹. Some of the characteristics seen above for the retail roaming market point to possibilities of tacit collusion on prices (low elasticity of demand in a relevant part of the market, homogeneous product, high barriers to entry, lack of competition for attracting non-regular roaming users, etc.). However, it is difficult to identify retaliatory mechanisms that could be applied by operators colluding at the retail level, and the study carried out by BEREC on alternative roaming tariffs suggests that for the more elastic part of the market (for example, high volume users), competition on prices exists among operators.

There is no evidence of explicit collusion for retail roaming services. Although retail prices are in general close to the cap, other factors highlighted in the previous sections affect competition at the retail level.

At the wholesale level

Wholesale inbound and resale service

In a competitive market there should not be evidence of explicit collusion and the structural market characteristics should not lead to tacit collusion among the wholesale providers. In markets with a limited number of providers with the same cost structure, there can be some opportunities for agreement (explicit or tacit) in maintaining wholesale prices high.

INITIAL ASSESSMENT OF THE ACTUAL SITUATION:

There is no evidence of explicit collusion at the wholesale level. In general, in most parts of the EU the market structure is composed of three or more MNOs with different cost structures partly due to different moments of entrance in the market in the last years. This situation points to competition that is not hampered by tacit or explicit collusion, although other factors highlighted in previous sections affect competition at the wholesale level.

H. CONCLUSIONS

The analysis performed on the structure of the roaming markets shows that roaming services markets, both at the wholesale and the retail levels cannot be considered as sufficiently competitive due to the following structural problems:

- At the retail level, the main problem for considering the market for roaming services as competitive is the “bundling” of roaming services and domestic services using the same user id (the telephone number). Although there are some imperfect substitutes that are

²⁹ See the case on explicit collusion in France (www.autoritedelaconcurrence.fr/user/standard.php?id_rub=160&id_article=502)

sold separately from domestic services, most customers buy both types of services together, where prices and quality of domestic services are the key issues when selecting or changing provider. Due to this characteristic of roaming services, roaming service switching costs for users are high (they have to change their domestic provider as well in order to obtain a perfect substitute) and the competition in roaming services is limited to roaming intensive market segments where roaming is a relevant part of total expenditure on mobile communications. Also, low price awareness for infrequent travellers (due to their relatively low expenditure on roaming, the convenience of traditional roaming provided by the domestic provider and lack of good substitutes), hamper competition for retail roaming services.

- At the wholesale level, the main problem for considering this market as competitive is the bilateral nature of contracts among providers (where competition is based on net roaming traffic exchanged by the operators), as well as the internalization of roaming traffic in existing trans-national groups, which excludes a relevant part of the roaming traffic from the market. Even considering only the market for the traffic managed outside of these groups, price and quality for providing wholesale services are not the only factors considered when contracting wholesale services. Roaming traffic offered by each wholesale provider plays a key role in the negotiation of wholesale roaming agreements. Under these circumstances, operators not integrated in trans-national group and with low bargaining power can suffer margin squeeze situations in the event that a retail cap is established for roaming services when wholesale prices remain too high.

3.2 Quality and Variety of Roaming Services

A. Quality of Roaming Services

According to the Article 11 of the Regulation (EC) No. 544/2009 of the European Parliament and of the Council of 18 June 2009 amending Regulation (EC) No. 717/2007 on roaming on public mobile telephone networks within the communications networks and services, the European Commission shall review the functioning of this Regulation and evaluate whether its objectives have been achieved. In so doing, the Commission shall review, i.e. “the availability and quality of services including those which are an alternative to roaming (voice, SMS and data), in particular in the light of technological developments”.

The present state of the technology used in the international roaming market, in 2010, does not allow providers to distinguish the QoS they provide for domestic services and international roaming services (where they are the visited network). However, it may be possible in the future. The purpose of this section is to identify and establish reference levels for appropriate quality parameters, which would allow us to assess whether the international roaming market is fully competitive with respect to the quality of service (QoS).

Regarding the (QoS) provided in the international roaming market, the most appropriate point of reference is on one hand the QoS provided for international services, and on the other hand the QoS provided in the domestic market for national services – both in the case of non-roaming users. In a sufficiently competitive roaming market the quality of roaming services would be close to the quality of services provided for international mobile services (defined as a connection originated in the home network by a non-roaming user, and terminated in the network situated in another country) on the same network in the case of voice and SMS (calls and SMS to a local number make up a small share of total volumes), and equal to the domestic data service of the visited EU Member State in the case of data transmission.

The parameters for measuring QoS in the roaming market should take into account the specific nature of roaming. Therefore, the list of quality parameters regarding all types of telecommunications services provided in the roaming market should include i.a. the following:

- 1) Seamless caller ID (where ‘caller’ should be understood as a customer calling or sending an SMS to another customer who is roaming) – the roaming customer should be able to identify a caller in the same way as when using his/her home network;
- 2) Areas where no service is available – where a domestic mobile service is available, the roaming service should be available as well; this does not mean that the home provider should provide roaming services in any area of the visited country covered by at least one operator; in practice it only means that in a competitive roaming market the home operator should be able to conclude an interconnection contract with at least one operator with national coverage;
- 3) Transparency – operators should fulfil their obligation of providing roaming customers with appropriate basic personalised pricing information on the roaming charges according to Article 6 of the Regulation; they should also be able to limit the number

of legitimate bill correctness complaints; the number of bill correctness complaints regarding roaming services should not be much higher than those regarding domestic services.

In the case of voice and SMS, the reference point should be the quality of the international equivalents of these services. Apart from that, with respect to voice, additional quality parameters, resulting from the specific nature of this service, should include i.a. the following:

- 1) Call set up time – time to establish a voice call should be the same for a roaming customer making a call as a domestic customer on the same network making an international call;
- 2) Possibility to access the home operator's general customer information centre/information hotline – the possibility of using it should be similar, irrespective of whether the customer is roaming or using his/her home network; however, where at home user usually connects to the hotline with a shortcode, the operator may choose to provide an appropriate regular phone number for the same purpose when the customer is roaming;
- 3) Response times for customer information centre/information hotline regarding roaming services – the waiting time to connect to the information hotline on roaming services should be reasonable and should not prevent customers from using it;
- 4) Unsuccessful call ratio – the ratio of unsuccessful to successful roaming voice calls on one hand should not be higher than the ratio of unsuccessful to successful international voice calls originated from the same network, and on the other hand not significantly higher than in the case of national calls – both for non-roaming users;
- 5) Aborted calls ('drops') – the ratio of interrupted to uninterrupted roaming calls on one hand should not be higher than the ratio of interrupted to uninterrupted international voice calls originated from the same network, and on the other hand not significantly higher than in the case of national calls – both for non-roaming users;
- 6) Sound – the quality of sound during the roaming voice call should be equal to the quality of an international call on the same network and not significantly lower than in the case of national calls – both for of non-roaming users.

In case of the quality of SMS in the hypothetical competitive international roaming market, additional quality parameters characteristic of this service should be mentioned:

- 1) Number of SMS undelivered – the ratio of undelivered to delivered roaming SMS on one hand should not be higher than the same ratio for international SMS messages sent from the same network, and not significantly higher than in the case of national messages – both for non-roaming users;
- 2) Number of SMS delivered late – the ratio of SMS delivered late to SMS delivered on time should not be higher than the same ratio for the international SMS messages sent from the same network, and not significantly higher than in the case of national messages – both for non-roaming users.

Data services are connected with two further quality parameters:

- 1) Speed of data transmission – actual speeds of roaming data transmission should be equal to the ones provided for domestic users of the visited network for non-roaming users;
- 2) Transparency: bill-shock – the roaming market should be transparent enough so that customers do not experience bill-shock and that clear information is available on the tariffs to be applied for the service.

In a competitive and innovative international roaming market, the QoS should be similar to QoS provided for the domestic users of the same networks for services using similar telecommunications infrastructure. The above lists of the quality parameters are not exhaustive; they mention only the most important ones. The present quality parameters will provide for one of the indicators of competitiveness in the international roaming market of the European Union.

B. Variety of Roaming Services

The variety of services in a competitive international roaming market of the European Union should be understood in two ways. The first is as a range of telecommunications services (voice, SMS and data), and second as a full range of distinctive retail offers targeting various consumption patterns, provided for the mentioned three main types of telecommunication services.

With regard to the first of the abovementioned definitions of variety of roaming services, it needs to be underlined that in a competitive roaming market all operators willing to provide their customers with roaming services should not find themselves in a situation where they cannot conclude appropriate agreements with foreign operators due to their general refusal to do this. Currently, BEREC has not been informed of such problems however, they have appeared in the past. Appearance of similar obstacles in the future would be evidence of distortion of competition in the roaming market. It could be also considered that the roaming market works properly when all types of mobile telecommunications services available on the domestic market are provided by all or the most of the operators on the roaming market as well.

The second of the abovementioned definitions of variety of services is generally considered as an indicator of competition in that it can reveal a certain degree of innovation. However, variety could also indicate product differentiation, which may in turn impact competition negatively if it prevents price transparency and/or if it is combined with high switching costs, lack of countervailing buyer power etc. Therefore, a full range of distinctive retail roaming services should not be treated as a *sine qua non* or the most important condition; additionally, in the roaming market the drive for differentiation is smaller than in the domestic markets of the EU Member States, because, unlike the domestic services, most customers use roaming only occasionally.

The range of retail offers on the roaming market is very wide and specifically dedicated to domestic demand. Therefore, the domestic roaming market is not as good point of reference with regard to variety of retail offers as it is in the case of prices. It could be expected, however, and first signs of this process are already observed, that on the international

roaming market, specific offers dedicated to the roaming market should appear. Roaming offers should address specific consumption patterns of different groups of roaming clients, including e.g. regular customers travelling occasionally but for a reasonable period of time (e.g. holiday bundles), customers travelling more frequently between a couple of Member States, customers changing their location due to the nature of their work, as well as business clients. The variety of roaming services adds to the competition and innovation in the roaming market, only if they are transparent and especially if the level of complication of the bundled domestic and roaming offers allows for informed consumer choice.

C. Conclusions

In conclusion, it should be stated once again that the variety of roaming services is not direct proof of the existence of the competition on the international roaming market. However, it could be expected that: on one hand, in a sufficiently competitive and innovative international roaming market, all operators are able to conclude interconnection agreements and provide all types of telecommunications mobile services (the first definition of 'variety'), even if they do not belong to alliances or pan-European groups. This does not mean, however, that the contractual conditions should be similar for all operators. On the other hand, with regard to the variety of retail roaming offers (the second definition of 'variety'), at least part of operators should be able to provide specific roaming offers targeting different consumer needs and market segments. Therefore, the variety of specific roaming services (under both definitions) targeting different consumer needs could serve as an indirect indicator of competition and innovation in the international roaming market of the European Union. Nonetheless, more important indicators of competition on the roaming market are: market structure, distinctive prices reflecting the costs borne by efficient market players, as well as the willingness of customers belonging to different consumer segments to pay them.

3.3 The Effect of the Current Roaming Regulation on Market Structure and on Other Mobile Services

This section sets out an assessment of the effect of the current Regulation on market structure, and on other mobile services (domestic and roaming outside of the EU). As such, it looks at the relative competitive position of different providers of roaming services, and any spill-over effects from roaming price regulation into other mobile services.

A. The effect on market structure

To inform our analysis of the effect of the Regulation on market structure, this section provides a brief description of the supply chain, international roaming agreements including the STIRA framework, groups/alliances, and finally the market shares and the competitive situation of operators.

Supply chain

The supply chain of international roaming services can roughly be divided into three natural layers: the visited network, the home network and the retail operator. The visited network supplies wholesale inbound roaming in the visited country.³⁰ The home network adds traffic signalling and routing for the roaming services where this is necessary. The retail operator sells the international roaming service to the roaming customer.

The supply chain can in principle be divided into more layers. E.g. a hub, an independent transit operator or other kind of middleman can be linking the visited network and the home network and a full MVNO can be present between the home network and the retail operator. However, fundamentally only the three levels mentioned is needed in a standard analysis of roaming services.

The structures of the analyses below are based on the three level supply chain of international roaming services. The analyses are therefore divided into three levels: Wholesale inbound international roaming, wholesale resale of international roaming and retail international roaming, referring to the three levels, respectively.

International roaming agreements and the STIRA framework

All operators are free to sign any type of wholesale international inbound roaming agreement establishing the technical and economic obligations and rights of the parties involved. However, in practice wholesale international roaming agreements are between MNOs and they base their agreements on the GSM Association framework called Standard International Roaming Agreements (STIRA) and the Inter-Operator Tariffs (IOT) regime, as explained in section 4 'The case for Regulation post-2012'.

Roaming wholesale resale agreements are signed between MNOs and MVNOs such that MVNOs can offer roaming services to their end users. Roaming wholesale resale agreements are in practice a part of the overall reseller/national roaming agreement

³⁰ Wholesale *inbound* roaming for the visited network is wholesale *outbound* roaming for the home (visiting) network. However, the analysis defines the markets from the supply side and therefore the term "wholesale inbound international roaming" is used throughout this chapter.

between the MNO and MVNO. The price for resale roaming MNVO is often set such that it only leaves a slight margin for the MVNOs to compete on at retail level.

Groups/Alliances

There exist several operators with footprints in EU. The operator with the largest footprint is Vodafone with operation in 13 countries. Several other operators have footprints of around 5-8 countries. The table below shows the EU footprint of different operators.

Company	Footprint
Vodafone	13 countries - Ireland, United Kingdom, Netherlands, Germany, Portugal, Spain, Italy, Czech Republic, Hungary, Romania, Greece, Malta and France
Orange	8 countries: United Kingdom ³¹ , Belgium, France, Spain, Austria, Poland, Slovakia and Romania
T-mobile	8 countries: United Kingdom ³² , Netherlands, Germany, Poland, Czech Republic, Austria, Hungary, Croatia
TeliaSonera	7 countries: Sweden, Norway, Denmark, Estonia, Latvia, Lithuania, Spain.
Hi3G	7 countries: Ireland, Denmark, Sweden, Norway, Austria, Italy and United Kingdom
O2/Moviestar	6 countries: Ireland, United Kingdom, Spain, Germany, Czech Republic, Slovakia
Telenor	5 countries: Norway, Sweden, Denmark, Finland and Hungary

Source: Operator websites

The footprints mentioned above are created by networks within the same group (same ownership). Alliances between operators of different ownership are also present in the market. E.g. The FreeMove Alliance is an alliance between Telecom Italia, T-mobile, Orange and TeliaSonera. Together this alliance covers 20 countries (Italy, United Kingdom, Netherlands, Germany, Poland, Czech Republic, Austria, Hungary, Croatia, Belgium, France, Spain, Slovenia, Romania, Sweden, Norway, Denmark Estonia, Latvia, and Lithuania). However, alliances may not be focused on lower wholesale prices within the group but on the continuance of special services across national borders.

Market shares of operators

There are generally one to three large MNOs and some smaller MNO and MVNOs on the European mobile markets. Market shares on the retail roaming markets are probably more or less equal to market shares on the domestic/national markets due to the bundling of the retail products and the bilateral nature of international roaming agreements – at least between large operators. Their market shares for the individual roaming markets are analysed below.

³¹ As part of the Everything Everywhere joint venture, with T-Mobile UK

³² Idem

Wholesale inbound international roaming

Responses from the industry indicate that large MNOs probably have a relatively large market share on this market due to large MNOs keeping the traffic between the large networks and smaller MNO need to buy international roaming from large MNOs to get good coverage and high quality. In other words, small MNOs buy more outbound roaming traffic than they sell of outbound roaming traffic. For large operators it's the opposite picture.

Wholesale resale international roaming

The market shares on this market are more or less determined by the size and number of MVNO's connected to the different networks. In the existing setup an MVNO without own operator code can only buy wholesale resale international roaming from its host MNO in the home country. An MVNO with own operator code could in principle buy wholesale resale international roaming services from another MNO than their host MNO in the home country. However, BEREC has not experienced any MVNOs using this business model.

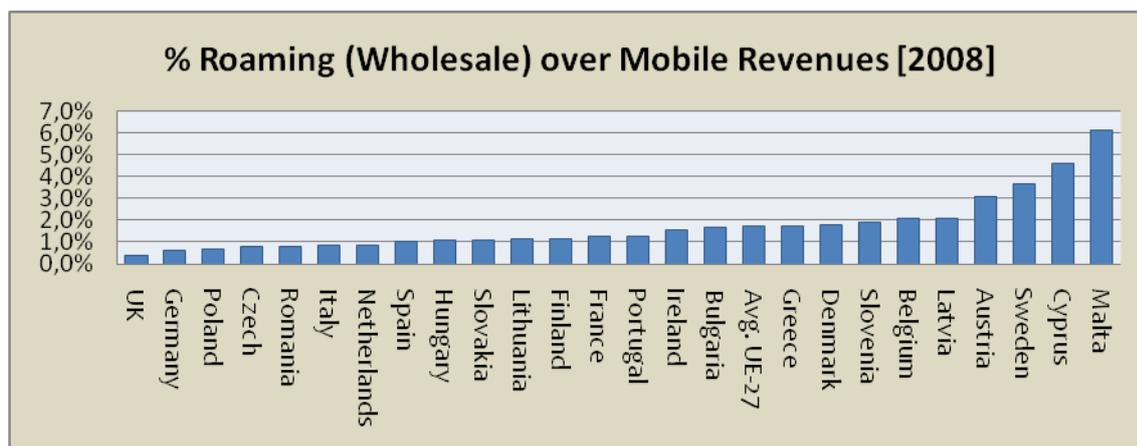
Retail international roaming

The market shares are probably very equal to market shares on the domestic markets due to the bundling of the roaming and domestic product. Deviations from this would be caused by operators targeting certain consumer segments that call more/less when they are abroad compared to their domestic use.

B. Competitive situation of different sized and type of operators

International roaming is small part of the bundled product of national/domestic services, international roaming services, and international (non-roaming) services. BEREC has estimated that retail revenue from international roaming in EU was 5% in 2008 and 4.2% in 2009. This figure is likely to be lower in 2012 due to the EU Roaming regulation. The percentage varies between Member States as indicated by the graph below.





Source: BEREC based on data from operators and EC implementation report.

Therefore the international roaming market is not likely to have a large influence on the overall competitive position/situation of the different operators, and any changes in their competitive position/situation that may be linked to international roaming will be difficult to find empirically.

Competitive situation of small, medium and large operators with respect to international roaming services

The competitive situation for operators of different size are analysed below for each roaming market.

Wholesale inbound international roaming

Small MNOs and maybe also medium size MNOs have difficulty attracting inbound international roaming traffic (i.e. to sell network capacity) due to the structure of roaming agreements. Large MNOs keep traffic between themselves due to the bilateral agreements where return traffic is more important than the price in the case of choice of network partner. Furthermore small MNOs have difficulty disrupting established agreements due to high switching costs. Finally small entrants are often late entrants that don't have nation-wide coverage. Due to contractual/commercial and technical reasons MVNOs cannot resell national roaming from the host network in their home country. MVNOs are therefore not present on the supply side of this market.

Wholesale resale international roaming

Due to less competitive wholesale deals on market for wholesale inbound international roaming (as a buyer) small MNOs and maybe also medium size MNOs can, compared to larger MNOs, probably offer less attractive deals on resale of international roaming. However, large MNOs do not in general offer attractive prices in their wholesale resale international roaming agreements. Therefore it is still possible for smaller and medium sized MNOs to get direct cost of the international roaming service covered when matching the international roaming resale prices of the large MNOs. We understand that MVNOs do not buy wholesale inbound international roaming services directly from the visited network due to technical, contractual/commercial reasons. Therefore they are not present in the market as suppliers of resale international roaming.

Retail international roaming

Again, due to less competitive wholesale deals on the wholesale market for inbound international roaming services (as buyers of network capacity), small MNOs and maybe also medium size MNOs can, compared to larger MNOs, probably offer less attractive deals on retail international roaming. However, large MNOs do not in general offer attractive retail international roaming retail prices. Therefore it is still possible for smaller and medium sized MNOs to cover the direct costs of the international roaming service when matching the international roaming retail prices of the large MNOs. However, if some business customers have negotiated very attractive roaming deals with the large MNOs then small and medium size operators could have a problem offering these services at the same price without incurring a loss. Assuming that large MVNOs can get better deals than small and medium size MVNOs on wholesale resale international roaming, size is also relevant for the competitive position between different MVNOs.

Has or will the regulation change the competitive situation of small, medium or large providers?

The competitive effect of the regulation are analysed below for each size of operator and for each roaming market.

Wholesale inbound international roaming

It is questionable whether the present regulation has changed or will change the competitive situation of small and medium sized MNOs with respect to selling wholesale inbound roaming. Large MNOs still keep their traffic between themselves to a large extent, as the key factor taken into consideration while negotiating roaming agreements is not the price but the possibility of traffic balance provided by the roaming partner. A future regulation that removes the bilateral nature of inbound roaming agreements may be able to change this. One small MNO states that regulation has reduced the margin to compete for inbound roaming traffic. MVNOs are understood not to offer wholesale inbound roaming for contractual/commercial and technical reasons. Regulation has not had an impact on these reasons and has therefore not had an effect on the competitive position of MVNOs on this market.

Wholesale resale international roaming

Regulation has made it easier for small and maybe medium sized MNOs to buy wholesale international inbound roaming at attractive prices. It therefore seems reasonable to conclude that the regulation has reduced the competitive disadvantage of small and maybe medium sized MNOs compared to large MNOs with respect to wholesale resale international roaming. As wholesale price decreases in the present or in a possible future regulation there will be a further reduction of the competitive disadvantage of small and maybe medium sized MNOs. MVNO's are not offering this service due to maybe contractual/commercial reasons. Regulation has not had an impact on these contractual/commercial conditions and therefore regulation is not believed to have had an effect on the competitive position of MVNOs (as suppliers) in this market.

Retail international roaming

Again due to more competitive prices on the wholesale inbound roaming market, the current Regulation has reduced the competitive disadvantage of small and maybe medium sized

MNOs compared to large MNOs in the international roaming retail market. As wholesale price caps decrease there will be a further reduction of the competitive disadvantage. Some small and large operators have put forward that retail regulation of voice and SMS has decreased the possibility of differentiation in the market. However, operators don't seem to compete within the existing margin, which leaves room for competition. Operators put forward that the margin has to be of a certain magnitude to trigger competition. This argument is weakened by the fact that the data roaming service has a high retail margin, even though wholesale prices are well below the average cap (0.36€ in Q2 2010, with a cap of 0.80€). Less possibility of differentiation can have been a disadvantage to small and maybe medium size MNOs. As retail price caps decrease this possible negative effect on the competitive position of small and medium size MNOs increases. It is questionable whether the competitive position between small, medium and large MVNOs has been and will be affected by the present Regulation.

Competitive situation of MVNOs and SPs (compared to MNOs)

The competitive situation for MVNOs compared to MNOs is analysed below for each roaming market.

Wholesale inbound international roaming market/supply

MVNO's are not present as suppliers in this market due to contractual/commercial and maybe technical reasons that prevent MVNOs from reselling inbound international roaming from their host network in their home country.

Wholesale resale international roaming market/supply

MVNOs are not buying wholesale inbound international roaming services directly from the visited network due to contractual/commercial reasons. MVNOs are therefore not present as suppliers on the resale international roaming market in question. MVNOs could in principle resell the international roaming services they buy from their home MVNO. However then the MVNOs would just be an extra layer in the supply chain reselling what is already resold from MNOs. It is therefore concluded that MNOs and MVNOs are not competing in the same resell layer and that MVNOs are not present in the wholesale resale international roaming market in question.

Retail international roaming market/supply

The price MVNOs pay on the wholesale resale international roaming market is probably higher than the cost MNOs incur when supplying the wholesale product. Therefore MVNOs probably have a competitive disadvantage when competing on retail international roaming markets. However, pricing on the resale international roaming market is assumed to be lower than the international roaming retail prices set by the MNO – often prices on resale market is set close to the retail price of the MNO. Therefore in general it seems possible for MVNOs to get direct cost of the international roaming service covered when matching the international roaming retail prices of the MNOs. However, if some business customers have negotiated very attractive roaming deals with the MNOs then MVNOs could have a problem offering these services to the same price without incurring a loss.

Has or will the Regulation change the competitive situation of MVNOs and SPs (compared to MNOs)

The competitive effect of the Regulation on MVNOs compared to MNOs is analysed below for each roaming market.

Wholesale inbound international roaming market/supply

MVNOs are not present as suppliers in this market and therefore they are not affected by the present Regulation. If technical barriers to MVNO-presence in this market can be overcome, regulation could be used to remove any remaining commercial or contractual barriers to MVNOs reselling the national roaming services that they have bought. However, although it could positively affect the international roaming markets, reselling of national roaming should be left to national markets.

Wholesale resale international roaming market/supply

MVNOs are in general not present as suppliers in this market and are therefore not affected by the present Regulation. However, if possible future regulation enables MVNOs to buy international outbound roaming directly from MNOs in the visited country (e.g. by addressing the bilateral nature of roaming agreements and lack of MVNO access to standardised documents like the GSMA STIRA), then it would be possible for MVNOs to enter this market and compete on a more equal basis with the MNOs, provided the resources required to negotiate their own wholesale roaming agreements do not outweigh the benefits.

Retail international roaming market/supply

The regulation sets price caps for the wholesale inbound international roaming and for the retail international roaming (only voice and sms on retail). The regulation has therefore probably reduced the price that MVNOs pay on the resale international roaming services and at the same time also reduced the price that MVNOs get on the international roaming retail market. Due to the price on the resale market many times are based on the price on the retail market it is even possible that the price reduction in the resale market is more or less equal to the price reduction in the retail market leaving the margin for the MVNOs unchanged. From that point of view the regulation has not changed the competitive situation of MVNOs compared to MNOs. However, MNOs are still making less money overall on the roaming product due to the price decreases at retail level. This could improve the competitive position of the MVNOs. On the other hand, because retail price regulation has narrowed the price gap between outgoing and incoming calls at retail level light MNVO ("SPs") offering call back services has been disadvantaged by the retail regulation.

C. Spill-over effects into other mobile services

This section analyses possible spill-over effects into other mobile services. Possible spill-over effects are, for example, arbitrage between national services and roaming services or rebalancing of non EU-roaming tariffs. These two possibilities are analysed below.

Has lower roaming charges led to arbitrage opportunities between roaming and national services?

Some have argued that if international roaming retail caps are lower than the highest national/domestic charges, arbitrage could occur, and the national services hereby will be indirectly regulated by the roaming regulation. Furthermore it has been argued, that even if there is no arbitrage opportunities, operators are forced to lower national charges due to public relations reasons.

Arbitrage is however not that likely to occur. When using international roaming for services within the roamed country the people calling or texting the number of the roaming party will pay international rates which are quite high compared to national/domestic rates. As a result less calls and text messages would be received on the “roaming” phone number.

Furthermore, incoming calls would be costly for the receiving (roaming) customer who has to pay a retail price. Of course this could be solved if the roaming customer also has national SIM card active at the same time where he/she could receive calls. That would then require a dual SIM card phone with possibility of have both SIM cards active at the same time, or would require simultaneous use of two phones. Using two subscriptions (and maybe two phones) is probably more costly than using one national subscription due to minimum usage and monthly subscriptions. Overall, it seems that the scope for arbitrage is lower present even though the international roaming retail price cap is below the highest prices on some unbundled services. However, in the end the scope for arbitrage will depend on the price difference between the roaming services and national services. If the price of national roaming services is significantly low compared to national domestic services arbitrage is possible and will put a downward pressure on prices for national domestic services.

After the implementation of the regulation, SMS roaming charges were lower than the national SMS out of bundle charges in a few member states. Furthermore, roaming charges for outgoing voice calls were also lower than the charges for international calls in some member states. It seems that operators in these member states have not been forced to lower the prices on these products due to arbitrage or public relation issues.

Has lower roaming charges of SMS and voice led to a rebalancing of other charges?

It is in practice impossible to demonstrate an empirical link between the Roaming Regulation and any changes in prices on national domestic, international (non-roaming) and “Non EU”-roaming services. Generally, domestic mobile prices seem unlikely to rise because they are the main focus of competition. While individual instances may be found where some customers are offered less favourable terms for certain types of calls than pre-regulation, the observation of national regulators is that such instances are fairly exceptional.

It has since been suggested that roaming tariffs for the rest of the world may have been increased to compensate for loss of European roaming revenue. The ERG Benchmark Data Reports show that the average rest of the world tariffs billed has decreased slightly for outgoing calls and increased slightly for calls received. Bearing in mind that the average price (billed) can be influenced either up or down by change in travel patterns it seems reasonable to conclude that tariffs on rest of the world roaming has neither decreased nor increased as a result of the EU roaming regulation.

In any case, any potential waterbed effect is likely to be small, since the intra EU roaming market represents a low share of total mobile revenues (varies between 2% and 8% with an

average of 5% in 2008, and between 2% and 10% with an average of 4% in 2009). These figures are likely to be lower in 2012 due to the EU roaming regulation.

D. Overall conclusion on the effect of regulation on market structure and other mobile services

Mainly small operators have at an overall level been positively affected by the regulation. Small operators have not been affected as suppliers on the market for inbound roaming. However, as buyers on this market, small operators have been able to get better deals which have improved their competitive situation as suppliers in the market for wholesale resale roaming and in the end at retail market. The latter, positive effect seems to outweigh the first, negative effect.

MVNOs do not seem to be affected significantly by the EU roaming regulation. Regulation has probably reduced the prices that MVNOs pay for resale wholesale roaming services. However regulation has limited the scope for call back solutions used by some MVNOs. If MVNOs were more present as buyers on the inbound wholesale international roaming market they would have more benefit of the roaming regulation as they would be net buyers on this market.

The possibility for indirect regulation of national services through the regulation of roaming services seems limited. Using roaming services as a substitute for national services will often be a less “consumer friendly” solution whether it is the use of dual SIM phones or two phones, fewer incoming calls, paying for incoming calls or, an operator supplying the mobile service in another language. However, the lower the price for roaming services compared to national domestic services, the more attractive roaming services become for the end consumer to use as a substitute.

The roaming regulation also does not seem to have had a significant impact on the pricing of other mobile services. The possible waterbed effect would also be expected to be small due to the fact that roaming revenue is a small part of the overall revenue (5%- 4% in 2008 and 2009). This is supported by the BEREC benchmark report that doesn't show a significant increase in the consumer price paid for roaming outside the EU. Finally, an increase in national domestic prices due to the Regulation will be difficult to find empirically.

Section 4

Regulatory Approaches

If further regulation is necessary, what form should it take?

1. Introduction

In accordance with Article 11 of the Regulation, the Commission needs to carefully look at alternatives to the current price regulation in its full evaluation:

The Commission shall also assess methods other than price regulation which could be used to create a competitive internal market for roaming and in so doing shall have regard to an analysis carried out independently by a body of European regulators for electronic communications. On the basis of this assessment the Commission shall make appropriate recommendations.

BEREC has analysed a number of options that could potentially provide an alternative to the current price regulation. These alternatives do not necessarily address the entire problem with roaming services today, nor do they preclude some form of price regulation. Some are targeted specifically at avoiding retail price regulation, whilst others are targeted at solving problems at the wholesale level. In addition, some solutions might need a longer lead time before becoming effective. Thus it is quite possible that if tariff regulation is to be avoided, more than one of these alternatives would need to be adopted.

As explained in Section 1, BEREC favours price caps 2011-2015, subject to an interim review in (say) 2014 when alternative forms of regulation may be considered again. Although it does not propose any one of these alternatives forms of regulation for 2011, it has made a distinction between alternatives that it has reviewed and that show some promise, those that could be considered as complementary measures, and alternatives that it has considered but has had to discard as being unlikely to be an effective alternative for the current price regulation.

The distinction between these categories is based on how the alternatives measure up when scored against the following criteria:

Criteria

Effectiveness
Price – prevent excessive pricing
Price – achieve the “EDA target”
Competition
Transparency
Regulatory burden

Impact on national markets
Consumer friendliness
Feasibility
Avoidance of regular reviews

Effectiveness

The following EU regulatory goals are currently on the table:

The objective of the current Regulation is that consumers should not pay **excessive prices** for roaming services (voice, SMS and data) in comparison with competitive national prices thereby contributing to the smooth functioning of the internal market while achieving a high level of consumer protection, fostering **competition** and **transparency** in the market and offering both incentives for innovation and consumer choice.

Regarding the level of roaming prices, this spring the European Digital Agenda³³ (EDA) set a potentially farther-reaching goal with this 'Key performance target':

- Single market for telecoms services: the difference between roaming and national tariffs should **approach zero** by 2015. (Baseline: In 2009, the roaming average price per minute was 0.38 cents (calls made) and the average price per minute for all calls in the EU was 0.13 cents (roaming included))³⁴.

This paper looks at the options for achieving both of the above objectives, to ensure that we have provided technical advice relevant to whichever goal the legislators decide to follow. Logically, given that the EDA target goes further than prevent excessive pricing, alternatives that score well at preventing excessive pricing won't necessarily be sufficient to achieve the EDA target. Conversely alternatives that are deemed capable of achieving the EDA target will always prevent excessive pricing for roaming services, provided the benchmark domestic prices are reasonably competitive.

The following 3 criteria, concerning the effectiveness of the measure, based on the above discussed goals shall therefore be discussed:

- a) Bringing lower roaming prices (either to prevent excessive pricing or achieve the EDA target)
- b) Increasing competition
- c) Increasing transparency

Bringing lower roaming prices

³³ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:EN:PDF>

³⁴ EDA: 'These indicators are mainly drawn from the Benchmarking framework 2011-2015, endorsed by the EU Member States in November 2009... For more information see Benchmarking framework 2011-2015; This is a conceptual framework for collection of statistics on the information society as well as a list of core indicators for benchmarking'.

The prices should not be high in comparison to the prices of competitive domestic services. As previously mentioned, there is a distinction between preventing excessive pricing and achieving the EDA target. As such these are scored separately. Where an alternative targets the wholesale market this criterion is meant to be read that the alternative would result in wholesale prices such that either of these goals is attainable, while preventing margin squeeze for individual operators.

Any alternative that BEREC is willing to consider seriously should at least score a “reasonable” in this category.

Increasing competition

Does this solution foster competition in the roaming market (wholesale and retail)? An alternative that limits pricing does not necessarily increase competition. Regarding retail voice roaming, is this a solution for both incoming and outgoing calls?

Increasing transparency

Does this alternative solution increase transparency and enable customers to make a better informed decision, or make available information easier to access?

Regulatory burden

Extent of the regulatory burden for market players. To what degree is their freedom to set prices limited either at wholesale or retail level or both? In addition, are there significant costs of implementing the measure?

An alternative will score positive when it is deemed to be a lighter measure than the current regulation and negative if it would be likely to impose a greater regulatory burden than the current regulation.

Potential impact on national markets

Are there any potential spill-over effects onto national markets, and if so, how big is the expected impact? If an alternative also impacts national markets (e.g. by distorting competition), this will lead to a negative score. Where there is no impact on the national market, the alternative will receive a positive score.

Consumer friendliness

Would the solution be easily accessible and practical for consumers to use – is this a mass-market solution? If an alternative only works for a few technically savvy consumers, but is too complicated for most users it will not have the desired effect, which will lead to a negative score.

Feasibility (enforcement and implementation)

How difficult would it be for the NRA to enforce the regulation? Regulation that is difficult to enforce or requires extensive monitoring will score negatively in this category.

Is the solution likely to be (able to be) implemented by the expiry of the current Regulation in 2012 and have an effect? Solutions that are likely to be effective will receive a positive

score, whereas alternatives that e.g. might not be effective until after 2015 will receive a negative score. Solutions that can be effective by 2015 will receive a neutral score. It may be that more than one solution could be adopted, to cover both the short and medium terms.

Avoidance of regular reviews

To what degree does this alternative present a structural solution that does not require regular evaluation of the roaming market? Solutions that present a “fire-and-forget” solution for the problems in the roaming market will receive a score of “very good” whereas solutions comparable to the current regulation that need regular review, will score “very poor”.

Each criterion shall be scored on the scale below:

Score Definition

--- Very poor

--	Poor
-	Mediocre
o	Neutral
+	Reasonable
++	Good
+++	Very good

2. Alternatives that are intended to have their main effect at the retail level

2.1 Carrier-select options rated “unsuitable for achieving the EDA target but otherwise worthy of consideration”

There are three distinct alternatives of carrier-select, with varying pros and cons. From a commercial and technical point of view, the three alternatives are very different. From the point of view of the customer, they are more similar. The rationale for all of them is to provide the consumer with a reasonably user-friendly method of choosing a provider of roaming services different from his normal service provider, thereby introducing real competitive pressure on roaming prices where there is little at present. From the customer perspective, the main differences concern the identity of the provider and the method of billing.

2.1.1 Carrier select – local provider, billing by home provider

Description

After crossing the border, a customer will receive one or several SMS with information about the option to choose an alternative roaming operator and tariff information. The customer will then be able to select an operator on the basis of the prices it offers. The alternative operators can set their retail prices in competition with each other and the home network. The home network shall bill this retail price to the customer. To this end, the home network

works a third party billing arrangement. The chosen visited network shall then receive the retail price minus a third party billing mark-up. The mark-up applied can be different for pre-pay and post-pay customers to reflect the different cost carried by the home network.

To increase transparency and enable consumers to make a choice before leaving home, a website could be setup that shows an overview per country of the different operators and the tariffs on offer. In addition, information could be provided on geographical coverage and customers could be presented with a possibility to choose their foreign operator before going abroad. The SMS the customer receives at the border could point to this overview site.

Such a website should also enable the consumer to indicate for how long they would wish to make use of the roaming provider's service. This could either be for a single trip abroad, e.g. only a few days or weeks, but could also be for a longer period or even indefinitely (until the consumer makes a different choice). Similar information could also be provided by a freephone service.

As such a system could entail significant setup costs, it would be proportionate to allow for additional time for its implementation to reduce the financial burden on operators.

If a consumer does not make a choice, it will be directed to the home operator's preferred visited network, ensuring the consumer always has access to roaming services. The pros and cons of a maintaining safeguard caps on wholesale and retail roaming services should therefore be assessed.

Regulation

To accomplish this situation the following aspects would have to be regulated:

- The home network is required to send one or several SMS at the border with reference to the alternative operators and how to choose these operators. (A website or freephone number could also be provided as a source of more detailed information)
- The home network cannot impose its choice of visited network if the customer chooses an alternative provider
- The home network is required to bill the customer the retail charge the customer chose and pay the visited operator the difference between the retail price and the mark-up
- A mark-up for third party billing and specific roaming expenses would have to be regulated so this is a uniform tariff for each home network. This mark-up should be taken into account when communicating tariffs to consumers

Technical Implementation

The selection of the roaming network can be achieved in two different ways:

- Manual network selection by the end user:

This solution imposes small implementation costs on the home network operator who is mostly required to provide pricing and network selection guidance information to the end user in a friendly way. However, it may be difficult (if not impossible) for the home network to provide detailed information on the manual procedure to choose a

network for all the different phones available. A manual network selection solution is therefore more appropriate for technically savvy consumers and may be confusing for the rest.

- Home network driven selection of roaming network:

The network can force the user terminal to select a particular network by rejecting location registration attempts in different networks. This procedure is already in use for steering roaming traffic to different roaming partners.

The home network operator will need to provide a way for the customer to choose the roaming provider and link that choice to the HLR. The implementation cost would be higher than that for the manual network selection.

At the same time, the implemented algorithm has to be smart enough not to leave the customer without service when for example the customer moves to a different country.

Choosing and locking on a particular roaming provider may give rise to certain practical issues.

- If the chosen roaming network has limited coverage or capacity, the roaming customer may not be able to receive service and may further be unable to switch to a different roaming network.
- Additionally, it is possible for an alternative roaming network to try and keep the customer on its network, despite the customer's choice. We are aware that this is happening with traffic steering where the roaming network simulates a manual network selection to keep the customer on its network. This could lead to unexpected charges for the roaming consumer.

Effect

The intended effect of this alternative is to stimulate competition in retail incoming and outgoing voice, SMS and data services, leading to a decrease in retail tariffs. It would still however be necessary to specify an absolute mark-up. The home network would not have any incentives to offer a mark-up below the regulated level, limiting any reduction in prices.

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail	✓	✓	✓	✓
Wholesale	N/A ³⁵	✗	✗	✗

³⁵ Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation.

Pros & Cons

The advantage of this solution is that it is already possible with current technology, making it relatively easy to implement in technical terms although there could still be significant costs involved. It also has the potential to stimulate consumers to think about roaming and offers them an easy to use method of accessing alternative tariffs for roaming, which could be more in line with local tariffs as they are offered directly to the consumer by the chosen visited network. To the extent that there are differences in average domestic prices across Europe, this may or may not be very close to the customer's usual domestic tariff.

The disadvantages relate to commercial implementation. A main disadvantage is that it requires users to manually select a network for every country visited. For SMS and data services it would require users to change their settings per network (which could be sent via easy to use over-the-air provisioning (OTA), similar to the way non-branded phones often receive these settings domestically). In the event the chosen network does not have sufficient coverage in (or en route to) the destination of the visiting consumer, they would need to manually select a different operator. This would entail repeating the selection process and possibly changing the settings on their handset again. Given that most networks competing for roaming traffic will have national coverage this should not occur often. However this would still be a deterioration of the roaming service compared to the current situation, where a handset will automatically switch to the network with the best coverage for the area that the consumer is currently roaming in.

Another significant disadvantage is about informing consumers of the alternative offers. Firstly, there is the problem that alternative operators will be limited in the amount of information they can send to consumers (via SMS) to entice them to choose their network for roaming services.

A website and/or freephone number would either need to be supported by the home operator or the operator offering the alternative roaming service would need to be able to provide the information regarding the services in the language of the consumer's home country. It might be necessary to regulate any information services provided by the home operator to avoid any commercial bias towards its own products. Overall, it may be costly to gather, compare and update information on the available offers for different countries, and present this in a consumer-friendly manner.

This alternative limits the amount and severity of retail regulation of prices. Retail regulation comprises the SMS that has to be sent, the billing of the customer and providing customers with a choice. Meanwhile, wholesale price regulation is limited to the mark-up.

However, the compliance costs could be significant. From a technical standpoint this option could possibly mean that each home operator would need to have a database containing all roaming tariffs offered within the EU, as the retail tariff would no longer be at the discretion of the home operator, but rather would be determined by the sum of tariff charged by the visited network plus the mark-up to account for the home operator's roaming specific costs. Alternatively, operators could possibly set up a system that would automatically retrieve the part charged by the visited network from the CDRs and simply add the regulated the mark-up. However, relying on CDRs provided for other customers may incur a risk of error. This

might not be possible for pre-paid subscribers, as their billing needs to be real-time, to ensure consumers have sufficient credit to cover the cost of the roaming service.

Ultimately, if insufficient alternative providers considered it commercially feasible to offer competitive alternative services to the mass market, and/or only a small group of customers used this solution, it would be unlikely to stimulate enough competition to bring lower prices for all consumers, or to reach the EDA target in the sense of a difference between roaming and national prices (in the visited country) that approaches zero.

Criteria

Criteria	Score	Description
<p>Effectiveness</p> <ul style="list-style-type: none"> Price – prevent excessive pricing Price – achieve the “EDA target” Competition Transparency 	<p style="text-align: center;">+</p> <p style="text-align: center;">-</p> <p style="text-align: center;">+</p> <p style="text-align: center;">0</p>	<p>Giving consumers the possibility to choose a local operator in a competitive market should lead to prices that are not excessive. However as the local operators are capable of differentiating between domestic and roaming customers, it is not unlikely that they would still charge higher tariffs.</p> <p>Regarding transparency there are issues with the way consumers would be able to receive sufficient information to choose a local operator and a cheaper deal, which could undermine possible price effects.</p>
Regulatory burden	++	Regulatory burden arises mainly from the costs operators will incur to implement such a system. They are not restricted in their commercial conduct.
Impact on national markets	0	As the national operators now compete for visitor traffic in a similar way to how they compete for domestic traffic, there should be little spillover effects.
Consumer friendliness	-	<p>This alternative requires significant action on part of the consumer. As consumers are used to simply being able to switch on their phone and make a call when abroad it is uncertain if most consumers would be willing choose a local operator (for each visited country).</p> <p>Operators looking to attract new customers will probably target frequent roamers. This leads to the real possibility that the mass market will not benefit.</p> <p>In addition consumers are likely to receive an</p>

		<p>increased number of messages when crossing the border of an EU country, which the majority of consumers will not appreciate.</p> <p>There is also the question of language, as regards understanding the details of the offer and the ease of accessing customer services if needed.</p>
Feasibility	-	Though this alternative requires the use of existing technology, experience from implementing the “bill shock” measures suggests that technical changes are non-trivial, both in terms of time and money.
Avoidance of regular reviews	-	Given the expected effectiveness of this solution it is likely to require review (at least initially) after a fixed period to ensure the required target is met or not.

2.1.2 Carrier Select – local provider with direct billing

Description

Similar to the previous alternative, this scenario seeks to allow a different operator from the home network to provide roaming services.

The local provider would directly charge consumers for all their outbound roaming traffic (calls received by consumers while roaming would still be charged for by their home operator – as a roaming call), without any implications for the home network, at least as regards charging for outbound roaming calls, messages and data.

This local roaming provider might be an established MNO or MVNO or, alternatively, a new type of service provider.

The network selection would be similar to the visited network selection under the current system; however it would be necessary to register the roaming customer in the system of the local roaming provider, in order to allow direct charging by this provider. This registration could be similar to the system used for registration on WiFi hotspots, using a web browser for users having a Smartphone or a PC with a 3G card or dongle; alternatively, the registration could be done through an Interactive Voice Response system (IVR), for users having no internet access on their handset. The registration should result in the possibility to link the IMSI of the roamer with an international credit card number.

For voice, such a solution is currently being offered, for example by Mobily in Saudi Arabia³⁶ and Truphone³⁷. Customers dial a shortcode to activate the service, after which they receive

³⁶

http://www.mobily.com.sa/wps/portal!/ut/p/c5/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gDCxNH1CPw

a local number, which they can use to make calls (after topping up their prepaid balance with the local provider). They can also still originate and receive calls and SMS on their usual number (at the roaming rate).

Regulation

In order to accomplish this scenario an implementation similar to Carrier (Pre) Selection for fixed telephony would be needed, whereby the home network would need to allow roaming traffic to be handled by a different operator.

Beside these retail regulations, there would need to be wholesale regulation in order to allow small players to compete in the roaming market.

Technical implementation

Such solutions are already available. MNOs can readily provide the inbound roaming customer with a “local roaming number”, without requiring the home network’s consent for technical implementation.

For a third party to be able to offer this service, a “short prefix code” would need to be allocated by the visited MNO and its MSCs would need to be configured to forward the outbound calls to the third party provider.

However, it would be a challenge for the third party provider to reach its potential customers. While a visited MNO can become aware of the (domestic) mobile number of the roaming customer and send them advertising SMS, a third party provider would be completely unaware of the contact details of its potential customers.

For these reasons, this option would probably allow the customer to receive service from the chosen provider only while remaining within the network coverage of that provider.

Effect

The intended effect of this regulation would be to unbundle roaming services from domestic services and thus enable competition to take place for the provision of these services. Ideally, consumers would be able to benefit from the competition that already exists between domestic operators. To the extent that there are differences in average domestic prices across Europe, this would be more or less close to the customer’s usual domestic tariff.

The effect would be largely dependent on whether or not sufficient local providers would have a commercial incentive to offer disruptive roaming prices to roaming-only consumers, and whether customers would be sufficiently motivated to make use of the provisions and exercise their right to choose a different provider for their roaming services. If they did, this could potentially lead to a general price reduction, after which there might be insufficient difference in prices for roaming services to make it worth the effort for consumers to switch.

[BAng1BDr2BDY0NzAwjQ9_Plz03VD07N0y_IdIQEAK7EiWY!/dl3/d3/L2dJQSEvUUt3QS9ZQnZ3LzZfME8zMDJEVjAyQzBLSFI5NEo3RjAwMDAwMDA!/?resetPortlet=true](http://www.truphone.com/)
³⁷ <http://www.truphone.com/>

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail				
Wholesale	N/A ³⁸			

Pros & Cons

This solution has many of the same advantages and drawbacks of the previous alternative, with the additional drawback of not offering a substitute for received roaming calls (the consumer can receive calls on the local number free of charge, if he distributes it). For occasional roamers it is likely to be overly complex.

Potentially, brand recognition could lead consumers to choose either the same group company they use domestically or alternatively one of the four main groups, dampening the competitive effect of the smaller market players.

This solution has the most potential for data services on laptops, as there aren't any issues about having two phone numbers (the consumer's usual number and a local number). In addition, travellers who frequently travel and use mobile data abroad are likely to already be used to looking for local alternatives, such as Wi-Fi or a local 3G card. However, the customer could only use the visited MNO's network for data services. A third party provider would have difficulty authenticating the user given that the IP address (which identifies the user) changes. Indeed, the IP address could then be allocated to another customer, who could then use the first customer's credit. It would be necessary to develop a system whereby the customer is asked to log back in every time their IP address changes, in order to identify themselves.

Criteria

Criteria	Score	Description
Effectiveness		This alternative is very similar to previous one, with the main drawback that it only works for outbound traffic and thus has no impact on the charges for incoming calls
Price – prevent excessive pricing	+	
Price – achieve the “EDA Target”	--	
Competition	+	
Transparency	0	

³⁸ Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation

Regulatory burden	++	Regulatory burden arises mainly from the costs operators will incur to implement such a system. They are not restricted in their commercial conduct.
Impact on national markets	0	As the national operators now compete for visitor traffic in a similar way to how they compete for domestic traffic, there should be little spillover effects.
Consumer friendliness	-	<p>This alternative requires significant action on part of the consumer. As consumers are used to simply being able to switch on their phone and use roaming services it is uncertain if a sufficiently large number of consumers would be willing choose a local operator (for each visited country).</p> <p>Operators looking to attract new customers will probably target frequent roamers. This leads to the real possibility that the mass market will not benefit.</p> <p>In addition, consumers are likely to receive an increased number of messages when crossing the border of an EU country, which the most may not appreciate.</p> <p>There is also the question of language, as regards understanding the details of the offer and the ease of accessing customer services if needed.</p>
Feasibility	-	Though this alternative requires the use of existing technology, experience from implementing the “bill shock” measures suggests that technical changes are non-trivial, both in terms of time and money.
Avoidance of regular reviews	-	Given the expected effectiveness of this solution it is likely to require review (at least initially) after a fixed period to evaluate whether the required target is met.

2.1.3 Carrier select – alternative home provider

Description

This scenario is similar to alternatives 2.1.2 and 2.1.1. However, given the technical complexity involved in setting up this alternative, overall it is deemed to be considerably less desirable.

This scenario enables consumers to select a provider for national calls and (potentially) a different provider for roaming calls, while at home. The provider of the roaming services could be the same provider as the one chosen for domestic services, but could equally well be a different MNO or MVNO. For practical reasons, it is likely this will be a domestic operator however there is no reason why a foreign MNO or global MVNO could not become the provider of roaming services. Due to this possibility, two distinct markets would be established: one for domestic services and one for roaming services. In effect, the de facto bundling of these two markets would be stopped. In this situation, the billing relationship is with the roaming provider.

For roaming services, customers would not be required to sign long contracts (but should not be prohibited from doing so either), giving customers the possibility to choose their provider for roaming services at any time and thus at any time when their focus is on roaming tariffs. As this usually does not coincide with the moment when they choose their domestic carrier, the ability to choose the roaming provider separately and at any time should provide more competitive pressure on operators to offer better retail roaming rates.

When roaming, a customer would register on a visited network. The visited network would then inform the home network. The home network would then ask the visited network to contact the consumer's chosen roaming provider instead. If a roaming customer decided to switch his roaming provider whilst already roaming there would need to be reasonable time frame for the new provider to take care of the service (at least 24 hours if 24 hour number portability works at the national level).

In order to accomplish this scenario, systems would need to be setup whereby the supplier of domestic services can indicate to the visited network who the chosen operator is for roaming services. Similar to the current provisions for alternate tariffs to the regulated Euro-tariff, customers would be free to switch their roaming provider after a minimum period of three months.

Alternatively, it is possible for the user's SIM card to have a secondary IMSI that is used while roaming. This secondary IMSI would belong in the roaming provider's PLMN range, telling the visited network to contact the roaming provider's HRL/AUC for authentication and location registration. While that would make registration and originating calls from the roaming user possible, the roaming provider would need to contact the customer's home (domestic) network and arrange diversion of the inbound calls through the roaming provider.

Next to these retail regulations there would need to be a wholesale regulation in order to allow small players to compete in the roaming market.

Technical implementation

If a single IMSI SIM card is used, the customer's home network would need to notify the visited network to contact the customer's preferred roaming provider for all authentication, registration, and billing purposes. As this is not a standard procedure, *significant implementation* will be required, backed by standardisation activities.

Furthermore, a more serious barrier may be security: the authentication and ciphering keys, and possibly the algorithms, present in the SIM card will be unknown to the roaming provider, and the home network will need to send these keys to the roaming provider over the air. A proprietary algorithm would make it impossible for the roaming provider to authenticate the user.

The use of multiple IMSI SIM cards (where these are compatible with the customer's handset) makes authentication, registration, and billing easier. However, there are still some barriers, including arranging the routing of inbound calls through the roaming provider. This process would need to be very quick so that the customer can receive services from the roaming provider right after entering another Member State.

Security considerations would still exist. The IMSI and security keys would still need to be sent to the SIM over the air, while use of a proprietary algorithm for authentication and ciphering could be an implementation barrier difficult to overcome, while maintaining the standard level of security.

Effect

The effect of this regulation would be to unbundle retail roaming services from domestic services and thus enable competition to take place for the provision of these services.

The effect would be largely dependent on whether or not customers would be sufficiently motivated to make use of the provisions and exercise their right to choose a different provider for their roaming services. If they did, this could potentially lead to a general price reduction, after which there would be insufficient difference in prices for roaming services to make it worth the effort for consumers to switch to a different provider for roaming services.

Conclusion

Competition for roaming services should bring prices down to a lower level, however it is uncertain whether this effect is sustainable or whether this might lead to a one time only general price reduction, after which there would be little dynamics in the retail roaming market. If this were to be the case, the size of the initial reduction would need to be large enough to ensure that the policy goals are met.

For services other than voice, the customer would be required to change the settings on his/her phone. As explained under 2.1.1, this is possible through OTA messages that require little effort on the part of the consumer, but still constitute a nuisance for the end user.

From a technical perspective, this solution is likely to require the consumer to either use a multi-IMSI SIM card or a handset that supports dual SIM cards. Furthermore, security concerns would still be difficult to overcome. On the basis of the expected technical difficulty and subsequent costly implementation, this approach could be difficult to justify.

2.2 “Roam like at home” – rated “not suitable for 2012, to be reconsidered in subsequent review of regulation for post-2015”

Description

This approach links the roaming price by the individual customer to the domestic price for national calls by that same customer.

This alternative works as follows. A customer pays for a roaming call, SMS or data at their usual domestic tariff, plus a supplement to allow recovery of the additional cost of roaming calls. If a customer has a bundle then roaming is part of the bundle (with a supplement). Every retail provider shall then for example offer all (non-premium) roaming calls within EU/EEA at price which is limited to a “small” supplement to the corresponding price for domestic calls.

The retail price caps for EU/EEA roaming shall then have to be replaced by a rule which aligns roaming tariffs with individual domestic tariffs, and calculates the applicable supplement.

The supplement could be calculated as follows:

- (a) For roaming services charged on a “per unit” (linear) basis, the cost of a roaming service within the EU could not exceed $(X + Y)$ per second, where X is the per unit price of the customer’s usual tariff for an equivalent domestic service, and Y is the mark-up specified by Regulation to cover the additional roaming-specific costs. The precise size of the mark-up may vary between services (voice, SMS and data) and between per-unit tariffs and bundles (where the mark-up might be accounted for in volume terms).
- (b) Where the user purchases domestic services in a bundle, EU roaming services would also count towards the total allowance. The additional cost of the roaming service could be recovered either through the absolute mark-up or by counting roaming units at a specified multiple of domestic units, though the latter option would be difficult to enforce, due to the fact that if the mark-up is small, this would entail using fractions of units and is less transparent and harder to regulate.
- (c) for offers with unlimited national usage only the absolute mark-up would apply to cover the roaming costs.

If desired, this alternative could be extended to also include international calls, which would go a long way towards creating a Pan-European market. However this would be a significant extension of the current regulation into an area that was previously not regulated.

In addition, there are two variations possible on this: “Roam like a local” and “Roam like at home Eurotariff”. These are discussed in paragraphs 2.4 and 5.77.

Regulation

At the retail level, the mark-up would need to be regulated. The mark-up needs to take account of two things: the additional cost of providing roaming services for the highest cost efficient operator; and to deal with issues that arise from price differences across Europe: ensuring wholesale providers are not required to sell wholesale inbound roaming below

efficiently incurred costs and that retail providers are not subject to margin squeeze. Defining the mark-up therefore requires an assessment of wholesale and retail roaming costs and of domestic mobile prices, across the EU. For incoming calls, which are usually not charged domestically, the same mark-up could be used as the mark-up for outgoing calls but with no other charge.

This policy would not do away with the need for wholesale regulation, which would remain necessary to avoid margin squeeze. And unless the European mark-up turned out to be genuinely small, it is unlikely that a change to this policy would make sense, as the resulting retail tariff would not be low enough to justify this type of heavy regulation. This in turn means that wholesale price regulation would need to be quite tight. As long as the wholesale cap allows all operators to recover both cost (i.e. allows for the highest efficiently incurred costs) and a reasonable margin, this should not constitute a problem.

The mark-up could be tuned in accordance with the wishes of policy makers. A higher mark-up would be less intrusive but less effective at lowering prices, and vice versa. A stable (e.g. average) exchange rate should be considered for countries outside the Eurozone, to avoid under recovery of costs as a result of large currency fluctuations.

Effect

The intended effect of this alternative is to leverage the existing competitive pressures that exist on domestic markets to the roaming market.

If (eventually) the mark-up were to be set close to zero this solution would result in a market which contains both national and roaming calls (and possibly also international calls if the scope of the regulation were to be broadened to include these as well). This should lead to increased competition, at least at the retail level. Within the EU the national origin of the customer's provider or phone number would no longer matter. In essence it would create a pan-European market in which there is no reason why a consumer could not choose to use a SIM from a foreign network. In practical terms, however, it is likely that subscribers would still prefer local operators, if only for brand recognition/ trust and service and support in their own language.

To allow for a mark-up set close to zero, two conditions need to be met:

- Wholesale prices need to be very close to cost-oriented levels;
- The spread of domestic prices across Europe needs to be narrow

In particular, the wholesale prices need to cover the highest efficiently incurred costs, to avoid under-recovery at the wholesale level, or inability to recovery wholesale costs at the retail level. The spread of domestic prices needs to narrow to ensure that all consumers benefit from genuinely lower roaming prices.

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail	✔	✔	✔	✔

Wholesale	N/A ³⁹			
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Pros & Cons

The rule seeks to import the competitive outcome from the domestic level to retail roaming calls where there is little competition at present and opens the possibility of creation of a genuine single market for retail mobile calls. To the user, it presents Europe as a single territory within which all calls cost the same except for a “small” supplement for calls to and from other member states. However, such advantages come with a cost. It is hardly a “light touch” form of regulation and could cause disruption to business models in some countries.

On the other hand, only the maximum difference between roaming and national calls would be regulated instead of the total retail price. This would give operators the freedom to recover their total retail costs. Only the additional cost of a roaming call in comparison to a national call would need to be taken into account. As a result, costs such as those for marketing and sales would not have to be taken into account in the mark-up, avoiding the need to add additional margin to ensure no operator is forced to offer their services below cost.

For as long as domestic prices vary significantly across Europe, this regulatory option would create some scope for arbitrage opportunities. Web-based businesses could be expected to develop based on imports of SIMs from the countries with the best domestic deals. To avoid losing retail customers, retail providers in the “high charge” countries would be forced to make their retail tariffs more attractive. The risk of this truly happening though is limited due to the fact that any subscriber using a foreign SIM card to get lower rates for making calls would now be faced with paying to receive calls, at the rate of the roaming supplement. In addition, other consumers wishing to contact this subscriber would be faced with the higher charges for making international calls to a foreign phone number. These practical drawbacks may limit consumer’s take-up of foreign SIMs. Nevertheless, arbitrage opportunities cannot be ruled out at least for users showing an intensive pattern for outgoing calls, and for those willing to use dual-SIM phones. In these cases, the possibility of disruption for some business models would still exist. This possibility would need to be thoroughly analysed. If retail prices in future become more similar across Europe, this concern would disappear.

The rule does create an incentive for companies to raise domestic tariffs. But where domestic markets are considered to be reasonably competitive, the effect would be severely limited by competitive pressure. Also, following existing regulation, retail roaming revenue makes up a small proportion of total revenue, so that any tariff rebalancing is unlikely to be significant.

Due to the scope for arbitrage, there exists the possibility for some disruption to business models in those countries where domestic rates are currently relatively high when compared the EU average. For example, handset subsidies are still significant in some national markets, recovered in part through higher call charges. Downward pressure on domestic call charges could make it difficult to sustain this business model. On the other hand,

³⁹ Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation

domestic subscribers are usually already offered better tariffs for SIM only subscriptions, when compared to deals that include a handset. It is unlikely that this would change due to the possibility of getting better rates through use of a foreign SIM, without a handset.

If international calls were to be included in this regulation, the scope for arbitrage would increase significantly, as the penalty for receiving calls when using a foreign SIM would be only limited to the charge that needs to be paid for receiving roaming calls. If this mark-up is very low, all calls within the EU would be treated more or less the same, whether they were domestic, international or roaming, and for end users it would be perfectly feasible to make use of mobile services offered by a foreign operator, rather than a domestic one, if this would better suit their needs. Needless to say, this would be a very severe form of regulation.

Criteria

This option can have quite different implications depending on the size of the mark-up set. It is most logical to consider this alternative if a decision is made to pursue the EDA target. As the success of this measure depends on meeting the two criteria necessary for setting a mark-up close to zero (near cost-oriented wholesale roaming prices and broadly similar prices across Europe), it is scored twice. In the main score, it is assumed that the market conditions will not have changed much by 2012 and the conditions will not be met.⁴⁰ In addition, a score is given in brackets for the situation where these conditions are met, which may be the case by 2015. (This second score is only given in the event that the scoring differs from 2012).

Criteria	Score	Description
Effectiveness		
Price – prevent excessive pricing	++ (+++)	The difference between roaming and domestic prices would be the additional cost of offering this service, plus (as needed) a mark-up to avoid operators being required to offer roaming services below cost and/or to avoid margin squeeze. Depending on wholesale roaming prices nearing cost and the differences in retail prices across Member States narrowing, the mark-up will be sufficiently small to fulfil the EDA target. This solution does not promote competition for roaming services, but rather reads competition in the domestic market across to the roaming market. Subject to the size of the mark-up, consumers would face charges for roaming services closer to domestic ones. The size of the mark-up would be constant and so could become familiar.
Price – achieve the “EDA target”	0 (++)	
Competition	0	
Transparency	++	

⁴⁰ BEREC estimates that at present the mark-up would need to be around € 0.10 per minute to avoid margin squeeze.

Regulatory burden	---	This alternative has the largest impact on roaming revenues and severely limits the operator's ability to differentiate their roaming prices from domestic prices. In some instances it may impact the current business model of operators.
Impact on national markets	- (--)	Depending on the size of the mark-up, arbitrage opportunities may arise, which could negatively impact the domestic market in some member states.
Consumer friendliness	+++	This alternative does not require any action on the part of the consumer.
Feasibility	++	This alternative mainly requires operators to change their billing systems and should be easy to enforce by NRAs.
Avoidance of regular reviews	0 (++)	Under the assumption that a glide path is used to reduce the mark-up, once it has reached the desired level and if policy makers deem further regulation unnecessary, no further review of the market would be necessary. Until such a time, the mark-up would require regular review, similar to the current price caps.

2.3 “Roam like a local” – rated “not suitable for 2012, to be reconsidered in subsequent review of regulation for post-2015”

Description

This alternative is a variation on the “Roam like at home” scenario described above. Due to the similar nature between the two this section focuses mainly on the differences. However, where the “Roam like at home” scenario seeks to link roaming tariffs with domestic home tariffs, this alternative would require operators to charge their roaming customers a tariff which would be close to the tariff that is being paid by local subscribers in the visited country for national services. For example, a Danish consumer roaming in Spain would face roaming tariffs that are “close” to what is paid by a Spanish consumer.

This could entail two things for calls back home: either the customer could be charged the same international tariff faced by domestic users (which are typically higher than the current roaming tariffs) or they could face roaming charge which would be tied to the “local tariff” for domestic calls. As the former will do little to reduce roaming charges, the latter option will be discussed further.

Regulation

Applying a local tariff for roaming calls should decrease the roaming charges. The difficulty would be in determining what this tariff would be. Most likely some benchmark would need to be used or perhaps it could be pegged to a pre-defined type of subscription.

In addition, consumers would be faced with a different tariff in each country, rather than a uniform EU roaming tariff.

Given that the retail rate would differ from country to country, this would enable the possibility of differentiating the wholesale cap on a per country basis as well. Whether or not this is desirable is a different issue as it could imply that countries with high retail averages would be “rewarded” with subsequent higher wholesale caps as well.

Effect

The effect of this alternative is to leverage the existing competitive pressures that exist on domestic markets to the roaming market, similar to “Roam like at home”, though the outcome would differ from country to country.

To allow for a mark-up set close to zero would require that wholesale prices need to be very close to cost-oriented levels. As the tariff would vary from country to country, the second condition required for “Roam like at home”, that domestic prices across Europe be broadly similar, does not apply here.

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail	✓	✓	✓	✓
Wholesale	N/A ⁴¹	✗	✗	✗

Pros & Cons

The main advantage of “roam like a local” over “roam like at home” is that the potential spill over effects onto national markets are reduced as the scope for arbitrage is diminished. In addition the ability to differentiate both the retail and wholesale cap on a per country basis would allow for less stringent regulation. On the other hand it could discriminate competitors in countries with low rates, which could have the same cost levels as a competitor in a country with a high rate.

The main drawback is that there would no longer be a simple identifiable tariff for consumers, raising the question of how to ensure consumers are well-informed. It would also be a difficult task to come up with a reliable benchmark that would be used to determine what the national roaming rate should be for each individual country, at both the retail and wholesale level.

⁴¹ Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation

The reduction in arbitrage possibilities for those countries that have higher domestic averages also reduces the potential positive spill over effects on the national market to international calls, though this is not the aim of the Regulation.

However this option would increase the burden on NRAs, because they need to check the compliance of all these operators in all the 27 countries, that have differing tariffs

Criteria

Similar to the previous alternative, here too the implications can be quite different depending on the size of the mark-up set. It is most logical to consider this alternative if a decision is made to pursue the EDA target, in the event that is defined as the difference between roaming prices and national (visited country) prices approaching zero. As the success of this measure depends on near cost-oriented wholesale roaming prices (taking account of the highest efficiently incurred costs), it is scored twice. In the main score, it is assumed that the market conditions will not have changed much by 2012 and the condition has not been met.

Similar to the previous alternative, a score is given in brackets for the situation where wholesale prices will be close enough to cost-oriented levels, which may be the case by 2015. (This second score is only given in the event that the scoring differs from 2012).

Given the similarity between this alternative and the “Roam like at home” scenario, the description here illustrates the difference between the two.

Criteria	Score	Description
Effectiveness		
Price – prevent excessive pricing	++ (+++)	Prices will vary from country to country, but will be lower than the current roaming caps and will reflect the competitive outcome in the visited country. Operators are likely to keep their prices even closer to the established “country cap” than we currently see for Euro-tariff.
Price – achieve the “EDA target”	0 (++)	
Competition	0	
Transparency	-	
		Due to the differentiated price per country, this reduces the transparency for consumers.
Regulatory burden	---	This alternative has the largest impact on roaming revenue and severely limits the operators ability to differentiate their roaming prices from domestic prices and is likely to impact the current business case of operators, similar to “Roam like at home”
Impact on national markets	0	Due to the differentiated pricing per country, arbitrage opportunities should be limited
Consumer friendliness	++	This alternative does not require any action on the part of the consumer, but offers less certainty for consumers, as they face a

		different tariff for each visited country
Feasibility Technical Feasibility Commercial Feasibility Regulatory Compliance	0 - --	It would be necessary to determine a cap (for both retail and wholesale) on a per country basis. Experience with determining an average price per user, per country, suggests this is non-trivial. This alternative mainly requires operators to change their billing systems, though they would now have to setup (and maintain) different prices for each EU member state.
Avoidance of regular reviews	---	Given the need to set a benchmark to determine the “local” price for each country, regular review would be necessary, unless an existing benchmark is chosen that already receives regular reviews, negating the necessity of policy makers to intervene.

3. Alternatives that are intended to have their main effect at the wholesale level

3.1 Full wholesale access on “cheap” regulated terms – rated “possible but unlikely”

Description

Under this proposal, service providers would have the right to obtain access to other European networks to originate calls on regulated terms.

Regulation

All MNOs would be required to offer access at cost-oriented prices at the wholesale level.

Effect

Though this proposal seeks to specifically address the issue of high roaming prices, the effect of this regulation would be to give all mobile operators the ability to become an MVNO in a different country. If the goal of the regulation is to reach the EDA target where the difference between national and roaming prices should approach zero, limiting the access to roaming service is simply not practical – possible subscriber acquisition for roaming only would not be significant enough for MVNOs to enter the market and lower prices.

Moreover, a limitation of the scope of the access right to the provision of roaming services would have the effect of discriminating between national and international service providers without any clear rationale. In practice therefore, the proposal amounts to a universal right to become an MVNO on regulated terms. This would increase competition in national, roaming and European wide markets.

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail	✓	✓	✓	✓
Wholesale	N/A ⁴²	✗	✗	✗

Pros & Cons

This would be a very significant extension of the Regulation. In terms of whether it would be effective at addressing the specific issue of competition in roaming, it would not of itself generate more wholesale competition (although conceivably this could be a by-product). Competition at the wholesale level could come from MNO's competing to get the business from MVNO's, especially for voice if they have capacity to spare on their network. It could be expected to stimulate the emergence of attractive retail pan-European offers, initially by (mostly smaller) players with an incentive to disrupt the market, which should then catalyse greater retail competition more generally. In the latter case, there would be an arbitrage opportunity for providers in "cheap" countries to market their services to consumers in "expensive" countries.

On balance, such a remedy could work well but is fairly intrusive. On the plus side, it should lead to a genuine single retail market not only for roaming but more generally for mobile telephony.

The main drawback is the uncertainty of the above mentioned events actually taking place. Although there is hope that the news surrounding the current Regulation has raised consumer awareness of roaming tariffs, there is no guarantee that new entrant MVNOs would have the commercial incentive to offer their customers lower roaming tariffs.

Criteria

Criteria	Score	Description
Effectiveness		This alternative is mainly aimed at adding more competition to the retail roaming market, which should in turn lead to lower retail tariffs. If it succeeds, it will allow providers to offer "all-Europe tariffs" on the basis of low wholesale access prices. The speed and extent of this effect is uncertain
Price – prevent excessive pricing	+	
Price – achieve the "EDA target"	-	
Competition	++	
Transparency	o	
Regulatory burden	---	This option entails regulating access (for providing roaming services) in all EU

⁴² Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation

		members states, where most NRA's have deemed such regulation unnecessary for their domestic market. Operators would thus be forced to open their networks to MVNOs, where they currently to not have to if they so choose.
Impact on national markets	--	As above, this alternative would mean regulation access where this currently is not imposed.
Consumer friendliness	++	Consumers would have more choice, but might have to switch operator to reap the benefits of the added competition.
Feasibility	+	Access is already provided on a commercial basis in many (most?) Member States. It could however still require some time for MVNOs and host network to setup all the required technical systems
Avoidance of regular reviews	0	Given the expected effectiveness of this solution it is likely to require review (at least initially) after a fixed period to see if the required target is met or not.

3.2 Wholesale spot market – rated “possible but unlikely”

Description

Most countries have 3 to 4 MNOs, which could each service the entire market for roaming traffic. This should lead to a fairly competitive wholesale market.

However, current bilateral roaming agreements are mainly based on two criteria: the agreed upon wholesale charge and the volumes both networks can send to each other. This latter part of the agreement is of crucial importance as the agreed upon wholesale charge will only apply to the net result of the traffic, and discounts are often applied according to the volume of traffic that the home network sends to the visited network.

Thus if an operator is looking for a new roaming agreement in a certain country it will not only look at the wholesale rates offered by the various networks in that country. An agreement with a very balanced traffic structure is far more likely to be attractive, despite a higher wholesale charge than an agreement with a very low wholesale rate, but with little return traffic, which means that the majority of the traffic will actually be billed.

Empirical evidence from termination rates suggests that although operators only pay for net traffic, they do base their retail price structure on the perceived wholesale rates they face⁴³.

In addition there are issues regarding coverage, the availability of a 2G/ 3G network, and quality of service mainly for voice calls (the preferred offer for voice roaming currently determines choice of networks for all roaming services). Quality for data services is likely to gain in importance.

For destinations outside the EU and Northern America, an auction house has been launched by Qroam.⁴⁴ As this could provide ideas for how a spot market might operate within the EU, a short description of the Qroam system is given below:

The Qroam solution is entirely web based, so there is no need for technical implementations, as Qroam only deals with the commercial side of the agreement. When an agreement is reached, Qroam sends out the standardized contracts to both parties. The parties then need to sign and return these to the other party. The Qroam solution works within the existing system of roaming contracts. After the commercial agreement is reached, there is still the need for the normal connection and testing procedures. This is less of a concern for roaming within the EU/EEA, as most MNOs already have working roaming relations.

The website of Qroam allows an MNO (buyer) to select a specific country for which they are looking to get a (better) roaming deal. After selecting a country, a list of all MNOs in that country is shown and the buyer can choose which of the MNOs he would like to include in the auction (according to Qroam, most buyers select all possible candidates). No further information is given regarding the MNOs in question, though a link is provided to the GSMA website for information regarding coverage. This means it is the buyer's responsibility to have a working knowledge of the quality of service they can expect from the selling MNO when selecting which MNOs should be included in the process. Again, this should be less of an issue within the EU as the MNOs will already have a working knowledge of the QoS of most of their roaming partners.

The buyer then chooses the desired duration of the contract, the volumes and other input criteria (like QoS) and whether or not it will be a blind or open auction, meaning that the bidding parties may or may not see the best bid to date, the reserve price, and the "buy now" price. The buyer will also be able to select when they want the contract to start. The time between placing an order and the start of a contract is usually 2 to 3 months.

The next step for the buyer is to set the following parameters for voice, SMS and data:

- a reservation price: if the reserve prices have been met, the bidder with the lowest weighted price (price weighted by the volume of each service) wins the contract. If two bids are equal, then the bidder that placed their bid first wins the contract.
- a "buy now" price (only for voice): if a bidding party offers this price (first) the auction ends and the bidder gets the contract (assuming the reserve prices for SMS and data have been met)

⁴³ See Tirole and Laffont (2000), *Competition in Telecommunications*, MIT Press and DeGraba (2000), *Bill and keep at the central office as the efficient interconnection regime*, FCC, OPP Working Paper No. 33.

⁴⁴ <http://www.qroam.com>

- a minimum commitment volume: a commitment to the volume the buyer will buy at the agreed price. This volume is also used to value the bid and compare bids
- an expected volume: typically slightly higher than the minimum commitment, enables the bidding parties to take this into account when setting their price.

Once the buyer has entered the details above, the auction is initiated and the bidders are invited to participate in the auction.

Full MVNOs can also use Qroam to buy roaming minutes. The main difficulty for them (at least initially) is to have a good estimate of their volumes. This does not need to be a problem for existing full MVNOs.

Though this solution has its merits, BEREC is doubtful if it could be scaled up to work for the EU. In particular, there are doubts whether or not such a system could be made sufficiently “blind” to achieve the goal of this alternative, as this is only a minor feature of the Qroam solution, but would be a serious requirement for an alternative at the EU level, where market players are far more familiar with each other and much larger traffic volumes are involved.

Regulation

The proposal seeks to stop the current system of bilateral traffic exchanges. This could be applied by introducing a legal obligation prohibiting providers from linking price to volume or by imposing open trading of wholesale inbound roaming traffic either on a spot market or an electronic platform.

As it would be difficult to enforce a simple legal obligation prohibiting bilateral agreements (it would be difficult to ensure that two simultaneously agreed upon contracts do not still amount to bilateral agreements, especially as existing players will be aware of each other’s volume requirements), BEREC considers imposing spot market without any bilateral trading allowed alongside⁴⁵ shows more promise and will be the focus of this section.

As in the Qroam solution, the spot market would function as an auction platform for the buying and selling of roaming traffic, where traffic could be traded either in real time or in a combination of both short- and long-term contracts. Additionally, it would have a hub function, which would centralise all agreements and interconnection and eliminate the need for lengthy negotiation and testing procedures, associated with bi-lateral agreements for new entrants or new routes.

As this solution addresses competition at the wholesale level and would rely on a disruptive provider (possibly MVNO entrants) taking the opportunity to offer lower retail prices, it would be necessary to consider introducing a safeguard cap at the retail level to ensure pass through to roaming consumers, at least in the short term. On the other hand, evidence from the current Regulation suggests that caps might tend to work as a target to which the market gravitates, impeding the development of competition.

⁴⁵ Bilateral trading alongside the spot market is allowed (e.g. in the UK electricity market) where the spot market alone could not account for aspects that could disrupt the market, e.g. uncertainty in predicting long-term demand and/or supply, product differentiation, or specific investments for which the party making them seeks guarantees from the trading counterpart.

Effect

Due to the fact that contracts would no longer include volumes of return traffic, operators would base their roaming agreements mainly on the offered rates and competition at the wholesale level would thus be focused more on price. This would enable smaller operators with smaller roaming traffic volumes to complete agreements at a more competitive rate.

Competition would mainly be stimulated through smaller operators, as (at least initially) it is unlikely that the larger group operators will react to this form of regulation as they already have the ability to keep much of their wholesale traffic within the group. Thus the possible subsequent stimulus of the retail market would have to come from non-aligned operators, which should be able to get better wholesale rates on the spot market. On the other hand, non-aligned operators may not be able to offer full national coverage, limiting the attractiveness of their offers and their ability to disrupt the market or drive competition, given that operators buy wholesale inbound roaming from more than one provider to ensure coverage.

On the other hand, full MVNOs could also trade on the spot market. Currently they have no return traffic to offer and therefore often have little choice but to make use of the roaming agreements of their host network. With a spot market they would be able to purchase traffic just like any other operator.

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail				
Wholesale	N/A ⁴⁶			

Pros & Cons

It would take time to setup up such a market properly. There would also be difficulties in ensuring that group companies don't still mainly keep traffic within their groups or and buy services from each other, which would lead to a much smaller market and the same existing difficulties for smaller providers to attract traffic to their network. Furthermore, most operators have multiple roaming arrangements to ensure coverage. The selection of multiple companies could be tricky in a spot market context because it is not known which operator offers the service, making it difficult to choose different operators if purchases are made at different times.

Assuming that the above issues are resolved and a roaming spot market is established, it would be necessary to consider how to provide information on the quality metrics associated with the user's communication needs. It is for example possible that a particular MNO would pay more for roaming in order to give its customers access to roaming providers with larger coverage or that can meet certain QoS criteria. A spot market requires standardised

⁴⁶ Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation

products. Therefore it would be necessary to define criteria on metrics like coverage and quality (there could possibly be more than one grade), assess all the roaming offers, and give objective ranking. It seems likely that some operators would be able to offer higher QoS than the minimums defined, and would be prevented from offering variable levels. It could be possible to allow the buying operator to deselect an operator on the basis of their requirements, with a stipulation that they must receive bids from a minimum number of operators (e.g. at least two operators). This is similar to the Qroam solution. This solution would concentrate competition around price.

A spot market also requires liquidity to function, to minimise volatility and for prices to reflect the fundamentals of supply and demand. Given the relatively small number of mobile operators directly buying and selling roaming under the current model, it would be necessary to assess whether liquidity could be brought about through third party traders, forward, future and option contracts, and the overall impact this would have on prices and transparency in the market.

If this option could be made to work, it could increase market transparency and create a more competitive wholesale market, which is more likely to result in better retail offers. Ideally there would be sufficient scope for competition to enable the withdrawal of retail regulation. It is however uncertain if the lower wholesale rates would be passed on to the retail level.

Criteria

Criteria	Score	Description
Effectiveness		
Price – prevent excessive wholesale pricing	+	A spot market for wholesale roaming services should provide incentives for operators to offer roaming minutes at more attractive rates than the current wholesale cap, as most MNOs have capacity to spare (especially for voice), that they can use to add revenue. This should ensure a more competitive outcome. The big unknown is how groups would choose to deal with their inter-group traffic. It is uncertain if the spot market would be able to deliver wholesale rates low enough to prevent margin squeeze in the event the EDA target is adopted.
Competition	++	
Transparency	+++	
Regulatory burden	--	The main regulatory burden arises from the cost of setting up and operating the spot market.
Impact on national markets	0	As the market would only deal with wholesale roaming services, the impact on national markets should be minimal.
Feasibility	--	The setup and use of such a spot market would require significant time and effort.

Avoidance of regular reviews	-	Given the uncertainty of the effectiveness of this solution it is likely to require review (at least initially) after a fixed period to see if the alternative is functioning well and delivers the intended level of wholesale rates.
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4. Approaches which cannot have a major impact but which could be considered as complementary to other measures

Retail level

4.1 Regulation of the wholesale resale roaming charges paid by MVNOs

Description

A perhaps simpler way to utilize the competitive pressure of MVNOs is by regulating the wholesale tariff the host MNO can charge the MVNO hosted on its network for roaming services. Currently the wholesale cap only applies to MNOs. The majority of national MVNO contracts are concluded on a commercial basis. Often where there are two or more national MNOs with GSM capacity to spare, there is competition to attract MVNOs onto these networks. This enables MVNOs to get contracts that enable them to offer interesting domestic tariffs. Unfortunately, these contracts appear to be focused on the same thing the majority of retail consumers are focused on: domestic tariffs. It is unlikely that an MVNO would willingly accept higher domestic charges in exchange for lower roaming charges.

Most contracts thus don't include interesting roaming tariffs and limit the ability of MVNOs to offer anything besides the currently required Eurotariff, limiting the competitive pressure on MNOs for roaming services.

By regulating a wholesale tariff which the host MNO can charge its MVNOs this would allow these MVNOs to offer better roaming deals to their customers. Depending on the commercial incentives for MVNOs to offer a disruptive roaming deal (ability to attract additional subscribers), this could potentially add sufficient competitive pressure to bring down roaming tariffs, without the need for retail regulation.

Regulation

This alternative amounts to giving MVNOs access to the regulated cap currently reserved for MNOs only. Depending on the target of the regulation, this cap could either be set comparable to those in the current regulation or could be set far more aggressively in order to achieve the EDA goal by 2015.

Effect

The effect would be to enable MVNOs to compete with MNOs for roaming services. If MVNOs had a commercial incentive to offer lower roaming rates, this could increase competition. It could also facilitate the creation of pan-European Roaming Providers, which would provide seamless mobile networks covering several countries, accessible with a

single subscription.

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail	✓	✓	✓	✓
Wholesale	N/A ⁴⁷	✗	✗	✗

Pros & Cons

The main advantage to such an approach is that if it worked as intended it would enable the withdrawal of the current retail regulation. Ideally stimulating access for MVNOs could lead to a similar situation as seen at the national level, with MNOs competing to attract MVNOs to their network, enabling the MVNOs to pass on (part of) the savings to consumers.

The main drawback is the uncertainty of the above mentioned events actually taking place. Although there is hope that the news surrounding the current Regulation has raised consumer awareness of roaming tariffs, there is no guarantee MVNOs would have the commercial incentive to offer their customers lower roaming tariffs. The main effect would have to come from MVNOs that specifically target roaming and their disruptive roaming offer would need to attract sufficient subscribers to lead other, more mainstream, providers to compete. For the majority of MVNOs that focus on domestic services it is unclear if they have sufficient incentive to pass through the lower wholesale roaming rates to consumers at the retail level.

Criteria

Criteria	Score	Description
Effectiveness		This alternative is mainly aimed at adding competitive pressure on retail roaming prices. It is not likely if these would be sufficiently low to achieve the EDA target, unless the regulated wholesale cap would be set significantly lower than the current caps.
Price – prevent excessive pricing	+	
Price – achieve the “EDA target”	--	
Competition	+	
Transparency	o	
Regulatory burden	o	This alternative mainly ensures all MVNOs have access to a wholesale rate which enables them to set competitive retail prices

⁴⁷ Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation.

		of their own choosing.
Impact on national markets	-	This would only impact existing MNO-MVNO relations.
Consumer friendliness	+	Consumers might experience more attractive pricing from MVNOs, However, the effect is likely to be limited – most MVNOs do not see roaming as a key competitive differentiator
Feasibility	++	This alternative only requires an adjustment of the (commercial) agreement between MNOs and MVNOs for providing roaming services.
Avoidance of regular reviews	--	Given the expected effectiveness of this solution it is likely to require review (at least initially) after a fixed period to see if the required target is met or not.

Wholesale level

4.2 Unbundling wholesale roaming services

Description

Currently the visited network takes care of origination, transit and termination and passes these costs on to the home operator under a single Inter Operator Tariff (IOT). However, the visited network does not actually provide the transit and termination services itself, but rather has to buy these services, which is covered by the IOT. This alternative proposes to single out this component of the IOT for regulation, as international transit is considered reasonably competitive and termination is already regulated by individual NRAs at the national level.

The home operator would only purchase the origination part of the call from the visited network, allowing the home operator to use their own transit and termination arrangements. This would allow only origination to be regulated.

This alternative would require indirect routing, as all traffic from the visited network would first be routed to the home network. Data collected for the initial Roaming Regulation indicated that the majority of roaming calls go back to the home country, but not necessarily to the same network as the roaming customer. As transit costs are low this should not be a significant problem.

Alternatively, the IOT could cover only origination and transit, to allow for direct routing, but still reduce the services being regulated.

In both scenarios, the home operator would have to set up multiple billing arrangements for the same call. In the first scenario this would be one for origination, one for transit and one

for termination. In the later scenario this would be one for origination and transit and one for termination. This complexity could be reduced by using a hub for transit.

Regulation

This alternative reduces the services that need to be regulated at the wholesale level for voice and SMS. Rather than covering all parts of the IOT, it only regulates origination and in doing so reduces the scope of the regulation.

Effect

The intended effect would be to only regulate the specific service that is the bottleneck. It would also allow for a better estimation of the cost for a typical European operator, as less variables need to be considered, reducing the need to add margin to certain services to ensure cost recovery for all European operators.

Scope of impact on competition	Voice – incoming	Voice – outgoing	SMS	Data
Retail				
Wholesale	N/A ⁴⁸			

Pros & Cons

The main attraction of this alternative is the ability to reduce the number of services that need regulation to the competition bottleneck of origination. This avoids the necessity to add margin to the regulated wholesale cap to ensure recovery by all European operators of transit and termination charges, wherever their calls terminate, this will become less of a problem when all MTR's converge to Pure BULRIC. Direct/ indirect transit can then be acquired in competition, and the home operator would pay the regulated termination rate actually incurred for each call. That could mean savings if many of his customers' roaming calls terminate in countries with a low regulated rate, although BEREC notes that the spread of MTRs in the EU is narrowing and this trend is likely to continue in light of the 2009 Commission Recommendation on termination rates. Overall, from a regulatory point of view, unbundling these charges would mean more targeted regulation.

Regulating origination only seems to be impractical and inefficient, however, as it would require a home operator to negotiate transit not only between the home country and all other EEA countries, but also between all combinations of EEA countries. At present, some operators agree a single transit deal for their inbound wholesale roaming and domestic international services, creating greater efficiencies of scale, which would also be lost.

If the visited network were to charge only for origination and transit, a new set of billing arrangements would have to be set up between the home network and the terminating

⁴⁸ Incoming roaming voice calls are not charged under the IOT and thus not affected by the Regulation

network. The analogous billing relationships for calls originated at home don't exist either. This could also create inefficiencies.

In practical terms therefore, market players have little incentive to buy an unbundled IOT as it could decrease efficiency.

Criteria

Criteria	Score	Description
Effectiveness Price – prevent excessive wholesale pricing Competition Transparency	o o ++	As this alternative strive to decrease the number of services regulated and in line with this decreases the need to add margin in the face of uncertainty regarding certain cost, the wholesale price should be expected to fall. It is unlikely however if this alternative would deliver wholesale rates low enough to prevent margin squeeze in the event the EDA target is adopted.
Regulatory burden	0	On the one hand this alternative reduces the number of regulated services, which is good, on the other hand it would require operators to either use indirect routing or to setup transit agreements between all possible combinations of operators within the EU/EEA
Impact on national markets	0	Reducing the scope of the regulated wholesale roaming service should not have an impact on the national market
Feasibility	-	If operators need to setup transit relationships between all combinations of EEA countries, this will likely involve significant time and effort.
Avoidance of regular reviews	-	Given the expected effectiveness of this solution it is likely to require review (at least initially) after a fixed period to see if the alternative delivers the intended level of wholesale rates. As this is thought to be unlikely, regular review would be necessary.

5. Alternatives that BEREC has reviewed but excluded from consideration

This paragraph deals mainly with solutions that already exist in the market today, but have proven to be insufficiently effective to allow for the withdrawal of the current roaming regulation.

5.1 *Purchase a local SIM card*

Description

All consumers with an unlocked handset are free to purchase a local SIM card to avoid having to pay roaming charges. This works well for data services, where consumers can have a similar experience as they are used to at home.

For voice and SMS services however this alternative is less attractive as customers would need to first communicate their new local number to their existing contacts at home, who would then be faced with the price of an international call or SMS when calling/texting.

Also, some consumers may be reluctant to identify and contract with a company abroad, perhaps in another language. Furthermore purchasing and replacing a domestic SIM could pose to complex for a lot of users. The effort to switch may not be considered worthwhile unless the consumer will spend a lot of time in the same foreign country.

Conclusion

This solution is readily available to most consumers today (those who do not have a SIM locked handset), but consumer take-up does not seem great enough to place significant competitive pressure on roaming prices, at least for voice and SMS. BEREC considers it unlikely this will change in the near future. As such this cannot be considered a mass market solution that will have sufficient impact on the market to force mobile operators to lower their roaming tariffs.

5.2 *Require handsets to always support (at least) dual-SIM*

Description

As discussed in 3.1, an alternative to roaming is to use a local SIM card (or a global SIM). One of the main reasons most consumers choose not to go this route is due to the fact that all their contacts are aware of their own national number and informing them to use a different number (an international rate if they are in the home country or a third country) for a limited duration seems more hassle than it's worth.

Giving consumers the option to use a local SIM card *in addition* to their own national card opens up the possibility for users to choose a local subscriber for local calls, which perhaps offers interesting tariffs for international calls as well, whilst remaining accessible for their regular contacts.

There is currently a technical solution being introduced on the market that allows single SIM telephones to be used with two SIM cards. With this solution, the user can physically put an extra SIM on top of the normal SIM card used for services in the home country. The extra SIM card can be used for roaming. Calls to the normal phone number can (automatically, if requested) be forwarded to the roaming SIM phone number. For outgoing calls and SMS, the user can select that the receiver of the call or SMS sees the phone number (caller ID) from the normal SIM. As such, this is a technical solution to achieve the roaming and home services as separate options. This technical solution does not need specific regulation. One existing solution may be used with 80 percent of the mobile phones in the present market, expected to increase to 90 percent. Especially smart phones are compatible with this

solution. The roaming provider needs to be a full, global MVNO with access agreements (MNO hosting) in the countries where local numbers are offered. Finally, at the present time SMS to the normal SIM phone number cannot be forwarded to the roaming SIM phone number. It is uncertain if it will be possible to forward SMS in future developments of this solution.

Conclusion

This solution does not address all incoming traffic, as subscribers will still receive calls and SMS (dual SIM handsets) or only SMS (two SIMs in a single SIM handset) on their home number. If it in the future it becomes possible to forward SMS, the single SIM handset solution could completely unbundle domestic and roaming services.

Regulating handsets is outside the scope of the Regulation. Even if this were possible, it is likely to take too long for sufficient handsets of this type to be in use by 2012. The solution whereby a roaming SIM can sit on top of the usual SIM could overcome the latter problem for many handsets.

5.3 Multi-IMSI

Description

One global solution is to have multi IMSI cards, able to support different numbers – one for the ‘home’ country and one for the country the customer is in. When the customer is travelling, call reception can be free (calling party pays) and local calls are inexpensive. The customer has at least two phone numbers (he might not see them) – his usual phone number and a local number – and can receive calls on both, thanks to call forwarding from the usual number to the local number when the he is abroad. His host network would ensure that the cheapest call option is automatically selected.

This solution is provided by some MNOs (for example, NTT DoCoMo and KTF between Japan and Korea or Telefónica and Meditel between Spain and Morocco).

This solution is also provided by MVNOs that have access in several countries. Once again, the customer gains access to local terms of the access market. Examples: Camel Wireless, Transatel, Truphone.

Conclusion

This is a roaming solution that is popular among full MVNOs that establish a presence in more than one country. This solution has two major advantages, the fact that it is actually implementable without the need for further regulation and the fact that the allocation of a local number to the roaming user can be a completely transparent procedure.

It appears that the MVNOs have a relative advantage over MNOs as they can be present in many countries without the need to rollout a network, while in some cases MVNOs use the same authentication, registration and billing resources (such as the HLR and the AUC) across all the countries where they are present.

The drawback of such system is that it requires mobile numbers in the different countries and a special SIM card (which however may be the SIM card originally provided by the

MVNO). Current offers seem to be too complex for occasional roamers and it is questionable if they will reach a critical mass by 2015.

Some regulatory issues may also exist, particularly related to the effective and efficient use of numbers (local numbers will be allocated for a few days and would probably need to be quarantined for several months before being re-used), the display of caller location information (CLI), or the location information provided to emergency services. We don't believe that these issues would be unsolvable and the NRAs should encourage MVNOs to properly resolve them.

5.4 Double stage dialling

Description

In this scenario, the user dials the number of the service provider, then enters a user number + pin code, then the called number. The service provider proceeds to establish the desired connection.

The call is billed directly by the service provider; however, the user would also incur charges for making a voice roaming call to a local number (in the visited network country), therefore making the scenario possibly interesting only for calls to expensive international destinations, but not for intra-European calls.

Conclusion

This scenario in principle only covers outgoing calls and even in this scenario the service provider has to make it possible to reach this number for a low cost as in fact the customer is still roaming. This option therefore does not seem to solve the roaming problem. This solution already exists in the market and take-up does not seem great enough to place significant competitive pressure on voice roaming prices.

5.5 By-pass solution: Call-back

Description

From the consumer's perspective, this solution is similar to Double stage dialling except that, after entering the number to be called, the user hangs up⁴⁹. The service provider then calls back on the user's number and proceeds to establish the desired connection.

The call is billed directly by the call-back service provider; however, the user would also incur charges for a voice roaming call to access the service, as well as the cost of receiving a roaming call for the call-back. This would still be cheaper than only making an outgoing roaming call, but might be too technical or cumbersome for incidental roamers.

Conclusion

The drawback of this scenario is that it will be overly complex for occasional roamers and it only covers outgoing voice traffic. Call-back solutions already exist today, but have not been able to bring sufficient competitive pressures to the market.

⁴⁹ Several methods could be used, but calling and hanging up is historically the most common.

5.6 *Require all operators to offer a VoIP alternative*

Description

In future it is likely that a large share of handsets will support VoIP solutions, and many customers will have applications installed (even pre-installed) on their mobile phones (as with many current generation smartphones). This development can be supported by the migration to LTE, with the possibility of higher speed data connections and increased QoS.

For roaming purposes this could enable a possible simplification of the current regulation to only data, an emerging market, where there is an increasing competitive pressure from local fixed (Wi-Fi) alternatives.

Regulation could either be limited to ensuring the use of VoIP is not barred when used in combination with a flat-fee data subscription (could be part of network neutrality principles), or it could go a step further and require operators to offer their customers a flat-fee package of XY euro/month for VoIP. This would ensure that consumers can benefit from competition for data services whilst roaming and not be forced into “old world” voice tariffs when travelling abroad. Consumers would be able to use their VoIP service in a similar manner as they are used to on their home network. The price for such a flat-fee could either be determined by the Regulation or could be left to competitive pressures, which have previously been identified to exist in the retail roaming data market.

Conclusion

It is unlikely that the aforementioned scenario will exist by 2012 in most countries across the EU. In the longer term, this could very well be a viable option for retail regulation.

5.7 *Roam like at home – Eurotariff*

Description

This alternative is another variation of the “Roam like at home” scenario described under 2.2. In this form all operators would need to offer one “Roam like at home” tariff, similar to the current regime which requires operators to at least offer a Eurotariff. Besides this Eurotariff package that has the same domestic and roaming tariff (subject to a roaming supplement), operators would be free to offer other domestic and roaming packages.

The appeal of the variation would be that it would limit the intrusiveness of the regulation that is required for the original “Roam like at home” alternative, as operators would need to offer only one such offer.

The difficulty in this variant however is similar to the previously discussed alternative: which tariff would be offered with the Eurotariff? If this tariff would be defined by regulation this would mean two things: firstly there would still be a need for a regulated roaming tariff and secondly the regulation would now also include a regulated domestic tariff.

Conclusion

BEREC does not find this option to be particularly better than the “Roam like at home” alternative either. It appears on the face of it to be less intrusive, but if you take into account that this form of regulation would require regulating the domestic tariff associated with the

“Roam like at home” Eurotariff, it is debatable whether or not this is true. In addition it has the drawback of still requiring a regulated tariff. Furthermore if this Eurotariff and the associated domestic tariff are set too high the package will not be interesting to consumers, nobody will purchase it and the roaming tariffs actually used will not fall in price. While on the other hand if the tariffs are set too low this regulation would severely impact the national markets.

5.8 Non-discrimination

Description

This alternative proposes to withdraw both wholesale and retail price caps and replace them with a non-discrimination obligation. MNOs would be required to offer wholesale roaming services under the same terms and conditions as they do to their own group companies.

This would mean that e.g. Vodafone UK would need to offer roaming services to T-Mobile DE at the same price and conditions as they would offer to Vodafone DE.

In a most positive case this would lead to a sharp reduction in wholesale tariffs. On the assumption that these lower wholesale rates would be passed through to the retail level (which we haven't seen much evidence of so far) this would also lead to lower retail rates.

BEREC however does not find this to be the most likely scenario. If MNOs are required only to offer a non-discriminatory wholesale rate there is no reason to assume they would actually offer low rates. Whatever wholesale tariff group companies charge each other doesn't really matter that much: it is an artificial rate they could raise or lower depending on what they want to offer competitors and whether or not they are looking to attract traffic to their networks.

By imposing a non-discrimination obligation, it would quite likely become prohibitively expensive for an MNO to lower their wholesale rates, as they would then have to offer this tariff to all of their wholesale customers regardless of volumes, quality, coverage, or routes, thus limiting the scope for operators to offer better retail tariffs based on reductions in their wholesale rates.

Conclusion

BEREC finds it unlikely that imposing a non-discrimination obligation would lead to more competitive wholesale market. To the contrary, BEREC thinks it is quite likely to suppress wholesale competition.

Section 5

Assessment of Costs

A. Introduction

1. Objectives

This document intends to update the existing ERG work on voice, SMS and data costs, to take account of falling MTRs and other factors in order to inform consideration of any proposal to extend price regulation in duration or scope. The aim is to be able to assess the impact of different approaches to cost when designing the form and level of any regulation.

2. Scope

This document studies cost issues for services included in the roaming regulation. It is divided into three main sections respectively dealing with costs of voice, SMS and data services. The following table reminds the scope of the roaming regulation:

		Wholesale	Retail
Voice	Incoming	<i>Mobile termination</i>	Included
	Outgoing	Included	Included
SMS	Incoming	<i>Not charged</i>	Included
	Outgoing	Included	Included
Data		Included	Not regulated
<p>'included' means included in the roaming regulation</p> <p>'mobile termination' means not included in the regulation, but may fall under the scope of mobile termination regulation</p> <p>'Not charged' means that operators do not to charge each other for incoming SMS services to roaming customers (cf. section 0.2)</p>			

B. Approach

1. Overview of interactions

For each service considered, this document examines the interactions between actors at wholesale and retail levels and identifies cost items at stake. In the following, interactions between actors will be presented using diagrams. It is assumed that calls and operators pictured fall under the scope of the European roaming regulation.

2. Cost items

For each service, this document discusses cost specificities, building on the general approach set out below, and assesses practical options available to evaluate cost levels. It

then provides a quantitative estimate of the wholesale cost of each service, based on a data collection carried out with NRAs in the third quarter of 2010. The questionnaire and a summary of questions answered by country are provided in Annex 3.

With respects to the quantitative analysis carried out as part of the cost assessment exercise, it is important to bear in mind the following.

(1)BEREC's approach to cost relies on a mix of (a) prudent and (b) forward looking assumptions.

(a) The approach entails conservative assumptions in many occurrences. For instance, for outgoing calls, it is assumed that all calls terminate as off-net calls to mobile networks. However, in practice a share of these calls would terminate either on-net or on fixed networks and the cost of termination for such calls would be lower than the termination rate paid for terminating off-net mobile calls. Such assumptions tend to result in cost estimates that are slightly higher than in reality, but it is reasonable to make such assumptions because the share of on-net calls and of calls to fixed networks could vary a lot from one mobile operator to another.

(b) The approach aims at being forward looking, because the cost need to be estimated for the period 2012-2015, rather than for today. It is difficult to predict costs in the medium-term, because robust data points are very scarce. The approach therefore relies on using proxies for what cost would be in the near future. For instance, for outgoing calls, termination rates for the period 2012-2015 has been estimated by using the actual incremental cost of termination in 2009. This is consistent with the EC recommendation (stating that termination rates should be set at incremental cost levels by 2012) and remains prudent because termination costs are likely to decrease further over the coming years (so actual cost of termination in 2009 is likely to be higher than actual cost of termination in 2012 or in 2015).

(2) About 6 to 9 NRAs have provided detailed inputs on network costs for voice, SMS and data services, based on their existing cost modelling work.

Cost items considered include relevant technical costs, sales and marketing costs, and common costs, as presented in the following table.

Technical costs	Sales and Marketing costs	Common costs
Access and call origination	Wholesale contracts management	
Transit	Wholesale and retail billing	
Platforms	Retail marketing (ads, leaflets, ...)	
Termination		

The number of respondents may seem small, but with this does not prevent to have confidence in the results:

(a) The range of countries that provided data points includes countries that are likely to be representative of the variety of geographic and market situations in Europe: countries with low population density (Norway), large countries with some mountainous areas (France, Spain), small countries with extended mountainous areas (Slovenia), small countries with rather flat geography (Denmark)...

(b) It is reasonable to believe that efficient network cost would not vary more than a few cents per unit of service from a European country to another. European mobile operators use similar technologies, all buy their equipment off a small number of the same providers and should have similar utilisation rates for their equipment. This leaves scale effects and geographies as the two main factors that could have an impact on costs, but as seen in 2(a) above the likely resulting range of variance has already been taken into account in this cost estimation exercise.

(c) As described in 1(a), the approach used has been rather conservative, so that confidence in the resulting upper boundaries is reasonably high.

Technical costs

The aim is to refine the approach to underlying technical costs. This could be done by unbundling the roaming cost stack in order to estimate individual costs for a set of specific functions, including:

- access and call origination (ACO thereafter)
- transit
- platforms (signalling)
- termination

In order to make robust estimates in an efficient manner, it is important to identify which functions represent a significant part of the total roaming cost, in order to focus on evaluating costs for those functions and neglect or use mark-ups for less significant ones.

➤ Platforms and transit

Transit and platform costs could be quantified using market prices, which could be a reasonable indicator of costs incurred.

- Quantitative analysis

Indeed, as part of the data collection, no countries have submitted data in answer to the question on transit cost (question 3). IRPT has therefore based its work on transit charges instead, according to the methodology initially identified.

Two countries have submitted data in answer to the question on transit charges (question 4) and data points tend to indicate that European transit costs will be negligible for voice calls between most European member states, meaning that the margin for errors accounted for in any calculations would be larger than those costs.

Two countries have submitted data in answer to the question on platform costs (question 5), with both data points suggesting that platform cost are very low and might be excluded from any detailed calculations, again because the margin for errors would be larger than those costs.

In addition to quantitative data collected from NRAs, feedback from stakeholders meeting have confirmed that transit cost did not represent a significant part of roaming costs. When updating the quantitative cost estimates, it could be relevant to collect information on international transit cost and charges from fixed operators, in order to confirm to what extent transit costs would be negligible.

As a conclusion, because transit and platforms costs represent an insignificant share of the total cost of roaming services, it makes sense to exclude those costs from any detailed quantitative analysis. Transit and platforms cost are therefore not considered again in the remainder of this document⁵⁰.

Sales and marketing costs

Operators support specific sales and marketing costs linked with international roaming. For instance, at wholesale level, such costs may include billing expenses and costs related to roaming agreements management, while at retail level there will be some marketing and billing costs involved. There should not be any marketing costs related to wholesale roaming.

Sales and marketing costs are likely to be difficult to assess since detailed information on sales and marketing cost is confidential and may vary largely depending on each operator's strategy.

Sales and marketing costs could therefore be accounted for by a mark-up, based on estimates.

Wholesale sales costs

Several approaches may be followed in order to estimate the level of the appropriate sales mark-up for wholesale services.

Ideally, to work out such a mark-up, BEREC could try and collect wholesale sales cost specifically related to roaming from operators. However, this approach seems unlikely to succeed given that there might be significant differences in the definition of wholesale sales costs to be allocated to roaming and a fair number of operators may not isolate wholesale roaming sales costs in their accounting systems at all.

An alternative would be to collect the relative proportion of wholesale sales costs in total operator costs and assume that this proportion would be the same in the cost of roaming services. The corresponding mark-up may be derived using proportions collected.

⁵⁰ While doing such estimates, IRPT bears in mind that overseas operators in the outermost regions of Europe are likely to incur higher inter-continental transit costs than operators in mainland Europe. Given the very small number of member states and operators concerned, this specific issue has not been explored in the present document, aiming at providing a general analysis. However, the situation of overseas operators should be looked at in details when designing the form of any roaming regulation.

A more complex but more precise alternative approach would involve collecting absolute values for wholesale sales costs and distributing them, based on allocation keys derived from revenues.

- Step 1: Total wholesale sales cost is first split into domestic and roaming using a revenue key, based on the split of wholesale revenues between domestic and international roaming. Domestic wholesale revenues would mainly include interconnection revenues from domestic termination, national roaming revenues, as well as origination and access revenues. Domestic wholesale revenues may include revenues from other wholesale activities, as long as the scope of activities included into wholesale revenues correspond to the ones included in the wholesale cost. Data on wholesale sales costs needs to be collected from operators for this step.
- Step 2: Resulting wholesale roaming sales cost is then split and allocated to the various services using another set of revenue keys, based on the split of roaming wholesale revenues between services. Further data would not need to be collected for this step, given that BEREC already collects wholesale roaming revenues.
- Step 3: Resulting wholesale sales costs by service may be unitised using relevant service volumes, already owned by BEREC.

This three-step approach would result in an absolute cost of sales mark-up for wholesale voice, SMS and data services, respectively per minute, per message and per Mbyte.

Retail sales and marketing costs

As in the case of wholesale sales costs, retail sales and marketing costs may be estimated using various approaches, in order to estimate the level of the appropriate sales and marketing mark-up for retail services.

Again, ideally, BEREC could try and collect retail sales and marketing costs specifically related to roaming from operators. However, this approach seems unlikely to succeed given that there might be differences in the definition of retail sales costs to be allocated to roaming and a fair number of operators may not isolate retail roaming sales and marketing costs in their accounting systems at all. Moreover, given the sensitive status of such marketing data, operators would most probably be very reluctant to cooperate.

A first alternative correspond to the second approach described for wholesale sales costs. It would involve collecting absolute values for retail sales and marketing costs and distributing them, based on allocation keys derived from retail revenues.

- Step 1: Total retail sales and marketing cost is first split into domestic and roaming using a revenue key, based on the split of retail revenues between domestic services and international roaming. Domestic retail services would include revenues from the whole range of domestic services, as long as the scope of retail activities included into retail revenues correspond to the ones included in the retail sales and marketing cost. Data on retail sales and marketing costs needs to be collected from operators for this step.

- Step 2: Resulting retail roaming sales and marketing cost is then split and allocated to the various services using another set of revenue keys, based on the split of retail roaming revenues between services. Further data would not need to be collected for this step, given that BEREC already collects retail roaming revenues.
- Step 3: Resulting retail sales and marketing costs by service may be unitised using relevant service volumes, already owned by BEREC.

This three-step approach would result in an absolute mark-up to account for sales and marketing costs for retail voice, SMS and data services, respectively per minute, per message and per Mb.

Another alternative approach could rely on a more global assessment of what the retail cost should be, using domestic markets as a reference.

- For outgoing voice and SMS services, the approach consist in working out the difference between the wholesale cost and average retails prices observed in Europe for those services. Wholesale cost of those domestic services would correspond to the sum of the average termination rate paid in the wholesale market and access and call origination costs in own operators network⁵¹.
- For incoming voice services, the mark-up would be the same as the one resulting from the calculation for outgoing voice services. IRPT should bear in mind that using the same mark-up for both incoming and outgoing voice may lead to overestimating retail costs.
- For mobile data, the approach would be more difficult to follow given that information on wholesale cost of mobile data is scarcer (see section E thereafter). Wholesale domestic costs could still be estimated based on data collected from available top-down or bottom-up models and the resulting domestic retail cost would be derived from the difference with average retail prices.

Sources for average retail prices could include data from the European Commission implementation report or other relevant benchmarks of retail prices.

For each above-mentioned retail service, this approach would result in an absolute mark-up accounting for retail sales and marketing costs, but also for a share of common costs and some margin.

It is important to bear in mind that the level of the resulting mark-up for retail services should be considered as part of the discussion on pricing. Retail costs largely depend on what level of margin would be considered as reasonable for retail roaming services and this issue belongs more to a global political debate on pricing issues rather than to a more technical work on costs.

- Quantitative analysis

⁵¹ This estimate would represent an upper bound of wholesale costs given that there are still differences between termination rates and actual underlying costs, which implies that there would be higher margins for on-net calls and messages.

As part of the data collection, ten countries have submitted data in answer to the question on sales and marketing costs (question 1). Results confirm that getting detailed information on those costs is not an easy exercise. However, two NRAs were able to provide recent information on the share of roaming sales and marketing costs in total roaming costs. All data points fell in a range going from 3% to 10%. **In the absence of more relevant data points, IRPT used the median (5%) of the available range in its quantitative analyses. This is consistent with the general prudent approach to cost outlined previously (cf. beginning of section 0.2). Firstly because the estimates come from two Member states with fairly different characteristics in terms of cost of labour and secondly, because the shares provided by one NRA included both retail and wholesale sales and marketing costs.**

An intend to collect absolute values for retail and wholesale sales and marketing costs indicated that very few NRAs had such information at hand. When updating the work on quantitative cost estimates, it could be relevant to collect such information from operators in order to be able to implement the corresponding approach (see above description).

For retail sales and marketing costs, IRPT could be able to implement the approach based on a comparison with retail costs of domestic services if a robust⁵² and extended benchmark of European retail prices were to be carried out.

Common costs

Relevant wholesale and retail roaming costs may include a share of common costs (management fees, administrative charges, HR...). Roaming consists in domestic operators using another operator's network for the benefit of their own subscribers. Domestic operators and roaming subscribers may therefore contribute to common costs generated by the network they are using.

Common costs may also be accounted for by a mark-up, for instance, based on cost levels commonly observed for European mobile operators.

- Quantitative analysis

As part of the data collection, ten countries have submitted data in answer to this question. Data received confirms that common costs represent a small share of overall costs and that they may be accounted for as an EPMU mark-up. Common costs range **from 4%** (France) **to 20%** (one operator in Spain, based on unaudited top-down data) with a straight average of all data points received situated around 10% and a median around 9%.

Differences between countries may be due to either different definitions of common costs across countries, either different imputation of common costs in regulated wholesale services. For instance, in Spain imputation of common costs to regulated wholesale services, such as termination, is very restrictive and as a result, unregulated wholesale services, such as wholesale roaming services, may receive a bigger share of common costs.

Based on those results, IRPT chose to use the median of data points available and included a 9% mark-up to account for common costs. This is consistent with the

⁵² Such a benchmark would be a very time-consuming exercise, and would need to include both a bottom-up and a top-down approach in order to ensure its robustness.

general prudent approach to cost outlined previously (cf. beginning of section 0.2), because the range of responding countries provide a representative view of shares of common costs observed for European mobile operators.

C. Voice services

1. Context

MTRs have been used since the first roaming regulation as a proxy for the costs of both origination and termination of roaming voice calls⁵³, transit and platform costs being accounted for by the fact that a significant percentage of roaming calls terminate on fixed-line networks, and therefore correspond to lower termination rates.

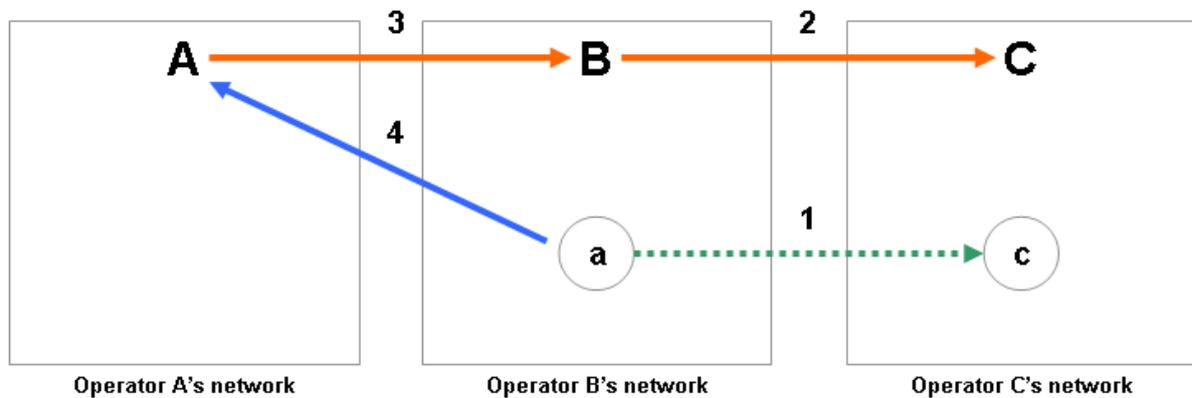
Given the Commission Recommendation on termination rates of May 2009, MTRs in Europe will drop over time, reflecting a shift from fully distributed cost (FDC) standards to incremental costs. In this respect, MTRs will no longer recover network costs other than those strictly necessary to ensure termination of incoming traffic (i.e. exclude coverage costs). Therefore, in the medium term, MTRs will no longer be a satisfactory proxy for access and call origination costs of roaming calls, which must account for a share of coverage costs. This means that the cost of wholesale roaming calls may not be calculated by solely adding two MTRs and further mark-ups added on top of the MTR component may be required to estimate the total cost of an end-to-end roaming call. Alternative approaches are discussed in the following.

⁵³ MTRs are a relatively loose proxy of termination costs given that in most EU States MTRs are not yet at cost level but comprise a profit margin.

2. Outgoing roaming voice calls

Overview

The diagram below shows the traffic routing and payments when a roaming customer places an outgoing voice call:



Legend

	Circles / lowercase letters represent subscribers		Wholesale financial transfer
	Squares represent operators' networks Uppercase letters represent operators		Retail financial transfer
			Call

Note: This example relies on the assumption that visited operator (B) routes outgoing roaming voice calls directly. This situation is the most common for outgoing voice calls within Europe.

The diagram shows:

- Customer (a) is domestic operator (A)'s customer
- Customer (a) roams on visited operator (B)'s network
- 1 – customer (a) calls customer (c) on (C)'s network
- 2 – visited operator (B) pays a termination fee to called operator (C)
- 3 – domestic operator (A) pays regulated wholesale fee to visited operator (B)
- 4 – customer (a) pays regulated retail fee to domestic operator (A)

The above example intends to represent a generic situation. Operator (C) may be a mobile or a fixed operator in operator (A)'s country, in operator (B)'s country or in another country. In case operator (C) is a fixed operator payment 2 corresponds to a fixed termination rate, while if operator (C) is a mobile operator, payment 2 will correspond to a mobile termination rate.

There are a few particular cases to be considered where:

- (C) and (A) are the same operator – in this case, it's likely that there won't be any changes to the above described situation and (B) will pay 2 to (A) while (A) will pay 3 to (B)
- (B) and (C) are the same operator – in this situation, instead of paying 2, (B) incurs the cost of an on-net call⁵⁴ (i.e. a call where the calling party and called party are on the same network)

Wholesale level

Under those assumptions, payment 3 by domestic operator (A) should allow visited operator (B):

- to recover ACO costs,
- to pay for termination to called operator (C) (or to recover termination cost in the case where (B) and (C) are the same operator),
- to recover transit and platforms costs (as discussed in section 0),
- to recover a share of sales costs and common costs (as discussed in section 0).

➤ ACO

Roaming subscribers should contribute to both origination and access costs. Those costs can be assessed either by applying an FDC cost standard to the whole "ACO" product or an incremental cost standard for origination and add an appropriate mark-up to account for network access costs.

There are several options to assess ACO costs:

- **Bottom-up and top-down models** designed to calculate **incremental termination** cost that have not been specifically designed to provide sound estimates of ACO should be used with great care as results for ACO might not have been fully proof-checked against inconsistencies.
- **Top-down models** designed as part of a **regulatory accounting exercise** could provide a more robust estimate of origination costs than above-mentioned LRIC models. However, regulatory accounting data of mobile operators may not be available in all countries
- **Relevant domestic rates** might be considered as a good upper bound for the ACO component included in the roaming rate. However, ACO domestic rates for MVNOs⁵⁵ are not regulated and using rates based on commercial negotiations as a reference for regulated roaming rates could have a potentially negative impact on those

⁵⁴ Assumes voice traffic is routed directly to destination and does not go through home network (A).

⁵⁵ 'ACO domestic rates for MVNOs' may correspond to rates granted to full or light MVNOs. Rates offered to light MVNOs may only be considered if it is possible to know what share of the per minute rate corresponds to access and call origination.

negotiations. MNOs are reluctant to see roaming tariffs decline and could be even less inclined to offer lower ACO rates to MVNOs, since this could mean a further decrease of roaming wholesale rates.

- **National roaming rates**, similarly to ACO rates offered to MVNOs, could be seen as a relevant upper bound for the ACO component. However, the same caveat applies since national roaming rates may not be regulated in a majority of member states.
- Termination rates are likely to be the most practical approximation to origination costs.
 - In technical terms, origination and termination are very similar services, given that they use the same network elements in roughly equivalent proportions.
 - In practical terms, termination rates are not confidential and readily available in all member states.
 - Given that those rates are already regulated, there isn't any risk of observing side effects resulting from using those rates as a basis to evaluate roaming costs.
 - The fact that termination rates will progressively shift to incremental cost standards may be compensated by a mark-up accounting for access costs or by applying a cost trend on the last rate based on FDC cost standards.

As a conclusion, it seems practical and reasonable to use MTRs based on incremental costs as an approximation for the origination cost component of the wholesale roaming rate, as long as a mark-up accounts for a share of unavoidable access costs allocated to roaming services. While setting such a mark-up, we would need to bear in mind that using current MTRs already results in a mark-up on incremental costs in the short run, given that MTRs are only starting to shift from FDC standards to pure LRIC standards and have not reached underlying cost levels yet.

➤ Termination

Termination costs could benefit from a revised approach:

- Termination costs considered could take into account that part of roaming calls terminate on fixed lines as opposed to mobile ones. This raises the question of evaluating the distribution of calls by destination: we should probably take into account the worst-case scenario as a reference, i.e. the operator with the higher proportion of calls to mobile, in order to provide an upper-bound estimate of termination costs.
- For off-net roaming calls (where (B) and (C) are two different operators), the underlying cost of termination is exactly the termination rate paid to the called party's operator (C).
- For on-net calls (where (B) and (C) are the same operator), the underlying cost of termination corresponds to network costs incurred to terminate the call.

It seems reasonable to use MTRs based on incremental costs as an approximation for the termination cost component of the wholesale roaming rate, given that:

- for off-net calls, this corresponds to the underlying cost of termination,
- for on-net calls, access costs are already accounted for by a mark-up as part of the ACO costs component.

As a conclusion on assessing costs of both termination and ACO for wholesale outgoing roaming calls, the approach suggested remains along the same lines than the one applied in previous exercises:

FDC termination cost + FDC ACO cost

↔

pure incremental termination cost + incremental origination cost + access costs
(accounted for as a mark-up)

↔

average EU MTR x 2 + access costs (accounted for as a mark-up, bearing in mind that in the short run EU MTR will still partially account for access costs)

➤ Quantitative analysis

As a part of the quantitative data collection, six countries have submitted data in order to support IRPT's work on voice termination costs (question 8).

For year 2009 – year with most data points – pure LRIC termination cost ranges from 0.6 eurocents (UK) to 3.2 eurocents (Slovenia), while a straight average of all data points received is situated at 1.6 eurocents and the median at 1.3 eurocents.

Based on data received, it is possible to estimate wholesale cost for outgoing voice calls, using the approach relying on pure LRIC termination cost as laid out in section C.2 above, as well as figures for sales and common costs presented in section 0.2. In the below calculation, 2009 pure LRIC termination cost are used as a proxy for the level of termination rates in the near future (2012-2015). Because, termination rates should be at incremental cost levels by 2012⁵⁶ and incremental costs are expected to decrease further in the near future, this approximation is a prudent one.

In addition to this, the below estimates do not assume any share of calls terminating on fixed networks, while termination of calls to fixed network would be expected to cost less than termination to mobile networks. This is because the share of calls terminating to fixed networks is uncertain and may vary widely from an operator to another. This is therefore another prudent assumption.

⁵⁶ According to the EC recommendation reference C(2009) 3359, as of 7 May 2009.

The below table presents results obtained for a lower bound, an upper bound, an average and a median situation (i.e. respectively taking the lowest figures, the highest figures, the average or the median of figures available from the data collection). In order to keep consistency, pure LRIC cost and corresponding mark-up are considered as an inseparable couple. For instance this means that in the calculation using the minimum figures, the mark-up used will be the one resulting from the relative difference between the LRIC+ and the pure LRIC cost for that precise country, regardless whether that mark-up was actually the lowest one.

All figures but mark-ups are presented in eurocents per minute.

		ACO cost (g)	Termination cost (t)	Network cost (n)	Sales cost (s)	Common cost (cc)	Total wholesale cost	Last regulated cap	Margin for improvement
Outgoing roaming voice calls	Approach	Pure LRIC + mark-up	Pure LRIC	(g)+(t)	5%	9%	(n) x (1+(s)) x (1+(cc))	18,00	
		Calculation using	Min	2,02			0,61		
Max	5,23	3,24	8,47	9,73	-46%				
Average	3,18	1,54	4,72	5,42	-70%				
Median	2,29	1,27	3,56	4,08	-77%				

For 2009, the quantitative analysis results in a cost of wholesale outgoing voice calls ranging between EURc3.02 per minute and EURc9.73 per minute, with an average at about EURc5.5 per minute and a median around EURc4 per minute.

As outlined at the beginning of section 0.2, confidence in upper bound and median figures is strong, because assumptions made are reasonably conservative and because the range of countries who provided data gave a fairly representative European data set,

Retail level

In the case of outgoing voice calls, payment 4 by customer (a) to domestic operator (A) should allow operator (A):

- to recover regulated roaming fee paid to visited operator (B),
- to recover a share of retail sales and marketing costs and common costs (as discussed in section 0).

The main cost component is the wholesale cost, other cost components being accounted for as mark-ups. As indicated in section II, it would seem sensible to include the discussion on appropriate levels for mark-ups in a more global debate on pricing issues rather than as part of a more technical work on costs. Pending availability of better benchmarks that could enable the implementation of an alternative approach to estimate retail costs, the below table indicates retail costs for a range of mark-up levels.

All figures but mark-ups are presented in eurocents per minute.

		Total wholesale cost	Resulting retail costs, depending on mark-up level					
			5%	10%	25%	33%	50%	
Outgoing roaming voice calls	Approach	Calculation using						
		Min	3,02	3,17	3,32	3,77	4,02	4,53
		Max	9,73	10,22	10,70	12,16	12,97	14,60
		Average	5,42	5,69	5,96	6,77	7,22	8,13
Median	4,08	4,29	4,49	5,10	5,44	6,12		

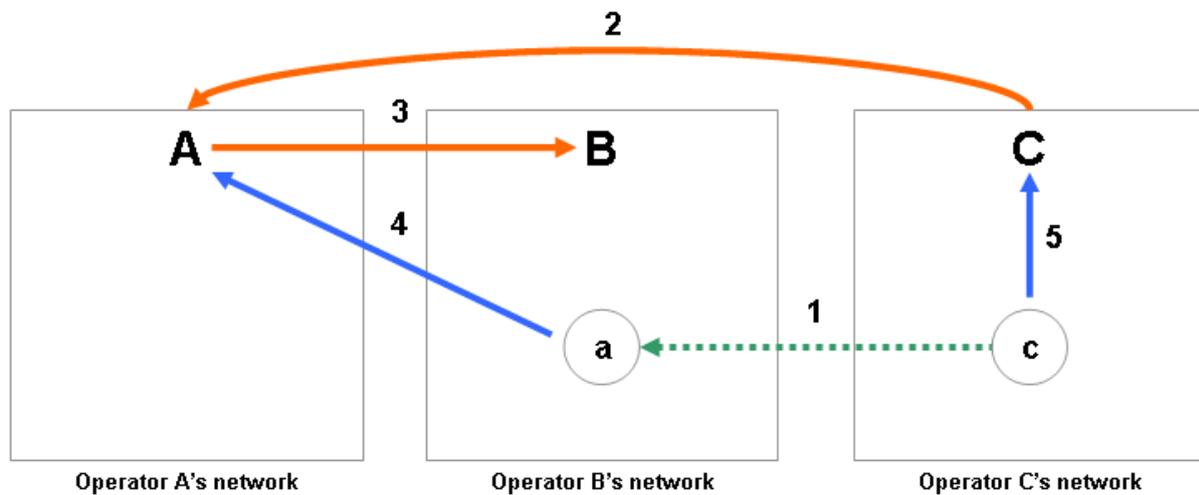
For 2009, the cost of retail outgoing voice calls would range between a little more than EURc3 and a little less than EURc15 per minute, to be compared to the last regulated cap of EURc35 per minute (see below table).

Outgoing roaming voice calls	Approach Calculation using	Min	Last regulated cap	Margin for improvement, depending on mark-up level				
				5%	10%	25%	33%	50%
		Max	35,00	-91%	-91%	-89%	-89%	-87%
		Average		-71%	-69%	-65%	-63%	-58%
		Median		-84%	-83%	-81%	-79%	-77%
				-88%	-87%	-85%	-84%	-83%

3. Incoming roaming voice calls

Overview

The diagram below shows the traffic routing and payments when a roaming customer receives an incoming voice call:



Legend

	Circles / lowercase letters represent subscribers		Wholesale financial transfer
	Squares represent operators' networks Uppercase letters represent operators		Retail financial transfer
			Call

The diagram shows:

- Customer (a) is domestic operator (A)'s customer
- Customer (a) roams on visited operator (B)'s network
- Customer (c) is on operator (C)'s network
- 1 – customer (a) receives a call from customer (c)
- 2 – calling operator (C) pays a mobile termination fee to called operator (A)
- 3 – domestic operator (A) pays an international mobile termination fee to visited operator (B)
- 4 – customer (a) pays regulated retail fee to domestic operator (A)
- 5 – customer (c) pays domestic retail fee to operator (C)

There are a few particular cases to be considered where:

- (C) and (A) are the same operator – (A) does not receive any termination payment (2), but receives a retail payment from the calling customer.
- (B) and (C) are the same operator – in this situation, it is likely that there won't be any changes to the generic situation and (B) will pay 2 to (A) while (A) will pay 3 to (B)

Wholesale level

Financial transfers at wholesale level for incoming calls are outside the scope of the roaming regulation:

- Payment number 2 is strictly equivalent to what would happen if the called party were not roaming outside its home network: calling party pays termination to the called party.
- Payment number 3 is an additional interaction generated by the roaming situation, which in practice corresponds to a termination payment.

➤ Termination

Financial transfers at wholesale level for incoming voice roaming services are outside the scope of the roaming regulation, whereas financial transfers at retail level fall inside this scope. This makes assessing costs for incoming wholesale voice roaming services an issue of second-priority order, while registering rates for those services remain necessary, as they are part of the costs incurred for the provision of incoming voice roaming services at the retail level.

In practice, operators do not apply different termination rates for incoming roaming calls and other incoming calls (international or national). Public data is thus available on wholesale incoming voice roaming service rates, based on MTR benchmarks.

The cost actually incurred at wholesale level for incoming voice roaming services will then correspond to the difference between the MTR received from the calling party's operator (C), that is MTR of operator (A) and the MTR paid by home operator (A) to visited operator (B), that is MTR of (B).

➤ Quantitative analysis

No questions were raised regarding wholesale incoming voice calls as part of the quantitative data collection, because MTR benchmarks are already available from recurring BEREC data collections.

The below table presents results obtained for a lower bound, an upper bound and an average situation (i.e. respectively taking the lowest EU MTR, the highest EU MTR, and the average MTR available from the latest BEREC benchmark⁵⁷). All figures are presented in eurocents per minute.

⁵⁷ July 2010 MTR benchmark (BoR (10) 45)

		Total wholesale charge
Incoming roaming voice calls	Approach	actual charge for (t)
	Calculation using Min	1,82
	Max	9,86
	Average	6,00

The worse situation a European operator can be in is to have the lowest MTR and to have to forward an incoming call to a client roaming on a visited network with the highest MTR. **In July 2010, the quantitative analysis would therefore result in a maximum cost of wholesale roaming incoming voice calls of about EURc8 per minute, bearing in mind that this corresponds to the worse case situation.**

However, in application of the European Commission's Recommendation on the regulation of mobile termination rates, MTR levels are likely to be nearer pure LRIC costs by 2012. It makes sense to carry out the above calculation using pure LRIC costs available today as a proxy for 2012 MTRs

Data collected as part of the work on outgoing calls indicate that pure LRIC costs of termination ranges between EURc0.61 per minute and EURc3.24 per minute. Pure LRIC cost differences may arise due to economies of scale (the country with the highest figure has a market of 2 million subscribers for four MNOs). **The prospective quantitative analysis results in a maximum cost of wholesale roaming incoming voice calls under EURc3 per minute.**

Again, such assumptions remain conservative, because the worse case situation is considered as a basis to work out the wholesale cost per minute. In practice, end-customers will roam to a diversity of countries so that even operators with the lowest mobile termination rates do not end-up in this worse case situation for all their roaming out traffic.

Retail level

In the case of incoming voice calls, payment 4 by customer (a) to domestic operator (A) should allow operator (A):

- to recover the difference between the mobile termination fee received from calling operator (C) and mobile termination fee paid to visited operator (B),
- to recover a share of retail sales and marketing costs and common costs (as discussed in section 0).

As in the case of outgoing roaming voice calls, it would seem sensible to include the discussion on appropriate levels for sales and marketing mark-ups in a more global debate on pricing issues. Pending availability of better benchmarks that could enable the implementation of an alternative approach to estimate retail costs, the below table indicates retail costs for a range of mark-up levels.

All figures but mark-ups are presented in eurocents per minute.

		Total wholesale charge	Resulting retail costs, depending on mark-up level				
			5%	10%	25%	33%	50%
Incoming roaming voice calls	Approach Calculation using Current (July 2010)	8,04	8,44	8,84	10,05	10,72	12,06
	Prospective (Pure LRIC)	2,63	2,76	2,89	3,29	3,51	3,94

The prospective retail cost of incoming voice calls would range between about EURc3 and EURc4 per minute, to be compared with the last regulated cap of EURc11 per minute, as presented in the below table.

		Last regulated cap	Margin for improvement, depending on mark-up level				
			5%	10%	25%	33%	50%
Incoming roaming voice calls	Approach Calculation using Current (July 2010)	11,00	-23%	-20%	-9%	-3%	10%
	Prospective (Pure LRIC)		-75%	-74%	-70%	-68%	-64%

D. SMS services

1. Context

As regards wholesale roaming SMS services, In ERG's response to the Commission⁵⁸, ERG proposed a wholesale price cap of 4€c, which were deemed to cover the average costs of any EU operator, given the modelled cost estimates from four EU/EEA Member States at the time (wholesale costs ranging between 1.2€c and 2.5€c).

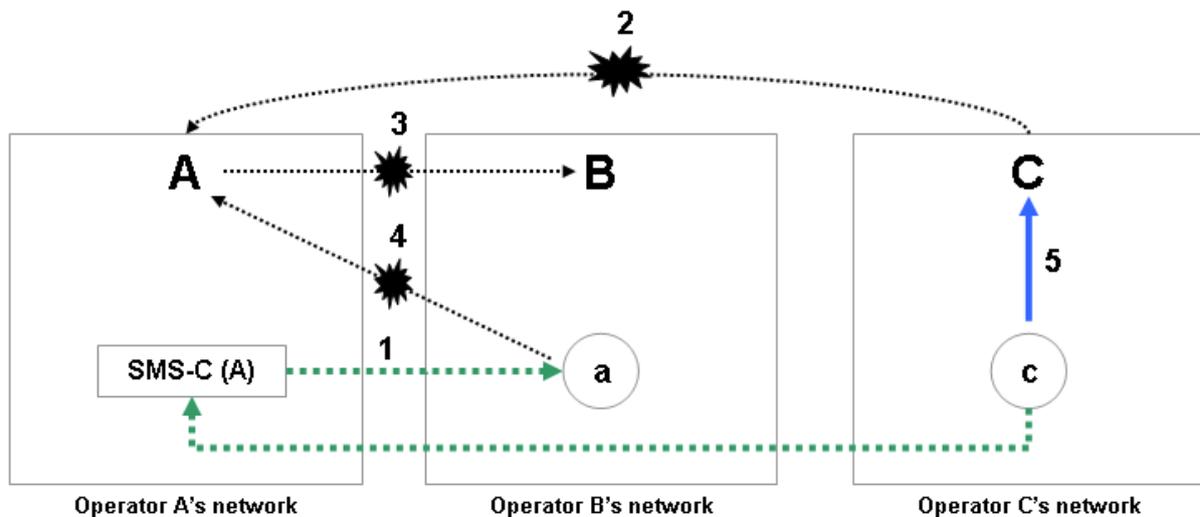
Retail roaming SMS caps of 11€c covered retail-specific costs of termination plus an allowance for commercial costs and a reasonable return over 2009 – 2012.

⁵⁸ IRG/ERG Response to the Commission's Public Consultation on Review of the Functioning of Regulation (EC) No 717/2007 and of its possible extension to SMS and data roaming services.

2. Incoming roaming SMS services

Overview

The diagram below shows the traffic routing and payments when a roaming customer receives an incoming SMS:



Legend



Circles / lowercase letters represent subscribers

.....> Absence of financial transfer



Squares represent operators' networks
Uppercase letters represent operators

————> Retail financial transfer

.....> SMS path

In the case of outgoing SMS services, the visited operator only provides ACO, as roaming SMS services are managed by the home operator's SMS-C.

The diagram shows:

- Customer (a) is domestic operator (A)'s customer
- Customer (a) roams on visited operator (B)'s network
- Customer (c) is on operator (C)'s network
- 1 – customer (a) receives an SMS from customer (c)
- 2 – calling operator (C) does not pay a termination fee to called operator (A), because customer (a) is roaming on another network⁵⁹
- 3 – domestic operator (A) does not pay anything to visited operator (B)⁶⁰

⁵⁹ According to the SMS interworking framework.

- 4 – customer (a) is not charged for receiving the SMS
- 5 – customer (c) pays domestic retail fee to operator (C)

Wholesale level

Recital 30 of the 2009 roaming regulation states that:

“The wholesale price limit for regulated roaming SMS should include all costs incurred by the provider of the wholesale service, including, inter alia, origination, transit and the unrecovered cost of termination of roaming SMS messages on the visited network. Wholesale providers of regulated roaming SMS services should therefore be prohibited from introducing a separate charge for the termination of roaming SMS messages on their network, in order to ensure the consistent application of the rules established by this Regulation.”

GSMA confirmed that there are no financial transfers corresponding to wholesale incoming SMS services.

Wholesale costs of incoming SMS services should therefore be accounted for as part of regulated wholesale rates for outgoing roaming SMS services.

Retail level

According to the market's practice and to the roaming regulation, incoming SMS services are free of charge for consumers. Indeed, according to recital 33 of the 2009 roaming regulation:

“Roaming customers should not be required to pay any additional charge for receiving a regulated roaming SMS or voicemail message while roaming on a visited network, since such termination costs are already compensated by the retail charge levied for the sending of a roaming SMS or voicemail message.”

The roaming regulation states that those costs should be recovered as part of the retail charge for outgoing roaming SMS services, assuming a ratio of one SMS received for each SMS sent.

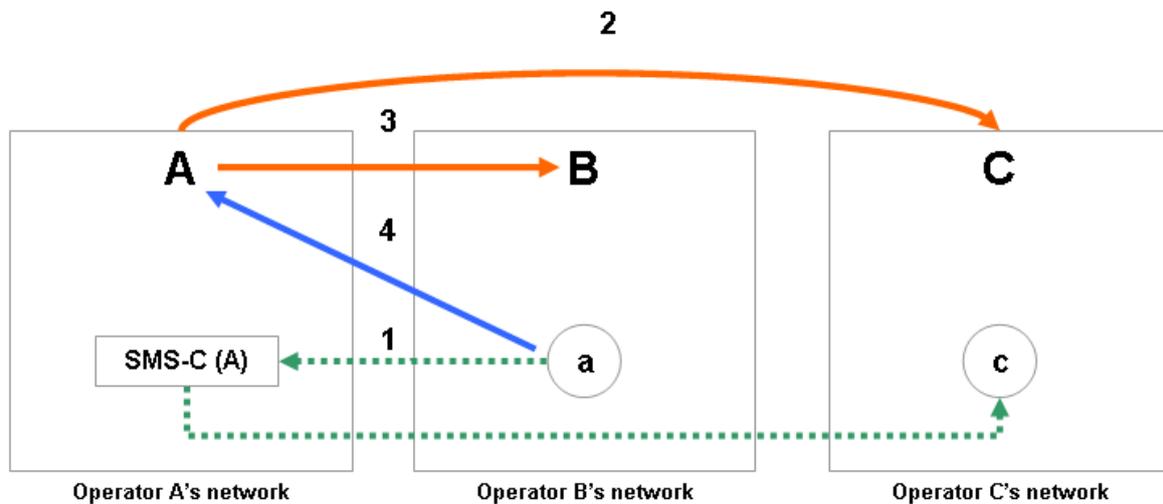
Retail costs of incoming roaming SMS services should therefore be accounted for as part of regulated retail rates for outgoing roaming SMS services.

⁶⁰ Because costs incurred for terminating the SMS are recovered as part of the wholesale fee for outgoing SMS services.

3. Outgoing roaming SMS services

Overview

In the case of outgoing SMS services, the visited operator only provides ACO, as roaming SMS services are managed by the home operator's SMS-C.



Legend

- | | | | |
|---|--|--|------------------------------|
|  | Circles / lowercase letters represent subscribers |  | Wholesale financial transfer |
|  | Squares represent operators' networks
Uppercase letters represent operators |  | Retail financial transfer |
| | |  | SMS path |

The diagram shows:

- Customer (a) is domestic operator (A)'s customer
- Customer (a) roams on visited operator (B)'s network
- Customer (c) is on operator (C)'s network
- 1 – customer (a) sends an SMS to customer (c)
- 2 – domestic operator (A) pays a mobile SMS termination fee to called operator (C)⁶¹
- 3 – domestic operator (A) pays regulated wholesale fee to visited operator (B)
- 4 – customer (a) pays regulated retail fee to domestic operator (A)

There are a few particular cases to be considered where:

- (C) and (A) are the same operator:
 - It means that payment 2 won't happen because once forwarded by (B) to (A) the SMS will become an on-net SMS on A's network. In this case, operator (A) incurs internal on-net termination costs.
- (B) and (C) are the same operator:
 - It is likely that there won't be any changes to the above described situation and (A) will pay both 2 and 3 to (B).

Wholesale level

The 2009 roaming regulation states that wholesale cost of incoming SMS services incurred by visited operators for terminating incoming SMS services to roaming customers should be recovered through wholesale charges for outgoing SMS services.

Under those assumptions, wholesale payment by domestic operator (A) should allow visited operator (B):

- to recover costs incurred for terminating incoming SMS services, assuming a ratio of one SMS received for each SMS sent
- to recover ACO costs
- to recover transit and platforms costs (as discussed in section 0)
- to recover a share of sales and common costs (as discussed in section 0).

Termination is not to be recovered by visited operator (B) since domestic operator (A) is responsible for paying for termination of the SMS.

Practical considerations

⁶¹ Unless customer (c) is roaming on another network than operator (C)'s network, in which case no termination payment occurs, according to the GSMA's SMS interworking framework.

➤ Termination

SMS termination is not regulated in most Member States. This means that SMS termination rates will only be publicly available in a very small number of countries.

However, several NRAs are known to own models that are able to evaluate the cost of SMS termination. Similarly to the approach followed during the latest cost assessment exercise, we could collect data available on the cost of SMS termination

➤ Origination

Models able to evaluate SMS termination are usually also able to work out the cost of SMS origination. In some cases, there is no split between origination and termination: information is provided on the total wholesale cost of an SMS.

BEREC has therefore collected data readily available on SMS origination and termination costs, or on the total wholesale domestic cost of an SMS services where the split is not available. Having a detailed split for all countries is not necessary given that we can assume that origination and termination costs are roughly equivalent.

As outlined previously in section 0.2, transit costs for SMS services are assumed to be negligible.

➤ Quantitative analysis

As a part of the quantitative data collection, nine countries have submitted data in order to support IRPT's work on SMS costs (question 6).

The below table summarises results obtained for a lower bound, an upper bound an average and a median situation (i.e. respectively taking the lowest figures, the highest figures, the average or the median of figures available from the data collection). All figures but mark-ups are presented in eurocents per message.

		Network cost (n)	Sales cost (s)	Common cost (cc)	Total wholesale cost	Regulated cap	Margin for improvement
Approach		$(n) \times (1+(s)) \times (1+(cc))$					
Outgoing roaming SMS	Calculation using Min	0,03	5%	9%	0,03	4,00	
	Max	1,21			1,39		
	Average	0,36			0,41		
	Median	0,24			0,27		
Incoming roaming SMS	Calculation using Min	0,03			0,03		
	Max	1,11			1,28		
	Average	0,35			0,40		
	Median	0,30			0,34		
Total roaming SMS	Calculation using Min				0,06		-98%
	Max				2,67		-33%
	Average				0,81		-80%
	Median				0,61		-85%

For 2009, the quantitative analysis results in a cost of wholesale outgoing roaming SMS per message ranging between EURc0.03 and EURc1.39, with an average at about EURc0.41 and a median slightly under EURc0.3, while wholesale incoming roaming SMS per message range from EURc0.03 to EURc1.28, with an average at about EURc0.40 and a median around EURc0.35.

According to current market practice as presented in previous sub-sections, the wholesale cost to be taken into account per outgoing roaming SMS per message would therefore range from EURc0.06 to EURc2.67, with an average at EURc0.81 and a median slightly above EURc0.6.

Confidence in upper boundaries and median results is good because data used for this exercise relies exclusively on 2009 figures, which have sometimes been calculated as far back as 2007, which is for some member states at times before SMS usage exploded. Figures used are therefore rather conservative: as usage continues to develop, together with the impact of technical progress, it is likely that actual costs experienced by operators by 2012 would be more in line with the lowest results rather than with upper boundaries presented in the above cost assessment⁶². However, for this cost assessment exercise, conservative assumptions are sufficient since they already allow for a fair margin for improvement with regards to the regulated cap that will apply until mid-2012.

Retail level

The 2009 roaming regulation states that retail costs of incoming SMS services incurred by home operators should be recovered through retail charges for outgoing SMS services.

In the case of outgoing SMS services, retail payment by customer (a) to domestic operator (A) should allow operator (A):

- to recover retail costs of incoming SMS services, assuming a ratio of one SMS received for each SMS sent (see previous section 0.2)
- to recover the regulated SMS wholesale fee paid to visited operator (B),
- to recover SMS termination paid to (C),
- to recover a share of retail sales and marketing costs and common costs (as discussed in section 0).

In the below calculation, consistently with the approach followed for voice services, BEREC used the data collected on 2009 SMS costs as a proxy for what SMS termination would be likely to cost by 2012.

As in the case of retail voice services, it would seem sensible to include the discussion on appropriate levels for sales and marketing mark-ups in a more global debate on pricing issues. Pending availability of better benchmarks that could enable the implementation of an alternative approach to estimate retail costs, the below table indicates retail costs for a range of mark-up levels.

⁶² Future cost work will be able to take the latest years' actual traffic development into account.

All figures but mark-ups are presented in eurocents per message.

Total roaming SMS services	Approach Calculation using		Total wholesale cost	Prospective termination charge	Resulting retail costs, depending on mark-up level				
					5%	10%	25%	33%	50%
	Min		0,06	0,53	0,63	0,66	0,75	0,80	0,90
	Max		2,67	0,53	3,36	3,52	4,00	4,27	4,81
	Average		0,81	0,53	1,41	1,48	1,68	1,79	2,01
	Median		0,61	0,53	1,20	1,26	1,43	1,53	1,72

For 2009, the total retail cost of roaming SMS services would range between about EURc0.6 and EURc5 per message, to be compared with the regulated cap of EURc11 per message, as presented in the following table.

Total roaming SMS services	Approach Calculation using		Regulated cap	Margin for improvement, depending on mark-up level				
				5%	10%	25%	33%	50%
	Min		11,00	-94%	-94%	-93%	-93%	-92%
	Max			-69%	-68%	-64%	-61%	-56%
	Average			-87%	-87%	-85%	-84%	-82%
	Median			-89%	-89%	-87%	-86%	-84%

E. Data services

1. Context

As regards the wholesale data roaming services, there is limited understanding of data costs and business models are evolving. Based on the cost models of three Member States, the safeguard cap of 1€ per MB was conservative. However, it was deemed acceptable since further lowering of that cap would have increased the risks of interfering with current competition and innovation across the EU/EEA, and the structure may not allow for both low and high volume sessions.

2. Data services

Overview

In the case of mobile data roaming, the visited operator only provides ACO and the mobile data session is managed by the domestic operator's internet gateways.

What happens in practice:

- Customer (a) is domestic operator (A)'s customer
- Customer (a) roams on visited operator (B)'s network
- 1 – customer (a) initiates a mobile data session while roaming
- 2 – visited operator (B) forwards data session request to domestic operator (A)
- 3 – domestic operator (A) pays regulated wholesale fee to visited operator (B)

- 4 – domestic operator (A) connects to the Internet
- 5 – customer (a) pays non-regulated retail fee to domestic operator (A)

Wholesale level

Wholesale payment by domestic operator (A) should allow visited operator (B):

- to recover ACO and termination costs
- to recover transit and platforms costs (as discussed in section 0)
- to recover a share of sales and common costs (as discussed in section 0).

Practical considerations

In the case of data services, information on costs is likely to be even scarcer than for other services because mobile data is not regulated in any Member State.

However, in some countries, bottom-up models developed to work out incremental voice termination costs may also calculate rough estimates of costs for domestic data services. Such models may be used to work out estimates of the cost of roaming data services, as long as they have been specifically adapted to ensure a sufficient level of robustness of results regarding data services.

Some NRAs may also own top-down data on domestic data services from regulatory accounting exercises that may be used to assess cost of roaming data services.

➤ Quantitative analysis

As a part of the quantitative data collection, nine countries have submitted data in order to support IRPT's work on mobile data's costs (question 7).

The below table summarises results obtained for a lower bound, an upper bound an average and a median situation (i.e. respectively taking the lowest figures, the highest figures, the average or the median of figures available from the data collection). All figures but mark-ups are presented in eurocents per megabyte.

		Network cost (n)	Sales cost (s)	Common cost (cc)	Total wholesale cost	Last regulated cap	Margin for improvement	
Approach		$(n) \times (1+(s)) \times (1+(cc))$						
3G roaming data services	calculation using Min	1,42	5%	9%	1,63	50,00	-97%	
	Max	13,05			14,99		-70%	
	Average	7,03			8,08		-84%	
	Median	7,58			8,71		-83%	

For 2009, year for which most data was available, the quantitative analysis results in a cost of roaming mobile data per megabyte ranging from EURc1.63 to EURc15, with an average at EURc8 and a median slightly under EURc9.

Again, those results remain conservative, because they rely on data for 2009, stemming from models that have been designed as far back as 2007 when data services had barely started to develop in most member states.

Recent experience has proved that usage forecasts and technical progress predicted by models built in the early years of mobile data services were too conservative and updated results tend to correspond to the lower boundary rather the upper boundary. This is why there are strong reasons to believe that underlying costs of providing mobile data services by 2012 would be more in line with the lower boundaries known at present that with upper bound results.

However, this does not really matter for this cost assessment exercise, since, as illustrated above, even upper boundaries figures would leave enough margin for further decrease of regulated caps, if required⁶³.

Retail level

In the case of data roaming, cost incurred by domestic operator (A) to provide the service correspond to:

- wholesale payment to visited operator (B),
- the cost of accessing to the Internet,
- a share of retail sales and marketing costs and common costs (as discussed in section 0).

The PT's understanding is that large mobile operators do not pay any specific fee to actually access the Internet, while smaller operators with lesser negotiating power may have to pay fees for interconnecting with Internet gateways. However, those fees may be assimilated to transit charges, which are assumed to be negligible compared to margins for error in other network and sales and marketing costs already accounted for in this cost assessment.

As in the case of retail voice and SMS services, it would seem sensible to include the discussion on appropriate levels for sales and marketing mark-ups in a more global debate on pricing issues.

Pending availability of better benchmarks that could enable the implementation of an alternative approach to estimate retail costs, the below table indicates retail costs for a range of mark-up levels.

All figures but mark-ups are presented in eurocents per megabyte.

⁶³ Future cost work will be able to take the latest years' actual traffic development into account.

3G roaming data services	Approach	Resulting retail costs, depending on mark-up level					
		Total wholesale	5%	10%	25%	33%	50%
	Calculation using Min	1,63	1,71	1,79	2,04	2,17	2,44
	Max	14,99	15,74	16,49	18,74	19,99	22,48
	Average	8,08	8,49	8,89	10,10	10,78	12,12
	Median	8,71	9,14	9,58	10,89	11,61	13,06

For 2009, resulting retail costs for mobile data roaming services would range between EURc1.71 per megabyte and EURc22.48 per megabyte, to be compared with the current European average around EUR1.3 per megabyte, as presented in the below table.

3G roaming data services	Approach	Current average price	Margin for improvement, depending on mark-up level				
			5%	10%	25%	33%	50%
	Calculation using Min	130,00	-99%	-99%	-98%	-98%	-98%
	Max		-88%	-87%	-86%	-85%	-83%
	Average		-93%	-93%	-92%	-92%	-91%
	Median		-93%	-93%	-92%	-91%	-90%

Section 6

Consumer Transparency and Bill Control Measures

A. Introduction

In addition to measures to moderate roaming prices, the current Regulation 544/2009 includes various provisions to improve the transparency of roaming prices for consumers, and to increase consumers' ability to control their expenditure. These are intended to enable consumers to make well-informed purchasing decisions and avoid unexpectedly high bills, which give 'bill shock'. In particular, these provisions are set out in Articles 6 and 6a of the Regulation, and Recitals 38 – 42.

Overall, BEREC has found a good level of compliance with the transparency and bill control measures. Recent NRA consumer research and compliance surveys indicate an increase in consumer understanding of roaming prices in recent years, as well as a continued need to raise awareness, and that the recently introduced bill control mechanism for data roaming has had an impact on the incidence of bill shock. BEREC considers that the transparency and bill control measures should be maintained in any future Regulation.

Nonetheless, through its experience of implementation of the current Roaming Regulation, BEREC has identified some areas where the transparency and bill control provisions should be reviewed during any future legislative negotiations, for their suitability 2012 - 2015, in order to ensure all consumers are well protected and able to have a positive experience of roaming. BEREC would also update its Guidelines for industry, which are complementary to the Regulation.

B. Value-added services

Firstly, regarding the transparency information provided to consumers under the Regulation, BEREC is aware of some operator and consumer calls for increased clarity about the treatment of value added services (VAS).

To give an indication of their scope, these services may be accessed over mobile voice, SMS, MMS or mobile data services, including VoIP. They are provided using non-geographic numbering ranges, including short codes. The consumer may contact the service, or agree to receive messages. Although the end-user receives a single bill from the mobile operator, the service has two parts – a mobile (electronic communications) service and a content service. These are typically provided by different parties: the mobile operator and the VAS provider, which might contract out the provision and/or promotion of the service to a further party (the content provider). These parties share the revenue paid to the mobile operator by the consumer. Alternatively, they may be provided by the same party, including mobile operators (e.g. offering downloads from their own web portal). As such, VAS offer a micro-payments system.

As regards the content, 'digital' goods and services are most common at present, and include information services like location-based services (maps, advertisements and promotions for local destinations); news and weather; customer services from public and private bodies; entertainment like games and competitions. The provision of non-digital goods and services is increasing, for example car parking or concert tickets.

The first Roaming Regulation 717/2007 excluded value added services from the scope of the Eurotariff⁶⁴, and the amended Regulation 544/2009 excluded such services from the scope of the Euro-SMS tariff⁶⁵.

There are likely to be instances where the customer cannot access a given VAS when roaming, because giving access is not economically or technically feasible for the mobile operator, in accordance with the EU Regulatory Framework. However, where access is given, concerns have arisen in some Member States, at both the wholesale and retail levels.

There are two main⁶⁶ alternatives for roaming VAS:

- (1) Roaming customer uses a VAS with a number range from the visited country (for instance, to get information about transport, the weather, directions, or any other service important to travellers)
- (2) Roaming customer uses a VAS with a number range from the home country (for instance, to check his or her bank account)

In the retail market, some Member States have received consumer complaints about instances of bill shock, as consumers thought that VAS would be charged at the rate mentioned in the 'welcome SMS' containing roaming tariff information, received when they first connected to a visited network in another Member State. In the wholesale market, some operators have highlighted that it is unclear whether VAS should be charged at a level in keeping with the average wholesale caps set out in the Regulation.

Indeed, it may be difficult for consumers to understand the cost of using a VAS voice, SMS or MMS service (non-geographic number) when roaming, particularly when it is described as 'charged at the local rate' or 'freephone' for domestic users.

Also, consumers may agree to receive VAS SMS, which are charged at the VAS rate and for which the VAS provider will seek a share of revenues, whereas roaming SMS received are required to be free of charge: the wholesale and retail costs of terminating roaming SMS are considered to be covered by the wholesale and retail charges for roaming SMS sent.

In the case of VAS accessed through roaming data services and MMS, the current Regulation is silent as no retail price regulation is in place. In the event that retail price regulation of data roaming services or MMS is introduced, the question of VAS would need to be addressed.

⁶⁴ Recital 19 of Roaming Regulation No 717/2007, in relation to the Eurotariff: "*This regulatory approach should not apply to value added services*".

⁶⁵ Recital 26 of Roaming Regulation 544/2009, in relation to the Euro-SMS tariff: "*This regulatory approach should not apply to value-added SMS services*".

⁶⁶ This leaves aside the less likely case where the roaming customer tries to use a VAS provided from a third country.

Overall, BEREC recommends that the question of VAS is considered in detail when designing any future Regulation. Firstly, consumers need to be well informed about VAS prices in a clear and accessible way. In this respect, BEREC would highlight that any proposed addition to the ‘welcome SMS’ would need to be both clear and very succinct to be considered. Otherwise the content could extend into various messages, increasing costs for operators and, above all, decreasing the attention paid by consumers. Requiring the data roaming bill control facility (Article 6a(3)) to cover expenditure on VAS accessed using data roaming services towards the financial or volume limit also needs to be considered in any future Regulation. This measure is recommended by the ERG Guidelines on the International Roaming Regulation 544/2009⁶⁷.

Secondly, it is important for operators to have clear guidance about the treatment of VAS services at the wholesale and retail levels, including a definition of VAS (which is compatible with other regulatory instruments in this area).

It is important to bear in mind that a simple extension of existing retail or wholesale price regulation to VAS may not be appropriate: the specificities of the VAS market and, in particular, its diversity of wholesale billing structures need to be taken into account.

Where access to VAS is provided, it might be that the (often-complex) wholesale charging system associated with a given VAS will not be compatible with the wholesale caps or regulated retail tariffs and as set by the Roaming Regulation, because it could cause either the visited or the home operator to make a loss on such communications. For example, as mentioned above, the mobile operator is charged by the VAS provider, for a share of the revenues from the customer’s use of the VAS. It may be that, if the visited mobile operator is required to charge the home operator an amount in keeping with the wholesale average roaming cap, and/or the home operator is required to charge the roaming customer no more than the regulated retail roaming tariff, the visited and/or the home network is unable to cover the VAS provider’s charges. (As noted above, some mobile providers may block access to some or all VAS for roaming customers if it is not economically feasible to provide access).

C. Bill control measures

Prepaid services

Article 6a(3) does not specify whether the financial or volume limit on roaming data expenditure applies to postpaid and prepaid communications. BEREC understands that the policy intention is that it applies to both.

During the negotiations on the current Regulation, the point was made that prepaid consumers are largely protected from bill shock by the nature of the prepaid system: they pay a chosen amount in advance and cannot spend more than the credit on their account, giving transparency and control. Concern was also expressed that some prepaid users may top up by a large amount and not intend to spend the full amount on data roaming; unexpectedly doing so could result in ‘bill shock’.

⁶⁷ ERG is the European Regulators Group, BEREC’s predecessor. See http://erg.eu.int/doc/publications/erg_09_24_final_roaming_regulation_erg_guidelines.pdf

From the experience of implementing Article 6a(3), operators from various Member States have said that:

- two solutions need to be developed to deliver the bill control facility for postpaid and prepaid customers respectively, because they use separate billing platforms
- the cost and resources required to develop this solution, as presently specified, for the prepaid billing platform need to be considered in light of the number of prepaid customers that top up by a sum above or equal to the default financial limit (50€ per month)
- the requirement to provide the bill control facility to prepaid customers has led a few operators to cease to provide data roaming services to prepaid customers

In light of these points, BEREC recommends that policy makers look at the position of prepaid customers under the provision post-2012, and whether or not the provision should be adapted, considering the likely profiles of prepaid data roaming consumers in 2012-2015, especially the level of prepaid credit (total financial exposure).

In this respect, BEREC notes that take-up of smartphones and dongles and demand for data services are likely to increase, giving scope for greater price competition on the one hand, and for unexpected use on the other; data roaming tariffs are evolving, particularly the availability of bundles, which give greater control and transparency than linear data tariffs, and the availability of alternatives like WiFi – but that these are more common in some countries and locations than others; and any retail data roaming price regulation, which could in itself protect prepaid consumers from high prices.

In any case, the twin aim must be to ensure that all consumers are well protected from bill shock and can still make use of data roaming.

MMS

MMS are included in the definition of 'regulated data roaming service' of the current Regulation (Article 2(2)(k)), and are not explicitly excluded from the scope of Article 6a(3). However, MMS may be charged in different ways – typically either a fixed price (possibly different fixed prices for 'large' and 'small' volume MMS, with defined volumes), a fixed price up to a certain volume and then volume-based charging, or purely volume-based charging.

Where the bill control facility is provided volume terms, operators have said that it is not possible to count fixed price MMS towards the limit, because the price is the same regardless of the volume. In the event that an MMS is charged purely at a fixed price (with no volume-based charging element), BEREC proposes that legislators review whether it could be excluded from the scope of Article 6a(3), in an analogy to fixed price, prepaid data bundles. This could provide a positive incentive for providers to offer transparent MMS roaming tariffs to consumers. Any price regulation of data roaming could in itself protect MMS consumers from any high fixed prices.

In addition, BEREC proposes that the overall technical and commercial feasibility of including MMS under the scope of Article 6a(3) is looked at for 2012-2015, to check the volume of MMS likely to be sent and the compliance costs, as different billing platforms may be involved from those for other data services (prepaid or postpaid). In particular, e-mail,

websites like social networks and instant messaging might increasingly provide alternative means of sharing audiovisual content and messages, reducing use of MMS. As for prepaid services, BEREC is aware that the requirement to apply the bill control facility to MMS has led a few operators to cease providing data roaming services.

However, as above, the twin aim must be to ensure that all consumers are well protected from bill shock and can still make use of data roaming.

Machine to Machine (M2M) communications

Companies may use machine to machine (M2M) SIMs, for example utility companies may install SIM cards in equipment to exchange automatically generated usage data, or SIMs may be used in goods lorries to send automatic location data back to a control centre. Companies may also use SIM cards in employee devices to give remote access to specific software, for instance for on- and off-site data collection.

In some cases, the SIM will be roaming in another Member State. As noted in the ERG Guidelines, there is no explicit exemption from the Roaming Regulation for such communications. This could usefully be clarified in a revised version of the Regulation, so that companies are suitably informed of the data roaming bill control facility (and other provisions of the Regulation), and can make an informed decision about whether they wish to benefit from the limit or to opt-out.

Future-proofing

Increasingly, mobile data services are provided by on new devices. In particular, tablet computers, e-readers, games consoles and digital cameras may include a SIM to enable browsing, purchases (e.g. of e-books or computer games) and uploading or downloading (e.g. of photos). In some cases, a new player will be involved as a service provider MVNO and the customer will have no direct relationship with the mobile operator. This is the case for some e-readers and games consoles, where the customer can browse for books and games for free, and pays a bundled price to the device and content provider for mobile data use and the digital product, if and when they buy a book or game for download.

BEREC therefore recommends that policy makers assess the need to apply any transparency measures to such data use in the event that a premium is charged for roaming within the EU (which is not always the case), so that the charges are clear to consumers. BEREC also recommends a review of the transparency measures to assess if all aspects as drafted are suited to new devices, for example the ability to receive SMS or other types of message.

D. Other provisions: exchange rates

Lastly, the Regulation defines the exchange rate to be applied to the regulated caps in Member States outside of the Euro zone. The rate on a specific date of the year is used. In light of the economic climate and significant fluctuations in the values of different currencies against the Euro (which in some cases has meant that the regulated caps could have been raised in the national currency, although they decreased in Euros), some operators have suggested that:

- An average exchange rate for the preceding quarter or six months should be used, to smooth the impact of dramatic (and sometimes short-lived) fluctuations in value. Such averages are available from official sources
- A longer period than one month should be given between when the applicable exchange rate is known and the new cap comes into force. To meet the month deadline, apparently some operators predict the new cap in the national currency for the purposes of preparing to update their billing systems and customer information, and then correct it once the true value is known; with currency fluctuations this has become more difficult.

Annex 1

Background

BEREC's predecessor, the European Regulators Group (ERG), was at the forefront of tackling the long-standing issue of high prices for international roaming services. Following its creation in January 2010, the Body of European Regulators in Electronic Communications (BEREC) has taken over responsibility for this work from ERG.

Background to the Roaming Regulation

BEREC is committed to the achievement of well-functioning markets. In 2005, when BEREC's predecessor I/ERG first studied the provision of international voice roaming services, it was clear that the market for those services was not functioning well. Subject to further analysis, I/ERG suspected that wholesale and retail charges for roaming calls within Europe were significantly higher than costs.

At the time, public concern was growing. The combination of low tariff visibility and perceived high charges compared to domestic rates lead to instances of "bill shock" when consumers returned home after a business or leisure trip abroad. At the same time, there was concern that customers had heard stories of large roaming bills and might simply chose not to use their mobile abroad.

It was also apparent to I/ERG that the 2002 regulatory framework for electronic communications⁶⁸ did not provide regulators with suitable tools to address the issue. According to the provisions of the framework, it was difficult for the necessary threshold to be crossed for regulatory intervention in the form of ex ante charge controls⁶⁹.

Accordingly, in December 2005, ERG wrote to the then Director General of the Commission's DG Information Society, Mr Fabio Colasanti, expressing concern that national regulators did not have the tools to fully address any consumer detriment and calling on the Commission to address the matter with I/ERG. The Commission subsequently proposed a Regulation, in particular to control wholesale and retail voice roaming charges and improve transparency within Europe.

As a result of public consultations and the legislative process, modifications were introduced with the aim of ensuring the Regulation was practical, reduced any risk of adverse effects on the charges for other mobile services and provided for tariff flexibility, while retaining a high degree of roaming consumer protection. I/ERG, collectively and via individual members, in responses to Commission consultations⁷⁰ and through briefings of national governments and

⁶⁸ Directive 2002/19/EC, Directive 2002/20/EC, Directive 2002/21/EC, Directive 2002/22/EC and Directive 2002/58/EC. See also the Commission Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC.

⁶⁹ Under the Framework, these could be applied only to operators found to have significant market power in a relevant market. Moreover, NRAs would not be able to enforce a reduction of retail charges where these resulted from high wholesale charges imposed by foreign operators.

⁷⁰ I/ERG response to the European Commission's call for input on its proposed EC Regulation in the international roaming market, 22 March 2006; and ERG response to the European Commission's second phase public consultation on a proposal for a Regulation (EC) of the European

MEPs, provided advice on the Regulation. Some of those proposals were adopted in the final version.

After significant debate, the first Regulation on international roaming services was published on 29 June 2007. The primary provisions capped wholesale and retail charges for voice roaming services, with a downwards glide path in the caps, and set out a number of transparency provisions to help to ensure that consumers were well informed about roaming prices. The provisions of the Regulation entered into force at different times, with the retail caps and transparency provisions taking full effect by the end of September 2007 and wholesale caps calculated annually from the end of August 2007. I/ERG issued Guidelines to promote consistency of application throughout Europe⁷¹.

On 7 May 2008, the Commission launched a public consultation on the functioning of the 2007 Regulation. ERG's⁷² views expressed in response to the consultation were substantially reflected in the Commission's legislative proposals,⁷³ published on 23 September 2008, to extend the 2007 Regulation in duration and scope.

On 22 April 2009, the European Parliament adopted Regulation (EC) No 544/2009 at first reading, with a view to amending Regulation (EC) No 717/2007. Six weeks later, the Council of EU Telecoms Ministers formally adopted the new EU roaming rules. The definitive text of Regulation (EC) No 544/2009 was published in the Official Journal of the European Union on 29 June 2009⁷⁴.

In particular, the Regulation introduced the following measures from 1 July 2009 to 30 June 2012:

- extended wholesale and retail price regulation for voice, with a yearly decrease in the level of the caps
- price regulation of SMS roaming services at both the wholesale and retail levels
- safeguard price regulation of data roaming services at the wholesale level
- "push" tariff information covering SMS and data, as well as voice roaming services

And from 1 March 2010 to 30 June 2012:

- retail transparency measures to protect consumers from "bill shock" when data roaming

The effect of Regulation (EC) 544/2009

Parliament and of the Council on mobile roaming services in the single market, 11 May 2006. (The Spanish member of the ERG, CMT, did not subscribe to these responses).

⁷¹ International Roaming Regulation, ERG Guidelines, amended June 2008, <http://erg.ec.europa.eu>

⁷² http://erg.eu.int/doc/publications/erg_08_35rev1_resp_intern_roaming_cons_080729.pdf

⁷³ http://ec.europa.eu/information_society/activities/roaming/docs/regulation/reg_en.pdf

⁷⁴ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:167:0012:0023:EN:PDF>

The Commission is required to conduct a review of the functioning of Regulation (EC) 544/2009 and, following public consultation, to report to the European Parliament and the European Council by 30 June 2011 (Article 11(1)). The Commission is asked to 'evaluate in particular whether the objectives of this Regulation have been achieved'. The objectives are:

'This Regulation introduces a common approach to ensuring that users of public mobile communications networks when travelling within the Community do not pay excessive prices for Community-wide roaming services in comparison with competitive national prices, when making calls and receiving calls, when sending and receiving SMS messages and when using packet switched data communication services, thereby contributing to the smooth functioning of the internal market while achieving a high level of consumer protection, fostering competition and transparency in the market and offering both incentives for innovation and consumer choice' (Article 1(1)).

The Commission is required to review, inter alia:

- the developments in wholesale and retail charges for the provision to roaming customers of voice, SMS and data communication services, and the corresponding development in mobile communications services at domestic level in the Member States, both for pre-paid and post-paid customers separately, and in the quality and speed of these services
- the availability and quality of services including those which are an alternative to roaming (voice, SMS and data), in particular in the light of technological developments
- the extent to which consumers have benefited through real reductions in the price of roaming services or in other ways from reductions in the costs of the provision of roaming services and the variety of tariffs and products which are available to consumers with different calling patterns
- the degree of competition in both the retail and wholesale markets, in particular the competitive situation of smaller, independent or newly started operators, including the competition effects of commercial agreements and the degree of interconnection between operators

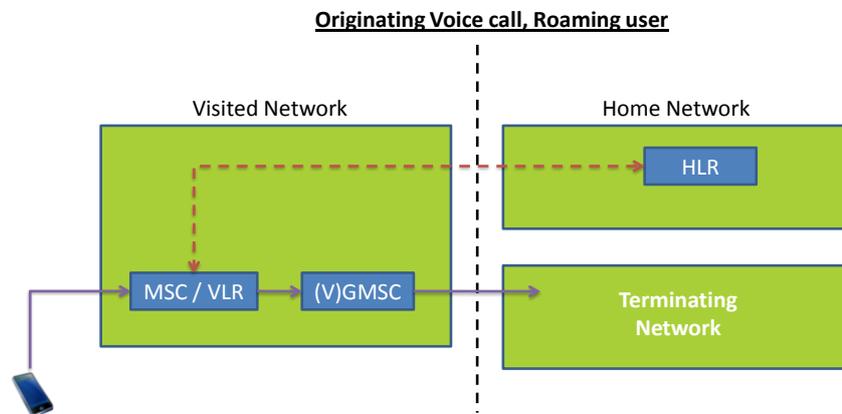
The Commission is also required to assess methods other than price regulation which could be used to create a competitive internal market for roaming. In doing so, the Commission must have regard to an analysis carried out independently by BEREC. On the basis of this assessment, the Commission will make appropriate recommendations.

Further to this Report, BEREC looks forward to assisting the European Commission during the coming months on developing its review of Roaming Regulation (EC) 544/2009, and on the detail of any regulatory proposals. BEREC also makes itself available, on request, to provide advice to the European Parliament and European Council in accordance with Regulation (EC) 1211/2009.

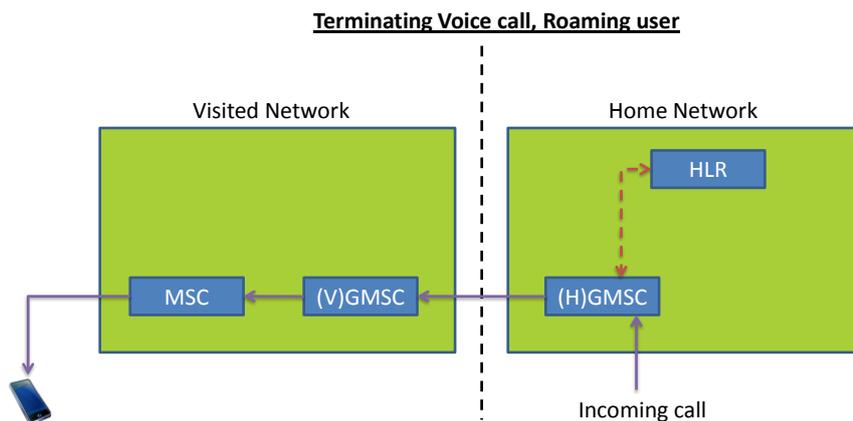
Annex 2

Routing of Roaming Services

Voice

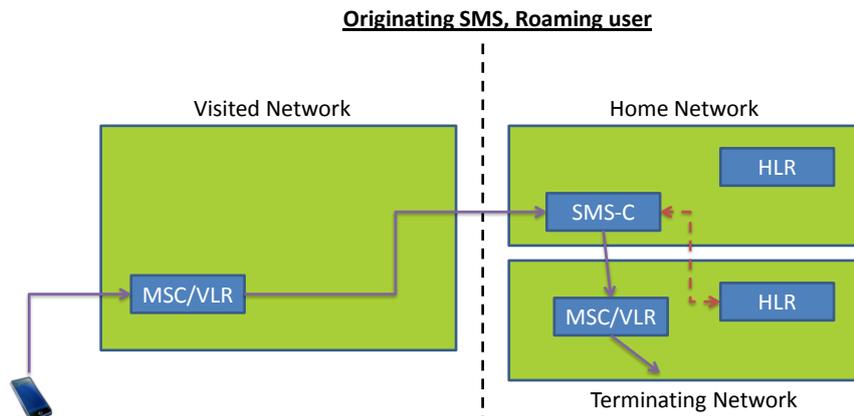


- Roaming user initiates call
- Serving MSC/VLR contacts the home network's HLR for authentication and to make sure the user is allowed to make a call
- Call is forwarded to the GMSC of the visited network and then to the terminating network

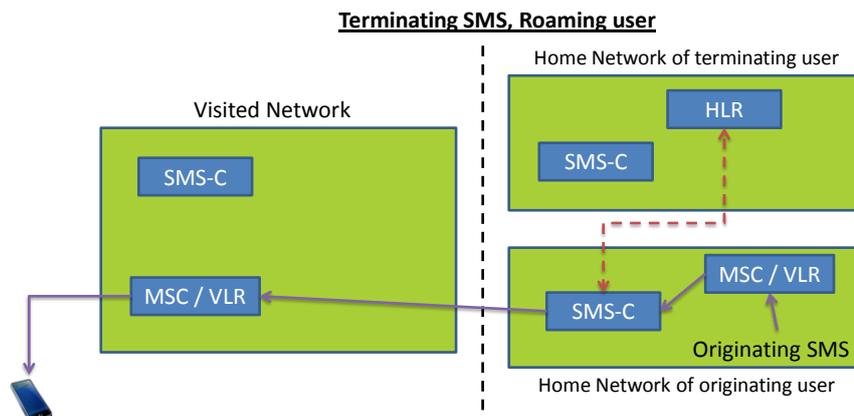


- Incoming call is received at the home GMSC
- GMSC queries the mobile location in the HLR and forwards the call to the visited network's serving MSC. The traffic is likely to go through the visited network's GMSC
- Call is terminated on the roaming user's mobile

SMS

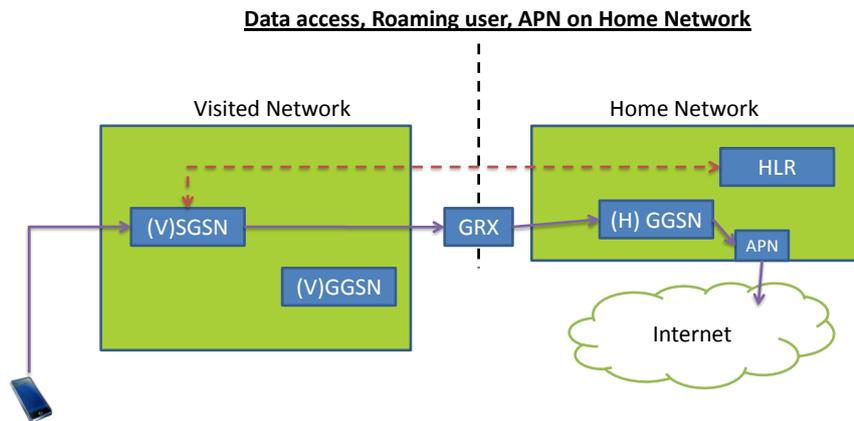


- Home SMS-C queries the terminating network's HLR to identify the location of the terminating mobile
- Home SMS-C forwards the SMS to the terminating mobile's serving MSC.
- SMS is received by the terminating mobile

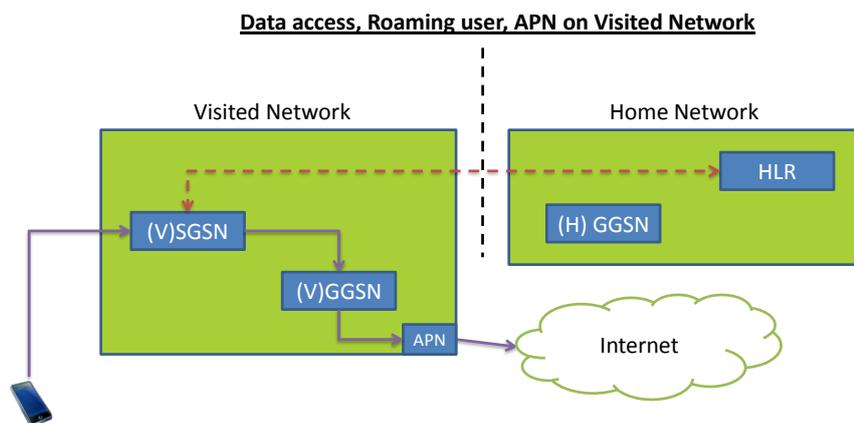


- Originating network's SMS-C queries the HLR of the terminating mobile to identify its location
- Originating SMS-C contacts visited network's MSC
- SMS is terminated on mobile

Data



- Visited SGSN verifies with HLR whether the subscriber is authorised to use data services from the specific Access Point (APN)
- Data is sent between the mobile on the visited network, the Access Point in the Home Network, and out to the Internet



- Visited SGSN verifies with the HLR in the home network whether the subscriber is authorised to use data services from the visiting network's Access Point (APN)
- Data is sent between the mobile, the Access Point in the Visited Network, and out to the Internet
- This approach does not incur costs for transiting the data between the home network and the visited network, as when the APN is in the Home Network

Annex 3

Assessment of Costs: Questionnaire and Results

BEREC IRPT Questionnaire on Costs 5 July 2010

Dear NRA

The Drafters from the International Roaming Project Team (IRPT) would like to request the information below to support our work on estimating the costs of wholesale and retail roaming services. An updated view of costs will inform IRPT's consideration of the impact of form and level of different regulatory options, in the event that further regulation is recommended by BEREC or proposed by the Commission. In particular, it will enable IRPT to check that efficiently incurred costs would be covered across the EU/EEA. IRPT will also assess the impact of different approaches to costs.

For the 2007 Roaming Regulation, we used MTRs as a proxy for the costs of both origination and termination of roaming voice calls (the '2 x MTR formula'). Transit and platform costs were covered by the conservatism in the formula, particularly because a percentage of roaming calls terminate on fixed-line networks, incurring fixed termination rates, which are lower than MTRs.

For the 2009 Roaming Regulation, we recognised that the MTR formula would cease to be a satisfactory proxy for access and call origination costs of roaming calls, as MTRs fell. In particular, the Commission Recommendation on termination rates of May 2009 recommends that MTRs in Europe drop over time and no longer recover network costs other than those strictly necessary to ensure termination of incoming traffic (i.e. excluding coverage costs). Therefore, the questions below ask for any data/ estimates that you have for the different cost elements involved in an end-to-end roaming call, text or data session.

Scope of the Questionnaire

Timeframe for the data: please provide whatever is available to your NRA. Ideally, we would like the most recent information available on an annual basis, plus historical trends and forecast data if available.

Any information provided should be related to **underlying volumes of traffic** (even for capacity-based charging), in order to make it possible to work out average per unit costs or charges.

For each question, please indicate the source of your estimate or the type of data you have drawn on, the cost elements you have included, and **how you have calculated the answer**.

Possible sources for your estimates, depending on what is available to your NRA, are:

- Cost model

- Regulatory accounting data
- Fixed operator wholesale price lists
- NRA market data collections
- Third-party studies (for the NRA or another party)
- Operators' annual reports

Questions 1 and 2 are not service-specific. The information requested in questions 3 to 5 may be provided respectively for voice, SMS and data services, if available. Question 6 is for SMS services only and question 7 is for data services only.

Questions for all NRAs

Question 1: Please provide an estimate of sales and marketing costs as a proportion of the total cost of mobile operations

Operators support specific sales and marketing costs linked with international roaming. For instance, at wholesale level, such costs may include billing expenses and costs related to roaming agreements management, while at retail level there will be some marketing and billing costs involved.

When responding, please specify what exactly you have included under 'Sales and marketing costs' and 'total cost of mobile operations'. Interconnection costs should not be included under Sales and marketing costs, but costs related to managing interconnection contracts or interconnection billing may be included under that heading.

Question 2: Please provide an estimate of common costs as a proportion of the total cost of mobile operations

Relevant wholesale and retail roaming costs may include a share of common costs (management fees, administrative charges, HR...). Roaming consists in domestic operators using another operator's network for the benefit of their own subscribers. Domestic operators and roaming subscribers may therefore contribute to common costs generated by the network they are using. For example, this could be a mark-up based on the overall common cost levels commonly observed for European mobile operators.

Please specify what exactly you have included under 'Common costs' and 'total cost of mobile operations'. Any sales and marketing costs should not be included under common costs, unless the split is unavailable, in which case the answers to X and Y will be the same. EPMU mark-ups used to account for common costs when calculating the FDC cost of mobile termination may be provided as an answer to this question.

Question 3: International transit costs

Please provide any information you may have on international transit costs between two European operators, including mobile operators:

- What cost components have you included (for instance capacity and/or volume)?
- What are the associated cost levels?

Please provide information respectively for voice, SMS and data services, if such a split is available.

Question 4: International transit *charges* (market prices)

Please provide any information you may have on international transit charges between two European operators, including mobile operators:

- (a) What are the main components of international transit charges (for instance capacity and/or volume)?
- (b) How is the financial weight divided between each component?
- (c) How is the volume component structured (for instance, per minute charge and/or call set-up charge)?
- (d) What are the ranges of charges for each component?

Please provide information respectively for voice, SMS and data services, if such a split is available.

Question 5: Platforms costs

Please provide any information you may have on the platform costs involved in international roaming. Please provide information respectively for voice, SMS and data services, if such a split is available.

Questions only for NRAs with a cost model or regulatory accounting data:

Question 6: SMS origination and termination costs

If you have a cost model or regulatory accounting data for mobile services, please provide information on SMS origination and termination costs. Please give a brief description of the cost model used to provide the data (for instance: FDC costs stemming from an updated pure LRIC model, or an old bottom-up LRAIC+ model used for voice termination, top-down model...). Information is required from year 2009 onwards and may include as much forecast data as is available in your model. Please specify whether the costs provided are in nominal or in real terms (and for the latter, please specify the year of reference).

Question 7: Mobile data services: domestic network costs

If you own a cost model or regulatory accounting data for mobile services, please provide information on the domestic network costs for a billed megabyte of mobile data.

Questions only for NRAs with a new, pure LRIC cost model (BIPT, OPTA, Ofcom, NPT):

Question 8: The pure LRIC cost of mobile voice termination

Please provide information on the pure LRIC cost of mobile voice termination from year 2009 onwards (and include as much forecast data as is available in your model). Please specify whether the costs provided are in nominal or in real terms (and for the latter, please specify the year of reference).

Summary of answers received as part of the data collection launched on 5 July 2010

As part of the data collection carried out during the third quarter of 2010, we have received answers from twenty NRAs, out of which thirteen were able to provide some data.

The below table summarises which questions were answered, by country.

Country	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	Q.8
Austria	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	N/A	N/A	N/A	N/A	N/A	✓	✓	✓
Bulgaria	N/A							
Czech Republic	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	N/A	N/A	✓	✓	✓	N/A
France	✓	✓	N/A	✓	N/A	✓	✓	✓
Germany	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Greece	✓	✓	N/A	N/A	N/A	✓	✓	N/A
Ireland	N/A							
Italy	N/A							
Latvia	N/A							
Malta	N/A							
Netherlands	✓	✓	N/A	N/A	N/A	✓	✓	✓
Norway	✓	✓	N/A	N/A	✓	✓	✓	✓
Poland	N/A							
Portugal	N/A							
Romania	✓	✓	N/A	N/A	N/A	✓	✓	N/A
Spain	✓	✓	N/A	N/A	N/A	✓	✓	N/A
Slovenia	N/A	✓						
Switzerland	N/A							
UK	✓	✓	N/A	✓	N/A	✓	✓	✓