

**BEREC Response to the European Commission
'Public Consultation on a Review of the
Functioning of Regulation (EC) No 544/2009 (the
"Roaming Regulation")'**

February 2011

Overview

This paper sets out BEREC's response to the European Commission's 'Public Consultation on a Review of the functioning of Regulation (EC) No 544/2009 (the "Roaming Regulation").

In conducting its review of the functioning of the Regulation and making appropriate recommendations on the future of regulation, the amended Roaming Regulation (EC) 544/2009 requires the Commission to have regard to an independent analysis by BEREC.

In December 2010, the Body of European Regulators for Electronic Communications (BEREC)¹ published a Report setting out its advice to the European Commission (International Mobile Roaming BEREC Report, December 2010²). This response to the Commission's consultation is complementary to that Report, and both documents should be read together.

In particular, the public consultation raised a few questions that were not fully covered in BEREC's Report, or where BEREC is now able to provide more detailed analysis. As such, we have limited this response to certain aspects of consultation questions 3, 4 and 8 – 13.

The following part of the Overview explains BEREC's approach to responding to the selected questions, and summarises our conclusions. Further supporting argument is provided in the Annex.

Questions 3, 4, 8: Options for price regulation in the event that the legislator adopts the Digital Agenda target

In Section 3 of its consultation, 'Options for future regulation', the Commission restates its European Digital Agenda, 'One of the key performance targets for the digital single market is that the difference between national and roaming charges should approach zero by 2015'. In this response, BEREC seeks to analyse to what extent the different methods of price regulation could deliver this target, in the event that it is adopted by the legislators. The methods assessed are: the current model of regulation, with the possibility of modifications (questions 3 – 4), and 'Roaming prices based on domestic prices in the home market' (which BEREC calls 'Roam like at home' (RLAH)) and 'Roaming prices based on domestic prices in the visited country' (which BEREC calls 'Roam like a local (RLAL)) (question 8).

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.

² http://www.erg.eu.int/doc/berec/bor_10_58.pdf

In its December 2010 Report, BEREC set out its initial analysis of the relative pros and cons of both “Roam like at Home” and “Roam like a local” as possible replacements for the current approach to control of retail prices by means of the default Eurotariff and Euro-SMS tariff. With the aim of providing technical advice on options for price regulation in the event that the EDA target is adopted, BEREC has now had the opportunity to consider the issues more deeply and is developing an analytical methodology which should be useful in assessing how price caps can be set in line with the policy objectives of the legislator while covering reasonably efficiently incurred costs and avoiding margin squeeze. It can also indicate where arbitrage situations could appear.

The Commission has re-stated its European Digital Agenda target that roaming prices should “approach” domestic prices by 2015. The BEREC Report concluded that there was little prospect of achieving (or coming close to achieving) that target, without relying on wholesale and retail price controls. In the event that such a policy is implemented, BEREC’s latest analysis confirms its earlier views. To recap, the “Roam like” options could be expected to work very well when there is relatively little variability of costs and/or of domestic retail prices across Europe. Under these circumstances, the options provide a market-oriented approach to price control while fulfilling the Commission objective. “Roam like at home” links the roaming price with the price paid “at home” for national calls by the individual consumer. “Roam like a local” links to a benchmark price for national calls within the visited country.

Neither alternative option works so well when there is considerable variation of retail domestic prices across Europe. An additional margin over the domestic benchmark would be necessary to protect against the risk of below-cost pricing or margin squeeze. This arises as a result of the combination of:

- The natural variability of underlying costs, reflecting a diversity of factors such as network topology, population density and retail business models;
- The differences between domestic and roaming costs

While these factors could reasonably be expected to be less significant by 2015, the extent of this is speculative for the moment. For this reason, detailed comparisons of how each of the methods might be implemented in 2015 cannot confidently be made until nearer the time. That line of analysis contributed to BEREC’s conclusion that if some form of price control is to be relied upon to moderate prices over the next few years, the traditional “Eurotariff” approach is the most straightforward and predictable in its effects.

BEREC draws some general conclusions below about the behaviour of the three approaches, which develop its earlier conclusions and are illustrated here in respect of outgoing voice roaming.

In its December Report (Table 1), BEREC presented some estimates of the costs of provision of wholesale and retail roaming services. For example, for outgoing voice roaming, BEREC concluded that for 2012, 10€c per minute at the wholesale level and 15€c per minute at the retail level were conservative estimates of costs. BEREC also noted that “expected reductions in termination rates and increases in network utilisation

could cause the unit cost to halve again over the next few years (after 2012)". These two figures would therefore also provide a conservative estimate of costs in 2015 while plausible but optimistic estimates for the wholesale and retail levels would be respectively 5€c per minute and 7.5€c per minute. These figures are obviously rather speculative and are presented here for the purposes of illustration.

Table 2 of the BEREC Report noted the median European rate for domestic mobile calls in the second quarter of 2009 was a little below 10€c per minute but with a large range of 3-17€c per minute for the 25 countries surveyed. Extrapolation of past trends gives a projected median rate for 2012 of around 7€c per minute with further extrapolation of the median to around 5€c per minute (with considerable variation in national averages in the range 2-12€c per minute) possible but nevertheless highly speculative. However, it is not necessary to make accurate projections of 2015 domestic rates at this stage. The point of this analysis is only to show that it should be possible to set a Eurotariff cap for 2015 which "approaches" domestic rates, without causing network operators to price below costs or retail providers to suffer a margin squeeze.

Roam like at Home vs Eurotariff

For "Roam like at home", to obtain the individual customer's retail roaming rate, a mark-up would be added to the customer's domestic national rate. There are various methods of calculating the appropriate mark-up which to some extent trade off the ability to get as close as possible to the domestic target against simplicity of application. In general, as wholesale costs reduce and converge across Europe, reflecting in particular a consistent approach to the setting of termination rates, the size of the mark-up would reduce.

The further review of regulation proposed by BEREC for 2014 would allow a good view of the necessary mark-up, given that there should be much greater clarity over costs at that point.

Roam like at home	Eurotariff
European median price depends on median domestic price plus roaming mark-up. The latter reflects degree of variability of costs across Europe	Median price reflects level of cap which can be set at any desired level
Roaming prices at least as great as domestic prices of the home country in all cases	Roaming price may be less than domestic price for a significant number of customers, depending on where the Eurotariff cap is set
Consumer roaming prices vary considerably across Europe but predictable relationship between individual customer's roaming and domestic prices	Consumer roaming prices consistent across Europe with only small difference between roaming and domestic prices for majority of customers
Retail margins for roaming services vary	Retail roaming margins constant but

significantly across Europe, probably without much objective justification	profitability varies, depending on (unknown) variation in retail costs
Possible opportunities for arbitrage in small number of Member States (where consumers might find it cheaper to “roam permanently” for their domestic services using a foreign SIM)	Opportunities for arbitrage in some Member States (where consumers might find it cheaper to “roam permanently” for their domestic services using a foreign SIM). Scale of opportunities depends on where the Eurotariff cap is set
Could be more complex to implement than Eurotariff, depending on method of implementation	Simple to implement

Roam like a local vs Eurotariff

BEREC considered two variants of “Roam like a local”, with a uniform wholesale cap and a “retail minus” wholesale cap. The starting point would be a single benchmark retail price (for national calls) in the visited country plus a roaming mark-up. In the “retail minus” variant, the wholesale price would be calculated by subtracting a constant retail margin, computed so that no operator was required to sell wholesale services below cost. Calculation of the roaming mark-up is highly speculative at the moment since it is very sensitive to assumptions about variation in wholesale cost and retail domestic price. However, BEREC considers that it would be likely to be smaller than the corresponding mark-up for Roam like at Home. The combination of Roam like a local with uniform wholesale cap leads to average retail prices in line with those for Roam like at Home. For the individual consumer, there is of course profound (and possibly unexpected) variation, depending on where they roam.

Comparing Roam like a local with the Eurotariff reveals the following main advantages and disadvantages:

Roam like a local	Eurotariff
European median roaming price depends on median domestic price plus roaming mark-up. The latter reflects variability of costs across Europe	Median price reflects level of cap which can be set at any desired level
Roaming price may be higher or lower than home domestic price and varies significantly by destination, thereby reducing transparency for consumers	Roaming price uniform but may be higher or lower than individual consumer’s domestic price, depending on the level at which the Eurotariff cap is set
Wide typical variation in difference between consumer’s domestic and roaming price – uniform relationship between domestic and roaming price in the visited country	Narrower variation in difference between consumer’s domestic and roaming price
Average consumer roaming prices broadly	Consumer roaming prices constant across

constant across Europe. But varies significantly between consumers, depending on individual travel patterns	Europe
For “uniform wholesale price” variant, retail profitability would probably be rather similar across Europe, although it may vary significantly by customer, depending on individual travel patterns For “retail minus” variant, retail margins constant while profitability varies depending on variation in retail costs	Retail margins constant while profitability varies depending on variation in retail costs
For “uniform wholesale price” variant, wholesale profitability varies depending on variation in costs For “retail minus” variant, wholesale profitability varies significantly across Europe, probably without much objective justification	Wholesale profitability varies, depending on variation in costs
Technically challenging and resource-intensive regular exercise required to set benchmark “local” prices	No such regular exercise required during the life of the Regulation. Simple to implement.

Safeguard Eurotariff

BEREC concluded in its Report that no structural measure could be relied on to deliver end-user prices close to the Commission’s target although some have the potential to increase competition and, thereby, to lead to some reduction in prices, at least for some customer segments. If the Commission nevertheless decides to propose the introduction of one of the structural solutions it is considering, it may wish to retain some kind of safeguard retail price control, to ensure that all customers continue to benefit from regulation.

In this context, it is natural to think in terms of a traditional price cap rather than one of the “Roam like ...” options. The cap could in principle be set at any level (fixed or decreasing by glidepath) but to avoid defeating the purpose of the structural solution introduced, it would have to be set at a level comfortably above cost to give sufficient scope and incentives for competition. Such a level would nevertheless ensure some progress towards the Commission’s target starting from current levels.

Questions 9 – 10: Separate sale of roaming services - decoupling of roaming from mobile services bundles (Carrier pre select)

In Section 3(e) of its consultation, the Commission considers the ‘Separate sale of roaming services - decoupling of roaming from mobile services bundles’. The Commission suggests that this could be implemented in one of three ways – ‘Carrier

Pre Select (CPS) in the domestic market', 'Carrier Pre Select (CPS) in the visited country', and 'Choose operator at the border (based on local retail price)'.

BEREC has focused on the technical implications of the option 'Carrier Pre-Select (CPS) in the domestic market', as this has been proposed by an MNO and BEREC has had the opportunity to further consider the question of technical implementation, in addition our analysis of the technical and commercial feasibility in the December 2010 Report.

In summary, our analysis has revealed several technical implementation barriers. While solutions may exist, significant standardisation activities will be required to establish the appropriate procedures. For this reason we believe that the CPS in the domestic market option is unattractive for the short to middle term.

We consider that the question of commercial feasibility is covered by the December Report. Meanwhile, the potential impact on competition of this solution raises the same questions as in our response to consultation question 12 (below). On both grounds, BEREC does not consider that this is an appropriate regulatory solution.

Question 11: Spot-trading of wholesale roaming

Section 3(f) considers the possibility of establishing a spot market or electronic trading platform as a means of increasing wholesale competition, by separating the offer to supply a given number of roaming minutes in a given visited country from the offer to purchase a given number of roaming minutes.

In response to this question, BEREC sets out further analysis and conclusions on the regulatory option of spot market trading for wholesale roaming, including its technical and commercial feasibility, efficiency and its potential impact on wholesale and retail competition.

Having taken up more investigation on this topic, BEREC comes to the conclusion that it would not be feasible to introduce a spot market exchange for trading roaming minutes. This is due to serious concerns about the design of the spot market (possibility of defining roaming services as standardised commodities, the question of defining grades of quality of service, the difficulty of maintaining the anonymity of the bidder and/or the seller, whether to allow bilateral trading), giving rise to a risk of regulatory failure and doubts about the impact that such a trading mechanism would have on competition for wholesale and retail roaming services.

Question 12: Access-based approaches

Question 12 asks whether different 'access-based' approaches can stimulate additional competition for roaming services and whether, in order to achieve significant reductions in roaming prices, they may need to be combined with other forms of wholesale price regulation (i.e. between MNOs) and/or retail price regulation.

BEREC has focused its response on potential impact on competition of the first access-based approach suggested by the consultation, whereby 'Wholesale access could be mandated for MVNOs, for roaming only, in visited networks. MVNOs would be entitled

to access for roaming services at regulated prices'. For a discussion of the other two access options, please see the December 2010 Report.

For BEREC, It is not clear that established MNOs or (new or established) MVNOs focused on providing domestic services would have much incentive to use this regulatory approach to offer lower retail roaming prices, especially for voice and SMS services. A 'global' MVNO would have an incentive to offer lower retail prices in order to build market share. However, it is likely to be focused on providing attractive tariffs to frequent roamers, both from a point of view of profitability per customer and to avoid the need to set up a large customer support operation to service the mass market. It would not necessarily reduce the "headline" roaming rate paid by the mass market of infrequent roamers. It is nevertheless possible that a "snow ball" effect could ensue, in the event that lower roaming prices offered to frequent roamers increase general consumer awareness of roaming prices and demand for roaming services.

On the other hand, depending on the level of the regulated wholesale resale price, this option could be used as a substitute for domestic services (customers buy a foreign SIM, e.g. on-line, so that that they are technically 'roaming' in their home country). This would affect the domestic mobile market, going beyond the competition problem identified and the target of any regulation (roaming services). An access right for roaming only could also be seen to discriminate between domestic and international players, as mentioned in the December Report (page 117).

The above analysis may hold less true for retail data services, as competition may be higher than for voice and SMS. As such, there may be greater commercial incentives for an established or new actor to consider using this regulatory option to offer a carrier select or 'global MVNO' product for data than for voice and SMS. A final consideration is that negotiating bilateral access agreements in each country could prove to be a significant barrier for smaller and newer entrants in particular. This could be alleviated by new actors using the access right to provide services at the wholesale level, who could conduct negotiations and aggregate MVNO volumes.

Overall, this option does not seem likely to increase competition in the short term, but might have an impact in the medium to longer term for data roaming services and for frequent travellers.

Section 6: Comments on related matters

The Commission asks for any other related comments.

BEREC shares the wish of the Commission to find an enduring structural solution to the problem of roaming. Unfortunately, so far, it has not been able to identify a solution which is credible, at least not if the legislator chooses to adopt the Commission's EDA Target. However, it believes worthy of further analysis an approach which could allow a structural solution to be implemented if a suitable one materialises before 2015, without the necessity of renegotiating the Regulation between 2012 and 2015.

Our suggestion is to provide for a general right of access for the purpose of providing roaming services on reasonable request and on reasonable terms. As such, the right

would not be limited to any particular class of market player but would be limited to those requests which facilitate the achievement of the objectives of the Regulation. This would enable a market-oriented 'structural solution' to roaming to emerge without disrupting other regulatory rules or competitive markets. It could facilitate the emergence of wholesale and retail competition by increasing the number of players

On the face of it, the Regulation contains no such general right at present and new provisions would be needed. Once such a right is in place, BEREC considers that the existing Framework, notably Articles 20 and 21 of the Framework Directive may apply to require NRAs to resolve any disputes in the event that a commercial agreement cannot be reached on reasonable request and terms and in a reasonable time. Co-ordination through BEREC could be used (for example, in the form of a BEREC Opinion or Report) to promote rapid implementation of any viable approach across Europe and not only in 1 or 2 Member States.

BEREC would be happy to elaborate this idea further if the Commission finds merit in it.

Question 13: Medium to Long Term View (Technology developments)

The consultation asks whether respondents share the view that, 'in the medium to long term, markets and technologies will possibly evolve to the point where roaming services can be provided by different competing technologies. Such developments seem to be unlikely to be sufficient to eliminate or minimize roaming problems within 5 years'.

Here BEREC has sought to provide further commentary on likely technology developments and their potential impact on roaming competition in the period to 2015. This is complementary to Section 2 of the December 2010 Report.

Overall, we consider that greater competition is only likely to result from technology developments to the extent that this brings new actors into the market (for example WiFi providers not associated to an existing MNO) and / or this has an impact on consumer demand and competition in the domestic market, which then feeds through into the roaming market. For instance, increasing smartphone take up and mobile Internet use is leading to growing demand for data services, firstly in the domestic market and then in the roaming market, particularly in some countries.

ANNEX – FURTHER SUPPORTING MATERIAL

Questions 9 – 10: Separate sale of roaming services - decoupling of roaming from mobile services bundles (Carrier pre select)

In replying to these questions we focus on the first scenario suggested by the consultation (CPS in the domestic market) as this has been proposed by a mobile network operator. Please refer to the BEREC report for our view on the other two scenarios. In addition, we limit this answer to additional considerations about the technical feasibility of this carrier select solution, in addition to those raised about the carrier select variants in the December 2010 BEREC Report. The BEREC Report also discusses commercial feasibility (see Section 5).

In summary, our analysis has revealed several technical implementation barriers. While solutions may exist, significant standardisation activities will be required to establish the appropriate procedures. This is likely to take time, particularly as in many cases the mobile operators may be reluctant to cooperate. For this reason we believe that the CPS in the domestic market option is unattractive for the short to middle term.

We have confined our answer to analysing the identified technical barriers in more depth, as the BEREC Report has already analysed the commercial barriers, which are also noteworthy.

Technical implementation issues

The proposed scenario suggests that while an MNO (or MVNO) offers domestic retail services to a customer, a different provider offers roaming services to the same customer, using the same mobile number.

While the mobile terminal is in the home country it registers with the domestic service provider. When the user is roaming, however, the mobile terminal initiates the registration procedure with the visited network, which should then contact the roaming provider for all authorisation, registration, service request, and billing purposes.

The technical implementation of this proposal requires the terminal to register using a different IMSI (International Mobile Subscriber Identification) number, as the five first digits of this number identify the home country and network of the subscriber. The IMSI is stored in the SIM (Subscriber Identification Module) card; consequently, the SIM would be required to have two IMSIs and an appropriate mechanism so that the correct IMSI is used depending on the roaming customer's location.

Security implications

Besides the IMSI number, a SIM card stores security information relating to subscriber authentication and data encryption. This information is very sensitive, while it may include proprietary algorithms.

While SIMs with dual (or even multiple) IMSIs exist, these are being used by operators that are present in many countries, such as global MVNOs. In this way, although a different IMSI is used depending on the country where the user is roaming, the single relationship between the end user and the home network allows the same security information to be used for authentication and encryption.

In the proposed CPS solution, the end-user is related to two different operators. Technical solutions must be developed to allow a SIM to contain the IMSI and security elements corresponding to both operators and allow their use interchangeably. Security elements include security keys, authentication algorithms and others technical parameters which are totally separated for each operator.

At present security and identification information is hardcoded on the SIM card during manufacturing. Following a similar approach for multiple IMSI and security elements is only a theoretical solution. It would be impractical as it requires any two operators (MNOs or full MVNOs) to have commercial relationships with the same SIM manufacturer and for SIM cards to be produced with different combinations of domestic and roaming providers.

Downloading new security elements to the SIM card at a later stage using over the air (OTA) messaging (dynamic post-allocation) is not possible with the current standards. Mobile operators (and the GSMA) have previously been reluctant to implement such procedure, highlighting the security concerns it raises and the regulatory requirements they need to comply with. Although it may be possible to use strong encryption for the OTA signalling to reduce the risk of identity theft, such a procedure is not standardised and it seems likely that the mobile operators will be reluctant to proceed with standardisation activities while the end user's communication security level would be impaired, even marginally.

Another solution is having standardised security algorithms for all operators that all HLRs can read. The SIM could be pre-programmed with the required standardised security information, but European operators will have to all agree for a common algorithm. Whereas some operators give a lot of importance to security and prefer having their own security elements, they will be reluctant to have a weaker security level than their own current one.

Forcing the operators to share common security algorithms could put the user's secure communication at risk, causing the involved providers to violate regulatory requirements, for example the Privacy and Electronic Communications Regulations 2003 Directive.

To reduce the security detriment of common security algorithms, these could be used only for roaming purposes. According to this option, SIM cards would have a standardised format of security elements that the roaming provider could populate independently, without the ability to read the security elements of the domestic provider. These fields would be empty if no separate roaming provider is chosen.

The roaming security elements would be added at the point of sale of roaming services (e.g. a retail shop of the roaming provider), by mailing the SIM to the roaming provider, or using OTA signalling. This solution would still require significant

standardisation activities (at least 2-3 years) for the definition of common security algorithms and/or the appropriate SIM interfaces. Security would be unavoidably impaired due to many operators accessing the same SIM. Due to both the length of any required standardisation activities and the security concerns, we do not believe that this is a plausible solution to be implemented within the time horizon of this regulation.

Routing implications

Some technical barriers also exist in the routing of inbound calls when the user is roaming. The calls would have to be routed to the roaming provider, either directly from the originating network, or through the domestic provider. This could be either accomplished through call (and SMS) forwarding, or by technical arrangements similar to those currently used for number portability. The challenge here is that these arrangements have to be established within moments after the user has entered a foreign country. Although technical solutions may be available or could be developed for voice and SMS, the required standards may take significant time and effort to implement.

Other technical and practical considerations

Established number portability arrangements may be affected since the subscriber number will be “shared” between two service providers – the domestic and roaming operators. The procedure itself would probably be more complicated resulting in slower number portability arrangements for all consumers, which would go against the EU’s target of 1-day number porting.

The “sharing” of mobile numbers between operators may complicate the regulatory requirements and technical procedures around national security issues such as legal interception and data retention.

It is also unclear that the SIM would automatically switch back to the home provider when the end-user returns to the home country, requiring them to manually search for their home network or again, for there to be development and standardisation work to make an automatic reversal possible.

Lastly, this option would require consumers to change SIM, and for legacy SIMs to be swapped out, implying a time delay in any market impact.

Conclusion

Our analysis has revealed several technical barriers in the implementation of the “CPS in the domestic market” solution. The issues identified relate particularly to maintaining the established level of security in GSM and UMTS systems, but also to arrangements around the routing of calls and SMS.

While certain solutions may be available, achieving industry-wide agreement and standards seems likely to be a time and effort intensive procedure. Forcing the providers to provide a quick solution could impair the end user’s level of secure communications, threatening his privacy or resulting in unexpected charges. For this reason we believe that this option is unattractive in the short to medium term.

Question 11: Spot-trading of wholesale roaming

BEREC included the idea of trading wholesale roaming minutes on a spot market in its December 2010 Report to the Commission (Section 5) and rated this idea as “possible but unlikely”. Unlike the common spot market, where short term contracts are traded in a single price auction – such as day-ahead contracts for energy – the term spot market analysed here should be understood as any approach to auctioning roaming minutes to be consumed over an extended period (e.g. 3 months, 12 months) on a platform allowing either single- or multi-price auctions.

A single-price auction generates one market clearing price, which would serve as a reference price to the market. In a multi-price auction, bidders and sellers contract on prices they are willing to sell and pay, i.e. bids are allocated to buyers as long as these do not exceed a preset maximum price level and quantity. In contrast to single-price auctions, this produces multiple prices. In addition to day-ahead contracts, energy exchanges typically also allow futures and options trading. Having conducted further research on this topic, BEREC has come to the conclusion that it would not be feasible to introduce a spot market exchange for trading roaming minutes.

BEREC looked into electricity and gas trading on the European spot markets in order to find any common ground, which could justify introducing spot market trading for roaming minutes. But there are more diversities than similarities. In contrast to electricity and gas, international roaming minutes cannot be classified as a standardised commodity. There are similarities such that both energy and roaming can be measured in units (MW and minutes or MB), which is essential, if commodities are supposed to be traded on exchanges, and capacity constraints amongst other factors. However, there are more differences such as the geographic scope that energy has; it is traded on national exchanges (regionalised markets) but delivered across borders. For roaming, the sellers are much more limited due to the geographical scope of the mobile networks. Given the apparent preference of network operators to negotiate long-term contracts in order to provide reasonable certainty over costs, the intensity of trading could be expected to be rather low.

Energy trading (via a single-price or multi-price auction) also works in terms of keeping bidders and sellers unknown to each other. BEREC is not convinced that this would work for roaming. Keeping market participants secret would be difficult to achieve as the way bids for roaming minutes would have to be placed and taken could disclose both bidders and buyers. It would be possible for a large operator to make small bids instead of bidding for large amount of minutes. Another possibility to solve this problem could be by disclosing the identity of only one side, i.e. disclose buyers but keeping sellers undisclosed or the other way around.

Nevertheless, demanding a certain quality of service (QoS) level could also reveal spot market participants. Generally there may be problems with guaranteeing quality of service (QoS) in terms of network coverage, availability of services and network speed, capacity and traffic congestion for data services. It is crucial for mobile operators to make sure that the deals they get ensure that their retail customers can

obtain high quality data roaming services in visited countries. Different operators will have different sensitivities on this point, depending on their customer profile. This is different in energy markets as QoS for energy is limited to the agreed amount being supplied at an agreed time slot. There is no good or bad quality of energy as long as the transmission or pipe lines technically allow energy transport. Major concerns have been expressed about defining different QoS levels as this could reduce any possible benefits from an exchange if it headed towards a separate QoS specification for each network. Furthermore it could be difficult for buyers to get a higher quality service if suppliers of any standardised roaming product do not have an incentive to go beyond the minimum necessary QoS requirements. It would also be impossible to distinguish between offers within a certain QoS level. Questions were also raised about who would determine QoS levels and classify operators into these levels.

There is a general risk of regulatory failure when the regulator sets up the rules for the exchange. How would the regulator define the details of an optimal market design? This idea would require the regulator to work closely with market players.

It would also be necessary to solve the problem of how traffic could be steered to the preferred network, when it is bought on a spot market. Under the current regime, many MNOs buy roaming minutes from more than one operator in the same country. It seems that they have preferred networks so that traffic is steered to these, in order of preference. Additional networks are partly taken for redundancy reasons. This would be difficult to accomplish if roaming trading was blind. Operators would be deprived of choosing their operator mix per country, creating optimisation shortcomings.

There is also the question of whether bilateral trading should still be possible if a roaming exchange was established. Bilateral trading here refers to any agreement between operators that would not take place on an exchange such as the current bilateral agreements between operators, and also trading tools like contracts for difference, futures and options.

One option is to allow bilateral trading alongside the spot market. If we assume that inter-Group trading would remain off the exchange, that would leave 66% of roaming traffic (non-group), some of which could be traded on the spot market and some in bilateral trades. This situation is similar to electricity in Germany, where 20% of generated electricity is traded on the energy exchange and the rest via over-the-counter (OTC) trading. Roaming units (minutes, SMS, MB) would be traded on long term contracts like futures, in order to avoid volatility in supply, demand and price that may be present in day-ahead trades. However, although this risk might be reduced if buyers could set a reserve price (not accepting bids above a certain level), allowing bilateral trading could defeat the purpose of the exchange as operators would be able to use off-exchange instruments to unwind the effect of the exchange-traded contracts.

Lastly BEREC is not sure that implementing a spot market for wholesale roaming minutes would actually bring wholesale or retail prices down. There is much uncertainty about this. Costs of introducing such a trading platform would be high

and the benefits rather unsure. Even if competition did increase at the wholesale level, safeguard retail measures would have to be put in place to ensure that reduced wholesale prices were fed through to the retail level, particularly for voice and SMS services.

After having reviewed all the arguments put forward, including a comparison with energy trading, more questions arose, not all of which have convincing answers. BEREC therefore remains reluctant to recommend spot market trading for wholesale roaming.

Question 12: Access-based approaches

In its December 2010 Report to the Commission, BEREC analysed two possible future regulatory approaches relating to access obligations and regulated wholesale rates for MVNOs, in line with options (ii) and (iii) of the consultation: regulated wholesale resale roaming cap, or mandated MVNO wholesale access for all services. For BEREC's comments on those options, please see the Report (from pages 117 and 124 respectively).

In its consultation the Commission has proposed a further variant in this area, namely mandated wholesale access for roaming only, at regulated prices – option (i). BEREC mentioned this briefly in its December Report, in relation to the option of mandated MVNO access for all services, and takes this opportunity to set out further considerations in relation to mandated access for roaming only.

BEREC understands that the aim of such a policy would be to increase the number of actors offering roaming services and for retail prices to fall through competition. In response to BEREC's 2010 stakeholder questionnaire and interviews, some MVNOs and global MVNOs expressed concern about time required to negotiate wholesale access and the terms offered. This option would be expected to have an impact in the medium to longer term.

An actor in one Member State could request access agreements from MNOs in other Member States (it could be an existing MNO or MVNO, or a new player). It would be hosted as an MVNO on those networks, but only for the purpose of offering retail roaming services to its customers. To enable the MVNO to offer such services at a competitive rate, the price of wholesale domestic resale services would also be regulated, to be used to provide retail roaming services only, with the level and approach of the wholesale price regulation taking into account the effect desired at the retail level (e.g. avoiding 'excessive pricing', regulating towards efficiently incurred costs, or on a retail minus basis). It would also be necessary to consider the question of consistency with the level and approach taken in any other areas of price regulation, e.g. regulation of the wholesale inbound roaming rates applicable between MNOs providing 'traditional' roaming services.

The actor could use this regulatory approach to set up a regional or pan-European (virtual) network for roaming and to benefit from a greater retail margin for roaming services, which it could use to offer a more competitive retail roaming tariffs. This could work in different ways, such as:

- (i) An existing MNO could use this access to provide roaming to its usual customer base, avoiding the current system of bilateral agreements for buying wholesale inbound roaming services and instead buying domestic resale services from each host MNO for the purposes of roaming, in its capacity as an MVNO;
- (ii) An actor could offer carrier pre-select services to roaming customers either 'in the visited network' or 'at the border', as described in Section (e) of the Commission's consultation. In this case, it would be necessary to require all home providers to allow their customers to

choose another provider for roaming services and, in the Carrier Select 'at the border' option, to offer to bill for roaming on behalf of the roaming provider; and/or

- (iii) An actor could offer a 'global MVNO' service, providing retail services to its end-users travelling in the different countries where it has access at prices nearer to the domestic level of those countries (depending on the level of price regulation).

As such, although consultation defines this form of access as for roaming purposes only, BEREC notes that a retail customer could use a SIM from a foreign provider to use 'roaming' services in his or her home country, and elsewhere in the EU, if the roaming price is competitive compared to domestic rates in that home country.

If we consider the technical implications of this form of regulated access, the actor would need enough IMSI numbers for each customer in each country where it has a hosting agreement, and so would usually be a 'full MVNO'. It could be possible for a service provider or light MVNO to also enter this market, in the event that they can obtain IMSIs from the host MNO, and the MNO adds digits to its MSC to indicate which HLR the MSC should contact for customer authentication purposes (i.e. the MSC of the MVNO or the host MNO). That would probably require software upgrades by the host MNO. (The variant of regulated access most applicable to service provider and light MVNOs is regulating the price of wholesale resale roaming, which could be implemented instead or in addition to this option).

For BEREC's assessment of the additional technical implications of using the present type of regulated access to provide carrier select, please see our response to consultation questions 9 and 10. We have also discussed the commercial feasibility of carrier select in the BEREC Report (see Section 5).

As regards the potential impact on competition regarding the three ways in which this form of access could be used at the retail level, in general it is not clear that established MNOs or (new or established) MVNOs focused on providing domestic services would have much incentive to use this regulatory approach to offer lower retail roaming prices, especially for voice and SMS services. As noted in BEREC's December Report, *'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 ...'* (see page 14).

For there to be a commercial incentive to compete on retail roaming prices, consumers would need to be willing to switch their domestic provider in order to access a more attractive roaming offer. Consumer research indicates that most mobile users focus on domestic prices when choosing a network (see Section 2.2 of the BEREC Report).

To benefit from lowering retail prices, a player would have to rely on one of two effects:

- (a) that the number of consumers who would switch was sufficient to increase

overall revenue (taking the reduced price into account) but insufficient to provoke a competitive response discouraging switching and resulting in a similar market share with lower revenues; or

- (b) there was sufficient demand elasticity that overall revenue grew sufficiently to outweigh reduced prices – this seems more credible for data roaming than for voice and SMS

There may be an exception in some border areas where there is frequent roaming traffic as customers travel between States for work or leisure. BEREC notes that there are already some retail tariffs on a regional basis, such as in Scandinavia or between Austria and Italy, for example where on-net roaming services are included in the domestic bundle.

A 'global' MVNO would have an incentive to offer lower retail prices in order to build market share. However, it is likely to be focused on providing attractive tariffs to frequent roamers, both from a point of view of profitability per customer and to avoid the need to set up a large customer support operation to service the mass market. For example, it might be inclined to offer attractively-priced large bundles or discounted prices in return for a fee for a specified time period. It would not necessarily reduce the "headline" roaming rate paid by the mass market of infrequent roamers. Or it may be argued that a "snow ball" effect could ensue, in the event that lower roaming prices offered to frequent roamers increase general consumer awareness of roaming prices and demand for roaming services, creating a larger price sensitive group that is willing to switch provider in response to roaming prices.

In the event that a global MVNO did have a particular impact on the market, it would seem likely to provoke the competitive response from MNOs and domestic MVNOs described in (a) above, focusing on the same customer segment. Nonetheless, the strategy could provide an effective means to enter the market.

On the other hand, depending on the level of the regulated wholesale resale price, this option could be used as a substitute for domestic services (customers buy a foreign SIM, e.g. on-line, so that they are technically 'roaming' in their home country). This would affect the domestic mobile market, going beyond the competition problem identified and the target of any regulation (roaming services). An access right for roaming only could also be seen to discriminate between domestic and international players, as mentioned in the December Report (page 117).

The above analysis may hold less true for retail data services. Competition for data roaming services may be higher than for voice and SMS. BEREC considers that some or all of the following reasons are likely to apply: there are alternatives services like WiFi (where available); it is a relatively novel service but has recently been expanding in volumes at a high rate, linked to increased smartphone penetration; wholesale data roaming is the one regulated service where average prices have been well below the cap; and/ or retail prices have come down, although the rate of reduction stabilised in the first half of 2010, and the threat of retail price regulation may have played a part in the falls. As such, there may be greater commercial

incentives for an established or new actor to consider using this regulatory option to offer a carrier select or 'global MVNO' product for data than for voice and SMS.

A final consideration is that negotiating bilateral access agreements in each country could involve additional resources for existing or new MVNOs, compared to using their host network's wholesale roaming agreements (wholesale resale roaming) or a roaming hub. This could prove to be a significant barrier for smaller and newer entrants in particular.

However, another possible use of this access right would be for new players to enter the *wholesale* market, negotiating access and agreeing to buy wholesale services from various host MNOs, in order to sell it on to actors at the retail level, which could include new MVNOs and global MVNOs. That would allow the new wholesale actor to aggregate the volumes of different MVNOs, possibly enabling it to offer a more attractive wholesale price, in addition to taking care of negotiations. This scenario could provide competition to hubs and MNOs, in the event that the provider is able to offer comparatively attractive commercial terms.

Section 6 - Comments on related matters

Under Section 6 of its public consultation, the Commission invites comments on any related matters. BEREC welcomes this opportunity to discuss a further possible regulatory approach, linked to regulated access.

The suggestion is to explore the possibility of inserting into the Roaming Regulation a new provision:

- requiring MNOs to provide access for the purposes of providing a retail roaming service on reasonable request and on reasonable terms; and
- requiring NRAs to consider disputes about the provision of access, including the terms and conditions on which it is offered

This would provide for a generic access right for the purposes of providing roaming services (i.e. rather than one limited to 'MVNOs'). As such, it would enable the market to define a technically and commercially viable 'structural solution' for bringing greater competition to roaming services, avoid uncertainty about the scope of the obligation (e.g. around the definition of 'MVNO'), and give regulators the tools to resolve any disputes about access and terms without the need to wait for a subsequent review of the Regulation. This would give some 'future proofing'. In addition, unlike a general access right, which could be used to provide domestic mobile services as well as roaming services, this option is targeted at roaming services, arguably making it more proportionate to the regulatory problem to be solved.

On the face of it, the Regulation contains no such general right at present and new provisions would be needed (the current Regulation refers to Article 5 of the 2002 Access Directive in Recital 35, in the case of end-to-end connectivity and interoperability for roaming customers of regulated roaming SMS services). BEREC

proposes that the legislator consider whether the revised Framework already provides for the above obligations, in which case it may be appropriate to add a Recital to any future Roaming Regulation highlighting its applicability, or whether new substantive provisions would need to be set out to create this access right. Once such a right is in place, BEREC considers that the existing Framework, notably Articles 20 and 21 of the Framework Directive may apply to require NRAs to resolve any disputes in the event that a commercial agreement cannot be reached on reasonable request and terms and in a reasonable time. Co-ordination through BEREC could be used (for example, in the form of a BEREC Opinion or Report) to promote rapid implementation of any viable approach across Europe and not only in 1 or 2 Member States.

BEREC would be happy to research this idea further if the Commission finds merit in it.

Question 13: Technology developments

Generally, economic theory perceives innovation to have a positive impact on competition and market performance and to increase availability of supply, either complementing or substituting existing technology.

To evaluate the impact of new technologies on the international roaming markets, BEREC has analysed the supply and demand structure with regard to new technologies and new business models. (The detailed analysis is published in the December 2010 Report (Section 2.1 C, page 52)).

Various new technologies exist in the domestic mobile markets, which can be used for international roaming as well. These include radio access networks such as LTE, WiMax and WiFi, new network architectures such as the use of small cells (Femtocells and UMA) for indoor coverage, devices such as smart phones, notebooks and tablet computers and applications such as VoIP, instant messaging, social networking and location-based services.

Considering networks, no technology is yet available on a sufficiently widespread basis to constitute a substitute for most consumers, most of the time. In particular, LTE and WiMax networks are still being tested and rolled out. It is further unclear whether such access networks, and particularly LTE, will constitute a substitute as in many cases they will form part of the access technologies offered by incumbent MNOs.

LTE is the next stage in mobile network technology, using an all-IP architecture where all services are handled as data, including voice.

So far, LTE is commercially available in three Member States (Sweden, Finland and Poland) and is expected to be made available imminently in two further countries (Germany and Austria), albeit with limited geographical coverage, for example in certain cities only. Tests are ongoing in various other countries. 2.6 GHz and 800 MHz spectrum is expected to have been made available in most Member States by 2013. Coverage of LTE networks is unlikely to reach 100% of the population, but seems likely to be extended if traffic growth is high and operators are able to generate greater revenues from LTE-based services.

LTE achieves 3 to 4 times the spectral efficiency of HSDPA technology, meaning that, if the same amount of spectrum is used, the operator will be able to offer 3 to 4 times more data to its users, all other things being equal. It is unclear, however, whether the more efficient use of spectrum will be translated to lower data prices for consumers, especially when roaming.

The LTE system is designed specifically for data access. Even voice services are provided as packet data, in a way similar to the way voice over IP (VoIP) operates over packet switched networks such as the internet. Voice over LTE can only occur once operators have implemented IMS within their core networks (all IP-based systems) and the required standards are developed, both of which are not likely to occur in the short to medium term.

Initially, it seems likely that mobile providers will offer LTE access for data-centric devices (e.g. tablets), followed by smartphones. Similar to TeliaSonera in Sweden where LTE has already been deployed³, operators may initially introduce quality of service tiered packages for data (3G vs LTE), where high volume and spend users would migrate to LTE in exchange for a higher subscription charge⁴.

The technical specifications of LTE render the use of VoIP over LTE feasible. On one hand this means that both domestic and roaming consumers may be able to substitute outgoing calls by outgoing VoIP calls. The improved quality of service of VoIP over LTE is likely to increase its substitutability from the end-user's perspective. On the other hand however, operators may consider that offering LTE data access at lower prices would create a risk of cannibalising revenues from current voice and SMS services (in addition to the need to recover investment). Therefore, at least in the early stages, providers are expected to run data services over their LTE networks while maintaining pricing or access policies adequate to disincentivise the use of LTE access for VoIP services. It could be argued that whatever access policy on VoIP applies in the domestic market should apply when roaming.

It therefore seems unlikely that the cost benefits of LTE will be passed through to domestic or roaming consumers in the short to medium term. A change is likely to come when the following parameters occur in the market: a significant proportion of mobile users demand to use data services and with higher quality, creating pressures on MNOs to reduce prices, or it is no longer economically efficient to maintain legacy 2G and 3G networks for voice and SMS services, and/or once smaller and independent MNOs see offering high quality data services, lower data prices and access to VoIP services (domestically and when roaming) as a means to gain domestic subscribers, thereby beginning to disrupt the market. As such, any change in demand and prices for roaming services seems likely to be lead by a change in demand and prices in the domestic market.

Meanwhile, WiMax could serve in the future as a substitute network (the initial version of WiMax was designed for fixed applications, such as a replacement for home fixed broadband, but newer versions can support mobility), in the event that it is provided by a different market player from the mobile services. The technical specifications of WiMax are very similar to those of LTE, allowing similar services to be offered by both these networks. WiMax roll-out is increasing, and networks are available in certain areas of most Member States, with deployment typically focused on a particular city or on a rural area where fixed broadband may be more difficult to deploy⁵. It is unclear however if there is commercial interest for widespread WiMax coverage.

³ <http://www.teliasonera.com/4g/>

⁴ Subject to radio access limitations, as the quality target for certain applications and customers is set within the SGSN (serving GPRS service node) in the home network and roaming traffic is tromboned back through the home SGSN, from a technical point of view tiered packages may be offered for both domestic and roaming services. The home operator would be likely to seek service level agreements with visited networks requiring a certain level of quality to be met for at least a certain percentage of data connections and traffic.

⁵ See <http://www.wimaxmaps.org/>

WiFi is the most significant recent development in terms of an alternative network thanks to its inexpensive deployment cost and license free operation. These characteristics have led to a great level of availability, suggesting that WiFi networks could supply a partial substitute for traditional international roaming. Public and private WiFi hotspots are increasingly common in large towns and cities, and places frequented by travellers like transport hubs, hotels and cafés. In some cases, WiFi may be free to access, or included in the roaming customer's mobile subscription where the MNO or MVNO and the (fixed) WiFi provider are part of the same group or partnership. In that case, operators may increasingly make such offers to 'off-load' growing mobile data traffic from the mobile network to avoid congestion and increase efficiencies, giving the option to roaming users to substitute roaming data access with WiFi access and outgoing roaming calls with VoIP calls over WiFi (assuming that a separate VoIP account is available to the user). Otherwise, WiFi is often provided by a provider different from the mobile operators, leading to greater competitive pressures.

Another technological evolution is the introduction of small cells. These technologies use access points connected on the customer's fixed broadband connection to extend the mobile operator's indoor coverage. Two main technologies exist, namely Femtocells and Unlicensed Mobile Access (UMA). Femtocells provide an extension of the mobile operator's network using the same licensed frequencies and air interface (e.g. GSM, 3G or LTE). For this reason, Femtocells can only operate within the country where the home operator holds a spectrum license.

UMA on the other hand uses unlicensed access networks, such as WiFi or Bluetooth to send voice mobile usage to the home operator's core network. This functionality requires mobile devices with special capabilities. Due to the use of unlicensed spectrum, UMA is not limited within a country's borders. In theory, customers abroad could use UMA to connect directly to their home network and make or receive calls at domestic prices. However, it is not clear that MNOs or MVNOs focusing on domestic services will have commercial incentives to allow use of UMA for roaming.

Furthermore, usage of UMA outside the home country of the user could prevent the home network operator from complying with other regulatory obligations that relate to security and caller location information for emergency services. Due to the sensitive nature of such regulation, it may be difficult to justify a requirement to enable customers to access UMA while in roaming at this point in time. Going forwards, however, the revised EU Regulatory Framework sets requirements for IP-level location information. Implementation of these requirements through international standards could allow the MNO/ MVNO to provide accurate location information for emergency calls made through small cells, opening the way for a potential regulatory requirement to allow roaming over small cells at domestic retail prices. Or it may be possible for operators to develop and standardise a solution that routes all 112 calls through a visited mobile network.

New developments in devices may also affect roaming prices. The use of mobile Internet and data demanding applications such as social networks, mobile video, and location based-services present on smart phones has significantly increased the demand for domestic data and, following that, roaming data (unlike demand for

roaming voice and SMS). This has pushed some operators to provide roaming-specific data packages. The demand for data is likely to further increase as new devices and services are introduced in the market, affecting the domestic market and feeding through to data roaming. For example, news from the Consumer Electronics Show (CES) 2011 was dominated by tablets and smartphones. 'Connected home' devices were also featured, whereby the customer can control consumer electronics in the home when on the move.

Going forward, more and more devices will be connected to mobile networks, for example, e-readers, cameras, music players, household appliances, car maintenance and navigation systems.⁶ This implies new market actors, such as e-book sellers or consumer technology companies. They have a direct retail relationship with the consumer for the mobile data service tied to the device and special agreements with an MNO, not always in the customer's home market (i.e. the customer is roaming). Typically, the price of the retail data connection is bundled with the product bought (e.g. an eBook or photo prints). These new actors and customer relationships may facilitate competition in the wider mobile market, although any developments seem likely to be limited in the short term. It is nevertheless hard to predict the specific effect (if any) these new actors may have in roaming markets.

Lastly, applications like VoIP over mobile could in the future have a significant impact on competition in the roaming market, at least for outgoing voice calls. New apps could make VoIP even simpler for consumers to use. 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 data connections. It also depends on mobile providers allowing VoIP access at a reasonable price when, as noted above, it could cannibalise existing voice revenues. The competitive impact of VoIP is therefore uncertain.

Conclusion

Although new technologies can put pressure on the market players and stimulate competition, they are unlikely to bring more competition while the same players are on the market.

As such, as a result of the analysis and in the light of the 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 technology and market developments reviewed could be considered as full substitutes for roaming services at the present time.

In the opinion of BEREC, competition in the near future would have to come from tariff innovation using existing technology, rather than through technology

⁶ Mobile internet report, December 2009
http://www.morganstanley.com/institutional/techresearch/pdfs/2SETUP_12142009_RI.pdf

developments. However, as discussed in the December 2010 Report, BEREC considers that competition is weak for voice and SMS, and unlikely to deliver lower prices in the Commission's time horizon (by 2015) in the absence of regulation.

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. Subject to a review of tariff developments in the first half of 2011, while retail data roaming seems relatively unlikely to become fully competitive during the Commission's time horizon (up to 2015), it is a reasonable longer-term expectation.