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COMMISSION RECOMMENDATION

on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU

EXPLANATORY NOTE

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EXPLANATORY NOTE

1. INTRODUCTION

This document provides the background to the Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU. A key observation during the assessment of more than 850 notifications under Article 7 of the Framework Directive¹ concerns inconsistencies in the application of remedies to voice call termination markets². Although some form of cost orientation is provided for in most Member States, it has not been implemented in a consistent manner throughout the EU and a considerable divergence between average termination rates, particularly as regards mobile termination rates, still exists across Member States the magnitude of which cannot be solely explained by differences in underlying costs³.

Additionally, National Regulatory Authorities (NRAs) have, in a number of cases, authorised higher termination rates for smaller fixed or mobile operators on the grounds that these operators are new entrants into the market and have not benefited from economies of scale and/or are subject to differing cost conditions. These asymmetries still exist, although they are slowly decreasing⁴. Furthermore, the absolute level of termination rates remains high in a number of Member States, thus continuing to translate into high, albeit decreasing, prices for end-consumers.

A number of inconsistencies in the regulation of mobile call termination rates have also been identified by the European Regulators Group (ERG)⁵, in particular in relation to the form of price regulation, treatment of asymmetries and the implementation of glide paths.

The above indicates significant differences in the regulatory treatment of terminating operators both within and across national boundaries. The distinct approach taken in different Member States as regards market players operating in similar conditions is difficult to justify.

The lack of harmonisation in the application of cost-accounting principles to termination markets to-date demonstrates a need for common guidelines and a common approach as to the implementation and interpretation of cost orientation obligations in termination markets which is, pursuant to Article 13 in conjunction

¹ Article 7 of Directive 2002/21/EC of the European Parliament and the Council of 7 March 2002 on a common regulatory framework for electronic communication networks and services (“the Framework Directive”), OJ L 108, 24.4.2002, p. 33.

² See the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on market reviews under the EU Regulatory Framework (2nd report), COM(2007) 401 final of 11.7.2007.

³ These differences are illustrated in the Annex below.

⁴ According to the European Regulators Group Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rates (ERG (07) 83 final 080312) (“ERG Common Position on symmetry”), average asymmetry of mobile termination rates (within individual countries) decreased from 1.4 €cents in January 2004 to 0.9 €cents in January 2007. The ERG has recognised in its Common Position on symmetry that termination rates should normally be symmetric and that asymmetry requires an adequate justification.

⁵ See the ERG Common Position on symmetry.

with Recital 20 of the Access Directive⁶, the appropriate method in markets where competition is inefficient. This will provide greater legal certainty and the right incentives for potential investors. It will also reduce the regulatory burden on existing operators that are currently active on a pan-European basis. The objective of coherent regulation in termination markets is clear and recognised by the NRAs.

This common approach builds on the decisional practice of the Commission to-date and is set out in the Recommendation. The objective of the Recommendation is to define and set out clear common principles, in accordance with the current regulatory framework, on:

- (a) the regulation of cost-oriented fixed and mobile termination rates in the EU, including common principles on the concepts of an efficient operator and symmetric regulation; and
- (b) the identification and calculation of efficient costs consistent with those incurred in a competitive market.

The Recommendation also considers how the termination rates might be regulated in a changing technological environment, e.g. in the presence of Next Generation Networks (NGNs).

The Recommendation furthermore considers approaches other than cost-based regulation of termination rates. These alternative approaches may help alleviate the competitive and regulatory issues inherent in the Calling Party Pays (CPP) convention.

The remainder of this document is structured as follows:

- Chapter 2: Rationale for regulating fixed and mobile call termination markets
- Chapter 3: Commission decisional practice/ERG experience
- Chapter 4: Common principles for regulating termination markets
- Chapter 5: The application of cost-based remedies
- Chapter 6: Forward-looking considerations
- Chapter 7: Implementation of the Recommendation.

⁶ Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities, OJ L 108, 24.4.2002, p. 7.

2. RATIONALE FOR REGULATING FIXED AND MOBILE CALL TERMINATION MARKETS⁷

2.1. General competition issues in fixed and mobile termination markets

Call termination can only be supplied by the network provider to which the called party is connected. There are currently no demand- or supply-side substitutes for call termination on an individual network. Therefore, each network constitutes a separate relevant market and each network operator has a monopolistic position on the market for terminating calls on its own network.

Moreover, under the prevailing CPP principle in the EU, the calling party pays entirely for the call, and the wholesale termination rate paid by the originating operator is normally passed on to its end customer. As the called party is not billed for incoming calls, it is generally indifferent to the termination charge set by its network provider (i.e. the terminating operator) and has little or no incentive to change its own network provider in the event that those charges are raised⁸.

Consequently, in the absence of other factors such as countervailing buyer power, the criteria necessary to merit *ex-ante* regulation are normally met, and the terminating operator is designated as having significant market power (SMP).

The main potential competition concern, common to both fixed and mobile termination markets, is that of *excessive pricing*, implying that operators may extract excessive profits at the wholesale level. Moreover, fixed and mobile terminating operators are vertically integrated into retail calls markets and compete with their wholesale customers on those markets. Consequently, terminating operators have incentives to raise rivals' costs by setting termination prices at a level that impedes their ability to compete in downstream retail markets.

Termination has been analysed as a situation of “two-way” interconnection whereby two wholesale prices have to be negotiated and each operator could potentially use the price charged for termination on its own network as leverage in the relevant negotiations. This may lead to efficient rates being negotiated, particularly among symmetrically sized networks, which is more likely in mobile markets. This type of interaction may, however, still facilitate anti-competitive behaviour in the form of excessive pricing. High termination charges may be used to foreclose a new entrant network, where a large proportion of originated calls are off-net. High termination rates may also facilitate collusive behaviour between two or more terminating operators.

In the past, negotiations between fixed and mobile operators typically evolved differently because mobile operators could raise the initially unregulated mobile termination rates without experiencing a reciprocal increase in the often tightly regulated fixed termination rate (FTR). This raised allocative-efficiency concerns

⁷ This assessment of competition problems in call termination markets is largely based on the prevailing interconnection arrangements in the fixed (PSTN) and mobile telephone networks.

⁸ A different rationale applies to numbers used by Service Providers (SP). A called SP is sensitive to the level of termination charges — which directly affect its revenues — and may therefore switch between providers of termination services.

where there is an implicit cross-subsidy from fixed network operators and their customers to mobile operators and mobile customers.

Furthermore, with the evolution of fixed–mobile hybrid services and a move towards convergence, a different regulatory treatment of fixed and mobile termination rates raises a possible inconsistency issue. The regulatory model underlying the FTR regulation assumes that operators will recover the cost of the local loop via retail subscription charges, and that these costs are not included in the FTR paid by other operators, including mobile operators. This is not the case in mobile networks where the access network costs are largely recovered via the termination rate. This needs to be considered in order to ensure that competitive distortions do not arise and that allocative-efficiency concerns as described above are addressed.

2.2. Rationale for cost-based pricing

In the light of the ability and incentives of terminating operators to raise prices substantially above cost, cost orientation is the most appropriate intervention to address this concern over the medium term. Cost orientation addresses both productive- and allocative-efficiency concerns. From a productive-efficiency perspective, low termination rates facilitate low retail call charges and higher consumption. It is also important that the relevant price is based on the costs of an *efficient* operator. If the regulation of termination charges was based on the *actual* costs of the operator, this would not provide the right incentives for operators to innovate and increase efficiency, as their inefficiency would be covered by their competitors. This will also give rise to allocative-efficiency concerns as customers of other operators would ultimately bear the costs of the inefficient operators.

Allocative efficiency suggests that one group of customers should not subsidise another group of customers. Apart from the fixed-to-mobile cross-subsidisation outlined above, this is also relevant within markets (e.g. in mobile markets). Late entrants argue that due to large traffic imbalances and on-net/off-net price differentiation they cannot compete effectively at the retail level. A large proportion of calls originated on late entrant networks is terminated on other networks, i.e. off-net. If new entrants pay a regulated termination charge in excess of actual costs they effectively give a transfer to the large network. As a result, their ability to offer retail rates comparable to the retail rates of an established operator, which terminates a majority of its calls on-net, is impeded.

3. COMMISSION DECISIONAL PRACTICE/EUROPEAN REGULATORS GROUP (ERG) EXPERIENCE

3.1. Key insights from the Article 7 procedure to-date

Any Recommendation regarding greater harmonisation of regulation in the EU must be guided by regulatory experience as well as by Commission decisional practice. In line with the Commission Recommendation on relevant markets, all NRAs have notified the markets for fixed and mobile call termination and imposed *ex ante* obligations on all SMP operators. Regulatory practice has demonstrated, however, that NRAs do not employ a consistent set of remedies in these markets. Differences exist in regulating different operators within a Member State, and across Member States. This has led the Commission to comment *inter alia* on three principal sources

of inconsistencies: the type of price control, the cost model used, as well as the issue of asymmetric termination rates.

3.1.1. *Type of price control*

One NRA decided not to impose price regulation on alternative operators, citing their higher cost of call termination, their significantly smaller scope of operation than that of the incumbent operator, the decreasing termination rates of alternative operators, absent regulation and their limited asymmetry in comparison with the incumbent⁹. In this instance, the Commission invited the NRA to impose effective price regulation also on the alternative operators if the downward trend of unregulated fixed termination rates did not continue, or if the asymmetry with the incumbent's rates increased. Similarly, when an NRA decided not to impose obligations of cost orientation, cost accounting and accounting separation¹⁰, the Commission stated that some form of cost control, such as benchmarking against a larger operator which is under a cost-orientation obligation, should also be imposed on smaller operators.

Where an NRA decided that the imposition of cost-orientation and cost-accounting obligations may be disproportionate¹¹, the Commission reiterated the need for a cost control to be imposed on smaller operators, e.g. by benchmarking against a larger operator whose termination rates are cost-oriented. The Commission has also noted that a glide path towards an efficient rate should be established without delay as any grace period could remove the incentive to become cost-effective as quickly as possible¹². The Commission also encourages an NRA to complement the imposed cost-orientation remedies by an appropriate *ex ante* price control obligation supported by an appropriate cost-accounting methodology¹³.

3.1.2. *Cost models used*

In its responses under the Article 7 procedure, the Commission has noted the importance of regulating termination rates based on the costs of an efficient operator. The Commission has also encouraged NRAs to develop cost models which take into account the necessity for alternative operators to become efficient over time¹⁴. At the same time, the Commission has acknowledged that these models could reflect objective cost differences which are outside the control of the operators concerned¹⁵.

In several cases the Commission indicated the necessity of also imposing an obligation of accounting separation, which would allow internal transfers to be visible. The Commission found that imposition of accounting separation as a separate measure would facilitate effective price control, increase transparency and decrease the risk of cross-subsidisation¹⁶.

⁹ Cases PL/2006/0502, PL/2007/0633, PL/2007/0641.

¹⁰ Case FI/2003/0029.

¹¹ Case FR/2005/0228.

¹² Case IE/2008/0746.

¹³ Case FI/2006/0403.

¹⁴ Cases IT/2006/0384, PL/2006/0502, EE/2007/0598.

¹⁵ Cases IT/2006/0384, EE/2007/0598, LV/2006/0464.

¹⁶ Cases PL/2006/0379, DE/2005/0234 and DE/2006/0421.

As regards the selection of the appropriate type of cost model, the Commission has encouraged an NRA to impose a cost-calculation obligation and to assess whether a forward-looking long-run incremental cost model (LRIC) would not be the most appropriate model for calculating termination rates, notably in terms of tariffs, and potential excessive costs and inefficiencies of the mobile operators¹⁷. In addition, the Commission indicated that it is important that LRIC models use current costs and not historical costs which risk over-estimating the appropriate costs¹⁸.

In terms of costs included in the relevant cost model, the Commission has noted that, as wholesale call termination services are traffic-related services, relevant costs considered for wholesale call termination charging purposes are typically those costs which vary in response to increased levels of wholesale call termination traffic, i.e. the additional costs involved in providing the service in question¹⁹. The Commission has further noted that there are costs of spectrum usage which are not traffic-related and, as such, should not be calculated as part of the wholesale call termination service²⁰. Where spectrum is included in the cost model, the value of 3G licences should be calculated at current value on a forward-looking basis and not on the basis of spectrum values which approximate past levels. In that respect, termination rates should be set at the cost which would be faced by an efficient operator providing the relevant service. The Commission stated that this consideration was particularly relevant for spectrum fees which had been written off by operators since the relevant frequencies had been auctioned and for which there may be an overstatement of the opportunity cost of 3G spectrum. Therefore, with a view to allowing end-users to obtain the benefits of regulation, the Commission invited the NRA concerned to reconsider the valuation of 3G licences²¹.

3.1.3. *Symmetry of remedies*

In several cases, the Commission has stated that in circumstances where a NRA intends to impose different remedies on different operators within similarly defined markets, such differential treatment should be adequately reasoned²².

More specifically, the Commission considered that termination rates should normally be symmetric and that asymmetry requires an adequate justification. The Commission recognised that in certain exceptional cases asymmetry might be justified by objective cost differences outside the control of the operators concerned. Such possible justifications could be objective network cost differences, for instance owing to cost differences between the operation of a GSM900 network and a DCS1800 network²³, or substantial differences in the date of market entry²⁴. However, the Commission has also emphasised that the fact that an operator entered

¹⁷ Case PL/2006/0379.

¹⁸ Case UK/2006/0498.

¹⁹ Case EL/2008/0786.

²⁰ Case IT/2008/0802.

²¹ Case UK/2006/0498.

²² Cases FI/2003/0029, FI/2003/0031, HU/2005/0152, DK/2005/0207, FR/2005/0228, IT/2006/0384, PL/2006/0502, EE/2007/0598.

²³ However, in cases BE/2006/0433 and LV/2006/0464 the Commission stated that it expects the differences related to technology to be small.

²⁴ Cases DE/2006/0421, BE/2006/0433, FR/2006/0461, LV/2006/0464, LV/2007/0574, FR/2007/0596, ES/2007/0654, IT/2007/0659.

the market later and that it therefore has a smaller market share can only justify higher termination rates for a limited transitory period. The persistence of a higher termination rate would not be justified after a period long enough for the operator to adapt to market conditions and become efficient over time, and could even discourage smaller operators from seeking to expand their market share²⁵.

The Commission has also commented upon traffic imbalances in the context of mobile termination markets by stating that such traffic imbalances may in fact be caused by the current asymmetric level of mobile termination rates, as well as by an on-net/off-net retail price differentiation which is within the control of the operators. The Commission also stressed the importance of reducing termination rates to the level of costs of an efficient operator, which would take into account objective cost differences²⁶.

Finally, the Commission, indicating the EU-wide importance of regulating mobile termination rates effectively and in a consistent manner, has in multiple cases encouraged the NRAs to work in close cooperation with the European Regulators Group in order to arrive at a coherent EU approach, as well as to revisit the NRAs' analysis in the light of a common approach as soon as this has been established. In this respect, relevant aspects of the work of the ERG on a common position on the regulation of both fixed and mobile call termination — as reported to-date — are also presented here.

3.2. Some practical experience to-date as reported by the ERG

The ERG Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rates adopted on 28 February 2008 (ERG Common Position on symmetry) helps to illustrate some inconsistencies observed in the NRAs' implementation of remedies in fixed and mobile termination markets to date.

A number of inconsistencies in the regulation of mobile call termination rates have been identified. According to ERG data, 21 out of 28 countries that provided information in response to an ERG questionnaire²⁷ indicated that they imposed a cost orientation obligation on at least the first mobile operator having entered the market. For later entrants, the price control obligation could sometimes take the form of a “non-excessive” or “fair and reasonable” price rule. A wholesale price cap was imposed in some countries, although not necessarily on all mobile operators.

In addition, significant variety was noted in respect of the cost models already in place. According to the ERG Common Position on symmetry:

- top-down accounting data was used by eleven NRAs as the main tool and by two NRAs as a complementary tool;

²⁵ Cases DE/2006/0421, AT/2006/0544, LV/2007/0574, FR/2007/0596, EE/2007/0598, BE/2006/0433, FR/2006/0461, FR/2007/0669.

²⁶ Case FR/2007/0669.

²⁷ The ERG questionnaire was also sent to non-EU Member States.

- a bottom–up model was used by two NRAs as the main tool while one NRA was developing it;
- a hybrid model (bottom–up model calibrated with data provided by Mobile Network Operators (MNOs)) was used by seven NRAs as the main tool and by one NRA as a complementary tool, while three NRAs were developing it; and
- international benchmarking was used by eight NRAs as the main tool and by five NRAs as a complementary tool²⁸.

Furthermore, even where NRAs chose the same costing tool, the ERG noted differing practices in implementing those models. For example, in relation to top–down models, the ERG observed large disparities in the way top–down accounting data are first produced and then how they are checked/verified. With regard to bottom–up modelling, the ERG also noted a large disparity with regard to the way depreciation is implemented in the model.

Finally, with regard to the definition of an “efficient” operator (whose charges are used as a reference target for the model, especially those models whose remit spans a number of years), the ERG acknowledged a large variety of definitions chosen by the NRAs (including the lowest cost of all the MNOs, the highest costs of the MNOs, an average or a weighted average of the costs of all the MNOs, the cost reference of an efficient operator, the actual costs of each operator as well as a benchmark).

As regards fixed call termination, ERG noted that a different, more stringent set of remedies is usually imposed on the incumbent operators as compared with the remedies imposed on alternative operators.

The NRAs have imposed the full scope of remedies set out in the Access Directive on the fixed incumbent operators²⁹. However, differences between Member States in implementing cost orientation are observable³⁰: although in most cases the termination rates are regulated on the basis of a LRIC model, a Fully Allocated Cost (FAC) model or other means of regulation are also applied. Moreover, Current Cost Accounting (CCA) is most commonly, but not exclusively, used for calculating FTRs. As a result, the different application of the same regulatory tool produces diverse results.

The diversity of methods is also apparent in the regulation of termination rates for fixed alternative operators. One of the following regulatory approaches is usually applied:

- requiring reasonable prices or forbidding excessive prices;
- adding a mark-up to the incumbent’s fixed termination rates;

²⁸ Two NRAs, Hungary and Poland, have two main tools.

²⁹ However, the following exceptions were noted by the ERG: one NRA has not imposed an obligation of transparency, but transparency followed, however, from the obligation to publish a reference offer; two NRAs have not imposed an obligation of accounting separation, but in one case it is stipulated by national law in the event an *ex ante* price control obligation is imposed.

³⁰ See, for example, ERG Report — Regulatory Accounting in Practice, 2007 (ERG (07)22).

- benchmarking the termination rates of alternative operators against the charges of the incumbent operator (higher rates may be approved on the basis of cost calculation);
- imposing symmetry gradually, after a “glide path” — i.e. the difference (asymmetry) between the termination rates of the incumbent and of an alternative operator is progressively decreased, so that both become equal (symmetric) at a given point in time;
- imposing delayed reciprocity where alternative operators’ termination rates are set equal to the incumbent’s termination rates but lagged by a specified number of years.

Theoretically, symmetry may also be achieved in the latter case if the incumbent’s termination rates do not change over several years.

Finally, in some cases no *ex ante* price control was imposed on alternative operators³¹.

In conclusion, as a consequence of the diverse approaches taken on regulating both mobile and fixed termination rates, these rates differ more between Member States and between operators than may be justified by different national circumstances or by exogenous cost factors.

4. COMMON PRINCIPLES FOR REGULATING TERMINATION MARKETS

4.1. Common principles in relation to cost determination

Article 8(2) of the Framework Directive requires NRAs to promote competition by *inter alia* ensuring that all users derive maximum benefit in terms of choice, price and quality, and that there is no distortion or restriction of competition. Recital 20 of the Access Directive states further that the method of cost recovery should be appropriate to the circumstances taking account of the need to promote efficiency and sustainable competition and maximise consumer benefits.

In relation to these obligations and taking account of the particular characteristics of call termination markets (as further outlined below), the Commission has previously emphasised that termination rates should be brought down to the costs of an efficient operator as soon as possible. As outlined in section 3.1 above, the Commission has also encouraged NRAs to develop cost models which take into account the necessity for alternative operators to become efficient over time and which take into account the costs of an efficient operator. In addition, the Commission has encouraged NRAs to assess whether a forward-looking LRIC model would not be the most appropriate model for calculating termination rates, notably in terms of potentially excessive tariffs and inefficiencies of operators.

A key regulatory decision relates to the appropriate cost base for calculating an efficient operator’s costs, and the question arises as to which cost base is more in line

³¹ For example Poland, Denmark.

with the above-stated regulatory objectives. Today regulators may use either the costs actually incurred by the regulated company (historic costs) or the costs that would be incurred if a notional network would be built today (current costs). While both approaches can, in principle, be used to satisfy the efficiency objective, the current-costs approach is more compatible with the competitive standard of efficiency, since in a competitive market prices would be set on the basis of the prevailing technology. In a competitive environment, operators would compete on the basis of current costs and would not be compensated for costs incurred through inefficiency; neither should high-cost operators be allowed through regulation to pass on their inefficiencies to final consumers. Operators that are compensated for actual costs incurred have few incentives to increase efficiency. In these circumstances, the operator that was able to terminate calls more cheaply would not be the operator to benefit from the efficiency gains. On the contrary, it would be the less efficient (competing) operator that would pay the lower termination charge and thereby gain an undue competitive advantage.

Final consumers also stand to gain from the use of current costs. Termination charges are expected to be lower using a current-cost base due to the impact of technological improvements in relation to the core network, where most of the termination costs are incurred. This gain in consumer surplus is unlikely to be outweighed by the fact that assets already depreciated in the past may under a current-cost methodology be included again. These costs primarily concern the access network which is less relevant for the calculation of termination charges.

The choice of the appropriate cost base is also related to the choice of cost model, i.e. whether a top-down (TD), bottom-up (BU) or hybrid model is used. In a TD model the starting source of information is the cost actually incurred by the operator. Consequently TD models are said to avoid disincentives to invest, since incurred costs are usually allowed to be recovered, even if this does not necessarily promote efficiency.

BU models use demand data as a starting point and determine an efficient network capable of serving that demand by using economic, engineering and accounting principles. BU models give more flexibility regarding network efficiency considerations and reduce the dependence on the regulated operator for data. A BU model is synonymous with the theoretical concept of developing the network of an efficient operator because it reflects the equipment quantity needed rather than actually provided and the model ignores legacy costs. A BU model does not ensure that all actually incurred costs are eventually recovered from the regulated service.

Also, BU models may understate the costs where technologies are rapidly changing and operators cannot instantaneously change their technologies.

Although BU models are generally developed by NRAs, operators can contribute to the model inputs and assumptions. This will increase the transparency and objectivity of BU models, although it carries the risk that 'negotiated' figures, as opposed to more accurate figures, will be used in the model.

Given the fact that a bottom-up model is based largely on derived data, e.g. network costs are computed using information from equipment vendors, regulators may wish to reconcile the results of a BU model with the results of a TD model in order to

produce as robust results as possible and to avoid large discrepancies in operating cost, capital cost and cost allocation between a hypothetical and a real operator. The purpose of the reconciliation is to show and to quantify the sources of differences between both models and to make appropriate adjustments accordingly, thus assisting in the verification of the BU model. This may be appropriate, for example, where there is an information asymmetry or a risk of certain cost categories being erroneously omitted. However, any modification of the BU model must take into account the necessity of showing the costs of an efficient operator; it should not be done merely to bring the results of both models closer.

Concerning cost standards, the Commission has stated³² that the long-run incremental cost (LRIC)³³ methodology is consistent with cost orientation. LRIC is normally based on forward-looking cost (FL-LRIC). “Forward-looking” is a term which is used interchangeably with current cost.

Standard economic theory determines that prices be set equal to marginal costs. This sends appropriate cost signals and ensures that consumers are informed about the costs of producing the product in question. However, it is often argued that should this pricing principle be applied in the telecommunications sector, a sector which faces substantial fixed costs (i.e. costs that do not vary with the volume of output), operators would not be in a position to fully recover all of their costs.

LRIC addresses the recovery of fixed costs in telecommunications markets as it is conceptually between marginal cost and stand-alone cost. This is achieved by considering the long run (as opposed to the short run for marginal costing) and rendering all assets variable, i.e. assuming that they can vary in response to demand. Additionally, instead of taking into account an additional unit of output, LRIC considers an additional increment. The increment can be defined narrowly, as a small change in the volume of a particular service, or broadly, as the addition of a whole group of services, with many possible increments of different size. By considering the long run, LRIC facilitates efficient recovery of costs relevant to the defined increment which in the short run are regarded as fixed.

Depending on the size of the increment, only costs associated with the services included in the increment would be allocated to that increment. If, for example, there was only one increment including all services provided by an operator, then LRIC would cover all costs and, in fact, be equivalent to Fully Allocated Cost (FAC). If smaller increments are chosen (such as a particular service), a LRIC model facilitates the recovery of costs proportionate to the size of the increment in question and requires a decision on an appropriate cost-allocation mechanism for joint costs (costs that can be directly attributed to more than one specific service) and common costs (costs which are not directly attributable to specific services) with regulators often applying a mark-up to account for these costs.

In this respect, it is important to note that LRIC facilitates efficient cost recovery and also provides scope for discretion as to how certain regulatory objectives are most

³² Recommendation of 8 January 1998 on interconnection in a liberalised telecommunications market (Part 1 — Interconnection pricing), (98/195/EC), OJ L 73, 12.3.1998, p. 42.

³³ The forward-looking long-run incremental cost provides an analytical framework which can be used to obtain an estimate of the cost that would be found in a competitive market.

effectively met. Under the current regulatory framework, the primary mechanism for ensuring that users derive maximum benefit in terms of choice, price and quality is competition. Furthermore, Recital 20 of the Access Directive underlines the importance of taking account of particular circumstances when determining the appropriate method of cost recovery. In view of the particular characteristics of call termination markets and their competitive influence, the Commission has recognised in its responses to several regulatory proposals under Article 7 of the Framework Directive that setting termination rates based on the costs of an efficient operator would promote efficiency and sustainable competition and maximise consumer benefits.

The main advantage of an incremental-cost approach which allocates only efficiently incurred costs is that it promotes efficient production and consumption decisions. It sends correct signals to originating operators as to the costs generated by their activities and they can therefore adjust their behaviour in the most efficient manner. For example, allowing network costs to be recovered from the wholesale termination rate which do not result directly from the provision of that service can lead to distorted signals and higher prices for the originating operators buying termination services and, consequently, for their consumers. In effect, this results in them cross-subsidising the investment costs of other operators' networks and may also result in a sub-optimal number of calls being made.

It is also important to note that termination markets are a situation of two-way access³⁴ where both interconnecting operators are presumed to benefit from the arrangement but, as these operators are also in competition with each other for subscribers, termination rates can have important strategic and competitive implications.

Termination rates which are set above efficient cost can create substantial transfers of wholesale termination revenues from:

- *Fixed network operators to mobile network operators, creating an effective cross-subsidy between fixed and mobile markets and consumers.*

While mobile termination rates are on a downward trend as a result of regulatory intervention in the EU, regulators have tended to implement glide paths with a more gradual rate of reduction and in 2007 mobile termination rates were still on average almost nine times the equivalent fixed rate³⁵. This results in substantial transfers and an indirect subsidy from fixed operators and their customers to mobile networks and services. This may in turn be contributing to inefficiently low usage of fixed networks in some Member States and could prove to be a barrier to important

³⁴ This is distinct from a situation of one-way access such as in local loop unbundling markets.

³⁵ According to the European Commission's 13th Report on the Implementation of the Telecommunications Regulatory Package (13th Progress Report), in 2007 the average mobile termination rate dropped for the first time below 10 cents, to 9.67 cents - a decrease of 12% compared to October 2006. However, the average mobile termination rate was still 8.7 times higher than the average fixed termination rate. According to the Commission's recently published 14th Progress Report, termination charges have continued to decrease and at October 2008 the average EU mobile termination charge was (at 8.55 cents) 11.58% lower than one year before. The report notes further that despite the continuing decline, termination charges remain on average more than 10 times higher than the fixed interconnection charges (single transit).

innovations and investments in the fixed sector such as fibre roll-out and delivery of next generation networks and bundled/convergent services.

- *Net senders to net receivers of voice traffic, which can reinforce network effects and increase barriers to smaller operators expanding within markets.*

Above-cost termination rates can give rise to competitive distortions between operators with asymmetric market shares and traffic flows. Termination rates that are set above an efficient level of cost result in higher off-net wholesale and retail prices. As smaller networks typically have a large proportion of off-net calls, this leads to significant payments to their larger competitors and hampers their ability to compete with on-net/off-net retail offers of larger incumbents. This can reinforce the network effects of larger networks and increase barriers to smaller operators entering and expanding within markets.

The further termination rates move away from incremental cost, the greater the competitive distortions become in each of the above cases.

In an environment of increasing convergence between fixed and mobile networks and with a view to promoting sustainable competition and investment within and across all telecoms markets, it is important that regulation is, as far as is practicable, technology neutral and ensures that there is no distortion or restriction of competition and that efficient investment and innovation is encouraged. These principles are enshrined in Article 8 of the Framework Directive and include the development of the internal market through consistent regulatory practice and consistent application of the regulatory framework. The above considerations imply that in similar circumstances and where similar market failures have been identified, similar costing principles should be applied.

Furthermore, it may be claimed that high termination rates charged on a per-minute price basis create pressure on operators to adopt per-minute retail tariffs, thereby limiting the possible emergence of more innovative offers such as those based on flat-rate tariff structures which could in turn promote greater retail consumption.

Basing the regulated wholesale termination charge on the incremental cost of providing this service alleviates the above-mentioned distortions and provides a more consistent and balanced regulatory framework. This is facilitated, for example, by reducing the magnitude of cross-subsidies between groups of customers (e.g. fixed and mobile) and by reducing the impact of any financial disadvantages arising from traffic imbalances between smaller and larger operators (e.g. in mobile markets). Thus, termination rates which approximate the long-run incremental cost of providing the service can be expected to lead to enhanced competition and lower retail tariffs across the range of consumers, while still facilitating efficient cost recovery and appropriate investment incentives.

When deciding on the correct level of the regulated wholesale termination rate, it is essential to ensure that the methodology adopted promotes efficient production and consumption decisions and minimises any artificial transfers and distortions between competitors and consumers. Therefore, regulators should construct models which set wholesale termination charges as close to incremental cost as possible. The closer the

termination price of all operators is to the incremental cost, the more likely it is that this will lead to the most efficient and least distortionary use of call termination services, and minimise the risk of problems such as cross-subsidisation between operators and customers and inefficient pricing and investment behaviour. Therefore, it is justified to apply a pure LRIC approach where the relevant increment is the wholesale call termination service and which includes only those costs that would not be incurred if that service were no longer produced (i.e. avoidable costs). A pure LRIC approach, while recognising the essential objective of short-run marginal cost pricing, also recognises that cost structures in network industries tend to be characterised by substantial fixed costs and (by assuming that all costs become variable over the long run) provides for the recovery of service-specific fixed costs and variable costs which are incremental to providing the service over the longer term.

A pure LRIC approach implies the exclusion of costs which would not be avoidable if the wholesale termination service were discontinued. It is frequently argued, however, that as a significant proportion of joint and common costs in telecommunications markets would not be avoidable in the absence of a wholesale termination service, provision should be made for their inclusion in the LRIC model either via a mark-up or by defining the increment more broadly. It is also argued that, in the case of multi-product firms, allocating joint and common costs by way of Ramsey pricing would yield the most socially optimal result. This implies a form of pricing whereby mark-ups are allocated according to the elasticities of the individual services. However, there are significant informational requirements associated with accurately identifying such elasticities. In addition, even if Ramsey pricing principles were applied to termination rates, there is a significant risk of corresponding (unregulated) retail prices not being set at Ramsey levels and overall welfare being reduced. Furthermore, as noted above, there are distributional and competitive problems (e.g. between fixed and mobile operators and smaller- and larger-scale operators respectively) associated with allowing mark-ups above incremental costs for call termination markets.

It should also be noted that the existing system of cost allocation used for cost orientation of wholesale termination rates in the EU, i.e. Calling Party Network Pays, assumes that the calling party is the only party causing costs to arise. However, it is important to recognise that both calling and called parties jointly cause a call to be made and jointly benefit from that call. If the receiver did not receive a benefit, they would not accept the call³⁶. In that respect, call termination differs from other markets where the creation of costs and attribution of benefits can be ascribed to one side only. The use of traditional cost-causation principles in setting cost-oriented prices suggests that the creator of the costs should bear those costs. Given the two-sided nature of call termination, not all related termination costs must necessarily be recovered from the wholesale charge levied on the originating operator. Even if wholesale termination rates were set at zero, terminating operators would still have the ability to recover their costs from non-regulated retail services. Rather it is a

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This is also known as a call externality which refers to the fact that it is not only the calling party but also the called party which obtains a benefit from receiving a call. The externality arises in this instance because under the calling party pays principle (CPP) such benefits accruing to the called party are not taken into account, but only the calling party is charged for the call.

question of how these financial transfers are distributed across operators in a way that best promotes economic efficiency to the benefit of consumers.

It has been further indicated in recent economic literature³⁷ that in the presence of call externalities mobile networks have strong incentives to implement on-net/off-net price differentials due to: (i) high mobile-to-mobile termination charges which exceed marginal costs; and (ii) their strategic incentives to reduce the number of calls that subscribers on rival networks receive, reducing the attractiveness of rival networks and hence their ability to compete. This theory suggests that mobile call termination charges above marginal costs can lead to permanent net payments by smaller networks and, since off-net prices are set above costs, also implies that smaller networks receive relatively fewer calls. According to some of this literature, termination charges which are above the marginal costs of termination result in strategically-induced network effects which may be detrimental to smaller networks.

However, for the purposes of this Recommendation, it should be noted that all of the incremental (avoidable) service-specific fixed and variable costs (as the fixed costs are assumed to become variable over the long run) of providing the wholesale termination service to third parties may be recovered via the regulated wholesale termination charge. Even if the Recommendation does not propose to set termination rates at the level of marginal cost or below (as suggested by some recent economic literature), applying a pure LRIC approach should in any case facilitate a more efficient distribution of these financial transfers between operators and thereby contribute to a level playing field between all fixed and mobile operators.

4.2. Common principles for symmetry/asymmetry of termination rates

As the relevant cost standard for setting termination rates should be BU LRIC which reflects the cost of an efficient operator, there should in principle be no asymmetries between the rate of the established operator(s) and the rates of later entrants to the market. This is broadly consistent with the ERG Common Position on symmetry which states that termination rates should normally be symmetric and that asymmetry requires adequate justification. As noted in section 3.1.3 above, the Commission has previously noted in its Article 7 decisions that termination rates should normally be symmetric and that asymmetry requires an adequate justification based on objective cost differences outside the control of the operators concerned. A key argument frequently used in support of the authorisation of temporary asymmetric rates in favour of later entrants, and in the absence of any verifiable objective cost differences, is that it forms part of an overall *entry assistance policy* which is aimed at promoting new entry and longer-term competition in fixed and mobile markets. The rationale is that allowing higher post-entry profits will encourage entry and investment and lead to more intense competition in the long run. However, it is generally accepted that such a policy may also attract inefficient entry. It may also be expected that consumers will end up paying higher retail prices than would otherwise be the case in a situation of cost-based symmetric termination rates. In addition, providing a mark-up for new entrants while regulating incumbents at cost effectively creates a cross-subsidy and can simultaneously reduce the incumbents' investment incentives.

³⁷ Armstrong and Wright (2007), Hoernig (2007), Calzada and Valletti (2007), Harbord and Pagnozzi (2008).

In the light of the above, it is questionable whether asymmetric termination rates should be used as a form of entry assistance. On the contrary, it may be argued that symmetric price control based on an efficient-cost benchmark, rather than on the costs actually incurred by an operator, gives efficient investment incentives to firms. These considerations apply to both fixed and mobile markets.

Arguments relating to *economies of scale* and the higher unit costs initially incurred by new entrants have in particular been raised as possible justification for transitory asymmetry in termination rates. The Commission has previously noted in that respect that objective cost differences due to substantial differences in the date of market entry could represent a possible justification for asymmetry. At the same time, it should be borne in mind that rewarding an operator for its smaller size can give inappropriate investment signals and risks promoting inefficient entry. Such a policy may, for example, act as a disincentive to smaller operators to innovate and expand. In that respect, the Commission has previously stated that the fact an operator entered the market later and that it therefore has a smaller market share can only justify higher termination rates for a limited transitory period. The persistence of a higher termination rate would not be justified after a period long enough for an operator to adapt to market conditions and become efficient and could even discourage smaller operators from seeking to expand their market share.

As regards the extent to which new entrants might be expected to have higher unit costs than incumbents, it has been argued that this consideration is more relevant for mobile than for fixed operators. Fixed operators have the opportunity to build their networks in a particular geographic area and focus on higher-density routes. Furthermore, they can lease relevant network services from the incumbent to reduce the fixed costs of network build and thereby reduce the impact of economies of scale. It has been argued, however, that scale economies play a bigger role in mobile networks: due to coverage requirements new entrants initially incur higher per-unit costs arising from their smaller customer base, although there is some debate regarding the magnitude of the costs involved.

Following the above considerations, it is important, after having identified impediments on the retail market to market entry and expansion, to limit any asymmetries allowing new mobile entrants to recoup their higher incremental costs compared to those of a modelled efficient operator for a transitional period before a minimum efficient scale³⁸ can be expected to be reached. Drawing upon the ERG Common Position on symmetry, it is reasonable to envisage a timeframe of four years (from the date of entry of the operator concerned) for phasing out asymmetries in mobile markets, based on the estimation that in the mobile market it can be expected to take three to four years to reach a market share of between 15 and 20%³⁹.

A further (albeit related) argument cited in support of temporary asymmetry is the existence of *traffic imbalances* between larger incumbent operators and smaller new entrants. Where a new market entrant initially has lower traffic volumes than the more established incumbents, this can result in net payments to the incumbents which are typically net receivers of traffic. It is further argued that the financial disadvantages which new entrants face as a result of their lower traffic volumes can

³⁸ See section 5.2.3 for the determination of the minimum efficient scale in mobile markets.

³⁹ ERG (07) 83 final 080312, p. 94.

be exacerbated by *differential on-net/off-net pricing* policies pursued by the incumbent operators.

It is difficult to see how arguments regarding financial imbalances resulting from differences in traffic volumes and differential on-net/off-net pricing would justify setting asymmetric termination rates. This is because asymmetric wholesale pricing is likely to reinforce the asymmetric pricing observed at retail level. That is, the off-net retail prices of the incumbents will likely rise to compensate for the increased cost of off-net wholesale termination to the new entrants. As long as traffic imbalances persist, asymmetric pricing will likely only contribute to perpetuating any resulting financial imbalances.

Moreover, it has been argued that on mobile markets there may be exogenous cost factors associated with *uneven spectrum assignments* which result in per-unit cost differences between mobile operators. In that regard, the Commission has previously recognised that objective cost differences may relate to uneven spectrum assignments between operators, even in situations where the minimum efficient scale can be expected to have been reached. Exogenous cost differences may arise where spectrum assignments have not taken place using market-based mechanisms but on the basis of a sequential licensing process where, for example, later entrants mainly receive 1800 MHz frequencies, thus facing higher unit costs in certain areas than operators with a 900 MHz allocation. Due to the better propagation characteristics of the 900 MHz spectrum, it is argued, for example, that in urban areas fewer base stations are needed to ensure indoor coverage than is the case with the 1800 MHz spectrum.

The extent of this cost disadvantage depends on a number of factors, including the regulatory situation, the nature of the demand for coverage and the geography and topology of the country. It appears that this relative cost disadvantage decreases as the market shares of the later entrants grow, increasing their capacity needs. In addition, where the spectrum assignment takes place through a market-based mechanism such as an auction or where there is a secondary market in place, any frequency-induced cost differences become more endogenously determined and are likely to be significantly reduced or eliminated. Moreover, with further spectrum liberalisation taking place, it needs to be examined whether on a forward-looking basis additional spectrum is likely to be made available through market-based assignment processes which might erode any cost differences arising from existing assignments. For example, the digital dividend is leading to the release of spectrum that is being freed up as a result of the switchover from analogue to all-digital television. The spectrum that will be released by the digital switchover is in the prime Ultra High Frequency (UHF) band. Since these bands are located in the lower spectrum range they can cover large geographical areas with relatively few base stations, offering nationwide network rollout at lower costs when compared to services delivered at higher frequencies, offering greater capacity but at shorter range.

An important argument for symmetric termination rates at the level of efficient cost is that asymmetric pricing can foster inefficient behaviour and generate productive inefficiencies. Productive efficiency takes place when a good is produced at the lowest cost possible. Rewarding an operator with a price above an efficient or cost-based level can reduce its incentives to innovate and minimise costs. For example,

asymmetries based on differences in dates of market entry and scale may discourage innovation and cost efficiency on the part of the later entrant/smaller operator, and may give rise to inappropriate investment incentives and inefficient entry.

Consequently, consumers may end up paying higher prices than would otherwise be the case in a situation of cost-based symmetric termination rates. This is because the higher termination rates have to be recovered by the originating operators and will presumably be passed onto consumers in the form of higher retail prices. This effectively creates a cross-subsidy from lower-cost operators and their consumers to their less efficient rivals, thereby generating allocative-efficiency concerns. Meanwhile, the less efficient operator benefits from the lower termination rates of its rivals, thus enabling it to lower its retail prices and win customers. As the subsidised operators expand, the negative impact on retail prices and consumer welfare is even greater. Given that the stated purpose of the regulation of wholesale termination charges is to prevent excessive pricing and its negative impact on consumer welfare, it is arguably counter-intuitive to apply a remedy that also generates allocative and productive inefficiencies.

5. THE APPLICATION OF COST-BASED REMEDIES

Following the choice of the appropriate cost base, cost model and cost standard (i.e. a BU LRIC model based on current costs), this section deals with the implementation of the chosen model in practice. The first question deals with the choice of technology, from that follows the definition of the increment. Since both fixed and mobile termination rates are generally subject to regulation, and since fixed and mobile networks are to an increasing extent in competition with each other, attention must be paid to consistent treatment of both network types.

5.1. Fixed networks

5.1.1. Choice of technology

From a forward-looking perspective, a new operator would choose a packet-switched network with all services delivered over an IP core network. Given that regulating termination rates at the level of efficient costs aims at reflecting a situation which would prevail under competitive circumstances, this implies the selection of the most efficient technologies subject to the availability of such technologies in the timeframe considered by the model. In a competitive market, a new entrant would opt for the most efficient available technology, i.e. one based on NGN, for the purposes of building a core network. Hence, a BU model built today could assume that the *core* network is NGN-based, to the extent that the costs of such a network can be reliably identified. Specifically, this implies that all existing PSTN switches would be assumed to be replaced with NGN equivalents and that Synchronous Digital Hierarchy/Asynchronous Transfer Mode (SDH/ATM) transmission equipment becomes redundant. It also implies that voice traffic needs to be converted to/from IP packets at the edges of the network. Whilst connecting operators still interconnect via Time Division Multiplexing (TDM) technologies, there will be a need to include Media Gateways in the BU model in order to interconnect with operators using PSTN-based equipment.

Technology developments in the *access* network may focus around the shortening of the local loop by partial replacement with fibre to the kerb or street cabinet (using Very-High-Rate Digital Subscriber Line (VDSL) technology), the replacement of the copper local loop with Fibre-To-The-Building (FTTB), or the replacement of the copper local loop with Fixed Wireless Access (FWA) equipment.

In principle, the concept of forward-looking costs would value all assets at the cost of a modern equivalent asset (MEA), which is the lowest cost asset with the latest available and proven technology. While it can be argued that an operator constructing a brand-new, nationwide access network today would install fibre directly to the home, the level of investment necessary to replace the existing copper-based access network with fibre on a nationwide basis precludes it from being a MEA for the twisted copper pair. Furthermore, FWA technologies are not likely to form a long-term replacement for the twisted copper pair since they appear to be deployed only in specialist cases. The question of how the cost of deploying fibre to the street cabinet should be treated in the LRIC model will largely depend on the increment chosen and is addressed in the next section.

5.1.2. *Definition of the increment*

As stated in section 4.1., LRIC models include only those fixed and variable costs (as the fixed costs are assumed to become variable over the long run) which are caused by the provision of a defined increment. This increment can contain single or multiple services or network components. Incremental costs can also be considered as the costs that would be saved if those services were no longer produced. Costs that span more than one increment are either joint or common costs. The smaller the increment, the larger the proportion of costs which are joint or common and *vice versa*.

The relevant incremental cost (i.e. avoidable costs) of the wholesale call termination increment is the difference between the total long-run costs of an operator providing its full range of services and the total long-run costs of that operator not providing a wholesale call termination service to third parties.

In this context a distinction needs to be made between traffic- and non-traffic-related costs to ensure the appropriate attribution of those costs. Traffic-related costs are all those fixed and variable costs which rise with increased levels of traffic. The relevant costs for the calculation of the regulated wholesale termination charges are the traffic-related costs which are only attributable to wholesale voice call termination services. Other costs, i.e. those traffic-related costs attributed to other services (e.g. call origination, data services, IPTV, etc.) and non-traffic-related costs are not to be taken into account.

The default demarcation point between traffic- and non-traffic-related costs is typically where the first point of traffic concentration occurs. In a PSTN network this is normally deemed to be the upstream side of the line card in the (remote) concentrator. The broadband NGN equivalent is the line card in the Digital Subscriber Line Access Multiplexer/Multi-Service Access Node (DSLAM/MSAN). The deployment of fibre to the street cabinets and the installation of active devices (DSLAM or MSAN) at that network level might be seen as an extension of the traffic-sensitive part of the network. The logic behind this is that under current

technology the loop is customer-specific and not traffic-dependent. In a Next Generation Access (NGA) network the former loop between the cabinet and the exchange/Main Distribution Frame (MDF) becomes a shared medium and might not be treated as being subscriber-driven, but rather as being traffic-sensitive.

The demarcation point between traffic- and non-traffic-sensitive costs in an NGA context is subject to considerable uncertainty. Certain regulators have decided that traffic is *amalgamated* at the cabinet and not concentrated, and that the fibre capacity between the cabinet and MDF is dedicated to each subscriber for the purposes of voice traffic. The existing demarcation point (i.e. at the line card) also remains unchanged if operators dedicate sufficient capacity for voice traffic to ensure there is never congestion. However, if operators would opt to prioritise traffic rather than dedicate capacity, then in a fibre-to-the-building scenario the traffic-sensitive part of the network could move closer to the final consumer.

For the time being it can be assumed that an efficient forward-looking network will allocate dedicated capacity to the voice channel irrespective of the technology deployed. Hence, the existing demarcation remains unchanged, unless there are significant NGA developments inducing an observable general trend towards using shared capacity, which would be reflected in the regulated access regime.

To facilitate accurate identification of avoidable costs that should be attributed to the wholesale call termination service, it may be appropriate to allocate operators' costs in the first instance to business segments/services other than wholesale voice call termination, with only the residual cost being allocated to the wholesale call termination increment. Given that wholesale call termination is a traffic-related service, non-traffic-related costs should not be taken into account when calculating wholesale termination rates. Then, it may be appropriate to first identify among the traffic-related costs (discussed above) those that are related to other services, such as data traffic (e.g. broadband, leased lines, IPTV, etc.) and other relevant voice services (e.g. call origination), and to develop cost-volume relationships according to which costs can be allocated to those services. When the costs for all other services have been calculated and attributed, only then should the remaining costs be allocated to the voice call termination service. As a consequence, the incremental costs of call termination are only those costs that can be avoided if the call termination service were no longer provided (avoidable costs).

Following this approach, examples of costs which would be part of the termination service increment would include additional network capacity needed to transport additional wholesale termination traffic (e.g. additional network infrastructure to the extent that it is driven by the need to increase capacity for the purposes of carrying the additional wholesale traffic) as well as additional wholesale commercial costs directly related to the provision of the wholesale termination service to third parties.

5.1.3. *Efficient scale of operators*

It is particularly difficult to determine minimum efficient scale for fixed networks due to a number of factors. Firstly, in fixed networks operators have the ability to rent infrastructure and to purchase interconnection. Secondly, fixed operators have the opportunity to build their networks in a particular geographic area and focus on

higher-density routes. Consequently, fixed operators can potentially achieve low unit costs at low levels of output and thereby reduce the impact of economies of scale.

When deciding on the appropriate single efficient scale of the modelled operator, NRAs should take into account the need to promote efficient entry, while also recognising that under certain conditions smaller operators can produce at low unit costs by operating in smaller geographic areas. Furthermore, smaller operators which cannot match the largest operators' scale advantages over broader geographic areas can be assumed to purchase wholesale inputs rather than self-provide termination services.

5.2. Mobile networks

5.2.1. Choice of technology

Just as in fixed networks, a forward-looking perspective would imply that all services will be delivered over an IP core network. A BU model built today could assume that the core network is NGN-based, to the extent that the costs of such a network can be reliably identified. Similar issues arise in relation to the mobile access network as compared to the fixed access network. In the same way as fibre to the node or to the home is replacing copper, so too are 3G- or UMTS-based technologies gradually replacing 2G. Some very important differences remain. In mobile networks economic conditions driven by demand concentration and geographic characteristics influence the selection of a range of spectrum-based technologies to match those conditions. It can be expected that 2G and 3G networks are likely to co-exist for a number of years. Hence, the model should be based on both 2G and 3G employed in the access part of the network to reflect the actually anticipated situation facing operators, while the core part could be assumed to be NGN-based.

5.2.2. Definition of the increment

As in fixed networks, for the purposes of calculating the incremental costs of wholesale call termination in mobile networks, it is necessary to identify only those fixed and variable costs that would not be incurred if the wholesale termination services were no longer provided to third-party operators (i.e. the avoidable costs only). The avoidable costs of the wholesale call termination increment may be calculated by identifying the total long-run cost of an operator providing its full range of services and then identifying the long-run costs of this same operator in the absence of the wholesale call termination service being provided to third parties. This may then be subtracted from the total long-run costs of the business to derive the defined increment.

Furthermore, as for the fixed network, a broad distinction will need to be made between traffic- and non-traffic-related costs to ensure the appropriate attribution of those costs.

The costs of the handset and the SIM card are not traffic-related and should be excluded from any costing model for wholesale voice call termination services.

Although there is no equivalent to the local loop or the line card as in the fixed access model, there is a requirement to provide coverage to subscribers, and this will cause certain unavoidable costs to be incurred to meet that requirement. Those costs

should consequently be treated as non-traffic-sensitive costs and should not be attributed to the wholesale call termination increment as they would not be avoided if that service were discontinued. Coverage can be best described as the capability or option to make a single call from any point of the network at a point in time. Coverage costs would, for example, include site preparation costs, the base station cost and the first transceiver cost of coverage sites. Investments in mature mobile markets are largely driven by capacity increases. Capacity represents the additional network costs which are necessary to carry increasing levels of traffic (above the network coverage necessary to offer a retail service to subscribers). These capacity costs can be regarded as traffic-related and may fall within the wholesale call termination service increment to the extent that those capacity requirements are driven by the provision of a wholesale call termination service and would be avoidable if that service were discontinued. The incremental cost of wholesale voice call termination services should therefore exclude coverage costs, but should include additional capacity costs to the extent that they are caused by the provision of wholesale voice call termination services.

As for the fixed network, an appropriate way of accurately identifying only those residual costs which may be attributed to the wholesale call termination service may be to first allocate costs to services other than wholesale voice call termination, with only the residual being allocated to the wholesale call termination increment. Given that wholesale call termination is a traffic-related service, it may be appropriate to identify from the traffic-related cost category those other services (e.g. data, SMS, MMS, call origination, etc.) which also fall within that broader cost category, and to develop cost-volume relationships according to which costs can be allocated to those services. When the costs for all other services have been calculated and attributed, only then should the remaining costs be allocated to voice call termination services. As a consequence, the incremental costs of call termination are only those costs that can be avoided if the call termination service were no longer provided (avoidable costs).

The costs of spectrum usage (the authorisation to retain and use spectrum frequencies) incurred in providing retail services to network subscribers are initially driven by the number of subscribers, and thus are not traffic-driven and should not be calculated as part of the wholesale call termination service increment. The costs of acquiring additional spectrum to increase capacity (above the initial spectrum necessary to provide retail services to subscribers) for the purposes of carrying additional traffic resulting from the provision of a wholesale voice call termination service should be included on the basis of forward-looking opportunity costs, where possible.

Following the approach outlined above, examples of costs which would be included in the termination service increment would include additional network capacity needed to transport additional wholesale traffic deriving from the provision of the wholesale call termination service to third-party operators (e.g. additional network infrastructure to the extent that it is driven by the need to increase capacity for the purposes of carrying the additional wholesale traffic). Such network-related costs could include additional Mobile Switching Centres (MSCs) or backbone infrastructure directly required to carry the terminating traffic for third parties. Furthermore, where certain network elements are shared for the purposes of supplying origination and termination services, such as cell sites or Base Transceiver

Stations (BTS), these network elements will be included in the termination cost model to the extent that they are needed because of the additional capacity necessary to carry terminating traffic by third parties. In addition, the additional spectrum costs and wholesale commercial costs directly related to the provision of the wholesale termination service to third parties would also be taken into account. This implies that coverage costs, unavoidable business overhead costs and retail commercial costs which would all still be incurred in the absence of a wholesale termination service being provided are not included.

5.2.3. *Efficient scale of operators*

To determine the minimum efficient scale for the purposes of the cost model, and taking account of market share developments in a number of EU Member States, the recommended approach is to set that scale at 20% market share.

When setting the appropriate efficient scale, it is important to mimic a competitive outcome and provide appropriate incentives for efficiency. The Competition Commission in the UK in the context of its 2003 review of the UK market concluded that once a mobile network operator has captured 20%–25% of the market volume, there are only very limited remaining economies of scale⁴⁰. In a number of European markets, however, there is still an observable spread of market shares between early and late entrants⁴¹. The Recommendation thus takes account of these market share developments and considers that the model should lead to results which also allow a mobile operator with a market share lower than the average market share of an efficient operator (as represented by an average market share of 1/Number of Mobile Network Operators⁴²) to be able to recover the long-run incremental costs of providing termination services. As indicated by the Competition Commission, a mobile operator with a lower than average market share has the opportunity to capture at least an average share of the market over time⁴³. It may similarly be expected that mobile operators, having entered the market, would strive to maximise efficiency and revenues and thus be in a position to achieve at least a minimum market share of 20%. In case an NRA can prove that the market conditions in the territory of that Member State would imply a higher minimum efficient scale, e.g. due to the maturity of the market operators may be expected to achieve the average market share, it could deviate from the recommended approach.

⁴⁰ UK Competition Commission, “Vodafone, O2, Orange and T-Mobile: Reports on references under section 13 of the Telecommunications Act 1984 on the charges made by Vodafone, O2, Orange and T-Mobile for terminating calls from fixed and mobile networks”, (Competition Commission Report), 2003.

⁴¹ The 13th Progress Report showed, for example, that, as of October 2007, the leading operators still had between 40 and 50% market share in 15 Member States, while in two Member States the leading operators had market shares in excess of 60%.

⁴² On the basis that no Member State has licensed more than five mobile network operators to date, this average market share would comprise at least 20% of the relevant national market. In the case of mobile virtual network operators, the opportunity to lease relevant network inputs from the mobile network operators may reduce the impact of economies of scale implying that low unit costs could potentially be achieved at low levels of output.

⁴³ Competition Commission Report (2003), p. 69. In its decision, the Competition Commission envisaged a time period of two to three years for an MNO with a lower than average market share to be in a position to capture at least an average share of the market.

As regards the basis for estimating this efficient scale (e.g. whether that is expressed in terms of volume of terminated minutes, total volume of traffic, numbers of subscribers, etc.) this may be determined in a national context. It may be useful to note some precedence in that regard. In its 2003 inquiry of the UK mobile market, the Competition Commission appears to have estimated the efficient scale based on the cost of a network that could support a 25% market share of total call traffic but which was actually only handling 20%. In its 2007 report for the Australian Competition and Consumer Commission, WIK appears to have estimated different scenarios for the efficient scale (at 25% and 31% respectively) based on the number of mobile users⁴⁴. Furthermore, the ERG's assessment, that in a mature mobile market it can be expected to take three to four years for a new entrant to reach a market share of between 15 and 20%, involves a market share reference relating to the number of subscribers⁴⁵.

5.2.4. Externalities

It is argued that in the presence of *network externalities*, the addition of a marginal subscriber to a mobile network may also be of value to other subscribers. For example, other fixed and mobile subscribers derive a benefit from being able to contact and be contacted by this additional subscriber. The externality arises because the benefit to other subscribers is not taken into account when the decision of whether or not to join a network is made. Thus a sub-optimal number of customers may choose to become network subscribers. Consequently, it is argued that it may be appropriate for wholesale termination charges to include an externality mark-up above cost which may then be used by the operators to subsidise the addition or maintenance of marginal subscribers on their networks with associated benefits for all consumers calling those networks. However, this argument relies on a number of assumptions.

The first is that customer penetration levels are not yet near saturation levels, as otherwise network externalities would be largely exhausted, or that, in the absence of a mark-up above cost, network operators would not act to attract or maintain marginal subscribers on their networks and are thus not in a position to internalise this externality. However, it should be noted that network operators have incentives to have as many subscribers on their networks as possible because subscribers benefit from being able to call other subscribers located on the same networks as themselves (i.e. network or club effects are generated). Furthermore, under the recommended approach the regulated termination rates would continue to cover the incremental costs of servicing these subscribers and there is evidence that where network externality mark-ups have not been applied, network operators have still acted to bring and maintain marginal subscribers onto the network.

It also assumes that there is a direct pass-through of the wholesale termination profits to marginal subscribers at retail level rather than being retained by the relevant operator as excess profits, i.e. that there is a waterbed effect. However, this relies on an assumption that operators are already operating close to the efficient cost level. Further, there is insufficient evidence as regards the magnitude of this effect.

⁴⁴ WIK-Consult, Mobile Termination Cost Model for Australia, Report for the Australian Competition and Consumer Commission, January 2007.

⁴⁵ See footnote 39 above.

Additionally, it ignores the competitive and distributional consequences of setting termination rates above efficient costs which must then be subsidised by other networks, such as by fixed networks and their consumers or by subscribers of smaller mobile networks

It further represents a static viewpoint of competition and consumer behaviour. While it is possible that the pricing structure at the retail level may be adjusted to reflect changes at the wholesale level⁴⁶, a stronger competitive dynamic resulting from the elimination of competitive distortions associated with above-cost termination rates should serve to constrain the costs of mobile phone ownership for end users and thus preserve high mobile penetration levels in the EU. More affordable calls for end users should also encourage increased usage (depending on the demand elasticity), the revenues from which may in turn be used to finance inducements for more marginal customer segments.

Therefore, in view of the current stage of mobile market development, the scope for operators to internalise network externalities, and the allocative efficiency concerns associated with above-cost termination rates, a network externality does not seem sufficient justification to allow for an increase in termination rates.

5.2.5. *Implication of recommended approach for mobile termination rates*

The recommended approach for setting termination rates sets out a consistent methodology for regulating termination rates based on the costs of an efficient operator. While any further reductions in termination rates in the EU will depend on the extent to which estimated termination rates might currently exceed the level of efficient cost, regulators have tended to implement glide paths with a more gradual rate of reduction for mobile termination rates and in 2007 they were still on average almost nine times the equivalent fixed rate. Thus it may be expected that a more consistent and effective interpretation of this cost concept will have an impact on the level of termination rates, in particular in mobile networks.

When examining the cost structure of mobile operations, it can be noted that on average around 75% of the costs of mobile call termination are currently network-related, slightly more than half of which are generated by the radio access network. According to the recommended approach, only those costs which are capacity-driven and incremental to the provision of a wholesale call termination service would be taken into account. Furthermore, the remaining 25% of the total cost of mobile call termination is typically accounted for by spectrum costs, business overheads and wholesale commercial costs. Cost models currently applied by NRAs treat a large proportion of the radio access network as traffic-driven and therefore a sizeable proportion of the radio access network costs are taken into account in calculating the costs of providing termination services. Under the recommended approach only that proportion of the radio access network costs which would be avoidable if a wholesale termination service were no longer provided would be allocated to the overall mobile termination cost. Further, that portion of spectrum costs driven by the need to increase capacity, above the spectrum necessary to provide retail services to

⁴⁶ In that respect, it may also be noted that handset subsidies are not a necessary inducement for marginal customers to join mobile networks. For example, penetration levels in Italy and Finland are high despite handset subsidies having been restricted in both countries in the past.

subscribers, for the purposes of carrying wholesale voice call termination traffic for third parties would be included. General business overheads would also only be included to the extent that they are driven by the provision of the wholesale termination service. Unavoidable business overhead costs would be excluded. Furthermore, wholesale commercial costs which are directly related to the provision of a wholesale call termination service (such as billing costs which result directly from providing a wholesale termination service) would be included; however of the latter cost categories, wholesale commercial costs are typically the smallest in magnitude.

6. FORWARD-LOOKING CONSIDERATIONS

6.1. Possible alternative approaches

6.1.1. Introduction

As noted above, call termination services are two-sided, with the network(s) being the platform and the caller and receiver being on either side of that platform. The demand elasticities on either side of the platform mean that the *structure* of prices impacts on the levels of consumption; therefore, it often plays a crucial role in bringing the two sides of the market together⁴⁷.

It has also been noted that in a call there are benefits to both the calling and to the called party, which in turn suggests that both parties have a part in the creation of costs. Currently, the benefit of the called party is largely ignored when regulating termination rates⁴⁸. The consideration of call externalities raises issues about how costs ought to be recovered in a forward-looking context.

In addition, there are non-trivial costs associated with developing cost models for the setting of wholesale termination rates. These costs need to be considered in the context of possible alternative mechanisms for remunerating termination services. A number of alternative arrangements for the exchange of termination traffic are considered below.

6.1.2. Bill and Keep

A few countries⁴⁹ use alternative arrangements, under which network operators negotiate termination fees, subject to an obligation to interconnect and usually subject to the requirement that rates received by both networks that are parties to the same agreement are reciprocal. These operators often choose to set termination rates at zero. That system, where traffic is exchanged without financial settlements, is known as *Bill and Keep*. Bill and Keep may be related to Receiving Party Pays (see 6.1.4.), as it allows operators to directly charge their customers for received calls without resorting to wholesale charges from other operators, although this is not a necessary consequence.

⁴⁷ See Rochet/Tirole (2004).

⁴⁸ Unlike in the regulation of international roaming calls, Regulation (EC) No 717/2007.

⁴⁹ For example, the USA, Canada and Singapore.

There is no record of Bill and Keep being imposed by a regulatory authority. It generally results from voluntary agreement between interested parties, which in certain circumstances choose to set these fees at zero, particularly where the net financial settlements are equal to or close to zero.

It is argued that Bill and Keep obviates the need for regulatory intervention and resolves the termination bottleneck. Moreover, it is further argued that Bill and Keep leads to lower retail prices for call origination and appears to increase usage due to the price elasticity of demand. Furthermore, proponents of Bill and Keep consider that it facilitates development of innovative offers, e.g. flat-rate offers promoting increased usage. It also brings immediate benefits by decreasing transaction and measurement costs. Finally, Bill and Keep takes account of the call externality.

Nevertheless, one should note that setting the price of any service at zero may cause distortionary behaviour, bring arbitrage opportunities, lead to inefficient traffic routing and inefficient network utilisation. For instance, a potentially problematic issue might be inefficient routing of traffic from operators not participating in the Bill and Keep scheme.

When assessing the possible introduction of the Bill and Keep system, potential merits and drawbacks of such an approach would have to be carefully considered. Given the high current level of termination rates under the prevailing CPP system in the EU, the full effects of switching to a Bill and Keep system may not be reliably foreseen.

However, a significant reduction of termination rates from current levels might create appropriate incentives for voluntary inter-operator agreements⁵⁰ and consequently Bill and Keep type arrangements could evolve naturally.

6.1.3. *Reciprocity*

One of the possible regulatory approaches is to require that interconnecting operators negotiate termination rates among themselves, subject only to the requirement that these rates are reciprocal. Bill and Keep is a particular example of a reciprocal arrangement, where the termination rates are set at zero. However, other levels of reciprocal termination rates may be applied.

Potentially, this could require limited regulation, assuming that prices are negotiated at an efficient level. Nevertheless, reciprocity may lead to collusion between operators aimed at maintaining high wholesale and retail prices. Moreover, it may be expected that the outcome of reciprocal arrangements would depend on the level of traffic flows between two interconnecting networks. A net recipient of traffic would likely prefer a higher termination rate and *vice versa*. Thus, efficient termination rates do not necessarily have to result from the imposition of reciprocity. Consequently, additional regulatory intervention may be needed.

⁵⁰ Voluntary agreements are always subject to competition law.

6.1.4. *Receiving Party Pays*

Some countries (e.g. Canada, Singapore, Hong Kong, the United States) use Receiving Party Pays (RPP) as an alternative arrangement to the CPP system at retail level. Under RPP the receiving network terminates calls without charging the originating operator the full cost of that termination service, leading the operator to potentially recover part of the termination costs from their own retail customers. Since this charge is now noticeable to the consumer, there is an incentive for the consumer to respond to that charge where more competitive alternatives exist. Thus, both incoming and outgoing call charges are subject to competition. Such a settlement system is consistent with an argument that while the calling party causes a cost originating the call, the called party causes a cost by accepting it and thus it recognises the existence of a positive call externality to the receiving party.

RPP avoids the deficiencies of the CPP system, e.g. high termination rates resulting from the monopoly on termination markets and which thus produce negative competitive consequences both at the wholesale and retail level. If subscribers are charged for incoming calls, they can be expected to be more sensitive to the price charged for them. Thus, competition between operators for mobile subscribers could be expected to exert a constraint on the setting of wholesale termination charges with associated implications for retail prices.

Nevertheless, it could possibly meet resistance from customers unwilling to meet the termination charge. RPP might not be efficient if the calling party values the call highly but the called party does not and, as a result, an efficient call might not be completed⁵¹. The reverse issue may arise in the CPP system, where an efficient call may not be initiated even if the called party values it highly but the calling party does not. In addition, if the originating operator continues to cover part of the termination cost, RPP would still require a degree of regulatory oversight, as otherwise RPP would likely revert to a CPP arrangement.

As noted above, there are potential merits in an RPP system given that it recognises that both calling and receiving parties benefit from a call and contribute towards its cost. However, it is difficult to envisage such a situation at present given the current high level of termination rates in the EU. Nevertheless, it may not be excluded that RPP will emerge if operators decide to recover part of the termination charge directly from the called party, in particular RPP may evolve after a reduction of the regulated termination charge or as a response to a Bill and Keep system.

6.1.5. *Conclusion*

Further to the above, a number of possible alternative approaches may be implemented over the longer term to the extent that they may promote efficiency and decrease the need for regulation. However, in view of the current high level of termination rates, particularly in the mobile sector, it is difficult to see how these alternative systems may be introduced in the short to medium term. Reducing termination rates to an efficient level is an appropriate first step before other potential approaches may be introduced.

⁵¹ However, operators may employ certain measures aimed at counteracting possible sub-optimal usage, e.g. flat rate offers with free incoming calls.

6.2. Migration to IP Interconnection

Another issue which needs to be considered with respect to forward-looking termination rates is the effect that termination arrangements are likely to have on investment and network evolution in the context of IP developments.

Currently, the most noteworthy driver of change in networks is the convergence of the network, with a single integrated IP-based network delivering a combination of data, voice and video services. This evolution makes it possible for different underlying platforms (for example, fixed telecommunications and cable television) to offer equivalent services, potentially benefiting competition. This same evolution enables bundled offers of multiple services to the end-user, thus changing the character of competition.

Although migration to an IP network enables a direct decrease of network costs, in addition to increasing the economies of scope resulting from an ability to offer a wider range of services, in the transition to IP certain inefficiencies may occur. Such short-term inefficiencies, resulting from the operators' own policy, should not serve as a justification for higher termination rates even for a limited period. For some operators, high termination rates represent an important source of revenue. They may therefore perceive this evolution as a threat, and possibly resist the emergence of these new forms of interconnection since they may undermine the current charging mechanisms.

Generally, IP-based interconnection (data traffic) is currently implemented by a mixture of peering and transit⁵². With *peering*, two Internet Service Providers (ISPs) agree to exchange traffic solely among their respective customers, sometimes without payment; with *transit*, one ISP agrees to carry the traffic of a customer (possibly also an ISP) to third parties for a fee. These freely negotiated arrangements result in a globally interconnected Internet, and do not (in most cases) depend on any regulatory obligations.

If call termination fees remain at current levels, it might be that many mobile operators and some fixed operators might choose not to evolve their networks to IP-based interconnection. They might perceive the migration as a risk of losing termination revenues. This suggests that waiting for the migration to IP-based NGNs to be implemented by operators in the presence of high termination charges might be a self-defeating strategy.

Furthermore, even in the event of a move to IP-based interconnection of voice calls, the inevitable question remains as to whether interconnection of future NGNs should or could be based on the Internet economic model, on the switched network model, or some third model (possibly a blend of the two). In the presence of high termination rates, any spontaneous move from the existing charging mechanisms for voice traffic exchange seems unlikely. The conclusion must be that given the current level of termination rates, the evolution of IP interconnection is likely to be slower and that any transition to alternative charging mechanisms is likely to be significantly impeded.

⁵² Other IP interconnection arrangements exist, such as mutual transit, but they are less frequently used.

7. IMPLEMENTATION OF THE RECOMMENDATION

7.1. Transition Period

The transition to the Recommendation raises issues for all stakeholders. Article 16(1) of the Framework Directive states that NRAs shall carry out an analysis of the relevant markets as soon as possible after adoption of the Recommendation or any updating thereof. That implies that “as soon as possible” in Article 16(1) is interpreted as respecting regulatory measures that have already been notified and agreed.

A period of transition can therefore be anticipated to ease the transition from the NRAs' latest market reviews. Such a time period should, on the one hand, be long enough to allow regulators to put the cost model in place and for operators to adapt their business plans accordingly while, on the other hand, ensuring that consumers derive maximum benefits in terms of efficient cost-based termination rates. Such a period should be limited to 31 December 2012, as of which date the NRAs should ensure that the termination rates are implemented in accordance with this Recommendation.

7.2. Possible exceptions

It is essential to ensure that the key objectives of the Recommendation, i.e. providing greater consistency in the regulation of termination rates across the EU and setting termination rates at the level of efficient costs, are met. However, it is recognised that the requirement to develop a bottom-up LRIC model by 31 December 2012 may be viewed as challenging for certain regulatory authorities with fewer resources.

Therefore, in exceptional circumstances where an NRA is not in a position, in particular due to limited resources, to finalise the recommended cost model in a timely manner, an NRA might implement a methodology other than the recommended methodology (provided that this would result in outcomes consistent with the Recommendation and generate efficient outcomes consistent with a competitive market) for an additional interim period after the recommended methodology for setting termination rates has become applicable.

In view of the experience that will be accumulated by those NRAs implementing the recommended approach from 31 December 2012, an additional period up to 01 July 2014 is deemed sufficiently long for those less well-resourced NRAs to establish cost models in line with the recommended approach. It can be expected that NRAs will work together over this time period, within the body established for cooperation among the NRAs and in the context of its related working groups, with the larger NRAs sharing the benefits of their resources and expertise with the smaller, less well-resourced NRAs and assisting them in building a cost model which may be implemented after the conclusion of this interim phase. Where, however, it would be objectively disproportionate for those NRAs with limited resources to apply the recommended cost methodology after 01 July 2014 and it is not possible for the body established for cooperation among the NRAs and the Commission to provide sufficient practical support and guidance to overcome this limitation of resources and, in particular, the cost of implementing the recommended cost methodology,

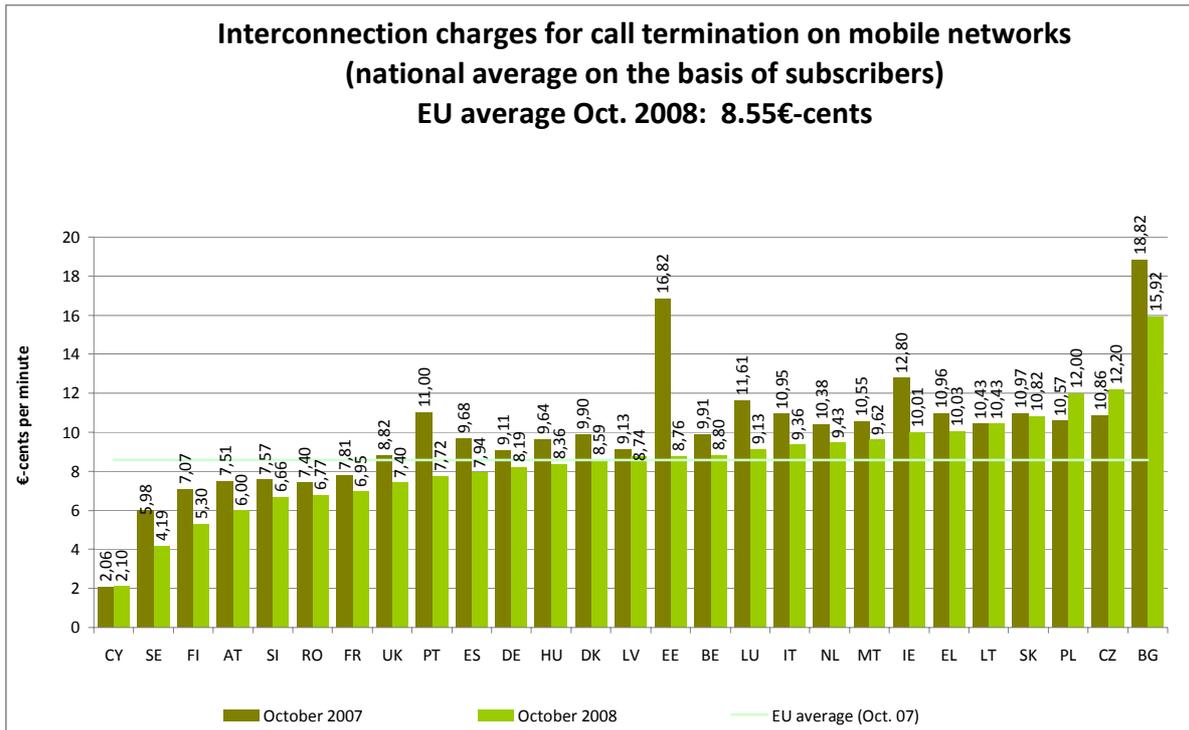
such NRAs may continue to apply an alternative methodology up to the date for review of the Recommendation.

As to alternative methodologies, benchmarking may, for example, be viewed as one possible mechanism for determining termination rates in the additional interim period. The most obvious benefit of benchmarking is its ease of implementation. Benchmarking can also have certain advantages in terms of promoting yardstick competition, e.g. frequently published international price comparisons can encourage countries to seek to improve their performance relative to their international peers. A potential disadvantage of this approach is that if inappropriate benchmarks are chosen that do not represent efficient cost-based estimates, distortions resulting from inconsistent and above-cost termination rates will persist. Furthermore, even where increased consistency is achieved via this approach, this may well be at an inefficient level.

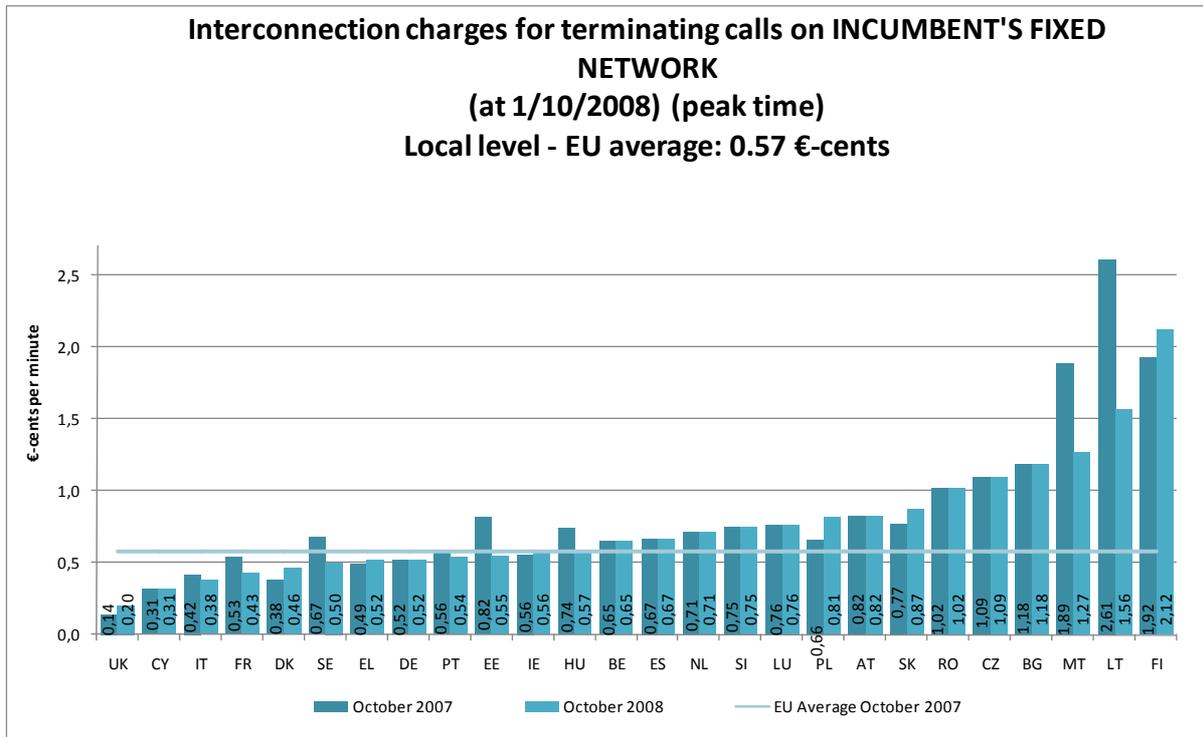
Against this background, it is essential that any benchmarking process has a strong efficiency underpinning. It is considered that this could be best achieved by limiting the circumstances under which benchmarking may be applied to only those situations where the costs of implementing the recommended cost methodology would clearly outweigh the benefits for the particular Member State and where the relevant benchmarks chosen are confined to those countries which have implemented the recommended costing approach. Such a guiding principle should help limit regulatory inconsistencies and ensure the selection of efficient benchmarks only.

To this end, NRAs should be able to demonstrate that any alternative methodology results in outcomes consistent with the Recommendation and generates efficient outcomes consistent with those in a competitive market. An outcome which is consistent with the Recommendation is one which does not exceed the average of the termination rates set by NRAs implementing the recommended cost methodology. During this additional interim period, this requirement would provide a sufficiently robust standard against which to test the results of any such alternative approaches.

ANNEX



Source: European Electronic Communications Regulation and Markets, 14th Progress Report

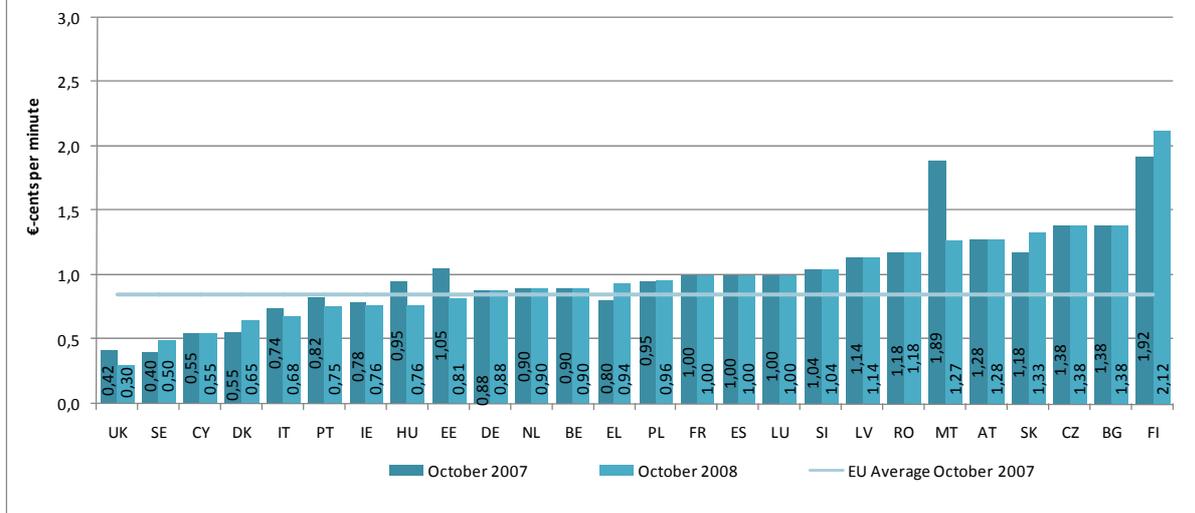


Source: European Electronic Communications Regulation and Markets, 14th Progress Report

Interconnection charges for terminating calls on INCUMBENT'S FIXED NETWORK

(at 1/10/2008)

Single transit - EU average: 0.86 €-cents



Source: European Electronic Communications Regulation and Markets, 14th Progress Report