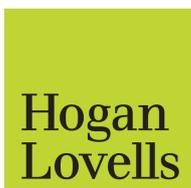


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STUDY ON THE FUTURE OF INTERCONNECTION CHARGING METHODS

Partnering with:



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1 Executive summary

This study has been undertaken for the European Commission by **TERA CONSULTANTS** in partnerships with **HOGAN LOVELLS**, with the support of a number of distinguished outside academic and technical experts. The opinions expressed in this Final Study Report are those of the authors and do not necessarily reflect the views of the European Commission.

The Commission's Recommendation of 7 May 2009 ("the Recommendation")¹ will improve the Current "Calling Party Network Pays" (CPNP) interconnection charging regime substantially.

The objective of this study on "The Future of interconnection charging methods" is to investigate whether there is a case to move beyond such an improved CPNP regime to a "Bill And Keep" (BAK) interconnection charging scheme given technological changes and market developments.

BAK is an interconnection charging scheme under which each network bears the costs of terminating traffic coming from other networks and there is no direct payment for the economic value associated with the termination provided at wholesale level. BAK is therefore not equivalent to an agreement between network operators to "net off" their termination fees, and pay only the resulting net sum.

When the Recommendation to improve CPNP is fully implemented, the market is likely to be very different from the current situation because:

- The improved CPNP regime will generate much of what is currently expected from a BAK regime, i.e. low and comparable termination rates between all networks, with costs recovered primarily at the retail level instead of at the wholesale level.
 - It will provide a closer approximation to the efficient economic costs expected to be incurred in electronic communications networks (large fixed costs and close to zero marginal costs).
 - In mobile markets, it will reduce or eliminate the scope for leading operators to leverage on-net preferential tariffs and will promote competition because operators will have to generate nearly all their revenue through their own end-users retail rates, rather than through higher than efficient Mobile Termination Rates.²

¹ Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile termination rates in the EU", C(2009) 3359:
http://ec.europa.eu/information_society/policy/ecommlibrary/recomm_guidelines/index_en.htm

² There will remain a "strategic" motive for mobile operators for mobile-to-mobile calls or for fixed operators for fixed-to-fixed calls – though at a lesser degree – to set off-net prices higher than on-net prices in order to reduce the number of calls received by subscribers on rival networks, thus reducing the rival network's ability to compete. This "strategic" motive is much stronger for large networks than for small networks,

- In fixed markets, it will remove cross subsidies between fixed and mobile services, leading to a reduction in fixed to mobile retail tariffs, higher fixed to mobile call volumes and the inclusion of fixed to mobile calls in flat rate call packages.
- It will facilitate efficient fixed to mobile convergence by removing artificial commercial barriers.
- Networks will migrate to IP technology. Next Generation Networks (“NGN”) will be multi-service networks, rather than service specific networks, offering audio (including voice), video (including TV-services) and Internet access. The migration to NGN, however:
 - Will not remove the termination monopoly in the voice service, but it will reduce significantly the costs of the voice services and reduce the number of Points of Interconnection needed for efficient operation.
 - Will not lead to a convergence with Internet since the NGN and Internet are organised totally differently. The NGN is designed as “PSTN on IP” and does not benefit from some of the design features that are central to the Internet. Such an NGN design is largely the result of the voluntary behaviour by the fixed/mobile operators, which appears to be the continuation of a behaviour that was appropriate in the past.³
 - Will not necessarily make BAK more likely than the improved CPNP.
- The market focus will also change, because both fixed and mobile markets are already well developed in Europe and the adoption of broadband is well underway for fixed networks and at a low, but accelerating, level for mobile networks.
 - The focus of competition in fixed services will shift from voice to bundles of services offered by broadband providers at flat rate tariffs (e.g. dual and triple play).
 - Although there is some uncertainty about how mobile operators will address the issue of Internet and TV usage, and in particular whether flat rates for these services are supportable in the light of usage patterns, flat rate packages for calls will become increasingly common especially for post-paid subscribers.

because they are more capable of reducing the utility of a smaller network’s subscribers than vice versa. However given the knowledge and experience gathered so far by both Regulatory and Competition authorities with potential anticompetitive on-net / off-net practices, we are of the view that there is a weak case for such a “strategy” by operators when the Recommendation of 7 May 2009 will be fully implemented.

³ However it is beyond the scope of this Study to assess the benefits in terms of consumer, competition or investment and innovation of having diverse design solutions such as NGN and Internet.

- If competition is driving retail prices for voice to flat rates as part of global triple- or quadruple play tariffs – and this becomes the “dominant” business model – , BAK arrangements could become more likely because:
 - The costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service.
 - The potential for arbitrage by operators having highly specific traffic flows – because they focus on particular customer groups such as high users – is not considered a significant threat anymore.

Termination fees for the voice service under the improved CPNP are expected to fall to a low level of around 1 €-cent per minute (based on estimates released by some National Regulatory Authorities).

The historical approach to termination rates in Europe has not matched the concept of cost-based CPNP in the economic literature, because the rates have been considerably higher than underlying costs (so called “CPNP with access mark-ups” in the economic literature). The move to “pure” LRIC will bring the European interconnection charging scheme into line with the concept of cost-based CPNP in the economic literature.⁴

When the Recommendation of 7 May 2009 will be fully implemented, the interconnection charging scheme will be based on the “pure” incremental cost of voice call termination (“pure” LRIC), with the incremental cost of voice call termination approaching zero. This improved CPNP will then become a valid approximation to the cost-based CPNP of the economic literature.

We have considered a “reference world” with the following characteristics:

- Calling Party Pays (“CPP”) as a charging scheme at retail level;
- Symmetry in network costs, and also in traffic flows;
- Linear retail prices (i.e. only pure per-minute prices);

⁴ When commenting on the draft final study (see Annex for the list of consultation questions), respondents expressed concern on how effectively the cost models developed by National Regulatory Authorities to implement the Recommendation of 7 May 2009 will properly compute pure-LRIC costs for Fixed and Mobile Termination and on whether or not National Regulatory Authorities will set Fixed and Mobile Termination Rates at their pure-LRIC cost level. It may therefore prove appropriate for the Commission to closely monitor the implementation of the Recommendation of 7 May 2009 as a mean to ensure that is properly and consistently implemented throughout the Member States. We observe in this respect that BEREC (2010, p. 24) underlines that “a regulator (...) faces information problems regarding the determination of the regulated price. Not all information necessary for setting the efficient price is available for the regulator who is dependent on operators that do not have incentives to provide the correct information”.

- No on-net⁵ discounting in retail prices;
- Assignment of all the benefits from the calls to the calling party.

For this “reference world”, which corresponds to standard models in the economic literature, in particular Laffont, Rey and Tirole (1998a) and Armstrong (1998), it has been shown that BAK is more efficient than cost-based CPNP, because it leads to lower retail tariffs for consumers (because the interconnection charge to be paid under cost-based CPNP for off-net calls tends to set a floor for retail tariffs) and can be expected to increase the incentives to innovate and invest in quality of service, when investment in one network does not largely impact the quality of service of other networks.

When the Recommendation of 7 May 2009 will be fully implemented, assuming that the charging scheme at retail level remains Calling Party Pays (“CPP”), the “real world” in the future will more closely resemble the “reference world”, because network traffic and associated wholesale payments will exhibit more symmetry, and the potential for operators to engage into on-net/off-net differentiation will be more limited.

However we expect that some of the assumptions of the “reference world” will still not hold:

- A deviation from pure usage-based prices to implicit two-part prices (i.e. a combination of a subscription fee and of a usage-based price) or flat-rates for at retail level.⁶
- A deviation to allow for call externality, where both sender and receiver get some of the value of the voice call, noting that it remains largely impossible to observe directly and measure the size of the call externality and whether or not it is internalized by people in stable calling relationships (whereby sender and receiver take alternatively the initiative to place the call so as to share the associated costs between them).

BAK remains nonetheless slightly superior to cost-based CPNP in such a “real world” if the sender and the receiver have broadly similar benefits from the call (noting that it remains largely impossible to directly observe and measure these benefits). However, with the incremental cost of voice call termination approaching zero, economic theory tends to show that the difference between BAK and cost-based CPNP becomes negligible in practice and more attention should therefore be paid to the regulatory costs of fine-tuning the tariff- and non-tariff aspects of interconnection regulations.

⁵ Off-net calls originate and terminate on different networks. By contrast on-net calls originate and terminate on the same network.

⁶ We acknowledge that Laffont, Rey and Tirole (1998a) have also extensively analysed two-part prices.

BAK is superior to cost-based CPNP in the “reference world” used in economic theory pursuant to the seminal work by Laffont, Rey and Tirole (1998a) and Armstrong (1998).

BAK remains slightly superior to cost-based CPNP in the “real world” in the future when the Recommendation of 7 May 2009 will be fully implemented if the sender and the receiver have broadly similar benefits from the call (noting that it remains largely impossible to directly observe and measure these benefits).

However, with the incremental cost of voice call termination approaching zero, economic theory tends to show that the difference between cost-based CPNP and BAK becomes negligible in practice and more attention should therefore be paid to the regulatory costs of fine-tuning the tariff- and non-tariff aspects of interconnection regulations.

It is often argued that BAK will significantly reduce regulatory costs by eliminating the need for cost models to set cost-oriented termination rates for the voice service and will decrease the regulatory uncertainty about the future level of interconnection charges. BAK should also reduce or eliminate the need for other interconnection related regulations.

Whilst it is true that BAK will decrease the regulatory uncertainty about the future level of interconnection charges as the price level of termination is always zero, BAK, however, will not eliminate the need for cost models in regulatory areas other than call termination, as long as there is an obligation pertaining to call origination because:

- Cost models will be needed to set the call origination charges for carrier selection and pre-selection (CPS), where this remedy is continued for fixed incumbent operators also in the case of broadband access origination.⁷ CPS still accounts for a significant share of the access market in some European countries although the share is reducing because of local loop unbundling. Since carrier selection operators use the access networks for both call origination and for call termination, there would be a need to review and increase charges for call origination if payments for call termination cease under BAK.⁸ Thus cost models will still be needed.
- Call origination charges also need to be set for calls to freephone and premium rate services, and if BAK is adopted for call termination then these charges can no

⁷ Under the current CPNP, the same charge levels are generally used for both call termination and for call origination since (broadly speaking) the same network elements were involved albeit with the calls flowing in different directions. Now that call termination rates are based on the improved CPNP, call origination charges will need to be recalculated anyway even if BAK is not introduced since the methodology set by the Recommendation for call termination is not necessarily appropriate for call origination.

⁸ See ERG (09) 34, p. 46-47. ERG (09) 34 recommends to address this issue by applying a mark-up on the originating tariff paid by CPS operators to originating fixed incumbent networks, so as to keep the net cash flow between the fixed incumbents, the CPS operators and other fixed and mobile operators on which the call can be terminated. So there is still a need to compute a cost-based originating tariff.

longer be set at the same level as call termination (Premium rate services commonly use the call origination model, where the originating operator charges the retail tariff to his customers, withholds an originating charge and passes the remainder to the terminating operator which has the relationship with the service / content provider). ERG has taken this into account.⁹ Again cost models are needed.

Neither will BAK eliminate the need for other interconnection related regulations in the future. The need may even increase since it will no longer be possible to influence the behaviour of operators of electronic communications networks by economic signals based on termination rates. The following are some of the new issues that may need to be addressed by National Regulatory Authorities as a result of the evolution from legacy networks to NGN networks:

- The definition of the boundary (meaning the number and geographic locations of the Points of Interconnection) at which the lowest termination fee under CPNP or BAK applies given the different structure and design trade-offs of fixed NGN and mobile NGN networks;
- The reduction in the number of interconnection points and the treatment of stranded assets;
- The formula for prioritising traffic, if different traffic types that need different Quality of Service levels are intermingled at the Points of Interconnection to create appropriate incentives to invest in higher Quality of Service;
- The dimensioning of the transport capacity at Points of Interconnection in order to provide sufficient interconnection capacity for incoming calls and hereby avoid discrimination in Quality of Service between off-net and on-net calls.

Finally there is a concern that if BAK leads to a reduction in retail tariffs, then this reduction may in turn lead to an increase in the volume of unsolicited calls. The main source for such unsolicited calls is call centres or calling platforms, since unsolicited automatic machine calling is not allowed under European Law. This problem, however, already exists under the current CPNP scheme, as exemplified by the Netherlands, and has been addressed by issuing appropriate consumer protection measures.¹⁰ Although unsolicited calls are facilitated directly by low retail prices (not wholesale prices), the improved CPNP scheme will reduce termination rates significantly and may increase the problem through lowering retail tariffs further. The effect may be limited if the costs of the voice calls are negligible compared to the cost of labour for call centres or calling platforms. The additional volume of unsolicited calls, e.g. in the form of SPIT (SPAM over Internet Telephony), produced by a move from the improved CPNP to BAK should be very small.

⁹ See ERG (09) 34, p. 33.

¹⁰ See ERG (09) 34, p. 34.

BAK will reduce the regulatory uncertainty about the future level of termination charges or price caps and will to some extent reduce regulatory costs for interconnection tariff regulation (as cost models for setting cost-based CPNP will no longer be required), but it will not eliminate these regulatory costs for other interconnection regulations.

In case of a move from cost-based CPNP to BAK at the wholesale level, a move from CPP to Receiving Party Pays (RPP) at the retail level could become more probable. This change of charging scheme at the retail level from CPP to RPP would lead to additional efficiency gains because it would effectively take into account and internalize the call externality. These additional efficiency gains are most significant if callers and receivers have the same benefit from a call.

However in debates and consultations on call termination, it is generally argued that introducing RPP at the retail level would be a major change in retail pricing in Europe, would be disruptive and would most probably not be welcomed by most customers. There would also be costs to operators associated with changing the billing systems. In those circumstances it is unlikely that an operator would introduce RPP tariffs at the retail level.

When combined with a move from CPP to RPP at the retail level, BAK could lead to additional efficiency gains because it would effectively take into account and internalize the call externality. These additional efficiency gains are most significant if callers and receivers have the same benefit from a call.

However in debates and consultations on call termination, it is generally argued that it is unlikely that an operator would introduce RPP tariffs at retail level in Europe.

Overall, the empirical economic literature, which focuses on the relative merits of “CPNP with access mark-ups + CPP” vs. “BAK + RPP” in terms of impact on consumers, is struggling with the problem of generating a data set without bias and with sufficient focus. Its results have to be taken with caution because the impacts of a change of charging scheme at the wholesale level should be logically separated from the impacts of a change of charging scheme at retail level.

However, several recent studies show that, when the penetration of the mobile service is high, it is the level of MTRs that becomes crucial for consumer welfare as lower MTRs result in higher mobile usages in term of minutes of use per month per subscription.

These empirical results have nevertheless little relevance in the future for the debate between cost-based CPNP vs. BAK because, when the Recommendation of 7 May 2009 will be fully implemented, the most significant decrease in MTRs will have been achieved by the move from the current CPNP with access mark-ups to the “pure” LRIC cost-based CPNP. The additional decrease in MTRs to be obtained from a subsequent move to BAK (where the MTRs will be effectively set at zero) will be much smaller.

Many people claim that “CPNP with access mark-ups + CPP” has been better than “BAK + RPP” for mobile penetration in the early growth phase of the mobile market, possibly due to the cross subsidy from fixed to mobile. However, given that the market is saturated, these empirical results have little relevance for the future — when the Recommendation of 7 May 2009 will be fully implemented, nearly all consumers will have a subscription to a mobile network.

When the Recommendation of 7 May 2009 will be fully implemented, much of the benefits expected from BAK will already have been achieved by the move to “pure” LRIC cost-based CPNP, because the incremental cost of voice call termination is relatively low.

The Final Study Report includes short case studies of changes or attempted changes to interconnection pricing schemes. These case studies corroborate some of the results of the theoretical analysis. These results include the benefits that accrue from BAK in terms of usage and of price levels but also of the reduced ability to engage into discriminatory on-net/off-net pricing at retail level (see experience in France with BAK for mobile-to-mobile interconnection). These case studies also clearly point out that the coexistence of alternative interconnection regimes for different types of calls often generates arbitrage opportunities, that in turn require significant regulatory involvement (see experience in France, New Zealand and the USA).

BAK has not been mandated by regulators so far in any country reviewed under this study, although some countries have had a voluntary and limited (e.g. for mobile-to-mobile calls in France, for local-to-local calls in New Zealand and in the USA) BAK regime for a number of years where traffic flows could be assumed to be, at least in principle, balanced.

In summary, taking account of theoretical and empirical economic literature as well as the short case studies, we conclude that there is only a weak case to mandate BAK instead of improved “pure” LRIC cost-based CPNP¹¹ in Europe, given the expected impact of the Recommendation of 7 May 2009.

Furthermore, under today’s European regulatory framework it appears to us difficult for an NRA to impose BAK.

If the NRA wished to impose BAK on all Significant Market Power (“SMP”) operators in the context of a market analysis and finding of SMP on the markets for call termination on individual networks, the measure could be challenged as inconsistent with Article 13 of the Access Directive. Article 13 of the Access Directive does not allow in our view a price control remedy to be imposed that is more severe than cost-orientation. BAK, to the extent

¹¹ However, it is still an open question whether the most appropriate CPNP interconnection scheme for the future should use capacity-based pricing or volume-based pricing (as currently implemented in most European countries).

it requires an operator to provide an interconnection service for 0 euro, could be challenged as not being a cost-orientation measure.¹² Being a price control remedy falling outside of the scope of Article 13, BAK would have to be specifically authorized by the European Commission under Article 8(3) of the Access Directive. Where traffic is roughly balanced, the imposition of BAK would not violate Article 13 because the arrangement would be the economic equivalent to reciprocal termination rates with net set-off. The issue only arises for traffic imbalances, because the SMP operator terminating the excess traffic would in effect have to provide the service for nothing, which is inconsistent with the concept of cost-orientation.

We also considered whether under the current regulatory framework the European Commission could issue a recommendation regarding BAK under Article 19(1) of the Framework Directive. If the hypothetical starting point for our analysis is a situation where NRAs have already implemented the Recommendation of 7 May 2009, it would seem difficult to justify another Commission recommendation calling for an evolution from a pure-LRIC termination rate model to BAK. To justify its action under Article 19(1) of the Framework Directive, the Commission would have to show that the measure is needed because of diverging implementation of the regulatory framework in Member States, which in the hypothetical case before us would not be the case. The Commission, as well as any NRA willing to impose BAK, would also have to show that the measure is proportionate. This would require a showing that BAK, as compared to a situation where all termination rates are set as pure-LRIC levels in accordance with the Commission's 2009 Recommendation, would bring significantly more benefits in terms of achieving the objectives of Article 8 of the Framework Directive than would the status quo of pure-LRIC rates.

Article 5 of the Access Directive permits NRAs to impose remedies on both SMP and non-SMP operators. The exact scope of Article 5 is the subject of debate. However, our reading of Article 5 in conjunction with Article 8 of the Access Directive suggests that Article 5 cannot be used as a substitute for Articles 8 and 13 of the Access Directive, and consequently Article 5 is not a route that would permit an NRA to impose BAK. We consider that the use of Article 5 by the Romanian NRA to regulate the call termination market is a questionable use of that article. But the Romanian case may have been justified by the need to provide immediate connectivity in a situation where there had not yet been a market analysis and finding of SMP on the Romanian market for call termination.

Individual dispute resolution provides another possible route for an NRA to impose BAK. As noted above, where traffic flows are roughly balanced, the imposition of BAK would not violate Article 13 of the Access Directive because the situation in that case would be equivalent to reciprocal termination rates, i.e. not true BAK but a form of set-off. However,

¹² Arguments exist that a 0 euro termination rate would still be cost-oriented and therefore consistent with Article 13, because costs would be recovered through other services. This interpretation, while reasonable, is in our view relatively fragile and could be subject to challenge.

any decision made by an NRA in a dispute resolution under Article 20 of the Framework Directive must be consistent with the remedies imposed by the NRA in the context of the market analysis process. It would be possible today for an NRA to include a remedy in its market analysis document providing that an SMP operator shall not unreasonably refuse to enter into quasi-BAK set-off arrangements where traffic flows are balanced and provided the arrangement would not create competitive distortions on the market. This is a possible option but would in practice be effective only at such time as termination rates are set at pure-LRIC levels. As long as termination rates remain above pure-LRIC levels, individual quasi-BAK set-off arrangements are likely to give rise to competitive distortions similar to those encountered for low on-net retail pricing. The NRA would not be in a position to impose quasi-BAK arrangements in an individual dispute resolution proceeding as long as those competitive distortions exist. However, once fixed and mobile rates are symmetrical and set a pure-LRIC level, an NRA might in appropriate cases impose a quasi BAK set-off arrangement pursuant to an individual dispute resolution proceeding, at least when traffic volumes are balanced. Doing so would not conflict with Article 13 of the Access Directive because of the balanced traffic, and "set-off" nature of the measure, which contrasts with a pure BAK situation where one of the two operators would have to sell a service for nothing when traffic is imbalanced.

In summary, it appears to us also difficult for an NRA to impose BAK under today's European regulatory framework.

In the future two or more fixed and/or mobile operators may nevertheless decide to implement BAK between them and on a voluntary basis even if they maintain CPP at the retail level.¹³ This could theoretically happen already under the current CPNP framework, if two or more operators would decide to set their termination fee at zero. Voluntary BAK arrangements would be however more likely in the future if:

- competition drives retail prices to flat rates as part of global triple- or quadruple-play tariffs;
- the costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service;
- the potential for arbitrage by operators having highly specific traffic flows - because they focus on particular customer groups such as high users- is not considered as a significant threat anymore.

There is no prohibition in the European directives themselves to voluntary BAK arrangements. We are of the view that such voluntary BAK would not violate non-discrimination obligations as long as the SMP operator is willing to enter into BAK agreements with other similarly situated operators. However, NRAs would have to pay

¹³ As it has been the case with French mobile operators throughout the period till 2005 when BAK was in place for mobile-to-mobile calls.

particular attention to possible competitive distortions, should voluntary BAK arrangements be implemented by operators before termination tariffs have reached pure-LRIC levels.

BAK could then potentially be imposed on a uniform basis throughout Europe through a regulation based on Article 114 TFEU.¹⁴ However, based on the European Court of Justice's recent decision on the EU Roaming Regulation, we are not sure that all the conditions of Article 114 TFEU would be satisfied. The most obvious route for permitting NRAs to impose BAK would be to amend Article 13 of the Access Directive to add pure BAK as a permitted form of price control that an NRA may impose in appropriate cases to further the objectives of Article 8 of the Framework Directive. In an environment where termination rates are set at pure-LRIC, the coexistence of BAK and CPNP should not in theory create significant competitive distortions or internal market problems. The example of the United States suggests that where termination rates are low enough, BAK and CPNP can coexist with low market distortions. If distortions were to exist the Commission could at that point issue a recommendation indicating how NRAs should apply the BAK remedy, or if internal market distortions were at that time considered serious, the Community legislature could adopt a regulation under Article 114 TFEU. In such a case, the Community legislature would have to establish appropriate charging methods for traffic terminated in the European Union that has been originated by operators located outside the European Union in order to avoid possible arbitrage problem with such “non EU” international incoming traffic.¹⁵

Finally, should the generalisation of BAK reduce or eliminate the terminating network monopoly, this could also lead to a reduction or even elimination of ex ante regulation, consistent with one of the key objectives of the Framework Directive. However the elimination of the termination network monopoly will also have the side effect of eliminating the ability to find SMP and impose remedies based on Articles 8 through 13(a) of the Access Directive. The NRA's sole tool in that case would be Article 5 of the Access Directive, which may not be sufficient to deal with all situations.

There is no prohibition in the European directives themselves to voluntary BAK arrangements. However, as long as the charge for termination exceeds the pure-LRIC level, there will be a risk of competitive distortions each time two or more fixed and/or mobile operators voluntarily enter into a BAK arrangement, and the NRA would have therefore to demonstrate in any related decision that this risk has been addressed.

In the future, i.e. once termination charges will have reached pure-LRIC levels, the risk of competitive distortions should drop significantly and voluntary BAK

¹⁴ Treaty on the Functioning of the European Union

¹⁵ Defining such rules is outside the scope of this Study.

arrangements could even be more likely, even if CPP is maintained at the retail level, if:

- competition drives retail prices to flat rates as part of global triple- or quadruple-play tariffs;*
- the costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service;*
- the potential for arbitrage by operators having highly specific traffic flows - because they focus on particular customer groups such as high users- is not considered as a significant threat anymore when termination rates are above pure-LRIC.*

Should voluntary BAK develop in most Member States, the most natural way to introduce BAK at European level would be through an amendment to Article 13 of the Access Directive, which would allow NRAs to impose BAK in appropriate cases. If complete harmonisation were deemed necessary, this could be done via a Regulation. In such a case, the risk of arbitrage for traffic terminated in the European Union that has been originated by operators located outside the European Union would need to be assessed and, if required, appropriate charging methods for “non EU” international incoming traffic would need to be established.

2 Introduction

This is the Final Study Report of a consulting study on “The Future of interconnection charging methods” which has been undertaken for the European Commission by **TERA CONSULTANTS** in partnerships with **HOGAN LOVELLS**, with the support of a number of distinguished outside academic and technical experts (Dr. Paul DE BIJL from the CPB Netherlands Bureau for Economic Policy Analysis, Prof. Edmond BARANES from the University of Montpellier I, and John HORROCKS from Horrocks Technology Ltd). The opinions expressed in this Final Study Report are those of the authors and do not necessarily reflect the views of the European Commission.

The widespread availability of affordable and secure fixed and mobile broadband communications networks across the European Union (EU) for the delivery of seamless voice, data and content services and applications is a key condition for realising the growth and job-creation potential of the EU, an objective which lies at the heart of the Lisbon strategy.

Electronic communications are the "enabling technologies" underpinning innovation and creativity in their own and other sectors and are responsible for a large share of the growth in productivity in the European economies. In the current economic downturn, the role of electronic communications is even more significant as their wider diffusion and use can mitigate the impact of the worsening economic conditions.

The EU regulatory framework for electronic communications is the main instrument to achieve this overarching objective. As part of this comprehensive set of rules, regulatory provisions on network interconnection play a pivotal role by, on the one hand, setting out the rights and conditions for the establishment of a physical and logical linking between public telecoms networks with a view to ensuring interoperability of services throughout the EU, and on the other hand by enabling the development of competition in a sector formerly controlled by public monopolies.

The regulatory provisions on interconnection, initially in the form of “Open Network Provisions” (ONP) under the 1998 EC regulatory framework, are now contained in Directive 2002/19/EC (Access Directive) of the EU regulatory framework, and apply to all public network infrastructures, with no distinction in terms of platforms, network architectures and underlying technologies.

However, according to the terms of reference of the study, under the impact of technological change and market development, notably through the convergence of networks using the Internet Protocol (IP), also called next generation networks (NGN), the interconnection regimes and associated regulatory obligations – which have mostly been applied to traditional circuit-switched networks, are increasingly being challenged.

The Commission published in February 2008 a study which analyses both traditional interconnection models (e.g. PSTN, mobile) and IP interconnection models (e.g. Internet,

mobile), that are used in Europe and other parts of the world, and provides a forward-looking analysis of IP interconnection regimes in the light of developments in both the traditional telecommunications and Internet environment¹⁶.

Another key feature of interconnection regimes in Europe is the presence of a bottleneck on network termination for voice calls, by which a receiving operator completely controls the delivery of traffic that is destined for his receiving subscribers. Where termination rates are set above efficient costs, as this has been mostly the case in Europe, it has given rise to significant transfers between fixed and mobile markets and consumers. In addition, there are in Europe significant divergences in national regulatory treatments of fixed and mobile termination rates. Taken together, these elements have resulted in the creation of fundamental competitive distortions which harm consumers and hinder investment and innovation.

To address this situation, the Commission adopted on 7 May 2009 a **Recommendation**¹⁷ whose objectives are to **ensure harmonisation of the regulatory treatment of termination rates across Europe and to eliminate excessive pricing**, by setting out clear guidance for EU telecoms regulators on the cost-based method to be used. The proposed approach should lead to substantial reductions in termination rates.

The above-mentioned technological changes and market developments combined with a significant reduction of termination rates might create incentives for operators to enter into new inter-operator agreements, in particular 'Bill and Keep' (BAK) by which traffic is exchanged without financial settlements taking place because there is no longer an economic value associated to the termination of calls as opposed to the existing "Calling Party Network Pays" (CPNP).

This issue was raised in Council working group during the discussions which took place in the context of the reform of the EU regulatory framework for electronic communications networks and services during 2008 and the first half of 2009. While the group concluded that it was premature to amend the relevant regulatory provisions at this point in time, the debate was a clear signal for further work to be carried out in this area.

Worthwhile to be mentioned in this respect is the **ERG Common Statement on Regulatory Principles of IP-IC/NGN Core – a work program towards a Common Position** (ERG (08) 26 final NGN IP-IC CS 081016) which analysed different charging mechanisms (CPNP/Bill & Keep) as a core element of an interconnection regime for termination services and presented a work plan for further study. In accordance with this work plan for further study, the ERG released for public consultation in October 2009 an

¹⁶ The Future of IP Interconnection: Technical, Economic and Public Policy Aspects, WIK Consult, February 2008, available at: http://ec.europa.eu/information_society/policy/ecommlibrary/ext_studies/index_en.htm#2008

¹⁷ Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile termination rates in the EU", C(2009) 3359: http://ec.europa.eu/information_society/policy/ecommlibrary/recomm_guidelines/index_en.htm

ERG DRAFT Common Position on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues (ERG (09) 34) concluding that “BAK is more promising than CPNP as a regulatory regime for termination for the long term and based on national circumstances (including legal issues) NRAs should set a glide path to BAK within the regulatory period related to the next market analysis they carry out for voice termination. However, for the short and medium term, CPNP can also be an appropriate choice based on national circumstances, so NRAs can also continue the CPNP at least in the next regulatory period”.¹⁸ Pursuant to this consultation, the BEREC¹⁹ released in June 2010 its **Common Statement (“CS”) on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues (BoR (10) 24 Rev 1)**.

²⁰ BEREC considers “BAK more promising than CPNP as a regulatory regime for (voice) termination in the long term. Strict application of cost orientation in the current CPNP environment in the short/medium term for mobile and fixed networks, particularly bringing down mobile termination rates to efficient cost levels, is a major step towards BAK representing the level effect as identified in this CS.²¹ While the economic analysis of this CS suggests that in the long run BAK is the preferred option, NRAs final conclusions depend on the country specific evidence and facts and particularly on an assessment of the system effects mentioned above. Therefore, the outcome of this assessment could vary between Member States. Of course any regime shift generally creates uncertainties, but convergence towards multi-service IP-networks requires adjustment of all elements of the interconnection regime (e.g. location/number of interconnection points) including future charging mechanisms. NRAs would need to carefully manage the transition process taking account of national circumstances including legal issues”.²²

The structure of this Final Study Report is as follows.

¹⁸ See ERG (09) 34, p. 9-10.

¹⁹ The Body of European Regulators for Electronic Communications (BEREC) was created within the recently approved reform of the EU Telecom rules to improve consistency of the EU regulatory framework. BEREC replaces the European Regulators Group (ERG) through which National Regulatory Authorities (NRAs) exchanged expertise and best practice and gave opinions on the functioning of the telecoms market in the EU.

²⁰ BEREC Common Statement on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues, June 2010, BoR (10) 24 Rev 1/.

²¹ In order to clearly identify and assess the properties of BAK it may sometimes be helpful to distinguish between the level effect and the system effect. The level effect refers to the impact of a decrease from a higher to a lower level of termination rates while maintaining a CPNP charging mechanism (with a termination rate > 0). For example the level effect covers how a reduction in termination rates affects usage. The system effect results from a change of the charging mechanism, i.e. shifting from CPNP to BAK and thereby effectively eliminating termination rates. In many cases, the level and the system effect work in the same direction but clearly there are differences that will persist even with very low per minute termination rates. If the expected decrease in regulated prices (or price caps) for wholesale termination under the current CPNP regime materialises (either because of technological developments, cost reductions, the implementation of “pure” LRIC or both), the difference between CPNP and BAK, in terms of effects, will become less prominent which may pave the way for a regime change. However a difference between the two methods will persist in the medium run and there will remain system effects. (See BoR (10) 24 Rev 1/, p. 2).

²² See BoR (10) 24 Rev 1/, p. 6-7.

Chapter 3 provides a brief overview of the reasons why it was deemed necessary in Europe to regulate the market for termination of voice calls on individual fixed and mobile networks as well as of the main interconnection charging methods and associated financial settlement mechanisms in Europe.

Chapter 4 assesses as forward-looking the likelihood of a transition towards BAK considering technological and market trends as well as the expected impact of the Recommendation of 7 May 2009.

Chapter 5 reviews empirical evidences of BAK compared to CPNP by surveying empirical economic literature.

Chapter 6 delves into the assessment of the merits and demerits from BAK compared with cost-based CPNP from an exhaustive analysis of the economic literature.

Chapter 7 analyses some selected short case studies of changes or attempted changes of the interconnection pricing scheme from or to BAK.

Chapter 8 provides a preliminary assessment of the magnitude of the potential regulatory burden associated with overseeing any (voluntary or mandated) move to a BAK system, both at national and Community level.

Finally, Chapter 9 concludes on whether a change from CPNP to BAK is likely to bring overall more benefit to the European Union than to remain with the existing (albeit improved) CPNP as per the Recommendation of 7 May 2009.

3 Overview of the main interconnection charging methods and associated financial settlement mechanisms in Europe

Under the existing European regulatory framework, interconnection is the physical and logical linking of public telecommunications networks used by the same or a different undertaking in order to allow the users of one undertaking to communicate with users of the same or another undertaking.²³

When considering such an interconnection for the voice service, and given a contractually specified network performance to be offered to each other by interconnected operators, the following issues are of relevance for the interconnection charging scheme and have to be defined:

- the charging mechanism used for the termination fee, which encompasses level and structure²⁴ of the termination fee should the latter not be set at zero, as in the case of BAK;
- the set and geographic locations of Points of Interconnection (Pols) of the terminating network from where the termination fees are applicable²⁵, which encompasses the number and geographic location of these interconnection points. If an operator does not interconnect to all these Pols, then he cannot benefit from the lowest possible termination fee under CPNP (e.g. the “local interconnect level” for termination on fixed networks) or from BAK²⁶;
- ancillary services required to establish physically the interconnection path between networks (e.g. co-location services, interconnect link services...). These ancillary services are required to physically establish the interconnection, and are not affected by the choice of the interconnection charging scheme of the traffic (CPNP or BAK).

Before providing an overview of the main interconnection charging methods and associated financial settlement mechanisms in Europe, it is useful to briefly review the reasons why it was deemed necessary in Europe to regulate the market for termination of voice calls on individual fixed and mobile networks.

²³ Definition based on Art. 2b Access Directive. Also used in ERG DRAFT Common Position on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues, ERG (09) 34, October 2009, p. 14.

²⁴ What is the accounting unit (minutes, capacity...)? Are termination fees geographically averaged? Do they distinguish between call set up and per minute charge? Is there a time of day / day of week differentiation (“peak-load” pricing)?

²⁵ This is what the ERG calls the “boundary” (ERG (09) 34, p. 18-20).

²⁶ In such a circumstance, he has to rely on the services of a network operator active in the transit market, which is generally considered as a transit market is sufficiently competitive.

3.1 Regulatory approach applicable to voice termination in Europe

We will first review the reasons why it was deemed necessary in Europe to regulate the market for termination of voice calls on individual fixed and mobile networks. We will then contrast this regulatory approach to the one applicable to Internet traffic exchange, and show that they are fundamentally different.

3.1.1 The regulation of voice call termination

CPNP is the prevailing approach for fixed and mobile interconnection charges in Europe. However there was no legal or regulatory obligation for this approach; neither ITU nor CEPT recommendations on tariff principles required in CPNP Europe. Instead, the approach grew out of the historic mode of charging used in European fixed telephony markets.²⁷ The ability of a terminating operator to impose CPNP on another interconnecting operator creates the conditions necessary for the terminating operator to hold SMP, which in turn forms the basis for regulating termination rates in Europe. CPNP is implicit in the negotiation of international accounting rates, and in dozens, if not hundreds, of regulatory decisions rendered over the last fifteen years on the interconnection of networks in Europe. **Yet CPNP itself, which consists of the assumption that the calling party and his network that are the economic beneficiaries of a telephone call, is not itself a regulatory requirement imposed by any directive or international treaty.**

3.1.1.1 Definition of relevant markets and substitutability test

The cornerstone for regulating voice termination on individual networks in Europe is the theory that each network constitutes a separate market and that consequently each network operator holds a monopoly on the market of terminating voice calls on its own network.

The conclusion that each operator constitutes a separate market flows from the classic substitutability test, i.e. if there is a small but significant non-transitory increase in price for the service of voice call termination on one network, can the purchaser turn to another network to obtain an equivalent service? If the answer to this question is yes, the alternative network or service should be part of the same market as the first network or service. If the answer is no, then the two networks or services represent different markets.

Regulators in Europe have concluded that there is no substitution between the voice termination services offered on one network and those offered on another network. In the event of a small but significant increase in price for call termination services on network A,

²⁷ The UK's Ofcom referred to CPP (the retail equivalent of wholesale CPNP) as the outgrowth of a "familiar and well-established charging structure." (See Competition Commission 2009, p. 329).

it will not be possible to use the services of network B or C to terminate the call. Only network A can terminate a call toward its own subscribers. There is no other way to reach a subscriber on A's network.

Consequently there exist distinct call termination markets for each network operator.

3.1.1.2 Finding of SMP and countervailing buying power

Once it has been determined that each network operator represents a separate market for the services of terminating voice traffic toward its own subscribers, it is necessary then to determine whether each of these operators holds significant market power or "SMP". SMP means that the relevant operator can behave independently of its competitors and ultimately of consumers. In other words, an SMP operator is immune from the normal forces of the market and can extract monopoly rents without suffering adverse consequences in the market.

European regulators have almost unanimously found that individual operators, regardless of their size, are under little or no market pressure to set low rates for termination of voice calls on their networks. Indeed in the absence of regulation, each of these operators would have the incentive and the ability to set termination rates many times above the actual costs of termination and thereby extract monopoly rents that could be used to help subsidize other services where the operator is under more competitive pressure.

The Calling Party Network Pays (CPNP) system for interconnection is at the root of the finding of SMP for each terminating operator. The reason why no operator is under any competitive pressure to keep its rate down for voice call termination under this system is that the cost of making the call is not borne by the terminating operator's own customers but rather by the network operator of the calling party. Without CPNP, the retail customers of each operator would be sensitive to the price of call termination since the called party would bear some or all of the cost of the terminated call. If the prices were excessive, the retail customer would change operators or, alternatively, refuse to accept calls. Consequently, each operator would be under competitive pressure to keep the cost of termination at competitive levels. **Without CPNP there would be no SMP, and without SMP there would be no basis for the current theory behind regulating the market for voice termination on individual networks.**

The theory that the party receiving the call does not care about increases in the price of call termination has its limits. If the terminating network increases its rates to a very high level, and if those rates are passed on to the calling party, at some point the calling party will cease to make calls to the receiving party. The receiving party would receive fewer calls from his or her friends, and would eventually change operator. Consequently there exists some competitive pressure on the terminating operator not to maintain unreasonably high termination rates. However regulators in Europe have so far

determined that this constraint is too weak to constitute a limit to the terminating operator's ability to set rates well above the competitive level, in part because calling parties generally do not know in advance the price of the call and therefore do not significantly change their calling behavior because of differences in termination rates.

Another constraint that potentially limits the terminating operator's ability to set high rates is countervailing buying power. The terminating operator may not be able to freely set its termination rates because the network operator with whom the terminating operator is negotiating interconnection will have the ability to retaliate, for example by setting high prices for services that the terminating operator needs to purchase.

Most regulators in Europe have found that countervailing buying power is weak or non-existent in this context because the network operator purchasing the services from the terminating operator is not itself free to apply whatever price it wants to services sold to the terminating operator. For example, if the party negotiating with the terminating operator is the incumbent operator, practically every wholesale service that the incumbent could possibly sell to the terminating operator will be subject to regulated price caps and/or non-discrimination obligations. In practice therefore the incumbent operator could not retaliate by increasing its own prices toward the terminating operator. In addition, the incumbent operator has a general obligation to interconnect with other operators so as to provide connectivity to all numbers from the national numbering plan. Consequently the incumbent operator also cannot threaten to refuse to interconnect. Because of this absence of retaliatory power in pricing and in refusing to interconnect, the incumbent is not able to apply sufficient countervailing buying power to offset the terminating operator's market power, even when the terminating operator is very small compared to the incumbent.

The conclusion reached by most regulators therefore is that each individual operator, no matter how small, holds SMP on the market for termination of voice calls to its own subscribers. This conclusion is dependent on several key inputs:

(i) the existence of the CPNP regime. Without CPNP there would be no SMP;

(ii) the inability for the incumbent operator to exercise retaliatory pressure against another terminating operator either by increasing the incumbent's own prices, or refusing to interconnect. The ability to retaliate, if it existed, would in most cases undermine SMP;

(iii) the principle that the pressure exerted by the terminating operator's own customers is too weak to have any effect on the terminating operator's behaviour. If high termination rates translated directly into fewer desirable calls received, the customers of the terminating operator would complain and eventually change operator, and in that case there would be no SMP. However, for the time being, this form of pressure is considered too weak to undermine SMP.

3.1.1.3 Remedies

Once it has been determined that each operator has SMP on the market for terminating voice calls on its own network, regulators then have to define appropriate remedies designed to address the competitive problems that arise from the existence of SMP.

In the case of the termination of voice calls on individual networks, the competitive problem consists of termination prices that are far above the level that would exist if the market were competitive. The competitive problem being excessive prices, the most appropriate remedy has been to apply a price cap, thereby limiting the price that each operator can charge for the termination of voice calls. Under Article 13 of the Access Directive, regulators are entitled to impose price controls including an obligation that prices be cost-oriented.

Virtually all regulatory authorities in Europe have chosen to impose on SMP operators the obligation to apply “cost oriented” termination tariffs and there is little or no controversy in the principle of cost orientation itself. While the principle of cost orientation is non-controversial, a great deal of controversy surrounds the question of determining exactly what cost orientation means.

The controversy has revolved around the following issues:

- Glide path applied on termination rates;
- What does cost orientation mean?
- Asymmetric versus symmetric termination rates.

3.1.1.3.1 Glide path applied on termination rates

The wholesale call termination service of mobile operators and of alternative operators was previously unregulated.

Consequently, mobile operators and alternative operators originally set very high termination rates and those rates generated significant income that was important to the operators' business plans. The high termination rate permitted the operator to invest in network infrastructure, subsidize handsets and offer low retail rates to its own customers, thereby encouraging penetration. The high termination rates meant that customers of the incumbent fixed network in fact subsidized the mobile or alternative operator. This subsidy was deemed to have some positive effects, by permitting mobile operators to offer relatively low retail prices which permitted mobile operators to quickly increase penetration and usage which in turn had the benefit of reducing the mobile operator's unit costs because the total costs were divided among a higher number of subscribers.²⁸ A virtuous circle was created because with lower unit costs, mobile operators could in turn reduce the wholesale price for call termination charged to other operators. In time, the initial cross

²⁸ See **Erreur ! Source du renvoi introuvable.**

subsidy would disappear, and call termination rates would eventually attain a level close to competitive levels.

In an effort not to undermine the business plan of alternative and mobile operators, regulators in Europe generally accepted the idea of a glide path pursuant to which cost orientation would be phased in over a period of several years. The duration and slope of the glide paths have been a source of dispute in a number of countries.

3.1.1.3.2 What does cost orientation mean?

Pursuant to the glide path methodology, operators are required to reduce their termination rate progressively over a number of years until the rates reach a level that is cost-oriented.

Regulators must decide however what cost orientation means in the particular context of termination of voice calls. This too has given rise to a great deal of controversy and continues to do so. The controversy involves questions such as whether regulators should take into account the actual costs of the operator or instead should refer to the notional costs of a so-called "efficient" operator. One of the key considerations is whether the effect of late entry into the market and low market share should be taken into account. Obviously, an operator with a low market share must divide its fixed costs among fewer customers which in turn results in higher unit costs. Operators with a more established high market shares have lower unit costs.

Some regulators have developed cost models based on actual costs of the operator, a "top down model", or else based on theoretical costs of an efficient operator, a so-called "bottom up model". The choice of a given cost methodology can of course have drastic effects for the relevant operators. Some operators complain that they are being required to charge prices below their actual costs, while others complain that the methodology results in certain operators receiving prices above their actual costs. Because of the large amount of money at stake, operators routinely challenge the decisions of regulators on these issues.

3.1.1.3.3 Asymmetric versus symmetric termination rates

Finally the third major area of controversy regarding pricing remedies is the existence of different termination prices for different networks. The requirements of cost orientation led most regulators to accept the idea that different prices should apply to different networks because each network has different costs. Consequently different glide paths were set and the end point for each glide path was generally different to reflect the differences in costs between various networks.

The existence of asymmetric rates however raised problems. The asymmetric rates resulted in the calling party potentially paying different retail prices for calls to different people on different networks. This leads to confusing situations for consumers who generally will not know in advance the price of the call because they would not know on which network the called party is located. Moreover, asymmetric rates could generate

competitive distortions and in particular club effects for operators that charge low retail prices for on-net calls.

As a result, there has been an effort by NRAs, under pressure from the European Commission, to eliminate asymmetric rates and ensure that at the end point of any glide path all mobile operators apply the same termination rates, and all fixed operators apply the same termination rates. Some asymmetry between fixed and mobile operators is still imposed by some NRAs, although the pure-LRIC methodology proposed by the European Commission in the Recommendation of 7 May 2009²⁹ would lead to a reduction, or even the elimination, of asymmetry between fixed and mobile termination rates.

There have been three major areas of controversy regarding pricing remedies: the application of glide path to termination rates, the meaning of cost orientation and whether or not termination rates should be symmetrical. The implementation of the pricing remedies has been routinely challenged by operators because of the large amount of money at stake.

3.1.2 The regulation of Internet traffic exchange

The regulatory approach and pricing scheme applicable to Internet traffic exchange are fundamentally different from those applicable to voice call termination. Contrary to voice call termination, Internet connectivity has been achieved without explicit regulatory obligations and is currently not regulated in Europe. BAK alongside with transit agreements has become the prevailing pricing scheme for Internet traffic exchange between Internet Service Providers (“ISPs”).

What rationale explains the differences in terms of regulatory approach between voice call termination and Internet traffic exchange?

As explained in the previous section, the cornerstone for regulating voice calls termination in Europe is the theory that each network constitutes a separate relevant market and that consequently each network operator holds a monopoly on the market of terminating voice calls on its own network. Intuitively and based on the principle of technology neutrality, one could think that, similarly to operators terminating voice calls, an ISP would hold a monopoly on the market for terminating data requests of Internet end-users.

However, the European Commission considers that, as opposed to wholesale call termination which is identified as relevant market susceptible to ex ante regulation, there is no relevant market for wholesale Internet connectivity. In addition, the European Commission recently vetoed the Polish regulator's draft decision finding SMP on the IP traffic exchange markets and proposing to impose ex ante remedies on the SMP operator.

²⁹ See 4.1

3.1.2.1 The absence of any relevant market for wholesale Internet connectivity

Wholesale Internet connectivity does not constitute one of the markets identified by the European Commission in the 2007 Recommendation as relevant markets susceptible to ex ante regulation.³⁰

In the Explanatory Note accompanying the 2007 Recommendation, the European Commission highlights that "*[t]here are a number of differences between the typical arrangements for terminating calls on the public telephone network and delivering packets to destination addresses on the public Internet. In the latter case, end-users are implicitly paying to both send and receive packets. It is not automatically or typically the case that incoming traffic is charged for and that this charge is passed to the traffic sender via the sender's network*".³¹

In addition, the European Commission notes that Internet traffic connectivity can be arranged in a number of ways: "*It can be purchased from a network that is in a position by its own arrangements to guarantee such connectivity. It can be obtained by interconnecting and exchanging traffic such a sufficiently large number of networks so that all possible destinations are covered. Alternatively it can be arranged by a combination of interconnecting with certain networks and purchasing the remaining connectivity that is needed*".³²

The European Commission considers that "*[e]ntry barriers to this market are low and although there is evidence of economies of scale and that the ability to strike mutual traffic exchange (peering) agreements is helped by scale, this alone cannot be construed as inhibiting competition*".³³ The European Commission concludes that "*[t]herefore, unlike the case of call termination (...), there is no priori presumption that ex ante market analysis is required*"³⁴ as regards wholesale Internet connectivity.

Despite the fact that the wholesale Internet connectivity is deemed competitive and is not regulated by any European NRA, the Polish regulatory authority, UKE, notified to the European Commission in November 2009 a draft decision by which it proposed to apply

³⁰ See Commission Recommendation on Relevant Product and Service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (C(2007)5406).

³¹ See p.24 of the Commission staff working document Explanatory Note, Accompanying document to the Commission Recommendation on Relevant Product and Service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (C(2007)5406), 13/11/2007.

³² Ibid.

³³ Ibid.

³⁴ Ibid.

ex ante regulation, on the basis of a proper market analysis and SMP finding, on the wholesale markets for IP traffic exchange consisting in IP transit and IP peering.

Before UKE's draft decision based on ex ante asymmetric regulation, the Polish authorities already imposed obligations³⁵ on the incumbent Telekomunikacja Polska (TP) as regards IP traffic exchange on the basis of Article 5 of the Access Directive and on the basis of ex post competition law. The aim of these measures was to prevent TP from selective degradations of IP traffic routed by ISPs trying to reach TP's users by purchasing TP transit services from foreign operators instead of buying more expensive services directly from TP.

In its 27 November 2009 draft decision, UKE considers that IP peering³⁶ and IP transit³⁷ are two different means of IP traffic exchange that should be defined as two separate relevant markets. UKE claims that the market for IP peering is limited to TP's network and to access to end-users controlled by TP at the wholesale IP exchange level, whereas IP transit is defined as the wholesale national market for IP traffic exchange in which many ISPs provide services.

According to UKE, IP peering and IP transit are not substitutable for the following reasons:

- The required points of interconnection differ for IP peering and IP transit since that ISPs wishing to directly interconnect to TP's end-users must do so at TP's private internet exchange point, while IP traffic involves a third party to convey traffic.
- IP peering ensures better quality of service than IP transit, which requires the traffic to be sent through third party networks.

UKE admits that those markets are not regulated in other Member States but considers that the situation is different in Poland and that the three criteria test is met for the wholesale market for Internet traffic exchange with TP and in the national IP transit market

In its letter addressed to UKE on 4 January 2010³⁸ and its decision dated 3 March 2010,³⁹ the European Commission, however, considers that UKE fails to provide

³⁵ On 10 July 2006, UKE took a decision based on Article 5 of the Access Directive and imposed to TP an obligation of non-discrimination and transparency. On 29 June 2007, UKE proposed to impose to TP further obligations as regards IP traffic exchange under Article 5 of the Access Directive. The Commission, however, considered that the additional obligations of access, non-discrimination, transparency and price control that UKE proposed to impose on TP were not justified and proportionate "since the effective implementation and execution of the previously imposed obligations, together with the competitive pressure exercised by the possibility to convey IP traffic through foreign carriers, should remedy the identified competition problems". Finally, the Polish Competition Authority found that TP's "discriminatory degradation of IP traffic" constituted an abuse of dominant position on the market for the provision of access to end users of the Internet connected to public telecommunication networks. On 20 December 2007, the Competition Authority imposed a fine on TP and requested that TP terminates such practice.

³⁶ IP peering consists in the direct exchange of IP traffic solely between the interconnected networks of two ISPs.

³⁷ IP transit is a service consisting of IP peering with additional services to enable the exchange of IP traffic with the global Internet.

³⁸ See Commission decision concerning Case PL/20091019 and Case PL/2009/1020, C(2010)10, SG-Greffe (2010) D/2, 4/01/2010.

evidence supporting the existence of two separate markets and to establish that the three criteria test is met for those two markets.

As regards the absence of substitutability between the market for IP peering and IP transit, the Commission observes that "*for routing their traffic at national level, ISPs with less developed networks can replace direct interconnection with TP with transit services provided by larger alternative Polish ISPs, which are interconnected at TP's private internet exchange point as well as at public internet exchange points*" and that "*the existence of various wholesale offers of alternative ISPs in Poland, for providing access to the internet including or excluding TP's end-users, further indicates that the conveyance of traffic to TP's network by means of direct or indirect interconnection are functionally substitutable from a demand-side perspective*".⁴⁰

The Commission also notes that as far as traffic routed through international carriers is concerned, UKE has not provided sufficient demonstration that degradation in quality of service would prevent operators from using international IP transit as a substitute for direct interconnection.

Finally, the Commission considers that the three test criteria is not met since:

- Barriers to entry are low on the IP transit market in particular;
- Several operators are competing for conveyance of IP traffic on the Polish market;
- Previous obligations imposed by UKE and the Competition authority have successfully remedied the problem of degradation of IP traffic on TP's network.

The Polish case illustrates the fact that, as assessed by the European Commission in its 2007 recommendation, wholesale IP connectivity is deemed competitive and not meeting the three test criteria necessary to impose ex ante regulation.

3.1.2.2 *The impossibility to demonstrate SMP as regards Internet traffic exchange*

The Polish case also illustrates the difficulty to find SMP as regards Internet traffic exchange, and some of the differences with the market for terminating voice calls.

³⁹ See Commission decision of 3 March 2010 in the Case PL/2009/1019 and Case PL/2009/1020, C(2010)1234, 3/03/2010.

⁴⁰ Ibid.

3.1.2.2.1 Existence of countervailing buying power/ retaliatory power

In the Polish case, the European Commission underlines that "*the parties exchanging IP traffic are interested in both the reception and provision of high-quality data conveyance services. As a consequence, the incentive of any operator to discriminate against IP traffic exchange partners in terms of quality would be limited since such practice would result in retaliatory action or cancellation of direct contractual relationship*".⁴¹ The ability of other operators to retaliate therefore eliminates the possibility for any ISP to be SMP on the termination of data communications on the Internet.

3.1.2.2.2 Bypass possibilities

In the Polish case, the European Commission notes that "*by using transit services of larger ISPs, small ISPs can indirectly convey traffic to both TP's end-users and the global internet via Tier 1 operators present at public internet exchange points in Poland*".⁴² This illustrates the fact that ISPs have the possibility to bypass another ISP adopting bad competitive behavior by using transit provided by alternative ISPs interconnected at public Internet exchange points. This bypass capability reduces the capacity of a "terminating" ISP to behave independently of market forces as regards IP interconnection.

3.1.2.2.3 Disciplinary power of the retail market

In the Polish case, the European Commission highlights that any attempt by TP to discriminate against alternative Polish ISPs in terms of quality of service "*would have a negative impact on TP's end-users and would cause some of them to switch to alternative ISPs*".⁴³ The Polish case therefore illustrates the fact that the retail market for Internet services, which is deemed competitive, will discipline the wholesale market for Internet connectivity and that therefore ISPs are not free to act independently from consumers as regards Internet connectivity.

3.1.2.2.4 An Internet user generally does not receive calls

Although not mentioned in the Polish case, another explanation for why SMP does not exist for an Internet access provider is that the Internet user generally does not receive calls. To use the example of a famous video sharing platform, it is always the user who "calls" YouTube, never the contrary. It could be argued therefore that the Internet access provider applies a Calling Party Pays regime in its relations with the Internet user. As the "calling party", the Internet user bears the full cost of the communication on the access

⁴¹ See (50) of the Commission decision of 3 March 2010 in the Case PL/2009/1019 and Case PL/2009/1020, C(2010)1234, 3/03/2010.

⁴² See (36) of the Commission decision of 3 March 2010 in the Case PL/2009/1019 and Case PL/2009/1020, C(2010)1234, 3/03/2010.

⁴³ See (51) of the Commission decision of 3 March 2010 in the Case PL/2009/1019 and Case PL/2009/1020, C(2010)1234, 3/03/2010.

network. Certain Internet applications (e.g. instant messaging) adopt a "push" model, so the principle that an Internet user does not receive calls is not universally true. But for applications transferring large volumes of data (e.g. video downloading), the end user generally initiates the request, and can be said to be initiating the communication.

These four aspects explain why, in spite of intuitive similarities between the terminating operator for voice calls and the terminating operator for Internet connectivity, the two have followed very different regulatory regimes in Europe. In the case of voice termination, each operator is found to hold SMP on the wholesale market for call termination. In the case of Internet connectivity, "terminating" operators are not considered to hold SMP at the wholesale level.

3.1.3 Overall conclusion on the different regulations for the voice call termination and the regulation of Internet traffic exchange in Europe

For the market for voice call termination, regulation is justified because of a finding of SMP on the market for voice call termination, and this finding in turn depends on several essential inputs such as CPNP. For exchange of Internet traffic, SMP does not exist because market forces are deemed to act as a discipline against anticompetitive behavior. An operator that attempts to increase prices for Internet traffic exchange to an unreasonably high level would be sanctioned by other wholesale operators on the market for Internet traffic exchange, or by the operator's own retail customers who would detect a decrease in quality. Consequently, the regulatory treatment for the two kinds of interconnection is quite different.

One of the key parameters that is sometimes cited as a differentiator between the voice world and the Internet world is the existence of CPNP, which allegedly does not exist in the Internet world. As noted above, an argument can be made that calling party pays does in fact exist at the level of Internet access, because the retail Internet subscriber is always the calling party. It could be argued that the day YouTube becomes a calling party the Internet access provider controlling the connection to the subscriber would be in a position to charge termination rates in a manner consistent with the CPNP regime applicable in voice calls.

3.2 Europe operates currently massively under Calling Party Pays / Calling Party Network Pays retail and wholesale regimes for voice calls

With respect to the traditional circuit-based voice telephony service, the European Union has been operating for the last 10 years massively under a **Calling Party Network Pays (“CPNP”) regime**, whereby the operator of the calling party pays a cost-based interconnection charge to the operator of the called party to terminate the calls⁴⁴. This CPNP regime is applicable to all types of calls: fixed to fixed, mobile to mobile, fixed to mobile and mobile to fixed. In most European countries CPNP is implemented as volume-based pricing (depending fundamentally on the volume of minutes of traffic).⁴⁵ Under the European regulatory framework⁴⁶, CPNP is mandated as an obligation on undertaking with Significant Market Power (SMP) in the markets for call origination and for call termination⁴⁷.

As rightly shown by Littlechild (2006), Vogelsang (2006)⁴⁸ and acknowledged by ERG (09) 34⁴⁹, wholesale and retail charging mechanisms are related because interconnection charges affect the structure as well as the level of interconnecting operator’s costs and revenues impacting in turn the cost recovery and the retail prices of the services provided to residential and business customers⁵⁰. However, **although a certain structural relation exists, there is no direct connection between them.**

In the European context, the massive usage of CPNP at the wholesale level is in fact associated to a massive usage of Calling Party Pays at retail level, whereby the calling end user bears all the costs of the voice call.

⁴⁴ Based on the 17 answers from NRAs to a questionnaire sent to 34 NRAs in the context of this study with the objective to identify the main interconnection charging methods and associated financial settlement mechanisms which have been implemented in the electronic communications sector in Europe (cf. 11.1): OFCOM (Switzerland), Bundesnetzagentur (Germany), NITA (Denmark), Estonian Competition Authority (Estonia), FICORA (Finland), ARCEP (France), HAKOM (Croatia), National Communications Authority (Hungary), RTT (Republic of Lithuania), Public Utilities Commission (Latvia), OPTA (The Netherlands), NPT (Norway), URTIP (Poland), ANACOM (Portugal), ANRC (Romania), Telecommunications Office (Slovak Republic), and ICTA (Turkey).

⁴⁵ In some countries, there are pure per-minute interconnection charges. In other countries, a combination of a call set-up charge and a per-minute charge. Finally, there could be also a fixed charge (such as a per port charge) alongside to the volume-based charge.

⁴⁶ See European Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC, Official Journal L 344 of 28.12.2007.

⁴⁷ For an overview of corresponding market analysis documents, please see 11.2 (Table 14 and Table 15).

⁴⁸ See Vogelsang, Ingo, Abrechnungssysteme und Zusammenschaltungsregime aus ökonomischer Sicht, Study for BNetzA, 2006, Ch. 3.3.1 and 7.3.3.

⁴⁹ See ERG (09) 34, p. 36-37.

⁵⁰ In the remaining of this Study, we will use “consumer” as a generic word for residential and business customers.

Over this period, only France implemented an alternative interconnection scheme to CPNP, namely a “pure”⁵¹ Bill And Keep (“BAK”) interconnection scheme, which was in place till January 2005 for mobile to mobile calls only. From January 2005 onwards, mobile to mobile calls interconnection has been governed by CPNP⁵² as all other voice calls (namely fixed to fixed, fixed to mobile and mobile to fixed). BAK is an interconnection charging scheme under which each network bears the costs of terminating traffic coming from other networks and there is no direct payment for the economic value associated for the termination provided at wholesale level⁵³. BAK is not akin to an agreement between network operators to “net off” their interconnection charges, and pay only the resulting net sum, but **BAK is similar to a barter transaction**.

As can be inferred from responses of the NRAs that have answered the questionnaire complemented by additional ad-hoc research⁵⁴, so far, **BAK has been rarely brought into the public debate as an alternative interconnection regime to CPNP in individual European countries:**

- In Croatia, BAK hasn't been addressed by the Croatian NRA HAKOM so far because there were not market requirements for this issue. According to the Forward Looking Strategy project and because of the migration towards NGN infrastructure, HAKOM specified in its answer that it will address in near future this issue for the first time.
- In France, BAK has been discussed in 2004 in the market analysis decision for the 1st cycle (2005-2007). This decision focused on the mobile gateways issue that was seen as an undesirable consequence of a BAK regime including mobile to mobile but not fixed to mobile calls (see 0). The French NRA ARCEP also stressed the need to coordinate the change from BAK to CPNP between mobile operators (Orange had first announced its intention to stop BAK) in order to put an end to arbitrage problems and to limit uncertainty on the future of the interconnection charging scheme.⁵⁵
- In Germany, BAK has been very intensively discussed, with a public debate of pros and cons of BAK in the context of defining an interconnection scheme for IP interconnection. As many stakeholders have argued against BAK in their responses to the public consultation, the German NRA assumed that BAK cannot be introduced across-the-board in the short term for the transition phase from circuit-based networks to packet-based networks as the new interconnection charging

⁵¹ As opposed to so-called “hybrid” BAK/CPNP approaches, whereby BAK is adopted for traffic that is “balanced” (within a specified limit) and CPNP for traffic that is “out of balance” (exceeding the specified limits). In such a “hybrid” BAK/CPNP approach, there is still an economic value associated to the termination of traffic. Please refer to 7.2.

⁵² See 7.1

⁵³ See ERG (09) 34, p. 17.

⁵⁴ Please note that not all NRAs have answered our questionnaire.

⁵⁵ See 7.1

scheme for voice services. However, as there is a separate transport-layer in NGNs, the German NRA was of the view that it is conceivable and worthwhile in the long term that BAK interconnection charging be implemented at least for the transport-layer within NGNs.⁵⁶

- In Austria, the Austrian NRA RTR organised between 2007 and 2009 a workshop series on wholesale charging systems. On November 28, 2007 the first event was held on the topic of "Bill & Keep" (BAK), in the course of which the participants expressed the desire to discuss the topic of termination – as the underlying problem area – in a broader context, and as a result the discussion went beyond bill & keep as one possible solution. Accordingly, the objective of the ensuing events was to identify forward-looking alternative solutions to the problem of termination (or specific aspects of this problem in the context of fixed-link and mobile communication) as well as criteria on the basis of which new approaches could be assessed, after which the aim was to jointly evaluate the options identified.
- In Hungary, the Hungarian National Communications Authority answered that it was discussing the issue in order to organise a national consultation on the topic.
- In the Republic of Lithuania, the Lithuanian NRA RRT has carried a small survey, regarding the views of operators on the BAK charging mechanism and possibilities of its implementation. RRT received varying answers: the incumbent argued for BAK, others indicated possible problems with spamming, international traffic, etc. No general agreement was reached.
- In the Netherlands, there was a short discussion of BAK as a long-term option in the consultation document for the current fixed and mobile termination analysis. In the response by market parties, most alternative fixed operators were positive about BAK, other operators were not.
- In the UK, the UK's Competition Commission was asked to consider whether the UK Regulator OFCOM should have imposed BAK on mobile operators following Hutchinson 3G's appeal of OFCOM's 2007 decision⁵⁷ on Mobile Termination Rates. The Commission's panel of economists was prevented by the Competition Appeal Tribunal, however, from considering any arguments in favour of BAK. The Commission nevertheless carried out a limited investigation into the economic issues, and found the evidence insufficient to overturn Ofcom's determination in favour of CPNP⁵⁸. The Competition Commission only had jurisdiction to consider BAK for Mobile-to-Mobile calls, and was thus required to assume that Mobile Termination Rates for Fixed-to-Mobile calls would remain under CPNP. All parties

⁵⁶ See 11.3

⁵⁷ See Ofcom, 2007, Mobile Call Termination: Statement.

⁵⁸ See Competition Commission, 2009, Mobile phone wholesale voice termination: Determination, Section 14.

agreed that a differential between the Fixed-to-Mobile and the Mobile-to-Mobile interconnection had the potential to create arbitrage.⁵⁹

As a matter of fact, BAK as an alternative to CPNP has been addressed by NRAs within the ERG in the context of a work programme towards Regulatory Principles of IP-IC/NGN Core.⁶⁰ The issue at stake is therefore to investigate the most appropriate interconnection charging scheme for the future IP-interconnection of voice services carried in Next Generation Networks (NGN), as opposed to the current circuit-based interconnection of voice services carried in fixed and mobile legacy networks. In this context, the ERG recently released a **DRAFT Common Position on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues**.⁶¹ In this Draft Common Position, the ERG states that:

“BAK is more promising than CPNP as a regulatory regime for termination for the long term and based on national circumstances (including legal issues) NRAs could set a glide path to BAK within the regulatory period related to the next market analysis they carry out for voice termination. However, for the short and medium term CPNP can also be an appropriate choice based on national circumstances, so NRAs can also continue the CPNP regime at least in the next regulatory period.”⁶²

Europe operates currently massively under CPP / CPNP retail and wholesale regimes for voice calls. Over the last ten years, only France implemented an alternative interconnection scheme to CPNP, namely a “pure” Bill And Keep (“BAK”) interconnection scheme, which was in place till January 2005 for mobile to mobile calls only. From January 2005 onwards, mobile to mobile calls interconnection has been governed by CPNP as all other voice calls (namely fixed to fixed, fixed to mobile and mobile to fixed).

As indicated by the NRAs in their answers, BAK has rarely been brought in the public debate so far as an alternative interconnection regime to CPNP in individual European countries. As a matter of fact, BAK as an alternative to CPNP has been addressed by NRAs within the ERG in the context of a work programme towards Regulatory Principles of IP-IC/NGN Core. The ERG recently released a DRAFT Common Position on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues.

⁵⁹ See Competition Commission, 2009, Mobile phone wholesale voice termination: Determination, Section 14.74.

⁶⁰ See ERG Common Statement on Regulatory Principles of IP-IC/NGN Core -A work program towards a Common Position, ERG (08) 26 final NGN IP-IC CS 081016.

⁶¹ See ERG DRAFT Common Position on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues, ERG (09) 34, October 2009.

⁶² See ERG (09) 34, p. 8-9.

3.3 There is so far little empirical data for IP-interconnection agreements in Europe

As noticed by the ERG, there is so far little empirical data for IP-interconnection agreements in Europe since they are not part of the regulated sphere⁶³ in all European countries. However, answers provided by NRAs to our questionnaire indicate that “pure”⁶⁴ IP-interconnection has been implemented in 8 out of 17 countries that have answered the questionnaire.

- First country where IP interconnection has been implemented is the Slovak Republic back in 2001. IP interconnection for voice services has been implemented by operators on a voluntary basis. The Slovak NRA considers that all Slovak VoIP operators use IP interconnection nowadays. Regarding the standards for the IP interconnection, the incumbent Slovak Telekom a.s. uses a SIP – 2 standard but IMS standards are currently being tested by operators.
- In Romania, IP interconnection is in place since 2004 on a voluntary basis between small fixed operators, accounting therefore for a small amount of total voice traffic. Regarding the standards for the IP interconnection, operators use IP SIP, SIPv2, H323/SIP,
- In Hungary, IP interconnection has been implemented in 2005 and 2006 between alternative operators only. Regarding the standards for the IP interconnection, operators use SIP-T signalling standard.
- In Denmark the incumbent TDC provides IP-interconnection with SIP Standards.
- In the Republic of Lithuania, there are voluntary IP interconnections for voice in current use between alternative fixed operators, but no information on the date when this IP-interconnection has been implemented. Indeed, alternative fixed operators are not subject to transparency obligations. According to the information available to RRT, IP interconnections use SPI-T standard.
- In Finland, IP interconnection for voice services is currently in an experimental phase between mobile networks. Commercial use is foreseen in 2010. There is no precise information on how many operators are offering this interface and since when, but at least one operator is already offering SIP interface to connect smaller VoIP providers to its network, and the two largest mobile network operators are the most likely candidates to take IP interconnection for voice services into commercial use. The standard used is SIP-I.

⁶³ See ERG (09) 34, p. 22.

⁶⁴ As opposed to the use of gateways, whereby an IP-originated traffic is converted into circuit-based traffic just before the PoI and converted back into IP-terminated traffic just after the PoI. The use of gateways is on the contrary fairly standard practice.

- In France, there are currently voluntary trials between France Telecom and a number of alternative fixed operators on IP-based interconnection for managed voice / Voice over Broadband. The French operator's federation (FFT) is leading the standardisation process. SIP and SIP-I are currently the two standards trialled.

Although only very limited information is available on the applicable charging scheme, it appears from the answers of NRAs to the questionnaires that a CPNP charging scheme seems to apply also to IP interconnection and that there is usually no differentiation between IP-interconnection and circuit-based interconnection termination rates for the voice service:

- There is no differentiation in Denmark, in Hungary, in Romania in France and in the Slovak Republic.
- In Finland, it is expected that there will be no significant differences in the charging systems between SIP-I and circuit switched interconnection.
- In the Republic in of Lithuania, the charges of IP call termination are settled in agreements between the alternative fixed operators. The information about IP call termination rates is not available to the NRA as there are no obligations for these operators to submit agreements to the NRA.

There is so far little empirical data for “pure” IP-interconnection agreements in Europe since they are not part of the regulated sphere in all European countries. From the very limited information available on the applicable charging scheme, it appears from the answers to the questionnaires that a CPNP charging scheme seems to apply also to IP interconnection and that there is usually no differentiation between IP-interconnection and circuit-based interconnection termination rates for the voice service.

4 Forward-looking assessment of the likelihood of a transition towards Bill And Keep

In this chapter the likelihood of a transition towards Bill And Keep (BAK) will be assessed, taking into account technological change and market developments, and in particular the shift from VoIP and other IP-based services, the development of bundled offers in the provision of services as well as the impact of operator's on-net/off-net strategies on the exchange of traffic. However prior to this review of technological and market trends, it is very important that the likelihood of a transition towards BAK shall be assessed assuming that the Commission's Recommendation of 7 May 2009⁶⁵ is effectively implemented.

4.1 Expected Impact of the implementation of the Commission's Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile interconnection in the EU"

After an overview of the Commission's Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile interconnection in the EU", we will detail the implication of the Recommendation for the level of fixed and mobile termination rates in Europe and conclude this section with an overall assessment of the impact of regulatory changes.

4.1.1 Summary of the Commission's Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile interconnection in the EU"

The Commission's Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile interconnection in the EU" recommends that NRAs should, by 31 December 2012⁶⁶, set fixed and mobile termination rates as follows:

- NRAs should set fixed and mobile termination rates based on the costs incurred by an efficient operator, which implies that termination rates would also be symmetric.⁶⁷ (Point 1)
- The evaluation of efficient costs should be based on current cost and the use of a bottom-up modelling approach using long-run incremental costs (LRIC) as the relevant cost methodology. (Point 2)

⁶⁵ Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile termination rates in the EU", C(2009) 3359:
http://ec.europa.eu/information_society/policy/ecomms/library/recomm_guidelines/index_en.htm

⁶⁶ For NRAs with limited resources, an additional transitional period may exceptionally be needed in order to prepare the recommended cost model.

⁶⁷ Subject to any objective cost differences identified in accordance with points 9 and 10 of the Recommendation of 7 May 2009.

- The cost model should be based on efficient technologies available in the time frame considered by the model. Therefore the core part of both fixed and mobile networks could in principle be Next-Generation-Network (NGN)-based. The access part of mobile networks should also be based on a combination of 2G and 3G telephony. (Point 4)
- A distinction needs to be made between traffic-related costs and non-traffic-related costs, whereby the latter costs should be disregarded for the purpose of calculating wholesale termination rates within the LRIC model. The recommended approach to identifying the relevant incremental cost would be to attribute traffic-related costs firstly to services other than wholesale voice call termination, with finally only the residual traffic-related costs being allocated to the wholesale voice call termination service. This implies that only those costs which would be avoided if a wholesale voice call termination service were no longer provided to third parties should be allocated to the regulated voice call termination services. (Point 6)
 - ‘Incremental costs’ are those costs that can be avoided if a specific increment is no longer provided (also known as avoidable costs); (Point 5a)
 - ‘Traffic-related costs’ are all those fixed and variable costs which rise with increased levels of traffic. (Point 5b)
- The appropriate efficient scale of the modelled operator in fixed and mobile termination networks (Point 8) is further specified in the Annex of the Recommendation of 7 May 2009 as follows:
 - For fixed networks, NRAs should take into account that operators have the opportunity to build their networks in particular geographic areas and to focus on high-density routes and/or to rent relevant network inputs from the incumbents. When defining the single efficient scale for the modelled operator, NRAs should therefore take into account the need to promote efficient entry while also recognising that under certain conditions smaller operators can produce at low unit costs in smaller geographic areas. Furthermore, smaller operators that cannot match the largest operators’ scale advantages over broader geographic areas can be assumed to purchase wholesale inputs rather than self-provide termination services.
 - For mobile networks, taking account of market share developments in a number of EU Member States, NRAs should set that scale at 20% market share. It may be expected that mobile operators, having entered the market, would strive to maximise efficiency and revenues and thus be in a position to achieve 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 different minimum efficient scale, it could deviate from the recommended approach.

To summarise the Commission’s Recommendation of 7 May 2009 on “The regulatory treatment of fixed and mobile interconnection in the EU”, the fixed and mobile termination rates should by 31 December 2012 be calculated only for traffic

related costs, and should be based on efficient technologies available in the time frame considered, which may include NGN, and be calculated as the last increment of costs that would be avoided if call termination were not provided (so-called “pure LRIC” cost modelling approach).

This Recommendation will be reviewed in 2013, i.e. four years after the date of application.

4.1.2 Implication of the Recommendation of 7 May 2009 for the level of fixed and mobile termination rates

4.1.2.1 Current situation of fixed and mobile termination rate levels in the EU before the implementation of the Recommendation of 7 May 2009

The current situation of fixed and mobile termination rate levels in the EU before the implementation of the Recommendation of 7 May 2009 is **highly heterogeneous** with:

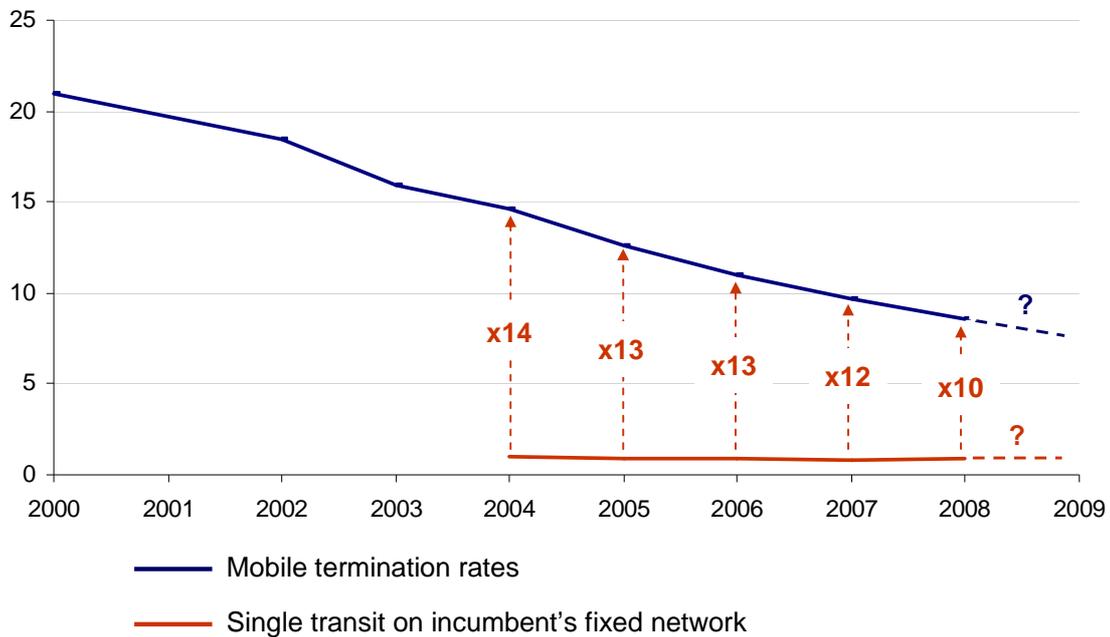
- **Mobile termination rates being significantly higher than the equivalent fixed termination rates⁶⁸**, on average more than 10 times as per the Commission's 14th Progress Report⁶⁹ (cf. Figure 1):
 - EU average Oct. 2008 of interconnection charges for call termination on mobile networks (national average on the basis of subscribers⁷⁰): 8.55 €-cents
 - Single transit - EU average Interconnection charges for terminating calls on INCUMBENT'S FIXED NETWORK (at 1/10/2008): 0.86 €-cents

⁶⁸ Single transit. See Commission Staff Working Document accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, {C(2009) 3359 final} {SEC(2009) 599}, Brussels, 7.5.2009, SEC(2009) 600, p. 15.

⁶⁹ Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions - Progress Report On The Single European Electronic Communications Market 2008 (14th Report).

⁷⁰ With an asymmetrical market share, national average on the basis of subscribers is the average of operators' MTRs, weighted by operators' market shares.

Figure 1: Mobile termination rates are significantly higher than the equivalent fixed termination rates in the EU



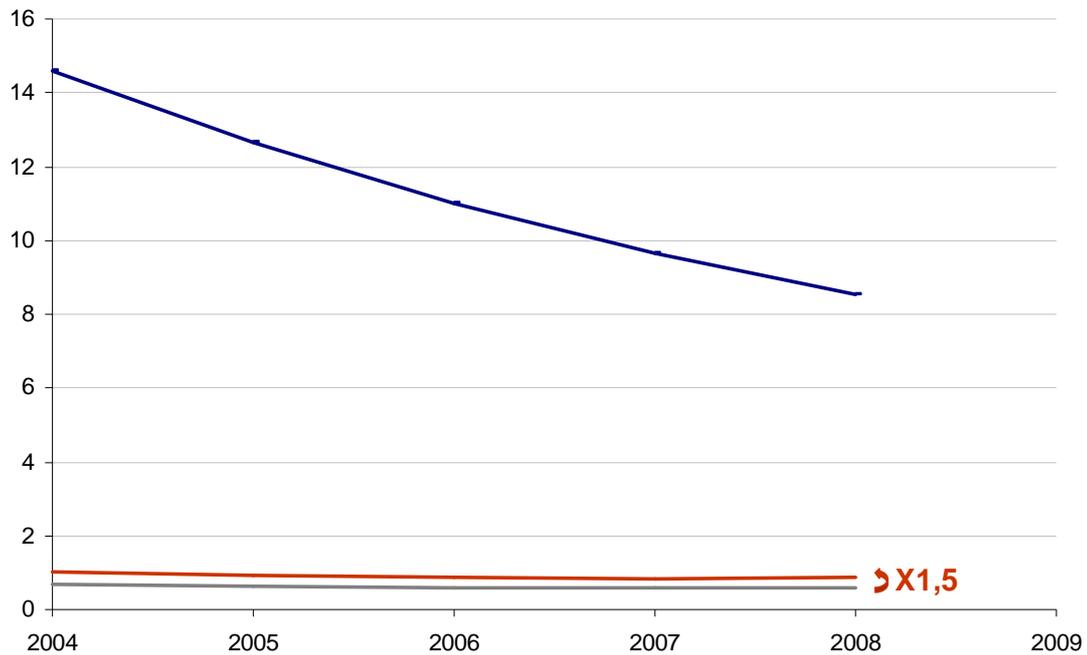
Source: European Commission

Reports on the Implementation of the Telecommunications Regulatory Package

- **Fixed termination rates, as opposed to mobile termination rates⁷¹, showing a distance dependency** with single transit rates being 1.5 times higher than local level rates (cf. Figure 2):
 - Single transit - EU average Interconnection charges for terminating calls on INCUMBENT'S FIXED NETWORK (at 1/10/2008): 0.86 €-cents
 - Local level - EU average Interconnection charges for terminating calls on INCUMBENT'S FIXED NETWORK (at 1/10/2008) (peak time): 0.57 €-cents

⁷¹ With mobile networks, there is no possibility for analysing the number to determine where the called party is located. As a result, the most efficient strategy (for the calling party AND the called party) is to deliver the traffic at the closest POI from the caller. Mobile operators generally also propose interconnection at other POIs but the termination tariff, which is not regulated, is higher.

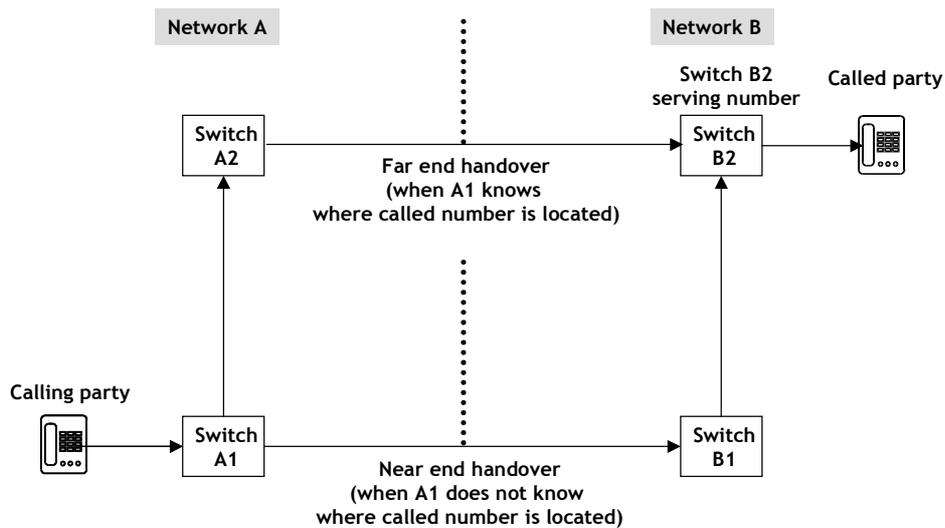
Figure 2: Fixed termination rates, as opposed to mobile termination rates, show a distance dependency in the EU



*Source: European Commission
Reports on the Implementation of the Telecommunications Regulatory Package*

This structure of regulated distance dependent fixed termination rates is based on geographical information in the numbering plan and it creates an incentive for operators to carry calls as far as they can. The interconnection arrangement is called "far end handover" and is illustrated in Figure 3. In contrast, with mobile networks there is no possibility for analysing the number to determine where the called party is located, and the most efficient strategy for the calling party but also for the called party (most part of the traffic concerns local calls) is to deliver the traffic at the closest POP from the caller. As a result, there is only a single regulated termination charge, and so no incentive to carry the call further than the nearest interconnection point. Thus the interconnection arrangement for mobile calls is called "near-end handover".

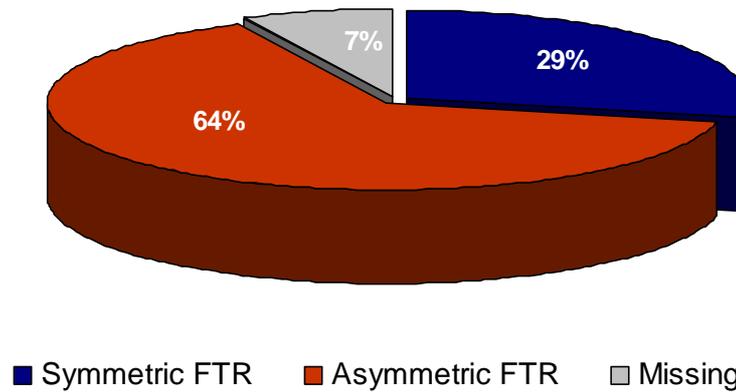
Figure 3: Comparison of near-end handover and far-end handover



Source: TERA Consultants analysis

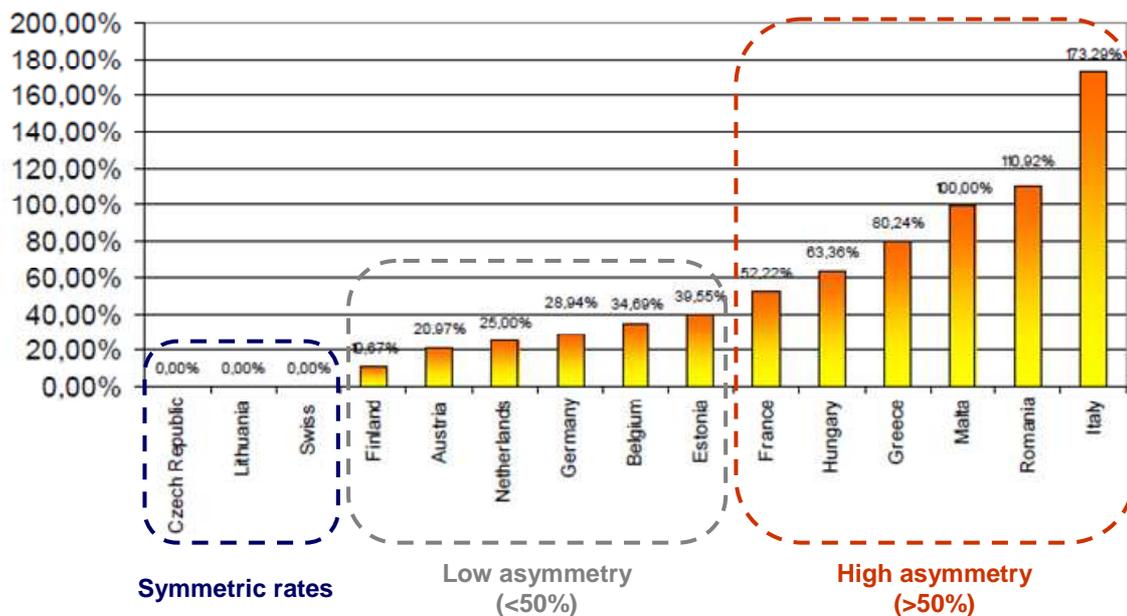
- **Termination rates between either mobile operators or fixed operators being not always symmetrical.**
 - Two thirds of EU countries use asymmetrical FTR (cf. Figure 4). In addition, the asymmetry strongly varies from one country to another (cf. Figure 5).

Figure 4: Proportion of asymmetric Fixed termination rates in the EU



Source: ERG's Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rates (28th February 2008)

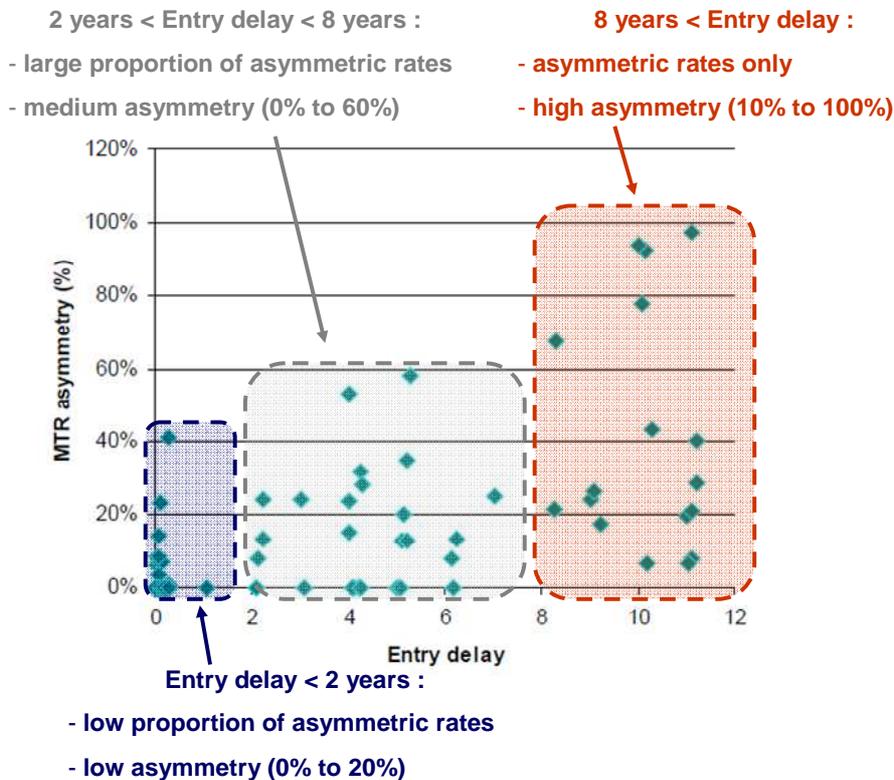
Figure 5: Global asymmetry index*



* Global asymmetry index is a composite (50/50) of local and single transit rates
 Source: ERG's Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rates (28th February 2008)

- MTRs are also asymmetrical in most of EU countries. The asymmetry varies from one country to another, and is correlated to the delay to entry (cf. Figure 6).

Figure 6: Mobile termination rates asymmetry in % (compared to the operator with the lowest MTR) related to delay of entry on the market (compared to the first operator entering the market)

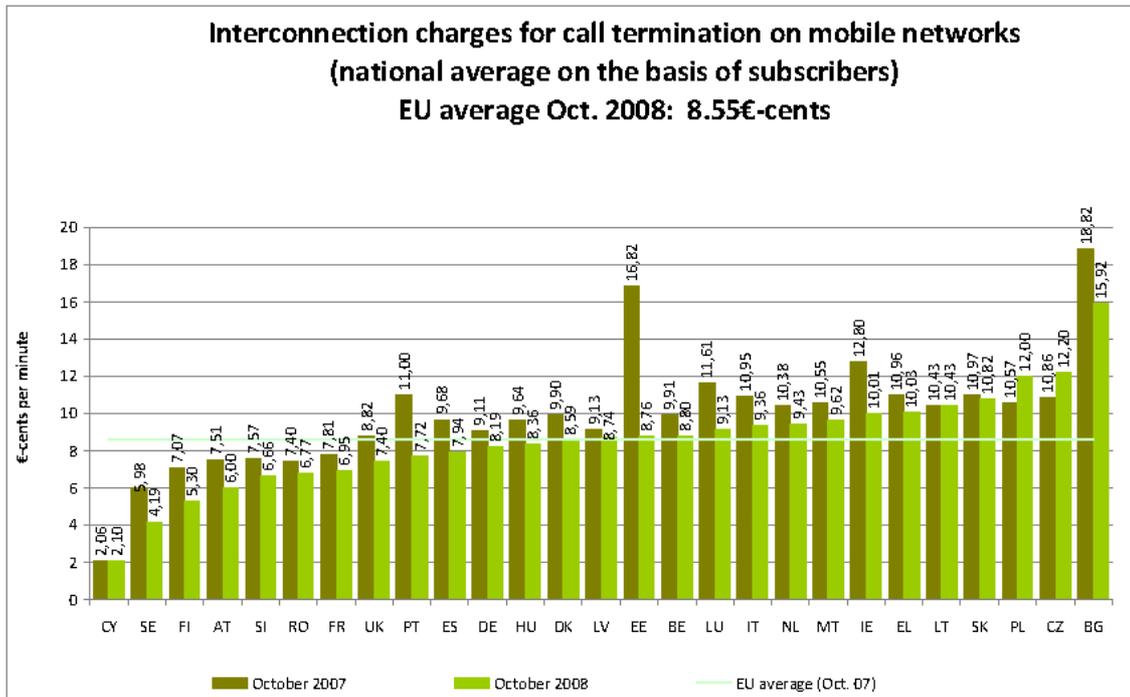


Source: ERG's Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rate (28th February 2008)

- **Fixed and mobile Termination rates varying significantly from one Member State to another** (cf. Figure 7 and Figure 8):
 - between 2.10 €-cents (CY) and 15.92 €-cents (BG) for interconnection charges for call termination on mobile networks (EU average being 8.55 €-cents);
 - between 0.20 €-cents (UK) and 2.12 €-cents (FI) for interconnection t - charges for terminating calls on INCUMBENT'S FIXED NETWORK at Local level (EU average being 0.57 €-cents).
 - MTRs appear to be a little bit more homogenous than FTRs:
 - for mobile networks, almost 60% of termination rates are between average MTR-20% and average MTR+20%. The average gap with the average MTR is around 20%;

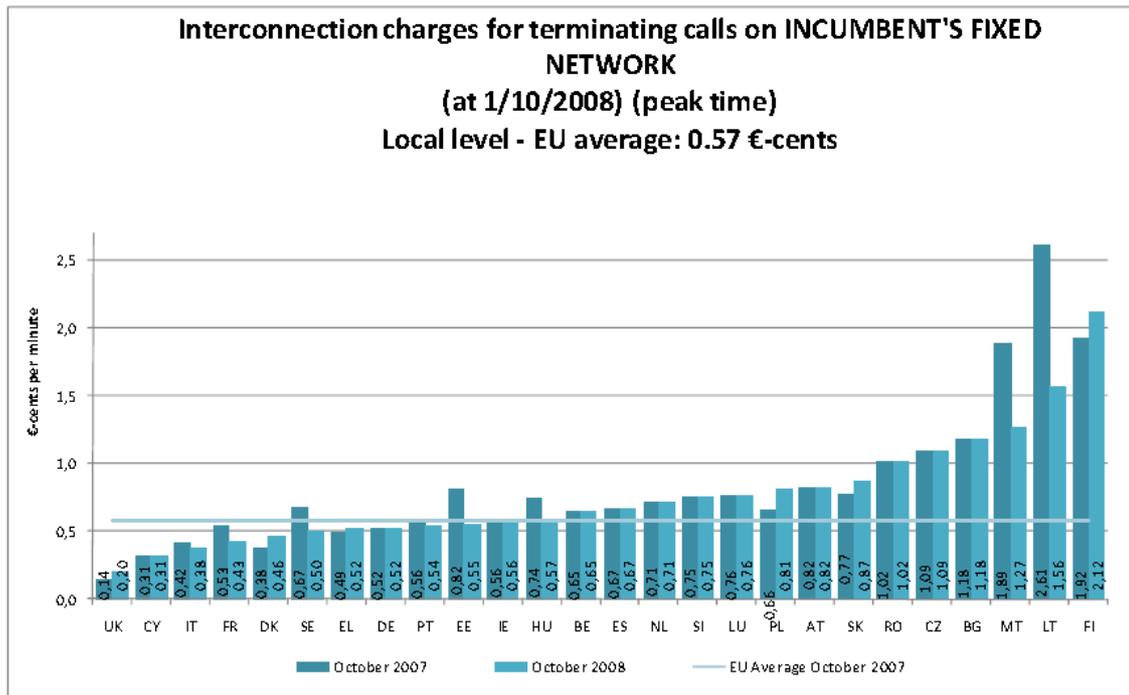
- for fixed networks, less than 40% of termination rates are between average FTR-20% and average FTR+20%. The average gap with the average MTR is around 50%.

Figure 7: Interconnection charges for call termination on mobile networks (national average on the basis of subscribers) in the EU



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

Figure 8: Interconnection charges for call termination on fixed networks Interconnection on INCUMBENT'S FIXED NETWORK in the EU - Local level



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

Fixed and mobile termination rate levels in the EU are currently (i.e. before the implementation of the Recommendation of 7 May 2009) highly heterogeneous:

- Mobile termination rates are significantly higher than the equivalent fixed termination rates;
- Fixed termination rates, as opposed to mobile termination rates, show a distance dependency;
- Termination rates between either mobile operators or fixed operators are not always symmetrical;
- Fixed and mobile Termination rates vary significantly from one Member State to another.

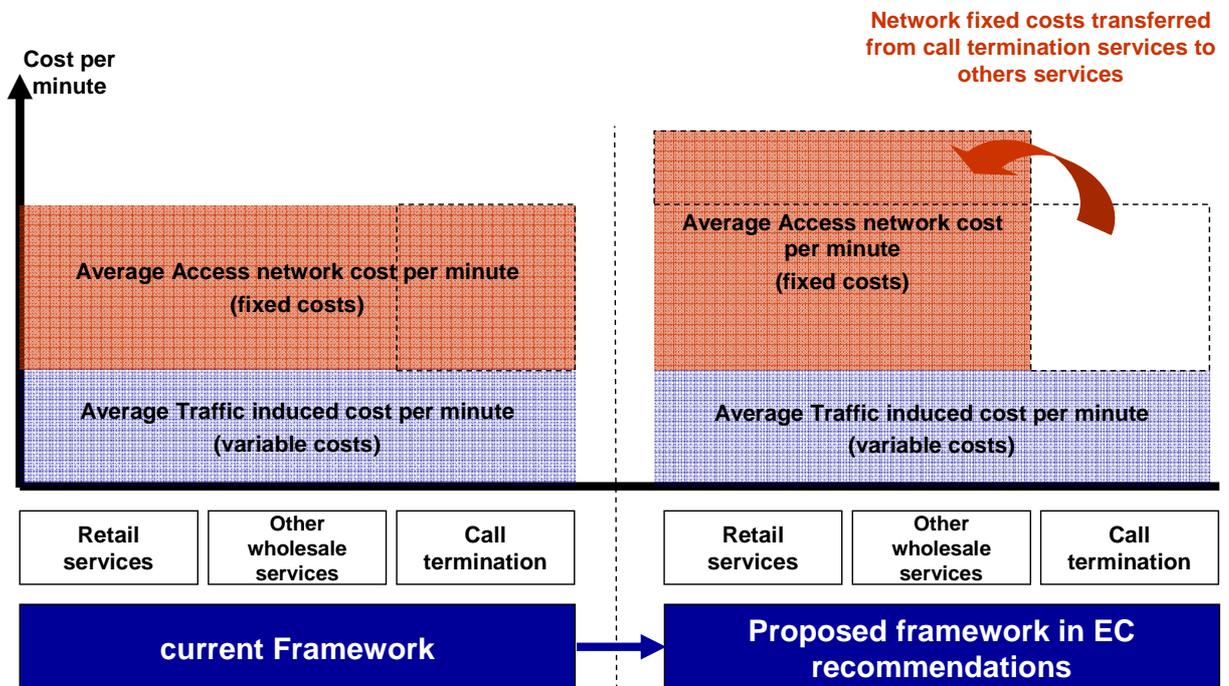
4.1.2.2 Expected situation of fixed and mobile termination rate levels in the EU after the implementation of the Recommendation of 7 May 2009

- **A significant reduction of the gap between mobile and fixed termination rates**

In order to assess the likely impact of the Recommendation of 7 May 2009 on the gap between Mobile Termination Rates and Fixed Termination Rates, we will first analyse it at a logical level, and then review any information released so far by NRAs that have already embarked in the building of cost models more or less in line with the Recommendation of 7 May 2009.

The expected effect of Recommendation of 7 May 2009 is a decrease of FTRs (as well as MTR). Indeed, whereas fixed costs (not related to traffic) were included in LRAIC costs of termination service, they are excluded of LRIC cost (cf. Figure 9) and transferred to other services, such as access and call origination.

Figure 9: Expected effect of Recommendation of 7 May 2009 on Termination Rates



Source: TERA Consultants analysis

Nevertheless, the Recommendation of 7 May 2009 will introduce a significant reduction of the gap between mobile and fixed termination rates, although MTR and FTR are supposed to decrease with the Recommendation. Indeed, in a fixed network, the Recommendation says that the eligible traffic related costs start from "the upstream side of the line card in the (remote) concentrator. The broadband NGN equivalent is the line card in the DSLAM/MSAN". This approach fits with the practice of operators to charge a fixed line rental for the section from the network termination point to this point where eligible traffic related costs start. The cost accounting systems of operators have been built historically around this approach and regulators have been concerned with tariff rebalancing to ensure that the line rental charged fully covers these costs.

The consequence is that a major part of the cost of a fixed network has been already excluded in the past from the scope of termination rates, whereas all the expensive radio access part of mobile networks has been included. Nevertheless, it should be noted that FTR will probably remain lower than MTR with LRIC cost-based orientation, because part of the radio access network of mobile operators is sensitive to traffic.

On the other hand, it is important to note that the absolute decrease of MTR and FTR is almost more important for operators than relative decrease (see ERG (09) 34: "Regarding the falling costs per minute, it is also important that **the absolute difference** in cost per minute between fixed and mobile is decreasing"). Indeed, as MTR is ten times higher than FTR, an identical relative decrease for MTR and FTR will considerably reduce financial flows from fixed to mobile.

Illustration: let's say for example than MTR is 10 and FTR is 1 before the recommendation. For one minute sent and one minute received, a fixed operator will have a net interconnection cost of 9. Now let's assume that the recommendation introduces the same relative decrease for these two rates (for example -50%): then the same fixed operator will have a net interconnection cost of 4.5 for one minute sent and one minute received.

A review of information released so far by NRAs that have already embarked in the building of cost models more or less in line with the Recommendation of 7 May 2009 - Fixed Termination Rates provides the following insights:

Some NRAs have already embarked in the building of cost models more or less in line with the Recommendation of 7 May 2009, and have sometimes released information on the calculated levels of fixed termination rates. The French NRA **ARCEP** developed in 2006 a cost model to compute the costs of Fixed Termination Rate at Local Level, with the following characteristics⁷²:

⁷² See ARCEP Price Regulation Consultation 20/05/2008, p. 17-20, « Consultation publique sur les référentiels de coûts et autres éléments pertinents pour la mise en œuvre des obligations de contrôle tarifaire sur les prestations de terminaison d'appel et de départ d'appel sur les réseaux fixes ».

- This model is a **bottom-up** model that determines the building and running costs of a nationwide efficient NGN, according to the volumes of voice and data that are carried in the network, and based on the best technologies available according to LRAIC methodology (i.e. it is not a pure LRIC);
- The model provides **pure NGN-interconnection** costs (whether per minute or per capacity) that are especially related to call termination service;
- The interconnection costs are evaluated according to several assumptions, such as **the number of interconnections levels** used by voice (local, regional or national), or according to the allocation key used to allocate joint costs to the different services in the network (capacity based⁷³ or Shapley-Shubik⁷⁴);
- The model provides costs **between 0.05 and 0.2 €-cents per minute for call termination services** (error margin of 0.1 €/min).
- Nevertheless, ARCEP underlines the following limits⁷⁵:
 - The model is based on forecasted demand whose evolution is prospective by nature. Therefore it should be updated in order to confirm the assumptions and the results of the model;
 - The topology chosen to model the future network could also be updated according to the evolution of the characteristics of the network elements, such as the capacity of the routers for instance;
 - Given the LRIC methodology used, and the choice of the most efficient technology to build the network, the model may be over-efficient and should be therefore reconciled with information on other costs (such as France Telecom BU LRIC model).

A review of information released so far by NRAs that have already embarked in the building of cost models more or less in line with the Recommendation of 7 May 2009 – Mobile Termination Rates provides the following insights:

- The French NRA **ARCEP** has evaluated that the Mobile Termination Rate would be between **1 and 2 €-cents/min** applying the Recommendation of 7 May 2009.⁷⁶

⁷³ Costs are distributed among different services according to the capacity required by each service.

⁷⁴ Costs allocated to a service are equal to the expected incremental cost (average of the incremental costs of the service after reviewing every order of arrival).

⁷⁵ See ARCEP « Consultation publique sur les référentiels de coûts et autres éléments pertinents pour la mise en œuvre des obligations de contrôle tarifaire sur les prestations de terminaison d'appel et de départ d'appel sur les réseaux fixes », 20/05/2008, p. 17-20.

⁷⁶ See Decision No. 08-1176.

- The Swedish NRA **PTS** estimates that a LRIC model in line with the Recommendation would result in a MTR level of **around 1 €-cents/min**
 - The Belgian NRA **IBPT** has computed that the Mobile Termination rate in 2012 using a “pure” LRIC approach as per the Recommendation would be **1.07 and 1.55 €-cents/min**⁷⁷
-
- **A significantly lower dependence from distance for fixed termination rates**

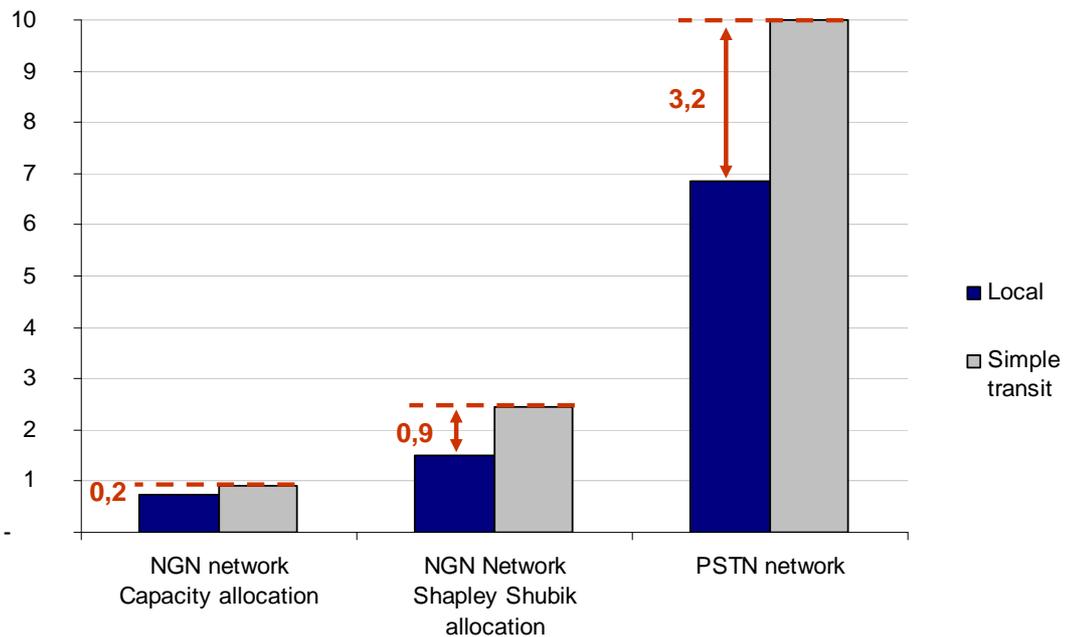
The Recommendation 7th May 2009 specifies that termination rate should be based on NGN core network costs. This will reduce the dependence from distance for fixed termination rates. Indeed, NGN network mutualised equipment for different services (voice, Internet, TV...) whereas PSTN networks use specific equipment for voice services. The mutualisation introduces an interconnection cost decrease at both levels (Local level, single transit...); and the absolute gap between local transit and single transit decreased too.

This impact can be illustrated with fixed NGN Bottom-Up cost modelling that TERA CONSULTANTS undertook recently for Regulatory Authorities.⁷⁸ An NGN network, compared with a PSTN network, significantly reduces the gap between single transit and local interconnection. Depending on cost allocation used for NGN network (cost allocation proportionate to usage or Shapley-Shubik allocation), the gap between single transit and local interconnection is divided between 3.5 and almost 20.

⁷⁷ See IBPT, Projet de Décision du Conseil de l'IBPT du JJ/MM/AAAA relative à la définition des marchés, l'analyse des conditions de concurrence, l'identification des opérateurs puissants et la détermination des obligations appropriées pour le marché 7 de la liste de la Recommandation de la Commission Européenne du 17 décembre 2007 – Terminaison d'appel vocal sur les réseaux mobiles individuels.

⁷⁸ ARCEP in France, ComReg in Ireland.

Figure 10: Dependence from distance for fixed termination rates – Base 10



Source: TERA Consultants analysis

This evolution has been pointed out by incumbent during ERG IP-Interconnection and NGN Project: “*The influence of distance on costs is less relevant in NGN than in PSTN. The transmission at lower costs and the possibility of choosing the location freely makes local interconnection unnecessary*”.⁷⁹

In addition, fixed transit markets being considered competitive, only “local interconnection” is regulated. Fixed operators generally continue to propose interconnection at a higher level but the termination tariff, which is not regulated, is higher.

- **A significantly higher degree of symmetry between fixed termination rates on the one hand, and mobile termination rates on the other hand**

“*The Commission considered that termination rates should normally be symmetric and that asymmetry requires an adequate justification*”.⁸⁰ Such a justification could be objective cost differences outside the control of the operators concerned⁸¹ (it could result

⁷⁹ See ERG (07) 09.

⁸⁰ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.9.

⁸¹ Besides, the Commission stated that an asymmetric termination rate cannot be justified by imbalanced traffic, which introduces termination deficit for operators that send more traffic than they receive (generally

in practice from spectrum assignment), or substantial differences in the date of market entry. But, the Commission adds *“in the case an operator enter the market later and that it therefore has a smaller market share can only justify higher termination rates for a limited transitory period.”*⁸²

*“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 in the market”.*⁸³

In addition, the spectrum assignments will have a lower impact on LRIC cost than on LRAIC cost:

- With LRAIC approach, coverage costs are included. As higher frequencies have a lower coverage, operators with 1800 MHz frequencies face higher coverage costs than operators with 900 MHz frequencies and LRAIC costs will be higher for these operators. With the LRIC approach, coverage costs are excluded and so the spread between 900 MHz network costs and 1800 MHz network costs will decrease.
- This will impact the spread between leading operators' MTRs and challengers' MTRs, because in many European countries, spectrum assignments have not taken place using market-based mechanisms but on the basis of a sequential licensing process (later entrants mainly received 1800 MHz frequencies whereas leading operators received 900 MHz frequencies).
- **A significantly higher degree of convergence of fixed and mobile termination rates amongst Member States**

In its explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, the Commission identified the lack of consistency in applying the cost orientation principle as the main reason for the low degree of convergence of fixed and mobile termination rates amongst Member States (although national circumstances can justify different termination rates between the member states):

“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

later entrant because of club effect). Indeed, “asymmetric wholesale pricing is likely to reinforce the asymmetric pricing observed at the 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.” (Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.20.

⁸² See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.10.

⁸³ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.18.

between operators than may be justified by different national circumstances or by exogenous cost factors”.⁸⁴

- For Mobile Termination Rate:
 - **Different methodologies are used for later entrant’s price control:** *“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”.*⁸⁵
 - There is a **significant variety of cost models** that are used for accessing Mobile Termination Rate:
 - *“top–down accounting data was used by eleven NRAs as the main tool and by two NRAs as a complementary tool;*
 - *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 an international benchmarking was used by eight NRAs as the main tool and by five NRAs as a complementary tool”.*⁸⁶
 - **The definition of an “efficient” operator varies** from one Member State to another: *“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”.*⁸⁷
- For fixed termination rate, differences in price control implementation are also observable:

“Although in most cases the termination rates are regulated on the basis of an 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

⁸⁴ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.12.

⁸⁵ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.10.

⁸⁶ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.10-11.

⁸⁷ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.11.

*exclusively, used for calculating FTRs. As a result, **the different application of the same regulatory tool produces diverse results.***⁸⁸

As a consequence, the Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU is to impose “*common guidelines and a common approach as to the implementation and interpretation of cost orientation obligations in termination markets*”⁸⁹. The Recommendation will reduce the difference between the termination rates amongst member states, since it defines more precisely than before the costing methodology to be implemented (bottom-up model, current costs, forward-looking long-run incremental costs) as well as the concept of an “efficient” operator:

- for fixed operators: “*To determine the efficient scale of an operator for the purposes of the cost model, NRAs should take into account that in fixed networks operators have the opportunity to build their networks in particular geographic areas and to focus on high-density routes and/or to rent relevant network inputs from the incumbents*”.⁹⁰
- for mobile 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% of the market share***”.⁹¹

In particular, coverage costs, which are not avoidable, will not be included in the termination rate because of the use of the LRIC approach. This will reduce the spread between Member States’ termination rates, especially the MTR spread (for mobile operators, the proportion of coverage cost in the total network cost varies with the geography and the demography of each country).

⁸⁸ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.11.

⁸⁹ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.4.

⁹⁰ See Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.73.

⁹¹ See Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.74.

Overall, the implications of the Recommendation of 7 May 2009 are:

- **to considerably reduce the gap between mobile and fixed termination rates, from around 8 €-cents/min in 2008 to 1 or 2 €-cents/min (order of magnitude – to take with caution);**
- **to have less distance dependency for fixed termination rates, as it is already the case in mobile networks;**
- **to have as a general rule symmetric termination rates between mobile operators on the one hand, and between fixed operators on the other hand;**
- **to have a higher degree of convergence of fixed and mobile termination rates amongst Member States.**

There will therefore be throughout the EU a much greater homogeneity of termination rates between mobile and fixed networks, with termination rates at a fairly low level of around 1 €-cent per minute.

Overall, it can be concluded that the future CPNP based on “pure” LRIC will more closely approximate the costs incurred in electronic communications networks (large fixed costs and close to zero marginal costs).⁹² This alleviates a key demerit of the current CPNP based on LRAIC compared to BAK.⁹³

⁹² When commenting on the draft final study (see Annex for the list of consultation questions), respondents expressed concern on how effectively the cost models developed by National Regulatory Authorities to implement the Recommendation of 7 May 2009 will properly compute pure-LRIC costs for Fixed and Mobile Termination and on whether or not National Regulatory Authorities will set Fixed and Mobile Termination Rates at their pure-LRIC cost level. It may therefore prove appropriate for the Commission to closely monitor the implementation of the Recommendation of 7 May 2009 as a mean to ensure that is properly and consistently implemented throughout the Member States. We observe in this respect that BEREC (2010, p. 24) underlines that “a regulator (...) faces information problems regarding the determination of the regulated price. Not all information necessary for setting the efficient price is available for the regulator who is dependent on operators that do not have incentives to provide the correct information”.

⁹³ See Quigley and Vogelsang (2009): « BAK is like a two-part tariff in access charges: the fixed fee equals the own-network costs for termination of the call generated by the other network, while the variable fee is zero.” (see also DeGraba (2003) and Calzada (2007)).

4.1.3 Implication of the Recommendation of 7 May 2009 for the character of competition

The Recommendation of 7 May 2009 will shift a significant part of the cost recovery of voice calls (acknowledging that the total cost of the voice call service will also significantly decrease due to technological change⁹⁴) from the wholesale domain to the retail domain. This will have key implications for the character of competition in mobile markets (4.1.3.1), in fixed markets (4.1.3.2) as well as in convergent fixed and mobile markets (4.1.3.3).

4.1.3.1 In mobile markets

With the current situation of mobile termination rate levels in the EU before the implementation of the Recommendation of 7 May 2009, leading operators can use MTRs to create a barrier for challengers that want to compete with their on-net offers:

- Leading operators (operating large networks) can propose valuable on-net offers (customers can have on-net attractive tariff for a large proportion of their calls).⁹⁵ In

⁹⁴ See 4.2.1

⁹⁵ This has been referred to as Tariff Mediated Network Externalities. Assuming that the value that each subscriber to a network gets from being a subscriber increases as the total number of subscribers increases (so called "network externality"), tariff mediated network externalities are created if the price of on-net and off-net calls differ because subscribers care about which network they want to call are one. In this respect, it is key to understand whether or not it is the leading operator that initiates on-net pricing in the market and whether or not the difference between on-net and off-net pricing does not artificially inflate club effects.

Sannaes (2008) points out that data suggests that on-net pricing was used as a competitive instrument by all operators in a market (country) triggered by intensifying competition, however the data does unfortunately not allow to ascertain which operator was the first to introduce on-net/off-net differentiation in the market. For detailed analysis of on-net pricing the French mobile market, see Section 6.2.1. France: different interconnection schemes for fixed-to-mobile / fixed-to-fixed (CPNP) and mobile-to-mobile (BAK) followed by a move to CPNP overall.

Elliott (2008) comments that tariff mediated network externalities have a dynamic impact, intensifying competition, reducing profits and increasing consumer surplus to the extent that on-net/off-net differentials reflect underlying access charges. For a detailed analysis of how on-net/off-net differentials greater not reflecting underlying access charges have a detrimental effect on competition and on consumer surplus, see: Autorité de la Concurrence, Décision n° 09-D-3 6 du 9 décembre 2009 relative à des pratiques mises en œuvre par Orange Caraïbe et France Télécom sur différents marchés de services de communications électroniques dans les départements de la Martinique, de la Guadeloupe et de la Guyane, p. 68-76. In this case, Orange Caraïbe introduced different tariffs for on net (calls within its network) and off net calls (calls made by an Orange subscriber to a Bouygues subscriber), where the difference between these on net and off net tariffs did exceed the difference between the costs borne by Orange Caraïbe for handling the two types of call. This "overpricing" of off net calls effectively gives the Bouygues network an unfavourable, expensive image, and encourages consumers who are able to coordinate their purchases (members of the same family, group, or company, etc.) to concentrate their subscriptions on just one network, the larger of the two (in this case Orange). This is known as the "club effect". In this respect, the Conseil emphasises that the anticompetitive impact of the club effect is due not to the absolute size of each of the networks concerned, but to the difference between their sizes: the larger network holds a market share in excess of 82%. The difference in size serves to multiply the overpricing effect.

addition, the asymmetry in wholesale pricing enables leading operators to reinforce on-net / off-net differentiation: the mark-up on retail off-net price is supposed to compensate the asymmetric wholesale prices.

- Challengers (operating smaller networks) cannot propose as valuable on-net offers as leading operators because their market shares are lower. Furthermore, MTRs significantly above costs prevent them from setting their off-net retail prices at the same level as the on-net retail price of the leading operator.

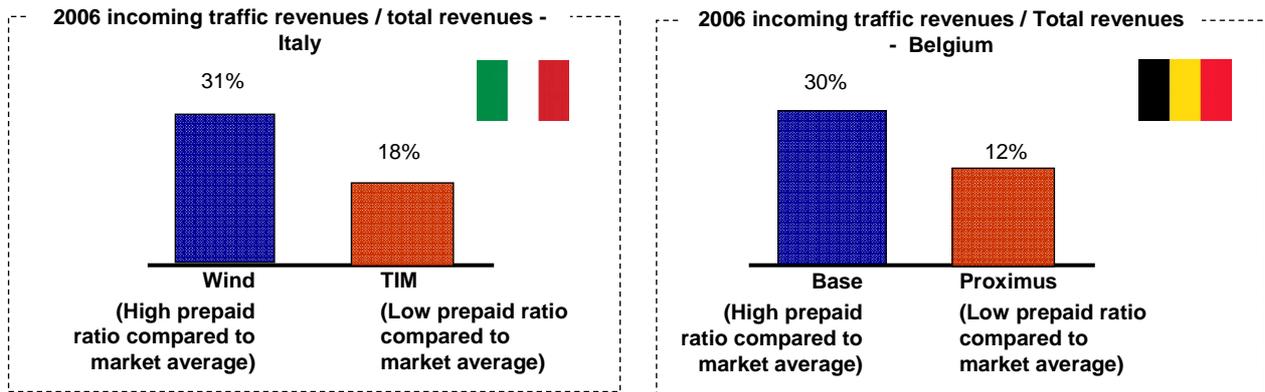
The Recommendation of 7 May 2009 will address the two sides of this issue:

- Under efficient cost-oriented access pricing and reciprocal access pricing between mobile operators, the **leading operator will have almost no rationale to justify significant on-net / off-net differentiation at the retail level.**
- As coverage cost will be allocated to retail services and other wholesale services, MTRs are supposed to be set at a much lower level than the current one. As a result, even if leading operators do not remove completely on-net offers, **challengers will be able to propose attractive cross-net offers in order to compete with them.**

Nevertheless, the effective implementation of the Recommendation of 7 May 2009 could also have an impact on the business model of mobile operators (especially for challengers). Indeed, all mobile operators would lose significant total margins from call termination (for fixed to mobile calls and for mobile to mobile calls) due to the decrease of MTR, but some operators will be more impacted than others:

- The evolution from asymmetrical MTR to symmetrical MTR will induce a higher decrease of challengers' MTR than leading operators' MTR;
- Mobile operators targeting low budget users (typically prepaid) have business models that depend more on interconnection revenues than mobile operators targeting high budget users (typically post-paid). Indeed, for one minute sent to another operator, a low AMPU/ARPU consumer will comparatively receive more incoming traffic than a high AMPU/ARPU consumer (cf. Figure 11).

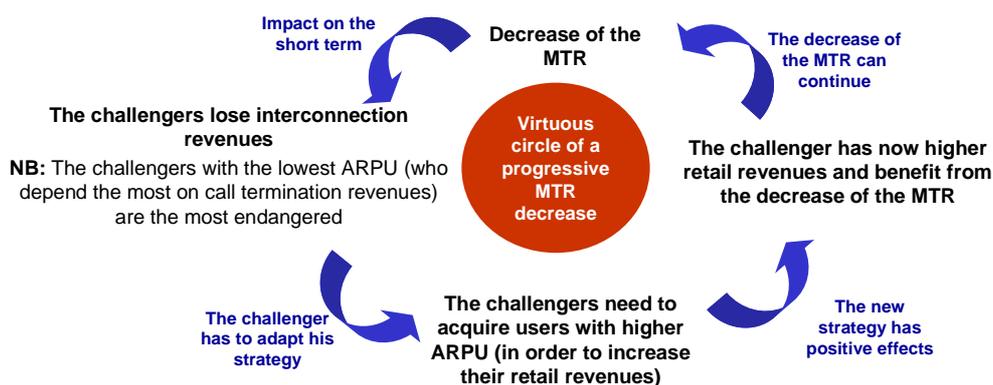
Figure 11: Incoming traffic revenues / total revenues (Italy and Belgium)



Source: Total revenues from annual reports 2006, incoming traffic revenues based on incoming traffic from annual reports and 2006 MTR (Italy) and Quantifica data for 2006 (Belgium)

As challengers generally target low budget users⁹⁶, they will cumulate these two effects on their margin. As a result, they will encounter a significant change in their business model, and will have to target (and acquire) users with higher ARPU, in order to reduce the proportion of incoming revenues in their total revenues (cf. Figure 12). To reach this objective, challengers will now be in a more favourable position to propose flat rate offers: indeed, proposing flat rate generally means a risk relating to the interconnection deficit (whereas revenues are fixed, interconnection costs are proportional to usage). With low MTRs this risk related to interconnection deficit is limited.

⁹⁶ We note in this respect that new entrant Three in the UK – generally alleged to be focusing on medium and larger budget users - has stated in its response to Ofcom Wholesale mobile call termination Market Review Consultation that high MTRs in the UK have specifically precluded Three from competing in certain segments of the mobile voice market, especially high-end postpay. Three also states that, as a 3G-only operator, the additional cost of 3G handsets has also limited its ability to compete in the low-end postpay and prepay segments. See Three (2010, p. 17-18).

Figure 12: Virtuous circle of a progressive MTR decrease

Source: TERA Consultants analysis

Last impact but not least, mobile operators will not recover coverage costs with termination rate, but with other services (retail services, other wholesale services) such as origination). It moves significantly cost recovery from wholesale market with SMP regulation to a retail market with competition⁹⁷, because a significant part of the costs that were previously recovered through MTR will be now recovered from the own end-users.

It can be argued that such a reduction of wholesale revenues will cause an increase of retail prices, which would deter consumer welfare (so called “waterbed effect”⁹⁸) although there is disagreement on whether or not it is complete.⁹⁹

Nevertheless, as ERG mentioned in its common position on NGN Future Charging Mechanism / Long Term Termination Issues (p. 28) : *“in parallel to the eliminated wholesale revenue for termination there is overall the same amount of eliminated wholesale costs albeit effects on individual operators may differ”*.

In addition, as retail markets are competitive, it increases incentives for efficient cost minimization. As a consequence, global consumer welfare should in fact increase as it is highly unlikely that the overall price level¹⁰⁰ will increase due to the decrease of MTRs induced by the Recommendation of 7 May 2009. Should there nevertheless be an overall price level increase in well penetrated mobile markets¹⁰¹, research have been conducted in order to assess the impact the likely impact on mobile penetration (expressed in terms of handset ownership, not to be confused with the SIM card ownership¹⁰²). Evidence

⁹⁷ See ERG (09) 34, p.27.

⁹⁸ A waterbed exists when lower termination rates induced by regulation will result higher retail prices to mobile subscribers.

⁹⁹ See e.g. Frontier Economics (2008); See also 5.2

¹⁰⁰ Please note that the overall retail structure is very likely to change.

¹⁰¹ See 4.3.1

¹⁰² The SIM card penetration is not a very relevant indicator to assess mobile penetration because it takes into account multi-SIM equipment and does therefore not provide an accurate information on the effective mobile ownership.

gathered so far tends to indicate that some mobile customers would react to an increase in retail prices by stopping using their mobile phone.¹⁰³

4.1.3.2 In fixed markets

From a logical point of view, the Recommendation of 7 May 2009 will address any potential issue related to on-net / off-net differentiation in the fixed market, even if the on-net / off-net differentiation issue is not as critical as in mobile market.

In addition, it can be noticed that the decrease of Fixed Termination Rate will have a lower impact on operators' profitability, and as a result the notion of transition phase is less critical than for the mobile market. Indeed, Fixed Termination rates are currently ten times smaller than MTR, so incoming revenues are generally a small part of total operators' revenues.

In fact, the impact of the Recommendation on financial interconnection balance of fixed operators will even be positive, since it will considerably reduce the gap between mobile and fixed termination rates.

- On the one hand, this will **end the cross-subsidies between fixed and mobile voice services**.
- On the other hand, **fixed operators will be able to lower their fixed to mobile retail tariffs, or even to propose a flat rate**: MTR lowering reduces interconnection deficit of flat rate offers (high usage offers generally generate more outgoing calls than incoming calls), as well as the risk associated with this deficit. This will stimulate fixed to mobile usage, to some extent at the expense of mobile to mobile usage.

For example, it is possible to assume that with an important decrease of MTR, fixed operators will be able to propose flat rate (unlimited offers) for fixed to mobile calls, as some of them already do for fixed to fixed calls. Indeed, flat rates are generally only possible with a low termination rate (with high termination rates, fixed operators would have a high uncertainty related to consumer's usage): ERG (09) 34 point out that "*the absence of alternative pricing schemes (flat rates, buckets of minutes) is usually related with calls to services with high termination rates.*"

¹⁰³ It is beyond the scope of this Study to conduct a review of the research into the impact on mobile ownership of higher retail prices (be there in the form of an increase of the monthly charge, higher of less subsidised handset prices, etc.).

4.1.3.3 In convergent fixed and mobile markets

It is generally acknowledged that, across the EU, there is a trend of fixed to mobile substitution, which in some countries has significantly intensified in recent years. Converged fixed-mobile services have started to appear in the market.

An integrated operator will support the impact of the Recommendation of 7 May 2009 for both sides: as a fixed operator and as a mobile operator. Nevertheless, it is important to notice that some impacts are not cumulative but opposite, so in fact, integrated operators will be probably less impacted than non integrated operators. Indeed, integrated operators will reduce their cash payment for Fixed to Mobile outgoing calls but they will also reduce their revenues for Fixed to Mobile incoming calls.

By contrast, Section 4.1.3.1 shows that mobile challengers, which generally target low budget users, cumulate two specific negative effects on their margin, because compared to leading operators they will support a higher decrease of their MTR and their wholesale revenues represent a larger part of their total revenues. Their competition position to develop fixed to mobile convergence may therefore be weakened compared to leading mobile operators.

The Recommendation of 7 May 2009 is likely have a significant impact on competition dynamic in mobile and fixed markets.

In the mobile market, it will contribute to prevent leading operators to implement on-net / off-net differentiation strategy and induce challengers to target high users, which will reduce their dependency to higher than efficient Mobile Termination Rates. In addition, the regulatory environment moves from a system with high Mobile Termination Rates where operators recover their costs through wholesale rates to a system with low Mobile Termination Rates where they recover a significant part of these costs through their own end-users retail rates.

In the fixed market, it will remove cross subsidies between fixed and mobile services, induce a decrease of fixed to mobile retail tariffs and stimulate fixed to mobile usage, in particular through inclusion in existing flat rates.

Overall artificial commercial barriers to fixed-to-mobile convergence will be removed.

4.1.4 Overall assessment of the impact of regulatory changes

According to the Commission's Recommendation of 7 May 2009 on "The regulatory treatment of fixed and mobile interconnection in the EU", the fixed and mobile termination rates should - by 31 December 2012 - be calculated only for traffic-related costs, and should be based on efficient technologies (in particular NGNs) available in the time frame considered. This should be calculated as the last increment of costs that would be avoided if call termination was not provided (the so-called "pure LRIC" cost modelling approach).

After the implementation of the Recommendation of 7 May 2009, there will be on the one hand low and comparable termination rates between networks and Member States, and on the other hand costs that are mostly recovered at the retail level instead of at the wholesale level.

Overall, it can be concluded that the improved CPNP based on "pure" LRIC will more closely approximate the costs expected to be incurred in electronic communications networks (large fixed costs and close to zero marginal costs). This alleviates a key demerit of the current CPNP based on LRAIC compared to BAK.

An additional move from this improved CPNP based on "pure" LRIC to BAK would mean that some traffic sensitive costs which were previously covered in the regulated wholesale market would be recovered in the unregulated retail market. Consequently, if there is sufficient competition at the retail level, the potential to exploit control of the termination bottleneck would no longer be available.¹⁰⁴

¹⁰⁴ We observe a convergence of analysis with BEREC which identifies and assesses the properties of BAK by distinguishing between the level effect and the system effect (BEREC 2010, p. 9-10). The level effect refers to impact of a decrease from a higher to a lower level of termination rates while maintaining a CPNP charging mechanism (with a termination rate > 0). For example the level effect covers how a reduction in termination rates affects usage. The system effect results from a change of the charging mechanism, i.e. shifting from CPNP to BAK and thereby effectively eliminating termination rates. In many cases, the level and the system effect work in the same direction but clearly there are differences that will persist even with very low per minute termination rates.

BEREC comments further that "... the cost price of both voice and data services is expected to fall in the near future. This is expected for both fixed and mobile services and is mainly driven by the development of NGN networks that deliver all or most services through a common, shared infrastructure. This decreasing cost price is relevant for the full cost including common and joint cost, but even more relevant for the incremental cost of termination. Regarding the falling costs per minute, it is also important that the absolute difference in cost per minute between fixed and mobile is decreasing. Beside this also the view on which costing methodology is appropriate within the CPNP is changing. The European Commission has released a new recommendation on the regulatory treatment of fixed and mobile termination rates in the EU. A crucial element in this recommendation is the pure LRIC costing methodology. In this pure LRIC methodology, the non-incremental (common and joint cost) should not be allocated to termination, resulting in a lower relevant cost price.

If the expected decrease in regulated prices (or price caps) for wholesale termination under the current CPNP regime materialises (either because of technological developments, cost reductions, the implementation of "pure" LRIC or both), the difference between CPNP and BAK, in terms of effects, will

4.2 Expected Impact of the convergence of the network, with a single integrated IP-based network delivering a combination of data, voice and video services

Electronic communications networks will become packet switched, mostly or completely based on the Internet Protocol (“IP”). They will be multi-service networks, rather than service specific networks, for audio (including voice), video (including TV-services) and data networks, allowing a decoupling of service and transport provision.¹⁰⁵

This convergence to a single integrated IP-based network delivering a combination of data, voice and video services is likely to have several major impacts on how interconnection has been generally considered:

- The voice service costs (and hence the cost base to implement CPNP) are likely to become far less significant than the costs of Internet/data and TV services in single integrated IP-based networks. However the termination monopoly for the voice service based on the telephone number will remain present in a multi-service NGN.
- The standardisation of IP interconnection for voice services is likely to introduce key changes in the economics of interconnection which are not related to the interconnection charging scheme.
- Although there is convergence in technology between NGN and Internet through the use of IP and convergence in the market-place through Internet Service Providers (“ISPs”) and others offering voice services on Internet (so-called “VoIP” services) as a substitute for the PSTN, there is no convergence in the way in which the NGN¹⁰⁶ and Internet are organised and run. As currently being designed, they are not converging but fundamentally different. This is explained in detail in this section. Consequently there is no case to argue that the charging mechanisms of the NGN of fixed/mobile operators need to copy those of Internet.

In the remaining of this section, we will detail each of the impacts in turn and conclude with an overall assessment of the impact of technological changes.

become less prominent which may pave the way for a regime change. However a difference between the two methods will persist in the medium run and there will remain system effects.” (BEREC (2010, p. 10)

¹⁰⁵ As acknowledged by the Recommendation of 7 May 2009.

¹⁰⁶ Since “NGN” is in practice a rather vague term that is used quite loosely, we should be clear that we use the term narrowly. In this Section, the comments refer to the provisions of services on the core networks (“Next Generation Networks” and do not refer to access networks (“Next Generation Access”) nor to the replacement below the IP-layer of SDH and ATM with Gigabit Ethernet to provide better broadband and to delivering TV, which is an especially positive development.

4.2.1 The voice service costs (and hence the cost base to implement CPNP) are likely to become far less significant than costs of Internet/data and TV services in single integrated IP-based networks

Traditional fixed and mobile network operators are migrating their voice service to NGN/IP networks.

According to NRAs' answers to our questionnaire sent in February 2010, circuit-based fixed voice traffic remains dominant but the substitution trend towards IP-based voice traffic seems to be significant even if there are variations between countries. In France the share of IP-based traffic¹⁰⁷ has now exceeded the share of circuit-based voice traffic. If the average growth rate remains as it is in the group of countries that have answered to our questionnaire, the voice service would be 50% on IP by 2012.¹⁰⁸

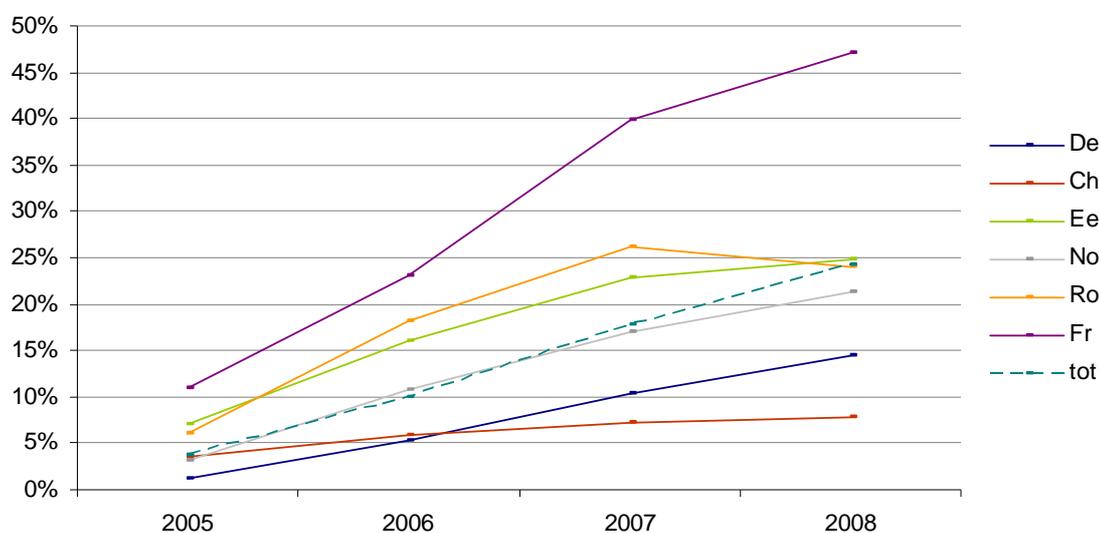
With respect to mobile networks, a trend towards enabling VoIP in particular from smartphones running on 3G networks is noticeable. This is sometimes enabled by mobile operators subject to the payment of a specific flat fee.¹⁰⁹

¹⁰⁷ From the comments accompanying answers to our questionnaire, it can be inferred that this is predominantly when not exclusively "managed" Voice / Voice over Broadband traffic.

¹⁰⁸ Data are available since 2005 for six countries (Estonia, France, Germany, Norway, Romania, and Switzerland) and for 8 countries since 2007 (Denmark, Portugal).

¹⁰⁹ E.g. Germany, the UK and France.

Figure 13: Evolution of the share of IP voice traffic on total outgoing fixed voice traffic (in minutes) in selected EU countries



Source: NRAs' answers to questionnaire¹¹⁰

However IP-based voice traffic already constitutes a relatively small fraction of overall IP traffic; in the future it is expected that this fraction will continue to be small in comparison with other services.¹¹¹ **Overall, circuit-based voice will migrate to IP-based voice, but this is likely to be a small proportion of the total traffic in the NGN multi-service networks, be they fixed or mobile.**¹¹²

The single integrated IP-based network delivering a combination of data, voice and video services will be characterized by a **higher proportion of common costs to be distributed amongst services**. The allocation of such common network costs between different services is indeed a key issue for network cost modelling, not only in fixed networks (TV, VoD, voice, Internet, etc.), but also increasingly in mobile networks which share many services (voice, SMS, MMS, data, VoIP type Skype, etc.). It should be noted that the extent of integration of different traffic types at the IP layer is still uncertain as there is as yet no commonly accepted single design. Different traffic types (e.g. voice,

¹¹⁰ The decline of IP-based voice traffic share in Romania between 2007 and 2008 could be the consequence of a change in measurement by the NRA. The NRA distinguishes three categories: PSTN, IP and other types of outgoing minutes, like homezone or DECT.

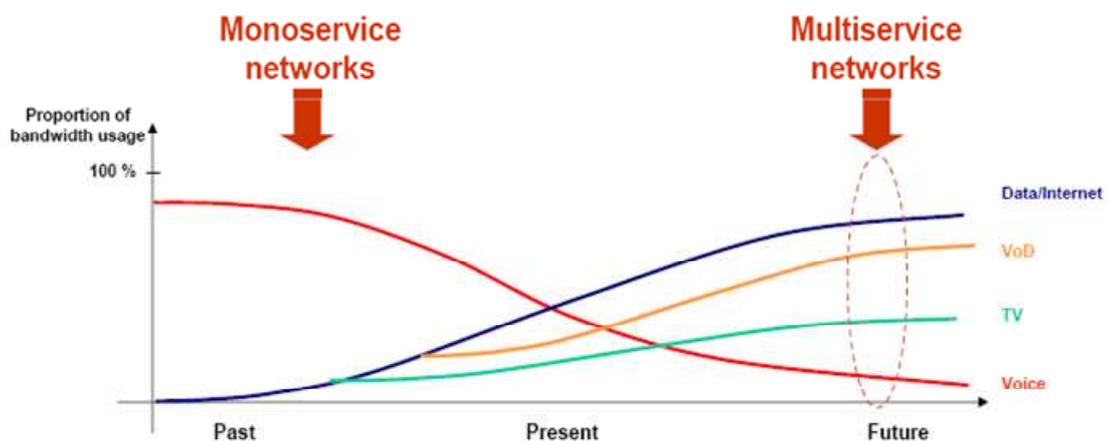
¹¹¹ See ERG (09) 34, p. 15.

¹¹² With respect to mobile, according to Cisco VNI Global Mobile Data Traffic Forecast for 2009-2014, data traffic will increase from 29 to 1076 TB per month over this period in Western Europe. Consequently, the share of voice traffic among global mobile traffic is expected to go down. Moreover part of this data traffic will be VoIP, according to Cisco.

VoD, Video, Internet...) may be segregated using MPLS or using the underlying transmission technology such as Gigabit Ethernet.

Given the increasing demand for services such as data, Internet or VoD, traditional cost allocations based on bandwidth (average cost rule) will eventually make the unitary cost of voice collapse in such multi-service NGN networks. Indeed, with the NGN architecture, several services are using the same active transmission or switching/routing equipment, which leads to an important re-allocation of costs amongst services (cf. Figure 14).

Figure 14: Evolution of bandwidth usage during the transition from “mono-service” legacy network to “multi-service” NGN



Source: TERA Consultants analysis

In the context of fixed NGN Bottom-Up cost modelling that we undertook recently for Regulatory Authorities¹¹³, we have reviewed alternative allocation rules for the network common costs considered in the economic theory pertaining either to the “proportional rules family” (e.g. equidistribution, required capacity, residual benefit, Moriarty, Louderback) or to the “game-theory rules family” (e.g. Shapley Shubik, nucleolus or serial cost sharing). We have effectively implemented alongside the traditional cost allocation methodologies (required capacity, whereby the costs are allocated according to required capacity of each service) and an allocation methodology following Shapley Shubik, which is allocating a higher share of the common network costs to the voice service because costs are allocated on the basis of the average incremental costs of a given service taking into account all possible orders of arrival.¹¹⁴

¹¹³ ARCEP in France, ComReg in Ireland.

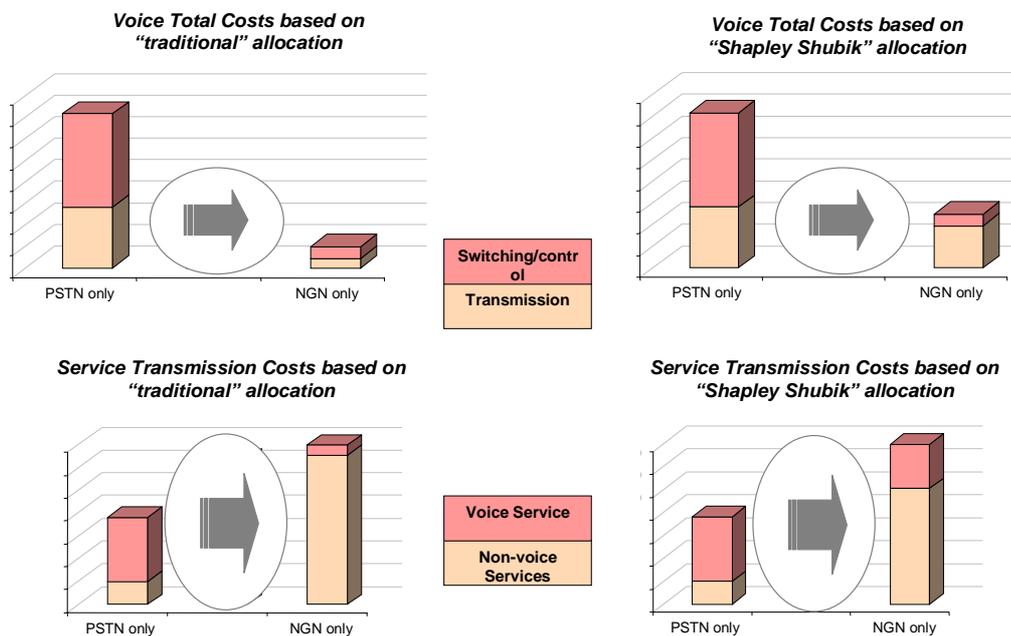
For the avoidance of doubt, the Bottom-Up cost modelling we are referring to computes Long Run AVERAGE Incremental Costs and not “pure” LRIC as per the Recommendation of 7 May 2009.

¹¹⁴ Let us suppose a network with three services, Voice, Data and TV. According to a Shapley-Shubik approach, we will consider a sequence of building the network to provide the voice, then the incremental

In any case, it appears that (cf. Figure 15) whatever the allocation methodology retained:

- The voice total costs will be much smaller in an “NGN only” network than in a “PSTN only” legacy network;
- The share of the voice total costs in the total costs of the network will be much smaller in an “NGN only” network than in a “PSTN only” legacy network.

Figure 15 : Overview of the impact of allocation keys



Source: TERA Consultants analysis

However, migration to multi-service NGN is unlikely to alleviate the termination monopoly. In circuit-based legacy networks, an operator completely controls the access to the traffic that is destined to its subscribers, enabling it to charge excessive pricing (absent regulation) for terminating traffic because the calling user can only choose between not making the call or pay whatever charge the terminating network sets for termination. As pointed out by ERG¹¹⁵, it is very likely that this problem remains after the

cost to provide the data having built the network for voice, and finally the incremental cost to provide TV having built the network for voice and data. We will then consider in turn all possible sequences of entry (there are six of them in our example : V – D – TV ; V – TV – D, D – TV – V ; D – V – TV ; TV – V – D ; TV – D – V) and compute all possible incremental costs for the three services. The Shapley-Shubik allocation key is then computed by averaging all possible incremental costs for each of the three services.

¹¹⁵ See ERG (09) 34 (p. 26-27) and by ERG (08) 26rev1, Chap. 3.2.

transition to NGNs¹¹⁶ because, to our knowledge, there is no foreseeable mechanism that would enable more than one telephone service provider to terminate voice calls on a single telephone number.

Circuit-based voice will migrate to IP-based voice, but is likely to be a small proportion of the total traffic in the NGN multi-service networks.

In the future, the voice total costs will be much smaller in an “NGN only” network than in a “PSTN only” legacy network. The share of the voice total costs in the total costs of the network will be small in an NGN network.

However the termination monopoly for the voice service based on the telephone number will remain present in a multi-service NGN.

4.2.2 The standardisation of IP interconnection for voice services is likely to introduce key changes in the economics of interconnection which are not related to the interconnection charging scheme

4.2.2.1 Current and expected status of the standardisation of IP interconnection interfaces for voice services

A great deal of standards work has been done on the NGN over a long period from 1997 to the present day and in particular on standards for IP-based interconnection of voice services. At an interconnection point both operators must indeed follow the same standards even if one uses a gateway adjacent to the interconnection point for conversion to its internal standards. Thus each country needs a national set of standards that specify the interconnection points between operators.

For the reader who is not familiar with telecommunications standards, it should be pointed out that there is not a single standard for IP-based interconnection of voice services. Instead there is a very complex collection of inter-related standards based on IETF documents called RFCs. The total paperwork needed to describe the interconnection interface would be well over 1000 pages.

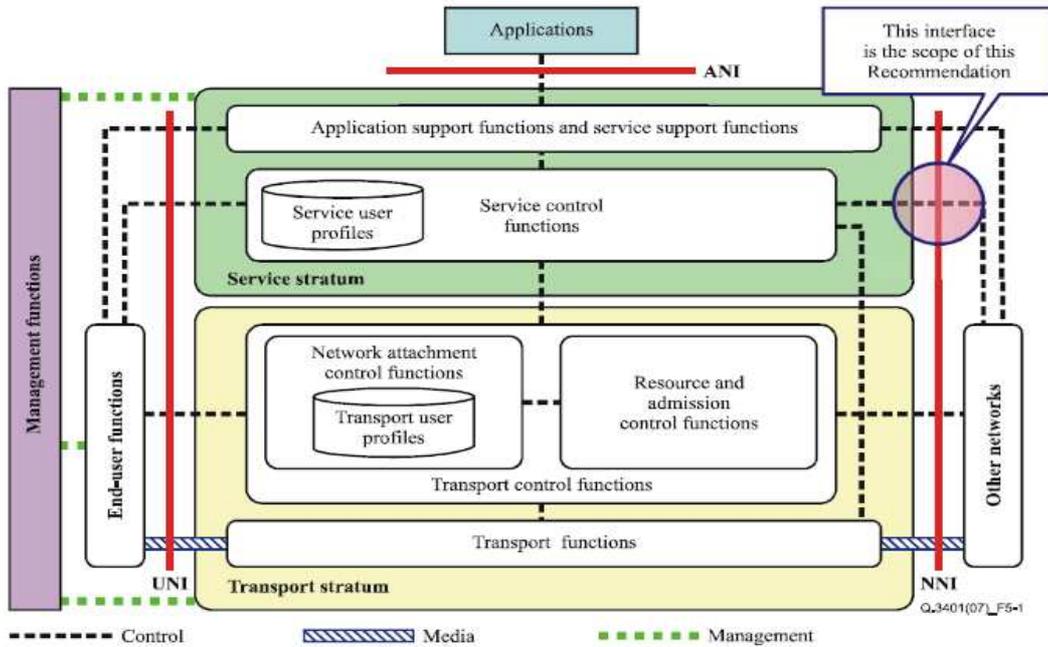
Within the telecommunications operators' standards world, the **focus is on the IP Multimedia Service (IMS) of 3GPP** which is a set of standards for an NGN core network based on "native" SIP and cable of supporting both fixed and mobile networks.

- The ITU is producing a manual on NGN and the drafts available to date show that it will be a comprehensive collection of information. The ITU has produced a

¹¹⁶ See also WIK-Consult, The Future of IP Interconnection: Technical, Economic and Public Policy Aspects, Final Report, Study for the European Commission, 29 January 2008, p. XI.

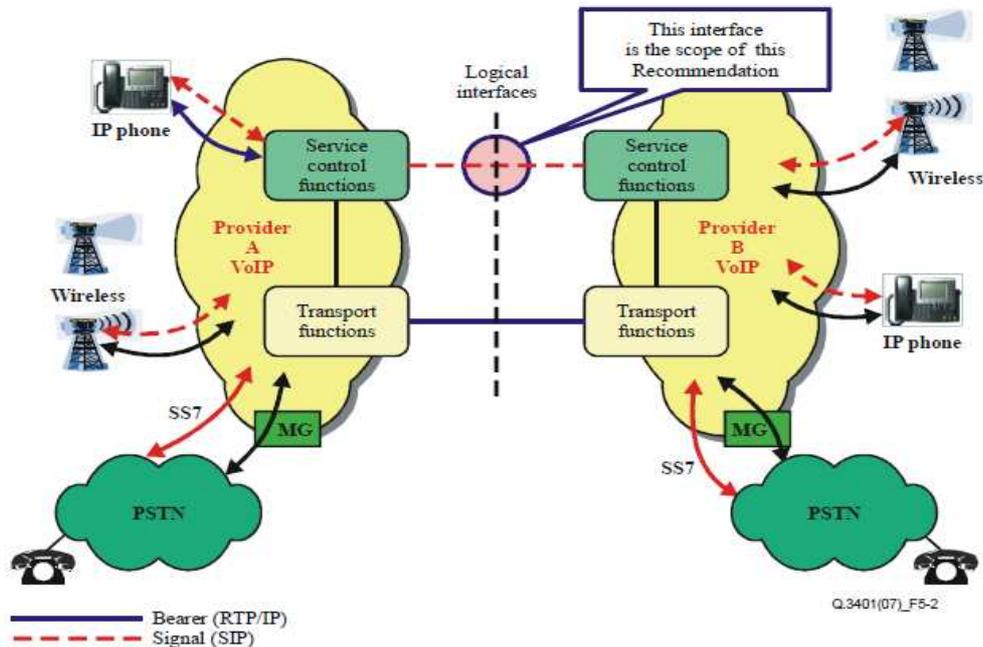
Recommendation for the signalling at the Network-Network Interface - Q.3401. Figure 16 shows the reference model and the interface, and Figure 17 shows the interface in more detail with the separation of service and transport.

Figure 16: ITU Reference Model



Source: ITU

Figure 17: Network - Network Interface



Source: ITU

- ETSI has produced its own broadly equivalent standards based on the IP Multimedia Subsystem of 3GPP, which has been developed to work with both fixed and mobile forms of access. Key developments are the (i) Network Attachment Subsystem (NASS) and (ii) Resource and Admission Control Subsystem (RACS). The main ETSI signalling standard is: ETSI ES 283 003 (3GPP TS 24.229 [Release 7], modified): IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3.
- The UK industry has prepared a set of its own standards indicating how it will use the ETSI standards at the interconnection interface. These standards are published on: <http://www.nicstandards.org.uk/publications/green-release.cfm>. This set is the most detailed work that we are aware for IP-based interconnection of telephony.

Some fixed operators who were planning to implement NGN with PSTN emulation are now postponing their work and planning instead to use PSTN simulation using the IMS standards because they think that this is the more future proof approach.

There are in practice two main forms of publicly available telephone service on the NGN¹¹⁷:

¹¹⁷ We ignore the earliest and little used form based on the ITU H.323 recommendation.

- **PSTN emulation**, which carries and uses the existing forms of ISUP signalling used within encapsulated SIP messages and reproduces PSTN services with a fairly high degree of precision;
- **PSTN simulation**, which uses "native" SIP messages instead of encapsulated ISUP signalling and reproduces PSTN services with less precision, but sufficient for compatibility.

PSTN emulation and PSTN simulation are merely two alternative standards for routing the voice service on the NGN. The choice between them has no impact on the choice between cost-based CPNP and BAK.

The standards for interfaces for IP interconnection for voice services have not been implemented much if at all to date and so it is likely that changes will be needed as lessons are learned during implementation in the years to come. There is no impact from the standards work on the choice between cost-based CPNP and BAK.

4.2.2.2 The effective implementation of IP-Interconnection will require defining the rules for the number and geographic location on points of interconnection

It is generally believed that the efficient network level for interconnection will move up with the transition to multi-service NGN¹¹⁸, because transport costs are believed to decrease and connecting at too many Pols increases the complexity of routing traffic between networks.

There is indeed a trade-off in interconnection at a lower network level or at a higher network level, depending on:

- non-traffic related costs, i.e. the costs of purely connecting to the different Pols of Network B (e.g. costs of collocation, network gateways...), which rise if the number of Pols rise;
- traffic-related costs, i.e. the costs to transport local traffic to a higher level where networks are interconnected and then transporting it down to a lower network level again (e.g. specific routing for interconnect traffic...), which decrease if the number of Pols rise.

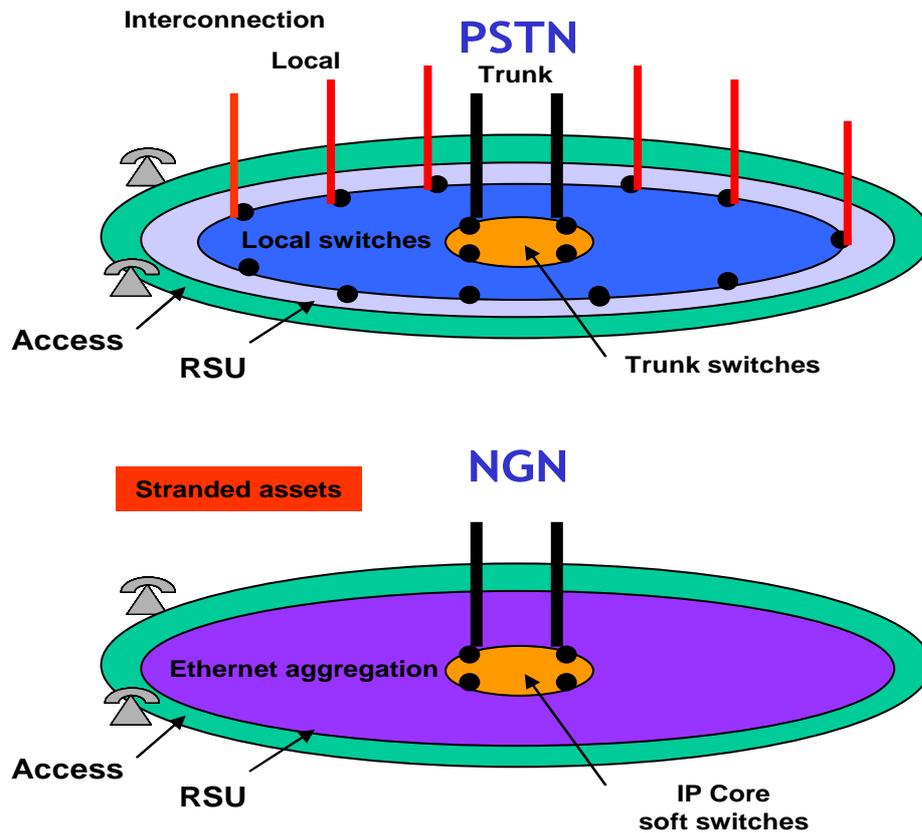
The standardisation of IP-Interconnection will therefore make it necessary to define the rules for the number and geographic location of points of interconnection for which

¹¹⁸ See ERG (09) 34 (p. 19) and ERG (08) 26rev1, Ch. B.3.31.

termination at the lowest termination fee is possible (under CPNP) or for which BAK is implemented (under BAK).¹¹⁹

This likely reduction in the number and geographic location of points of interconnection is a major issue for most facilities-based alternative operators in the voice market because it causes stranded assets. As illustrated in Figure 18 in an extreme situation, interconnection at the local level (“the edges of the NGN”) would no longer be relevant for IP-traffic, as such traffic could be easily exchanged directly at national level (“the core of the NGN”). Consequently, all investments made by alternative operators at the local level (e.g. collocation, fiber-backhaul...) are stranded unless they have connected local exchange sites from where these operators are also requesting Local Loop Unbundling¹²⁰.

Figure 18: The issue of stranded assets in the migration from circuit-based to IP-based interconnection for voice



Source: TERA Consultants analysis

¹¹⁹ See ERG (09) 34; Question 3 “How would you define the boundary for the application of BAK and where should it be located (i.e. points of interconnection where BAK is applicable)?”

¹²⁰ It should nevertheless be mentioned that NGA (Next Generation Access) plans by fixed incumbent operators are also likely to impact the number and geographic location of these exchange sites.

The effective implementation of IP-Interconnection will require the definition of rules for the number and geographic location on those interconnection points for which termination at the lowest termination fee is possible (in the case of cost-based CPNP) or for which BAK is implemented (case of BAK). Rules for points of interconnection for IP-interconnection will have to be defined notwithstanding the choice of the future interconnection charging scheme.

4.2.3 Although there is convergence in technology between NGN and Internet through the use of IP and convergence in the market-place through ISPs and others offering voice services on Internet (so-called “VoIP” services) as a substitute for the PSTN, there is no convergence in the way in which NGN and Internet are run

The WIK Report on the Future of IP Interconnection¹²¹ provided a high quality and comprehensive overview of IP interconnection both in the Internet and NGN worlds. Basically, we think that the difference between these two worlds needs to be emphasised even more strongly than it is in the WIK report.

There appears indeed to be considerable confusion about NGN and Internet with insufficient emphasis on the completely different way in which they are organised operationally and commercially, even though they use the same basic technology. It is therefore worth explaining these differences in some detail because there seems to be an expectation that they are converging and that this will affect the debate between CPNP and BAK for voice traffic.

The argument or expectation¹²² that the interconnection regime for voice should move from CPNP to BAK because of convergence between the NGN and Internet is as follows:

- The NGN is based on IP technology;
- Internet is based on IP technology;
- The NGN and Internet are converging;
- Both the NGN and Internet offer aim to support third party service provision;
- Internet uses peering, which is a form of BAK, and it works well with no regulation;

¹²¹ WIK-Consult, Final Report, Study for the European Commission, “The Future of IP Interconnection: Technical, Economic, and Public Policy Aspects”, Bad Honnef, 29 January 2008.

¹²² This expectation is, we suspect, the reason why both the previous WIK study and the NGN Handbook (see below) being developed by the ITU intermingle discussion of the NGN and Internet so extensively.

- Therefore voice traffic on the NGN should use BAK.

Based on observation of both the work of the standards bodies and the developments in the markets, we consider that this expectation is incorrect. Whilst in theory this convergence might exist, in practice it does not exist, since the NGN has been designed on the basis of the PSTN commercial models and is equivalent to "PSTN on IP". Although the technology is the same, the way it is organised and charged for is totally different.

In order to start to explain this point we now repeat the expectation and show where we consider that it is incorrect:

- The NGN is based on IP technology.
- Internet is based on IP technology.
- The NGN and Internet are NOT converging. Although they are converging in the market place by offering similar services, they are organised completely differently and so remain separate and distinct, even though they share the same transmission infrastructure (such as fibre networks).
- Both the NGN and Internet aim to support third party service provision, but the NGN distinguishes service and transport, whilst Internet distinguishes service and connectivity. The transport layer of the NGN is completely different from the connectivity layer of Internet.
- On Internet, users can buy services such as email separately from Internet access / connectivity. At the service level, services on Internet such as email use BAK but could use CPNP. In the NGN, the user cannot buy services and transport separately but the transport is linked to the service and sold with it.¹²³
- Internet uses peering, which is a form of BAK, and it works well with no regulation. This is true of the connectivity layer but this layer also uses transit, which is not BAK.¹²⁴

¹²³ The service and transport may be provided by different parties if there is third party service provision where the transport provider is subcontracting to the service provider.

¹²⁴ At the connectivity layer, the "interconnection" regime for packets flows is therefore equivalent to an hybrid BAK/CPNP approach for voice traffic (and not to a "pure" BAK) whereby no economic value is associated to the exchange of packets when Internet Services Providers ("ISPs") are roughly of the same size and an economic value (the price for transit, usually capacity-based and not per minute based as for circuit-voice currently) is associated for exchange of packets from smaller ISPs to larger ISPs.

It is worth reminding in this respect that in the very early years of Internet such a peering arrangement was implemented between US universities and public research centres for the purpose of reciprocal access to and exchange of information. There was no economic value associated to the termination of Internet traffic and according to the so-called "acceptable use" policy, no private interests were allowed to enter the system. Once private companies entered the system, the original idea of no financial flows between peers was kept, but an economic value for traffic to be terminated for "non-peers" was introduced in the form of transit prices (Dang Nguyen and Penard, 1998).

- Therefore the NGN and Internet are not converging and so there is no argument from convergence in favour of BAK.
- There are, however, some other technological factors that affect the debate over CPNP and BAK such as the reduction in the cost of voice traffic.

Two technical issues seem to be causing this confusion between the NGN and Internet:

- The **common use of IP technology**;
- The **common concept of distinguishing services from connectivity in the case of Internet and from transport in the case of the NGN**. The difference between connectivity in Internet and the transport layer in the NGN is fundamental and is explained in more detail later.

As illustrated in Figure 19 below, the four features that give Internet its commercial attractiveness and potential for supporting new services **are not present in the NGN**, namely:

- The complete separation of services and connectivity;
- Global public IP addressing;
- Global public distributed database for translating names to addresses and other functions;
- The Border Gateway Protocol for fast updating of IP address routing tables as IP addresses are added and networks change.

Figure 19: Overview of differences between interconnection on NGN and on Internet

| | Internet | NGN built by fixed/mobile operators |
|--|---|---|
| Structure at the IP level | Open | Closed |
| Border controls | Not present | Borders tightly controlled |
| IP Addressing | Global Public addresses | Private addresses not visible externally |
| Third party service provision | Supported | Supported |
| Services and connectivity | Totally separate and can be sold separately | Connectivity is available only when linked to services through the transport layer. Always sold together. |
| Interconnection contracts | Typically short and simple for connectivity and may not be needed at all for services such as email | Lengthy and complex |
| Time to establish interconnection | Less than a month | 4-9 months |
| Updating of routing tables | Automatic using BGP at the IP level | Administrative processes between operators |

Source: TERA Consultants analysis

There is a great deal of confusion about convergence between the NGN and the Internet. Although they use the same technology they are organised completely differently and are NOT converging.

We will now investigate these differences between the NGN and Internet in more detail.

4.2.3.1 Structure at the IP level, Border controls and IP Addressing

Internet is a collection of separate interconnected packet switched networks that share a common public addressing system as part of the IPv4 protocol, which is gradually being superseded by IPv6. In general, there is no control over the packets that cross points of interconnection, although there may be some blocking of packets that are considered "dangerous". The individual networks that make up Internet are provided by fixed/mobile operators and Internet Service Providers who use transmission facilities from the fixed/mobile operators.

New networks can join Internet by concluding a simple interconnection agreement with any network that is already part of Internet and then have full connectivity to all the other networks on Internet. The addition of a new network with a new address range is greatly facilitated by the automatic Border Gateway Protocol, which removes the need for other operators to update their routing tables manually or exchange information on new addresses by administrative means.

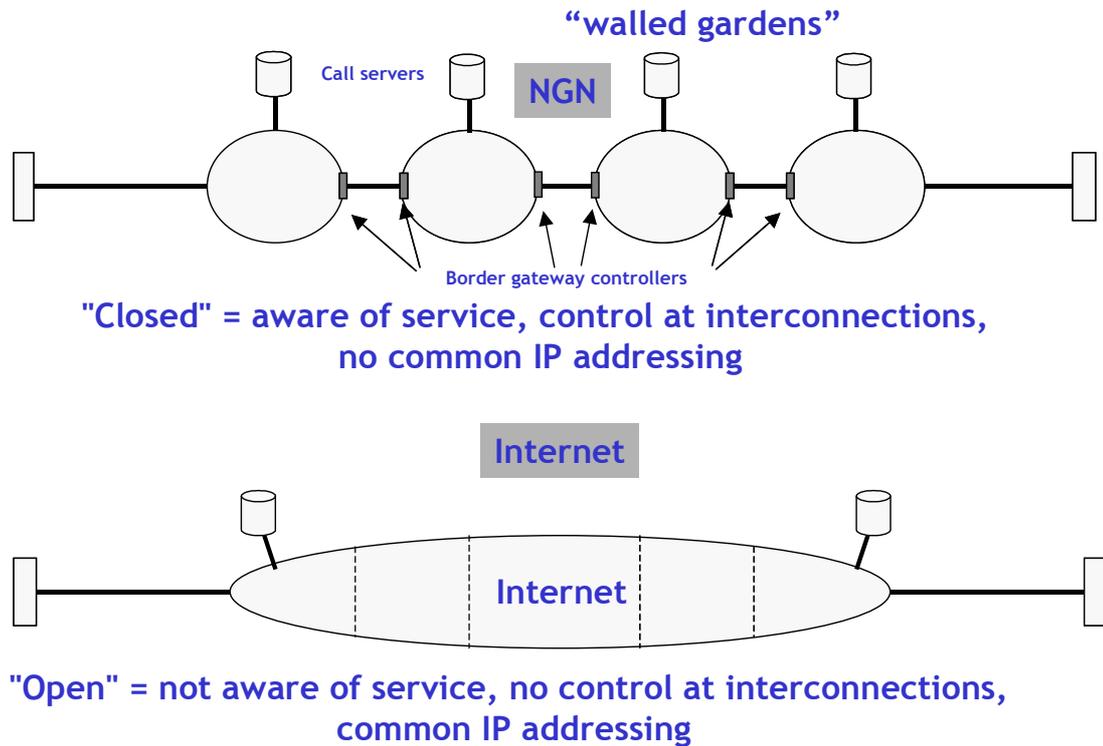
The result is that any user connected at any point can send a packet that will reach any other point on Internet. In other words, a user can "see" right across Internet. To use an analogy, Internet is like a number of adjacent pieces of land under different ownership but with open borders and people able to cross the borders without any border control (rather like the continental EU).

The NGN built by fixed/mobile operators is quite different even though it shares the same underlying transmission infrastructure as Internet.

Each fixed/mobile NGN platform is like a "walled garden" or a country with strict border controls such as firewalls. Packets cannot be allowed across the interconnection point unless they are authorised, meaning that there has to be an interconnection contract that specifically allows such a packet to cross the border (rather like needing a visa before travel). Within each fixed/mobile operator's NGN platform, the operator may use private IP addressing rather than public IP addressing but in any case these addresses are not visible externally.

Adding a new network to the fixed/mobile NGNs with a new number range will require administrative processes to inform other networks of the new ranges. This is a slow and unreliable process unlike the automated process on Internet.

Thus whereas Internet is a collection of "open networks", the fixed/mobile NGNs are a collection of "closed" networks. The differences are illustrated in Figure 20.

Figure 20: Comparison of the open Internet and the closed fixed/mobile operators' NGNs

Source: TERA Consultants analysis

For voice services the NGN is therefore designed to copy PSTN onto IP technology and hence can be described as "PSTN on IP".¹²⁵ It is not "voice services on Internet".

¹²⁵ The latest ITU definition of NGN is as follows (from Y.2001- 12/2004): **"Next Generation Network (NGN):** A packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users."

This definition is more a statement of intention than a statement of current fact. The following are some issues raised by the definition:

- Depending on the interpretation of "able to make use of multiple broadband, QoS-enabled transport technologies" the definition might encompass the Internet since the Internet can run over forms of Gigabit Ethernet that support different levels of quality. The definition does not state that the network offers services at different levels of quality.
- The definition of "transport technology" would need to exclude the "connectivity" of the Internet if the definition is to distinguish the NGN from the Internet. This is not totally clear.
- The definition says that the NGN offers: "... unfettered access for users to networks and to competing service providers and/or services of their choice", but currently the implementations of NGN offer no more than the carrier selection services available on the old PSTN. Access is far from "unfettered", it depends on contracts and commercial terms and the technical possibilities in current implementations are highly limited. It may not even be offered. A user connected to BT's NGN cannot use the services of France Telecom's NGN other than to terminate calls in the normal way (unless it uses the UK Orange service through carrier selection or wholesale line rental across a circuit switched interconnection).

Currently there is therefore almost no direct interconnection between NGNs of fixed and mobile operators for voice traffic carried over NGN: the traffic is transformed from IP to circuit then handed over at the interconnection, and then transformed back from circuit to IP.¹²⁶

Some VoIP services, however, are designed as voice services on Internet except where they interconnect with fixed/mobile PSTN services: in that case, the traffic is also transformed from IP to circuit then handed over at the interconnection, and then transformed back from circuit to IP.

4.2.3.2 Services and connectivity

Internet offers connectivity, the provision of services is quite separate, and at the connectivity level Internet is not aware of the services that it is carrying. For example, although many users may in practice buy their email service from their ISP together with their Internet access/connectivity, they can buy their email service separately from a different provider.

-
- The definition says that the NGN supports: "...generalized mobility which will allow consistent and ubiquitous provision of services to users". This sentence is inconsistent with the separate definition of generalized mobility, which introduces scope for the mobility to be far less than "consistent and ubiquitous": "**Generalized mobility:** The ability for the user or other mobile entities to communicate and access services irrespective of changes of the location or technical environment. The degree of service availability may depend on several factors including the Access Network capabilities, service level agreements between the user's home network and the visited network (if applicable), etc. Mobility includes the ability of telecommunication with or without service continuity." As far as we are aware such mobility is available only on the home network and may not even be available throughout the home network in some implementations.

The conclusion is that the current NGN implementations do not fit the ITU definition of NGN because the definition has been formulated as more a statement of long term intention than a clear discriminator of what is currently advertised as "NGN".

"PSTN on IP" is therefore a fair description of the current implementations of NGN.

However the term "PSTN on IP" is not meant to detract from the new technical features that are intended for the future. Rather it is intended to draw attention to the common "walled garden" nature of both the PSTN and the NGN. We are aware of no intention to move away from the "walled garden" concept to the open connectivity infrastructure concept of the Internet.

¹²⁶ The authors of the Study on Next Generation Networks (NGN) for the European Parliament (European Parliament and Directorate General for Internal Policies, 2009, p. 29) comment that "clearly, something is happening here that has little to do with technology". Their belief is that operators "are unlikely to evolve their interconnection arrangements to IP as long as they perceive a risk to their wholesale and retail payment arrangements". They observe therefore that "the lower termination rates (as per the Recommendation of 9 May 2009) are probably a step in the right direction in terms of enabling network operators who wish to do so to shift their interconnection arrangements from circuit-switched SS-7 to packet-switched IP."

Commenting on their Recommendation 8: Monitor the migration to IP-based interconnection (European Parliament and Directorate General for Internal Policies, 2009, p. 52-53), the authors conclude that "for the most part, technical standards for NGN appear to be evolving as they should. (They) see no immediate need for policy intervention, but (they) think that developments bear watching. As previously noted, there is a constellation of unresolved issues as regards IP-based interconnection. Why has there been so little movement by large network operators to migrate their voice services to IP-based interconnection (...)? Why so little movement to implement QoS-aware IP data interconnection (...)? And why has there been such glacial movement on technical standards for QoS-aware IP interconnection?"

Any third party can introduce and offer a service at any time without any pre-arrangement, using a normal access arrangement to Internet. The service can be offered to any Internet user in the world without the need to follow any other procedures other than the service provider being able to collect any payment for the service normally by credit card. Thus Internet supports "innovation without permission" and this is what has allowed many new services to be introduced and grow rapidly.

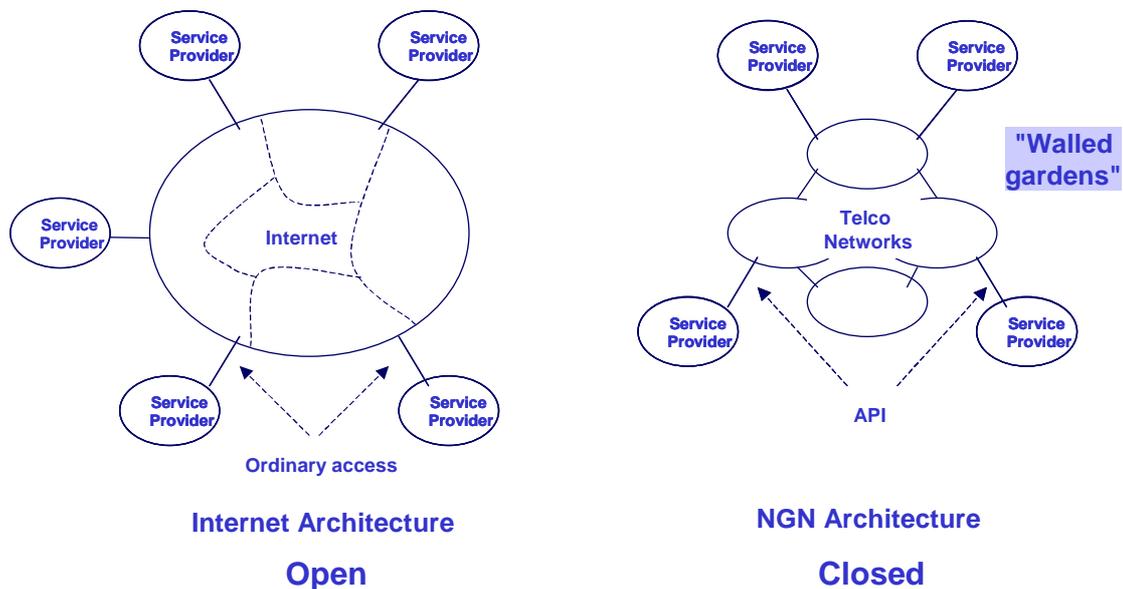
The fixed/mobile operators' NGNs do not offer open connectivity at the IP level on its own, instead they offer services supported by the necessary connectivity. The voice service on NGN is an example of such a service.

Although the fixed/mobile operators resisted attempts by National Regulatory Authorities to introduce third party service provision on the ISDN/PSTN using intelligent network technology¹²⁷, **the NGN is effectively being designed to support third party service provision but there are few instances of such provision taking place commercially to date.**

However this is different from the open service provision on Internet. Third party service providers will require a contract with the NGN provider and will use special protocols to provide the service and control for the connectivity associated with the service. This is much more restrictive and quite different from Internet, as it is the case with the voice telephony service on the NGN. The differences in service provision are illustrated in Figure 21 below.

¹²⁷ The PSTN was designed to provide the voice telephony service (only) in an era when telecommunications was fairly expensive and was provided in Member States by a state-owned monopoly, so that the use of networks had to be carefully controlled and charged. Great ingenuity went into the design of the PSTN in the analogue technology era with standardisation at the global level through the ITU. The PSTN was subsequently converted to digital technology. Services such as facsimile and data transfer via modem were added as terminal technology developed further, but the essential PSTN design concepts were not changed. Special purpose packet switched data networks were created such as those using the X.25 family of standards. ISDN was developed to offer access to both voice and data services, but in contrast to its name it was never an integrated network, just an integrated access system to separate voice and data networks. Liberalisation and promotion of competition created challenges for the PSTN/ISDN that pushed the network design to its limits, and some regulatory proposals such as third party provision and liberalisation of the U-interface attempted to push it beyond the design limits.

Figure 21: Comparison of service provision on the open Internet and on the closed fixed/mobile operators' NGNs



Source: TERA Consultants analysis

There is a general consensus that in the NGN there is a separation between service and transport, and there is an expectation that this should be reflected in the interconnection arrangements for IP-based NGNs.

A non-technical reader might mistake this distinction as being the same as the distinction that we have made above between services and connectivity. The key question therefore is whether the NGN transport layer is just an enhanced version of the Internet connectivity layer or is something totally different?

From reading the various studies referred to earlier and also the ITU Manual on Next Generation Networks and the way in which they move "seamlessly" from discussing the NGN to discussing Internet, we have the impression that many people may consider that the NGN transport layer is just an enhanced version of the Internet connectivity layer. The consequence is that the NGN is (mis)-represented as a good platform for new services.

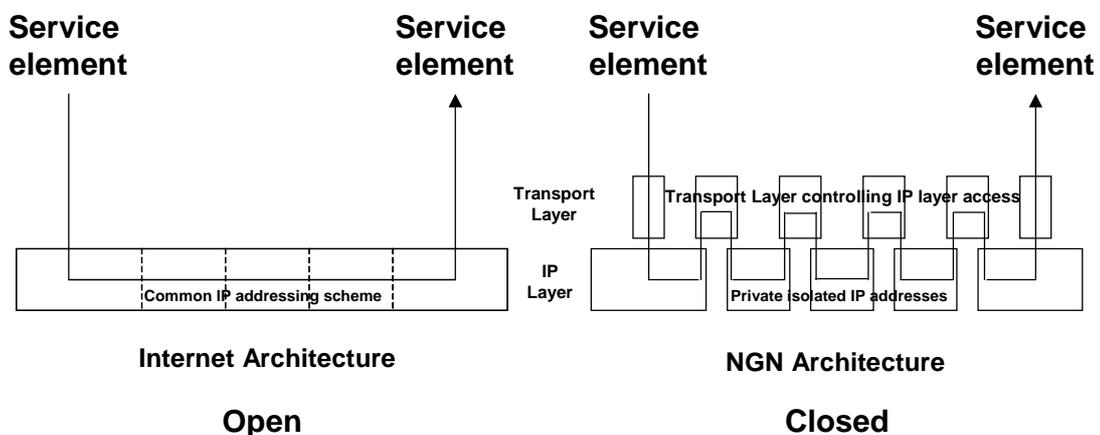
In our view the NGN transport layer and the Internet connectivity layer are completely different and we think that these differences need to be given much more emphasis. The consequence of our view is that we do not regard the NGN as it is being implemented as a good platform for new services. It may be better than the old PSTN but it is greatly inferior to Internet.

The two critical differences are that:

- The connectivity layer of Internet is open with public addressing (as explained above) whereas the connectivity layer of the NGN underlying the transport layer is a number of interconnected access-controlled closed platforms. Whilst it is possible for the transport layer to set up connections across these closed platforms, this can be done only if there are complex interconnection agreements in place and if all the necessary permission set in the border gateways. This is both a complex administrative and technical issue.
- Service provision that uses the transport layer will require special protocols, interconnection arrangements, payment and permissions and is quite different from the “innovation without permission” service provision on Internet.

In other words the transport layer cannot overcome the disadvantages of the separate closed platforms at the connectivity level in NGN. Thus in terms of the discussion above, the transport layer of the NGNs should be seen as a "lower service layer" compared to the Internet's connectivity layer. Figure 22 illustrates these differences by comparing the communication paths between service elements across Internet and interconnected NGNs.

Figure 22: Comparison of the open Internet and on the closed fixed/mobile operator's NGNs in terms of layers



Source: TERA Consultants analysis

All this means that innovation on the NGNs remains "innovation with permission and standardisation" in contrast to the "innovation without permission" genius of Internet.

4.2.3.3 Interconnection contracts, time to establish interconnection and updating of routing tables

On Internet, interconnection is a separate issue for connectivity and services. Interconnection for connectivity is unaffected by interconnection for services because the points of interconnection at the connectivity level are unaware of the services being supported. Interconnection for services may be open, in that it requires no interconnection agreement and no payment, i.e. it uses bill and keep. This is the case for email and, together with the open connectivity of Internet, the main reason why the e-mail service was able to grow so rapidly in contrast to the slower growth of MMS and SMS.

By contrast, NGN interconnection is primarily service based, with connectivity provided as necessary to support the service.

There is also a big difference in the administrative arrangements between interconnection on Internet and interconnection on NGNs.

- Interconnection on Internet at the connectivity level requires a simple contract to be signed. This may be only a few pages. Practical arrangements are supported at Internet Exchanges where many different ISPs exchange traffic on secure premises. The time needed for a new ISP to establish a new interconnection may be only a few days or a week or so. Once the interconnection is established full connectivity to the rest of Internet is available.
- Interconnection between fixed/mobile operators requires a lengthy contract to be signed which details the traffic as well as the arrangements. Forecasts have to be exchanged, traffic-related billing established and testing completed. The contract itself may be typically 30-100 pages with many other manuals and specifications referred to.

Finally, the time needed for a new fixed/mobile operator to establish a new interconnection is typically 4-9 months. Once the interconnection is established, there is normally a long and uncertain period before all callers on the rest of the PSTN are able to reach the new numbers because of the administrative process of publishing and updating routing tables in other networks. By contrast, the time to establish an interconnection in Internet is less than a month, and routing tables are updated automatically using BGP at the IP level.¹²⁸

¹²⁸ It could be noted that the GSM Association has taken steps to simplify the interconnection administration and charging arrangements with the development of the IPX, but it is not being used yet for voice. The basic concept is that an operator can sign a single interconnection agreement with one IPX member and then exchange traffic with all other IPX users without additional agreements. This substantially reduces the problems of needing a mesh of interconnection agreements. See: http://www.gsmworld.com/our-work/programmes-and-initiatives/ip-networking/ipi_principles.htm.

4.2.3.4 *The issue of quality of service*

One of the issues that occur frequently in discussion about NGN vs. the Internet is the ability of NGNs to “guarantee” quality of service. This claim seems to be over-stated though because no network can guarantee both quality and accessibility in the face of statistically varying demand.

The Internet is designed to maintain access but degrade transmission quality or throughput when congestion occurs, whereas the PSTN was designed to deny new access but to maintain quality. The essential difference between quality of service on the different network technologies is therefore that:

- On a circuit-switched network, congestion causes call blocking for new calls;
- On a packet-based network, congestion causes degradation in call quality for all calls.

There is much discussion about speech quality on IP-based networks and various techniques for improving speech quality. Live interactive speech and any related video are especially sensitive to congestion on packet-based networks because the congestion introduces delay and some packet loss.

The approach to quality of the voice service in current implementations of NGN is to use:

- Prioritisation of delay-sensitive packets;
- Segregation of delay sensitive traffic with more generous network dimensioning;

so that the probability of quality degrading is very low (**in other words, a “super best efforts” approach**). Whilst a great deal of research has been devoted to quality of service issues on IP, few of the more advanced concepts are implemented other than a simple priority system that provides no “guarantees”.

These techniques are used at present within networks and not between networks as there is little IP-based interconnection for voice, although the reversion to circuit for interconnection is a form of segregation. More advanced techniques may be used in the future for interconnection.

If in the future traffic with different quality requirements (one of them being the voice service) is exchanged across points of interconnection, the traffic can be segregated using MPLS, or can be carried on different VLANs. If cost-based CPNP is continued, the charges could be different for different quality levels. If BAK is introduced whilst there would be no traffic-related payment, the different traffic classes could still be segregated. Thus whilst the approaches might differ, there is no fundamental reason related to quality either to adopt or reject BAK.

Overall, there are substantial differences between interconnection on Internet and interconnection between NGNs because NGNs are organized differently than Internet. The inside of each operator's NGN is quite similar to the Internet except that there may be techniques to prioritise different forms of traffic ("managed bandwidth"). However at the edges of each individual operator's NGN there are strict boarder controls and service controls making the structure of NGNs quite different from Internet.

Such an NGN design is largely the result of the voluntary behaviour by the fixed/mobile operators, which appears to be the continuation of a behaviour that was appropriate in the past.

Currently there is almost no direct interconnection between NGNs: for voice traffic in particular, the traffic is transformed from IP to circuit then handed over at the interconnection, and then transformed back from circuit to IP.

The migration from circuit-based interconnection for voice in PSTN networks to IP-based interconnection in NGN networks is therefore unlikely to change the nature of interconnection significantly, because existing facilities-based fixed and mobile operators are designing voice services on NGN to copy the characteristics of PSTN/ISDN.

If in the future traffic with different quality requirements (one of them being the voice service) is exchanged across points of interconnection, the traffic can be segregated using MPLS or can be carried on different VLANs. If cost-based CPNP is continued, the charges could be different for different quality levels. If BAK is introduced whilst there would be no traffic-related payment, the different traffic classes could still be segregated. Thus whilst the approach might differ, there is no fundamental reason related to quality either to adopt or reject BAK.

4.2.4 Overall assessment of the impact of technological changes

Electronic communications networks will become packet switched, mostly or completely based on IP. They will be multi-service networks, rather than service specific networks, for audio (including voice), video (including TV-services) and data networks, allowing a decoupling of service and transport provision. It is not yet clear how or to what extent different types of traffic will be segregated.

This technological change is likely to change significantly the economics of voice in general (voice costs will become a small proportion of the total) and of voice with respect to interconnection in particular (with a significant decrease in the efficient number of efficient Points of Interconnection).

There will be convergence in technology between NGN and Internet through the use of IP as well as to convergence in the market-place through ISPs and others offering voice services on Internet (so-called “VoIP” services) as a substitute for PSTN. However, in contrast, there is no convergence in the way in which NGN and Internet are organised and run – the two will remain fundamentally different.

Therefore there is no need to have a convergence between the charging mechanisms of NGN and Internet. Technological change does not make BAK necessarily more advisable than cost-based CPNP.

Finally it shall be recalled that the termination monopoly for the voice service based on the telephone number will remain present in a multi-service NGN.

4.3 Expected Impact of market changes

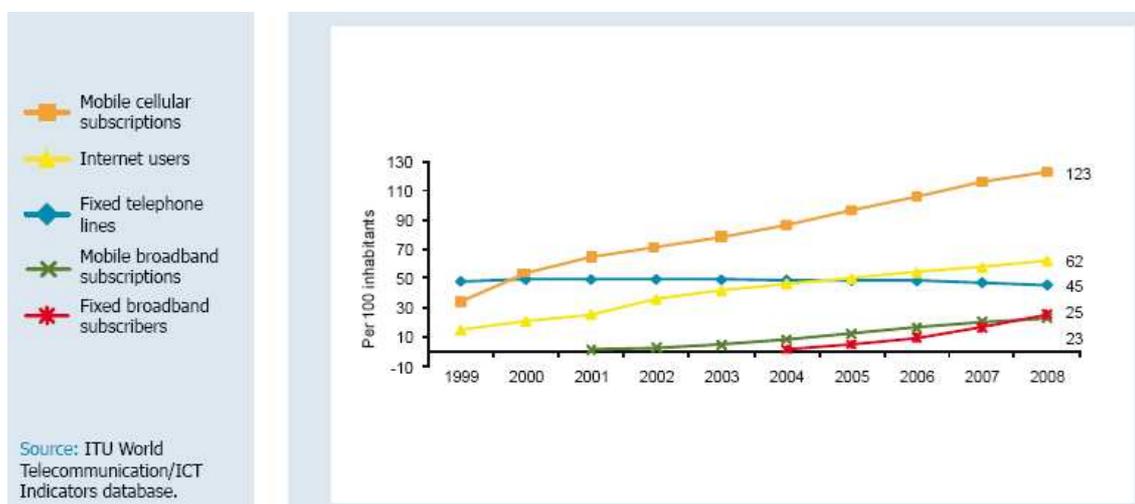
In this section, we will review major trends at retail level especially in terms of growth of broadband access in fixed and mobile network and in terms of retail pricing, and conclude this section with an overall assessment of the impact of market changes.

4.3.1 An increasing share of broadband access both on fixed and on mobile networks to meet a growing demand of other services than voice

As shown in Figure 23 below, mobile cellular subscriptions are still increasing in Europe though growth is tending to slow down, whilst the fixed telephone lines appear to follow a declining trend due to fixed-to-mobile substitution amongst other factors. **So both fixed and mobile markets appear to be well penetrated in Europe.**

Noticeable is an increasing trend for both fixed and mobile broadband access over the same period.

Figure 23: Evolution of Fixed broadband and Mobile Broadband in EU-27, 1999-2008

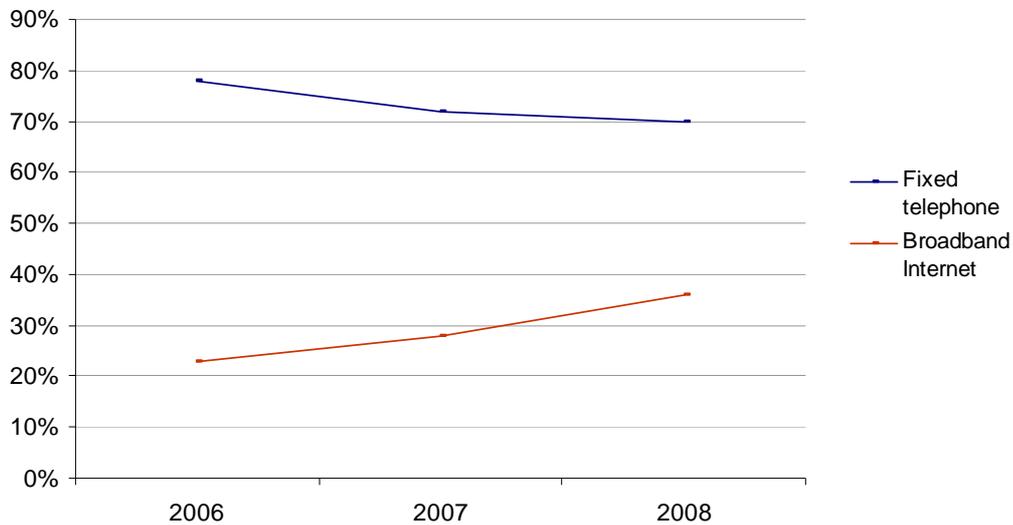


Source: Information Society Statistical Profile Europe, ITU, 2009

However the penetration of broadband in fixed networks is currently much more developed than in mobile networks.

- While the share of households having a fixed-line fell from 78% to 70% between 2006 and 2008, the penetration of broadband accesses increased significantly from 22% to 36%.

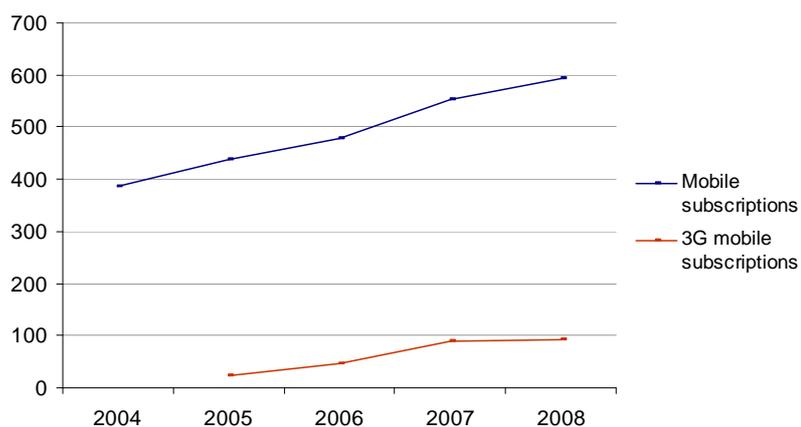
Figure 24: Fixed telephone line and Broadband Internet access penetration in the EU (households)



Source: E-Communications Household Survey, Eurobarometer, 2008

- Although between 2005 and 2008 3G mobile subscriptions increased from 22.4 to 91.3 million, 3G mobile subscriptions only represents 15.4% of the global mobile market.

Figure 25: 2G Mobile and 3G mobile in the EU (subscriptions)



Source: Digiworld Yearbook 2008, IDATE/ Progress Report on the Single European Electronic Communications Market 2008, European Commission, 2009

A review of recent market studies indicates that there is a consensus that the growth of fixed broadband will continue (driven by the combination of a wider footprint of broadband networks, and in particular of offers based on the Unbundling of the Local Loop and of differentiation at retail level of packages to better address different usages of fixed broadband) and that the growth of mobile broadband will accelerate (driven in particular by the smartphones).

So both fixed and mobile markets appear to be well penetrated in Europe.

There is a currently an increasing share of broadband access both on fixed and on mobile networks to meet a growing demand of other services than voice.

There is a consensus that the growth of fixed broadband will continue and that the growth of mobile broadband will accelerate.

4.3.2 In the fixed markets where broadband penetration is significant, the emerging dominant retail pricing model is a dual-play or a triple-play flat rate for fixed to fixed national or even fixed to international calls

As recalled by the ERG¹²⁹, all kind of retail plans (per minute, flat rate, partial flat rate and buckets of minutes) are available for fixed to fixed calls across Europe, though not necessarily in every single country.

However, taking a forward-looking view, it should be emphasised that in a fixed telecommunications market with significant broadband penetration, the emerging dominant retail pricing model is a dual-play or a triple-play flat rate or partial flat rate for fixed to fixed national or even fixed to international calls¹³⁰. The type of calls that are generally excluded from such dual-play or a triple-play flat rates are:

- calls to some international destinations;
- calls to mobile networks;
- calls to special numbers enabling access to Value Added Services.

This evolution towards flat rate or partial flat rate has been driven in particular by the low level of the fixed termination fee.

The dynamics of competition in these countries increasingly shifts from a service by service competition to a competition on the scope of services proposed under a given flat

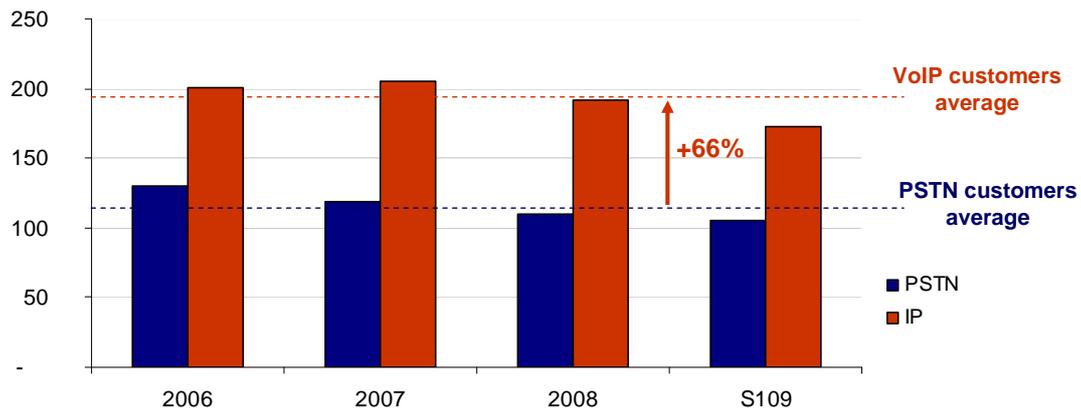
¹²⁹ See ERG (09) 34, p. 21.

¹³⁰ See ERG (09) 34, p. 42 : Based on a spot check in 7 Member States, the ERG estimates that within this sample more than 50% of fixed to fixed voice connections where flat rate or partial flat rate.

rate by broadband access providers (amongst which the fixed incumbent operators) for a price around 30 / 40 € VAT incl. per month for residential customers.¹³¹

Finally, limited available empirical data tends to indicate that customers on a dual-play or a triple-play flat rate or partial flat rate could have a higher usage as shown in Figure 26.

Figure 26: Average Minutes Per User (per month) to a national fixed network in France



Source: ARCEP website

In fixed markets with significant broadband penetration, the dominant retail pricing model is a dual-play or a triple-play flat rate for fixed to fixed national or even fixed to international calls.

The dynamics of competition in these countries increasingly shifts from a service by service competition to a competition on the scope of services proposed under a given flat rate by broadband access providers. Limited empirical data tend to show that the usage of the voice service is higher for customers of a dual or triple play offer.

This evolution has been driven in particular by the low level of the fixed termination fee.

The only type of calls that remain generally excluded from such dual-play or triple-play flat rates are: calls to mobile networks and calls to special numbers enabling access to Value Added Services.

¹³¹ This is also true to some extent for the voice service. Once it is included in such a flat rate, the experience in France shows for example that there has been a clear and continuous evolution from “national fixed to fixed calls” to “international calls” with an increasing number of countries proposed.

4.3.3 In mobile markets, broadband penetration remains generally low but the emerging retail pricing model for contracts is flat rate or partial flat rate (in the form of unlimited calls)

Pre-paid is still the most popular type of mobile subscription, but the share of post-paid (or contracts) slowly increases as shown in table below and is approaching the share of pre-paid ¹³² (cf. Table 1).

Table 1: Mobile telephone access in Europe by type of subscription

| | 2006 | 2007 | 2008 |
|---------------------------------|------|------|------|
| <i>pre-paid</i> | 37% | 37% | 35% |
| <i>post-paid (or contracts)</i> | 28% | 29% | 31% |
| <i>post-paid+pre-paid</i> | 15% | 15% | 17% |
| <i>without access</i> | 20% | 19% | 17% |

Source: E-Communications Household Survey, Eurobarometer, 2008

A substantial number of mobile users entered the market under prepaid arrangements in combination with handset subsidies. However, prepaid users contributed relatively little to the growth in the number of call minutes, compared to post-paid or contract users. Reasons for this difference are, for instance, that prepaid users include people who want to control their budget more tightly (e.g. adolescents) and people who expect to use their phone relatively little. Moreover per-minute prices charged to prepaid users are typically higher than those charged to postpaid users. Since the strategic focus of mobile operators gradually shifted away from attracting new users as the market matured, prepaid offerings have become less prominent in their marketing tactics (De Bijl and al, 2005, p. 10).

As recalled by the ERG¹³³, per minute and buckets of minutes are the most common schemes in mobile markets, indicating that some of the buckets of minutes are so huge that the offer is equivalent to a flat rate (i.e. unlimited calls).

¹³² Nevertheless aggregate data hides strong heterogeneity among countries. For example in 2008 76% of Maltese households had access via a pre-paid arrangement while 86% of Finnish households had a contract scheme.

¹³³ See ERG (09) 34, p. 21.

However, with respect to post-paid customers, there is an emerging trend towards flat rate or partial flat rate provisions as the Mobile Termination Rates decrease. They often discriminate between on-net and off-net but not always, as exemplified in the following countries¹³⁴:

- In France, flat rate schemes to a limited number of mobiles or to other mobile phones on evening and week-ends are generally been restricted to on-net calls. However this type of discrimination is not systematic. For example, the later entrant Bouygues Telecom introduced non-discrimination unlimited calls with its NEO contracts and the leading operator Orange does not discriminate for its “three favourite numbers” offer for some new contracts.
- In Germany, Deutsche Telekom discriminates between on-net and off-net calls for flat rate calls on evenings and week-ends in its Relax type contracts.
- In Spain, Movistar’s option for flat rate calls on week-ends does not discriminate between both.
- In Belgium, Proximus’ Evening&WeekEnd contracts include flat rate on-net and off-net calls on evenings and week-ends (up to 10 hrs per month).

The only type of calls that remain generally excluded from unlimited call packages are international calls.

It remains nevertheless to be seen how mobile operators are going to price access to Internet and TV on their networks, as the requirements in terms of capacity not only in the core network but also in terms of the (shared between all users in a given area) frequency usage is likely to generate significant investments in the following years.

In mobile markets where broadband penetration remains low, the dominant retail pricing model is largely per minute and buckets of minutes.

However for contracts, the dynamics of competition seem to shift towards different forms of unlimited calls.

This evolution towards unlimited off net calls between mobile operators is driven in particular by the decrease of the mobile termination fee.

The only type of calls that remain generally excluded from unlimited call packages are international calls.

¹³⁴ Non-discriminating offers for unlimited calls seem to develop recently, as Mobile Termination Rates decrease.

However, there is a high uncertainty on how mobile operators will address the issue of Internet and TV usage, and in particular whether flat rates are supportable in light of usage patterns.

4.3.4 Overall assessment of the impact of market changes

Both fixed and mobile markets appear to be well penetrated in Europe and there is currently a major trend towards a migration to broadband, well underway for fixed and at a low level, but accelerating for mobile.

Enabled by the low level of the fixed termination fee, the dynamics of competition increasingly shifts in fixed telecommunications from a competition for voice service to a competition on the scope of services proposed under a given flat rate by broadband access providers (dual or triple offers).

Given the fairly low level of broadband accesses in mobile, the evolution towards flat rates is predominantly for post-paid (or contract) customers, in the form of unlimited calls. The restriction to on-net calls is not systematic, and is likely to be lifted as Mobile Termination Rates decrease.

However, there is high uncertainty on how mobile operators will address the issue of Internet and TV usage, and in particular whether they will introduce double- or triple-play flat rates, as in the fixed market in light of usage patterns.

If competition is driving retail prices for voice to flat rates as part of global triple- or quadruple play tariffs – and this becomes the “dominant” business model – , BAK arrangements could become more likely because:

- The costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service;***
- The potential for arbitrage by operators having highly specific traffic flows – because they focus on particular customer groups such as high users – is not considered a significant threat anymore.***

5 Analysis of empirical evidence of Bill And Keep compared with Calling Party Network Pays

The objective of this Chapter is to analyse empirical evidence of BAK compared with CPNP. **However, it should be clearly emphasised that the comparison made in the empirical literature is rather a comparison between BAK and CPNP with high access mark-ups than a comparison between BAK and cost-based CPNP** because none of the countries used in the data sets (to our knowledge) had implemented CPNP on the basis of “pure” LRIC. Furthermore, countries having retained CPNP at wholesale have in general CPP (“Calling Party Pays”) at retail level, whereas countries having retained BAK at wholesale level have in general RPP (“Receiving Party Pays”) a retail level. **Consequently a careful discussion of results is required, because Chapter 6 shows that the impacts of a change of charging scheme at wholesale level should be logically separated from the impacts of a change of charging scheme at retail level.**

We will nevertheless review the empirical literature in the field, which is focussed on the impact of interconnection regimes on various markets and has addressed **three main impacts of the interconnection charging regime on consumers:**

- the impact on mobile penetration (in other words, mobile services take-up and subsequent diffusion in a given country);¹³⁵
- the impact on mobile retail prices and profitability of mobile operators (the so-called “waterbed effect”);¹³⁶
- the impact on mobile usages and on the potential distortion of retail prices between fixed and mobile services.¹³⁷

It should be noted that some relation between these types of impacts is likely to exist, as e.g. it is generally expected that a lower level of retail prices is associated with a higher level of usage.

¹³⁵ We have reviewed in particular studies including European countries in their data set: Dewenter and Kruse (2005); Jang, Dai and Sung (2005); Littlechild (2006); Veronese and Pesendorfer (2009).

¹³⁶ We have reviewed in particular studies including European countries in their data set: Littlechild (2006); Andersson and Hansen (2007); Genakos and Valetti (2008); Veronese and Pesendorfer (2009).

¹³⁷ We have reviewed studies including European countries in their data set: Littlechild (2006); Marcus (2007); Veronese and Pesendorfer (2009).

5.1 Impact of the interconnection charging regime on mobile penetration

Empirical economic studies focused on directly assessing the impact of CPNP with access mark-ups and BAK on mobile penetration use various methodologies and also exploit data that are often quite heterogeneous and corresponding to the emerging phase of mobile markets where a significant part of the traffic terminating on mobile networks was originated on fixed networks. **Most of them consider that BAK may encourage operators to implement RPP at the retail level and thereby BAK could lead to the same impact as RPP in terms of take-up and diffusion of mobile services.** So, at first glance, it seems that CPNP (associated with CPP at retail level) facilitates mobile penetration compared to BAK (associated to RPP at retail level). Indeed, subscribers are generally reluctant to pay for receiving calls since they are not aware whether they could benefit from these calls. They could then switch off their mobile handsets to avoid unsolicited calls or simply not answer all their calls. **If it leads to RPP, BAK could therefore indirectly discourage the receipt of some calls and this could reduce both mobile traffic and mobile penetration** (Littlechild (2006); Dewenter and Kruse (2005)).

Jang, Dai and Sung (2005) and Dewenter and Kruse (2005) use diffusion models applied to different data sets (30 countries for the former, 84 countries for the latter) over a 20 year period and both show the impact of CPNP on mobile service take-up and penetration should be positive.

Jang, Dai and Sung (2005) seek to identify the key factors influencing the penetration rate for 29 OECD countries and Taiwan between 1980 and 2001. They show that CPNP is the most important explanatory variable¹³⁸ and that this interconnection charging regime affects positively the penetration rate of mobile telephony. Their results suggest that BAK could have, if it is applied, a significant negative impact on the penetration rate of mobiles.

In a similar manner, Dewenter and Kruse (2005) analyze the impact of interconnection charging regimes on mobile penetration rates in 84 countries from 1980 to 2003. This data includes information on countries under a Calling Party Pays (“CPP”) regime at retail level – considered to be associated with a CPNP at wholesale level –, a Receiving Party Pays (“RPP”) regime at retail level – considered to be associated with BAK at wholesale level – and under both regimes (changes from RPP to CPP). The results show a little evidence for a positive effect of CPP (CPNP) on the mobile penetration rate, probably due to the very different sizes of the data sets used in the two studies. However, Dewenter and Kruse (2005) claim that their results suffer from a possible endogeneity in policy decisions so that the impact of CPNP as inferred from their data set is in fact statistically insignificant.

¹³⁸ The other explanatory variables are: the population density, GDP, a dummy variable for the market structure, a dummy variable to indicate whether the countries has access to digital technology, the penetration rate of the fixed network, the number of fixed telecommunication lines per head of population.

Littlechild (2006) shows a link between high Mobile Termination Rates (MTRs) and mobile penetration since with high MTRs mobile operators can attract subscribers by subsidizing handsets or providing additional services and discounts. Littlechild (2006) also states that some countries with a BAK regime (defined as those having RPP at retail level) have penetration rates among the highest (Hong Kong and Singapore). He then concludes that there is no significant difference in average penetration rate between BAK and CPNP and suggests that various other economic and technical factors also have an influence.¹³⁹ It should however be noted that the countries showing a high penetration rate under BAK (Hong Kong and Singapore) are probably more comparable with big cities in European countries where mobile penetration rate is much higher than the country's average. The study presented by Littlechild (2006) is of a limited interest because of various reasons (a single year analysis, a very large and heterogeneous panel of countries with no geographic control variables, etc.) and therefore we must be very careful in interpreting results.

A more rigorous econometric analysis by Veronese and Pesendorfer (2009) measures mobile penetration by the number of SIM cards per capita using a panel data set with 39 OECD countries from 2002 to 2007. Their main finding is that the number of SIM cards per capital is higher in CPNP countries and when MTRs are high. Veronese and Pesendorfer (2009) show that increasing MTRs by 10% leads to an increase in mobile penetration by 0.34%. Regarding the impact of CPNP regime, complementary results point out that it should be attributed largely to the level of MTRs. Finally, Veronese and Pesendorfer (2009) conclude that BAK has a negative effect on the rate of mobile penetration.

The study by Veronese and Pesendorfer (2009) could be criticized though because the SIM card penetration is not a very relevant indicator to assess mobile penetration. Indeed, this indicator captures also multi-SIM equipment favoured by high MTRs (possibly associated with significant on-net / off-net differentials) in "CPNP+CPP" countries compared to "BAK+RPP" countries. This leads to overestimate penetration in CPNP countries because of subscribers who have made and received few calls (inactive subscribers). Adjusting for such inactive subscribers¹⁴⁰, a recent study by Frontier Economics (2008) validates that the previous results drawn by Veronese and Pesendorfer (2009) are robust and consequently that **"BAK + RPP" has definitively a negative effect on penetration¹⁴¹ vs. "CPNP with access mark-up +CPP"**.

¹³⁹ The other explanatory variables are national income, a dummy variable for high national income, fixed penetration, concentration subscribers in mobile technologies, market share of top two players, proportion of prepaid subscribers, a dummy variable for the policies RPP and a change from RPP to CPP.

¹⁴⁰ Following this study, active subscribers are subscribers who have made or received a call in the last 3 months.

¹⁴¹ Another more appropriate indicator for mobile penetration would be to measure the % of households with at least 1 mobile. Results obtained with this measure of mobile penetration are consistent with those reported in Veronese and Pesendorfer (2009).

The following Table summarizes the main results and indicates panel and data sources:

Table 2: Main results and data sets - Impact of the interconnection charging regime on mobile penetration

| | Panel data | Data sources | Years | CPNP | BAK |
|--|--------------------------------------|--|-------------|--|-----|
| Jang, Dai and Sung (2005) | 29 OECD countries Taiwan | ITU OECD | 1980 - 2001 | + | - |
| Dewenter and Kruse (2005) | 84 countries | ITU Worldbank Various NRAs | 1980 - 2003 | +(insignificant) | |
| Littlechild (2006) | 44 countries | Merrill Lynch | 2005 | +(insignificant) | |
| Veronese and Pesendorfer (2009) | 39 European and other OECD countries | Oftel Teligen Merrill Lynch European Commission | 2002 - 2007 | +(consistent with different measures for mobile penetration) | - |

Source: from review of empirical economic literature

Empirical economic studies focused on assessing the impact of CPNP with access mark-ups and BAK on mobile penetration use various methodologies and tend to exploit data that are often quite heterogeneous (and sometimes corresponding to the emerging phase of mobile markets where a significant part of the traffic terminating on mobile networks was originated on fixed networks). Furthermore, countries having retained CPNP at wholesale have in general CPP (“Calling Party Pays”) at retail level, whereas countries having retained BAK at wholesale level have in general RPP (“Receiving Party Pays”) a retail level. Consequently a careful discussion of results is required, because the next chapter¹⁴² will show that the impacts of a change of charging scheme at wholesale level should be logically separated from the impacts of a change of charging scheme at retail level.

Results obtained so far tend nevertheless to show that “BAK + RPP” has been more detrimental to mobile penetration in the phase of mobile services take-up and subsequent diffusion than “CPNP with access mark-ups + CPP” (and this conclusion is independent of how subscription is effectively measured).

¹⁴² See 6.2.1

5.2 Impact of the interconnection charging regime on mobile retail prices and profitability of mobile operators

The main effects that emerge from the theoretical economic literature for the CPNP with access mark-ups regime are quite clear. MTRs are likely to be used as an instrument to soften downstream competition when mobile operators use linear pricing and do not discriminate on whether the call terminates on-net or off-net. So, high MTRs are expected to push retail prices up. However, in case operators apply more sophisticated retail pricing strategies, high MTRs could also enable them to compete with each other fiercely using other strategic instruments (subscription fees, handset subvention or other mobile services). This leads to what is widely known as the “waterbed effect”.¹⁴³ Hence, by contrast, an interconnection charge equals to zero (as in BAK) leads, thanks to the “waterbed effect”, to higher retail prices. Similarly, the effect of an increase of MTRs on the networks’ profits depends on the type of tariffs offered to consumers.

Empirical studies focused on assessing the impact of the interconnection charging regime on mobile retail prices and profitability of mobile operators aim at showing to what extent the above mentioned effects remain valid with more complex market conditions (e.g. more than two operators, market shares or MTRs asymmetries and other asymmetric market structures). In particular, empirical studies have sought to test the “profit neutrality” result¹⁴⁴ or the “waterbed effect”.

Andersson and Hansen (2007) examine whether a change in MTRs has an impact on the profitability of mobile operators using a regression of EBITDA on the average level of MTRs. What interests them is whether an increase of MTRs could raise operators’ profits and thus test the “profit neutrality” result. They use a panel data set on European mobile operators from 2003 to 2006. Data relate to north-western European countries, in other words countries quite similar with respect to income level and rate of mobile penetration. These conditions satisfy especially the assumption of full participation of all potential customers underlying the theoretical models. Their empirical study cannot then reject profit neutrality which means that the profits of operators are insensitive to the variations in MTRs. Hence, regarding the European context, Anderson and Hansen (2007) **provide empirical evidence for the insignificant impact of different MTRs levels on operator profits.**

Genakos and Valletti (2008) test the “waterbed effect” in a more comprehensive framework. Their starting point is that when MTRs are regulated at lower levels, there is a

¹⁴³ In a theoretical paper, Schiff (2008) gives conditions under which the waterbed effect applies.

¹⁴⁴ As explained in Chapter 6, the “profit neutrality” result arises when an identical change in all termination rates does not affect profits.

“waterbed effect” and retail prices should be higher. A possible reason is that due to lower MTRs, mobile operators might derive lower termination revenues, meaning they would have less to transfer to consumers and would therefore have to increase retail prices in order to maintain profits. Such a “waterbed effect” might apparently be full if the mobile operators’ profits are unaffected as retail prices fully adapt to MTRs changes¹⁴⁵. Following this direction, Genakos and Valletti (2008) show that **mobile operators’ profits in the OECD are slightly impacted by the MTR setting, suggesting that the “waterbed effect” is not full**. In their study Genakos and Valletti (2008) use EBITDA from Merrill Lynch to evaluate profits and tariffs of the two largest mobile operators from Teligen to measure the total bills paid by consumers. Hence, Genakos and Valletti (2008) establish that the “waterbed effect” exists and has a long run effect. They discuss the effects of competition and market penetration on the intensity of the “waterbed effect”. Using the number of rival operators as a proxy for competition, their results show that the “waterbed effect” is higher when market competition is fierce with high penetration of mobile services. Hence, **both competition and market saturation affect the overall impact of the “waterbed effect” and this overall impact is more important when competition is fierce and mobile penetration high**. To measure competition level, Genakos and Valletti (2008) also used the HHI index¹⁴⁶ but they claim that it suffers from a serious endogeneity; therefore they select the model using the number of rival operator as a proxy for competition to draw results. Finally, by comparing the “waterbed effect” between pre-paid and post-paid consumers, they show that **the “waterbed effect” is not observed on pre-paid tariffs since pre-paid users receive few calls than post-paid subscribers**.

Using the Average Revenue Per Minute of Use, Veronese and Pesendorfer (2009) show a small positive impact of MTRs on retail prices which is consistent with the fact that mobile operators usually increase prices to recover higher MTRs. However, this average per minute price of use (provided by Merrill Lynch) is the voice only average revenue per subscription (ARPU) divided by the total minutes of use per subscription. As this index includes revenues from MTRs, it tends to be overstated in CPNP countries (because termination costs tend to be counted twice, both in MTRs revenues at wholesale level and in off-net calls revenues at retail level). Finally, Veronese and Pesendorfer (2009) use a “debiased” data provided by Ofcom and find significant impact of MTRs on retail prices. Their study also attempts to analyze whether, independently to the level of MTRs, a CPNP

¹⁴⁵ In other words, the “profit neutrality” should appear with regards to MTRs levels.

¹⁴⁶ Herfindahl-Hirschmann-Index (HHI): Specific measurement of market concentration, the extent to which a small number of firms account for a large proportion of output. The HHI is used as one possible indicator of market power or competition among firms. It measures market concentration by adding the squares of the market shares of all firms in the industry. For example, in a market where five companies each have a market share of 20%, the HHI is $400 + 400 + 400 + 400 + 400 = 2000$. The higher the HHI for a specific market, the more output is concentrated within a small number of firms. In general terms, with an HHI below 1000 the market concentration can be characterized as low, between 1000 and 1800 as moderate and above 1800 as high. (Source DGCOMP)

regime compared to BAK regime has an impact on retail prices and conclude that there is no significant impact of a CPNP regime on retail prices.

In a recent study, Growitsch, Marcus and Wernick (2010) use figures on voice service-based revenue per minute of use from Merrill Lynch Global Wireless Matrix as a proxy for retail prices.¹⁴⁷ The panel data combines 61 MNOs from 16 Member States from 2003 to 2008. Their results are consistent with Veronese and Pesendorfer (2009) and show that **a decrease in MTRs will tend to decrease the retail prices of mobile voice services.**¹⁴⁸ To check their econometric results, they develop a case study on Spain using data on retail prices from the Spanish National Regulatory Authority CMT that do not suffer from any bias. Data from CMT indeed represent the real measure of retail voice revenues per originating minutes and therefore appropriately reflect prices paid by subscribers. Their econometric results are consistent with observations from this case study on Spain.

Littlechild (2006) presents an empirical study which is highlighting other aspects of the potential impacts of both the interconnection charging regime (CPNP and BAK) and the level of MTRs in the case of CPNP. Littlechild (2006) bases his empirical analysis on data from 44 countries for a single year (namely 2005) and compares the impacts of CPNP and BAK (assuming that BAK at wholesale level has the advantages of RPP at retail level) on average revenue per minute. The database differentiates three categories of countries: countries with a CPNP regime, countries with a BAK regime and countries that changed from BAK to CPNP. The results show that BAK reduces significantly Average Revenue Per Minute of Use compared to a CPNP regime. Littlechild (2006) interprets these results as an **indication of higher retail prices in CPNP relative to a BAK.** Finally, a specific study of countries that changed from BAK to CPNP indicates that this change had no significant impact on the Average Revenue Per Minute of Use. Unlike other empirical studies, Littlechild (2006) points out that when MTRs are high, making calls is costly for users and this may discourage them to make certain calls. That is to say, a CPNP regime with high MTRs may lower the mobile network's attractiveness and thus incite some consumers not to join, therefore leading to a lower mobile penetration. So, Littlechild (2006) concludes that the relative impact of CPNP and BAK depends on the retail prices and on the relative levels and elasticities of demand both for making and receiving calls.

The following Table summarizes the main results and indicates panel and data sources:

¹⁴⁷ They point out the well known bias associated with Merrill Lynch minutes of use and estimate that it results in a bias of about 15% when comparing revenue per minute in BAK countries and in CPNP countries. However, they consider that such overestimation does not induce any bias in the results as they focus on CPNP countries only.

¹⁴⁸ Growitsch, Marcus and Wernick (2010, p.21) add two qualifications. First, for consumer retail prices to be lower *on average* with lower MTRs does not exclude the possibility that some customers (e.g. those with lower disposable income) might be worse off. Second, for consumer retail prices to be lower on average does not necessarily mean that all components of the retail price are lower; with a two-part tariff, it is probable that monthly fees (for instance) would be higher while minute fees were lower.

Table 3: Main results and data sets - Impact of the interconnection charging regime on mobile retail prices and profitability of mobile operators

| | Panel data | Data Sources | Years | Results |
|---|--------------------------------------|--|-------------|--|
| Andersen and Hansen (2007) | 9 European Countries | Ovum Wireless Intelligence | 2003 - 2006 | Cannot reject profit neutrality |
| Genakos and Valletti (2008) | OECD countries | Cullen International Teligen | 2002 - 2006 | Negative impact of MTRs on retail prices (stronger with competition and penetration) |
| Veronese and Pesendorfer (2009) | 39 European and other OECD countries | Oftel Teligen Merrill Lynch European Commission | 2002 - 2007 | Small positive impact of MTRs on retail prices (insignificant with debiased data) |
| Growitsch, Marcus and Wernick (2010) | 16 European countries | ERG Merrill Lynch CMT | 2003-2008 | Positive impact of MTRs on retail prices |
| Littlechild (2006) | 44 countries | Merrill Lynch | 2005 | Insignificant impact of MTRs regime on retail prices |

Source: from review of empirical economic literature

Empirical economic literature focused on assessing the impact of the interconnection charging regime on mobile retail prices and profitability of mobile operators tends to show that a decrease of MTRs will tend to lead to lower mobile retail prices. The effects on retail prices are stronger the more intense competition is and the higher market penetration is. Although it is not easy to obtain ideal data, several recent studies show that these empirical results also hold when relevant adjustments to the available (and sometimes biased) data are done.

5.3 Impact of the interconnection charging regime on mobile usages

There are few recent empirical economic studies that test the impact of CPNP and BAK interconnection charging regimes on mobile usage (measured in terms of minutes of use) and they use quite different data.

Littlechild (2006) indicates that traditionally the use of the mobile voice service is related to average retail prices. In a first step, he draws figures for 2005 from Merrill Lynch and the

FCC report¹⁴⁹ and deduces from cross-section comparisons that as CPNP increases average retail prices compared to BAK, then CPNP is less favourable than BAK to increase the use of the mobile voice service. He deduces this by suggesting that higher revenue per minute of use in CPNP countries could be interpreted as higher retail prices compared to a BAK regime. In particular, he observes that CPNP significantly reduces the median level of use (154 minutes in CPP countries) while BAK (373 minutes in RPP countries) leads to a higher median level of use. In a second step, from a panel of 44 countries and for a single year (namely 2005), Littlechild (2006) tests from a regression analysis the impact of both mobile termination rate regimes (“CNPP with access mark-ups + CPP” and “BAK + RPP”) on mobile average usage (minutes of use per month). Results show that **“BAK + RPP” significantly increases the average usage which suggests that “CPNP with access mark-ups + CPP” leads to lower average usage than “BAK + RPP”**. Finally, Littlechild (2006) shows that fixed penetration decreases mobile usage by reducing minutes of use but he suggests this result holds obviously because local calls are free in “BAK + RPP” countries. These results should be taken with great caution because of various reasons (a single year analysis, a very large and heterogeneous panel of countries with no geographic control variables, data from Merrill Lynch biased for minutes of use and revenue per subscriber, etc.).

Marcus (2007) uses the same data as Littlechild (2006)¹⁵⁰ and draws relationships between interconnection charging regimes and usage of mobile services by consumers from comparisons between 14 countries. First, he observes that retail prices in countries with CPNP tend to be higher than those with BAK regimes. Second, he adds that a CPNP regime probably distorts fixed networks and broadband services by organizing a mechanism for subsidizing mobile services. From that conclusion and by suggesting BAK is correlated with low service-based revenues per minute, Marcus (2007) observes that **lower retail prices from BAK regimes lead to significantly higher mobile usages (minutes of use per month) than CPNP regimes**. A simple linear regression confirms clearly that lower retail prices from BAK regimes are associated with significantly higher mobile usages. This suggests that demand elasticity is sufficiently high to lead to higher usages when retail prices are lower. In other words, while in CPNP mobile handsets are subsidised, in BAK countries they are not. However, consumers have greater incentive to use services once they have acquired the handset. Along with this issue, cross-countries comparisons show that **CPNP promotes pre-paid arrangements compared to a BAK regime**. Finally, a BAK regime also helps mobile operators to offer retail services with flat rates which create higher usages.

Certainly one of the most interesting and robust study is that of Veronese and Pesendorfer (2009) who have contributed to the debate about impacts of interconnection charging

¹⁴⁹ FCC, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, 10th Report (11th CMRS Competition Report), September 2006, Table 12, based on Interactive Global Wireless Matrix 4Q05, Merrill Lynch, Telecom Services Research.

¹⁵⁰ Data for 2005 from the FCC report on mobile services and Merrill Lynch.

regimes on mobile usages with a rigorous econometric study. In their econometric framework, mobile usages are measured by minutes of use per subscription including both incoming and outgoing calls. As in BAK countries minutes of use are biased upward due to a double-counting of mobile-to-mobile calls¹⁵¹, Veronese and Pesendorfer (2009) corrected to original data. Unlike the other studies, and especially the analysis by Littlechild (2006), they have used selected countries and debiased data for several years. They estimate both the impact of interconnection charging regimes and of the level of MTRs on mobile usages. Their results show a potential negative effect of CPNP regimes on mobile usages. However, a more rigorous analysis, with specifications including time and country effects, highlights the insignificant effect of CPNP regimes on usage. Veronese and Pesendorfer (2009) are not much more convincing for the impact of MTRs on mobile usages. They found indeed that **the impact of the level of MTRs on usages is statistically insignificant**. According to their model specification, the impact of the level of MTRs can be positive or negative and always remains limited¹⁵². It would thus seem that there are other explanatory variables not included (such as national income, market concentration, fixed penetration...) in the model at play and which may have better significance for mobile usages. They finally conclude that there is not robust statistical evidence between MTRs and usages.

In their recent work, Growitsch, Marcus and Wernick (2010) demonstrate that **lower mobile termination rates results in higher mobile usages in term of minutes of use per month per subscription**. This important result certainly comes from the fact that mobile termination rates and retail prices tend to move in the same direction and it is obtained with a high significance.

The following Table summarizes the main results and indicates panel and data sources:

¹⁵¹ According to OFCOM, Merrill Lynch estimates that figures may be overestimated by 20% in BAK countries compared to CPNP countries.

¹⁵² “low goodness of fit”

Table 4: Main results and data sets - Impact of the interconnection charging regime on mobile usages

| | Panel data | Data sources | Years | CPNP | BAK |
|---|--------------------------------------|--|-------------|--|-----|
| Littlechild (2006) | 44 countries | Merrill Lynch | 2005 | - | + |
| Marcus (2007) | 14 countries | Merrill Lynch | 2005 | | + |
| Veronese and Pesendorfer (2009) | 39 European and other OECD countries | Oftel Teligen Merrill Lynch European Commission | 2002 - 2007 | No robust statistical evidence (of CPNP and the level of MTRs) | |
| Growitsch, Marcus and Wernick (2010) | 16 European States | ERG Merrill Lynch CMT | 2003 - 2008 | - (with high significance) | |

Source: from review of empirical economic literature

Basic empirical economic studies focused on the impact of the interconnection charging regime on mobile usages show that lower retail rates in “BAK + RPP” countries are rather associated with a higher usage of the mobile voice service, but also more generally that lower MTRs results in higher mobile usages in term of minutes of use per month per subscription. However, more rigorous econometric studies are not convinced by the potential negative effect of MTRs and conclude that there is no clear impact. Obviously “CPNP with access mark-ups + CPP” promotes also more pre-paid arrangements at retail level compared to “BAK + RPP”.

5.4 Conclusions of the analysis of empirical economic literature in the field

Overall, empirical economic literature focusing on the relative merits of “CPNP with access mark-ups + CPP” vs. “BAK + RPP” in terms of impact on consumers (measured by mobile penetration, level of mobile retail prices or mobile usages) is struggling with the difficulty to generate a data set without bias and sufficiently focused and its results have to be taken with caution because the next chapter¹⁵³ will show that the impacts of a change of charging scheme at wholesale level should be logically separated from the impacts of a change of charging scheme at retail level.

However, several recent studies show that, when the penetration of the mobile service is high, it is the level of MTRs that becomes crucial for consumer welfare as lower MTRs results in higher mobile usages in term of minutes of use per month per subscription. These empirical results have nevertheless little relevance for the future for the debate between cost-based CPNP vs. BAK because in the “real world” when the Recommendation of 7 May 2009 will be fully implemented, as explained in the next chapter¹⁵⁴, the most significant decrease in MTRs will have been achieved by the move from the current CPNP with access mark-ups to the cost-based CPNP; by contrast the additional decrease in the MTRs to be obtained from a subsequent move to a BAK interconnection charging scheme (where the MTRs will be effectively set at zero) is likely to be much smaller.

By contrast, results obtained so far tend to show that “BAK + RPP” has been more detrimental to mobile penetration in the phase of mobile services take-up and subsequent diffusion than “CPNP with access mark-ups + CPP” (and this conclusion is independent of how subscription is effectively measured).

Again these empirical results have little relevance for the future because in the “real world” when the Recommendation of 7 May 2009 will be fully implemented, as explained in the next chapter¹⁵⁵, each communications network can be assumed to have full coverage and there is full penetration of the networks, so nearly all consumers have a subscription to either one of the networks.

¹⁵³ See 6.2.1.

¹⁵⁴ See 6.2.1.

¹⁵⁵ See 6.2.1.

6 Assessment of the merits and demerits of Bill And Keep compared with cost-based Calling Party Network Pays from an analysis of the theoretical literature on economics of interconnection

The objective of this Chapter is to identify and assess the relative merits and demerits - from an economic point of view - of BAK and CPNP from an analysis of the theoretical literature on economics of interconnection.

Given that the Recommendation of 7 May 2009 establishes as a general rule that termination fees should (i) be calculated using a “pure” LRIC approach and (ii) be symmetrical between mobile operators on the one hand, and between fixed operators on the other hand – the gap between mobile and fixed termination rates being considerably reduced compared to the current situation -, **our case of interest** in this Chapter **will be to compare symmetric “cost-based” CPNP** (where termination rates are set on the basis of marginal costs of call termination) **with symmetric BAK** (where termination rates set at zero). However, it should be kept in mind that economic literature is quite often looking at alternative interconnection regimes by contrasting below cost-based termination rates and above cost-based termination rates (so called CPNP with access mark-ups on marginal costs of call termination) and not directly BAK and CPNP. So caution is required when inferring conclusions on the relative merits and demerits of BAK vs. cost-based CPNP.

As explained previously, the incremental costs referred to in the Recommendation of 7 May 2009 refers to the extra cost that an operator of an electronic communications network incurs, in order to supply the wholesale call termination service (defined as the last increment in output) to another operator. When the relevant increment becomes sufficiently small, the incremental costs approach the marginal costs. However, as acknowledged by the Commission, applying such a marginal cost pricing to wholesale call termination service is less appropriate than the recommended incremental cost pricing: because the electronic communications sector faces substantial fixed costs (i.e. costs that do not vary with the volume of output), an operator would not be in a position to fully recover all of their costs under a marginal cost approach as opposed to “pure” LRIC approach. In deed, while recognising the essential objective of short-run marginal cost pricing, the “pure” LRIC cost approach 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.¹⁵⁶ Consequently, we can assume that, from an economic point of view, the “pure” LRIC approach as defined by the Recommendation of 7 May 2009 can be considered *prima facie* a valid approximation to the “cost-based” CPNP of the economic literature as it cannot be disputed that there are some traffic sensitive costs associated with the termination of a call on another network.

Acknowledging the effective implementation of the Recommendation of 7 May 2009, our case of interest in this Chapter will be to compare symmetric cost-based CPNP (where termination rates are set on the basis of “pure” LRIC costs, which are considered to be a valid approximation to the marginal costs of call termination) with symmetric BAK (where termination rates set at zero).

We propose therefore to undertake this mostly theoretical analysis as follows:

1. First, the merits and demerits of BAK compared to cost-based CPNP are best to be assessed by **considering a “reference world” enabling a straightforward analysis from an economic point of view¹⁵⁷, and removing, in a step by step approach, the assumptions of this “reference world” in order to gradually approach a more realistic situation.** This shall enable to give a more structured and goal-oriented analysis of the theoretical literature, as we seek to identify the “basic” market conditions that would make BAK superior to cost-based CPNP in electronic communications.
2. Second, according to the economic literature in general, and the literature on economics of interconnection in particular, the relative merits and demerits of BAK and cost-based CPNP for each deviation from the “reference world” to the “real world” **are to be assessed against three key criteria** which are **broadly consistent with the objectives included in Article 8 Para 2-4 of the Framework Directive¹⁵⁸**, namely promoting competition and in so doing encouraging efficient investment in infrastructure and ensuring that users derive maximum benefits in terms of choice, price and quality as well as promoting the internal market. These three criteria are:
 - (i) Impact on **consumers**: e.g. on consumers’ surplus¹⁵⁹, on distortion of consumer choices and usage;

¹⁵⁶ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.13-14.

¹⁵⁷ This means that such a “reference world” is not to be considered as a representation of an “ideal” or “perfect” world, but merely as a standard or reference framework for the economic analysis.

¹⁵⁸ See Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive).

¹⁵⁹ Consumers’ surplus is defined as the consumers’ aggregate net utility (or benefit) obtained through the voice calls made on the electronic communications networks.

- (ii) Impact on **competition**: e.g. on producers' surplus¹⁶⁰, retail prices, protection of new entrants from monopolistic abuses, potential distortion of competition between different services (e.g. arbitrage¹⁶¹);
- (iii) Impact on **investment and innovation**: e.g. investment and innovation incentives and dynamic efficiency.

It is indeed important to consider these criteria not in isolation, because a regulator wishing that consumers benefit from entry and competition in electronic communications markets may be interested in maximizing consumer surplus under the constraint that the operators make enough profits to have incentives to invest in infrastructure or in quality of service ("QoS"). Alternatively, it may want to maximize a weighted average of consumer surplus and profits for each operator.¹⁶²

3. Finally, **should the difference between cost-based CPNP and BAK be found very theoretical, more attention** will have to be paid to the **regulatory costs of fine-tuning interconnection regulation** both on tariff- and on non-tariff issues.

6.1 Assessment of the merits and demerits from an economic point of view of Bill And Keep vs. cost-based Calling Party Network Pays in the "reference world"

First, the assumptions specifying the "reference world" will be defined based on seminal economic literature on the economics of interconnection (6.1.1). Then, the impacts of CPNP and BAK will be assessed in such an "reference world" against the three criteria of impact on consumers, impact on competition and impact on investment and innovation (6.1.2).

6.1.1 Defining the "reference world" for the purpose of assessing alternative interconnection schemes

We propose to define the "reference world" for the purpose of assessing alternative interconnection schemes based on seminal economic literature on the economics of interconnection aiming at defining a **"standard model" of two-way interconnection**

¹⁶⁰ Producers' surplus is defined as the sum of the profits made by operators of electronic communications networks.

¹⁶¹ From an economic point of view, an arbitrage opportunity is the opportunity to buy an asset at a low price then immediately selling it on a different market for a higher price. Arbitrage opportunities in telecommunications occur whenever services are functionally similar but not necessarily equivalent (especially from the point of QoS) and arbitrageurs can find and exploit price margins created by regulation within a country or different competitive conditions amongst countries (ex: accounting rate amongst different countries, accounting rate vs. domestic interconnection rates, retail fixed to mobile vs. retail mobile to mobile...).

¹⁶² See: De Bijl and Peitz (2002a), p. 34.

between networks in a situation of unregulated competition in the retail market, with imperfectly substitutable services.¹⁶³

More precisely, our proposed “reference world” of facilities-based competition, where the assessment of alternative interconnection schemes shall be fairly straightforward, will be based on fairly similar models of interconnection developed by **Laffont, Rey and Tirole (1998a)¹⁶⁴** and **Armstrong (1998)¹⁶⁵**.

As can be seen in Table 5 below, **the “reference world” has been defined** by these authors **with 9 key assumptions belonging to six logical clusters: competition characteristics, demand characteristics, network coverage characteristics, retail offer characteristics, interconnection characteristics and cost structure characteristics.**

¹⁶³ In other words, the two networks sell a differentiated but substitutable service.

¹⁶⁴ Laffont J.J., P. Rey and J. Tirole (1998a), “Network competition: I. Overview and non-discriminatory pricing”, RAND Journal of Economics, vol. 29, N°1, Spring, p 1-37. Please note that Laffont, Rey and Tirole (1998a) have developed several variations of the same model of interconnection (e.g. using two-part tariffs instead of linear tariffs): it is the first variation (developed in sections 3 and 5) that is used here to define our proposed “reference world”.

¹⁶⁵ Armstrong M. (1998), “Network Interconnection in Telecommunications”, The Economic Journal, vol. 108 (May), pp. 545-564.

Table 5: Comparison of the 9 “reference world” assumptions in Laffont, Rey and Tirole (1998a) and in Armstrong (1998) “standard models” of two ways interconnection between networks in an unregulated competition with imperfectly substitutable services

| | Type of logical cluster | Issue | Underlying Question | Assumptions | |
|--------|----------------------------------|---------------------------|---|---|---|
| | | | | Laffont, Rey, Tirole (1998a) | Armstrong (1998) |
| (0) | Competition characteristics | Type of competition | What is the type of competition? | imperfect unregulated competition at retail level under a Calling Party Pays (“CPP”) regime | imperfect unregulated competition at retail level under a Calling Party Pays (“CPP”) regime |
| (i) | Demand characteristics | Retail demand function | What is the behavior of customers? | Function of own characteristics and retail prices (Hotelling model) | Function of own characteristics and retail prices (Hotelling model) |
| | | | What is the type of the function demand for calls? | Constant elasticity of demand (the same for the two networks) | Elasticity of demand (the same for the two networks) |
| (ii) | Network coverage characteristics | Networks’ coverage | Do the networks have full or partial coverage and penetration? | Full network coverage and penetration | Full network coverage and penetration |
| (iii) | Interconnection characteristics | Traffic balance | Is the traffic pattern balanced? | Yes | Yes |
| (iv) | Cost structure characteristics | Costs | Do the networks face the same origination and termination costs? | Yes | Yes |
| | | | Does the cost for originating a call equal the cost for terminating a call? | Yes | No |
| | | | What is the cost structure of interconnected networks? | A fixed cost per customer, a marginal cost per originating a call, a marginal cost per terminating a call, a marginal cost in between the interconnected networks | A fixed cost per customer, a marginal cost per originating a call, a marginal cost per terminating a call |
| (v) | Interconnection characteristics | Reciprocal access pricing | Is the termination charge of the two networks equal? | Yes (which implies that there are uniform and reciprocal obligations in terms of points of interconnection) | Yes (which implies that there are uniform and reciprocal obligations in terms of points of interconnection) |
| (vi) | Retail offer characteristics | Price discrimination | Are on-net and off-net calls priced differently? | No price discrimination | No price discrimination |
| (vii) | Retail offer characteristics | Price structure | Is the price structure linear, binomial, ...? | Linear structure | Linear structure |
| (viii) | Demand characteristics | Call externalities | Does the calling customer get the whole value of a call? | Yes | Yes |

Source: Laffont, Rey and Tirole (1998a)¹⁶⁶, Armstrong (1998), TERA Consultants analysis

We will present now these 9 assumptions in detail and highlight the very few differences between Laffont, Rey and Tirole (1998a), on the one side, and Armstrong (1998), on the other side. This will also enable the non-economic reader to compare more easily these assumptions with the characteristics of the “real world” of electronic communications.

- **Competition characteristics:**

- According to assumption (0), there is imperfect, unregulated competition in the retail market between two interconnected networks¹⁶⁷. The networks compete by simultaneously setting retail prices offered under a Calling Party Pays (“CPP”) regime.

¹⁶⁶ To avoid any confusion, please note that Laffont, Rey and Tirole (1998a) have also considered two-part tariffs but the « reference world » is based on the first sections of their work, where retail prices are assumed to be linear.

¹⁶⁷ Please note that it is assumed that the RETAIL market is unregulated. The WHOLESale market may or may not be regulated. It is not specified how interconnection prices are chosen.

- **Demand characteristics:**

- According to assumption (i), each customer makes its choice to join a given network depending on its own characteristics and preferences, as well as on the comparison of the retail prices offered by the networks, in order to maximise its net utility (so called “Hotelling model”¹⁶⁸). This implies that the retail market shares of the two networks depend on the retail prices offered by both networks.

Furthermore, once a customer has chosen a given network, the elasticity of its demand for calls is depending only on the network chosen, i.e. the volume of calls made by the customer once he has chosen a given network, does not depend any more on the retail prices of the other network. This elasticity is the same whatever the network chosen. Contrary to Laffont, Rey and Tirole (1998a), Armstrong (1998) makes a more general assumption by assuming that this elasticity is not necessarily constant.

- According to assumption (viii), there is no call externality¹⁶⁹, which refers to the fact that it is only the calling party (and not also the called party) which obtains a benefit from the call.¹⁷⁰

- **Network coverage characteristics:**

- According to assumption (ii), both networks have a full geographic coverage¹⁷¹, and there is full penetration of both networks, so all consumers can choose between both networks, and ultimately will subscribe to either one of the networks.¹⁷² This can be considered indeed as a natural starting point when analysing mature electronic communications markets.

¹⁶⁸ The Hotelling model enables to avoid head-to-head competition à la Bertrand, in which networks (sellers) set prices and their customers (buyers) choose quantities at that price, by introducing horizontal differentiation between the networks.

¹⁶⁹ An externality is an impact on any party not directly involved in an economic decision: it occurs when an economic activity causes external costs or external benefits (or utility) to third party stakeholders who did not directly affect the economic transaction.

¹⁷⁰ Alongside to this “call externality”, there is also a “network externality”. The network externality is the extra benefit that existing users of the network enjoy when new users join the network. However in the “reference world” of two interconnected offering non-discriminatory prices, the network externality is the same for both networks.

¹⁷¹ See Laffont J.J., P. Rey and J. Tirole (1998a), “Network competition: I. Overview and non-discriminatory pricing”, RAND Journal of Economics, vol. 29, N°1, Spring, p. 1-37: “Define a network’s coverage as the fraction of consumers who can be served by the network at a given point of time. The “coverage” should in general be thought as a geographic coverage, but it may admit other interpretations such as the instalment of functionalities needed by certain types of consumers of the calling capacity.”

¹⁷² In other words all potential consumers have effectively joined one of the two networks and adjust their usage on the basis of the retail prices offered. This assumption would make less sense in case of two-part instead of linear retail tariffs. Clearly, for high subscription fees some consumers eventually no longer

- **Retail offer characteristics:**
 - According to assumption (vi), retail prices are not discriminatory, which implies that off-net calls¹⁷³ and on-net calls¹⁷⁴ cannot be priced differently, even if the costs of on-net and of on-net calls are not identical.
 - According to assumption (viii), retail prices are linear, which means that there are no separate prices for subscription to the network and voice calls. In other words, retail prices for the calls are solely minute-based.

- **Interconnection characteristics:**
 - According to assumption (iii), there are balanced calling patterns. This means that consumers call anyone else (whether on-net or off-net) with equal probability, resulting in volumes of on-net and off-net traffic being proportional to market shares (in customers): that is to say, if a given network has 40% of market share in customers, than 40% of the total calls made by its customers shall be on-net calls.
 - According to assumption (v), interconnection prices are reciprocal (i.e. symmetrical), which means that the termination rates charged by the two networks are equal, which implies also that there are symmetric or uniform obligations in terms of points of interconnection so as to ensure that a network always pays as much for termination of a call on the rival network as it receives for completing a call originated on the rival network.¹⁷⁵
 - Note that we assume that interconnection prices are given. They may result from negotiations among the networks or alternatively, be set by the regulator. The purpose of our discussion is to explore the effects of the levels of interconnection prices. To do so, we will vary interconnection prices, e.g. to compare BAK versus CPNC, under a Calling Party Pays (“CPP”) regime at retail level.

subscribe to the networks: the assumption of full participation of consumers only makes sense for sufficiently low subscription fees. (De Bijl and Peitz (2004), p. 417).

¹⁷³ An off-net call is a call originating and terminating on different networks.

¹⁷⁴ An on-net call is a call originating and terminating on the same network.

¹⁷⁵ In other words, it is required to specify not only the structure and level of termination fees, but also the locations of Poles of the termination network from where these termination fees are applicable. This is what the ERG describes as the “boundary” of the charging regime (cf. ERG (09) 34, p. 18-20).

- **Cost structure characteristics:**

- According to assumption (iv), both networks are technologically symmetric that is with identical cost structures. Contrary to Laffont, Rey and Tirole (1998a), Armstrong (1998) assumes that the cost of originating and terminating a call in a given network are not necessarily the same.

Furthermore, whereas Laffont, Rey, and Tirole (1998a) consider the three following types of costs as shown in Figure 27 below:

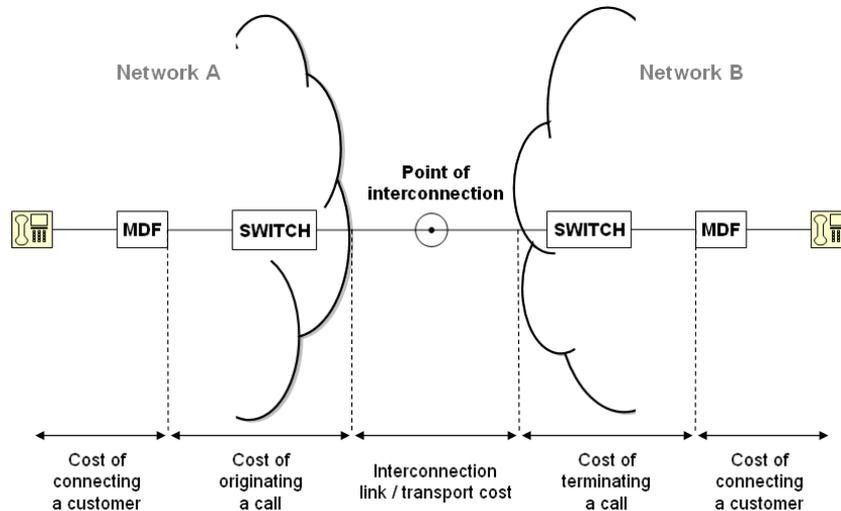
- costs of connecting a customer¹⁷⁶;
- costs to originate a call or to terminate a call; and
- costs to transport each call originated from one network to the other network in case of off-net calls (often called interconnection specific or incremental costs) using an interconnection link between the two networks. The boundary between the responsibilities of each network is located at the Point of Interconnection (PoI).

Contrary to Laffont, Rey and Tirole (1998a), Armstrong (1998) does not consider the costs to transport each call from one network to the other in the case of off-net calls (in other words they are split equally between the two networks so that they have a neutral impact).¹⁷⁷

¹⁷⁶ This cost captures, for example in fixed networks, the maintenance of the local loop and may also include the investment cost that has to be recovered. (De Bijl and Peiz (2002a), p. 31-32).

¹⁷⁷ This is logically equivalent to an assumption that the costs of interconnection such as PoIs are shared equally between the networks (cf. Atkinson and Barnekov (2000) in their work on their "Bill Access to Subscribers, (Incremental) Interconnection Costs Split" (BASICS) model).

**Figure 27: Type of costs to be considered for two ways interconnection between networks in an unregulated competition with imperfectly substitutable services
(Example of a fixed network)**



Source: Laffont and al (1998a), Armstrong (1998), TERA Consultants analysis

For the purpose of exploring how policy and regulation – including with respect to interconnection charges - can stimulate competition whilst explicitly taking consumers' benefits into account, De Bijl and Peitz¹⁷⁸ have defined a “benchmark model” building upon the seminal work by Laffont, Rey and Tirole (1998a) and Armstrong (1998). Since the latter articles do not discuss BAK, we will use simulations with this type of “benchmark model” to check outcomes under BAK.¹⁷⁹ Alternatively, one can immediately see in the formulas of equilibrium prices in the economic literature what the effects of the level of the termination charge on retail prices are. The simulations confirm this.

Thus we can consider the impact on consumers' surplus, producers' surplus and welfare level in the “reference world” of the following interconnection charging scheme in particular:

¹⁷⁸ De Bijl and Peitz (2000; 2002a; 2002b) use a static “benchmark model” as a building block of dynamic competition: this static game is repeated during a number of periods so as to the evolution over time of the industry from infant to mature market with two networks (incumbent and entrant). Their approach enables to perform numerical simulations with Mathematica software whose robustness (to parameter changes in the model, to different model specifications, to alternative assumptions) has been verified. Their static (one-period) model in a fully symmetric situation will be used for illustrative purposes in the remaining of this chapter. This is fully compatible to the analysis by Laffont, Rey and Tirole (1998) and Armstrong (1998), on which the model is based.

¹⁷⁹ See 11.4

- symmetric cost based CPNP (called “cost-based regulation”, where interconnection charges / termination rates are set on the basis of marginal costs of call termination¹⁸⁰);
- symmetric CPNP with access mark-ups (called “reciprocal access price regulation”, with mark-ups on marginal costs of call termination for both networks).

The proposed “reference world” for the purpose of assessing alternative interconnection schemes is defined with the following 9 key assumptions:

(0) There is imperfect unregulated competition between two interconnected networks.

(i) Market shares of the two networks depend on retail prices – under a Calling Party Pays regime – proposed by each network. Demand for calls depends only from the originating network unit price.

(ii) Each communications network is assumed to have full coverage and there is full penetration of the networks, so all consumers are subscribed to either one of the networks.

(iii) The traffic pattern is balanced – that is to say, the percentage of on net calls is equal to the fraction of consumers subscribing to this network (“balanced calling pattern”).

(iv) Communications networks face the same costs, i.e. the cost for originating or terminating a call (supposed to be equal) are identical for the two communications networks, as well as the costs of connecting a customer.

(v) Reciprocal (or symmetrical) access pricing, which means that the termination price charged by the two networks is equal (which includes the fact that there are uniform and reciprocal obligations in terms of points of interconnection).

(vi) Non-discriminatory pricing, whereby off-net call and on-net calls cannot be priced differently.

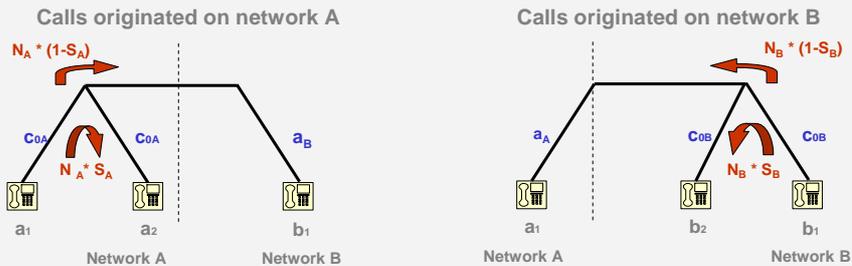
(vii) Linear pricing, which means that there is no separate prices for subscription and calls, but only unit prices.

(viii) No call externalities, which means that the calling party is supposed to get the whole value of the call.

¹⁸⁰ Please note that the improved CPNP according to the Recommendation will closely approximate this cost-based CPNP.

This “reference world” can be modelled as follows (cf. Figure 28 below).

Figure 28: Reference world’s model of two ways interconnection between networks in an unregulated monopolistic competition



- *Balanced calling pattern assumption implies that traffic between networks is balanced:*
 - Each customer generates the same traffic $\rightarrow N_A / N_B = S_A / S_B$
 - As a result, $N_A * (1 - S_A) = N_B * S_A / S_B * (1 - S_A) = N_B * S_A / S_B * S_B = N_B * S_A = N_B * (1 - S_B)$
- *Networks face the same costs : $c_{0A} = c_{0B}$*
- *Reciprocal access pricing is mandated: $a_A = a_B$*
- *Non discriminatory pricing: $p_{Aon-net} = p_{Aoff-net}$*

N_A : number of calls monthly originated by network A
 S_A : market share of network A; $S_B = 1 - S_A$: market share of network B
 c_0 : originating cost (= terminating cost) for network A (per call)
 a_A : termination fee charge by network A to network B (per call)
 $p_{Aon-net}$: on-net call's price for network A
 $p_{Aoff-net}$: off-net call's price for network A
 f_A : costs of connecting a customer to network A

Source: TERA Consultants analysis

6.1.2 Assessing the merits and demerits of BAK and cost-based CPNP in the “reference world”

In the following, we will consider how both CPNP and BAK may affect network’s incentives to set retail prices (impact on consumers), affect the intensity and/or the character of the competition between networks (impact on competition), or affect network’s incentives to invest and/or to innovate so as to reduce costs (i.e. by choosing the lowest cost assets with the latest available and proven technology) or to increase the quality of service (impact on investment and innovation).

6.1.2.1 Impact on consumers

It can be demonstrated that in the “reference world” (as defined in 6.1.1 and Figure 28 above) retail prices are higher under cost-based CPNP than under BAK.

We will proceed in two steps: (1) Description of costs and revenues of a network under CPNP and BAK and (2) Calculation of retail prices in the “reference world” under CPNP and BAK.

1. Description of costs and revenues of a network under CPNP and BAK regimes.

Costs and revenues shall be calculated for Network A originated calls, Network A terminated calls and Network A connection of customers (cf. Table 6 below):

Table 6: Description of costs and revenue of Network A costs and revenues under CPNP and BAK regimes

| | CPNP | BAK |
|---|---|--|
| Network A originated calls | | |
| Costs = costs of on-net calls + costs of off-net calls | $C_{oA\ CPNP} = N_{A\ CPNP} * (1 - S_{A\ CPNP}) * (c_{0A} + a_B) + N_{A\ CPNP} * S_{A\ CPNP} * 2c_{0A}$ | $C_{oA\ BAK} = N_{A\ BAK} * (1 - S_{A\ BAK}) * c_{0A} + N_{A\ BAK} * S_{A\ BAK} * 2c_{0A}$ |
| Revenue = revenue from on-net calls + revenue of off-net calls | $R_{oA\ CPNP} = N_{A\ CPNP} * S_{A\ CPNP} * p_{A\ on-net\ CPNP} + N_{A\ CPNP} * (1 - S_{A\ CPNP}) * p_{A\ off-net\ CPNP}$ | $R_{oA\ BAK} = N_{A\ BAK} * S_{A\ BAK} * p_{A\ on-net\ BAK} + N_{A\ BAK} * (1 - S_{A\ BAK}) * p_{A\ off-net\ BAK}$ |
| Network A terminated calls | | |
| Costs | $C_{tA\ CPNP} = N_{B\ CPNP} * S_{A\ CPNP} * c_{0A}$ | $C_{tA\ BAK} = N_{B\ BAK} * S_{A\ BAK} * c_{0A}$ |
| Revenue | $R_{tA\ CPNP} = N_{B\ CPNP} * S_{A\ CPNP} * a_A$ | $R_{tA\ BAK} = 0$ |
| Connection of Network A's customers | | |
| Costs | $S_{A\ CPNP} * f_A$ | $S_{A\ BAK} * f_A$ |

Source: TERA Consultants analysis

Costs of Network A originated calls are lower under BAK than under CPNP, whereas associated revenues are the same. This shows (as noticed by Laffont, Rey and Tirole (1998a)) that, in the “reference world”, the “positive” interconnection charge under CPNP affects each network’s perceived

incremental cost even though there is no net payment between the two networks, which tends to set a floor for the retail price of a call.

Revenues of Network A terminated calls are lower under BAK than under CPNP, whereas associated costs are the same.

Costs associated to the connection are the same under BAK and under CPNP.¹⁸¹

2. Calculation of retail prices in the “reference” world.

In the “reference world”, the profits of a network A are defined as:

$$[R_{oA} + R_{tA}] - [S_A * f_A + C_{oA} + C_{tA}].$$

This leads to the following profits according to the alternative interconnection charging regime:

- Under CPNP:

$$[N_{A \text{ CPNP}} * S_{A \text{ CPNP}} * p_{A \text{ on-net CPNP}} + N_{A \text{ CPNP}} * (1 - S_{A \text{ CPNP}}) * p_{A \text{ off-net CPNP}} + N_{B \text{ CPNP}} * S_{A \text{ CPNP}} * a_A] - [S_{A \text{ CPNP}} * f_A + N_{A \text{ CPNP}} * (1 - S_{A \text{ CPNP}}) * (c_{0A} + a_B) + N_{A \text{ CPNP}} * S_{A \text{ CPNP}} * 2c_{0A} + N_{B \text{ CPNP}} * S_{A \text{ CPNP}} * c_{0A}]$$

- Under BAK:

$$[N_{A \text{ BAK}} * S_{A \text{ BAK}} * p_{A \text{ on-net BAK}} + N_{A \text{ BAK}} * (1 - S_{A \text{ BAK}}) * p_{A \text{ off-net BAK}}] - [S_{A \text{ BAK}} * f_A + N_{A \text{ BAK}} * (1 - S_{A \text{ BAK}}) * c_{0A} + N_{A \text{ BAK}} * S_{A \text{ BAK}} * 2c_{0A} + N_{B \text{ BAK}} * S_{A \text{ BAK}} * c_{0A}]$$

These profits can be further simplified applying the following assumptions of the “reference” world:

- Assumption (v): Reciprocal access pricing

$$a_A = a_B$$

- Assumption (vi): Non discriminatory pricing

$$p_{A \text{ on-net CPNP}} = p_{A \text{ off-net CPNP}} = p_{A \text{ CPNP}} \text{ et } p_{A \text{ on-net BAK}} = p_{A \text{ off-net BAK}} = p_{A \text{ BAK}}$$

The profits expressions are thus as follows:

¹⁸¹ In the “reference world”, costs of connecting customers are not recovered through specific associated revenues because of assumption (vii) Linear pricing, which means that there are no separate prices for access and calls, but only unit prices.

- Under CPNP:

$$[N_{A\text{ CPNP}} * p_{A\text{ CPNP}} + N_{B\text{ CPNP}} * S_{A\text{ CPNP}} * a_A] - [S_{A\text{ CPNP}} * f_A + N_{A\text{ CPNP}} * (1 - S_{A\text{ CPNP}}) * (c_{0A} + a_A) + N_{A\text{ CPNP}} * S_{A\text{ CPNP}} * 2c_{0A} + N_{B\text{ CPNP}} * S_{A\text{ CPNP}} * c_{0A}]$$

- Under BAK:

$$[N_{A\text{ BAK}} * p_{A\text{ BAK}}] - [S_{A\text{ BAK}} * f_A + N_{A\text{ BAK}} * (1 - S_{A\text{ BAK}}) * c_{0A} + N_{A\text{ BAK}} * S_{A\text{ BAK}} * 2c_{0A} + N_{B\text{ BAK}} * S_{A\text{ BAK}} * c_{0A}]$$

As the networks are symmetric in terms of costs and demand¹⁸², the two networks apply the same retail tariff at the equilibrium¹⁸³ (that is to say when the two networks have effectively defined their retail tariffs) and the consumption per user is the same :

$$n = N_A / S_A = N_B / S_B \quad ^{184}$$

Because of the balance calling pattern assumption (assumption (iii)), this implies that at equilibrium the **traffic is balanced** between the two networks, as shown by Laffont, Rey, Tirole (1998a) and Armstrong (1998):

- Laffont, Rey and Tirole (1998a) show that the balanced calling pattern assumption implies that for equal unit prices, flows in and out of a network are balanced – even if market shares are not¹⁸⁵ and, at equilibrium, unit retail prices are equal.¹⁸⁶
- Following Armstrong (1998), “this implies that if both networks set the same retail price then the net outflow of calls from each network is zero”¹⁸⁷ and, at equilibrium, unit retail prices are equal”¹⁸⁸.

Finally, in the “reference world”, profits of each network (which are the same for Network A and for Network B because the networks are symmetric in terms of costs and demand) are simplified as follows:

¹⁸² Even if the products are differentiated, the model assumptions imply that the networks have the same structure and level of costs and attract identical subgroups of consumers.

¹⁸³ Please note that this refers to the Nash equilibrium. A Nash equilibrium is a set of strategies, one for each network, such that no network has incentive to unilaterally change its action. Networks are in equilibrium if a change in strategies by any one of them would lead that network to earn less than if it remained with its current strategy.

¹⁸⁴ In other words, n is the Average Minute Per User (AMPU).

¹⁸⁵ See Laffont, Rey and Tirole (1998a), pp. 1-37, p. 3.

¹⁸⁶ See Laffont, Rey and Tirole (1998a), p. 1-37, p. 10, proposition 1, “there exists a unique equilibrium, which is symmetric”.

¹⁸⁷ See Armstrong (1998), pp. 545-564, p. 553.

¹⁸⁸ See Armstrong (1998), pp. 545-564, p. 550.

- Under CPNP:

$$[n_{\text{CPNP}} * p_{\text{A CPNP}}] - [S_{\text{A CPNP}} * f_{\text{A}} + n_{\text{CPNP}} * (1 - S_{\text{A CPNP}}) * c_{0 \text{ A}} + n_{\text{CPNP}} * S_{\text{A CPNP}} * 2c_{0 \text{ A}} + n_{\text{CPNP}} * S_{\text{B CPNP}} * c_{0 \text{ A}}]$$

- Under BAK:

$$[n_{\text{BAK}} * p_{\text{A BAK}}] - [S_{\text{A BAK}} * f_{\text{A}} + n_{\text{BAK}} * (1 - S_{\text{A BAK}}) * c_{0 \text{ A}} + n_{\text{BAK}} * S_{\text{A BAK}} * 2c_{0 \text{ A}} + n_{\text{BAK}} * S_{\text{B BAK}} * c_{0 \text{ A}}]$$

This shows that the difference between profits under CPNP and BAK is caused by the level of the retail tariffs p_{A} and is not impacted by the payments at interconnection level. The intuition behind this conclusion is that in the “reference world”, the two networks will offer the same price, so that consumer consumptions are the same in each network. Thus, the balanced calling pattern assumption – assumption (iii) – implies that flows in and out of the networks are the same. Finally, as termination fees are identical – assumption (v) –, a network will in fact exactly compensate its out payments for off-net calls with its revenues for incoming calls.

Using for illustrative purposes only De Bijl and Peitz’s model, the impact on consumers’ surplus, producers’ surplus and welfare level in the “reference world” of the following interconnection charging regimes:

- symmetric BAK;
- symmetric cost-based CPNP;
- symmetric CPNP with access mark-ups.

is shown in Table below. The marginal cost level of call termination is set at 1 cent for both operators.

The model has been calibrated in an ad hoc fashion. Nevertheless, as reported in De Bijl and Peitz (2002)¹⁸⁹, running this type of model under a variety of parameter constellations within a reasonable range, will not affect the qualitative implications of the model. Thus, even though the model does not try to achieve real-world accuracy, one can safely use it to understand how the regulatory regime and various underlying market characteristics (as expressed in the assumptions of the model) may impact the nature of competition and the effects on consumers and producers surplus.

¹⁸⁹ See De Bijl and Peitz (2002), section 3.4.2, p. 56.

Table 7: Comparison of impact of BAK and CPNP in the “reference world” using De Bijl and Peitz model (for illustrative purposes only)

| | BAK | Cost-based CPNP | CPNP with access mark-ups | | | | |
|--|----------------|-----------------|---------------------------|---------|---------|---------|---------|
| Access charges (cents) | 0 | 1 | 2 | 3 | 5 | 10 | 15 |
| Retail (per-minute) tariff (cents) | 5.38 | 5.47 | 5.57 | 5.67 | 5.87 | 6.44 | 7.11 |
| Consumers' surplus (millions) | 684.516 | 677.66 | 670.69 | 663.598 | 649.021 | 609.849 | 565.398 |
| Aggregate networks' profits (millions) | 146.959 | 152.203 | 157.479 | 162.788 | 173.504 | 200.921 | 229.329 |
| Total welfare (millions) | 831.475 | 829.864 | 828.169 | 826.385 | 822.524 | 810.77 | 794.527 |

Source: De Bijl, March-April 2010, based on earlier work with Martin Peitz

One can observe that the lower symmetric termination rates are, the lower retail tariffs are. The intuition behind this is that networks perceived marginal costs are decreasing with termination rates.

Consequently, retail tariffs are lower under BAK than under cost-based CPNP, which brings them a little bit closer to efficient levels. Consumers' welfare is therefore higher under BAK than under cost-based CPNP. The effect is reverse on network profits: network profits are lower under BAK than under cost-based CPNP. Overall, total welfare (sum of consumers' welfare and networks' profits) is higher under BAK than under cost-based CPNP.

The simulation results confirm and extend the results of Laffont, Rey and Tirole. (1998a) and Armstrong (1998) by adding the case of BAK. In fact, the lower the access price, the lower retail prices, and the more consumers benefit. Thus it is natural that BAK outperforms cost-based CPNP, just as cost-based CPNP outperforms CPNP with access mark-ups. More precisely, **decreasing termination fees that are already close to marginal costs (and keeping them close to marginal costs) has little effect on surplus levels. More importantly, the biggest impact is made by substantially**

reducing high access mark-ups (i.e. moving from CPNP with access mark-ups to cost-based CPNP).

Furthermore, following assumption (vi), there is no difference between off-net and on-net prices. Consequently neither under cost-based CPNP nor under BAK can a difference of market shares between the interconnected networks be mediated in tariffs in order to distort customer choice.

In the “reference world” retail prices are lower under BAK than under cost-based CPNP. This leads to higher consumers’ welfare and total welfare under BAK than under cost-based CPNP. Decreasing termination fees that are already close to marginal costs (and keeping them close to marginal costs) has little effect on surplus levels. More importantly, the biggest impact is made by substantially reducing high access mark-ups (i.e. moving from CPNP with access mark-ups to cost-based CPNP).

Furthermore, following assumption (vi), there is no difference between off-net and on-net prices, so that neither under cost-based CPNP nor under BAK can a difference of market shares between the interconnected networks be mediated in tariffs in order to distort customer choice.

6.1.2.2 Impact on competition

The intensity of competition is generally assessed on the basis of retail prices. Everything else being equal, the lower the retail prices, the fiercer the competition can be said to be, given that we assume that the networks compete in prices. **Since BAK leads to lower retail prices than cost-based CPNP, clearly, BAK leads to fiercer competition.**

As pointed out in Laffont, Rey and Tirole (1998a) “a reciprocal access pricing arrangement that results in balanced contributions due to equal final prices is not equivalent to a “bill-and-keep” system in which networks would not pay access charges to each other; a network’s incentive to raise price is affected by the existence of a positive access charge.”¹⁹⁰ **In other words, in the “reference world”, the “positive” interconnection charge under CPNP affects each network’s perceived incremental cost even though there is no net payment between the two networks, which tends to set a floor for the retail price of a call.** This is seen immediately by looking at the level of the perceived marginal cost for each operator, which is equal to $2 S c_0 + (1 - S) (c_0 + i)$.

¹⁹⁰ See Laffont J.J., P. Rey and J. Tirole (1998a), “Network competition: I. Overview and non-discriminatory pricing”, RAND Journal of Economics, vol. 29, N°1, Spring, p 1-37. ; Laffont J.J., P. Rey and J. Tirole (1998b), “Network competition: II. Price discrimination”, RAND Journal of Economics, vol. 29, N°1, Spring, pp. 38-56, p. 9.

Furthermore, two competition issues which are of more relevance in the context of CPNP with access mark-ups – absent regulation to enforce cost-based CPNP - ought to be mentioned.

Firstly, because in the “reference world” retail prices are assumed to be non-discriminatory (assumption (vi)) and linear (assumption (vii)), both networks have under CPNP an incentive to set an excessive termination rate as illustrated in Table 5. This will generate an “artificial” increase of retail prices and plays as an instrument of tacit collusion in the context of CPNP with access mark-ups. We can therefore conclude that CPNP can effectively lead to a collusive strategy amongst networks while under BAK this does not arise (Laffont, Rey and Tirole (1998a)¹⁹¹; Armstrong (1998)¹⁹²).¹⁹³ By contrast, under BAK, as there are no termination fees any more, the networks can decrease retail prices in order to gain market share, and hence, they cannot use termination agreements to implement a tacit collusion strategy (because there are no termination fees levied under BAK). As noticed by Atkinson and Barnekov (2000), BAK would lead to an increase in competition, because networks can only exploit their own customers, who could switch to the other network. BAK avoids therefore the “termination bottleneck” generated by the fact that a given network completely controls the access for traffic that is destined for his customers: under BAK, the bottleneck owner cannot exploit its monopoly power over the bottleneck, whereas under CPNP, the caller can only choose between not making a call or paying whatever charge the terminating network sets for terminating the call.¹⁹⁴

Secondly, both under BAK and under CPNP, to the extent that the termination fee is fixed, there is no possibility for Network A to increase its termination fee with the objective to increase the costs of Network B for its off-net calls, driving herewith the retail prices of Network B upwards.

- Under BAK, Network A cannot raise such barrier to entry with its termination fee, because there is no termination fee paid between networks.

¹⁹¹ See Laffont J.J., P. Rey and J. Tirole (1998a), “Network competition: I. Overview and non-discriminatory pricing”, RAND Journal of Economics, vol. 29, N°1, Spring, p 1-37. ; Laffont J.J., P. Rey and J. Tirole (1998b), “Network competition: II. Price discrimination”, RAND Journal of Economics, vol. 29, N°1, Spring, pp. 38-56.

¹⁹² See Armstrong M. (1998), “Network Interconnection in Telecommunications”, The Economic Journal, vol. 108 (May), pp. 545-564.

¹⁹³ We note that Hoffler (2009) provided a complementary explanation for why termination rates can support collusion in the retail market in an infinitely repeated competition à la Bertrand. Bertrand competition is a model of competition where firms (sellers) set prices and their customers (buyers) choose quantities at that price.

¹⁹⁴ However, under CPNP, the “termination bottleneck” can be addressed by introducing a regulatory authority, which will implement a cost-based regulation of termination fees. We observe in this respect that BEREC (2010, p. 24) underlines that “a regulator (...) faces information problems regarding the determination of the regulated price. Not all information necessary for setting the efficient price is available for the regulator who is dependent on operators that do not have incentives to provide the correct information”.

- Under CPNP, in the “reference world”, a network will earn from termination revenues as much as it will pay for off-net calls because flow in and flow out of a network is equal (traffic between the two communications networks is balanced – assumption (iii)) and unit termination fees are the same (reciprocal access charge – assumption (v)). As a result, Network A cannot raise a barrier to entry with its termination fee.

In the “reference world”, BAK leads to lower retail prices than cost-based CPNP at equilibrium.

6.1.2.3 Impact on investment and on innovation

The impact on investment and on innovation under CPNP and under BAK can be investigated using the work of Stühmeier (2010)¹⁹⁵, which confirms in the case of linear prices the results obtained by Valletti and Cambini (2005) in the case of two-part tariffs¹⁹⁶. Stühmeier (2010) introduces an investment stage prior to price competition, where the networks choose their level of fixed investment. For example, networks must choose capacity levels, which are either built or rented in both the backbone or the access network, prior competing in price. Consumers are indeed enjoying such investments increasing the quality of service, ceteris paribus, because they will get easier access, faster delivery, less congestion problems, etc.

When a network undertakes such an investment, this does not only affect the quality of its own service (both on-net and off-net) but also the perceived quality of the rival firm (because off-net calls show a better quality than previously). However, networks do not take account for the effect of their investment on rival's demand.

- **Under CPNP**, in the “reference world”, Stühmeier (2010) shows that if investment of Network A does not largely impact quality of calls of Network B)¹⁹⁷, networks invest less if termination rates are regulated above costs and invest more when termination rates are regulated below cost. Indeed, if Network A undertakes an investment that will improve the quality of service for all its calls relatively to Network B, it will increase the demand for calls from its customers, both on-net and off-net, proportionally to the elasticity of demand (because an increase in quality of

¹⁹⁵ Stühmeier (2010), “Semi-collusion on Investments in the Mobile Internet Market”, Working Paper. We reckon that this paper is concerned with national roaming for mobile Internet services on 3G networks. However the underlying conceptual framework is analogous to the one that would be applicable would we be analysing voice services (and is obviously based on Valetti and Cambini previous work on voice call termination).

¹⁹⁶ Valletti and Cambini (2005) do not investigate as such the relative merits and demerits of CPNP and BAK, but extend their analysis to BAK by considering BAK as a situation with the termination charge below cost. Stühmeier (2010) investigates as such the relative merits and demerits of CPNP and BAK.

¹⁹⁷ Also called for lower spillovers value on investments.

service for a given level of retail prices is equivalent to a decrease in retail prices for a given level of quality of service)¹⁹⁸. As the investment of Network A does not impact too much the demand for services of Network B, demand for calls from Network B customers will increase less than demand for calls from Network A customers. This will generate an imbalanced traffic. This implies that Network A will have to pay more for outgoing traffic (off-net calls) than for incoming traffic under CPNP. Therefore Network A is more reluctant to invest as to improve the quality of service for all its calls under CPNP.¹⁹⁹

On the contrary, if the investment of Network A largely impacts the quality of calls of Network B (which means the investment of Network A impacts the quality of calls of Network B quite as much as the quality of calls of Network A)²⁰⁰, networks invest more if termination rates are regulated above costs and invest less if termination rates are regulated below cost.

- By contrast, **under BAK**, as there are no termination rates any more, the networks can invest in quality of service without risking generating losses at interconnection level. Then, if the investment of network A does not largely impact the quality of calls of Network B, Network A is more willing to invest to improve the quality of service for all its calls under BAK. On the contrary, if the investment of Network A largely impacts the quality of calls of network B and vice versa, Network A is more reluctant to invest to improve the quality of service for all its calls under BAK

The parameters of Stühmeier's (2010) model suggest²⁰¹ that it is more probable that investment of one network does not largely impact the quality of calls of the other network.

In the “reference world”, BAK provides better incentives to invest in quality of service than cost-based CPNP when investment of Network A does not largely impact the quality of Network B.

¹⁹⁸ Let's suppose that a given mobile operator is investing in its radio network so as to better cover railways tracks, mobile customers will tend to use their mobile phones in the train.

¹⁹⁹ Valletti and Cambini (2005) comment in this respect that reciprocal (i.e. symmetrical) access pricing is an instrument enabling networks not to engage in a (very costly) competition on investments.

²⁰⁰ Also called for large spillovers value on investments.

²⁰¹ Because there is only a small range in which they could vary.

6.1.2.4 Conclusion of the assessment of the merits and demerits of BAK and cost-based CPNP in the “reference world”

It appears therefore, as summarized in Table 8 below, that BAK is more efficient than cost-based CPNP in the “reference world” because of its superior impact on consumers (lower retail tariffs), on competition (incentive to decrease retail price) as well as on investment and innovation (incentive to invest in quality of service).

Table 8: Conclusion of the assessment of the merits and demerits of BAK and cost-based CPNP in the “reference world”

| Impact on | Cost-based CPNP | BAK | Conclusion |
|----------------------------------|--|--|------------|
| CONSUMER | <ul style="list-style-type: none"> • Higher retail price • Lower consumers’ surplus • Lower welfare • No distortion of customers’ choice with on-net/off-net pricing | <ul style="list-style-type: none"> • Lower retail price • Higher consumers’ surplus • Higher welfare • No distortion of customers’ choice with on-net/off-net pricing | BAK |
| COMPETITION | <ul style="list-style-type: none"> • Risk of collusive prices (if CPNP with access mark-ups) • No monopoly issue (traffic flows balanced) | <ul style="list-style-type: none"> • BAK leads to more intense competition in the retail market because it leads to lower retail prices • Absence of collusive prices • No monopoly issue (no termination fees) | BAK |
| INVESTMENT AND INNOVATION | <ul style="list-style-type: none"> • Low incentives to invest in QoS (risk of generating losses at interconnection level) | <ul style="list-style-type: none"> • High incentives to invest in QoS | BAK |

Source: TERA Consultants analysis

6.2 Removal of the hypotheses of the "reference world" step-by-step so as to clearly identify the conditions under which Bill And Keep would remain the most economically efficient charging mechanism

Our review of economic literature shows that five basic clusters of deviations from the assumptions of the “reference world” so as to become closer and closer to the “real world” of electronic communications have been investigated²⁰²:

1. a deviation from **symmetry to asymmetry** in terms of network coverage characteristics which will remove assumption (ii) from the “reference world”;
2. a deviation from **symmetry to asymmetry** in terms of interconnection or cost structure characteristics, which will remove assumptions (iii), (iv) and (v) from the “reference world”;
3. a deviation from **non-discriminatory to discriminatory retail prices** for retail offer characteristics, which will remove assumption (vi) from the “reference world”;
4. a deviation from **linear to two-parts retail prices** for retail offer characteristics, which will remove assumption (vii) from the “reference world”;
5. removal of the assumption of **no call externalities** (sender assumed to get the whole value of the voice call) **to allow for call externalities** (both sender and receiver assumed to get some value of the voice call) for demand characteristics, which will remove assumption (viii) from the “reference world”.

We shall investigate below the main findings of economic literature with respect to the most efficient interconnection charging regime for these basic clusters of deviations against the three criteria used previously for the assessment in the “reference world”, namely impact on **consumers**, impact on **competition**, and impact on **investment and innovation**.

In so doing we will however endeavour to focus our review on the “real world” of electronic communications when the Recommendation of 7 May 2009 will be fully implemented as described in Chapter 4 of this Study. This mean that we shall first aim at identifying which from the above basic clusters of deviations from the “reference world” that should most likely be observed in such a “real world” of electronic communications.

Furthermore we will assume that the **charging scheme at retail level remains Calling Party Pays (“CPP”)** – i.e. operators would continue to refrain from making an explicit pricing of incoming calls – and that the **retail market remains unregulated**.

²⁰² Indeed, the assumption (i) of the “reference world” is generally considered **more sensible** in the “real” world compared to the more aggressive competition à la Bertrand through prices.

6.2.1 Assessing the most likely deviations from the “reference world” that should be observed in the “real world” in the future, when the Recommendation of 7 May 2009 will be fully implemented

6.2.1.1 *Assessing whether there is a deviation from symmetry to asymmetry in terms of network coverage characteristics*

As emphasized in Chapter 4, both fixed and mobile voice markets appear to be well penetrated. Consequently, when the Recommendation of 7 May 2009 will be fully implemented, no deviation should be observed from assumption (ii) of the “reference world”, namely that each communications network is assumed to have full coverage and there is full penetration of the networks, so all consumers have subscribed to either one of the networks.²⁰³

In the future, no deviation should be observed from assumption (ii) of the “reference world”, namely that each communications network is assumed to have full coverage and there is full penetration of the networks, so all consumers have subscribed to either one of the networks.

6.2.1.2 *Assessing whether there is a deviation from symmetry to asymmetry in terms of interconnection or cost structure characteristics*

6.2.1.2.1 *Assessing whether there is a deviation from balanced traffic patterns*

According to assumption (iii) of the “reference” world, there are balanced calling patterns. This means that consumers call anyone else (whether on-net or off-net) with equal probability, resulting in volumes of on-net and off-net traffic being proportional to market shares (in customers).

A major cause for traffic imbalances observed currently in electronic communications markets is on-net/off-net discrimination by leading operators.²⁰⁴

As emphasized in Chapter 4, it can be expected that the effective implementation of the Recommendation of 7 May 2009 will significantly reduce or totally eliminate the scope for

²⁰³ This implies that it is no longer relevant to investigate whether or not the fixed-to-mobile termination charge can be used to increase mobile take-up. Consequently it is beyond the scope of this Study to review the abundant economic literature aiming at defining the optimal level of Mobile Termination Rates in case the mobile market is expanding. See e.g. Armstrong and Wright (2009).

²⁰⁴ See e.g. in Section 6.2.1. France: different interconnection schemes for fixed-to-mobile / fixed-to-fixed (CPNP) and mobile-to-mobile (BAK) followed by a move to CPNP overall.

leading operators to implement on-net preferential tariffs. As a consequence, challenger operators will have much better opportunities than in the past to target all markets segments²⁰⁵, so that traffic imbalances due to past on-net/off-net discrimination could also be significantly reduced or totally eliminated.

In the future, it can be expected that no significant deviation should be observed from assumption (iii) of the “reference world”, namely that the traffic pattern is balanced – that is to say, the percentage of on net calls is equal to the fraction of consumers subscribing to this network (“balanced calling pattern”).

6.2.1.2.2 Assessing whether there is a deviation from identical costs or from symmetrical termination rates

When the Recommendation of 7 May 2009 will be fully implemented, there will be a significantly higher degree of symmetry between fixed termination rates on the one hand, and mobile termination rates on the other hand.

Therefore, two main sources of asymmetries between termination rates for the voice service can be expected to remain forward-looking:

- Those between mobile termination rates and fixed termination rates representing the difference in traffic sensitive costs of terminating a call on fixed vs. on mobile networks, with a difference of around 1 or 2 €-cents/min (order of magnitude – to take with caution) compared to around 8 €-cents/min in 2008 ;
- Those between termination rates of established operators²⁰⁶ and wholly new entrants. However, as stated by the Commission *“in the case an operator enter the market later and (...) it therefore has a smaller market share (this) can only justify higher termination rates for a limited transitory period.”*²⁰⁷ *“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 in the market”*.²⁰⁸

²⁰⁵ Provided leading integrated fixed-mobile operators do not launch attractive convergent fixed-mobile offers that would be difficult to replicate by challenger operators.

²⁰⁶ By “established” operators, it is referred to the operators that are currently active in the voice market and that will remain so at the time when the Recommendation of 7 May 2009 will be fully implemented.

²⁰⁷ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.10.

²⁰⁸ See Explanatory note accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.18.

Forward-looking, our focus shall therefore be on established operators asymmetries in costs between fixed (i.e. networks relying on wireline access network) and mobile networks (i.e. networks relying on wireless access networks) that feed into non reciprocal (i.e. asymmetric) termination rates – removal of assumption (iv) and (v) from the “reference world” -²⁰⁹. As pointed out in Section 4.1.3, when the Recommendation of 7 May 2009 will be fully implemented, the voice services provided onto fixed and onto mobile networks are unlikely to be viewed as complete substitutes to each other.^{210 211}

Be it for the voice service provided on fixed networks on the one hand or for the voice service provided onto mobile networks on the other hand, no significant deviation from the model assumptions of identical costs and symmetrical termination rates is to be expected. In deed, as shown in Section 4.2.1, the voice service costs (and hence the cost based to implement cost-based CPNP) are likely to become far less significant than costs of Internet/data and TV services in single integrated IP-based networks. Consequently, any difference in the NGN/NGA technology retained for the purpose of setting “pure-LRIC” termination rates will not cause a significant difference in the costs of providing the voice service.

In the future, be it for the voice service provided on fixed (NGN) networks on the one hand, or for the voice service provided onto mobile (NGN) networks on the other hand, no significant deviation from the assumption of identical costs or from symmetrical termination rates is to be expected.

6.2.1.3 Assessing whether there is a deviation from non-discriminatory to discriminatory retail prices for retail offer characteristics

As shown in Section 4.1.2, when the Recommendation of 7 May 2009 will be fully implemented, there will be a significantly higher degree of symmetry between fixed termination rates on the one hand, and mobile termination rates on the other hand.

²⁰⁹ There is a larger amount of research focusing on recently liberalized markets, where the initial position of new entrants with respect to coverage, installed consumer base, quality of services and reputation is different to the established operators' position, De Bijl and Peitz show that asymmetric access prices with an access mark-up for the new entrant only may be superior to BAK (see: section 6.2.2 in De Bijl and Peitz (2002)).

²¹⁰ This does not preclude so-called « quadruple-play » competition, whereby fixed-to-fixed, fixed-to-mobile, mobile-to-mobile and mobile-to-fixed will be included in a bundle together with Broadband Internet and TV.

²¹¹ We acknowledge that in most of Europe fixed networks have subsidized, through high mobile termination rates, the development of mobile networks. However we focus in this study on the relative merits and demerits for interconnection charging regimes applicable to networks offering imperfectly substitutable products.

Therefore, the main source for discriminatory retail prices is between voice calls that remain either fixed or mobile networks, and voice calls that are made from a fixed network to a mobile network or from a mobile network to a fixed network.

However, as described in Section 4.1.3, when the Recommendation of 7 May 2009 will be fully implemented, the cost-based CPNP regime will significantly reduce in mobile markets the scope for leading operators to implement on-net preferential tariffs because, when the termination fee goes down to incremental cost level, on-net and off-net prices will have a tendency to converge to the same level. Furthermore, mobile to fixed calls are generally already included in mobile flat rate call packages.

In fixed markets, the only type of calls that remain generally excluded from fixed dual-play or triple play flat rates are calls to mobile networks, but the cost-based CPNP regime will facilitate the inclusion of fixed to mobile calls in flat rate call packages – which is not generally the case currently.

There will remain nonetheless a “strategic” motive for mobile operators for mobile-to-mobile calls or for fixed operators for fixed-to-fixed calls – though at a lesser degree – to set off-net prices higher than on-net prices in order to reduce the number of calls received by subscribers on rival networks, thus reducing the rival network’s ability to compete.²¹² This “strategic” motive is much stronger for large networks than for small networks, because they are more capable of reducing the utility of a smaller network’s subscribers than vice versa. However given the knowledge and experience gathered so far by both Regulatory and Competition authorities with potential anticompetitive on-net / off-net practices, we are of the view that there is a weak case for such a “strategy” by operators when the Recommendation of 7 May 2009 will be fully implemented.

So forward-looking a deviation from non-discriminatory to discriminatory retail prices for retail offer is unlikely to be a significant deviation from the “reference” world to be observed in the “real” world of electronic communications.²¹³ Consequently a customer does not need to think about whether his calls terminate on-net (i.e. on the network to which he has subscribed) or off-net (i.e. on a different network) because there is **no termination-based price discrimination**.

In the future, no deviation from the assumption of non-discriminatory per-minute call prices to discriminatory prices is likely to be observed.

²¹² See. e.g. Harbord and Pagnozzi (2010, p.11, p. 18-20).

²¹³ However we shall briefly comment on the issue of discriminatory prices, whenever appropriate, in the sections below.

6.2.1.4 Assessing whether there is a deviation from the assumption of linear to two-parts retail prices

Currently there are not only linear tariffs (such as some mobile prepaid offerings) but there are also explicit two-part tariffs (with a subscription and a per-minute price) or implicit two-part tariffs and more complex types of non-linear tariffs, such as bucket of minutes (with the per-minute pricing depending of the volume of minutes in the bucket).

As discussed in Section 4.3, forward-looking it is expected that in fixed markets the focus of competition will shift from voice to bundles of services offered by broadband providers at flat rate tariffs (e.g. dual or triple play). In mobile markets, although there is some uncertainty about how mobile operators will address the issue of Internet and TV usage, and in particular whether flat rates for these services are supportable in light of usage patterns, flat rate packages for calls will become increasingly common especially for post-paid subscribers. Furthermore, it should also be noted that “refilling” for prepaid customers are increasingly sold as a given total value (e.g. 5 euros, 20 euros, etc.) corresponding to different amounts of free minutes, herewith making it not a “pure” linear tariff anymore.

In the future, a deviation from the assumption of linear prices to implicit two-part tariffs, such as buckets of minutes, or flat rates should be observed.

6.2.1.5 Assessing whether the assumption of no call externalities (sender assumed to get the whole value of the voice call) should be replaced to allow for call externalities (both sender and receiver assumed to get some value of the voice call)

The call externality is determined by the costs and benefits (utility) that the sender and the receiver get when a call is made. It is difficult to measure or observe the size of call externalities empirically and, to our knowledge, there are no estimates of call externalities in Europe so far.

As noticed by CRA (2003) in its survey of economic literature, it is probable that under the existing Calling Party Pays regime at retail level which is generally associated with the Calling Party Network Pays regime at wholesale level, the value of outgoing calls is higher on average than the value of incoming calls: the higher the call charge, the higher the call charge, the larger the expected value of outgoing calls.

Curien (2010)²¹⁴ also considers that the utility for the receiver of a call (whilst probably strictly positive) is likely to be smaller than the utility of the caller, first because the

²¹⁴ See Curien (2010), p. 3.

“decision maker” of calls is the caller, and second, because receiving calls may sometimes generate a disutility, as in the case of spamming.

However, as pointed by the ERG (09) 34²¹⁵, considering consumption and prices under the Receiving Party Pays regime in the United States, the difference of the value of usage (on average) between sender and receiver of a voice call is unlikely to be very large, even though the value of each outgoing calls heavily depends on the nature of the call - and so it will widely vary from call to call.

Overall, it is likely that in the “real world” of electronic communications, the sender gets - on average - higher benefits (or utility) from a call than the receiver, but one cannot draw a clear-cut conclusion on the relative difference in utility.

Furthermore, it should be noted that such call externality may also be internalized by people in stable calling relationships. As pointed out back in 2003, “the caller might be prepared to make a call even if his expected benefit was less than the price, because he expected that a further call (or calls) would be generated, initiated and paid for by the other party, from which he would receive a benefit without having to pay”.²¹⁶

However it remains largely impossible to directly observe and measure the size of the call externality, and whether or not it is partially or fully internalised by consumers, although there is some indirect empirical.²¹⁷

In the future, a deviation from the assumption of no call externality to allow for a call externality should be observed, where it is likely that – on average – the sender receives more utility from a voice call than the receiver. Furthermore, it should be noted that such a call externality may be partially or fully internalized by people in stable calling relationships.

However it remains largely impossible to directly observe and measure the size of the call externality, and whether or not it is internalised by consumers.

²¹⁵ See ERG (09) 34, p. 31.

²¹⁶ See Competition Commission, “Vodafone, O2, Orange and T-Mobile: Reports on References Under Section 13 of Telecommunications Act 1984 on Charges Made by Vodafone, Orange, O2 and T-Mobile for Terminating Calls Made by Fixed and Mobile Networks, HMSO, 2003, paras 8.257 to 8.260 ; See Ofel, “Statement on Wholesale Mobile Voice Call Termination, 2003, para D.16.

²¹⁷ See e.g. Harbord and Pagnozzi (2010, p. 20).

6.2.1.6 Overall assessment of most likely deviations from the “reference world” that should be observed in the “real world” when the Recommendation of 7 May 2009 will be fully implemented

In the “real world” in the future, when the Recommendation of 7 May 2009 will be fully implemented, be it for the voice service provided on fixed networks or for the voice service provided onto mobile networks, the following deviations from the “reference world” assumptions should be observed:

- a deviation from linear to implicit two-parts retail prices or flat-rates for retail offer characteristics (this will remove assumption (vii) from the “reference world”);*
- a deviation to allow for a call externality, so that both sender and receiver get some value of the voice call (this will remove assumption (viii) from the “reference world”).*

6.2.2 Assessing cost-based CPNP vs. BAK for deviations from linear to two-part retail prices²¹⁸

6.2.2.1.1 Impact on consumers

Under linear retail pricing, CPNP may facilitate collusion. However, when networks are competing against each other with two-part tariffs, they have two instruments, the (fixed) subscription price and the (variable) usage price for the calls, and then can pursue separately the objective of increasing their market share (in subscribers) and the objective of increasing call volume from their subscribers.

While a network can use the (fixed) subscription fee to attract subscribers, it can increase its call volume with a low per-minute price for the calls. This means that a network can build its market share without inflating its outgoing traffic. A corollary under CPNP with access mark-ups is that high termination rates generates high revenues and then leads to tougher competition for market share. As traditionally the extraction of consumer surplus is limited by the intensity of competition, little surplus may be extracted from consumers with relatively high termination rates.

²¹⁸ For this section, we have reviewed in particular the following literature: Laffont, Rey, Tirole (1998a), pp. 19-22; Gans and King (2001); Economides, Lopomo and Woroch (1996); Valletti and Cambini (2005); Cambini and Valletti (2003); Cambini and Valletti (2004), Hoernig (2007), Armstrong and Wright (2009), Jullien, Rey and Sand-Zantman (2010).

Using for illustrative purposes only De Bijl and Peitz's model, the impact on consumers' surplus, producers' surplus and welfare level of a deviation from linear to two-part tariffs of (without discrimination between on-net and off-net prices) the following interconnection charging schemes:

- symmetric BAK (whereby termination rates are set at zero);
- symmetric cost based CPNP;
- symmetric CPNP with access mark-ups;

is shown in Table 9.

It appears that subscription fee is higher under BAK whereas per-minute price is lower, which leads to a slightly higher consumer surplus with cost-based CPNP. However the smaller the marginal cost of termination, the closer BAK is to the optimum (in other words, if marginal cost of termination were zero, then BAK and cost-based CPNP are equivalent). Network profits do not vary²¹⁹ whatever the interconnection charging regime, which corresponds to the conclusion by Laffont, Rey, Tirole (1998a) that the collusive power of termination rates totally disappears when networks compete in a non-linear context.²²⁰ Overall, total welfare (sum of consumers' welfare and networks' profits) is slightly higher under cost-based CPNP than under BAK. This is because the marginal cost of call termination was assumed to be 1 cent per minute. Hence, BAK would lead to a per-minute price that deviates from the underlying marginal cost, which slightly distorts efficient pricing.

²¹⁹ This is referred to as the « profit neutrality » result.

²²⁰ See 6.2.2.1.2

Table 9: Comparison of the impact of BAK and CPNP for a deviation from linear to two-part tariffs using De Bijl and Peitz model (for illustrative purposes only)

| | BAK | Cost-based CPNP | CPNP with access mark-ups | |
|--|---------|-----------------|---------------------------|-------|
| Access charges (cents) | 0 | 1 | 2 | 3 |
| Per-minute price (cents) | 1.50 | 2.00 | 2.50 | 3 |
| Subscription fee | 34.62 | 30.00 | 25.63 | 21.50 |
| Consumers' surplus (millions) | 659.375 | 660 | 659.375 | 657.5 |
| Aggregate networks' profits (millions) | 200 | 200 | 200 | 200 |
| Total welfare (millions) | 859.375 | 860 | 859.375 | 857.5 |

Source: De Bijl, March 2010, based on earlier work with Martin Peitz

If we assume now that networks can use on-net and off-net price discrimination, then a termination rate above the marginal cost (CPNP with access mark-ups) leads to an increase of the difference between on-net and off-net prices. Indeed, off-net calls become more costly to produce than on-net calls and then networks will charge more for off-net calls than for on-net calls.²²¹ Finally, such on-net / off-net price discrimination reintroduces network externalities among consumers because the attractiveness of lower on-net price offered by a network increases with its size (as customers can place a higher number of calls at the lower price). In the same manner as under linear prices, high termination rates under CPNP do not facilitate collusion. The interconnection (or access) deficit indeed depends only on the off-net traffic (and off-net price) but not on the on-net price. Hence, a network can build up its market share by decreasing its on-net price without raising its interconnection (access) deficit.

By contrast, Gans and King (2001) show that when networks compete on two-part tariffs and can price discriminate between on-net and off-net calls, below cost termination rates can soften downstream price competition, allowing firms to obtain higher profits. This result arises because low termination rates (below cost) reduce the overall benefits from attracting a consumer and then the intensity of competition for market share. Consequently, BAK may be undesirable from the consumer's perspective compared to

²²¹ See e.g. De Bijl and Peitz (2002, section 6.4.3).

cost-based CPNP.²²² However, discriminatory retail prices will be significantly reduced or will have totally disappeared in the “real world” when the Recommendation of 7 May 2009 will be fully implemented.

Cost-based CPNP, which maximizes welfare as well as consumers’ surplus, is superior to BAK in terms of impact on consumers when networks compete in two-part tariffs.

If the marginal cost of call termination becomes negligible, BAK and cost-based CPNP perform roughly the same with respect to welfare.

6.2.2.1.2 Impact on competition²²³

The possible anti-competitive use of termination rates between symmetrical interconnected networks when they compete in linear prices (i.e. they charge per-minute prices but no subscription fee) has been shown by Laffont, Rey and Tirole (1998a) and Armstrong (1998): in particular high termination rates under CPNP with access mark-ups can lead to a “raising each other’s cost effect” in such a linear pricing context and when networks cannot price discriminate between on-net and off-net calls.

The collusive power of termination rates totally disappears when networks compete in a non-linear pricing context (Laffont, Rey and Tirole, 1998a) because the positive effect of higher termination rates on retail profit is totally neutralized by a lower subscription fee²²⁴: any possible profit generated through the impact of the termination rate in the per-minute price would simply be passed on to consumers via a reduction in their subscription fee, because networks want to keep their market shares.

As noticed by Baranes and Flochel (2008, p. 2), an extensive literature has been developed for testing the robustness of this total disappearance of the collusive power of termination rates in a non-linear pricing context. Carter and Wright (1999) show that the collusion effect still applies when both termination rates exceed the marginal cost (i.e. under CPNP with access-mark-ups) when the networks are asymmetric and termination rates non-reciprocal, which does not correspond to the expected “real world” characteristics. Dessein (2004) and Hahn (2004) also show that the collusion effect still applies when subscription demand elasticity exists or when the nature of calling patterns

²²² Julien, Rey and Sand-Zantman (2010) show that, when account is taken of heterogeneity in usage patterns among users (namely between heavy users and light users) in such a non-linear with on-net / off-net price discrimination, welfare as well as profit may be maximised under CPNP with access-mark ups. The optimal level of the termination rate depends on factors such as the proportion of light users and their demand elasticity.

²²³ For this section, we rely abundantly on the review of economic literature by Baranes and Flochel (2008).

²²⁴ This is known as the “profit neutrality” result. The “profit neutrality” result arises when an identical change in all termination rates does not affect profits.

affects the possibility to discriminate between types of customers with different volume demand (such as high and low users), which we have argued to be fairly unlikely when the Recommendation of 7 May 2009 will be fully implemented.

We observe that under two-part tariffs, cost-based CPNP could intensify competition in a non-fully penetrated market because it leads to a lower subscription fee than under BAK. However, when the Recommendation of 7 May 2009 will be fully implemented, it is very likely that there is full penetration of the networks so that the effect of the cost-based termination fee on the respective level of the subscription fee and of the per-minute price is no longer important.

When networks compete in two-part tariffs (without termination-based price discrimination), cost-based CPNP and BAK are equivalent in terms of impact on competition, termination rates cannot facilitate tacit collusion.

6.2.2.1.3 Impact on investment and on innovation

The impact on investment and on innovation under CPNP and under BAK with two-part tariffs and in absence of call externalities can be investigated using Valletti and Cambini (2005)²²⁵ and Cambini and Valletti (2003, 2004). More precisely, they introduce an initial investment stage²²⁶ in which each network chooses its level of fixed investment; in a second stage, the networks compete in price, as in the “reference” world. This level of investment impacts the quality of service perceived by consumer (denoted by a quality of service parameter) and positively affects both customers’ usage with the service (e.g. think of speed, capacity, coverage, better quality related to the simultaneity of a conversation, easier access, faster delivery, or fewer congestion problems²²⁷).

- Cambini and Valletti (2003) do not investigate as such the relative merits and demerits of CPNP and BAK assuming that the quality of service **for on-net and off-net services is the same**, but extend their analysis to BAK when saying that BAK is like a termination charge below cost. Under CPNP, networks would prefer to negotiate above-cost termination fees (i.e. CPNP with access mark-ups) because they avoid herewith competing excessively against each other over their investments. Networks tend to under-invest in quality, and this would be exacerbated if they can negotiate reciprocal termination fees above cost. Intuitively, when termination rates are above cost, an increase of own quality relative to the

²²⁵ Cambini and Valletti (2003 and 2004) detail separately the two cases explained in Valletti and Cambini (2005) which are the quality for on-net and off-net services are the same, or off-net quality depends on the interaction with the rival’s quality.

²²⁶ This is called “endogenous” investment stage, because profits in the price competition stage will depend on the level of investments in the initial phase.

²²⁷ Examples quoted either in Valletti and Cambini (2005) and Cambini and Valletti (2003, 2004).

other network (due to an increase of own-investments level) increases the number of outgoing calls whereas the number of calls originated by the other network remains the same. It creates an imbalanced traffic (off-net calls increase whereas incoming calls do not), creating an access deficit that makes a network reluctant to invest. This has a positive impact on operator's profits, since they avoid a costly battle over investments. By contrast, it would be more efficient to have termination rates under cost; therefore, under BAK, as there is no termination fees any more, the networks can invest in quality of service without risking generating losses at the interconnection level.

- Cambini and Valletti (2004) do not investigate as such the relative merits and demerits of CPNP and BAK assuming that the quality of service **for on-net and off-net services is different** (because the quality of service of off-net calls depends solely on the quality of service of the terminating network)²²⁸, but extend their analysis to BAK by considering BAK as a termination charge below cost. In such a situation, if Network A unilaterally invests in quality of service, the quantity of its on-net calls increases, while the quantity of its off-net calls remains the same (because it depends solely from the quality of service of Network B). However, the quantity of calls to be terminated on Network A (i.e. off-net calls originated by Network B) rises as the increase prompts customers of Network B to call more often off-net, because their quality of service has increased (because it depends solely on the quality of service of Network A). In the end, Network A receives a net inflow of calls, which is remunerative if termination fees are set above the termination costs (CPNP with access mark-ups). Such an incentive to invest is absent under BAK. As a result, CPNP has a positive impact on investment and innovation. By contrast, it would be less efficient to have termination rates under cost; BAK can reduce investment because, as there is no termination rate, a net inflow of calls does not remunerate the investments incurred by the network.

There are no clear-cut results for the relative merits of CPNP and BAK in terms of impact on investment in quality of service when networks compete in two-part tariffs:

- ***if the quality of off-net calls depends solely on an investment in the originating network (and is therefore the same as for on-net calls), BAK has a better impact on investment in quality of service than CPNP.***
- ***if the quality of off-net calls depends solely on an investment in the terminating network (and is therefore different than for on-net calls), CPNP has a better impact on investment in quality of service than BAK.***

²²⁸ This is compliant with the intuition that the total quality of a call is in fact driven by the lower of the two qualities of service in the originating and in the terminating networks.

6.2.2.1.4 Conclusion for deviations from linear to two-part retail prices

In case of deviations from linear to two-part retail prices, cost-based CPNP is superior to BAK in terms of impact on consumers (but if the cost of call termination is close to zero, BAK and cost-based CPNP perform roughly the same) and equivalent to BAK in terms of impact on competition. There are no clear-cut conclusions in terms of impact on investment on quality of service.

| Impact on | « reference world » | « real world » with deviation from linear to two-part retail tariffs |
|----------------------------------|---------------------|--|
| CONSUMERS | BAK | Cost-based CPNP (but if the cost of call termination is close to zero, BAK and cost-based CPNP perform roughly the same) |
| COMPETITION | BAK | BAK = cost-based CPNP |
| INVESTMENT AND INNOVATION | BAK | <u>No clear cut conclusions</u> - if the quality of off-net calls depends solely on an investment in the originating network (and is therefore the same as for on-net calls), BAK has a better impact on investment and on innovation than CPNP - if the quality of off-net calls depends solely on an investment in the terminating network (and is therefore different then for on-net calls), CPNP has a better impact on investment and on innovation than BAK) |

6.2.3 Assessing cost-based CPNP vs. BAK for deviations from the assumption of no call externalities to allow for call externalities

The call externality is determined by the costs and benefits (utility) that the sender and the receiver get when a call is made. Recent work on call externalities has important

implications for the relative merits and demerits of cost-based CPNP vs. BAK in terms of impact on consumer, on competition and on investment and innovation.²²⁹

6.2.3.1.1 Impact on consumers

Hermalin and Katz (2001) and De Graba (2003)²³⁰ show that the efficient level of consumption by consumers of the two competing networks will be obtained when (1) the sender and the receiver jointly pay a per-minute price that covers the marginal cost of a minute of calling, and (2) each consumer pays a proportion of this marginal cost equal to the proportion of the benefits it gets from the call (be it an on-net call or an off-net call). As noticed by Harbord and Pagnozzi (2010, p. 4), “rather than the traditional focus on how the terminating network’s costs should be recovered from the sender, the key economic issue becomes how prices should be set to recover (...) networks’ costs in a way that efficiently internalizes the two-sided benefits”. Note that since it will be hard to empirically assess the size of the externality (which may moreover be non-uniform across different consumers) as well as whether it is partially or fully internalized, in practice it will be next to impossible to determine the socially optimal interconnection charging scheme when both the sender and the receiver of the voice call benefit from it.

Building upon CRA (2007), ERG (09) 34 has provided a graphic representation of the above findings to show what is the superior interconnection charging scheme in terms of impact on consumers depending on the distribution of the value and of the costs of the call between sender and receiver²³¹ (assuming – to simplify things - that there is a linearity between value and costs, equally among all consumers)²³² (cf. Figure 29).

If we focus on the area of the graphic representation below which corresponds to the situation where the sender has on average a higher benefit (or utility) from the call than the receiver (this corresponds to all the area left to the vertical axis in the middle of the figure, where sender and receiver each get 50% of the benefits from the call)²³³, then:

²²⁹ For this section, we have reviewed in particular the following economic literature: Hermalin and Katz (2001); DeGraba (2000a); DeGraba (2000b); DeGraba (2003); Berger (2004); Jeon, Laffont and Tirole (2004); Berger (2005); Baranes and Flochel (2008), Hermalin and Katz (2009); Harbord and Pagnozzi (2010).

²³⁰ De Graba (2003) argues that a voice call can be viewed as a public good jointly consumed by the sender and the receiver.

²³¹ Which is a removal of the “reference world” assumption (iv): Communications networks face the same costs, i.e. the cost for originating or terminating a call (supposed to be equal) are identical for the two communications networks, as well as the costs of connecting a customer.

²³² See ERG (09) 34, p. 32.

²³³ We therefore do not consider the right part of the figure, where a Receiving Party Network Pays (RPNP) regime would become superior. Consequently, we have not surveyed economic literature considering call externalities under a Receiving Party Pays regime at retail level (cf. Jeon, Laffont and Tirole (2004)). It should be noted that the unwillingness of consumers to pay for receiving nuisance calls is often considered

- CPNP is most efficient from the point of view of the impact on consumer if the sender has 100% of the benefits from the call) and the receiver has none, whatever the distribution of total costs of the call between networks (this corresponds to the left vertical axis in the figure below).
- BAK is most efficient from the point of view of the impact on consumer if the benefits from the call are distributed amongst sender and receiver in the exact proportion to the relative cost distribution of the originating and of the terminating networks (this corresponds to the diagonal axis in the figure below).
- Apart from these two lines where either CPNP or BAK is most efficient, there is a break-even line (connecting to “theoretical” end-points in terms of distribution of total costs of a call) where CPNP and BAK are evenly efficient from the point of view of consumers.
 - The first “theoretical” end-point on the break-even line is the point where the costs are 100% in termination and the benefits are the same for the sender and for the receiver (this corresponds to the upper point of the vertical axis in the middle of the figure, where the sender and the receiver each get 50% of the benefits from the call). In this end-point, CPNP and BAK are evenly efficient because both the sender and the receiver have the same benefits; while in BAK the receiver pays while in CPNP the sender pays. From an efficiency point of view, it doesn’t make any difference whether it is the sender or the receiver that pays for the call.
 - The second “theoretical” end-point on the break-even line is the origin, where the sender has 100% of the benefits from the call and where the costs of a call are 100% in origination. In this end-point, whether you apply BAK or not, the receiver does not pay anything: BAK and CPNP de facto are the same.
 - On any point located on the left hand-side from the break-even line connecting these “theoretical” end-points, CPNP is more efficient than BAK in terms of consumer impact.²³⁴

In case of interconnected networks with broadly similar costs for originating and terminating a call (this corresponds to the horizontal axis in the middle of the figure, where originating network and terminating network each get 50% of the costs of the call), CPNP is superior to BAK only if the sender gets significantly more benefits from the call than the receiver (more than 75% as per the figure below).²³⁵ The more costs are carried by the

as being the main reason why, in Europe, it would be very difficult if not infeasible to establish such a Receiving Party Pays regime at retail level.

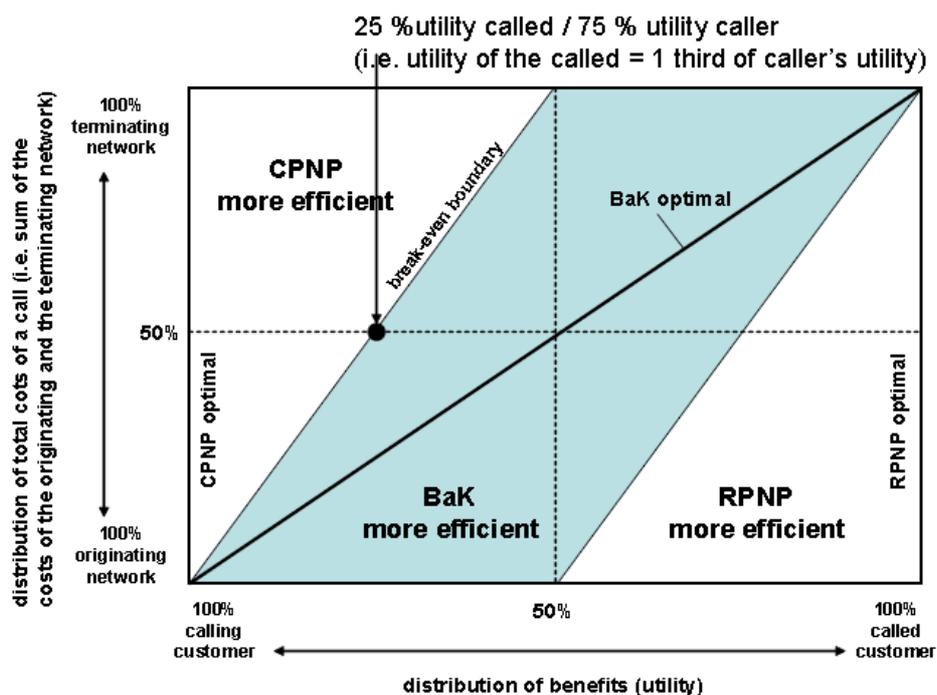
²³⁴ It can be noticed that the point corresponding to 100% of the benefits to the sender and 50%/50% sharing of the costs between originating and terminating network has CPNP superior to BAK. However as ERG (09) 34 is not specifying all the underlying assumptions, a comparison with the “reference world” cannot be made.

²³⁵ See also BERECA (2010), p. 29-30.

terminating network as opposed to the originating network, the less it is required for the sender to have significantly more benefits from the call in order to consider CPNP superior to BAK.

By contrast, if it is assumed that the sender and the receiver have broadly similar benefits from the call, BAK is always superior to CPNP, whatever the distribution of costs between originating and terminating networks. De Graba (2003) has also shown that this remains the case even if there is an imbalance of traffic between networks: this is due to the fact that the optimal termination rate applies to individual calls and is completely independent of the total amount of traffic originated on one network as opposed to the other.

Figure 29: Superior interconnection charging scheme in terms of impact on consumer depending on the distribution of the value and of the costs of the call between sender and receiver



Source: ERG (09) 34, p. 32

There are no clear-cut results for the relative merits of cost-based CPNP and BAK in terms of impact on consumers because they depend on how call externalities are shared between sender and receiver:

- if the sender and the receiver have broadly similar benefits from the call, BAK is always superior to cost-based CPNP, whatever the distribution of costs between originating and terminating networks.

- if the sender gets significantly higher benefits from the call than receiver, cost-based CPNP is superior to BAK.²³⁶

Note that it is hard to empirically assess the size of and extent that consumers internalize, the call externality (which may moreover be non-uniform across different consumers).

6.2.3.1.2 Impact on competition²³⁷

Jeon, Laffont and Tirole (2004), Armstrong and Wright (2009b), Berger (2004) (2005) and Hoernig (2007) show that, under a CPNP regime in presence of call externalities, networks²³⁸ have a strategic motive to reduce - via higher off-net prices - the number of calls that subscribers on rival networks will receive, reducing the attractiveness of rival networks to subscribers, and hence their ability to compete.

As discussed in Armstrong and Wright (2009b)²³⁹, Hoernig (2007)²⁴⁰, Calzada and Valetti (2007)²⁴¹ and Lopez and Rey (2009)²⁴², such on-net / off-net retail price differentials create a barrier to entry and growth for small networks. When on-net calls are priced below off-net calls, ceteris paribus, subscribers to large networks experience lower average call

²³⁶ See also BEREC (2010), p. 29-30. « If the called user has more than a third of the utility of the calling user (...), in the general case of equal cost of the called network and calling network, BAK seems a more efficient regime. Given the uncertainty about utility distribution, this conclusion has to be treated with caution.

²³⁷ For this section, we rely abundantly on the review of economic literature by Harbord and Pagnozzi (2010).

²³⁸ In the case of Jeon, Laffont and Tirole (2004), these networks are symmetric and compete with non-linear prices.

²³⁹ Armstrong and White (2009b) show that the observed differences in on-net and off-net call charges are not solely due to mobile-to-mobile termination rates which exceed marginal cost. Rather networks set high off-net prices in order to reduce the number of calls received by subscribers on rival networks, thus reducing the rival's network ability to compete.

²⁴⁰ Hoernig (2007) shows that call externalities give the incumbent an incentive to increase its off-net price in order to make a smaller rival less attractive (as it will receive fewer or shorter calls), and this incentive is even higher when the incumbent engages in predatory pricing and seeks to reduce its rival's profit.

²⁴¹ Calzada and Valetti (2008) extend Gans and King (2001) analysis to a symmetric multi-firm industry. They stress that incumbents may favour above-cost termination rates (i.e. not improved CPNP) when new operators face entry costs: for any given number of firms, increasing the termination charge above costs decreases the equilibrium profits but, by the same token, limits the number of entrants. Overall, this allows incumbent operators to increase their own profits.

²⁴² Lopez and Rey (2009) show how an incumbent monopolist can increase the reciprocal termination charge to increase its own profits at the expense of a smaller rival, when subscribers incur switching costs to move from own network to the other.

charges since more of their calls are made on-net. This makes larger networks more attractive and places smaller networks at a competitive disadvantage. As noticed by Harbord and Pagnozzi (2010, p. 5), call externalities reinforce this effect since, when large networks set high off-net prices, subscribers to smaller networks will receive fewer calls, further reducing their ability to compete.²⁴³

In addition, as shown in Berger (2005) and Hoernig (2007), in the presence of call externalities, large networks competing with non-linear prices charge higher off-net prices, and create higher on-net /off-net differentials than smaller networks. This causes interconnection traffic between networks to be no longer balanced, with smaller networks facing permanent “access deficits”, in the sense that their termination out-payments to the larger networks will exceed their in payments. This further impedes the ability of smaller operators to compete against larger operators.

As noticed in Harbord and Pagnozzi (2010, p. 18-20), the incentives for large networks to engage in such off-net / on-net differentials remain, albeit in a milder form:

- if call externalities are largely “internalized” by subscribers in stable calling relationships with each other²⁴⁴;
- if call externalities are mitigated by a “call propagation” effect (Cambini and Valetti, 2008), whereby each outgoing off-net call results in a fraction x ²⁴⁵ of incoming calls.

By contrast, BAK would help eliminate such barriers to entry and increase competition.

However, because discriminatory retail prices will be significantly reduced or will have totally disappeared in the “real world” when the Recommendation of 7 May 2009 will be fully implemented, BAK and CPNP are equivalent in terms of impact on competition.

If there are deviations from the “reference world” in terms of termination-based price discrimination (independently of whether or not retail prices are linear or two-part) and the presence of call externalities, then CPNP with access mark-ups has a negative impact on competition when networks are not symmetrical because it enables large operators via high off-net prices to raise barriers to entry and growth for smaller networks.

²⁴³ Please remember that we do not focus on recently liberalised markets, where the initial position of new entrants with respect to coverage, installed customer base, quality of services and reputation is different to the established operator's position.

²⁴⁴ See Competition Commission (2003, para. 8.257 to 8.260) and OFTEL (2003, para D.16). In such a case, the sender might be prepared to make a call even if his expected benefit was less than the price, because he expected that a further call (or calls) would be generated, initiated and paid for by the other party, from which he would receive a benefit without having to pay.

²⁴⁵ Cambini and Valetti (2008) cite empirical evidence in Taylor (2004) who in turn cites the point-to-point demand models of Southwestern Bell and Telecom Canada, which suggest that « a call in one direction stimulates something like one-half of two-thirds of call in return ».

However, because termination-based price discrimination will be significantly reduced or will have totally disappeared in the “real world” in the future, BAK and cost-based CPNP are equivalent in terms of impact on competition.

6.2.3.1.3 Impact on investment and on innovation

In our survey, we have not identified economic literature investigating specifically the impact of BAK vs. cost-based CPNP on investment and on innovation if there is a call externality (removal of hypothesis (viii) of the “reference world”).

6.2.3.1.4 Conclusion for deviations from the assumption of no call externalities to allow for call externalities

In case of deviations from the assumption of no call externalities to allow for call externalities, there are no clear-cut conclusions in terms of impact on consumers and cost-based CPNP is equivalent to BAK in terms of impact on competition. No conclusions have been found with respect to the impact on investment and innovation.

| Impact on | « reference world » | « real world » with deviation from the assumption of no call externalities to allow for call externalities |
|----------------------------------|---------------------|--|
| CONSUMERS | BAK | <p><u>No clear cut conclusions</u></p> <ul style="list-style-type: none"> - if the sender gets significantly higher benefits from the call than the receiver, cost-based CPNP is superior to BAK - if the sender and the receiver have broadly similar benefits from the call, BAK is superior to cost-based CPNP (whatever the distribution of costs between originating and terminating networks) |
| COMPETITION | BAK | <p>BAK = cost-based CPNP</p> <p>(because termination-based price discrimination will be significantly reduced or will have totally disappeared in the “real world” in the future when the Recommendation of 7 May 2009 will be fully implemented)</p> |
| INVESTMENT AND INNOVATION | BAK | <p><u>No conclusions found</u></p> |

6.2.4 Overall assessment of the relative merits and demerits of BAK compared to CPNP in the “real world” in the future when the Recommendation of 7 May 2009 will be fully implemented, assuming that the charging scheme at retail level remains Calling Party Pays (“CPP”)

If BAK is superior to cost-based CPNP in the “reference world” in terms of impact on consumers, on competition and on investment and innovation, the “real world” may differ significantly from such a “reference world” and so **BAK would remain superior to the cost-based CPNP only in case the sender and the receiver would have broadly similar benefits from the call** assuming that the charging scheme at retail level remains Calling Party Pays (“CPP”) (see: Table 10 below).

However, **if the incremental cost of voice call termination approaches zero** (because, as pointed out in Section 4.2.1 the voice service incremental costs are likely to become far less significant in single integrated IP-networks), **the difference between cost-based CPNP and BAK becomes merely theoretical** and more attention should therefore be paid to the regulatory costs of fine-tuning interconnection regulation both on tariff- and on non-tariff issues.

Table 10: Overall assessment of cost-based CPNP vs. BAK in the “real world” in the future when the Recommendation of 7 May 2009 will be fully implemented

| Impact on | « reference world » | « real world » with deviation from linear to two-part retail tariffs | « real world » with deviation from the assumption of no call externalities to allow for call externalities |
|---------------------------|---------------------|---|---|
| CONSUMERS | BAK | <p>cost-based CPNP (but if the cost of call termination is close to zero, BAK and cost-based CPNP perform roughly the same)</p> | <p>No clear cut conclusions</p> <ul style="list-style-type: none"> - if the sender gets significantly higher benefits from the call than the receiver, cost-based CPNP is superior to BAK - if the sender and the receiver have broadly similar benefits from the call, BAK is superior to cost-based CPNP (whatever the distribution of costs between originating and terminating networks) |
| COMPETITION | BAK | <p>BAK = cost-based CPNP</p> | <p>BAK = cost-based CPNP</p> <p>(because termination-based price discrimination will be significantly reduced or will have totally disappeared in the “real world” when the Recommendation of 7 May 2009 will be fully implemented)</p> |
| INVESTMENT AND INNOVATION | BAK | <p>No clear cut conclusions for investments in Quality of Service</p> <ul style="list-style-type: none"> - if the quality of off-net calls depends solely on an investment in the originating network (and is therefore the same as for on-net calls), BAK has a better impact on investment and on innovation than CPNP - if the quality of off-net calls depends solely on an investment in the terminating network (and is therefore different then for on-net calls), CPNP has a better impact on investment and on innovation than BAK) | <p>No conclusions found</p> |

Source: TERA Consultants analysis

BAK is superior to cost-based CPNP in the “reference world” commonly used for economic analysis.

In the “real world” when the Recommendation of 7 May 2009 will be fully implemented, assuming that the charging scheme at the retail level remains Calling Party Pays (“CPP”), BAK would remain slightly superior to cost-based CPNP only in case the sender and the receiver would have broadly similar benefits from the call.

However, if the incremental cost of voice call termination approaches zero, the difference between cost-based CPNP and BAK becomes merely theoretical and more attention should therefore be paid to the regulatory costs of fine-tuning interconnection regulations both on tariff- and on non-tariff issues.

As noted by Harbord and Pagnozzi (2010, p. 35-38), the economic literature on the impact of the adoption of BAK at the wholesale level when combined with a change from Calling

Party Pays to Receiving Party Pays at the retail level is still in its infancy.²⁴⁶ RPP at the retail level means that the sender and the receiver share the cost of the call, where the balance of cost sharing is endogenously determined in accordance with the prices set by networks for making and receiving off-net calls.

- As detailed in Jeon, Laffont and Tirole (2004), if there are deviations from the “reference world” in terms of non-linear retail tariffs, in terms of some call externalities and also in terms of deviations in terms of discriminatory prices, then BAK, absent regulation at retail level, is likely to lead to high reception charges at the retail level because networks (even if they are identical and symmetric) have a strategic motive to choose high off-net reception charges in order to make the rival network less attractive for subscribers. The authors consequently suggest a need for some form of regulation of reception charges “in the same way that termination charges cannot be just left to the discretion of the terminating network”.²⁴⁷
- By contrast, if there are deviations from the “reference world” only in terms of non-linear retail tariffs and in terms of some call externalities, Lopez (2008) shows that such a strategic motive is no longer present because each network (for any given level of market shares) charge outgoing and incoming traffic at the marginal cost level.²⁴⁸ It should be noted that the author shows that (efficient²⁴⁹) networks will charge incoming calls only when termination rates are below costs, which would be the case should there be a further move from cost-based CPNP (as per the full implementation of the Recommendation of 7 May 2009) to BAK at the wholesale level. In such a case, BAK may be socially optimal if callers and receivers have the same utility functions.

A recent paper by Curien (2010)²⁵⁰ has addressed this issue of a change from CPP to RPP at the retail level in a simplified theoretical framework of first-best optimality where

²⁴⁶ See e.g. Lopez (2008), Jeon, Laffont and Tirole (2004) as well as Hermalin and Katz (2009). The authors usually assume also that there is a so-called “receiver sovereignty”, meaning that the receiver can affect the length of the call by hanging up.

²⁴⁷ See Jeon, Laffont and Tirole (2004, p. 107). Note that if the competition characteristics are changed, whereby networks first choose their number of subscribers and then prices (competition à la Cournot), then such a strategic motive disappears: networks always set off-net sender and receiver prices equal to the corresponding perceived marginal cost and on-net/off-net price differentials result entirely from a failure to internalize the benefits off-net calling creates on other networks (Hermalin and Katz, 2009).

²⁴⁸ More precisely, each network sets equal prices for a subscriber's outgoing and incoming traffic at the marginal cost that it would incur if all other subscribers belonged to the other network. This is called the “off-net-cost pricing principle”, which is under general conditions that do not seem to be restrictive, the unique possible equilibrium (Lopez, 2008, p. 12-13).

²⁴⁹ If inefficient operators (i.e. less efficient than the reference efficient operator used to compute the cost-based termination rate according to the Recommendation of 7 May 2009) would try to recover the costs of terminating the call through charging customers for receiving calls, they would face a competitive disadvantage that may lead them to be efficient (Lopez, 2008, p. 21).

²⁵⁰ See Curien, N., “BAK or CPNP ? A simple model”, May 2010, Working paper.

networks compete à la Cournot²⁵¹ and social surplus is maximised, using however the distinctive assumptions of the “real world” as defined above (namely: full coverage and penetration of the networks, balanced traffic pattern, identical costs and symmetrical termination rates, two part tariffs, non-discriminatory prices, existence of call externalities). Even though the first-best outcome cannot directly be compared to the equilibrium outcome of our model²⁵², it provides useful complementary intuitions on the key differences in terms of surplus maximization between a combination of CPNP at the wholesale level and CPP at the retail level, and a combination of BAK at the wholesale level and RPP at the retail level by separating the effects of a change of regime at the wholesale level (i.e. from CPNP to BAK) from the effects of a change of regime at the retail level (i.e. from CPP to RPP).

Curien (2010) shows that a combination “BAK + RPP” is less distortive in terms of social surplus than a combination of “CPNP + CPP”, but this due to the superiority of RPP over CPP at the retail level that enables to effectively take into account and internalize the call externality: the higher the benefit for the receiver, the higher the superiority of RPP over CPP.²⁵³ Indeed, provided termination rates are cost-based, CPNP and BAK are equivalent in terms of social surplus because the only effect of a transition from cost-based CPNP to BAK is transferring the costs of incoming traffic from the outgoing traffic sub-account to the incoming traffic sub-account. The author consequently concludes that “BAK looks more attractive than CPNP if great confidence is placed in the degree of competition in the retail market and if deep suspicion is placed in the ability of regulation to discipline the wholesale market towards efficiency at a reasonable regulatory cost; whereas CPNP looks more attractive than BAK if the degree of competition in the unregulated retail market is judged unsatisfactory and thus unable to guide operators towards efficiency (cost-oriented pricing) in the lack of price regulation at wholesale level”.²⁵⁴

However in debates and consultations on call termination, it is generally argued that that introducing RPP at the retail level would be a major change in retail pricing in Europe, would be disruptive and would most probably not be welcomed by most customers.²⁵⁵

²⁵¹ Under competition à la Cournot, networks choose their output levels trying to maximize their profits. Given the total output produced, the market demand curve determines the price and the profit for each network. To illustrate, such an assumption would mean, in case of mobile networks, that all consumers have a SIM card from all operators.

²⁵² Please note that the findings of Curien (2010) cannot be compared to the equilibrium outcomes of Laffont, Rey and Tirole (1998) or Armstrong (1998), because the latter equilibrium outcomes are not first-best outcomes.

²⁵³ Curien (2010, p. 9-10) shows that, for a given level of benefit for the receiver, this superiority of RPP over CPP can be further improved if there is a high level of competition in the retail market (expressed in terms of competing networks) and if the final demand is very price elastic (i.e.; changes in price have a relatively large effect on the quantity demanded for the voice service).

²⁵⁴ See Curien (2010, p. 10).

²⁵⁵ According to the market research conducted by Jigsaw Research on behalf of Ofcom for the “Wholesale mobile voice call termination: preliminary consultation of future regulation”, May 2009, Annex 10, prepaid customers would tend to prefer an upfront price increase for the handset over RPP and postpaid customers

There would also be costs to operators associated with changing the billing systems. In those circumstances it is unlikely that an operator would introduce RPP tariffs at the retail level.

In case of a further move from cost-based CPNP to BAK at the wholesale level, RPP could become more probable and this change of charging scheme at the retail level from CPP to RPP would enable to achieve additional efficiency gains, because it would enable to effectively take into account and internalize the call externality. These additional efficiency gains are most significant if callers and receivers have roughly the same benefit from a voice call.

In case there is not sufficient competition at retail level, BAK combined with RPP, could however lead to new incentives for termination-based discrimination, because networks (even if they are equal) have a strategic motive to choose high off-net reception charges in order to make the rival network less attractive for subscribers.

However in debates and consultations on call termination, it is generally argued that it is unlikely that an operator would introduce RPP tariffs at retail level in Europe.

6.3 Potential consequences of a move from cost-based Calling Party Network Pays to Bill And Keep on the regulatory costs of fine-tuning interconnection regulation both on tariff- and on non-tariff issues

It is often argued that BAK will significantly reduce regulatory costs by eliminating the need for cost models to set cost-oriented termination rates for the voice service and will decrease the regulatory uncertainty about the future level of interconnection charges.²⁵⁶ BAK should also reduce or eliminate the need for other interconnection related regulations.

Whilst it is true that BAK will decrease the regulatory uncertainty about the future level of interconnection charges as the price level of termination is always zero, BAK, however, will not eliminate the need for cost models in other regulatory areas than call termination, as long as there is an obligation pertaining to call origination because:

would tend to prefer a monthly subscription price increase over an upfront price increase for the handset or RPP.

²⁵⁶ See ERG (09) 34, Question 5 “How does BAK affect regulatory certainty and the risk of legal disputes?”; See also Harbord and Pagnozzi (2010, p. 29): “Bill-and-Keep has other practical advantages, such as being much simpler to implement than cost-based termination charges”. See also BEREC (2010), p. 26-27.

- Cost models will be needed to set the call origination charges for carrier selection and pre-selection (CPS), where this remedy is continued for fixed incumbent operators also in the case of broadband access origination.²⁵⁷ CPS still accounts for a significant share of the access market in some European countries although the share is reducing because of local loop unbundling.²⁵⁸ Since carrier selection operators use the access networks for both call origination and for call termination, there would be a need to review and increase charges for call origination if payments for call termination cease under BAK.²⁵⁹ Thus cost models will still be needed.
- Call origination charges also need to be set for calls to freephone and premium rate services, and if BAK is adopted for call termination then these charges can no longer be set at the same level as call termination (Premium rate services commonly use the call origination model, where the originating operator charges the retail tariff to his customers, withholds an originating charge and passes the remainder to the terminating operator which has the relation with the service / content provider). ERG has taken this into account.²⁶⁰ Again cost models are needed.

Neither will BAK eliminate the need for other interconnection related regulations in the future. The need may even increase since it will no longer be possible to influence behaviour of operators of electronic communications networks by economic signals based on termination charges. The following are some of the issues that may need to be addressed by National Regulatory Authorities²⁶¹ as a result of the evolution from legacy networks to NGN networks:

- The definition of the boundary (meaning the number and geographic locations of the Points of Interconnection) at which the lowest termination fee under CPNP or BAK applies, given the different structure and design trade-offs of fixed NGN and mobile NGN networks;

²⁵⁷ Under the current CPNP, the same charge levels are generally used for both call termination and for call origination since (broadly speaking) the same network elements were involved albeit with the calls flowing in different directions. Now that call termination charges are based on the improved CPNP, call origination charges will need to be recalculated anyway even if BAK is not introduced since the methodology set by the Recommendation for call termination is not necessarily appropriate for call origination.

²⁵⁸ See ERG (09) 34, p. 46-47.

²⁵⁹ See ERG (09) 34, p. 46-47. ERG (09) 34 recommends to address this issue by applying a mark-up on the originating tariff paid by CPS operators to originating fixed incumbent networks, so as to keep the net cash flow between the fixed incumbents, the CPS operators and other fixed and mobile operators on which the call can be terminated. So there is still a need to compute a cost-based originating tariff.

²⁶⁰ See ERG (09) 34, p. 33.

²⁶¹ It is questionable whether such issues could be simply left to ex-post regulation. In deed, most of them are caused by the technological change from legacy networks to NGNs, and have been solved under legacy networks by NRAs (sometimes pursuant to litigation). These are in deed fairly technical questions and we are of the view that it is doubtful whether a Competition authority would be well equipped to address them.

- The reduction in the number of interconnection points and the treatment of stranded assets;
- The formula for prioritising traffic, if different traffic types that need different Quality of Service levels are intermingled at the Points of Interconnection to create appropriate incentives to invest in higher Quality of Service²⁶²;
- The dimensioning of the transport capacity at Points of Interconnection in order to provide sufficient interconnection capacity for incoming calls and hereby avoid discrimination in Quality of Service between off-net and on-net calls²⁶³;
- Even if BAK can be introduced for terminating traffic assuming interconnection takes place at all Pols²⁶⁴, there will remain technical differences between fixed NGN (with possibly NGA in the access) and mobile NGN (with possibly 3G/4G in the access)²⁶⁵ making the effective choice of the number and locations of Pols more complex as the underlying costs could no longer be mediated through close but nonetheless different termination rates.²⁶⁶

Finally there is a concern that if BAK leads to a reduction in retail tariffs, then this reduction may in turn lead to an increase in the volume of unsolicited calls.²⁶⁷ The main source for such unsolicited calls is call centres or calling platforms, since unsolicited automatic machine calling is not allowed under European Law. This problem, however, already exists under the current CPNP scheme, as exemplified by the Netherlands, and has been addressed by issuing appropriate consumer protection measures.²⁶⁸ The improved CPNP scheme will reduce termination rates significantly and may increase the problem though lowering retail tariffs. The effect may be limited if the costs of the voice calls are negligible compared to the cost of labour for call centres or calling platform. The

²⁶² Voice and data traffic have significantly different service quality requirements in terms of latency caused by packet congestion in the network at the busy hour. Whereas data traffic can tolerate significant latency, the voice service can not. Voice service packets, therefore, will need to be prioritised over the network at the busy hour.

²⁶³ An NRA making such a determination on “sufficient” capacity would need to perform the (forward looking) calculations and make the judgments normally performed by network planners, balancing the cost of interconnection capacity against the judgment of an acceptable level of congestion.

²⁶⁴ If an operator does not interconnect to all these Pols, then he has to use a transit service offered by another operator being interconnected to all these Pols.

²⁶⁵ Unless it is assumed that in every Member State all operators will be integrated as fixed and mobile operators.

²⁶⁶ In this respect, it should be noted that under the peering relationship in the Internet, since the ISPs are interested in minimizing their own costs, they predominantly use the nearest-exit or “hot potato” routing, in which outgoing traffic exits the originating network as quickly as possible. However, in some cases where the receiving network is a bigger player and is able to exert its market power, the routing is farthest-exit or “cold potato” routing. (Shrimali and Kumar (2005)).

²⁶⁷ As a matter of fact, it may consider inappropriate to leave it to the called party to hang up in case of an unwanted call.

²⁶⁸ See ERG (09) 34, p. 34.

additional volume of unsolicited calls, e.g. in the form of SPIT (SPAM over Internet Telephony), produced by a move from the improved CPNP to BAK should be very small.

BAK reduce the regulatory uncertainty about the future level of termination charges and price caps and will also to some extent reduce regulatory costs for interconnection tariff regulation (as cost models for setting cost-based CPNP will no longer be required), but it will not eliminate these regulatory costs for other interconnection regulations.

7 Selected short case studies of changes or attempted changes of the interconnection pricing scheme from or to Bill And Keep

In this Chapter, we will present in turn selected short case studies of changes or attempted changes of the interconnection pricing scheme from or to BAK. These case studies are:

1. **France:** different interconnection schemes for fixed-to-mobile / fixed-to-fixed (CPNP) and mobile-to-mobile (BAK) followed by a move to CPNP overall;
2. **New Zealand:** CPNP overall followed by a move to Bill And Keep for fixed-to-fixed local calls and CNPP for all other type of fixed and mobile calls;
3. **United States of America:** different interconnection schemes for circuit-based voice and IP-based voice in fixed networks leading to arbitrage and impossibility to impose an obligation for a BAK overall.

7.1 France: different interconnection schemes for fixed-to-mobile / fixed-to-fixed (CPNP with access mark-ups) and mobile-to-mobile (BAK) followed by a move to CPNP with access mark-ups overall

From 1995 to December 2004 a heterogeneous interconnection scheme with mobile operators was in place in France:

- **fixed-to-mobile interconnection was governed by a CPNP with access mark-ups** charging scheme with high Mobile Termination Rates (MTR) in the initial years (more than 20 c€ until 2002);
- **mobile-to-mobile interconnection was governed by a BAK** charging scheme, which all three mobile operators agreed to implement voluntarily. This specific scheme could be removed upon the decision by the will of one single operator without the agreement of the two others.

It should be noted that the pricing scheme at retail level was and has remained CPP (“Calling Party Pays”).

**Table 11: Presentation of interconnection schemes in place in France till December 2004
(with CPP at retail level)**

|To) Type of interconnection (From... | FIXED | MOBILE |
|--|--------------------------------------|--------------------------------------|
| FIXED | CPNP with access mark-ups | CPNP with access mark-ups |
| MOBILE | CPNP with access mark-ups | BAK |

Source: TERA Consultants analysis

This heterogeneous interconnection scheme was justified with the following rationale:

- The high MTR according to a CPNP with access mark-ups scheme for fixed-to-mobile termination was a means to cross subsidize the mobile sector in order to foster the development of mobile telecommunications infrastructures and services.²⁶⁹ Fixed operators included the MTR in their retail tariff for fixed-to-mobile calls, so that the subsidy was ultimately borne by their end-users (either as direct customer or an indirect customer using Customer Pre-selection or Call by Call).²⁷⁰
- The BAK scheme between mobile operators was already in place (voluntary undertaking between mobile operators) and keeping it would avoid setting up a billing system for interconnection purposes.

The heterogeneous interconnection scheme was ended by the French NRA in December 2004²⁷¹, because the coexistence of two alternative interconnection schemes (but not BAK per se) led to significantly different prices at the retail level, which in turn gave rise to

²⁶⁹ See decision n°99–823: “average price for outgoing [mobile] calls is relatively lower than average price for incoming [mobile] calls [...] mobile sector has a strong dynamic thanks to outgoing calls’ prices” (our translation).

²⁷⁰ It should be noted that for at least two fixed operators (France Telecom / Orange and SFR / Cegetel), high MTRs were not an issue because they were integrated operators (i.e. fixed and mobile).

²⁷¹ Orange sent to SFR and Bouygues Telecom a letter in the second half of 2004, specifying that it will stop the BAK agreement. In order to clarify the situation and knowing the operator’s willingness to end BAK, ARCEP decided to impose the end of BAK for January 1st 2005 in its Decision No. 04-937.

arbitrage opportunities on fixed-to-mobile traffic, resulting eventually in a significant loss in interconnection revenues for mobile operators as well as in an inefficient use of radio frequencies (cf. 7.1.1).

Nevertheless, the analysis of the French mobile market before and after the move from BAK to CPNP with access mark-ups tends to indicate that BAK had a positive impact on competition as well as on consumer benefits (cf. 7.1.2 and 7.1.3) given the stage of development of the French mobile market. No conclusion with respect to the impact on investment can be drawn because, as recalled above, the development of mobile telecommunications infrastructures and services was primarily cross subsidized by the high MTR.

7.1.1 The heterogeneous interconnection scheme introduced arbitrage opportunities on fixed-to-mobile traffic resulting ultimately in an inefficient usage of radio frequencies and in a significant pressure for decreasing Mobile Termination Rates that were charged for fixed-to-mobile calls

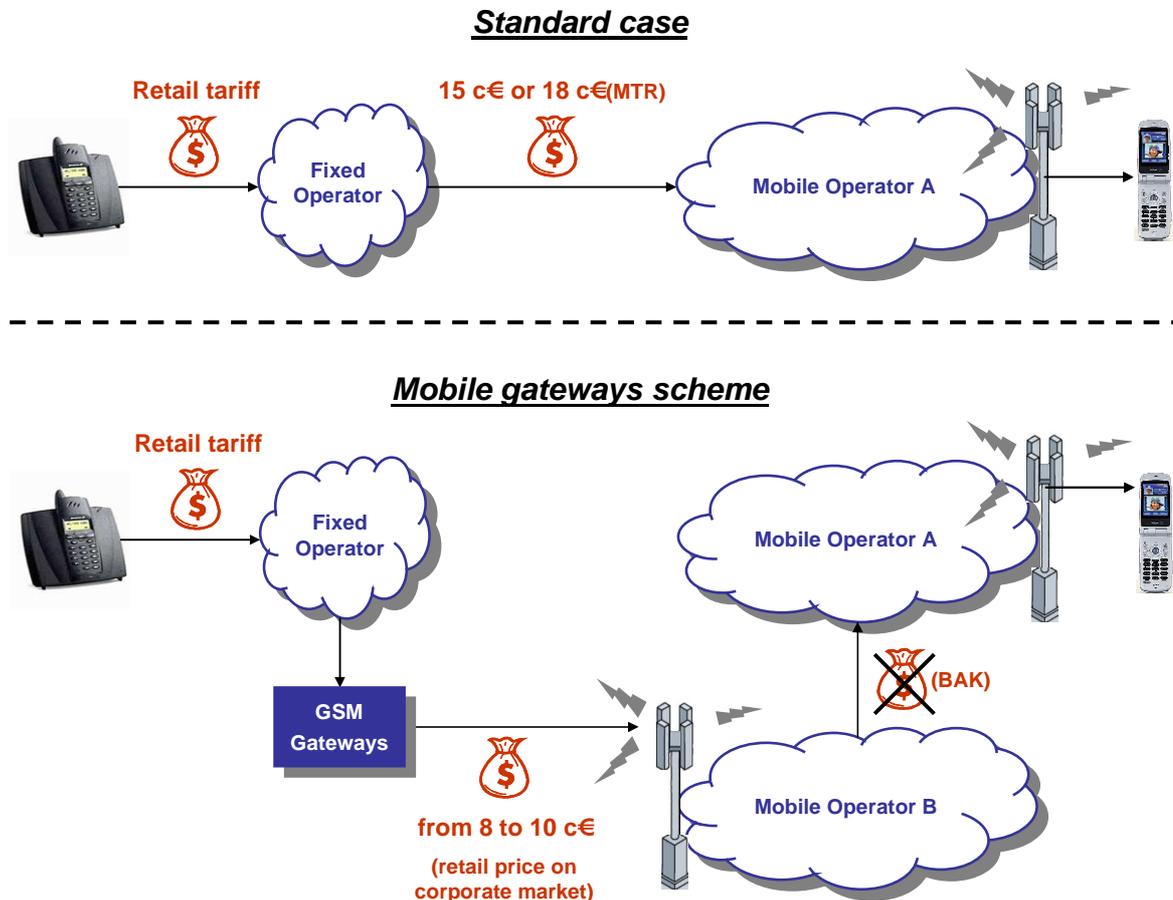
Before 2004, fixed and mobile markets in France were considered as separate markets, with separate dynamics as fixed – mobile substitution was not considered to be a major issue.

Orange and SFR, which were integrated fixed and mobile operators, started to propose in their offers as fixed operators attractive tariffs for calls to their own mobile networks. Such offers were not replicable by other non-integrated fixed operators given the level of the MTRs for fixed to mobile calls (around 15 c€/min for Orange and SFR and around 18 c€ for Bouygues Telecom in 2004). As a consequence, they couldn't sell profitable offers with retail tariffs lower than 15-18 c€ (VAT excluded).

In order to protect themselves against this margin squeeze effect, non-integrated fixed operators offering also fixed-to-mobile calls in their offers exploited an arbitrage opportunity²⁷² by implementing mobile gateways to convert their fixed-to-mobile traffic into mobile-to-mobile traffic. As mobile to mobile calls (especially those sold to high volume customers) were cheaper than MTRs, non-integrated fixed operators managed herewith to reduce their wholesale cost significantly (from 15/18 c€ per minute to 8/10 c€ per minute – cf. Figure 30).

²⁷² From an economic point of view, an arbitrage opportunity is the opportunity to buy an asset at a low price then immediately selling it on a different market for a higher price. Arbitrage opportunities in telecommunications occur whenever services are functionally similar but not necessarily equivalent (especially from the point of QoS) and arbitrageurs can find and exploit price margins created by regulation within a country or different competitive conditions amongst countries (e.g. accounting rate amongst different countries, accounting rate vs. domestic interconnection rates, retail fixed to mobile vs. retail mobile to mobile...).

Figure 30: Arbitrage for fixed-to-mobile calls through mobile gateways enabled by the dual interconnection scheme in France in 2004



Source: LOUTREL Benoit (ARCEP), "Bill and Keep in the French Mobile Industry: A case study", WIK International Workshop "Bill and Keep: A New Model for Intercarrier Compensation Arrangements?", Königswinter, April 4-5, 2006

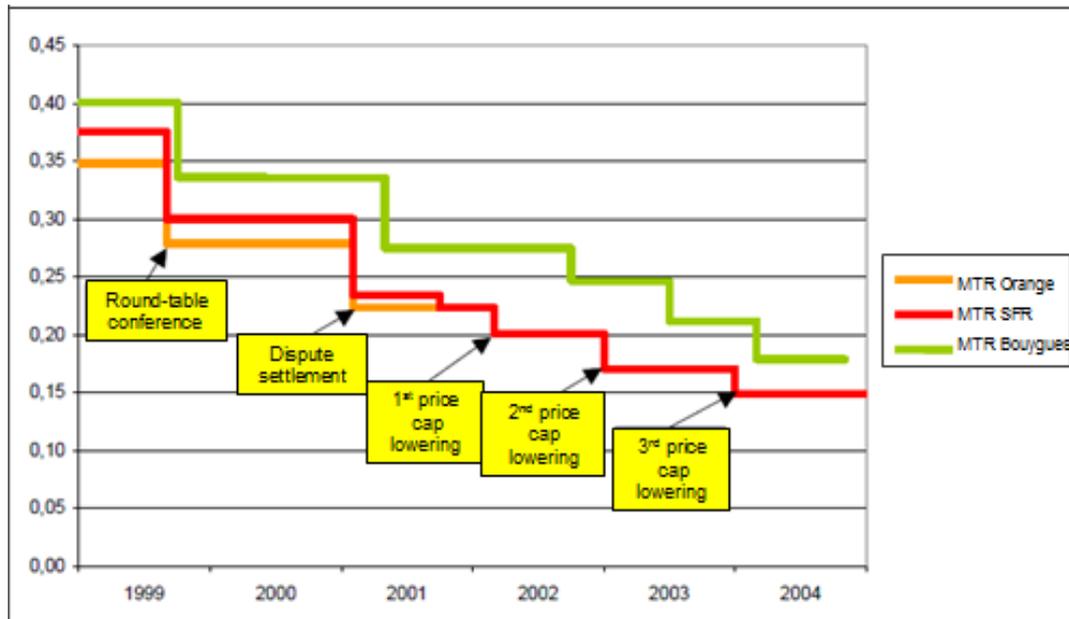
Mobile operators first tried to prevent non-integrated fixed operators to use mobile gateways but then integrated operators finally decided to install their own gateways as a means to compete with non-integrated fixed operators.

By 2004, between 20 and 30% of total mobile incoming traffic²⁷³ was routed through such mobile gateways, which is clearly an inefficient technical solution from the point of view of the radio frequency usage.²⁷⁴

²⁷³ See Decision n°04-937.

The French NRA did not actively fight mobile gateways since mobile gateways ultimately benefit customers (because of lower fixed-to-mobile prices) and can be considered a short term phenomenon given the decreasing trend for MTRs (cf. Figure 31).

Figure 31: Average Retail Fixed to Mobile and MTR evolution in France in €/min



Source: ARCEP, Decision n°04-937 (translated)

ETNA France²⁷⁵ submitted eventually the case to the French Competition Authority, which fined France Telecom and SFR (as vertically integrated operators in the fixed and mobile telephony markets) for implementing anticompetitive pricing practices.²⁷⁶

Other non-integrated fixed operators using mobile gateways were not found guilty because the Competition Authority considered that their practice of installing mobile gateways was the mere consequence of the high regulated MTRs for fixed to mobile calls, which were regulated.

At last, as the dual interconnection scheme had led to only to ineffective technical solutions but made also the existing level of MTRs unsustainable if BAK were to be

²⁷⁴ Mobile operators are in deed obliged to install more capacity than normally required in the areas where such mobile gateways have been installed.

²⁷⁵ ETNA France (formally TENOR) is an association created in 1991, with approximately one hundred members (telecommunication operators, service providers, manufacturers, consultants...).

²⁷⁶ See « Décision n° 04-D-48 du 14 octobre 2004 relative à des pratiques mises en œuvre par France Télécom, SFR Cegetel et Bouygues Télécom ».

maintained for mobile-to-mobile calls.²⁷⁷ Consequently, the leading mobile operator decided to opt out of the BAK and CPNP with access mark-ups was subsequently introduced by the French NRA for mobile-to-mobile calls.

The heterogeneous interconnection regime (BAK for mobile-to-mobile calls as a voluntary undertaking, CPNP for all other calls as a regulatory obligation) has not only led to inefficient technical solutions in terms of spectrum usage but has also made the existing level of MTRs unsustainable if BAK were to be maintained for mobile-to-mobile calls.

Consequently, the leading mobile operator decided to opt out of the BAK and CPNP with access mark-ups was subsequently introduced by the French NRA for mobile-to-mobile calls.

7.1.2 BAK had a positive impact on competition in the French mobile market because it reduced the scope for on-net / off-net practices by mobile early entrants

In most European countries with high MTRs for mobile-to-mobile calls under a CPNP interconnection scheme, mobile later entrants encountered difficulties to compete for high AMPU²⁷⁸ business or residential customers because of attractive on-net offers by early entrants. Consequently, they tended to focus their market entry strategy on low AMPU customers as:

- this segment was not the main target of mobile early entrants;
- mobile later entrants could get high wholesale revenues since the proportion of incoming calls is higher for low AMPU consumers than for high APMU consumers.

The market entry of the French last mobile entrant (Bouygues Telecom) occurred however much earlier than in other European countries, at a time when the mobile market was still emerging. Thus Bouygues Telecom could enter the market by focusing on residential high AMPU customers²⁷⁹ via buckets of minutes offers (so called “forfaits”). BAK for mobile-to-mobile calls simplified their implementation as

²⁷⁷ This fact that a mobile network cannot maintain a high fixed-to-mobile termination charge together with low mobile-to-mobile termination rates, since the fixed network could “transit” its calls via an another mobile network and so end up paying the lower mobile-to-mobile termination charge (plus possibly a small transit fee) has been analysed and confirmed in Armstrong and Wright (2008).

²⁷⁸ Average Minute Per User (average minute of use per customer and per month).

²⁷⁹ By contrast, business high AMPU customers were largely served by mobile early entrants and Bouygues Telecom as other later entrants in Europe could not gain a significant market share on business customers).

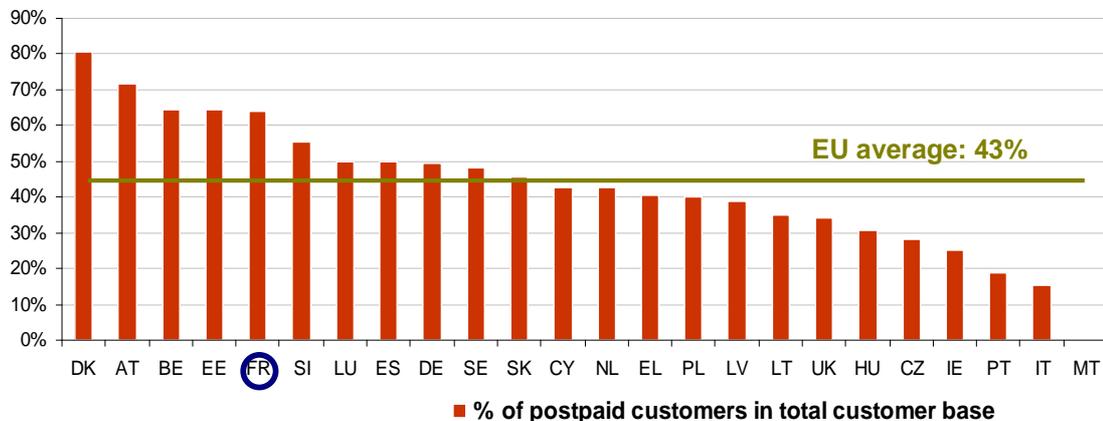
mobile operators incur no third party wholesale payments, which greatly reduces costs and uncertainty in the calculation of such buckets of minutes.

Because of the BAK interconnection scheme for mobile-to-mobile in France, Bouygues Telecom could compete on the residential high AMPU customer segments with aggressive post-paid offers of buckets of minutes. Indeed, the access charge under CPNP affects each network's perceived incremental cost even though there is no net payment between the two networks, which tends to set a floor for the retail price of a call²⁸⁰ : this was not the case with BAK on the French mobile market.

In addition there was no ground for mobile early entrants to develop on-net strategies so as to increase club effects.²⁸¹ Indeed with BAK, there is no interest for an operator to try to increase on-net calls as underlying costs for on-net calls are higher than for off-net calls, since there are no termination costs for off-net calls.²⁸²

Public data confirms this distinctive feature of the French mobile market: in 2005, the proportion of post-paid consumers is high in France compared to most European countries and Bouygues Telecom has shown a higher global AMPU than the two French early entrants (Orange, SFR).

Figure 32: Distribution of post-paid customers in Europe (October 2005)



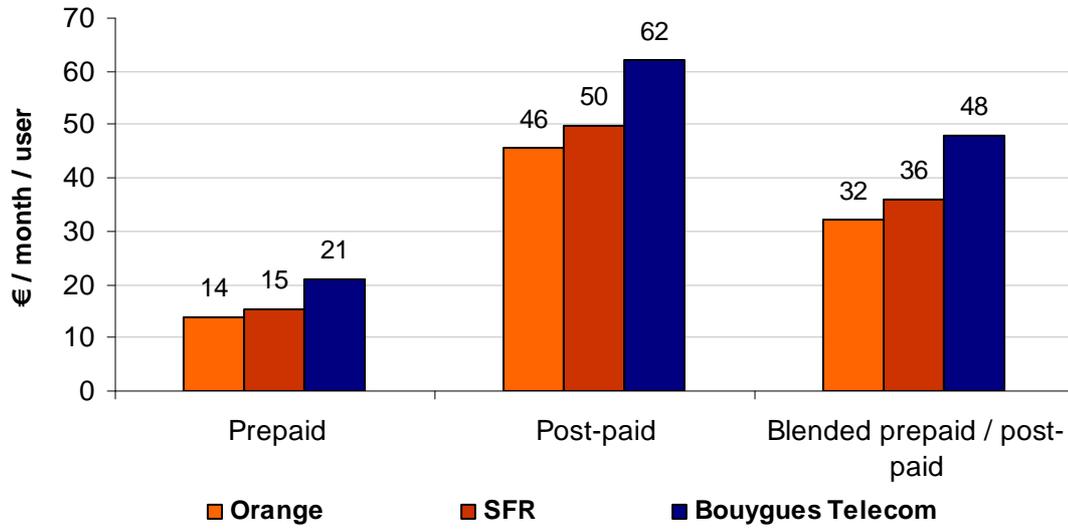
Source: European commission (11th Report, February 2006)

²⁸⁰ See 6.2.2

²⁸¹ As a matter of fact, the leading mobile early entrant (Orange) made an attempt in September 2002 to introduce a mark-up (so called "surfacturation") on off-net calls in the broader context of the introduction of per second billing at the retail level. Pursuant to a claim to the Competition Council par Bouygues Telecom and by the major user association UFC-Que Choisir, Orange withdrew voluntarily this mark-up on off-net calls. See Decision n°02-D-69 (November 2002, 26th).

²⁸² See 6.2.2

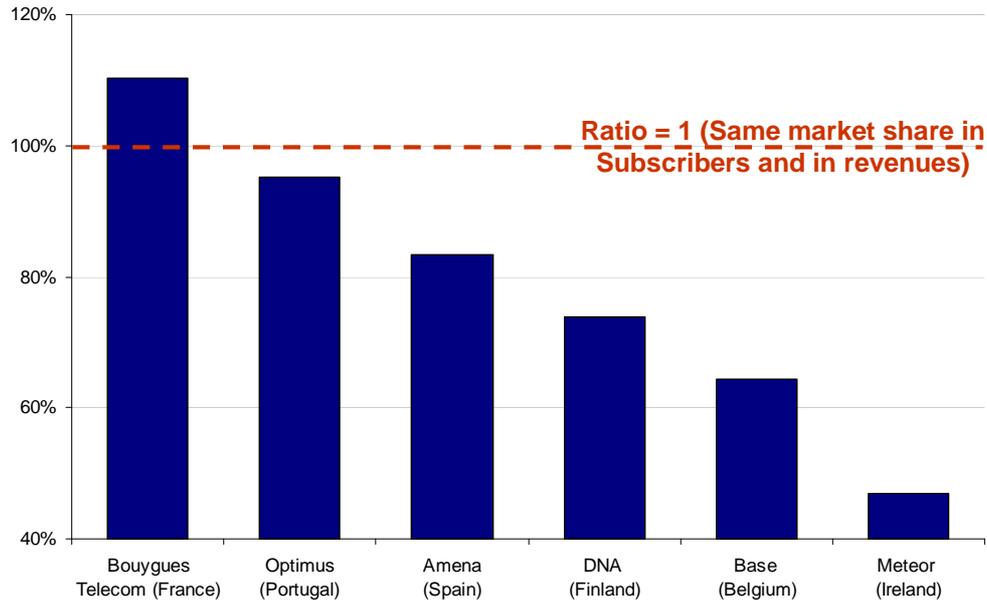
Figure 33: French mobile operator's ARPU in 2004



Source: Operators Annual Reports

As a consequence, the third mobile entrant in France has a higher market share in revenues than in subscribers. This is a specific characteristic of the French market: in a benchmark of some EU15 mobile markets with three operators, Bouygues Telecom is the only third entrant presenting a higher market share in revenues than in subscribers.

Figure 34: third entrants' market shares (in subscribers and in revenues) in 2004

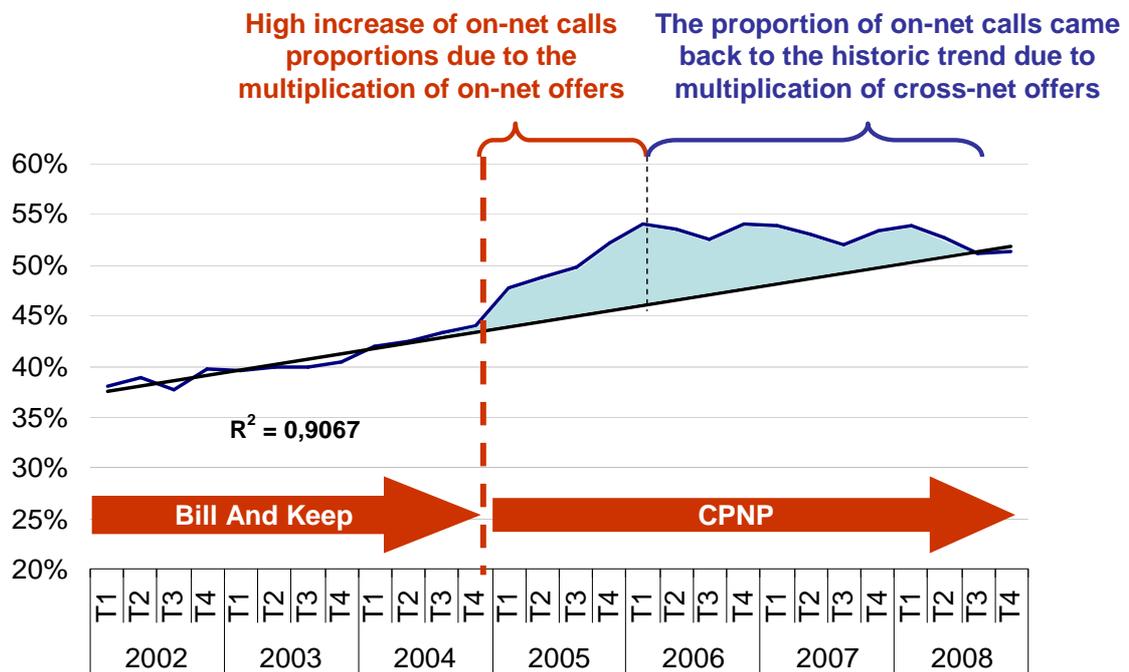


Source: Quantifica, TERA Consultants analysis

The shift from BAK to CPNP with access mark-ups for mobile-to-mobile calls in December 2004 (with the same MTRs as for fixed-to-mobile calls, hereby suppressing any scope for arbitrage for fixed-to-mobile calls) was accompanied by a surge of on-net practices initiated by the leading mobile early entrant leading to a strong increase of the proportion of on-net calls compared to the historic trend (cf. Figure 35).

Such an on-net / off-net pricing, when proposed by leading mobile operators, can enable to generate a “restricted” club effect, whereby heavy users will consider that they have more benefits if they switch to the leading mobile operators because a significant proportion of their calls will be eligible to the lower on-net prices. As can be seen from the Figure below, the proportion of on-net calls deviated from the historic trend after the move from BAK to CPNP with access mark-ups for mobile-to-mobile calls and following the subsequent practice of on-net / off-net differentiation at the retail level, which enabled leading mobile operators to compete more fiercely for heavy users.

Figure 35: Proportion of on-net calls for French mobile telephony



Source: TERA Consultants analysis and ARCEP (data)

The deviation of the historic trend was a key factor justifying - for the French NRA - the asymmetry between the MTR of the later entrant and the MTRs of the early entrants, as the interconnection deficit incurred by Bouygues Telecom at the wholesale level after the move from BAK to CPNP with access mark-ups was generated by the on-net / off-net practices of the early entrants at the retail level.²⁸³

Between 2006 and 2008, the proportion of on-net calls came back to the historic trend progressively, thanks to the combination of the following:

- the development of cross-net offers²⁸⁴ driven by the mobile later entrants (Bouygues Telecom) as the only appealing offers - from a customer point of view – to replicate on-net offers by mobile early entrants (Orange, SFR) ;
- accompanied by a significant decrease in the MTRs (from 12.5/15 c€ per minute in 2005 to 6.5/8.5 c€ per minute in 2008), which makes such a strategy of cross-net offers possible from an economic point of view.

²⁸³ See Decision 08-1176.

²⁸⁴ Cross-net = On-net + Off-net.

Furthermore, the move from BAK to CPNP with access mark-ups, given the level of development of the French mobile market, induced a more intense competition for low users, which explains largely the increased penetration of mobile after 2005.

In France, BAK (combined with CPP at retail level) protected the mobile later entrant against the development of on-net offers by mobile early entrants, enabling to effectively enter the market of residential high AMPU customers via buckets of minutes (so called “forfaits”) as the French mobile market was at that time in an emerging phase.

The mobile later entrant had to face such on-net strategies from 2005 after the move from BAK to CPNP with access mark-ups, that is to say almost ten years after its market entry. As a result, the effects of these on-net strategies were much lower than the ones in other European countries, as they could be countered by cross-net offers made economically possible by a significant drop in MTRs.

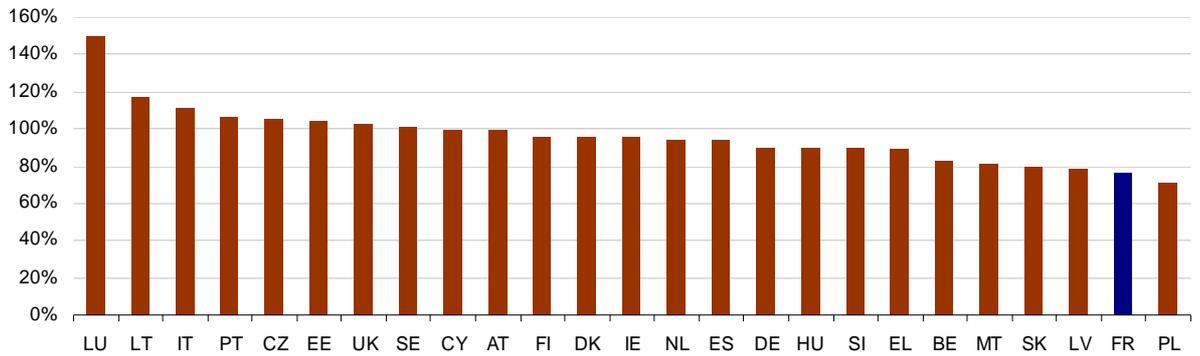
As explained in Chapter 6, in the “real world” when the Recommendation of 7 May 2009 will be fully implemented, no deviation from non-discriminatory prices to discriminatory prices is likely to be observed.

7.1.3 The combination of BAK in the early phase of development of the market and CPNP later on had a positive impact on consumer benefits in the French mobile market

In order to assess the impact of BAK in the early phase of development of the market, we propose to use relevant indicators of consumer benefits such as mobile penetration, global outbound AMPU and level retail tariffs:

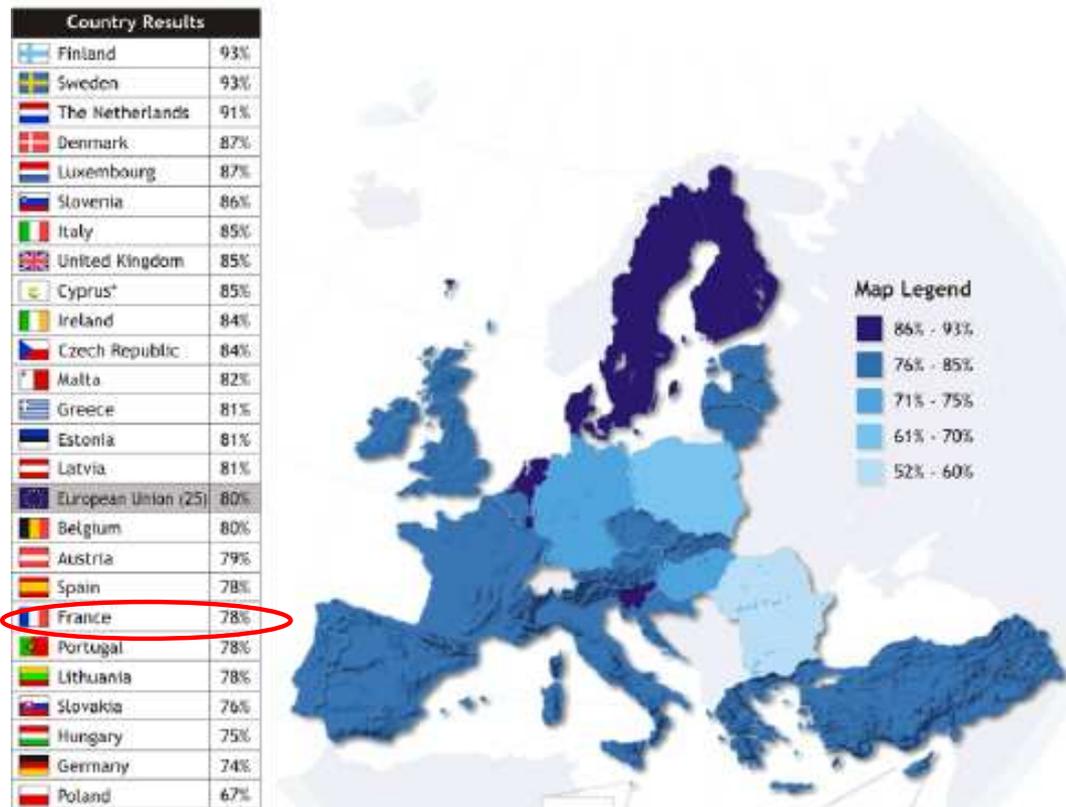
- Although SIM card penetration is quite low in France compared to other European countries (cf. Figure 36), it is not a very relevant indicator to assess mobile penetration because it takes into account multi-SIM equipment. A more appropriate indicator for mobile penetration is the % of households with at least 1 mobile, which shows that France is slightly below EU average at the end of the BAK period (78% for France and 80% for EU average - cf. Figure 37). After the move from BAK to CPNP with access mark-ups, penetration has increased significantly and France shows nowadays a mobile penetration amongst the highest in the EU (cf. Figure 38).

Figure 36: SIM card penetration rate (October 2005)



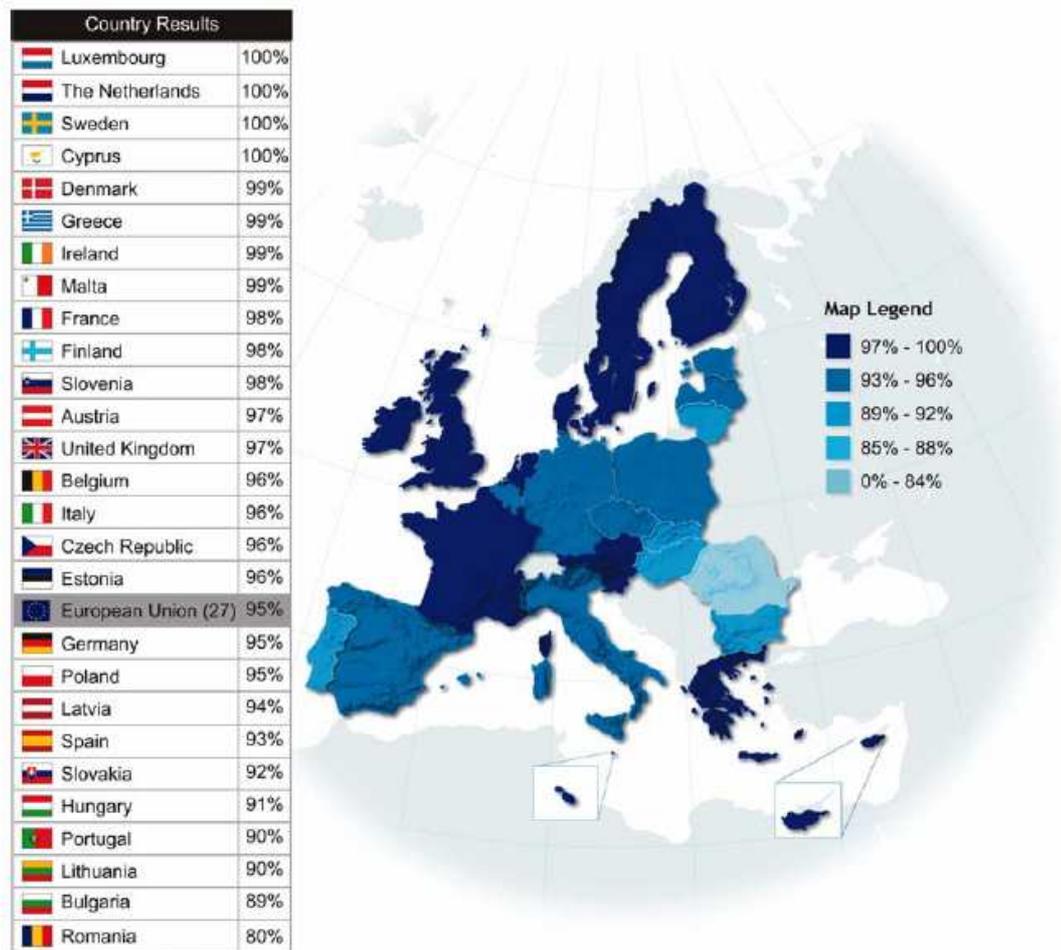
Source: European commission (11th Report, February 2006)

Figure 37: % of households with at least 1 mobile (December 2005)



Source: Eurobarometer (July 2006)

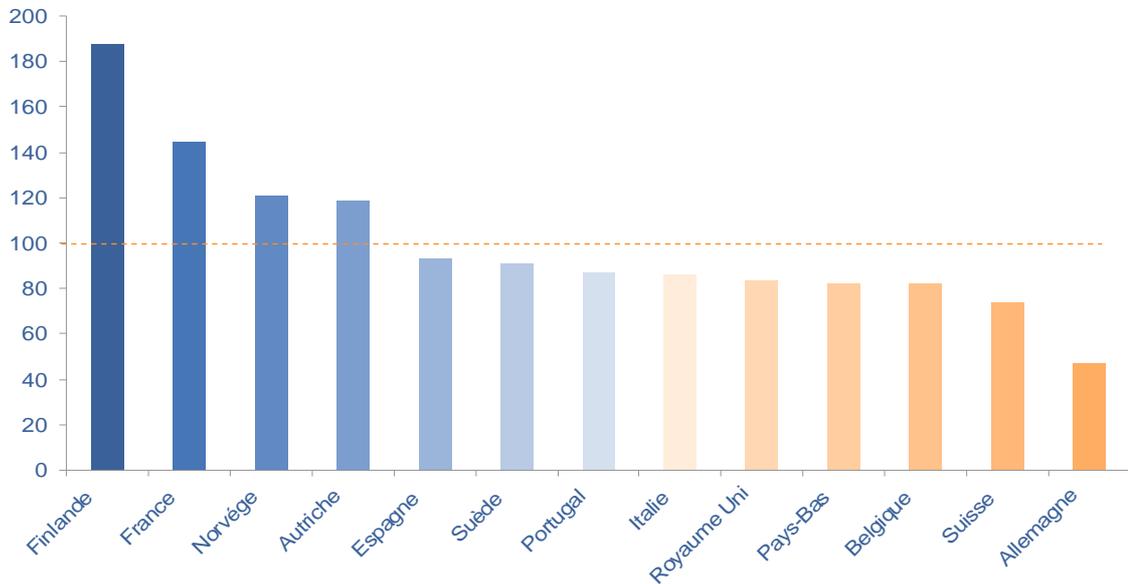
Figure 38: % of households with at least 1 mobile (December 2007)



Source: Eurobarometer (July 2008)

- About the consumption per user, France appears to be one of the countries with the highest global outbound AMPU (2nd in a benchmark of 13 European countries in 2005).

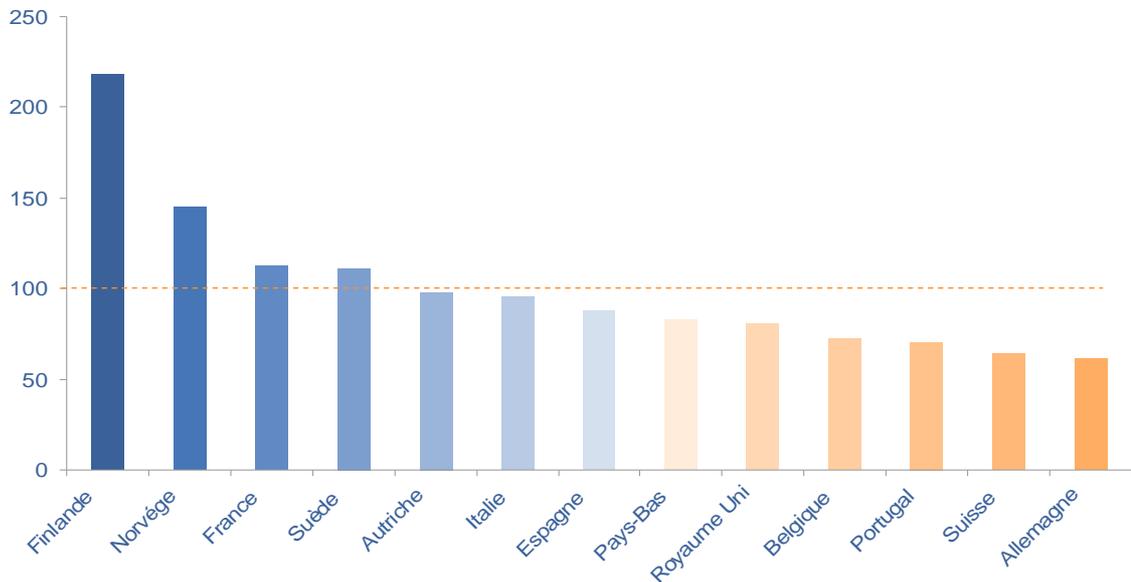
Figure 39: Average minutes per user - outbound traffic (base 100 = average) - 2005



Source: Performance Review of European Mobile Market (Quantifica, 4th edition)

- In order to measure price competitiveness of the French mobile market, prices have to be compared under Purchasing Power Parity (PPP). According to Quantifica's study, France is quite competitive for average price per outbound minute: 3rd in a benchmark of 13 European countries in 2005.

**Figure 40: Competitive country ranking for average price per outbound minute PPP
(base 100 = average) - 2005**



Source: Performance Review of European Mobile Market (Quantifica, 4th edition)

BAK had a positive impact on consumer benefits in France compared to other EU countries, especially in terms of outbound minutes as it was introduced when the market was still emerging and competition could be therefore more intense for residential high-volume customers. Also France appears to be quite competitive for average price per outbound minute.

Though, it is the move from BAK to CPNP with access mark-ups that has triggered a higher mobile penetration (expressed as % of households with at least 1 mobile) in France.

The key findings of the empirical studies with respect to the relative impact of CPNP with access mark-ups and BAK on penetration, retail price level and usage are confirmed in the case of France.

7.2 New Zealand: CPNP overall followed by a move to Bill And Keep for fixed to fixed local calls and CPNP for all other types of fixed and mobile calls

7.2.1 BAK has been implemented on a voluntary basis in the specific case of local calls between the fixed incumbent and other fixed and mobile operators

Schedule 1 of the Telecommunications Act 2001 defines “Interconnection with Telecom’s fixed PSTN” as “Origination and termination (and their associated functions) of voice and data calls (including dial-up internet calls) on Telecom’s fixed PSTN”.²⁸⁵ The initial pricing principle to be applied by the Commerce Commission in case it is called for a determination is described in Schedule 1, Part 2, subpart 1 of the Act as:

Benchmarking against interconnection prices in comparable countries that result from the application to networks that are similar to the access provider’s fixed PSTN of:

(a) a forward-looking cost-based pricing method; or

(b) if the Commission considers that a forward-looking cost-based pricing method does not best give effect to the purpose set out in section 18, whichever of the following methods that the Commission considers best gives effect to that purpose:

(i) a pure Bill And Keep method; or

(ii) a pure Bill And Keep method applied to two-way traffic in balance (or to a specified margin of out-of-balance traffic) and a forward-looking cost-based pricing method applied to out-of-balance traffic (or traffic beyond a specified out-of-balance margin).

Consequently, the preferred approach in case of a determination shall be a CPNP type of interconnection scheme (forward looking cost-based pricing) unless CPNP does not best give effect to promote competition in telecommunications markets for the long-term benefit of end-users (as per Section 18 of the Act); in such a circumstance, BAK can be envisaged.

²⁸⁵ See subpart 1, Part 2 of Schedule 1 of the Act.

- **Bill And Keep for (fixed) local calls between the fixed incumbent and competing fixed operators**

After having fought many years to impose for local interconnection a CPNP type of interconnection scheme based on the ECPR²⁸⁶, the fixed incumbent Telecom New Zealand accepted in October 2000 the terms of a dual BAK arrangement with its fixed competitor Clear²⁸⁷ as follows:

- A pure BAK approach is implemented for defined numbers associated with “one-way” calls such as Internet dial up (so-called “call sink” traffic) ;
- A hybrid BAK approach is implemented to other calls such as voice calls (so-called “non call sink” traffic), whereby neither party charges the other for taking or receiving calls as long as traffic flows are roughly balanced (i.e. within specified limits); should traffic flows be longer roughly balanced, CPNP would apply.

This move from CPNP to the combination of pure and hybrid BAK has been explained by the following:

- Because Telecom is required to offer unlimited local calling – including dial up Internet - to its retail customers and had therefore limited ability to pass on termination rates for internet traffic to its local access residential customers, so-called free ISPs had strong incentives to generate dial up Internet traffic on local numbers so as to attract interconnect termination (“call sink” traffic) and to propose to the market “free” access to Internet. Free ISPs disappeared once interconnect agreements were renegotiated to replace CPNP by pure BAK.²⁸⁸
- The intensity of competition faced by Telecom in the local market made it more attractive to offer favourable interconnection terms to other local operators. Indeed when interconnection prices are high, it is much cheaper for an operator to convey a call entirely over its own network than to have to use the network of another operator. High interconnection prices therefore give operators a strong incentive to

²⁸⁶ Clear, already operating in the long distance market, also wanted to provide local telephone services in competition with Telecom. Clear and Telecom have been unable to conclude an interconnection agreement for local calls as Telecom put forward the Efficient component pricing rule (ECPR) for setting the interconnection price: the rule states that monopolists are entitled to provide services to competitors at the same price they implicitly charge themselves, including monopoly profits. In the absence of any regulatory agency, Clear's only resort was to commence legal action alleging anti-competitive behaviour. The ECPR was accepted by the New Zealand High Court, rejected by the Court of Appeal, and finally in 1994 sanctioned by the Privy Council, New Zealand's highest court. Nevertheless, the Government issued a media release on 26th June 1996, in which it considers that the ECPR has “the potential to lessen competition, thereby limiting the rate of introduction of new products and services and lessening the benefits to users” and the ECPR was finally abandoned. This litigation is reported to have cost more than \$10 million, involving three court sittings.

²⁸⁷ Telecom also concluded a similar agreement with another fixed competitor, Telstra Saturn. These two competitors merged subsequently to form TelstraClear.

²⁸⁸ See Introductory note of 7 July 2002 by Telecom.

maximize the number of calls originating and ending within their own network — that is, to compete fiercely for market share at the local level.²⁸⁹

It should be noted that the pricing scheme at retail level was and has remained CPP (“Calling Party Pays”).

The introduction of this dual BAK arrangement was however very soon followed by arbitrage.²⁹⁰ The arbitrage initiative involved another carrier terminating internet traffic that originated from the Telecom network, but using a computer call generator to send "phantom" return calls purportedly from the same number used to terminate the authentic Internet traffic. The result was an appearance of traffic within the 10:1 ratio of incoming to outgoing traffic that defined a call sink and hence Telecom was expected to pay termination payments.

This led Telecom to advocate for pure BAK for all local traffic, be it call sink or non call sink, as hybrid BAK retains a known risk of arbitrage not present with pure BAK.²⁹¹

On the contrary, TelstraClear argued that the local interconnection price for both voice and data calls should be based on a CPNP (TSLRIC²⁹² based) methodology, as it should only be departed from the legislated TSLRIC principle if it is satisfied that it would not best give effect to the purpose set out in section 18 of the Act, namely promote competition in telecommunications markets for the long-term benefit of end-users.²⁹³

The Commerce Commission argued nevertheless that CPNP (TSLRIC based) was not appropriate given the existence of dial-up Internet as it “may create incentives for inefficiently low ISP prices, inefficient greater use of Internet and over-investment in telecommunications network capacity. These incentives will exist **where there are: free local calls for retail customers; and above cost call termination rates.**”²⁹⁴

- With respect to free local calls for retail customers, the Commerce Commission pointed out that ISPs could use termination profits to lower charges for Internet

²⁸⁹ See Michel Kerf, Isabel Neto, and Damien Gérardin, Antitrust or Sector Regulation and the Case of New Zealand, Interconnection Disputes, Antitrust or Sector Regulation and the Case of New Zealand, The World Bank Group, Private Sector Development Vice Presidency, Note Number 2 9 5, June 2005.

²⁹⁰ See Introductory note of 7 July 2002 by Telecom.

²⁹¹ See Introductory note of 7 July 2002 by Telecom.

²⁹² Total Service Long Run Incremental Cost, in relation to a telecommunications service, means:

- a) the forward-looking costs over the long run of the total quantity of the facilities and functions that are directly attributable to, or reasonably identifiable as incremental to, the service, taking into account the service provider's provision of other telecommunications services;
- b) and includes a reasonable allocation of forward-looking common costs.

²⁹³ It should be noted that neither party was in favour of reciprocal access charges under a CPNP (TSLRIC) methodology.

²⁹⁴ See Commerce Commission, Draft Determination on the TelstraClear Application for Determination for Designated Access Services, 26th August 2002, p. 11-12.

access, while the originating operator cannot respond by raising call prices to retail residential customers. Since consumers are not bearing the full cost of their decision to use the Internet, the network will bear heavier traffic than would be the case if consumers were bearing the full cost of usage. In an extreme case, ISPs could encourage consumers to stay connected to Internet even when they are not using it. The end result could be significant over-investment in ISP services and telecommunication network capacity needed to provide them.

- With respect to above cost call termination rates, the Commerce Commission pointed out that when interconnection charges are set on an average basis, charges for calls to ISPs will tend to be above cost and may well result in incentives to terminate calls. Voice calls are unlikely to be affected by these incentives, as the actual cost will be close to the charge due to the average call duration of voice calls and their cost of termination. Furthermore, above cost termination rates for voice calls will not be reflected in services provided to the originating customer, but in the line charges paid by the recipient of the call. Therefore, above cost termination rates for voice will not stimulate calls in the same manner as above cost termination rates for ISP calls.²⁹⁵

The Commission has a preliminary preference for pure BAK for calls to ISPs and CPNP for voice calls as it addresses the problem of incentives to terminate ISP calls, while not creating spillover distortions to the voice market and in the absence of the information to set the appropriate level for a call cap. However on 13 September 2002, the parties notified the Commission that they had agreed all local voice and data calls will be subject to pure BAK:

“The per-Call and per-minute charges each carrier must pay to the other for origination and/or termination of all Intra-LICA Calls and all Internet Calls are nil (i.e. those Calls shall be charged on the basis of “pure bill and keep”).²⁹⁶

Pure BAK was consequently retained by the Commerce Commission in its Determination of 5 November 2002 as the sole interconnection regime for local calls between fixed operators.²⁹⁷

- **Bill And Keep for (fixed) local calls between the fixed incumbent and competing mobile operators offering so-called “Homezone” products**

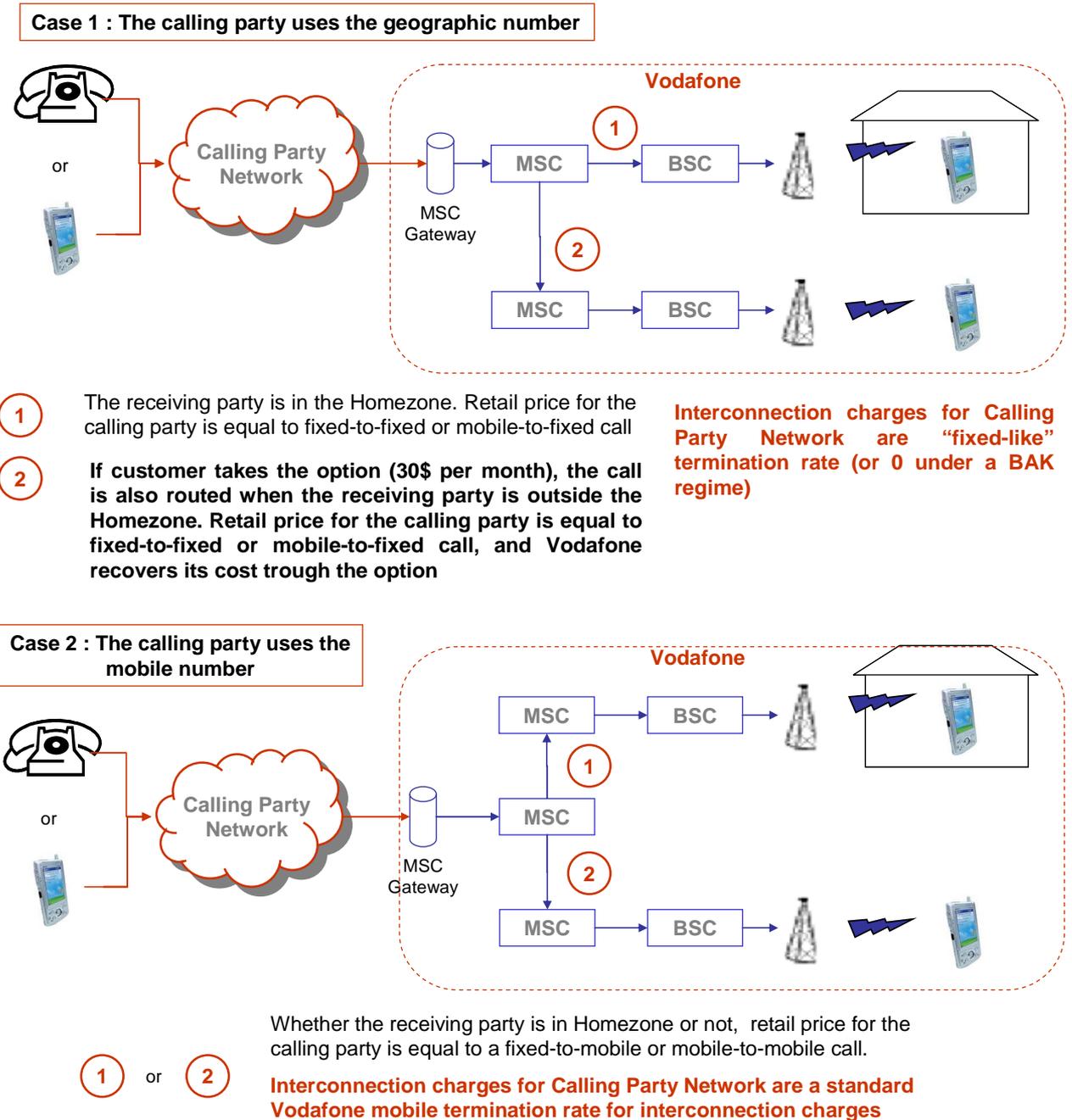
²⁹⁵ The Commission considers also that above or below cost termination rates for voice calls may have potentially negative consequences.

²⁹⁶ See APPENDIX 2: INTERCONNECTION TERMS of Appendix 2 - Full Interconnection Agreement between Telecom and TelstraClear of Final Determination (5 November 2002).

²⁹⁷ See Commerce Commission, Determination on the Telstra Clear Application for Determination for Designated Access Services, 5 November 2002.

On January 2006 Vodafone New Zealand Limited (Vodafone) intended to launch a geographically structured service over its cellular network. Vodafone's customers subscribing to this service would be allocated a geographic local number from the national numbering scheme so that they could make or receive local voice calls while remaining within a geographic area surrounding the customer's home or business (the so called "homezone") in order to stimulate fixed to mobile substitution. The interest for Vodafone was to propose a convergent offer that can substitute a double subscription (fixed line + mobile line).

Figure 41: Description of the geographically-structured service over the Vodafone’s cellular network



Source: TERA Consultants analysis

However, Vodafone and the fixed incumbent Telecom failed to reach an interconnection agreement for local voice calls between Vodafone “homezone” local numbers and Telecom’s fixed PSTN local numbers.

As a consequence, Vodafone filed on 13 January 2006 an application with the New Zealand Commerce Commission²⁹⁸ for “determination of a designated access to interconnection with Telecom's fixed PSTN”. Vodafone requested that the Commission adopt a BAK pricing methodology for local voice calls made to or from local numbers assigned to Vodafone (but not to calls to or from Vodafone's mobile numbers nor to data calls such as calls to ISPs)²⁹⁹. Vodafone also requested that the Commission apply a condition preventing Telecom from having its retail price discriminate between local calls its customers make to Vodafone's local numbers, and those made to other networks.

The Commerce Commission ruled on 28 September 2006 in favour of Vodafone³⁰⁰ and mandated **pure BAK for local voice calls**³⁰¹ between Telecom and Vodafone, with the following arguments:

- it prevents any potential barrier to entry related to monopolistic abuses on termination services;
- it removes incentive for operators to target customers who are net receivers of local voice calls, which can lead to inefficient cross subsidies (i.e. subsidize low AMPU consumers, with the objective to compensate the subsidies with wholesale revenues instead of retail revenues);
- it reduces regulatory and administrative costs;
- Vodafone, which had requested BAK, had a higher termination cost than Telecom. As a result, the decision is not supposed to disadvantage Telecom;
- there is no reason that BAK for (fixed) local calls between the fixed incumbent and competing mobile operators offering so-called “Homezone” products would introduced new arbitrage issues compared to BAK for (fixed) local calls between the fixed incumbent and competing fixed operators: “*Specifically these risks*”

²⁹⁸ The Telecommunications Act 2001 made the New Zealand Commerce Commission (which is charged with enforcing legislation promoting competition) responsible for making regulatory decisions relating to access to telecommunication networks. Prior to this, no specific industry regulator was established. Instead, in the course of wide-ranging deregulation, the Government explicitly adopted a policy of 'light-handed regulation', relying on the enforcement of existing antitrust legislation to preclude anti-competitive practices. The lengthy (three court sittings between 1991 and 1996) and costly (more than \$10 million) litigation between a fixed new entrant Clear Communication and the fixed incumbent Telecom made the Government change its policy.

²⁹⁹ In its application, Vodafone notes that it had agreed with another fixed carrier to exchange traffic with the proposed local access service on a Bill and Keep basis.

³⁰⁰ See “Final Determination on the application for determination for ‘Interconnection with Telecom's fixed PSTN”, PUBLIC version, J 7567, 28 September 2006.

³⁰¹ A local voice call is a voice call where the number from which the call originates and the number of the intended recipient of the call are local numbers that have been allocated to the same LICA (Local Interconnection Calling Area). This is exactly the same definition as the one used in the context of the Telecom – Clear local interconnection. Contrary to Telecom's request (cf. Submission of 3 July 2006 by Telecom, VODAFONE'S APPLICATION FOR DETERMINATION FOR INTERCONNECTION WITH TELECOM'S FIXED PSTN: SUBMISSIONS ON DRAFT REPORT), the Commission refrained from further defining the features of a local voice call beyond the link to a local number. The Commission clearly stated that it is not required to consider what happens to a local call from a Telecom customer to a Vodafone local number after the call has been handed over to Vodafone.

[Arbitrage issues] *all existed when Telecom proposed using bill and keep for local calls [...]. Telecom does not explain why the risks would be greater when one of the carriers uses mobile technology”.*

The Commerce Commission also ruled that Telecom shall not charge its customers a higher price for local voice calls to Vodafone local numbers, relative to the price charged for other local voice calls made by its customers.

Following this ruling, the interconnection scheme in New Zealand was as follows (cf. Table 12), whereby fixed local calls are governed by a pure Bill and Keep scheme and all other calls by a CPNP scheme.

Table 12: Presentation of interconnection schemes in place in New Zealand after final Determination on the application for determination for ‘Interconnection with Telecom’s fixed PSTN’

|To) Type of interconnection (From... | FIXED | MOBILE |
|---|--|-------------|
| FIXED | - local voice calls pure BAK - other voice calls CPNP | CPNP |
| MOBILE | CPNP | CPNP |

Source: TERA Consultants analysis

The fixed incumbent in New Zealand is required to offer unlimited local calling to its customers.

Pure BAK has been in place for local calls between fixed operators since the early 2000s on the basis of a voluntary undertaking. This scheme has been extended to local calls between fixed operators and mobile operators (“homezone” products) in

2006, whereby the fixed incumbent is also prevented to charge its customers a higher price for local voice calls to local numbers of the mobile operators, relative to the price charged for other local voice calls made by its customers.

7.2.2 BAK has been considered as an alternative to cost-based CPNP for Fixed-to-Mobile and Mobile-to-Mobile but not retained

In May 2004, the Commerce Commission decided to investigate mobile termination after considering complaints that a lack of competition in the mobile termination market resulted in charges for fixed-to-mobile calls in New Zealand that were unreasonably high. It released its Mobile Termination Reconsideration Final Report in April 2006, recommending that the termination rate for fixed-to-mobile calls be regulated.

Three mobile operators are active in New Zealand: Vodafone New Zealand (which was the leading operator with more than 50% of market share), Telecom Mobile (mobile subsidiary of the fixed incumbent) and 2degrees who launched its service in August 2009.³⁰² They provide mainly traditional voice and SMS services on a 4 million mobile subscribers market.

In 2008, the Commerce Commission started a new investigation on MTRs in order to define MTRs for fixed to mobile calls but also for mobile to mobile calls and for SMS. This new investigation was launched to address in particular the following issues³⁰³:

- MTRs (16 c€/min) appeared to be considerably in excess of cost-based benchmarks. MTRs higher than cost are considered to be a potential barrier to entry in case traffic flows between new entrant and established operators are unbalanced.
- On-net pricing plans at retail level had grown significantly in New-Zealand between 2006 and 2008. These plans, which were made attractive to mobile early entrant because of high MTRs, impaired the ability of a mobile late entrant to attract customers.
- Fixed-only operators face difficulties since integrated operators have offered retail FTM prices close to or below the MTRs (for example, Vodafone offered retail FTM calls from its fixed-line customers to Vodafone mobile subscribers for 13 cpm. This retail price was lower than the MTR of 15cpm).

³⁰² Beginning of February 2010, 2degrees announced that they had signed up 206,000 active customers, a figure that was well ahead of expectations, and also announced that for the first time people in New Zealand are now able to access prepaid calling rates at prices well below the OECD average. They are also claiming ARPU (average revenue per user) in excess of \$10, a figure that is higher than many Telecom prepaid customers. ("Is the MTR saga over?" by Steve Biddle <http://www.geekzone.co.nz/sbiddle/7110>).

³⁰³ <http://www.comcom.govt.nz/IndustryRegulation/Telecommunications/Investigations/MobiletoMobileTermination/ContentFiles/Documents/MTAS%20Reasons.pdf>

In the context of this investigation on MTRs, the pros and cons of BAK have been discussed.

- Concept Economic realized a study for 2degrees, which concluded that BAK is likely to promote competition for the long term benefit of end-user and will result in greater efficiencies compared to three other alternatives (estimation of a theoretically optimal MTR, use of an international benchmark of MTRs or no regulation):
 - Cost for setting a theoretically optimal MTR are substantial due to the small size of the market;
 - Using an international benchmark is essentially a meaningless exercise;
 - BAK requires minimal billing and regulatory costs, and it provides similar result that more complex pricing approaches;
 - In addition, the report argues that BAK has already been used in New-Zealand for local calls between Vodafone and Telecom (cf. part 7.2.1).
- On the other hand, Nera produced for Telecom a similar study that identified demerits of Bill And Keep. The study concluded that BAK is expected:
 - to soften competition. The note refers to the Gans and King Article:
“The flip side of this is that below cost MTRs actually soften competition. Indeed, in these models the collusive outcome would be a below cost MTR (Gans and King (2001))”.
 - to introduce arbitrage. The note refers to the French case:
“The potential for arbitrage to undermine the regulatory regime is illustrated by the French experience, where BAK was implemented for MTM only until 2005. By 2004, up to 80-90% of FTM calls of alternative fixed operators were routed through mobile gateways. This ultimately led to ARCEP introducing cost-based MTM rates. As Benoit Loutrel of ARCEP noted: “Bill and Keep is an attractive scheme but is not sustainable if implemented partially in the industry”.“

In March 2009, the Commerce Commission ruled that cost-based pricing according to CPNP was currently more appropriate than BAK for mobile call termination and SMS termination because cost-based pricing was likely to best promote competition and be consistent with economic efficiency³⁰⁴ (the Commission was, however, open-minded to the possibility that, in the long-term, it may become appropriate to consider the adoption of

³⁰⁴<http://www.comcom.govt.nz/IndustryRegulation/Telecommunications/Investigations/MobiletoMobileTermination/ContentFiles/Documents/MTAS%20Comments%20letter.pdf>

BAK in New Zealand). The Final Report³⁰⁵ concluded in February 2010 that there were grounds for recommending regulation of the MTRs in order to remove the barrier to efficient entry and to promote competition in the retail FTM/toll market.

Nevertheless, Schedule 3A of the Act contains a regime that allows access providers to submit undertakings as a potential alternative to regulation. The Commission received a number of undertakings from Telecom, Vodafone, and 2degrees during the Investigation.³⁰⁶ The MTRs that would apply to fixed-to-mobile and mobile-to-mobile traffic in the Final Undertakings from October 2010 are between 30% and 59% lower than the MTRs in the 12 January 2009 undertakings submitted by Telecom and Vodafone (12 c€/min in October 2010, 10 c€/min in 2011, 9 c€/min in 2012, 8 c€/min in 2013, 6 c€/min in 2014).

In a context of MTRs considerably in excess of cost-based benchmarks (i.e. CPNP with significant access mark-ups), the New Zealand Commerce Commission ruled in 2009 that cost-based CPNP was more appropriate than BAK because cost-based pricing was likely to best promote competition and be consistent with economic efficiency.

In the final decision, the Telecommunication Commissioner and Associate Commissioner Pickering were of the view that acceptance of the Final Undertakings was the best solution promoting competition in telecommunications markets for the long term benefit of end-users. Although undertaking proposed higher MTRs than the ones that would be imposed with regulation, they were low enough to solve competition issues (it enabled 2 degrees, as well as a non-integrated fixed line operator, to compete with the current retail on-net prices).³⁰⁷

³⁰⁵ Final Report on whether the mobile termination access services (incorporating mobile-to-mobile voice termination, fixed-to-mobile voice termination and short-message-service termination) should become designated or specified services.

³⁰⁶ Initial undertakings received from 2degrees, Telecom and Vodafone in January 2009, revised undertakings submitted by Telecom and Vodafone on 6 May 2009, further revised undertakings from 2degrees, Telecom and Vodafone dated 2 October 2009 and Final Undertakings submitted by Telecom and Vodafone in December 2006 - February 2010.

³⁰⁷ However, Commissioner Mazzoleni recommended regulation of the MTAS, because with the final undertaking, MTRs would remain 20-50% above the ones that would be imposed with regulation at the end of the Final Undertakings.

7.3 United States of America: different interconnection schemes for circuit-based voice and IP-based voice in fixed networks leading to arbitrage and impossibility to impose an obligation for a BAK overall

Pursuant to the liberalisation of the telecommunications market via the Telecommunication Act of 1996, the US telecommunications market was characterized in the early 2000s by different interconnection schemes for PSTN voice traffic depending on whether it is a local call or a long distance call.

These different interconnection schemes are both CPNP types of scheme, but showed two very different levels of interconnection charges for local calls (so-called “reciprocal compensation”) and for long distance (so-called “access charges”):

- Interconnection between so-called Local Exchange Carriers (LECs) for local traffic was governed by a “**reciprocal access**”³⁰⁸ scheme. LECs were wired local loop operators in a given local area, with directly connected customers.

LECs could be either Incumbent Local Exchange Carriers (ILECs) or Competitive Local Exchange Carriers (CLECs). ILECs include operators that provided telecommunication services before the Telecommunications Act of 1996 AND that are members of the association NECA 25 (National Exchange Carrier Association). In the early 2000s, CLECs had difficulties to penetrate the local market, with a global market share of merely 10% as per end of 2002.

The 1996 Telecommunications Act required such a reciprocal compensation between ILECs and CLECs based on the view that such a compulsory scheme would favour market entry and competition in the local exchange services, demand being herewith stimulated with lower prices and new options (predominantly in the form of flat rate pricing at retail level)³⁰⁹.

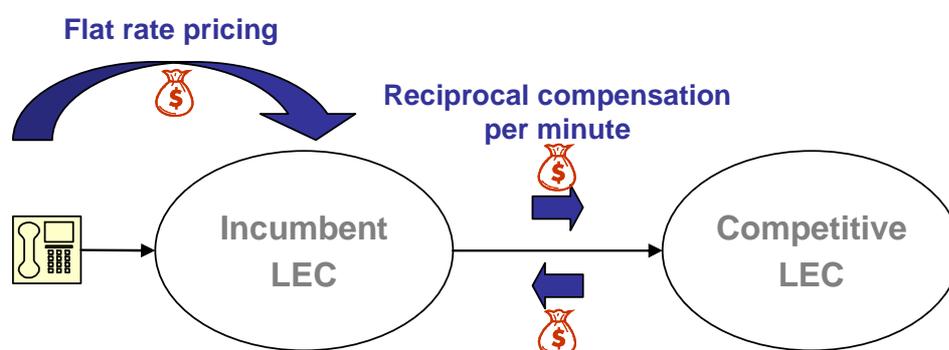
Reciprocal compensation was computed so as to cover cost of call termination for the LECs (cf. Figure 42)³¹⁰. This has led in practice to low termination rates for termination to and from ILECs at a small fraction of a U.S. cent per minute).³¹¹

³⁰⁸ “Reciprocal” means that LECs pay each other for terminating a call. It does not mean that such payments are symmetrical.

³⁰⁹ Each State regulator – “PUC” – has jurisdiction over the reciprocal access charges but has to follow the guidelines set by the Federal regulator – “FCC” –.

³¹⁰ Conventional wisdom at the time of passage of the U.S. Telecommunications Act of 1996 (1996 Act) had it that the new CLECs would have many more outgoing calls to ILECs than ILECs would have calls to CLECs. Thus, policy makers expected an access charge deficit of CLECs. Bill And keep was therefore allowed in the 1996 Act as a possible way to help CLECs. However, TSLRIC became the dominant charge basis for termination rates. See CRA, 2003, p.11.

³¹¹ See SCOTT MARCUS, J. “Framework for Interconnection of IP-Based Networks – Accounting Systems and Interconnection Regimes in the USA and the UK”, Wik-Consult Report, 27 March 2006, p. 24-25.

Figure 42: Interconnection scheme for local call in the USA

Source: TERA Consultants analysis

- Interconnection between LECs and so-called Interexchange Carriers (IXCs) for long distance / toll traffic³¹² was governed by an “**access charge**” scheme. IXCs channelled communications from one local area to another local area (transit service) and had no directly connected customers.

There were in the early 2000s more than 700 IXCs in the USA, but only two integrated operators (i.e. LEC + IXC): AT&T and Alascom, which had to publish separated accounts for their long distance activity.

IXCs had to pay access charges for origination and termination services to LECs in order to provide to end-user long distance communications (cf. Figure 43). As some LECs had regulated access charges (RBOC operators³¹³) and others had not (other ILECs and CLECs), IXCs bore therefore heterogeneous access charges.

However, each IXC had the obligation to set a homogenous retail tariff, independent of the location of the calling party and the called party. This tariff was calculated from the weighted average of the LECs’ access charges.

The access charge scheme (which is also a CPNP interconnection scheme) has been designed primarily so as to transfer subsidies from IXCs to LECs in order to

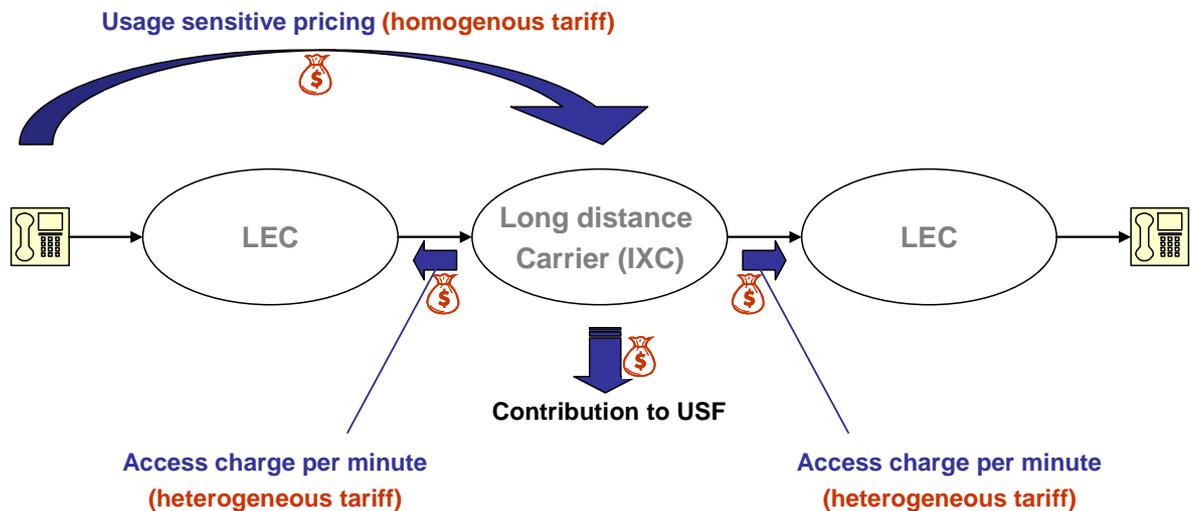
³¹² This long distance traffic can be an interstate call (over which the Federal regulator – “FCC” – has jurisdiction) or an intrastate call (over which each State regulator – PUC – has jurisdiction).

³¹³ Amongst ILECs, a distinction should be made between RBOC (“Regional Bell Operating Companies”) operators - which were once part of the Bell system and have regulated access charges - and other ILECs, which have unregulated access charges. In the early 2000s, access charges of other ILECs were approximately three times higher than RBOCs access charges.

reduce retail local rates.³¹⁴ Access charges per minute were therefore significantly higher than reciprocal compensation per minute.

In practice for RBOCs, access charges have generally been pegged to rates in the neighbourhood of half a U.S. cent per minute. Rural ILECs may be permitted to charge significantly higher rates. A CLEC is not permitted to charge a higher rates the ILEC for the geographical area in question unless the CLEC wishes to demonstrate that its costs are higher than the ILEC (in practice, this is not done). With the exception of a few rural ILECs and CLECs, access charges are below 0.65 U.S. cents per minute.³¹⁵

Figure 43: Interconnection scheme for long distance call in the USA



Source: TERA Consultants analysis

These different interconnection schemes proved fairly unstable and the FCC had to revisit them especially because of arbitrage opportunities exploited by US operators.

³¹⁴ In addition, IXCs had to contribute to the Universal Service Fund.

³¹⁵ See SCOTT MARCUS, J. "Framework for Interconnection of IP-Based Networks – Accounting Systems and Interconnection Regimes in the USA and the UK", WIK-Consult Report, 27th March 2006, p. 24-25.

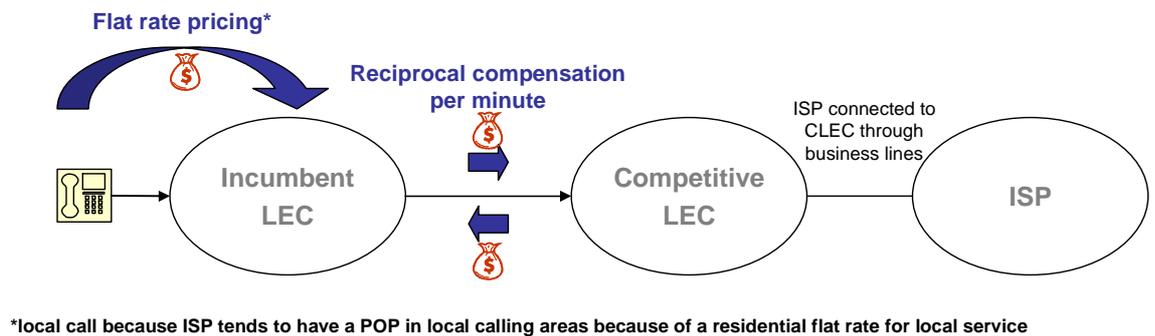
7.3.1 BAK has been envisaged as an overall alternative to the CPNP in fixed telecommunications but not implemented because of the high heterogeneity of termination rates between LECs, and because of the surge of Internet dial-up traffic

The different interconnection schemes for PSTN voice traffic depending on whether it is a local call or a long distance call caused two different problems:

- 1. Firstly, the obligation for IXCs to set homogenous retail tariffs, since the heterogeneous access charges of LECs had an adverse impact on consumer benefits and competition.**
 - The retail tariff that customer A pays for calling customer B was constant (flat rates), whatever the access charge for terminating the call was.
 - As a consequence, all non RBOC LECs had an incentive to have high access charges (above the competitive level), since they knew that their access charges had no impact on the volume of incoming calls. They could easily impose such access charges on IXCs because once customer A had chosen an LEC, that operator represented the only way that customer A could obtain originating access to its IXC.
 - With CLECs' access charges above the competitive level, IXCs costs increased above the competitive level, long distance rates were correspondingly raised, and consumer's benefits decreased.
 - This issue also distorted competition, because CLECs could use their high termination rates to charge retail tariff below the competitive level for local service in order to attract customers.

- 2. Secondly, the surge of narrowband Internet traffic generated by ISPs connected to CLECs caused significant imbalances of traffic in favour of these CLECs.**
 - CLECs started to connect ISPs through business lines and to receive narrow-band Internet traffic in the form of numerous lengthy Web-surfing sessions daily (cf. Figure 44).

Figure 44: Interconnection scheme for dial-up Internet traffic



Source: TERA Consultants analysis

1. Because CLECs were small relative to the telecommunications market, most of these calls would originate in ILEC networks, causing a large access deficit for the ILECs. This problem became acute because the net outpayment for termination by the ILECs reached several billion U.S.\$ per year by the late 1990s.³¹⁶

2 solutions were identified in the public debate to address this issue:

- **First option – move to an overall Bill And Keep interconnection regime:**

As recalled by J. Scott Marcus³¹⁷, a number of U.S. experts (many of them with connections to the FCC) have argued that the way to achieve consistency between Internet wholesale compensation models and those of the PSTN, in order to avoid arbitrage in the future converged world, is to evolve the PSTN models in the direction of those used in Internet.³¹⁸

Setting access charges to 0 and making the customers bear the cost for access (the calling party would pay for originating access service and the called party would pay for the terminating access service) imply that the customers will adjust their consumption according to these charges.

In such a situation, retail tariffs would be higher for calling a LECs customer with high access charges. As a consequence, these LECs would see their incoming traffic decrease.

³¹⁶ See CRA 2003, p.12.

³¹⁷ See SCOTT MARCUS, J. "Framework for Interconnection of IP-Based Networks – Accounting Systems and Interconnection Regimes in the USA and the UK", WIK-Consult Report, 27 March 2006; p. 30-31.

³¹⁸ See FCC Office of Strategic Planning and Policy Analysis (OSP) Working Paper 34: ATKINSON Jay M. and BARNEKOV Christopher C., "A Competitively Neutral Approach to Network Interconnection", December 2000; DEGRABA Patrick, "Bill And Keep at the Central Office As the Efficient Interconnection Regime", December 2000, at 95.

But this option would have removed the homogenous retail tariff obligation that IXCs could no longer calculate their retail tariff as the weighted average of the LEC's access charges.

- **The second option, which was ultimately chosen in 2001, is to regulate CLECs' access charges and reciprocal charges under the existing CPNP regime.**
 - With respect to reciprocal charges, the FCC reacted by slashing termination rates for ISP traffic almost to zero and by proposing a Bill And Keep regime for the future (FCC, 2001). Reciprocal compensation was to decrease according to the following cap: \$.0015/minute for the first six months, \$.0010/minute for the 18 months thereafter and \$.0007/min thereafter. The FCC specified that this cap was “not intended to reflect the costs incurred by each carrier that delivers ISP traffic. Some carriers' costs may be higher; some are probably lower” and that “Carriers whose costs exceed these rates are (and will continue to be) able to collect additional amounts from their ISP customers”. The FCC mentioned that operators (and more specifically ILEC) that wanted to benefit from the cap for ISP-bound traffic had also to use this cap for their own incoming traffic.
 - With respect to access charges, the FCC reacted by imposing a “cap”, based on the regulated access charges of the adjacent ILEC³¹⁹. Indeed, the FCC stated that it would be “prudent to avoid a ‘flash cut’ to a new compensation regime that would upset the legitimate business expectations of carriers and their customers.”

According to J. Scott Marcus³²⁰, this choice of the second option has been caused by “the determined opposition of those carriers whose financial interests would be impacted by such a migration. The large fixed incumbents (called RBOCs) have for the most part been reasonably supportive of a migration to Bill and Keep; small rural fixed operators, whose termination rates tend to be much higher, have been the main opponents”.

The FCC attempted to “holistically” revise the intercarrier compensation scheme in 2005³²¹, but there is no obvious progress to date.

However, some ILECs between themselves as well as some CLECs between themselves have implemented on a voluntary basis BAK agreements for their local

³¹⁹ See FCC 01-131.

³²⁰ See SCOTT MARCUS, J. “Framework for Interconnection of IP-Based Networks – Accounting Systems and Interconnection Regimes in the USA and the UK”, WIK-Consult Report, 27 March 2006; p. 31.

³²¹ See Developing a Unified Intercarrier Compensation Regime, Further Notice of Proposed Rulemaking, 3 March 2005, FCC 05-33.

traffic.³²² These BAK agreements are not in the public domain so that it was not possible to form an informed view on how widespread they are.

Although BAK has been envisaged as an overall alternative to the CPNP in fixed telecommunications for all types of traffic (voice and data) and generated significant work by the FCC and economists close to the FCC, it has not been implemented as the FCC wanted to avoid a ‘flash cut’ to a new compensation regime”.

Main opponents to a change from CPNP to BAK tended to be those LECs with the higher termination rates.

However, some ILECs between themselves as well as some CLECs between themselves have implemented on a voluntary basis BAK agreements for their local traffic. These BAK agreements are not in the public domain so that it was not possible to form an informed view on how widespread they are.

7.3.2 The different CPNP interconnection schemes gave rise to arbitrage opportunities on long distance calls because PSTN-based long distance calls were governed by access charges whilst VoIP-based long distance calls were governed by reciprocal compensation

In its 1998 Universal Service Report³²³ (cf. Table 13), the FCC decided to exempt VoIP from the access charge scheme as well as from the contribution to the Universal Service Fund (this issue to be reconsidered in the future, when the overall intercarrier compensation regime will be re-examined):

³²² See: “Interconnection as Networks Evolve to Internet Protocol (IP)”, J. Scott Marcus:, Auckland, New Zealand, 27 February 2009, p. 20. See also 11.6.

³²³ See CC Docket No. 96-45.

Table 13: Presentation of mandated interconnection schemes in place in the USA in the early 2000s

|type of technology) Type of interconnection (type of call... | PSTN | VoIP |
|--|------------------------------|------------------------------|
| LOCAL | Reciprocal access | Reciprocal access |
| LONG DISTANCE | Access charges | Reciprocal access |

Source: TERA Consultants analysis

This opened an arbitrage opportunity for ISPs who started to offer VoIP by connecting to CLECs through business lines and receiving VoIP traffic on local phone numbers³²⁴ (cf. Figure 44). VoIP was subsequently perceived by customers as a mean to phone long distance at (very) cheap rates compared to those offered by IXCs because firstly local calls were generally included in flat rate pricing and secondly access charges accounted in the early 2000s for approximately 45% of the costs of providing a long distance call.

Pursuant to the development of VoIP traffic, ILECs started to police terminating VoIP traffic and to demand for the payment of access charges on VoIP traffic: CLEC / ISP must either stop carrying VoIP traffic or carry on their book potential liability associated with the claim for access charge.

IXCs, supported by some Incumbent LECs argued furthermore that VoIP is to be considered as a parasite onto traditional PSTN, taking its revenues from what it should replace as the main revenue stream from VoIP operators came from traffic from / to PSTN. In their view, the main problem is that this is due to the co-existence of different levels of interconnection rates, namely reciprocal compensation and access charges and not innovation or efficiency. When network deployment is merely driven by potential for arbitrage, IXCs concluded that there is a high risk of inefficient network deployment.

Other potential undesirable effects on market dynamics from a welfare point of view have also pointed out by customer associations. For instance that the PSTN will have fewer

³²⁴ In the early 2000s the VoIP (as well as Internet) traffic was predominantly narrowband.

subscribers, and fewer switched minutes, leaving the burden of Universal Service to the fewer customers, who correlate highly with the under-side of the digital divide because these are the last one that are likely to be in a position to migrate to broadband access (and hence abandon narrowband Internet access included in their retail flat rates).

The FCC ruled that ISPs have to pay access charges for VoIP services that interact with the public telephone network in 2004³²⁵ (without engaging in a discussion of CPNP vs. BAK) and that they have to contribute to the Universal Service Fund in 2006.³²⁶

The different CPNP interconnection schemes (reciprocal compensation local calls, access charges for long distance) gave rise to arbitrage opportunities on long distance calls because VoIP long distance calls were treated as PSTN local calls and not as PSTN long distance calls, resulting eventually in strong variations of traffic flows at local level (local to long distance is transformed into local to local) as well as in a distorted allocation of Universal Service Fund contributions amongst customer groups. The FCC ruled eventually that VoIP long distance calls should face the same CPNP interconnection scheme as PSTN long distance calls.

³²⁵ See FCC-04-97.

³²⁶ See FCC-06-94.

7.4 Findings from the selected short case studies of changes or attempted changes of the interconnection pricing scheme from or to BAK

Short case studies of changes or attempted changes of the interconnection pricing schemes corroborate some key results of the theoretical analysis and of the analysis of empirical literature. These results include the benefits that accrue from BAK in terms of usage and of price levels but also of the reduced ability to engage into discriminatory on-net/off-net pricing at retail level (see experience in France with BAK for mobile-to-mobile interconnection).

These short case studies also clearly point out that the coexistence of alternative interconnection regimes for different types of calls often generates arbitrage opportunities³²⁷, that in turn require significant regulatory involvement. That is the case not only if it is CPNP vs. BAK (see experience in France), but also if it is under BAK (see experience in New Zealand) or under CPNP (see experience in the USA).

These short case studies finally show that while BAK has been implemented on a voluntary basis (see experience in France, in New Zealand and in the USA) where traffic flows could be assumed to be, at least in principle, balanced, it seems to be fairly difficult to mandate it as an overall approach in a context when there is a high variation in the level of termination rates and in the traffic flows between operators (see experience in the USA).

³²⁷ See 11.5 for an example in another industry, namely worldwide and European posts where there has been a change from a “BAK” type of scheme to a “CPNP” type of scheme for the international post because of growing imbalances of postal flows between countries.

8 Preliminary assessment of the magnitude of the potential regulatory burden associated with overseeing any (voluntary or mandated) move to a Bill And Keep system, both at national and Community level

The previous chapter has shown that BAK could remain slightly superior to CPNP when the Recommendation of 7 May 2009 is fully implemented, but the difference between cost-based CPNP and BAK becomes merely theoretical and more attention should be paid to the regulatory costs of fine-tuning interconnection regulations both on tariff- and on non-tariff issues. In this respect, BAK reduce the regulatory uncertainty about the future level of termination charges and price caps and will also to some extent reduce regulatory costs for interconnection tariff regulation (as cost models for setting cost-based CPNP will no longer be required), but it will not eliminate these regulatory costs for other interconnection regulations.

Nevertheless, one of the lessons of the short case studies is that BAK is likely to be implemented on a voluntary basis, and that mandating BAK as an overall approach may prove difficult when there is a high variation in the level of termination rates and in the traffic flows between operators. When assessing the regulatory burden associated with BAK, the first question is therefore under what circumstances voluntary BAK arrangements can exist under the current regulatory framework.

Unlike the Telecommunications Acts in New Zealand or in the United States, the European directives on electronic communications contain no explicit reference to Bill & Keep (“BAK”) as a form of possible interconnection arrangement. We are also not aware of any provision in the telecommunications laws of member states that refer expressly to Bill & Keep.

We will show that voluntary BAK is in theory possible today. In practice, however, if an SMP operator proposes BAK to one partner, the SMP operator would have to propose the same arrangement to all other similarly-situated operators in accordance with the SMP operator's non-discrimination obligations. Moreover, until such time as termination rates attain pure-LRIC levels, voluntary BAK arrangements are likely to create competitive distortions similar to those encountered today in situations of low on-net pricing scenarios. While termination rates are above pure-LRIC levels, NRA intervention will be necessary to allow voluntary BAK arrangements only in cases where there is no violation of the SMP operator's non-discrimination obligation and where the arrangements do not create competitive distortions and arbitrage opportunities. During this period, the Commission could usefully provide guidance to NRAs, in the form of “soft law”, to indicate the conditions under which voluntary BAK arrangements could be allowed to coexist with CPNP arrangements, without such coexistence creating competitive distortions and barriers to the internal market. Once termination rates attain pure-LRIC levels the competitive distortions of voluntary BAK should diminish within the EU. When termination

rates are sufficiently low, the coexistence of BAK alongside CPNP may cease to be a problem. At that point, NRAs may be able to be more tolerant regarding the coexistence of both regimes and allow individual BAK arrangements to emerge through a more flexible application of the non-discrimination principles. If it turned out that coexistence of BAK and CPNP still created barriers to the internal market, the Commission could at that point consider proposing a regulation under Article 114 TFEU.

Our second line of inquiry is whether NRAs could, in the absence of an express provision referring to BAK in the European directives, impose BAK on operators in the Member States without violating provisions of the existing European directives. **We will show that BAK can probably not be imposed on operators under the current European regulatory framework.** Consequently, if the Community legislature deemed it important to impose BAK at some point in the future – acknowledging that the previous chapters have shown that there is only a weak case to mandate BAK instead of improved “pure” LRIC cost-based CPNP in Europe, given the expected impact of the Recommendation of 7 May 2009 - then this can be done, as detailed below, by empowering NRAs to impose it via a change in the Access Directive. The imposition through a Regulation may also be considered, although we are not certain all the conditions of Article 114 TFEU would be satisfied.

8.1 Assessment of whether voluntary Bill And Keep by operators is possible under the existing European directives

In the future two or more fixed and/or mobile operators may decide to implement BAK between them and on a voluntary basis under the current CPNP framework even if they maintain CPP at the retail level.³²⁸ Voluntary BAK arrangements would be more likely in the future if:

- competition drives retail prices to flat rates as part of global triple- or quadruple-play tariffs;
- the costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service;
- the potential for arbitrage by operators having highly specific traffic flows - because they focus on particular customer groups such as high users- is not considered as a significant threat anymore;

In this section, we will investigate whether voluntary BAK arrangements are compatible with price caps on termination rates and non discrimination obligations under the existing European directives.

8.1.1 Freedom to negotiate interconnection

Article 3(1) of Directive 2002/19/EC (Access Directive) states that operators should be free to negotiate interconnection arrangements of their choosing:

Member States shall ensure that there are no restrictions which prevent undertakings in the same Member State or in different Member States from negotiating between themselves agreements on technical and commercial arrangements for access and/or interconnection, in accordance with Community law. The undertaking requesting access or interconnection does not need to be authorised to operate in the Member States where access or interconnection is requested, if it is not providing services and does not operate a network in that Member State.

The principle of freedom of negotiation is reinforced in Recital 5 in the preamble to Directive 2002/19/EC which states that in principle negotiations for access and interconnection should take place on a commercial basis and in good faith, and that in a

³²⁸ As it has been the case with French mobile operators throughout the period till 2005 when BAK was in place for mobile-to-mobile calls.

competitive market such negotiations should be free from restrictions, subject to the competition rules of the EC Treaty.

Consequently there is no prohibition in the directives themselves to voluntary BAK. On the contrary, the Access Directive affirms the principle of free commercial negotiation of interconnection agreements.

8.1.2 Compatibility with price caps on voice call termination rates

However, BAK arrangements may be limited by existing SMP remedies. One typical remedy imposed on SMP operators is a price-cap on wholesale call termination rates.

We are not aware of any price cap remedy prohibiting an SMP operator from charging prices below the relevant price caps. Consequently the price controls imposed by an NRA through Article 13 of the Access Directive would not prohibit an SMP operator from charging a price of 0 euro either pursuant to a voluntary unilateral action by the SMP operator or pursuant to a commercial agreement. As noted above, Article 3 of the Access Directive establishes the principle that parties are free to negotiate commercial arrangements for interconnection.

If the SMP operator voluntarily applies a 0 euro termination price to all parties requesting interconnection, then there will be no violation of non-discrimination. The problem arises in the more likely event that the SMP operator chooses to apply the 0 euro termination rate to some but not all interconnected operators.

8.1.3 Compatibility with non-discrimination

Non-discrimination obligations exist under both competition law and as an *ex ante* remedy that NRAs can – and generally do – impose on SMP operators as part of the market analysis process. The scope of the non-discrimination obligation under competition law is generally not the same as under *ex ante* remedies.³²⁹ Under competition law there is more room to justify discrimination based on the fact that the two situations are not equivalent, and/or that the discrimination has an objective justification. Moreover, discrimination even without justification is permitted under competition law if it has no appreciable effect on competition.

Non-discrimination obligations that flow from NRAs' market analysis and SMP remedies are typically framed in more strict terms. The non-discrimination obligation generally refers to non-discrimination in the SMP's treatment of third party operators as compared to the

³²⁹ See T. Madiaga, *Interaction between EC Competition Law and Sector-Specific Regulation in Converging Electronic Communications Markets*, Doctoral Thesis, European University Institute, 2008, pp. 248 et seq.

SMP operator's dealings with its own internal business units. In the context of *ex ante* remedies, the non-discrimination obligation rarely contains a carve-out that would allow discrimination that does not have an appreciable effect on competition.

From the standpoint of *ex ante* non-discrimination, the SMP operator that terminates a call is supposed to be treated as a separate functional entity from the rest of its organization. Thus even for the termination of a call that originates on its own network, the SMP operator is supposed to charge itself the same termination rate as what the SMP operator charges other operators. This principle has generated considerable debate in the context of retail on-net calling rates which in some cases are below the SMP operator's wholesale call termination charges. Competing operators claim that such on-net retail tariffs show a manifest violation of the SMP operator's non-discrimination obligation, while the operators who charge the low on-net calling prices claim that the low retail tariffs do not necessarily mean that the SMP operator is not charging itself the same termination rate as other operators. It simply means that the operator is allocating those costs differently in the larger basket of retail charges that the customer pays. It is not necessary here to go into the details of this debate. In theory, SMP operators must show in their regulatory accounting an internal charge to the SMP operator's retail division reflecting the cost of terminating the call, applying a kind of internal CPNP regime.

However, this is not always the case in practice. Within their own organization, some SMP operator don't go to the trouble of showing internal charges, and may apply of form of internal BAK. This situation is not innocuous. The existence of low or non-existent retail charges for on-net calls creates competitive distortions. Those distortions and the inherent cross-subsidies that flow from above-cost termination rates are the principal reason why NRAs and the European Commission have tried to lower termination rates to reach the marginal costs that SMP operators actually bear for call termination. Once termination rates attain pure-LRIC levels as per the Recommendation of 7 May 2009, the competitive distortions flowing from an SMP operator's own internal arrangements should in theory disappear. If that is the case, then one logical conclusion is that the competitive distortions resulting from external BAK arrangements would also be small or non-existent where termination rates are at pure-LRIC levels. Put another way, there is no reason that the nature of the competitive distortions would be different as between a large fixed or mobile operator that applies internal BAK among its own call origination and call termination operations, and a BAK arrangement entered into among several smaller operators. In each case, there will be competitive distortions as long as the charge for termination exceeds the operator's true marginal costs of termination. When the two are aligned, however, the risks of competitive distortions should drop significantly. **In that context, it would seem possible for individual BAK arrangements to exist at the same time as billed termination rates under CPNP, without necessarily leading to a violation of non-discrimination or significant market distortions.**

However, this nuance would have to be explained in future NRA decisions relating to the regulation of markets for call termination. For example, the NRA may indicate that the non-discrimination remedy shall not preclude the SMP operator from entering

BAK arrangements with other operators as long as (1) the SMP operator does not unreasonably refuse to enter into similar arrangements with other operators in an equivalent situation, and (2) the arrangement is not likely to lead to competitive distortions.

To avoid controversy regarding the existence of competitive distortions, the NRA could indicate that competitive distortions will be presumed not to exist for BAK arrangements when the SMP's termination rate reaches the pure-LRIC level indicated at the end of the glide path. This could potentially act as an incentive for an SMP operator to implement pure-LRIC rates earlier than planned.

It is possible therefore that once termination rates are very low, the coexistence of CPNP and BAK will not create competitive distortions, arbitrage opportunities or barriers to the internal market.

In the United States³³⁰, individual BAK arrangements exist alongside traditional CPNP reciprocal compensation regimes. The reciprocal compensation arrangements are based on extremely low termination rates of less than 0.01 euro. The fact that the FCC has not identified any competitive distortions flowing from the coexistence of BAK and traditional CPNP regimes suggests that when termination rates are low enough the anti-competitive effects that might arise from the formation of clusters of BAK operators are small or non-existent. This conclusion would need to be studied further, however.

Moreover, the difficult part will be managing the transition between the situation today, where the coexistence of BAK and CNCP would create significant competitive distortions, arbitrage opportunities and barriers to the internal market, and the situation that would exist sometime in the future when termination rates in the EU are so low that coexistence of BAK and CPNP ceases to be a major issue.

This suggests a form of regulatory glide path. At the starting point of the glide path, NRAs would continue to apply *ex ante* non-discrimination remedies on SMP operators in a strict way that would make it impossible for the SMP operator to offer a termination rate of 0 euro to anyone, unless the operator also proposed the 0 euro rate to all operators.

At the end point of the glide path, the NRA could take a more flexible approach to non-discrimination, allowing SMP operators to enter into bilateral BAK arrangements as long as they offer similar arrangements to "similarly situated" operators and as long as the arrangements do not create appreciable competitive distortions on the market. This more flexible approach to non-discrimination would resemble the application of a pure competition-law based approach to non-discrimination and would allow individually negotiated BAK arrangements to emerge.

To ensure a consistent approach by NRAs to managing this regulatory glide path, the Commission could provide guidance in the form of a recommendation, for example, that

³³⁰ See 7.3 and 11.6

would help NRAs determine when they could begin taking a more flexible approach to non-discrimination in connection with individual BAK initiatives.

8.1.4 Overall conclusion whether voluntary BAK by operators is possible under the existing European directives

BAK arrangements would not violate non-discrimination obligations as long as the SMP operator is willing to enter into BAK agreements with other similarly situated operators. However, to prevent competitive distortions, BAK arrangements should be permitted by NRAs only once termination tariffs have reached pure-LRIC levels.

Given that the coexistence of alternative interconnection regimes for different types of calls generally generates arbitrage opportunities³³¹, which induce significant regulatory involvement, if BAK is adopted on a voluntary basis in a given Member State, there would be a case for harmonising European interconnection charging on the basis of BAK, because arbitrage opportunities are likely to be undesirable from an internal market point of view. But it is too early to predict when this will happen. Also, the extent of the distortions is difficult to assess in advance. It is possible that the distortions will be minimal when termination rates reach pure-LRIC levels.

A form of regulatory glide path could be envisioned between now and the time when the Recommendation will have been fully implemented, when NRAs should discourage or prohibit individual BAK arrangements because of the competitive distortions that such arrangements would create, and some point in the future when NRAs may be more tolerant of individual BAK arrangements because of the low level of termination rates and the minimal competitive distortions that would result from such arrangements. The NRAs would use the ex ante non-discrimination remedy as the regulatory lever that could be adjusted either to discourage, or to permit, individual BAK initiatives. A more flexible approach to non-discrimination would give more leeway for operators to conclude individual BAK arrangements.

³³¹ See 7.4

NRAs could use the ex ante non-discrimination remedy as a way to either discourage individual BAK measures, or, at some point in the future when termination rates are so low as to reduce the risk of competitive distortions, to allow individual BAK arrangements to emerge under certain conditions.

The Commission could provide guidance to NRAs in the form of a recommendation, for example, to help ensure that NRAs apply this policy in a harmonized manner.

8.2 Assessment of possible regulatory approaches for National Regulatory Authorities to impose Bill And Keep on operators under the existing European directives

In the preceding section, we examined whether and under which conditions NRAs could allow voluntary BAK arrangements to emerge. In this section we will examine whether NRAs currently have the power to impose BAK.

There are potentially three contexts in which NRAs could decide to impose BAK in connection with the termination of voice traffic.

1. The first context is through a traditional market analysis of the markets for termination of voice communications on fixed and mobile networks. After analysis of each market and finding that each operator holds significant market power, the NRA could potentially decide to impose a BAK arrangement as a pricing remedy in the same manner as the NRA today sets fixed and mobile termination rates.
2. The second possible context in which NRAs could envisage imposing BAK is through a decision based on Article 5 of the Access Directive, pursuant to which the imposition of BAK would be independent of any Significant Market Power (“SMP”) analysis. This would be a form of symmetric regulation similar to the action taken by the ARCEP in France to regulate certain services associated with premium numbers.
3. Finally, the third context in which an NRA could impose BAK is in an individual dispute resolution proceeding.

We will examine each of these possible avenues to determine whether they are feasible under existing European legislation. For purposes of our analysis we will assume that the national legislation of each Member State is identical to the language in the European directives on electronic communications as amended on November 25, 2009. This will avoid complex scenarios involving idiosyncratic national legislation that does not completely echo the provisions of the EU directives.

8.2.1 Imposition of BAK by NRAs in the context of a market analysis decision

In this hypothetical situation, the NRA would conduct a market analysis of the market for termination of voice calls on fixed and mobile networks, exactly as the NRAs do today. The relevant NRA would find that each fixed and mobile operator holds SMP on the market for terminating calls on its own network. When the NRA gets to the stage of determining appropriate remedies, the NRA would decide that when parties exchange

reciprocal traffic at certain predefined points in their networks, that exchange of traffic would occur on a BAK basis.

The NRA's decision could have three potential variants.

1. In the first variant, the NRA would require BAK only if the exchange of traffic is balanced. This would be the equivalent of setting a reciprocal termination rate and an off-set arrangement.
2. The second possible variant would be to impose BAK when reciprocal traffic is balanced within certain limits (within a so-called “collar”)³³², and allow an operator to start invoicing normal termination rates when the traffic imbalance exceeds the predefined threshold. This too is a form of off-set arrangement because operators would need to keep track of the volume of traffic, and a net settlement would kick-in at a certain level of imbalance. This is a form of hybrid BAK.
3. Finally, the third possible variant would be for the NRA to impose BAK for all reciprocal traffic exchanged at predefined interconnection points, regardless of possible traffic imbalances.³³³ This is true BAK because neither operator will even bother to count the volume of traffic exchanged.

We will review sequentially each of these possible three variants to analyze their compatibility with the provisions of the electronic communications directives.

The first variant consists of an NRA imposing BAK only when the traffic exchange between the two operators is balanced. This option has little practical interest because it is the economic equivalent of setting reciprocal, but non-zero, compensation rates between the two operators. Indeed this approach would be no different from what exists today when termination rates are set at a symmetric level between various operators and they decide to offset payments. An NRA decision that required operators not to invoice each other when traffic is balanced could be challenged as disproportionate because the measure imposes a particular method of invoicing, or lack thereof, which may give rise to accounting and tax issues for the parties, without really furthering any of the objectives set forth in Article 8 of the Framework Directive. As compared to a situation where the NRA sets symmetric termination rates, this additional BAK variant would carry no additional benefit in terms of achieving the Article 8 objectives of the Framework Directive.

The second variant consists of the NRA setting a BAK regime that would apply as long as traffic imbalances do not exceed a certain threshold. Once a traffic imbalance exceeds a predefined threshold, the operator receiving the excess traffic would be entitled to start invoicing for that traffic at the “normal” termination rate. We assume in this variant that the

³³² Referred to as “hybrid” BAK in New-Zealand. See 7.2

³³³ Referred to as “pure” BAK in New-Zealand. See 7.2

termination rate would be set at the normal pure-LRIC rate under the CPNP interconnection charging regime and would not be increased to “claw back” the costs for the traffic received below the threshold. From an economic standpoint, this approach is equivalent to the NRA imposing a termination rate of 0 euro for the excess traffic up to the threshold point and then a termination rate of (for example) 0,01 euro for the traffic beyond that threshold. Under this scenario, one can imagine that the operator receiving excess traffic would challenge the NRA’s decision on the ground that the NRA is not entitled under the current regulatory framework to impose a termination rate below the operator’s pure-LRIC costs. The operator would argue that setting a termination rate of 0 euro is illegal under the current regulatory framework because it is not cost-oriented.

Finally under the third variant, the NRA would impose BAK regardless of the level of traffic imbalances between the parties. As in variant two, the operator receiving excess traffic would likely challenge the legality of such a measure on the ground that an NRA may not set a termination rate of zero because zero is below the operator’s costs, even under pure-LRIC methodology, and therefore the measure is not cost-oriented.

The purpose of this illustration is to underline the important distinction between quasi-BAK with set-off (also called “hybrid” BAK in New Zealand³³⁴) and pure BAK. Under pure BAK one of the two operators will necessarily be obliged to provide a service for nothing to the extent traffic is not balanced. To oblige an operator, even SMP, to provide a service for nothing raises legal issues problems under Article 13 of the Access Directive

8.2.1.1 Compatibility with Article 13 of the Access Directive

Articles 9 through 13a of the amended Access Directive provide a list of remedies that an NRA can apply to an operator that has been found to hold SMP. Remedies falling outside the list contained in Articles 9 through 13A can be applied by an NRA, but only in “exceptional circumstances”.³³⁵ Moreover, the adoption of any such exceptional remedy would require the prior approval of the European Commission after having taken utmost account of the opinion of the BEREC.

In order to apply a price control remedy, an NRA would have to look to Article 13 of the Access Directive as the source of its authority. There is no other article in the Access Directive dealing with a price control remedy for an SMP operator. In our hypothetical situation, the NRA’s desire to set a termination rate of 0 euro (thereby establishing pure BAK) in the context of a market analysis and SMP proceedings would have to be evaluated under the language of Article 13 and under relevant case law.

³³⁴ See 7.2

³³⁵ Art. 8(3), Access Directive.

8.2.1.1.1 Article 13(1)

Paragraph 1 of Article 13 states that

1) A national regulatory authority *may*, in accordance with the provisions of Article 8, *impose obligations relating to cost recovery and price controls, including obligations for cost orientation of prices* and obligations concerning cost accounting systems, for the provision of specific types of interconnection and/or access, in situations where a market analysis indicates that a lack of effective competition means that the operator concerned may sustain prices at an excessively high level, or may apply a price squeeze, to the detriment of end-users. To encourage investments by the operator, including in the next generation networks, national regulatory authorities shall take into account the investment made by the operator, and allow him a reasonable rate of return on adequate capital employed, taking into account the risks specific to a particular new investment network project. (emphasis added)

Article 13(1) gives considerable discretion to NRAs to choose different forms of price controls. Article 13(1) mentions that price controls may include obligations for cost orientation of prices and obligations concerning cost accounting systems. Forms of price control other than cost orientation have frequently been used by NRAs, such as retail minus prices, so-called “non excessive” prices or prices that will not cause market eviction. In the panoply of price control options adopted so far by NRAs, cost orientation is the most severe price control that an NRA can adopt *vis à vis* the SMP operator providing the service. It results in the lowest prices. To our knowledge, no NRA has ever attempted to impose a price control remedy that is more severe than cost orientation, nor has any court decision, Commission recommendation, or ERG document suggested that any such price remedy is possible.

The principle of cost orientation has its roots in competition law decisions involving access to essential facilities. The concept was then included in the original ONP Interconnection Directive, and the 2000 Regulation on unbundling the local loop. Consequently at the time the European Council and Parliament enacted the Access Directive in 2002, cost orientation represented the most extreme pricing remedy in existence under telecommunications and competition law. **The context and language of Article 13(1) of the Access Directive suggest that the reference to price controls "including" cost orientation means a range of possible price controls, but with cost orientation representing the outer limit of possible approaches in terms of severity *vis à vis* the SMP entity providing the service.** The other price control options would presumably include measures such as retail minus, or reasonable prices, which are less severe than cost orientation for the SMP entity providing the service. The interpretation is supported by Recital 20 of the original Access Directive:

Price control may be necessary when market analysis in a particular market reveals inefficient competition. The regulatory intervention may be relatively light, such as an obligation that prices for carrier selection are reasonable as laid down in Directive 97/33/EC, or much heavier such as an obligation that prices are cost oriented to provide full justification for those prices where competition is not sufficiently strong to prevent excessive pricing.

If we accept that cost orientation represents the outer limit of possible price controls under Article 13, then we need to examine the question of whether a remedy imposing a 0 euro price for call termination, ie. pure BAK, can be considered a "cost orientation" measure.

The European Court of Justice in the ARCOR case confirmed that there is no single definition of cost orientation and that NRAs have considerable discretion to set cost orientation rules that further the objectives of Article 8 of the Framework Directive. The ARCOR decision refers to the 2000 regulation for unbundling the local loop, but the reasoning in the ARCOR decision can be applied to an interpretation of Article 13 of the Access Directive.

The European Court of Justice in the ARCOR case looked at the specific language of the relevant legislative instrument - in that case the unbundling regulation and the Interconnection Directive 97/33 - to reach a conclusion regarding the meaning of "cost orientation". The Court held that in addition to the wording of the relevant legislation, it is also necessary to take account of the context of the cost-orientation principle and the objectives pursued by the legislation laying down that principle. (ARCOR decision, paragraph 57).³³⁶

In our case, it is necessary to look first and foremost to the language of the Access Directive. The second sentence of Article 13(1) states that "national regulatory authorities shall take into account the investment made by the operator, and allow him a reasonable rate of return on adequate capital employed, taking into account any risks specific to a particular new investment network project." In contrast to the word "may" used in the first sentence of Article 13(1), the word "shall" used in the second sentence indicates that no discretion is left on this point for NRAs. In fixing a termination rate of 0 euro, it is conceivable that an NRA could successfully argue that it "took into account" the investment made by the operator. But it would be more difficult to argue that the rate of 0 euro allows the operator a reasonable rate of return on adequate capital employed. And as indicated above, this requirement is mandatory under the language of Article 13(1): NRAs must when setting price controls allow a reasonable rate of return for the operator providing the service. The importance of allowing a reasonable rate of return for the

³³⁶ See Court of Justice of the European Union, Arcor AG&Co. KG v. Bundesrepublik Deutschland, case C-SS/06, judgment of 24 April 2008.

operator is underlined in Recital 57 of the Better Regulation Directive³³⁷ that amends the Framework, Authorisation and Access Directives:

(57) When imposing remedies to control prices, national regulatory authorities should seek to allow a fair return for the investor on a particular new investment project. In particular, there may be risks associated with investment projects specific to new access networks which support products for which demand is uncertain at the time the investment is made.

Recital (57) deals with new investment projects such as fiber, 3G or 4G wireless networks. However the same principle of return on investment is mentioned in Recital 20 of the original 2002 Access Directive:

When a national regulatory authority calculates costs incurred in establishing a service mandated under this Directive, it is appropriate to allow a reasonable return on the capital employed including appropriate labour and building costs, with the value of capital adjusted where necessary to reflect the current valuation of assets and efficiency of operations. 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.³³⁸

In conclusion therefore, setting a 0 euro termination rate would be problematic under Article 13(1)'s requirement that cost-orientation "shall" allow the operator a reasonable return adequate capital employed.

8.2.1.1.2 Article 13(2)

Let us now look at the language of Article 13(2) of the Access Directive:

2) National regulatory authorities shall ensure that any cost recovery mechanism or pricing methodology that is mandated serves to promote efficiency and sustainable competition and maximise consumer benefits. In this regard national regulatory authorities may also take account of prices available in comparable competitive markets.

Under the test of Article 13(2), an NRA would have to demonstrate that its setting of a termination rate of 0 euro serves to promote efficiency and sustainable competition and maximize consumer benefits. These criteria must be read in conjunction with Article 8 of

³³⁷ See Directive 2009/140/EC.

³³⁸ See Directive 2002/21/EC.

the Framework Directive, which the NRA must also comply with when setting a termination rate of 0 euro. If a compelling economic argument could be made that a 0 euro termination rate enhances consumer welfare, promotes efficiency and sustainable competition, then the NRA would pass the test under Article 13(2) of the Directive.

The NRA would also have to show that the 0 euro termination rate promotes efficient investment and innovation in new and enhanced infrastructures (Article 8(5)(d) Framework Directive).

Finally, to satisfy the proportionality test of Article 8(4) of the Access Directive, the NRA would have to show that there are not other less-invasive remedies that would achieve the desired objective. The NRA would have to show, for example, that the imposition of the existing remedy, where termination rates are set at pure-LRIC levels, would not achieve the desired results in terms of efficiency, sustainable competition and consumer benefits.

Some national courts have required that the NRA conduct a cost-benefit analysis using alternative remedy scenarios and in each case take into account the burden on the SMP operator of a given remedy compared to the benefits. If a given remedy represents a large increase in the burden on the SMP operator but carries only a small marginal improvement in benefits, the remedy may not be deemed proportionate.

In conclusion therefore, an NRA has to show that a zero euro termination rate contributes to the achievement of the objectives listed in Article 13(2) of the Access Directive and Article 8 of the Framework Directive. In addition, the NRA would have to show that the 0 euro rate achieves those objectives significantly better than pure-LRIC termination rates.

8.2.1.1.3 Article 13(3)

Let us continue to Article 13(3) of the Access Directive:

3) Where an operator has an obligation regarding the cost orientation of its prices, the burden of proof that charges are derived from costs including a reasonable rate of return on investment shall lie with the operator concerned. For the purpose of calculating the cost of efficient provision of services, national regulatory authorities may use cost accounting methods independent of those used by the undertaking. National regulatory authorities may require an operator to provide full justification for its prices, and may, where appropriate, require prices to be adjusted.

Language very similar to this appeared in Directive 97/33 which the European Court of Justice reviewed in the context of the ARCOR decision. Advocate General Poiares Maduro concluded from reading the language in Directive 97/33 that the intent of the

Community legislator was to make the principle of cost-orientation linked to the documented costs of the actual network operator, and that a price control set solely on virtual costs unconnected with actual costs would not comply with Community legislation. The decision of the European Court of Justice does not expressly address this point. Nevertheless, the argument of Advocate General Maduro must be considered in the context of Article 13 of the Access Directive. If an NRA were completely free to create fictional costs without any reference at all to the SMP operator's actual costs, Article 13(3) of the Access Directive would be superfluous. Consequently, one can infer that there may exist a requirement under Article 13 that there exist some linkage between the costs fixed by the NRA and the operator's actual costs.

It can be argued that a 0 euro termination rate would still respect cost-orientation and permit a reasonable return on investment because the costs are simply allocated to and recovered through a different service. However this interpretation is not the only, or most obvious, interpretation of the wording of Article 13, and could in our view be subject to challenge in national court proceedings.

In conclusion therefore for Article 13(3), a zero euro termination rate could be challenged as having no connection whatsoever to actual costs of the SMP operator.

8.2.1.1.4 Article 13(4)

Finally, let us review Article 13(4):

4) National regulatory authorities shall ensure that, where implementation of a cost accounting system is mandated in order to support price controls, a description of the cost accounting system is made publicly available, showing at least the main categories under which costs are grouped and the rules used for the allocation of costs. Compliance with the cost accounting system shall be verified by a qualified independent body. A statement concerning compliance shall be published annually.

This paragraph deals with cost accounting systems that may be imposed on the SMP operator to support price controls. Article 13(4) again suggests that some kind of linkage should exist between the cost-orientation price remedy and an actual accounting system of the SMP operator, along the lines of Advocate General Maduro's argument in the ARCOR case referred to above. Would it be possible to construct a cost accounting system that shows a 0 euro cost for the provision of a call termination service? Probably not. However, it would be possible to change how the cost of termination is allocated. The established wisdom under CPNP regimes is that the cost is "caused" by the calling party

who therefore should bear the cost. Consequently the cost of the termination is appropriately allocated to the beneficiary of the termination service, who is the calling party's network. That simple assumption can however be reversed. If the cost is "caused" by the receiving party, because the receiving party has elected to have total telephone connectivity, then the beneficiary of the service is the receiving party, not the calling party. Consequently the cost of service to the calling party's network is zero because no service is being provided to the calling party and its network.

This relatively minor change in cost accounting would have the advantage of fixing a 0 euro price for the service provided to the calling party's network without having to reach the impossible conclusion that the cost of the termination service is itself 0 euro. The cost of the service is not changed, merely the beneficiary of the service. This apparently simple change would disrupt, however, several decades of tradition in the field of voice interconnection.³³⁹ As demonstrated in Section I, it would also destroy the ability to find SMP on the market for call termination, and thereby destroy the ability to regulate using asymmetric regulatory tools. An NRA who attempted such an approach would have to pass the proportionality test, as mentioned above, by showing that less drastic measures are not sufficient to achieve the desired benefits for consumers. The NRA would have to show that the SMP operator still earns a fair return on its capital, and that the new approach of having the receiving party bear all the cost of termination encourages efficient investment in infrastructure. These arguments may be difficult to make. The NRA's action may also run afoul of Article 8(5)(a) of the Framework Directive, which requires that NRAs promote regulatory predictability by ensuring a consistent regulatory approach over appropriate review periods. An NRA who attempted to eliminate by the stroke of a pen the assumption under which CPNP, interconnection agreements, and SMP decisions have been based over the last fifteen years could be accused of disrupting regulatory predictability. The NRA would also have to explain, perhaps before national courts when the NRA's decision is challenged by one of the affected operators, why there is no inconsistency in the NRA's reasoning between the NRA's finding of SMP on the one hand, which is premised entirely on the CPNP principle, and the remedies section, which causes CPNP to disappear and be replaced by Bill & Keep.

Lastly, the NRA's decision would have to be reconciled with Articles 8(3)(d) and 19(2) of the Framework Directive, which require the NRA to take utmost account of any Commission recommendations, and to contribute to the development of consistent regulatory practice and the consistent application of the directives. A single NRA's decision to set a termination rate of 0 euro would conflict with the existing Commission Recommendation on termination rates, which recommends adoption of pure-LRIC methodology for setting termination rates but still starts from the premise that the calling party's network is the beneficiary of the service. Switching the beneficiary of the service would conflict with the existing recommendation as well as current regulatory practice

³³⁹ See 3.1

throughout Europe. Keeping the same beneficiary of the service (ie. the calling party's network) but setting the cost at 0 euro would conflict with the cost-orientation principle and the Commission's recommendation to use pure-LRIC methodology.

In conclusion therefore for Article 13(4), a cost accounting system could not show that the cost of termination is zero. The system could conceivably change the beneficiary of the service, from the calling party's network to the receiving party. However, doing so would raise proportionality issues, and issues of regulatory predictability.

8.2.1.1.5 Overall conclusion on the imposition of Bill & Keep by NRAs in the context of a market analysis decision

A single NRA's decision setting a termination rate of 0 (thereby imposing BAK at wholesale level) in the context of a market analysis decision could not easily be justified on the basis of Article 13 of the Access Directive.

This conclusion is confirmed if we apply to the current case the methodology used in the ARCOR case, which requires us not only to review the language of the directives, but to take account of the purpose and context of the relevant measures.

Should an NRA wish to impose Bill & Keep, it would have to argue that the purpose of the cost-orientation principle in Article 13 of the Access Directive supports the setting of a termination rate of 0 euro rather than the setting of a termination rate of (for example) 0.01 euro based on pure-LRIC.

The NRA trying to make this argument would first have to show that the 0 euro termination rate is not an unreasonable interpretation of "cost-orientation" under Article 13. This is already problematic as noted above, since it would be impossible to argue that the cost of providing the service is zero. The argument can be made that a 0 euro termination rate would still be cost-oriented and therefore consistent with Article 13, because costs would be recovered through other services. But this argument would be relatively fragile and subject to challenge in national court proceedings following an NRA's decision.

Second, even if the NRA got over this hurdle, it would have to show that the "0 euro" interpretation of the cost-orientation principle better fulfils the purpose of the directives than does the "pure-LRIC" interpretation of cost-orientation. The purpose of the cost-orientation principle in the context of termination rates is different than in the context of

local loop unbundling. The purpose of the principle in the call termination context is to prevent market distortions through anticompetitive cross-subsidies. Once termination rates reach a pure LRIC level, market distortions through anticompetitive cross-subsidies should in theory disappear. It may be hard in these circumstances to argue that the "0 euro" interpretation of the cost-orientation principle will better serve the purpose of eliminating anticompetitive cross-subsidies than a "pure-LRIC" interpretation. This is similar to the proportionality test referred to above, pursuant to which an NRA would have to demonstrate why the establishment of a 0 euro termination rate is better suited to achieve the objectives of Article 8 of the Framework Directive than imposing pure-LRIC termination rates.

8.2.1.2 Possibility to issue a new recommendation under Article 19 of the Framework directive

A single NRA's decision setting a termination rate of 0 euro could more easily be justified if the decision were adopted in furtherance of a Commission's recommendation.

However the NRA's decision would still have to withstand scrutiny *vis à vis* the language of the directives themselves, so many of the problems described above would have to be addressed. But at least the decision would not be criticized for failure to take "utmost account" of a Commission's recommendation. But could the Commission adopt such a recommendation under Article 19 of the Framework Directive?

Article 19(1) allows the Commission to issue a recommendation where the Commission finds that divergences in the implementation by NRAs of regulatory tasks may create a barrier to the internal market. Article 19(3) further limits the Commission's latitude, by requiring that the Commission's recommendation only identify a harmonized or coordinated approach for the purposes of addressing inconsistent implementation of general regulatory approaches by NRAs, where such inconsistency creates a barrier to the internal market. Recital 58 of the Better Regulation Directive explains this requirement further:

(58) Any Commission decision under Article 19(1) of Directive 2002/21/ED (Framework Directive) should be limited to regulatory principles, approaches and methodologies. For the avoidance of doubt, it should not prescribe details which will normally need to reflect national circumstances, and it should not prohibit alternative approaches which can reasonably be expected to have equivalent effect. Such a decision should be proportionate and should not have an effect on decisions taken by national regulatory authorities that do not create a barrier to the internal market.

Article 19(3) also requires that the Commission may propose a draft decision only after two years following the adoption of a Commission's recommendation dealing with the

same matter, and that the Commission must take utmost account of an opinion from BEREC.

If we start from the hypothesis that NRAs in Member States have all fully implemented the Commission's Recommendation of 7 May 2009 on termination rates, the Commission could not justify a further recommendation on the basis of divergence in the implementation of regulatory approaches. In the hypothetical situation we are examining, there would be no divergence because all NRAs would have implemented the Recommendation of 7 May 2009.

The Commission would also run into the same substantive problems as any NRA regarding the compatibility of a 0 euro termination rate with the current directives:

- stating that the cost of termination is 0 euro would likely be challenged as violating the principle of cost-orientation as set forth in Article 13 of the Access Directive, because no matter what method of measuring the cost is used, the cost cannot be zero;
- stating that the cost of termination is not zero, but that the beneficiary of the service is the receiving party would raise the problem of consistency and predictability of regulatory approaches in violation of Article 8(5)(a) of the Framework Directive. The justification for regulating termination rates over the last ten years is based on the premise that the beneficiary of the service is the calling party's network in the first place. It is this principle that permitted the European Commission and national regulators to find SMP and regulate the terminating network. If the Commission were able to reverse this key assumption through a recommendation, the Commission would have to explain why circumstances have changed in the meantime making the original assumption incorrect or out of date. In the course of doing so, the Commission might unintentionally demonstrate the fragility of the original assumption, thereby putting into question ten years of regulation of termination rates. Like an NRA decision, the Commission's recommendation would have to satisfy the proportionality test, and the requirement that any Commission's recommendation "not prescribe detail which will normally need to reflect national circumstances," and "not prohibit alternative approaches which can reasonably be expected to have equivalent effect."³⁴⁰ As noted above, the proportionality test would require that the Commission demonstrate not only that Bill & Keep would further the regulatory objectives of the Framework Directive, but that it would do so significantly better than the existing approach of pure-LRIC under the CPNP regime.

³⁴⁰ See Better Regulation Directive, Recital 58.

A single NRA's decision setting a termination rate of 0 euro could more easily be justified if the decision were adopted in furtherance of a Commission's Recommendation.

However a Commission's Recommendation can be justified where there are divergences of implementation among NRAs. In the hypothetical case presented, there would be no divergence because the NRAs will have already implemented the Recommendation of 7 May 2009 on termination rates.

8.2.2 Imposition of BAK by NRAs through Article 5 of the Access Directive

NRAs have relatively broad powers under Article 5 of the Access Directive, but the extent of those powers, and their relationship to the market analysis and remedies procedures under Articles 8 through 13 of the Access Directive, are not well understood.

Article 5 permits NRAs in certain justified cases to impose remedies related to access, interconnection and interoperability on entities that do not hold SMP in order to further the objectives of Article 8 of the Framework Directive, in particular when doing so is necessary to ensure end-to-end connectivity. Article 5 also permits NRAs to take actions with regard to SMP operators, but it is not at all clear in the case of SMP operators that Article 5 can permit an NRA to avoid the limitations that otherwise would apply under Articles 8 through 13(a) of the Access Directive. **If an NRA wishes to impose a remedy on an SMP operator and those remedies seek to address competitive concerns identified in the market analysis process, we are of the opinion that the NRA must choose from the remedies listed in Articles 9 through 13(a) of the Access Directive or else, go through the procedures set forth in Article 8(3) of the Access Directive.** This interpretation is not free from doubt. In particular, the case law of the European Court of Justice in case C-227/07 Commission v. Poland suggests that Article 5 may create general powers to take measures that further the objectives of Article 8 of the Framework Directive.

Our conclusion is based on the language of Articles 5 and 8 of the Access Directive. Article 5, which is located in the section entitled “Chapter II General Provisions” of the Directive, states that:

1. National regulatory authorities shall, acting in pursuit of the objectives set out in Article 8 of Directive 2002/21/EC (Framework Directive) encourage and where appropriate ensure, in accordance with the provisions of this Directive, adequate access and interconnection, and the interoperability of services, exercising their responsibility in a way that promotes efficiency, sustainable competition, efficient investment and innovation, and gives the maximum benefit to end-users.

In particular, without prejudice to measures that may be taken regarding undertakings with significant market power in accordance with Article 8, national regulatory authorities shall be able to impose:

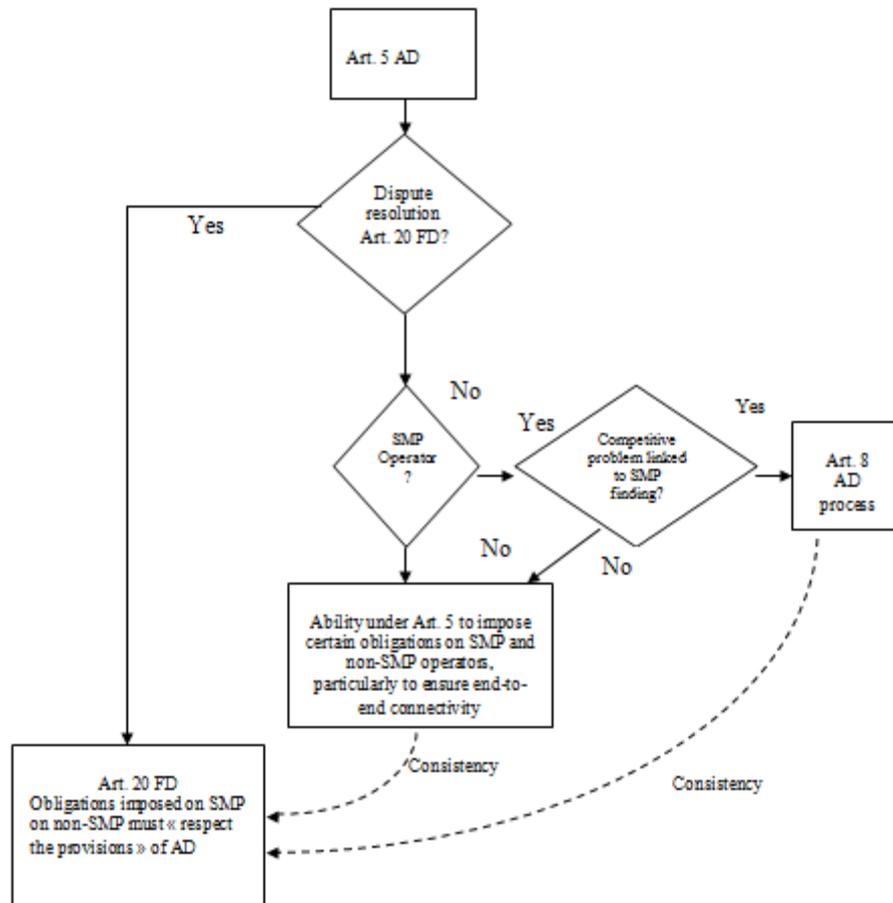
- a) to the extent that is necessary to ensure end-to-end connectivity, obligations on undertakings that control access to end-users, including in justified cases the obligation to interconnect their networks where this is not already the case;
- b) in justified cases and to the extent that is necessary, the obligations on undertakings that control access to end-users to make their services interoperable;
- c) to the extent that is necessary to ensure accessibility for end-users to digital radio and television broadcasting services specified by the Member State, obligations on operators to provide access to the other facilities referred to in Annex I, Part II on fair, reasonable and non-discriminatory terms.

8.2.2.1 Analysis of Article 5 language

Article 5(1) states that NRAs shall where appropriate ensure, in accordance with the provisions of this Directive, adequate access and interconnection. The wording “in accordance with the provisions of this Directive”, together with the fact that Article 5 is located in the “General Provisions” chapter of the Directive, suggest that where other provisions of the Access Directive provide more precise guidance on how interconnection and access should be ensured by NRAs with respect to certain types of operators, those other more precise provisions should take precedence over the general provisions. This is further confirmed by the language in the second sentence of Article 5(1). The second sentence states that NRAs shall be able to impose certain obligations on operators that control access to end-users, but indicates that the provision is “without prejudice to measures that may be taken regarding undertakings with significant market power in accordance with Article 8”, suggesting that the more specific provisions of Article 8 of the Access Directive should apply when remedies concern SMP operators.

Article 5 provides general authority for NRAs to impose interconnection and access in appropriate cases in order to further the objectives of Article 8 of the Framework Directive. When the operator has significant market power, that general authority is then more precisely defined and regulated in Articles 8 through 13(a) of the Access Directive. **This interpretation suggests that, where an SMP operator is concerned, NRAs must use the procedures in Articles 8 through 13(a) of the Access Directive when imposing obligations, at least when the problem that the remedy is intended to address is a problem related to SMP. If the problem is one that is not directly linked to the SMP finding, then there may be room to use Article 5 as a separate route for remedies.**

Figure 45: Analysis of Article 5 language



Source: HOGAN LOVELLS analysis

This interpretation is subject to debate. The European Court of Justice has not directly addressed the question. As noted in the immediately following section, the European Court of Justice recently held that Article 5 provides for a general authority for NRAs to further the objectives of Article 8 of the Framework Directive in the context of access and interconnection. However, the question presented to the court in the *Commission v. Poland* case was not the same as the question presented here. Consequently the question of whether Article 5 could be used by an NRA to impose a remedy on an SMP operator that would fall outside the range of remedies permitted by Article 9 through 13(a) of the Access Directive remains open.

8.2.2.2 Analysis of Article 8 language

Our suggested interpretation above that Article 8 of the Access Directive provides the exclusive route for imposing remedies in SMP situations is supported by the language of Article 8:

“Where an operator is designated as having significant market power on a specific market as a result of a market analysis...national regulatory authorities *shall* impose the obligations set out in Articles 9 to 13 of this Directive as appropriate.” (emphasis added)

Article 8’s use of the word “shall” suggests that the only toolbox available to NRAs for SMP operators is Articles 9 to 13. Otherwise the directive would have contained more open language such as: “without prejudice to the provisions of Article 5(1)”, which is the language used in the following paragraph of Article 8, dealing with non-SMP operators.

NRAs’ obligation to use the SMP toolbox as opposed to some other Article 5 toolbox is further reinforced by the language of the second sentence of Article 8(3) of the Access Directive, which states that if an NRA wants “in exceptional circumstances” to impose on an SMP operator “obligations for access or interconnection other than those set out in Articles 9 to 13 in this Directive, it *shall* submit this request to the Commission.” (emphasis added) Again, the use of the word “shall” suggests that the Article 8 procedure may be the sole route for interconnection-related remedies imposed on an SMP operator. Either the remedy falls within those authorized in Articles 9 to 13, or the remedy falls outside in which case the NRA must request permission from the Commission under Article 8. There is no “without prejudice to the provisions of Article 5(1)” in this sentence that would suggest the existence of a third alternative.

As noted above, we are not aware of any case law expressly addressing this issue. Case C-227/07 Commission v. Poland, deals with two issues, neither of which is directly applicable to the question presented here. The Polish Telecommunications Law contained a provision that obligated all operators to negotiate interconnection and access agreements and that empowered the regulator to fix terms of access or interconnection if negotiations failed. The first issue decided by the Court was whether by imposing an obligation to negotiate access on all operators, whether or not they held SMP, the Polish law had violated Article 4(1) of the Access Directive. The Court held that Polish law was incompatible with the Access Directive because under the Access Directive, operators have a general obligation to negotiate interconnection, but not access. Imposing an obligation to negotiate or conclude access agreements can only be done by the NRA after a competitive analysis of the market in accordance with Article 8 of the Access Directive. Such a general obligation cannot be imposed on operators by the legislature without a competitive assessment. The second issue decided by the Court was whether Polish law failed to include a provision allowing the NRA to supervise and if necessary intervene to impose access and interconnection, in appropriate cases, as foreseen in Article 5(1) of the Access Directive. The Court held that “the first subparagraph of Article 5(1) of the Access Directive is *limited to providing for a general power for the national regulatory authorities for the purpose of achieving the objectives of Article 8 of the Framework Directive in the*”

specific context of access and interconnection".³⁴¹ The Court held that the Polish law gave broad powers to the Polish regulator, including in the context of interconnection and access, and that the Commission had failed to show how those general provisions of Polish law failed to give the NRA the authority required by Article 5(1) of the Access Directive

Confusion regarding the scope of Article 5 of the Access Directive was expressed in many of the submissions received by the European Commission in connection with the review of the regulatory framework. However, most of the confusion surrounding Article 5 lies in the scope of its potential application to non-SMP operators.

On balance, we do not believe that Article 5 provides a back-door through which BAK could be imposed on operators, principally because the operators in question are already regulated on an SMP basis for the termination of voice calls on their networks. Imposing BAK would amount to imposing a new interconnection-related remedy on these SMP operators for a competitive issue directly related to their SMP status. For remedies imposed on SMP operators designed to address the SMP problem, Article 8 of the Access Directive states that EITHER the remedy is permitted by Articles 9 to 13(a) in which case the normal Article 7 Framework Directive notification procedure applies, OR the remedy falls outside Articles 9 to 13(a) of the Access Directive, in which case the remedy must receive the prior approval of the European Commission after consulting BEREC. In our view Article 5 of the Access Directive does not provide a third route.

Our answer would not necessarily be the same if the operators in question were not already regulated as SMP operators or if the issue at stake were not directly related to the call termination bottleneck. The scope of Article 5 for non-SMP operators leaves more room for interpretation. For example, Article 5 has been used to regulate certain aspects of Internet traffic exchange where end-to-end connectivity is at stake and there has been no specific finding of SMP. Article 5 has also been used to ensure end-to-end connectivity among voice telephony operators, including an SMP operator. But in that case the connectivity issue was not one directly related to the SMP status of a given operator, but rather a horizontal connectivity issue independent of SMP. However, on the market for voice call termination, which is already regulated on the basis of SMP regulation, we do not think that the Directives allow NRAs to pick and choose between SMP regulation based on market analysis, and non-SMP Article 5 regulation. In that case, only Articles 8 through 13(a) of the Access Directive should be used. This interpretation must naturally be approached with caution until such time as the European Court of Justice has had occasion to address the issue.

³⁴¹ See Case C-227/07, para. 65 (emphasis added).

8.2.2.3 Use of Article 5 by NRAs

We are aware of seven notifications to the European Commission regarding the use of Article 5 of the Access Directive.

Two of those involve call termination on individual networks. In one notification, the UK regulatory authority OFCOM proposed to impose on BT an obligation to purchase call termination services from other operators in order to ensure end-to-end connectivity.³⁴² In this situation, BT had not been designated as holding SMP with regards to the purchase of termination services. Consequently, the Article 5 remedy imposed on BT had no relation to the SMP-related problem of supply of call termination services by an operator controlling a call termination bottleneck. Consequently the use of Article 5 was unrelated to BT's SMP status. In the second notification, the Romanian regulatory authority proposed to impose on the operator called "RCS & RDS" obligations with regard to the supply of call termination services on its network.³⁴³ The Romanian NRA proposed to use Article 5 to impose non-discrimination, transparency, price controls remedies and an obligation to provide call termination services. Apparently, the Romanian regulatory authority had not yet conducted a market analysis and had not yet designated RCS & RDS as holding SMP on the market for call termination.

The Romanian regulatory authority's use of Article 5 to impose price control remedies for call termination would suggest that Article 5 could also be used to impose BAK, in contradiction with the position we have developed above. This illustrates the considerable uncertainty surrounding the use of Article 5. We feel, however, that the Romanian approach is not consistent with the language and philosophy of the Access Directive³⁴⁴ and that a market analysis and finding of SMP would have been the more appropriate route for regulatory intervention.³⁴⁵ In the case of Romania, the use of Article 5 may have been justified by the fact that no SMP analysis had yet taken place and the regulator was confronted with an immediate problem of ensuring end-to-end connectivity which is one of the situations Article 5 was designed to permit NRAs to address.

³⁴² See Case UK/2006/0454.

³⁴³ See Case RO/2007/0653.

³⁴⁴ In case RO/2007/0653, the Commission expressed the view that Article 5 of the Access Directive must be used with caution, taking into account the general principle of the electronic communications regulatory framework that regulation should only be imposed when necessary and must in any event be proportionate to the market failure identified.

³⁴⁵ In this respect, the Commission emphasised in the relating Article 7 decision that "any preliminary findings which form part of the current draft measure should not prejudge the outcome of the market analysis and SMP assessment in the market for call termination on individual public telephone networks provided at a fixed location, which is to be carried out and notified to the Commission and other NRAs in accordance with Articles 15 and 16 of the Framework Directive".

8.2.2.4 Overall conclusion on the imposition of Bill & Keep by NRAs through Article 5 of the Access Directive

Article 5 of the Access Directive permits NRAs to impose remedies on both SMP and non-SMP operators. The exact scope of Article 5 is the subject of debate. However, our reading of Article 5 in conjunction with Article 8 of the Access Directive suggests that Article 5 should not be used as a substitute for Articles 8 and 13 of the Access Directive, and consequently Article 5 is not a route that would permit an NRA to impose BAK. This interpretation must be considered with caution until such time as the European Court of Justice provides further guidance on the use of Article 5. Nevertheless, and subject to this reserve, we consider that the use of Article 5 by the Romanian NRA to regulate the call termination market is an exception which might be justified by the need to provide immediate connectivity in a situation where there had not yet been a market analysis and finding of SMP on the Romanian market for call termination.

8.2.3 Imposition of Bill & Keep by NRAs in the context of dispute resolution

The last hypothetical case to be examined is the question whether BAK could be imposed by an NRA in the context of a dispute resolution procedure.

Article 5 of the Access Directive when read in conjunction with Article 20 of the Framework Directive provides authority to NRAs to impose access or interconnection-related obligations on SMP and non-SMP operators in the context of dispute resolution procedures. Article 20(3) states that:

“In resolving the dispute, the national regulatory authority shall take decisions aimed at achieving the objectives set out in Article 8. Any obligations imposed on an undertaking by the national regulatory authority in resolving a dispute shall respect the provisions of this Directive or the Specific Directives.”

NRAs in most Member States have wide discretion in dispute resolution proceedings to impose technical and commercial solutions on the parties to the dispute which further the general regulatory objectives of Article 8 of the Framework Directive. It is not unusual for a set of general remedies to be defined in the market analysis and remedies procedures followed by an NRA under Article 8 of the Access Directive, and for details of the remedies to be defined by the NRA subsequently in the context of individual dispute resolution procedures. For example, a regulator may impose the principle of cost orientation, but the

actual price for an interconnection service in a given situation will be set in a dispute resolution procedure.

In each case, however, the remedy imposed in the dispute resolution procedure must be consistent with the general remedies imposed by the NRA under the market analysis proceeding. The second sentence in Article 20(3) of the Framework Directive states that obligations imposed in dispute resolution proceedings “shall respect the provisions of this Directive or the Specific Directives,” as well as aim at achieving the objectives of Article 8 of the Framework Directive. A remedy imposed in a dispute resolution procedure that contradicts a remedy established in the market analysis process would violate the second sentence of Article 20(3) of the Framework Directive and would also contradict one of the new objectives, inserted in the 2009 reform, of Article 8 of the Framework Directive, which is to “promot[e] regulatory predictability by ensuring a consistent regulatory approach over appropriate review periods.”

One route might permit NRAs to impose BAK in individual dispute resolution procedures without violating the existing directives: if the NRA previously defined remedies in the market analysis for voice call termination as including the obligation to charge cost-oriented prices and the obligation not unreasonably to refuse requests for BAK arrangements where traffic is balanced and the arrangement would not violate other obligations of the SMP operator including non-discrimination, the NRA would empower itself to impose BAK arrangements in appropriate individual cases in the context of dispute resolution procedures without violating Article 20(3) of the Framework Directive.

Individual dispute resolution provides another possible route for an NRA to impose BAK. As noted above, where traffic flows are roughly balanced, the imposition of BAK would not violate Article 13 of the Access Directive because the situation in that case would be equivalent to reciprocal termination rates. However, any decision made by an NRA in a dispute resolution under Article 20 of the Framework Directive must be consistent with the remedies imposed by the NRA in the context of the market analysis process. It would be possible today for an NRA to include a remedy in its market analysis document providing that an SMP operator shall not unreasonably refuse to enter into BAK arrangements where traffic flows are balanced and provided the arrangement would not create competitive distortions on the market. This is a possible option but would in practice be effective only at such time as termination rates are set at pure-LRIC levels. As long as termination rates remain above pure-LRIC levels, individual BAK arrangements are likely to give rise to competitive distortions similar to those encountered for low on-net retail pricing. The NRA would not be in a position to impose BAK in an individual dispute resolution proceeding as long as those competitive distortions exist. However, once fixed and mobile rates are symmetrical and set a pure-LRIC level, an NRA

might in appropriate cases impose a BAK arrangement pursuant to an individual dispute resolution proceeding, at least when traffic volumes are balanced.

8.2.4 Overall conclusion on possible regulatory approaches for NRAs to impose Bill & Keep on operators under the existing European directives

Under today's European regulatory framework it appears to us difficult for an NRA to impose BAK.

If the NRA wished to impose BAK on all SMP operators in the context of a market analysis and finding of SMP on the markets for call termination on individual markets, the measure could be challenged as inconsistent with Article 13 of the Access Directive. Article 13 does not allow in our view a price control remedy to be imposed that is more severe than cost-orientation. BAK, to the extent it requires an operator to provide an interconnection service for 0 euro, could be challenged as not being a cost-orientation measure.³⁴⁶ Being a price control remedy falling outside of the scope of Article 13, BAK would have to be specifically authorized by the European Commission under Article 8(3) of the Access Directive. Where traffic is roughly balanced, the imposition of BAK would not violate Article 13 because the arrangement would be the economic equivalent to reciprocal termination rates. The issue only arises for traffic imbalances, because the SMP operator terminating the excess traffic would in effect have to provide the service for nothing.

We also considered whether under the current regulatory framework the European Commission could issue a recommendation regarding BAK under Article 19(1) of the Framework Directive. If the hypothetical starting point for our analysis is a situation where NRAs have already implemented the Commission's Recommendation of 7 May 2009, it would seem difficult to justify another Commission recommendation calling for an evolution from a pure-LRIC termination rate model to BAK. To justify its action under Article 19(1) of the Framework Directive, the Commission would have to show that the measure is needed because of diverging implementation of the regulatory framework in Member States, which in the hypothetical case before us would not be the case. The Commission, as well as any NRA wishing to impose BAK, would also have to show that the measure is

³⁴⁶ Arguments exist that a 0 euro termination rate would still be cost-oriented and therefore consistent with Article 13, because costs would be recovered through other services. This interpretation, while reasonable, is in our view relatively fragile and could be subject to challenge.

proportionate. This would require a showing that BAK, as compared to a situation where all termination rates are set as pure-LRIC levels in accordance with the Commission's Recommendation of 7 May 2009, would bring significantly more benefits in terms of achieving the objectives of Article 8 of the Framework Directive than would the status quo of pure-LRIC rates.

Article 5 of the Access Directive permits NRAs to impose remedies on both SMP and non-SMP operators. The exact scope of Article 5 is the subject of debate. However, our reading of Article 5 in conjunction with Article 8 of the Access Directive suggests that Article 5 cannot be used as a substitute for Articles 8 and 13 of the Access Directive, and consequently Article 5 is not a route that would permit an NRA to impose BAK. This interpretation must naturally be considered with caution until such time as the European Court of Justice provides more guidance on the scope of Article 5 in particular situations. Nevertheless, and subject to this reserve, we consider that the use of Article 5 by the Romanian NRA to regulate the call termination market is an exception which might be justified by the need to provide immediate connectivity in a situation where there had not yet been a market analysis and finding of SMP on the Romanian market for call termination.

Individual dispute resolution provides another possible route for an NRA to impose BAK. As noted above, where traffic flows are roughly balanced, the imposition of BAK would not violate Article 13 of the Access Directive because the situation in that case would be equivalent to reciprocal termination rates. However, any decision made by an NRA in a dispute resolution under Article 20 of the Framework Directive must be consistent with the remedies imposed by the NRA in the context of the market analysis process. It would be possible today for an NRA to include a remedy in its market analysis document providing that an SMP operator shall not unreasonably refuse to enter into BAK arrangements where traffic flows are balanced and provided the arrangement would not create competitive distortions on the market. This is a possible option but would in practice be effective only at such time as termination rates are set at pure-LRIC levels. As long as termination rates remain above pure-LRIC levels, individual BAK arrangements are likely to give rise to competitive distortions similar to those encountered for low on-net retail pricing. The NRA would not be in a position to impose BAK in an individual dispute resolution proceeding as long as those competitive distortions exist. However, once fixed and mobile rates are symmetrical and set a pure-LRIC level, an NRA might in appropriate cases impose a BAK arrangement pursuant to an individual dispute resolution proceeding, at least when traffic volumes are balanced.

8.3 Assessment of legislative options at European level to impose Bill And Keep on operators

We have seen that BAK can probably not be imposed under the current regulatory framework. If the Community legislature deemed it important to impose BAK, this could potentially be done either by imposing it directly through a regulation, or by empowering NRAs to impose it via a change in the Access Directive.

In any case, the Community legislature would have to establish appropriate charging methods for traffic terminated in the European Union that has been originated by operators located outside the European Union in order to avoid possible arbitrage problem with such “non EU” international incoming traffic.³⁴⁷

8.3.1 Regulation

Article 114 TFEU³⁴⁸ provides that "the European Parliament and the Council shall, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee, adopt the measures for the approximation to the provisions laid down by law, regulation or administrative action in Member States which have as their object the establishment and functioning of the internal market".

On 8 June 2010, the Court of Justice of the European Union rendered a judgment in a preliminary ruling proceeding related to the validity of the Roaming Regulation n°717/2007 of 27 June 2007 adopted on the basis of the ex Article 95 TEC (now Article 114 TFEU).

As highlighted by the Advocate General Póitares Maduro, the core question of the "Vodafone and Others" Case (Case C-58/08) is whether the Community can regulate prices under the new Article 114 TFEU and, if so, to what extent and under which conditions.

In this case, the Court highlights conditions for recourse to Article 114 TFEU as a legal basis:

- First, "the object of measures adopted on the basis of Article 95(1) CE must genuinely be to improve the conditions for the establishment and functioning of the internal market".
- The Court also specifies that "while a mere finding of disparities between national rules and the abstract risk of infringements of fundamental freedoms or distortion of

³⁴⁷ Defining such rules is outside the scope of this Study.

³⁴⁸ Treaty on the Functioning of the European Union

competition is not sufficient to justify the choice of Article 95 CE as a legal basis, the Community legislature may have recourse to it in particular where there are differences between national rules which are such as to obstruct the fundamental freedoms and thus have a direct effect on the functioning of the internal market [...] or to cause significant distortions of competition".

- The Court adds that "recourse to that provision is also possible if the aim is to prevent the emergence of such obstacles to trade resulting from the divergent development of national laws. However, the emergence of such obstacles must be likely and the measure in question must be designed to prevent them".

When examining whether those conditions are fulfilled as regards the Roaming Regulation, the Court highlights that, as provided at Recital 4 of Regulation 717/2007, the European Regulatory Framework has not provided NRAs with sufficient tools to take effective and decisive action with regards to the pricing of Community-wide roaming services and the Roaming regulation has been adopted to support and complement the existing regulatory framework. The mechanism for ex ante regulation by NRAs has proven unadapted to the cross-border nature of international roaming. The Court also considers that "as regards the functioning of the roaming market [...], it is clear that a divergent development of national laws seeking to lower retail charges only, without affecting the level of costs for the wholesale provision of Community-wide roaming services, would have been liable to cause significant distortions of competition and to disrupt the orderly functioning of the Community-wide roaming market" and that "such a situation justified the Community legislature's seeking to protect the proper functioning of the internal market" .

It is, however, difficult to assess whether having recourse to Article 114 TFEU would be justified to impose BAK. Would the differences in national call termination markets, in particular after the implementation of the European Commission's Recommendation of 7 May 2009, be such as to "obstruct the fundamental freedoms and thus have a direct effect on the functioning of the internal market [...] or [...] cause significant distortions of competition" and therefore justify the adoption of a legislative instrument on the basis of Article 114 TFEU?

If the Recommendation of 7 May 2009 proves ineffective in harmonizing and reducing termination rates in Europe, there may be a situation similar to international roaming, in which the current regulatory tools were insufficient to address the problem. However, if the starting point for analysis is a situation in which the Recommendation of 7 May 2009 has been fully implemented, it is difficult to see how the Community legislature could use Article 114 TFEU as a legal basis in light of the European Court of Justice's recent decision.

8.3.2 Amendment to Article 13 of the Access Directive

The most natural way to introduce BAK into legislation would be through an amendment to Article 13 of the Access Directive, which would allow NRAs to impose BAK in appropriate cases, where the BAK arrangement would further the objectives of Article 8 of the Framework Directive and in particular not create competitive distortion either within the relevant Member State or within the internal market.

BAK could be relatively easily introduced into the NRA's regulatory toolbox through an addition to Article 13. This would give NRAs the option but not the obligation to impose BAK in appropriate cases. If diverging zones of BAK were to emerge and create distortions in the functioning of the internal market, this could potentially be dealt with through a Commission recommendation, or even a Regulation under Article 114 TFEU. However, it is not sure that the existence of BAK islands would create necessarily internal market problems if the CPNP termination rates are set at pure LRIC levels.

Another consequence of imposing BAK is the elimination of the terminating network monopoly. One positive effect of the elimination of the terminating network monopoly is that *ex ante* regulation will decrease or disappear, in accordance with one of the key objectives of the Framework Directive. However, as noted previously there will still be a need to compute costs for CPS and for the routing of calls to premium numbers. Moreover, the disappearance of the terminating network monopoly could deprive NRAs of all the tools contained in Articles 8 through 13(a) of the Access Directive, since SMP would no longer exist. Without the panoply of tools of Articles 8 through 13(a) of the Access Directive, NRAs would only have the limited tools of Article 5 of the Access Directive, which may not be sufficient to deal with all situations. The possible side-effect of losing the ability to regulate using Articles 8 through 13(a) of the Access Directive should be studied in more detail before NRAs impose pure BAK.

8.3.3 Overall conclusion on the European legislative options to impose Bill And Keep on operators

The most natural way to introduce Bill And Keep into European legislation would be through an amendment to Article 13 of the Access Directive, which would allow NRAs to impose Bill And Keep in appropriate cases.

9 Conclusions on any necessary requirements at national and European level with respect to the future of interconnection charging methods

When the Recommendation to improve CPNP is fully implemented, the market is likely to be very different from today because:

- The improved CPNP regime will generate much of what is currently expected from a BAK regime, i.e. low and comparable termination rates between all networks, with costs recovered primarily at the retail level instead of at the wholesale level.
 - It will provide a closer approximation to the efficient economic costs expected to be incurred in electronic communications networks (large fixed costs and close to zero marginal costs).
 - In mobile markets, it will reduce or eliminate the scope for leading operators to implement on-net preferential tariffs and will promote competition because operators will have to generate nearly all their revenue through their own end-users retail rates, rather than through higher than efficient Mobile Termination Rates.
 - In fixed markets, it will remove cross subsidies between fixed and mobile services, leading to a reduction in fixed to mobile retail tariffs, higher fixed to mobile call volumes and the inclusion of fixed to mobile calls in flat rate call packages.
 - It will facilitate efficient fixed to mobile convergence by removing artificial commercial barriers.
- Networks will migrate to IP technology. Next Generation Networks (“NGN”) will be multi-service networks, rather than service specific networks, offering audio (including voice), video (including TV-services) and Internet access. The migration to NGN, however:
 - Will not remove the termination monopoly in the voice service, but it will reduce significantly the costs of the voice services and reduce the number of Points of Interconnection needed for efficient operation.
 - Will not lead to a convergence with Internet since the NGN and Internet are organised totally differently. The NGN is designed as “PSTN on IP” and does not benefit from some of the design features that are central to the Internet. Such an NGN design is largely the result of the voluntary behaviour by the

fixed/mobile operators, which appears to be the continuation of a behaviour that was appropriate in the past.³⁴⁹

- Will not necessarily make BAK more likely than the improved CPNP.
- The market focus will also change, because both fixed and mobile markets are already well developed in Europe and the adoption of broadband is well underway for fixed networks and at a low, but accelerating, level for mobile networks.
 - The focus of competition in fixed services will shift from voice to bundles of services offered by broadband providers at flat rate tariffs (e.g. dual and triple play).
 - Although there is some uncertainty about how mobile operators will address the issue of Internet and TV usage, and in particular whether flat rates for these services are supportable in the light of usage patterns, flat rate packages for calls will become increasingly common especially for post-paid subscribers.
 - If competition is driving retail prices for voice to flat rates as part of global triple- or quadruple play tariffs – and this becomes the “dominant” business model – , BAK arrangements could become more likely because:
 - The costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service;
 - The potential for arbitrage by operators having highly specific traffic flows – because they focus on particular customer groups such as high users – is not considered a significant threat anymore.

Termination fees for the voice service under the improved CPNP are expected to fall to a low level of around 1 €-cent per minute (based on estimates by some National Regulatory Authorities).

The historical approach to termination rates in Europe has not matched the concept of cost-based CPNP in the economic literature because the rates have been considerably higher than the underlying costs (so called “CPNP with access mark-ups” in the economic literature). The move to “pure” LRIC will bring the European interconnection charging scheme into line with the concept of cost-based CPNP in the economic literature.³⁵⁰

³⁴⁹ However it is beyond the scope of this Study to assess the benefits in terms of consumer, competition or investment and innovation of having diverse design solutions such as NGN and Internet.

³⁵⁰ When commenting on the draft final study (see Annex for the list of consultation questions), respondents expressed concern on how effectively the cost models developed by National Regulatory Authorities to implement the Recommendation of 7 May 2009 will properly compute pure-LRIC costs for Fixed and Mobile

BAK is superior to cost-based CPNP in the “reference world” used in economic theory pursuant to the seminal work by Laffont, Rey and Tirole (1998a) and Armstrong (1998). BAK will remain slightly superior to cost-based CPNP in the “real world” in the future when the Recommendation of 7 May 2009 will be fully implemented if the sender and the receiver have broadly similar benefits from the call (noting that it remains largely impossible to directly observe and measure these benefits). However, with the incremental cost of voice call termination approaching zero, economic theory tends to show that the difference between cost-based CPNP and BAK becomes negligible in practice and more attention should therefore be paid to the regulatory costs of fine-tuning the tariff- and non-tariff aspects of interconnection regulations.

It is often argued that BAK will significantly reduce regulatory costs by eliminating the need for cost models to set cost-oriented termination rates for the voice service and will decrease the regulatory uncertainty about the future level of interconnection charges. BAK should also reduce or eliminate the need for other interconnection related regulations.

Whilst it is true that BAK will decrease the regulatory uncertainty about the future level of interconnection charges as the price level of termination is always zero, BAK, however, will not eliminate the need for cost models in regulatory areas other than call termination, as long as there is an obligation pertaining to call origination. Neither will BAK eliminate the need for other interconnection related regulations in the future. The need may even increase since it will no longer be possible to influence the behaviour of operators of electronic communications networks by economic signals based on termination rates. Finally there is a concern that if BAK leads to a reduction in retail tariffs then this reduction may in turn lead to an increase in the volume of unsolicited calls. This problem, however, already exists under the current CPNP scheme and may increase with the improved CPNP of the Recommendation of 7 May 2009. Therefore the additional volume of unsolicited calls, e.g. in the form of SPIT (SPAM over Internet Telephony), produced by a move from the improved CPNP to BAK should be very small.

In case of a further move from cost-based CPNP to BAK at the wholesale level, a move from CPP to Receiving Party Pays (RPP) at the retail level could become more probable. This change of charging scheme at the retail level from CPP to RPP would lead to additional efficiency gains because it would effectively take into account and internalize the call externality. These additional efficiency gains are most significant if callers and receivers have the same benefit from a call.

However in debates and consultations on call termination, it is generally argued that introducing RPP at the retail level would be a major change in retail pricing in Europe,

Termination and on whether or not National Regulatory Authorities will set Fixed and Mobile Termination Rates at their pure-LRIC cost level. It may therefore prove appropriate to closely monitor the implementation of the Recommendation of 7 May 2009 as a mean to ensure that is properly and consistently implemented throughout the Member States.

would be disruptive and would most probably not be welcomed by most customers. There would also be costs to operators associated with changing the billing systems. In those circumstances it is unlikely that an operator would introduce RPP tariffs at the retail level.

In summary, we conclude that there is only a weak case to mandate BAK instead of improved “pure” LRIC cost-based CPNP³⁵¹ in Europe given the expected impact of the Recommendation of 7 May 2009.

Furthermore, under today’s European regulatory framework it appears to us difficult for an NRA to impose BAK.

If the NRA wished to impose BAK on all Significant Market Power (“SMP”) operators in the context of a market analysis and finding of SMP on the markets for call termination on individual networks, the measure could be challenged as inconsistent with Article 13 of the Access Directive. Access 13 does not allow in our view a price control remedy to be imposed that is more severe than cost-orientation. BAK, to the extent it requires an operator to provide an interconnection service for 0 euro, cannot be considered as a cost-orientation measure. Being a price control remedy falling outside of the scope of Article 13, BAK would have to be specifically authorized by the European Commission under Article 8(3) of the Access Directive. Where traffic is roughly balanced, the imposition of BAK would not violate Article 13 because the arrangement would be the economic equivalent to reciprocal termination rates with net set-off. The issue only arises for traffic imbalances, because the SMP operator terminating the excess traffic would in effect have to provide the service for nothing, which is inconsistent with the concept of cost-orientation.

We also considered whether under the current regulatory framework the European Commission could issue a recommendation regarding BAK under Article 19(1) of the Framework Directive. If the hypothetical starting point for our analysis is a situation where NRAs have already implemented the Recommendation of 7 May 2009, it would seem difficult to justify another Commission recommendation calling for an evolution from a pure-LRIC termination rate model to BAK. To justify its action under Article 19(1) of the Framework Directive, the Commission would have to show that the measure is needed because of diverging implementation of the regulatory framework in Member States, which in the hypothetical case before us would not be the case. The Commission, as well as any NRA willing to impose BAK, would also have to show that the measure is proportionate. This would require a showing that BAK, as compared to a situation where all termination

³⁵¹ However, it is still an open question whether the most appropriate CPNP interconnection scheme for the future should use capacity-based pricing or volume-based pricing (as currently implemented in most European countries).

rates are set as pure-LRIC levels in accordance with the Commission's 2009 Recommendation, would bring significantly more benefits in terms of achieving the objectives of Article 8 of the Framework Directive than would the status quo of pure-LRIC rates.

Article 5 of the Access Directive permits NRAs to impose remedies on both SMP and non-SMP operators. The exact scope of Article 5 is the subject of debate. However, our reading of Article 5 in conjunction with Article 8 of the Access Directive suggests that Article 5 cannot be used as a substitute for Articles 8 and 13 of the Access Directive, and consequently Article 5 is not a route that would permit an NRA to impose BAK. We consider that the use of Article 5 by the Romanian NRA to regulate the call termination market is a questionable use of that article. But the Romanian case may have been justified by the need to provide immediate connectivity in a situation where there had not yet been a market analysis and finding of SMP on the Romanian market for call termination.

Individual dispute resolution provides another possible route for an NRA to impose BAK. As noted above, where traffic flows are roughly balanced, the imposition of BAK would not violate Article 13 of the Access Directive because the situation in that case would be equivalent to reciprocal termination rates, ie. not true BAK but a form of set-off. However, any decision made by an NRA in a dispute resolution under Article 20 of the Framework Directive must be consistent with the remedies imposed by the NRA in the context of the market analysis process. It would be possible today for an NRA to include a remedy in its market analysis document providing that an SMP operator shall not unreasonably refuse to enter into quasi-BAK set-off arrangements where traffic flows are balanced and provided the arrangement would not create competitive distortions on the market. This is a possible option but would in practice be effective only at such time as termination rates are set at pure-LRIC levels. As long as termination rates remain above pure-LRIC levels, individual quasi-BAK set-off arrangements are likely to give rise to competitive distortions similar to those encountered for low on-net retail pricing. The NRA would not be in a position to impose quasi-BAK arrangements in an individual dispute resolution proceeding as long as those competitive distortions exist. However, once fixed and mobile rates are symmetrical and set a pure-LRIC level, an NRA might in appropriate cases impose a quasi BAK set-off arrangement pursuant to an individual dispute resolution proceeding, at least when traffic volumes are balanced. Doing so would not conflict with Article 13 of the Access Directive because of the balanced traffic and set-off nature of the measure, in contrast to a pure BAK situation where one of the two operators would have to sell a service for nothing when traffic is imbalanced.

In summary, under today's European regulatory framework it appears to us difficult for an NRA to impose BAK.

Nevertheless, in the future two or more fixed and/or mobile operators may decide to implement BAK between them and on a voluntary basis even if they maintain CPP at the retail level.³⁵² This could theoretically happen already under the current CPNP framework, if two or more operators would decide to set their termination fee at zero. Voluntary BAK arrangements would be more likely in the future if:

- competition drives retail prices to flat rates as part of global triple- or quadruple-play tariffs;
- the costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service;
- the potential for arbitrage by operators having highly specific traffic flows - because they focus on particular customer groups such as high users- is not considered as a significant threat anymore.

There is no prohibition in the European directives themselves to voluntary BAK arrangements. We are of the view that such voluntary BAK would not violate non-discrimination obligations as long as the SMP operator is willing to enter into BAK agreements with other similarly situated operators. However, NRAs would have to pay particular attention to possible competitive distortions, should voluntary BAK arrangements be implemented by operators before termination tariffs have reached pure-LRIC levels.

BAK could potentially be imposed on a uniform basis throughout Europe through a regulation based on Article 114 TFEU. However, based on the European Court of Justice's recent decision on the EU Roaming Regulation, we are not sure that the conditions of Article 114 TFEU would be satisfied. The most obvious route for permitting NRAs to impose pure BAK would be to amend Article 13 of the Access Directive to add pure BAK as a permitted form of price control that an NRA may impose in appropriate cases to further the objectives of Article 8 of the Framework Directive. In an environment where termination rates are set at pure-LRIC, the coexistence of BAK and CPNP should not in theory create competitive distortions or internal market problems. The example of the United States suggests that where termination rates are low enough, BAK and CPNP can coexist with low market distortions. If distortions were to exist the Commission could at that point issue a recommendation indicating how NRAs should apply the BAK remedy, or if internal market distortions were at that time considered serious, the Community legislature could issue a regulation under Article 114 TFEU. In any case, the Community legislature would have to establish appropriate charging methods for traffic terminated in the European Union that has been originated by operators located outside the European

³⁵² As it has been the case with French mobile operators throughout the period till 2005 when BAK was in place for mobile-to-mobile calls.

Union in order to avoid possible arbitrage problem with such “non EU” international incoming traffic.³⁵³

Finally, should the generalisation of BAK reduce or eliminate the terminating network monopoly, this could also lead to a reduction or even elimination of ex ante regulation, consistent with one of the key objectives of the Framework Directive. However the elimination of the termination network monopoly will also have the side effect of eliminating the ability to find SMP and impose remedies based on Articles 8 through 13(a) of the Access Directive. The NRA's sole tool in that case would be Article 5 of the Access Directive, which may not be sufficient to deal with all situations.

There is no prohibition in the European directives themselves to voluntary BAK arrangements. As long as the charge for termination exceeds the pure-LRIC level, there will be a risk of competitive distortions each time two or more fixed and/or mobile operators voluntarily enter into a BAK arrangement, and the NRA would have therefore to demonstrate in any related decision that this risk has been addressed.

In the future, i.e. once termination charges will have reached pure-LRIC levels, the risk of competitive distortions should drop significantly and voluntary BAK arrangements could even be more likely, even if CPP is maintained at the retail level, if:

- competition drives retail prices to flat rates as part of global triple- or quadruple-play tariffs;***
- the costs of maintaining the complex billing systems required for CPNP become too high compared to the revenue stream generated by the voice service;***
- the potential for arbitrage by operators having highly specific traffic flows - because they focus on particular customer groups such as high users- is not considered as a significant threat anymore when termination rates are above pure-LRIC.***

Should voluntary BAK develop in most Member States, the most natural way to introduce BAK at European level would be through an amendment to Article 13 of the Access Directive, which would allow NRAs to impose BAK in appropriate cases. If complete harmonisation were deemed necessary, this could be done via a Regulation. In such a case, the risk of arbitrage for traffic terminated in the European Union that has been originated by operators located outside the

³⁵³ Defining such rules are outside the scope of this Study.

European Union would need to be assessed and, if required, appropriate charging methods for “non EU” international incoming traffic would need to be established.

10 Bibliography

10.1 Key references for Chapter 6:

- Armstrong, M. (1998), “Network Interconnection in Telecommunications”, *Economic Journal*, 108(408), pp. 545-564.
- Armstrong, M. (2002), “The Theory of access pricing and interconnection”, *Handbook of Telecommunications Economics*, Vol. I.
- Armstrong, M. (2004), “Network interconnection with asymmetric networks and heterogeneous calling patterns”, *Information Economics and Policy*.
- Armstrong, M., and Wright, J., (2009), “Mobile Call Termination”, *Economic Journal* (119), June, F270-F307.
- Atkinson, J.M., and C.C. Barnekov (2000), “A Competitively Neutral Approach To Network Interconnection », FCC, OPP working paper series, December.
- Baranes, E., and L. Flochel (2008), “Competition in telecommunication network with call externalities”, *Journal of Regulatory Economics*, Springer, Vol. 34(1), pp. 53-74, August.
- Berger, U. (2005), “Bill-and-Keep vs. Cost-Based: Access Pricing Revisited”, *Economics Letters*, 86, pp. 107-112.
- De Bijl, P.W.J., and M. Peitz (2000), “Competition and Regulation in Telecommunications Markets”, CPB Netherlands Bureau for Economic Policy Analysis
- De Bijl, P.W.J., and M. Peitz (2002a), “New Competition in Telecommunications Markets: Regulatory Pricing Principles”, *ifo Studien* 48, pp. 27-52.
- De Bijl, P.W.J., and M. Peitz (2002b), “Regulation and Entry into Telecommunications Markets”, Cambridge University Press.
- De Bijl, P.W.J., and M. Peitz (2004), “Dynamic regulation and entry in telecommunications markets: a policy framework”, *Information Economics and Policy*, pp. 411-437.
- Cambini, C., and T. Valletti (2003), “Network competition with price discrimination: ‘bill-and-keep’ is not so bad after all”, *Economics Letters*, 81, pp. 205-213.
- Cambini, C., and T. Valletti (2004), “Access charges and quality choice in competing networks”, *Information Economics and Policy*, 16, pp. 391-409.
- Carter, M., and J. Wright (1999), “Interconnection in Network Industries”, *Review of Industrial Organization*, 14, pp. 1-25.

- Carter, M., and J. Wright (2003), “Asymmetric Network Interconnection”, *Review of Industrial Organization*, 22, pp. 27-46.
- Charles River Associates (2003), “Economic Analysis Of Fixed-To-Mobile Call Termination rates”, March.
- Charles River Associates (2007), “Economic study on IP interworking: White Paper”.
- Curien, N., “BAK or CPNP ? A simple model”, May 2010, Working paper.
- Economides, N., G. Lopomo, and G. Woroch, (1996), “Regulatory Pricing Rules to Neutralize Network Dominance”, *Oxford Journal*.
- DeGraba, P. (2000a), “Bill And Keep at the Central Office As the Efficient Interconnection Regime”, FCC, OPP working paper series, December.
- DeGraba, P. (2000b), “Bill And Keep at the Central Office As the Efficient Interconnection Regime? A Reply”, *Review of Network Economics*, Vol. 1, Issue 1, March.
- DeGraba, P. (2003), “Efficient Intercarrier Compensation for Competing Networks: When Customers Share the Value of Call”, *Journal of Economics and Management Strategy* 12, pp. 207-230.
- Dessein, W. (2001), "Network Competition in Nonlinear Pricing", mimeo.
- Dessein, W. (2004), “Network competition with heterogeneous customers and calling patterns”, *Information Economics and Policy*.
- Fudenberg, D., and J. Tirole, “The fat-cat effect, the puppy-dog ploy, and the lean and hungry look” (1983). *American Economic Review*, 74, pp. 361-366.
- Gans, J., and S. King (2001), “Using ‘Bill And Keep’ interconnect arrangements to soften network competition”, *Economics Letters*, 71, pp. 413-420.
- Hahn, J.-H. (1999), "Network Competition and Interconnection with Heterogeneous Subscribers", mimeo.
- Hermalin, B., and M. Katz (2001), “Network Interconnection with Two-Sided User Benefits”, mimeo.
- Hoernig, S. (2007), “On-net and Off-net Pricing on Asymmetric Telecommunications Networks”, *Information Economics and Policy*, 19(2), pp. 171-188.
- Jeon, D., J.J. Laffont, and J. Tirole (2004), “On the Receiver Pays Principle”, *RAND Journal of Economics*, 35, pp. 85-110.
- Jullien, B., Rey, P. and Sand-Zantman, W. (2010), “Mobile call termination revisited”, *Toulouse School of Economics*, 30 August.

- Laffont J.J., P. Rey, and J. Tirole (1998a), “Network competition: I. Overview and nondiscriminatory pricing”, RAND Journal of Economics, Vol. 29, N°1, Spring, pp. 1-37.
- Laffont, J.J., P. Rey, and J. Tirole (1998b), “Network competition: II. Price discrimination”, RAND Journal of Economics, Vol. 29, N°1, Spring, p 38-56.
- Laffont, J.-J., and J. Tirole (2000), “Competition in telecommunications”. Cambridge, MA, MIT Press.
- Stühmeier (2010), “Semi-collusion on Investments in the Mobile Internet Market”, Working Paper.
- Valletti, T. (2003), “The Theory of Access Pricing and its Linkage with Investment Incentives”, Telecommunications Policy, 27, pp. 659-675.
- Valletti, T., and C. Cambini (2005), “Investment and network competition”, RAND Journal of Economics, Vol. 36, No 2, Summer, p. 446-468.

- Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework on a common regulatory framework for electronic communications networks and services (Framework Directive), Official Journal L 108, 04.24.2002, pp. 0033 – 0050

- ERG, Draft Common Position on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues (ERG (09) 34).

10.2 Key references for Chapter 5:

- Andersson, K., and B. Hansen (2007), “Network Competition: Empirical Evidence on Mobile Termination rates and Profitability”, mimeo.
- Dewenter, R., and J. Kruse (2005), “Calling Party Pays or Receiving Party Pays? The diffusion of Mobile Telephony with Endogenous Regulation,” mimeo.
- Frontier Economics (2008), Assessing the impact of lowering mobile termination rates; A REPORT PREPARED FOR DEUTSCHE TELEKOM, ORANGE, TELECOM ITALIA, TELEFONICA, AND VODAFONE, July 2008.
- Genakos, C., and T. Valletti (2008), “Testing the “Waterbed” Effect in Mobile Telephony”, mimeo Paper No' CEPDP0827.
- Growitsch, C., Marcus, J. S., Wernick, C. , “The effects of lower Mobile Termination Rates (MTRs) on retail prices and demand” (2010), Paper, 8 April 2010.

- Jang, S., S. Dai, and S. Sung (2005), “The Pattern and Externality Effect of Diffusion of Mobile Telecommunications, The Case of the OECD and Taiwan, *Information Economics and Policy*”, 17, 133 – 148.
- Littlechild, S. (2006), “Mobile termination rates: Calling Party Pays versus Receiving Party Pays”, *Telecommunications Policy*, 30, pp. 242-277.
- Marcus, J. S. (2007), “Interconnection in an IP-based NGN Environment”, GSR Discussion Paper, presented at the ITU Global Symposium for Regulators, Dubai.
- Schiff, A. (2008). The ‘waterbed’ effect and price regulation, *Review of Network Economics*, 7: pp. 392-414.
- Veronese, B., and M. Pesendorfer (2009), “Wholesale termination regime, termination charge levels and mobile industry performance”, report for Ofcom.
- Zehle, E. (2003), « CPP Benchmark Report », Coleago Consulting Ltd.

- FCC, *Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, 10th Report (11th CMRS Competition Report)*, September 2006, Table 12, based on *Interactive Global Wireless Matrix 4Q05*, Merrill Lynch, Telecom Services Research.

- European Commission, Recommendation of 7 May 2009 on the regulatory treatment of fixed and mobile termination rates in the EU, C(2009) 3359.

10.3 Key references for Other Chapters:

- Autorité de la Concurrence (2009), Décision n° 09-D-36 du 9 décembre 2009 relative à des pratiques mises en oeuvre par Orange Caraïbe et France Télécom sur différents marchés de services de communications électroniques dans les départements de la Martinique, de la Guadeloupe et de la Guyane.
- Charles River Associates (2002), “Comments on the Draft Access Determination: Interconnection Pricing“, 9 September 2002, pp. 42,43 and 50.
- DeGraba, P. (2000a), “Bill & Keep at the Central Office As the Efficient Interconnection Regime”, FCC, OPP working paper series, December.
- Dang Nguyen, G., and T. Penard (1998), “Les accords d’interconnexion dans Internet : enjeux économiques et perspectives réglementaires”, *Communications & Stratégies*, n°32, 1998, 4th quarter, pp 107-133.
- Elliott, D. (2008), “Two-way access charges and on-net/off-net differentials”, *Moving the debate forward, The Policy Paper Series, Number 8*, April 2008, p. 11-25.

- European Parliament, Directorate-General for Internal Policies, « Next Generation Networks (NGN) », PE 429.973 (IP/A/ITRE/ST/2009-10), October 2009.
- Marcus, J. S. (2006), “Framework for Interconnection of IP-Based Networks – Accounting Systems and Interconnection Regimes in the USA and the UK”, Wik-Consult Report, 27 March 2006, pp. 24-25.
- Marcus, J. S. (2009), “Interconnection as Networks Evolve to Internet Protocol (IP)”, J. Scott Marcus:, Auckland, New Zealand, 27 February 2009.
- Sannaes, H. (2008), “On-Net Pricing in Mobile Services”, Moving the debate forward, The Policy Paper Series, Number 8, April 2008, p. 26-25.
- Shrimali, G., and S. Kumar (2005), “Can ‘Bill-and-Keep’ Peering Be Mutually Beneficial?”, Computer Science.
- WIK-Consult, “The Future of IP Interconnection: Technical, Economic and Public Policy Aspects”, Final Report, Study for the European Commission, 29 January 2008, p. XI.

- BEREC Common Statement on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues, June 2010, BoR (10) 24 Rev 1
- 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 (Access Directive), Official Journal L 108 , 04.24.2002, pp. 0007 – 0020.
- European Commission, Recommendation of 17 May 2009 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC, Official Journal L 344 of 12. 28.2007.
- European Commission, Recommendation of 7 May 2009 on the regulatory treatment of fixed and mobile termination rates in the EU, C(2009) 3359.

- European Commission, Staff Working document accompanying the Commission Recommendation on the regulatory treatment of fixed and mobile termination rates in the EU, {C(2009) 3359 final} {SEC(2009) 599}, 7.5.2009, SEC(2009) 600, p. 15.
- European Commission, Report On The Single European Electronic Communications Market 2008 (14th Report), March 2009.
- ERG, Common Statement on Regulatory Principles of IP-IC/NGN Core – a work program towards a Common Position (ERG (08) 26 final NGN IP-IC CS 081016).
- ERG, Draft Common Position on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues (ERG (09) 34), October 2009.

10.4 Additional references:

- Alderighi, M. (2008), “Optimal reciprocal access pricing and collusion”, *Telecommunications Policy*, 32, p 381-387.
- Analysys Mason (2008), “Case studies of mobile termination regimes in Canada, Hong Kong, Singapore and the USA”, report for Ofcom.
- Armstrong, M., and J. Wright (2009), “Mobile call termination”, *The Economic Journal*, Vol. 119, issue 538, pp. F270-F307, June 2009.
- Baake, P., and T. Wichmann (1999), “On the Economics of Internet Peering”, *Netnomics* Vol. 1, pp. 89-105.
- Badasyan, N., and S. Chakrabarti (2003a), “Private Peering Among Internet Backbone Providers”, mimeo.
- Badasyan, N., and S. Chakrabarti (2003b), “Intra-backbone and Inter-backbone Peering Among Internet Service Providers”, mimeo.
- Badasyan, N., and S. Chakrabarti (2005), “A Simple Game Theoretic Analysis of Peering and Transit Contracting among Internet Access Providers”, Paper Presented at the TPRC, Carpet, VA, 2003.
- Baranes, E., L. Benzoni and C. Vuong (2009), “Waterbed effects” across Europe’s mobile markets”, mimeo.
- Baranes, E., and L. Flochel (2003), “Competition and mergers in networks with call externalities”, *Cahiers du LASER*, n°007-01-03.
- Baranes, E., and C. Vuong (2009), “How does termination rate regulation impact mobile operator performance?”, mimeo.
- De Bijl, P.W.J., and M. Peitz (2008), “Innovation, convergence and the role of regulation in the Netherlands and beyond”, *Telecommunications Policy*, 32, p 744-754.
- De Bijl, P.W.J., and M. Peitz (2010), “Regulatory legacy, VoIP adoption and investment incentives”
- De Bijl, P.W.J., E.E.C. Van Damme, G. Brunekreeft, P. Larouche, V. Sorana, and N. Shelkopyas (2005), “Interconnected Networks”, TILEC Discussion Paper 2005-007, Tilburg University. Available at SSRN: <http://ssrn.com/abstract=871391>
- Calzada, J., and T. Valletti (2008), “Network Competition and Entry Deterrence”, *The Economic Journal*, Vol. 118, Issue 531, pp. 1223-1244.
- Cambini, C., and T. Valletti (2008), “Information Exchange and Competition in Communications Networks”, *Journal of Industrial Economics*, 56, pp. 707-728.
- Crémer, J., P. Rey, and J. Tirole (2000), “Connectivity in the Commercial Internet”, *Journal of Industrial Economics*, Vol. 48, pp. 433-472.

- Dewenter, R., and J. Haucap (2005), “The Effects of Regulating Mobile Termination Rates for Asymmetric Networks”, *European Journal of Law and Economics*, Vol. 20, pp. 185-197.
- Dodd, M., A. Jung, B. Mitchell, P. Paterson, and P. Reynolds (2008), “Bill-and-keep and the economics of interconnection in next-generation networks”, *Telecommunications Policy*, 33, p 324-337.
- Economides, N. (2004), “The Economics of the Internet Backbone”, mimeo.
- Economides, N. (2005), “Economics of the Internet Backbone”, in Majumdar, Sumit/Vogelsang, Ingo/ Cave, Martin (eds.): “Handbook of Telecommunications Economics”, Vol. 2, Holland/Elsevier, pp. 373-412.
- Evans D. (2002), “The Antitrust Economics of Two-sided Markets”, mimeo.
- Faratin, Clark et al., “The Growing Complexity of Internet Interconnection”, *Communications & Strategies*, no. 72, 4th quarter 2008, p. 51
- Frieden, R. (2008), “A Primer on Network Neutrality”, *Intereconomics*, January-February.
- Gabel, D. (2002), “Interconnection payments in telecommunications: a competitive market approach”.
- Gallo, E. (2008) Is there a “Right Charging Principle with the NGN Advent?”, *Communications & Strategies*, no. 72, 4th quarter 2008, p. 33
- Harbord, D. and M. Pagnozzi (2010), "Network-Based Price Discrimination and 'Bill-and-Keep' vs. 'Cost-Based' Regulation of Mobile Termination Rates", *Review of Network Economics*, Vol. 9, Issue 1 2010 Article 1.
- Harbord, D. and S. Hoerning (2010), “Welfare Analysis of Regulating Mobile Termination Rates in the UK (with an Application to the Orange/T-Mobile Merger)”.
- Haucap, J. (2003), “The Economics of Mobile Telephone Regulation”, mimeo.
- Huigen, J., and M. Cave (2008), “Regulation and the promotion of investment in next generation networks – A European dilemma”, *Telecommunications Policy*, 32, pp. 713-721.
- IUT (2003), “Mobile overtakes fixed: Implications for policy and regulation”.
- Jahn, E., and J. Prüfer (2004), “Transit versus (Paid) Peering: Interconnection and Competition in the Internet Backbone Market”, mimeo.
- Jahn, E., and J. Prüfer (2008), “Interconnection and competition among asymmetric networks in the Internet backbone market”, *Information Economics and Policy*.
- Knieps, G., and I. Vogelsang (2007), « Digital economy and regulatory issues. Introduction”, *IEEP*, 4: 101-107.
- Laffont, J.J., J.S. Marcus, P. Rey and J. Tirole (2003), “Internet Interconnection and the Off-Net-Cost Pricing Principle”, *RAND Journal of Economics*, 34, pp. 370-390.

- MacDonald, I., and L. Meriluoto (2005), “Efficient usage and access pricing in telephone Networks”, *International Journal of Industrial Organization*, Vol. 23, pp. 615-623.
- Marcus, J.S. (2004), “Call Termination Fees: The U.S. in global perspective”, Paper Presented at the 4th ZEW Conference on the Economics of Information and Communication Technologies.
- Marcus, J. S. (2006), “Interconnection in an NGN Environment”, background paper commissioned for the ITU New Initiatives Programme workshop on “What rules for IP enabled Next Generation Networks?” held on 23-24 March 2006 at ITU Headquarters, Geneva.
- Ofcom (2009), “Wholesale mobile voice call termination: preliminary consultation of future regulation”, May 2009, Annex 10.
- Peitz, M. (2003), “Asymmetric access price regulation in telecommunications markets”, *European Economic Review*.
- Roson, R. (2002), “Two Papers on Internet Connectivity and Quality”, *Review of Network Economics*.
- Three, Response to Ofcom Wholesale mobile call termination Market Review Consultation, Non-Confidential, 23 June 2010.
- Vogelsang, I. (2003), “Price Regulation of Access to Telecommunications Networks”, *Journal of Economic Literature*, Vol. XLI, pp. 830-862.
- Wright, J. (2001), “The ISP reciprocal compensation problem”, CRNEC Working Paper, February.
- Wright, J. (2002), “Bill And Keep as the Efficient Interconnection Regime?”, *Review of Network Economics*.
- Wright, J. (2004), “Pricing access to Internet service providers”, *Information Economics and Policy*.

11 Annex

11.1 Questionnaire sent to National Regulatory Authorities in the context of this study

QUESTIONNAIRE

The objective of this questionnaire is to help identifying the main interconnection charging methods and associated financial settlement mechanisms which have been implemented in the electronic communications sector so far, in Europe and in other world-wide regions, and analyse each of them against a number of relevant parameters, such as, for instance, network environment (e.g. IP v circuit-switched networks, fixed v mobile), situation in the value chain (e.g. transit v termination) and associated regulatory obligations, so as to provide a clear and comprehensive empirical background for carrying out the Study on The Future of Interconnection Charging Methods.

Answers to this questionnaire will be published in the Study. Please specify whether there is any confidential information, so that this information will be used only in an aggregated format at the European level.

Question 1:

With respect to IP-based interconnection for voice services, please indicate:

1. whether there is any obligation on fixed operators and/or mobile operators to provide IP interconnection in addition to or instead of circuit switched interconnection. If yes:
 - Does the obligation apply to only some operators (which?) or all operators?
 - Is the obligation to provide this form of interconnection on request or some other formulation?

- Please provide references and provisions of relevant regulation with a special emphasis on the setting of corresponding interconnection charges.
2. whether there is any IP interconnection for voice services in current use, either mandated or voluntary. If yes, please indicate:
- when this IP interconnection has been implemented,
 - what signalling standards are used e.g. SIP-T, SIP-I, IMS (which version?)
 - which operators are concerned,
 - whether the charges for call termination are the same as for circuit switched interconnection, and if not how they differ,
 - at which existing circuit switched interconnection locations such IP interconnection is available or required,
 - whether information pertaining to this interconnection is in the public domain (with references of relevant documents).

Question 2:

With respect to circuit-based interconnection for voice call termination, please indicate:

| | Termination service on fixed network | Termination service on mobile network |
|--|--------------------------------------|---------------------------------------|
| Reference of the corresponding market analysis document | | |
| Reference of any associated documents describing the charging method and implemented price control | | |
| Do requirements apply to all operators or only to some (which?) | | |
| The key features of the implemented price control (duration, annual control or Wholesale Price Cap / Glide Path, ...) | | |
| Whether the cost analysis/modelling underlying the implemented price control has incorporated the issue of the evolution towards NGN | | |
| what is the basis of the cost analysis/modelling | | |

| | | |
|---------------------------------|--|--|
| (e.g. top down, bottom up, etc) | | |
|---------------------------------|--|--|

Question 3:

In case the method of interconnection charging for circuit-based interconnection has changed in the last 10 years,

1. please provide brief description (e.g. in France: mobile-to-mobile circuit-based termination has changed from BAK to CPNP on 1st January 2005).
2. please indicate:
 - What were the reasons for this change (competition issues, evolution from circuit-switch to IP networks, traffic imbalances, etc.)?
 - Has the change produced any advantages (e.g. a decrease of transaction and/or regulatory costs, increase of the QoS, etc.)?
 - Has the change produced any disadvantages (e.g. a distortion of competition, effects on investment, etc.)?

Question 4:

In case Bill And Keep has been specifically addressed/discussed in the context or the regulation of interconnection charges in your country in the past:

1. please provide brief overview.
2. please provide references of relevant documents, consultation papers, decision, etc.

In case it hasn't been addressed/discussed so far, are there any plans to do so in the near future, and for what reason?

Question 5:

Could you please provide (if available) total outgoing minutes from fixed lines on a yearly basis since 2005, split:

- in PSTN minutes (originating on a traditional copper pair using analogue or ISDN technology (or other digital circuit switched technology), etc.),
- and in IP minutes (Calls that originate using NGN technology over fibre (e.g. FTTH) or a copper pair with a home gateway, calls that originate using VoIP over normal broadband internet access (e.g. Skype), etc.).

Question 6:

Could you please indicate whether you collect any information on interconnection traffic flows on an individual operator basis?

11.2 Answers by National Regulatory Authorities on current interconnection charging methods

Table 14: References of the corresponding market analysis document

| | Termination service on fixed network | Termination service on mobile network |
|--------------|--|---|
| Switzerland, | http://www.comcom.admin.ch/themen/00500/00781/index.html?lang=de&download=M3wBPgDB/8ull6Du36WenojQ1NTTjaXZnqWfVpzLhmfnapmmc7ZI6rZnqCkkIN0fHeCbKbXrZ6lhuDZz8mMps2gpKfo | No market analysis due to lack of legal challenges (ex post regime) |
| Germany | http://www.bundesnetzagentur.de/media/archive/16005.pdf | http://www.bundesnetzagentur.de/media/archive/15119.pdf |
| Denmark | http://www.itst.dk/tele-og-internetregulering/smp-regulering/markedundersogelser/2-runde-af-markedsundersogelser/horing-over-markedsafgoelser/marked-4/ http://www.itst.dk/tele-og-internetregulering/smp-regulering/markedundersogelser/2-runde-af-markedsundersogelser/horing-over-markedsafgoelser/marked-5/ | http://www.itst.dk/tele-og-internetregulering/smp-regulering/markedundersogelser/2-runde-af-markedsundersogelser/horing-over-markedsanalyser/marked-7-taleopkald |
| Estonia | ENCB ³⁵⁴ Decision 28.06.2007 No J.1-45/07/08 | ECA ³⁵⁵ Decision 26.03.09 No 8.3-12/09-0002 |
| Finland | http://www.ficora.fi/index/saadokset/tulkinnat/hmvpaatokset/hmv9.html (available in Finnish and Swedish only) | http://www.ficora.fi/index/saadokset/tulkinnat/hmvpaatokset/hmv16.html (available in Finnish and Swedish only) |
| France | Fixed telephony market analysis decision n°2008-0896 of 29 July 2008. http://www.arcep.fr/uploads/tx_gsavis/08-0896.pdf | Mobile voice termination market analysis decisions n°2007-0810 (mainland) and 2007-0811 (overseas) of 4 th October 2007. http://www.arcep.fr/uploads/tx_gsavis/07- |

³⁵⁴ ENCB - Estonian National Communications Board (until 31.12.2007)

³⁵⁵ ECA – Estonian Competition Authority

FYI: Since January 1st the previous Estonian Competition Board, Estonian National Communications Board and the Energy Market Inspectorate have been merged into the new Estonian Competition Authority, dealing with supervisory activities in the areas of competition supervision, fuel and energy, electronic and postal communications.

| | | |
|-----------------------|---|--|
| | | 0810.pdf http://www.arcep.fr/uploads/tx_gsavis/07-0810.pdf |
| Croatia | Market for call termination provided at fixed location – decision and document (can be found on HAKOM's web site only in Croatian) ³⁵⁶ | Market for call termination on mobile networks – decision and document (can be found on HAKOM's web site only in Croatian) ³⁵⁷ |
| Hungary | NRA decision No. DH-26154-29/2007 | NRA decision No. DH-9549-54/2006 |
| Republic of Lithuania | Call termination on individual public telephone networks provided at a fixed location (Market 3*) The Report and decisions are available here Old market 9** | Voice call termination on the individual public mobile network (Market 7*) The Report and decisions are available here Old market 16** |
| Latvia | http://www.sprk.gov.lv/doc_upl/Zinojums_par_tirgus_analizi.pdf | http://www.sprk.gov.lv/doc_upl/Zinojums_par_tirgus_analizi_16_Bite.pdf http://www.sprk.gov.lv/doc_upl/Zinojums_par_tirgus_analizi..pdf |
| Nederland | OPTA/AM/2008/202723, Marktanalyse vaste gespreksafgifte, 19 december 2008. http://www.opta.nl/nl/actueel/alle-publicaties/publicatie/?id=2802 | OPTA/TN/2007/201479, 30 juli 2007 aangepast met OPTA/AM/2008/202914, 19 december 2008. http://www.opta.nl/nl/actueel/alle-publicaties/publicatie/?id=2813 http://www.opta.nl/nl/actueel/alle-publicaties/publicatie/?id=2362 |
| Norway | The current market analysis is dated 24 March 2006, but the NPT is currently conducting a new analysis which is to be sent on public consultation this summer. Here is a link to the current decision: http://www.npt.no/portal/page/portal/PG_NPT_NO_EN/PAG_NPT_EN_HOME/PAG_SERVICES_TEXT?p_d_i=-121&p_d_c=&p_d_v=48994 | There are two current decisions in place regarding termination on mobile networks. Decision dated 8 May 2007 regarding termination in Telenor, NetCom, Tele2, TDC and MTU's network: http://www.npt.no/portal/page/portal/PG_NPT_NO_EN/PAG_NPT_EN_HOME/PAG_SERVICES_TEXT?p_d_i=-121&p_d_c=&p_d_v=101559 Decision dated 17 November 2008 regarding termination in Network Norway, Ventelo and Barablu's network (including a more precise |

³⁵⁶ http://www.hakom.hr/UserDocImages/dokumenti/Tržište%20završavanja%20terminacije_%20poziva%20u%20određenu%20javnu%20komunikacijsku%20mrežu.pdf

³⁵⁷ http://www.hakom.hr/UserDocImages/dokumenti/Tržište%20završavanja%20terminacije_%20poziva%20u%20određenu%20pokretnu%20javnu%20komunikacijsku%20mrežu.pdf

| | | |
|-----------------|---|--|
| | | <p>definition of “fair and reasonable prices” for Tele2 and TDC):</p> <p>http://www.npt.no/portal/page/portal/PG_NPT_NO_EN/PAG_NPT_EN_HOME/PAG_SERVICES_TEXT?p_d_i=-121&p_d_c=&p_d_v=108205</p> <p>NPT is currently working on its fourth market analysis regarding mobile termination which is to be sent on public consultation during Q2 2010.</p> |
| Portugal | <p>http://www.anacom.pt/download.jsp?contentId=439159&fileId=212253&channel=graphic&languageId=1 (2004 - market analysis)</p> | <p>http://www.anacom.pt/streaming/dec_mer16.pdf?contentId=258947&field=ATTACHED_FILE (2005 - market analysis)</p> <p>http://www.anacom.pt/streaming/mercgrossistas_deli13012010.pdf?contentId=1004795&field=ATTACHED_FILE (2010 – new market analysis – draft decision still on consultation)</p> |
| Romania | Case RO/2008/0774 | Case RO/2009/0878 |
| Slovak Republic | <p>http://www.teleoff.gov.sk/index.php?ID=141</p> <p>Currently, the second round of market analysis is under national consultation.</p> <p>http://www.teleoff.gov.sk/data/files/5982.pdf</p> | <p>http://www.teleoff.gov.sk/index.php?ID=149</p> <p>http://www.teleoff.gov.sk/index.php?ID=150</p> <p>http://www.teleoff.gov.sk/index.php?ID=2482</p> <p>http://www.teleoff.gov.sk/index.php?ID=285</p> |
| Turkey | http://www.tk.gov.tr/eng/ma/fd.htm | http://www.tk.gov.tr/eng/ma/fd.htm |

Source: operators

Table 15: Reference of associated documents describing the charging method and implemented price control

| | Termination service on fixed network | Termination service on mobile network |
|-------------|--|---------------------------------------|
| Switzerland | <p>Ordinance on Telecommunications Services (articles 32, 61 and 52, 53, 54)</p> <p>And</p> <p>http://www.comcom.admin.ch/themen/00500/00781/index.html?lang=de&download=M3wBPgDB/8ull6Du3</p> | No active regulation |

| | | |
|---------|---|---|
| | 6WenojQ1NTTjaXZnqWfVpzLhmfhnappmmc7Zi6rZnqCkkIN0fHeCbKbXrZ6lhuDZz8mMps2gpKfo | |
| Germany | <p>http://www.bundesnetzagentur.de/media/archive/16004.pdf</p> <p>Beside the relevant regulatory order, the details of charging are described in the DTAG reference offer for interconnection (accessible only through DTAG)</p> | <p>http://www.bundesnetzagentur.de/media/archive/15127.pdf</p> <p>and related regulatory orders BK3-09-010 to BK3-09-13, see footnote below³⁵⁸. Beside the relevant regulatory order, the details of charging are described in the MNO reference offer for interconnection (accessible only through MNO)</p> |
| Denmark | <p>http://www.itst.dk/tele-og-internetregulering/smp-regulering/engrospriser/lraic-1/lraic-processor</p> <p>http://www.itst.dk/tele-og-internetregulering/smp-regulering/engrospriser/lraic-1/lraic-priser/fastnet/2009</p> | <p>http://www.itst.dk/tele-og-internetregulering/smp-regulering/engrospriser/lraic-1/lraic-priser/mobil/2009</p> <p>http://www.itst.dk/tele-og-internetregulering/smp-regulering/engrospriser/lraic-1/lraic-processor</p> |
| Estonia | ENCB Decision 28.06.2007 No J.1-45/07/08 | ECA decision 26.03.09 No 8.3-12/09-0002 |
| Finland | <p>Assessment principles for the pricing of fixed network interconnection,</p> <p>http://www.ficora.fi/attachments/englantiaiv/5IKNExwdk/Arviointiperiaatteet_kiintean_verkon_yhdysliikenteen_hinnoittelusta_EN.doc</p> | <p>Assessment principles for the pricing of mobile termination,</p> <p>http://www.ficora.fi/attachments/englantiaiv/5IKNHd6Eb/Arviointiperiaatteet_matkaviestinverkon_laskevan_liikenteen_hinnoittelusta_EN.doc</p> |
| France | | <p>Price cap decisions (implementation of a transition period for MTRs towards LRIC of a generic efficient operator)</p> <p>Mainland: n°2008-1176 of 2nd December 2008</p> <p>http://www.arcep.fr/uploads/tx_gsavis/08-1176.pdf</p> <p>Overseas: n°2009-0655 of 28th July 2009</p> <p>http://www.arcep.fr/uploads/tx_gsavis/09-0655.pdf</p> |

³⁵⁸ http://www.bundesnetzagentur.de/enid/9c9bed037d78a1f27ce80b16f01c4bf4,0/Einheitliche_Informationsstelle/Regulierungsverfuegung_111.html

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| | | |
|-----------------------|--|--|
| Croatia | - | - |
| Hungary | NRA decision No. <u>DH-26154-29/2007</u> (annexe) | NRA decision No. <u>DH-9549-54/2006</u> (annexe) |
| Republic of Lithuania | Model reference paper BU-LRAIC Paper on WACC calculations Documentation of HY-LRAIC model Price controls (decisions on SMP): Incumbent (TEO LT,AB) – HY-LRAIC based FTRs till 2012 (glide path – see table in the decision). Alternative operators – price ceiling at the level of Incumbents FTRs. | Model reference paper Paper on WACC calculations Documentation of BU-LRAIC model Price controls (decisions on SMP): Symmetrical MTRs, based on BU-LRAIC model, glide path till 2012 (see table in the decisions) |
| Latvia | http://www.sprk.gov.lv/index.php?id=4412&sadala=198 | |
| Netherlands | OPTA/AM/2008/202723, Marktanalyse vaste gespreksafgifte, 19 december 2008. http://www.opta.nl/nl/actueel/alle-publicaties/publicatie/?id=2802 | OPTA/TN/2007/201479, 30 juli 2007 aangepast met OPTA/AM/2008/202914, 19 december 2008. http://www.opta.nl/nl/actueel/alle-publicaties/publicatie/?id=2813 http://www.opta.nl/nl/actueel/alle-publicaties/publicatie/?id=2362 |
| Norway | The charging method and price control is specified in the decision (cf. Table 14). | The charging method and price control is specified in the decisions (cf. Table 14). |
| Portugal | http://www.anacom.pt/streaming/decisao_final17122004.pdf?contentId=246822&field=ATTACHED_FILE (2004 - interconnection obligations, including price control) | http://www.anacom.pt/streaming/contrlprecos25.2.05en_2.pdf?contentId=268445&field=ATTACHED_FILE (2005 – price control obligation) http://www.anacom.pt/streaming/decisao02072008.pdf?contentId=600897&field=ATTACHED_FILE (2008 – price control obligation) http://www.anacom.pt/streaming/controloprecos_deli13012010.pdf?contentId=1004798&field=ATTACHED_FILE (2010 – new price control obligation – draft decision still on consultation) |
| Romania | CPP charging method Rates are per second, no call set-up, flat 24h average caps Rates are regulated in nominal terms and apply for all calls terminated in Romania, without prejudice to their national or international place of origin. | |

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| | | |
|-----------------|---|---|
| | Symmetry with incumbents' regional IC | Symmetry starting July 2010 with one exception for late entry. |
| Slovak Republic | http://www.teleoff.gov.sk/index.php?ID=143 <i>The new price control method is under consultation as well.</i> | http://www.teleoff.gov.sk/index.php?ID=2382 |
| Turkey | Consultation documents had been published on Authority's website while preparing bottom up LRIC model | Consultation documents had been published on Authority's website while preparing bottom up LRIC model |

Source: operators

11.3 Overview of the public debate in Germany on pros and cons of Bill And Keep in the context of defining an interconnection scheme for IP interconnection

End of August 2005 the German NRA (Bundesnetzagentur – “BNetzA”) launched an advisory group consisting of industry experts (representing fixed and mobile operators as well as ISPs) with the objective of forming a view on what would be the most appropriate charging scheme for the future IP interconnection and what would be the best transition path towards it (“Rahmenbedingungen der Zusammenschaltung IP-basierter Netze”)³⁵⁹.

The advisory group met approximately once a month and enumerated at each of its meetings themes to be investigated, presented and discussed by the next meeting. Examples of such themes are: Arbitrage – Models, Experiences in the USA, Main differences between Peering and PSTN interconnect, Quality of service, SPIT...

Key building blocks for this IP interconnection have been summarized in a final report released on 15th December 2006 (“Abschlussbericht der Projektgruppe - Rahmenbedingungen der Zusammenschaltung IP-basierter Netze”) and submitted subsequently to public consultation³⁶⁰, in particular structure/number of Points of Interconnection and interconnection charging³⁶¹.

The advisory group could not reach a common position with respect to the interconnection charging to be recommended. Whilst some industry experts favoured a CPNP scheme and rejected a regulatory mandated BAK, others could imagine in the long run a BAK close to the edges of the core network³⁶², although not being in a position to set a migration path towards it.

The advisory group has noticed that there is a strong relationship between retail and interconnection (“wholesale”) charging, albeit not in the form of direct causation even if a “structural” consistency can be noticed:

- either between CPP (“Calling Party Pays”) at retail level and CPNP (“Calling Party Network Pays”) at wholesale level (as exemplified for example in fixed and mobile markets in Europe),

³⁵⁹ See <http://bundesnetzagentur.de> => Telekommunikation => Regulierung Telekommunikation => IP-Zusammenschaltung

³⁶⁰ See <http://bundesnetzagentur.de> => Telekommunikation => Regulierung Telekommunikation => IP-Zusammenschaltung

³⁶¹ See Abschlussbericht der Projektgruppe – Rahmenbedingungen der Zusammenschaltung IP-basierter Netze, p. 79 – 103.

³⁶² The so-called “Konzentratornetz”.

- or between RPP (“Receiving Party Pays”) at retail level and BAK (“Bill And Keep”) at wholesale level (as exemplified for example in mobile markets in the USA and in Internet with the peering arrangements).

The analysis of the advisory group with respect to advantages and drawbacks of BAK is summarized in the Table below.

Table 16: Advantages and drawbacks of BAK according to the advisory group

| Advantages (“PROS”) of BAK | Drawbacks (“CONS) of BAK |
|---|--|
| <p>1/ Avoids the termination bottleneck, which consequently</p> <ul style="list-style-type: none"> • reduces the regulatory burden associated with implementing the remedy of cost oriented prices => every end-user will choose its operator taking into account how its operator will aim at recovering all of its access costs from its end users • leads to a more efficient network usage => absent the remedy of cost-oriented prices, operators can sustain interconnection charges far above incremental costs, which leads to high retail charges and therefore to sub-optimal consumption <p>2/ Leads to a lower complexity of the billing process³⁶³</p> <ul style="list-style-type: none"> • it can be assumed that a significant reason for peering agreements to have emerged for Internet is that they reduce the transaction costs <p>3/ Avoids incentive for Gaming and leads to more balanced traffic flows (even between networks that have different sizes)</p> <ul style="list-style-type: none"> • absent the remedy of cost-oriented prices, operators can indeed sustain interconnection charges far above incremental costs, and focus consequently on customer groups with more incoming than outgoing traffic <p>4/ Enables to internalise positive consumption externalities and reduces the scope for arbitrage³⁶⁴</p> | <p>1/ Can favour “SPIT”</p> <ul style="list-style-type: none"> • However this problem is analogous to SPAM in the Internet world, which has been addressed by ISPs/operators with “SPAM-Filters”. The offering of SPAM-Filter has become indeed a differentiator. • Furthermore, “SPIT” is more likely to be an issue for consumer protection than for interconnection regulation. <p>2/ Can favour “Hot Potato” routing</p> <ul style="list-style-type: none"> • However this problem can be addressed by defining an appropriate minimum location/number of Points of Interconnection. The closest to the edges of the core network these Points of Interconnection are, the smallest the usage of the terminating network, and therefore the smallest the “Hot Potato” routing problem is. |

³⁶³ See Scott, Marcus, “Framework for Interconnection of IP-Based networks – Accounting Systems and Interconnection Regimes in the USA and in the UK”, Gutachten im Auftrag des Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen, 2006, p. 39 and ff.

³⁶⁴ See Charles River Associates, “Comments on the Draft Access Determination: Interconnection Pricing”, 9th September 2002, p. 42, 43 and 50.

| | |
|---|--|
| <p>5/ Enables at least as high a flexibility in retail pricing as CPNP</p> <ul style="list-style-type: none"> • It could well be that the current trend towards Flat rates becomes additional support with an implementation of BAK | |
|---|--|

Source: Abschlussbericht der Projektgruppe – Rahmenbedingungen der Zusammenschaltung IP-basierter Netze, pp.84 – 90

Following a public consultation from 10 January 2007 till 23 April 2007 and the subsequent review of the responses received from 26 stakeholders (“Synopse der Stellungnahmen zum Abschlussbericht der Projektgruppe “Rahmenbedingungen der Zusammenschaltung IP-basierter Netze”³⁶⁵), the German NRA released on 11 December 2008 its Principles for the interconnection of IP based networks (“Eckpunkte zur Zusammenschaltung IP-basierter Netze”).³⁶⁶

Principle Nr 7 deals with Bill And Keep in the following way:

- The German NRA assumes that BAK cannot be introduced across-the-board in the short run for the transition phase from circuit-based networks to packet-based networks as the new interconnection charging scheme for voice services.
 - The German NRA acknowledged herewith that the public consultation has shown that many stakeholders have argued against BAK.
- However, as there is a separate transport-layer in NGNs, it is conceivable and worthwhile that BAK interconnection charging in the long run be implemented at least for the transport-layer.
 - The German NRA argues herewith that in the long run incentives should arise that will make BAK more attractive at least for the transport layer, because this transport layer will ultimately enable interconnection without a clear relation to the service effectively supplied to the end-user. The more so as Bill And Keep is already in place in Internet, alongside other interconnection charging schemes.

³⁶⁵ See <http://bundesnetzagentur.de> => Telekommunikation => Regulierung Telekommunikation => IP-Zusammenschaltung

³⁶⁶ See <http://bundesnetzagentur.de> => Telekommunikation => Regulierung Telekommunikation => IP-Zusammenschaltung

As many stakeholders have argued against BAK in their responses to the public consultation, the German NRA assumed that BAK cannot be introduced across-the-board in the short term for the transition phase from circuit-based networks to packet-based networks as the new interconnection charging scheme for voice services. However, as there is a separate transport-layer in NGNs, the German NRA was of the view that it is conceivable and worthwhile in the long term that BAK interconnection charging be implemented at least for the transport-layer within NGNs.

In the following, we shall recall the main arguments “Pros” and “Cons” BAK submitted by stakeholders in their responses to the public consultation as summarized by the German NRA.

Table 17: Advantages and drawbacks of BAK according to responses to the public consultation

| Advantages (“PROS”) of BAK | Drawbacks (“CONS) of BAK |
|--|---|
| <p>1/ Incentives for Gaming exist for CPNP as well as for BAK</p> <p>2/ BAK at the edges of the core network for Voice Over IP services prevents arbitrage</p> <p>3/ BAK contributes to breaking up the club effect</p> <ul style="list-style-type: none"> • The profitability of flat rates is less dependent on the size of the operator (and hence on its market position) because there are no more outpayments to other operators <p>4/ As shown by the US mobile market, BAK has led to a fairly comparable penetration but a much higher consumption than in Germany</p> <p>5/ Symmetrical traffic flows and similar network sizes are necessary for peering but not for BAK, because BAK is not analogous to a barter.</p> | <p>1/ Does not incentivise either investment in infrastructure or in quality</p> <ul style="list-style-type: none"> • no incentive for stakeholders to offer quality at retail level because quality of an end-to-end call depends greatly on the quality of all interconnected networks (“adverse selection”) • Hot potato routing leads to inefficient network usage (the more so as it provides incentive for Gaming in focusing on customer groups like call centres which have a lot of incoming traffic) <p>2/ Requires to be in a situation analogous to a barter of similar services</p> <ul style="list-style-type: none"> • Meaning not only symmetrical traffic flows but also symmetry/similarity in the structure, costs and customer base of the interconnected networks • Otherwise, induces operators to renegotiate the interconnection charging and/or incentives arbitrage • Consequently, no possibility to take into account differences in density of customer bases (e.g. through asymmetrical interconnection charges) <p>3/ Does not lead to lower transaction costs</p> <ul style="list-style-type: none"> • Neither for implementation because of adjustments of the billing system (catering also for operators not allowed to participate in BAK, if any), the installation of new measuring systems to monitor traffic flows, the consequences on the billing wholesale services required for some particular retail services such as value added services • Nor for the regulatory burden, as there is a key regulatory work in setting the location/number of Points of |

| | |
|--|--|
| | <p>Interconnection, as well as in setting the interconnection charging for operators not allowed to participate in BAK, if any, as well as for some services like Value Added Services</p> <p>4/ Does not have a strong impact in internalising positive consumption externalities</p> <ul style="list-style-type: none"> • For the majority of calls at retail level, Calling Party Pays is more appropriate • Very low acceptance to be expected in Europe for a Receiving Party Pays charging at the retail level • High surge in SPIT to be expected, leading to end users switching off the phone or to network congestion <p>4/ Is unclear whether it can be implemented only partially and not across the board (international, mobile) without incentivising arbitrage</p> |
|--|--|

Source: Synopse der Stellungnahmen zum Abschlussbericht der Projektgruppe – „Rahmenbedingungen der Zusammenschaltung IP-basierter Netze“, pp.10 – 13

We notice from the names of respondents quoted by the German NRA that, generally speaking, facilities-based operators and manufacturers have argued against BAK whereas (non-facilities based) ISPs have argued in favour of BAK. Main opponents to a change from CPNP to BAK are therefore those with the higher (cost based) termination fees.

It is also fairly obvious that generally speaking, pro BAK arguments appear to be less substantiated than arguments against it, probably because of the amount of resources that can be devoted by ISPs to responding to a public consultation compared to facilities-based operators.

11.4 Simulation on the basis of De Bijl and Peitz model

11.4.1 Assumptions of the model

Assumptions of the model are the followings:

- Demand
 - Size of the market: market size = 10 000 000;
 - Consumers possibly derive a constant utility from being connected to a network: constutility = 2 000;
 - Individual utility and demand for call minutes:
 - Individual utility from making telephone calls: $u(z) = a \cdot z - (b \cdot z^2) / 2$
Remark: marginal utility is non-decreasing only if $x \leq a/b$, which will automatically be satisfied for non-negative prices (see the demand function below).
 - Individual consumer's demand function for call minutes: $x(p) = (a - p) / b$
 - Demand parameters: $a = 20$; $b = 0.02$;
 - Horizontal differentiation parameter $\sigma = 2000$;
- Infrastructure
 - Traffic-dependent costs operator 1
 - Marginal cost of an on-net call: $c_{11} = 2$;
 - Marginal cost of an off-net call: $c_{12} = 1$;
 - Marginal cost of an incoming call: $c_{13} = 1$;
 - Traffic-dependent costs operator 2
 - Marginal cost of an on-net call: $c_{21} = 2$;
 - Marginal cost of an off-net call: $c_{22} = 1$;
 - Marginal cost of an incoming call: $c_{23} = 1$;
 - Fixed costs
 - Fixed cost of single local connection: $f_1 = 1000$; $f_2 = 1000$;
- Access prices
 - $ta_{21} = ta_{12} = ta$
 - $ta = 0$ under BAK, $ta = 1$ under improved CPNP, $ta > 1$ under CPNP with mark-up on costs

11.4.2 Results of the model in the “reference world”

The numbers are based on the same set of parameter values and are for illustrative purposes only, showing the relationship between access prices and market outcomes. The marginal cost level of call termination is set at 1.

Table 18: Comparison of equilibrium outputs between BAK and CPNP on the basis of De Bijl and Peitz model in the “reference world”: Linear retail prices and symmetric access charges

| | 0 (BAK) | 1 (cost-based CPNP) | 2 | 3 | 5 | 10 | 15 |
|-------------------------------|---------|---------------------|---------|---------|---------|---------|---------|
| Per-minute price (cents) | 5.38 | 5.47 | 5.57 | 5.67 | 5.87 | 6.44 | 7.11 |
| Subscription fee | - | - | - | - | - | - | - |
| Profits (millions) | 73.4794 | 76.1017 | 78.7397 | 81.3938 | 86.7519 | 100.46 | 114.664 |
| Consumers' Surplus (millions) | 684.516 | 677.66 | 670.69 | 663.598 | 649.021 | 609.849 | 565.398 |
| Producers' surplus (millions) | 146.959 | 152.203 | 157.479 | 162.788 | 173.504 | 200.921 | 229.329 |
| Total Welfare (millions) | 831.475 | 829.864 | 828.169 | 826.385 | 822.524 | 810.77 | 794.727 |

Source: De Bijl, March-April 2010, based on earlier work with Martin Peitz

- The lower the symmetric access price, the higher consumer surplus and welfare, and the lower producer surplus.
- Accordingly, BAK is best.
- The table illustrates that changing access charges that are already close to marginal costs (and keeping them close to marginal costs) has little effect on surplus levels. More importantly, the biggest impact is made by substantially reducing high access mark-ups.

11.4.3 Results of the model in the “reference world” removing the assumption (vii) of linear tariffs

The numbers are based on the same set of parameter values and are for illustrative purposes only, showing the relationship between access prices and market outcomes. The marginal cost level of call termination is set at 1.

Table 19: Comparison of equilibrium outputs between BAK and CPNP on the basis of De Bijl and Peitz model removing the assumption (vii) of linear tariffs: Two-part retail tariffs and symmetric access charges

| | 0 (BAK) | 1 (cost-based) | 2 | 3 | 5 | 10 |
|-------------------------------|---------|----------------|---------|-------|-----|---------|
| Per-minute price (cents) | 1.50 | 2.00 | 2.50 | 3 | 4 | 6.5 |
| Subscription fee | 34.62 | 30.00 | 25.63 | 21.50 | 14 | -37.5 |
| Profits (millions) | 100 | 100 | 100 | 100 | 100 | 100 |
| Consumers' Surplus (millions) | 659.375 | 660 | 659.375 | 657.5 | 650 | 609.375 |
| Producers' surplus (millions) | 200 | 200 | 200 | 200 | 200 | 200 |
| Total Welfare (millions) | 859.375 | 860 | 859.375 | 857.5 | 850 | 809.375 |

Source: De Bijl, March-April 2010, based on earlier work with Martin Peitz

- Consumer surplus and welfare are maximized by improved cost-based access prices.
- Improved cost-based is better than BAK. The smaller the marginal cost of call termination, the closer BAK is to the optimum.
- Note the negative subscription fees when the access prices is set at 10. The first- and second-order conditions for the Nash equilibrium are satisfied for the equilibrium prices. Hence this outcome is probably correct, and can then be interpreted as handset subsidies.
- The table illustrates that changing access charges that are already close to marginal costs (and keeping them close to marginal costs) has little effect on surplus levels. More importantly, the biggest impact is made by substantially reducing high access mark-ups.

11.5 Worldwide and European posts: change from a “Bill And Keep” type of scheme to a “Calling Party Network Pays” type of scheme for the international post because of growing imbalances of postal flows between countries

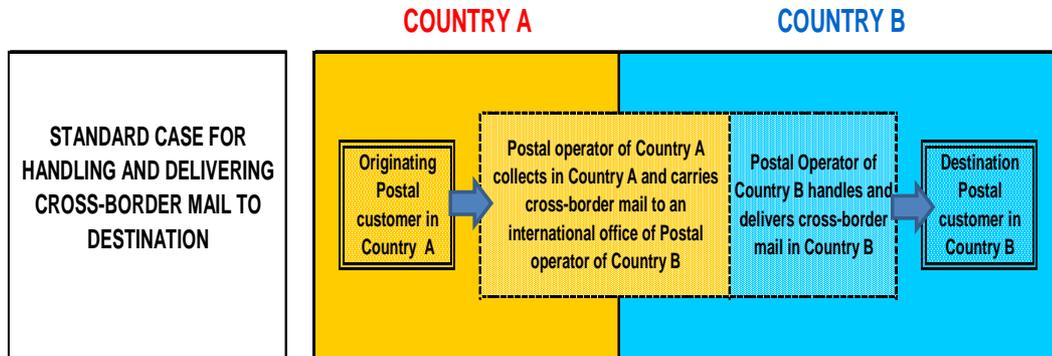
Founded in 1874, the Universal Postal Union (UPU)³⁶⁷ provides a regulatory framework for the international exchange of mail. National postal operators (which were called national postal administrations at that time) agreed to provide domestic delivery services for incoming cross-border mail. Given the legal monopolies that existed for the delivery of mail whether it was domestic or incoming cross-border mail, postal operators engaged in cross-border mail services are indeed obliged to hand over their mail to the incumbent postal operator in the country of delivery.

Prior to 1969, postal operators did not directly compensate each other for the delivery of international mail since it was assumed that each mail item generated a reciprocal response, resulting in a broad balance of traffic. It should be added that this assumption also implicitly implied that postal operators bore more or less the same cost for delivering a letter to destination.

Although an imbalance of postal flows was quickly noted in the case of printed papers, it is only in 1969 (Tokyo Congress), when the volume of international mail traffic was no longer negligible compared to domestic mail, that the UPU introduced a different scheme for international post providing for remuneration of the costs of handling and delivering cross-border mail in the country of destination. The fees which have to be paid for these services are commonly referred to as “terminal dues” (cf. Figure 46). It is important to note that the “terminal dues” scheme was not meant to suppress or to act against postal flow imbalances but was conceived as a fairer way of dealing with them.

³⁶⁷ The UPU is now a special agency of the United Nations responsible for postal matters. See http://www.upu.int/terminal_dues/en/history_composition.html

Figure 46: Overview of the “terminal dues” (CPNP like) scheme implemented for cross-border mail



Postal operator A gets revenues from its originating customers in Country A sending cross-border mail and pays terminal dues to Postal operator B to handle and deliver cross-border mail to destination customers in Country B

Source: TERA Consultants analysis

As can be seen in Table 20 for intra EU cross-border mail in the mid 1990s, traffic imbalances were quite significant, with some countries being net-exporters of cross-border mail (e.g. UK, Luxembourg, Denmark and Portugal) and some others being net-importers (e.g. Ireland, Finland, Sweden, Italy, Germany and France).

Table 20: Ratio of outgoing to incoming cross-border mail and Ratio of cross-border mail traffic to total mail traffic in 1996 in some European countries

| Member States | Outgoing to Incoming Ratio | Cross –border mail as a % of total mail traffic |
|---------------|----------------------------|---|
| UK | 1.77 | 7.2% |
| L | 1.46 | 36.5% |
| DK | 1.13 | 11.1% |
| P | 1.10 | 8.9% |
| S | 1.02 | 4.6% |
| A | 1.02 | 10.5% |
| B | 0.95 | 12.5% |
| F | 0.88 | 3.4% |
| D | 0.86 | 5.1% |
| I | 0.73 | 5.3% |
| S | 0.70 | 7.5% |
| FIN | 0.64 | 4.1% |
| IRL | 0.55 | 27.6% |

Source: UPU (1996) – Data not available for Greece and the Netherlands; quoted in: BUIGES, A., BARATTA R., JOHANSSON, D. SCHIFF, S., The cross border mail market in the EU: economic context and competition concerns, Third Conference on "Regulation, Competition and Universal Service in the Postal Sector", I.D.E.I. Toulouse, November 13-14, 2003

This change in the compensating scheme for the delivery of international mail is indeed very comparable to a change from BAK to CPNP in the telecommunications world, as it was the case for example for mobile-to-mobile interconnection in France³⁶⁸.

In 1969 the worldwide « terminal dues » scheme, analogous to a CPNP scheme, was introduced instead of a worldwide historical scheme analogous to BAK, because of growing imbalances of postal flows between countries.

³⁶⁸ See part 7.1.

At that time, international mail has developed significantly and was akin to a saturated market with a significant share of low users worldwide.

In Europe, the change from a “BAK” type of scheme to a “CPNP” type of scheme for the international post has driven two fairly different sets of behaviours by postal operators.

11.5.1 European Historical postal operators with higher incoming postal flows have chosen to voluntarily enter agreements establishing a closer relation of “terminal dues” to underlying costs, taking into account the quality of service of the postal delivery

In the early 1970s the terminal dues was characterized by a non-satisfactory relation to the underlying costs of handling and delivering cross-border mail in the country of destination because:

- the level was the same for all the countries around the world, even though costs could be different according to the specificity of each country;
- the level was based on a rate per kilogramme, even though it was less costly to deliver one item of mail weighting 1 kilogramme than 50 items weighting each 20 grammes.

This led several European³⁶⁹ postal operators to start working out different formulas to compute the “terminal dues”, ultimately establishing an explicit link between the level of “terminal dues” and the underlying Quality of Service of handling and delivering cross-border mail.

- Within the framework of the CEPT³⁷⁰, a so-called **CEPT system** was introduced in 1987 consisting of both a change in the structure of “terminal dues” (with a two part tariff, comprising of a rate per item and a rate per kilogramme) and in their level, with a considerable increases in the tariff of most of the mail concerned. In 1993 however, following a complaint lodged by the International Express Carriers

³⁶⁹ At the international level (outside of Europe), there are two different sub-regimes currently:

- The target regime, implemented in industrialized countries (other countries that wished to do so also integrated this system) which respect the principle of cost orientation.
- The transitional regime, which is applied in relation with developing countries not yet ready to join the target system. Rates are not based on the costs of the destination country, but rather on world average costs. The objective of the UPU is to move from transitional regime to target regime for all countries by 1 January 2014 at the latest.

³⁷⁰ CEPT stands for Conference of Postal and Telecommunications Administrations, a sub-grouping with the UPU.

Conference (IECC), the European Commission issued a statement of objections in which it expressed the view that the CEPT system was contrary to Article 85(1) since it fixed a uniform rate for the delivery of incoming international mail and that that Article 85(3) was not applicable since the terminal dues agreed on were not cost based. However, in view of subsequent developments with the REIMS agreements, the European Commission decided not to proceed to a prohibition decision, and this approach was endorsed by the Court of First Instance in its judgment of 16 September 1998 in Case T-110/95³⁷¹.

- In 1995, fourteen postal operators entered into the **REIMS³⁷² I** agreement whereby the “terminal dues” were linked to domestic tariffs on a European-wide basis, following the views expressed by the Commission in its statement of objections with respect to the CEPT system. Terminal dues were to be increased to 80% of domestic tariffs in yearly steps till 2001, using as their starting point the CEPT system. The validity of the REIMS I agreement had been made dependent on the condition that the Spanish postal operator acceded to it by 31 May 1997. Since this condition was not fulfilled, the REIMS I agreement expired on 30 September 1997.
- In 1997, sixteen European postal operators entered the **REIMS II** agreement whereby cost-based “terminal dues” were now linked to the domestic mail tariffs in the country of destination and also to the quality of service (i.e. deadlines for delivering the letters) provided by the postal operator that delivers the mail.
- After two years of negotiations, the sixteen European postal operators³⁷³ have reached a new agreement on terminal dues payments replacing the REIMS II Agreement. This **REIMS III** Agreement took effect on 1 January 2008. REIMS III continues with quality of service standards much more ambitious than the targets under the EU Postal Directive³⁷⁴ and ensures that terminal dues as stipulated in the EU Postal Directive are cost-based, and are based on regulated domestic tariffs in the delivering country.

³⁷¹ Please refer for background to: Notification of an agreement on terminal dues between postal operators (Case No IV/36.748) (98/C 371/05), Official Journal, 1 December 1998.

³⁷² REIMS stands for Remuneration for the Exchange of International Mail.

³⁷³ Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Norway, Sweden and Switzerland. REIMS III remains open for signature for all present and former parties of the REIMS II Agreement and the REIMS East Agreement that participated in its negotiation.

³⁷⁴ The Community objectives for postal services have been implemented in Community law through a Framework Postal Directive which established a complete regulatory framework for European postal services (Directive 97/67/EC of the European Parliament and of the Council of 15 December 1997 on common rules for the development of the internal market of Community postal services and the improvement of quality of service). On 10 June 2002, the European Parliament and the Council formally adopted the Postal Directive 2002/39/EC, which amends the initial Postal Directive (97/67/EC) by defining further steps in the process of gradual and controlled market opening and further limiting the service sectors that can be reserved. On 20 February, the European Parliament and the Council formally adopted the Directive 2008/06/EC, which amends the initial Postal Directive (97/67/EC) as amended by Directive 2002/39/EC by defining 2010, and for some Member States 2012, as a final step in the process of gradual market opening.

It should be noted that not all historic postal operators have entered the REIMS agreements. In particular postal operators who have a higher outgoing postal flow (such as in The Netherlands) - as opposed to those who have a higher incoming postal flow - have a weak interest to enter a system whose key characteristic is to base terminal dues on the cost of the priority-regulated domestic service (which has a higher cost than the standard or the economy service).

The CPNP-like system gradually evolved in Europe from a symmetrical non-cost based charging system to an asymmetrical cost-based charging system.

Historic postal operators who have a higher incoming postal flow have voluntarily entered agreements (so-called REIMS agreements) aiming at establishing a closer link to an associated higher quality of service of delivery. Historic postal operators who have a higher outgoing postal flow have an incentive to refrain from entering such agreements.

11.5.2 Postal operators have developed several arbitrage strategies to take advantage of differences in the level of terminal dues in their offers to big postal customers

Big postal customers such as companies issuing administrative or direct marketing mail or companies clustering letters from several other firms enjoy significant countervailing buying power and have led specialist private remailing firms as well as incumbent postal operators to develop:

- Either arbitrage strategies, taking advantage of differences in the level of cross border in their offers to big postal customers, which has developed significantly over the years;
- Or second sourcing strategies, taking advantage of the existence in some countries of competing postal operators to the historic ones, which is in the initial stage of development as the intensity of competition on the postal market is still low.

Focusing on arbitrage strategies that have been implemented outside the scope of the Postal Universal Service as defined by the Postal directives, two main approaches can be identified³⁷⁵:

³⁷⁵ It should be noted that there is another arbitrage strategy possible (type ABA) whereby big customer A would deliver its letters to country A via the postal operator B. Such an arbitrage strategy is forbidden because it is does not enable country A to recover its cost for delivering a letter to destination.

- **Arbitrage strategies type “ABC” (cf. Figure 47)**

A postal operator of country B is proposing to a big customer of country A to convey its international post to country C (as an alternative to postal operator of country A).

Such a strategy is followed when retail tariffs for outgoing mail to country C are lower in country B than in country A. The main reason for such a situation within the European Union is that terminal dues paid by postal operator B to operator C are lower than terminal dues paid by postal operator A to operator C because operator B is not part of the REIMS agreement whilst operator A is. In some cases it can also be the case that the cost structure of postal operator B to convey international post to postal operator C is more favourable than the cost structure of operator A.

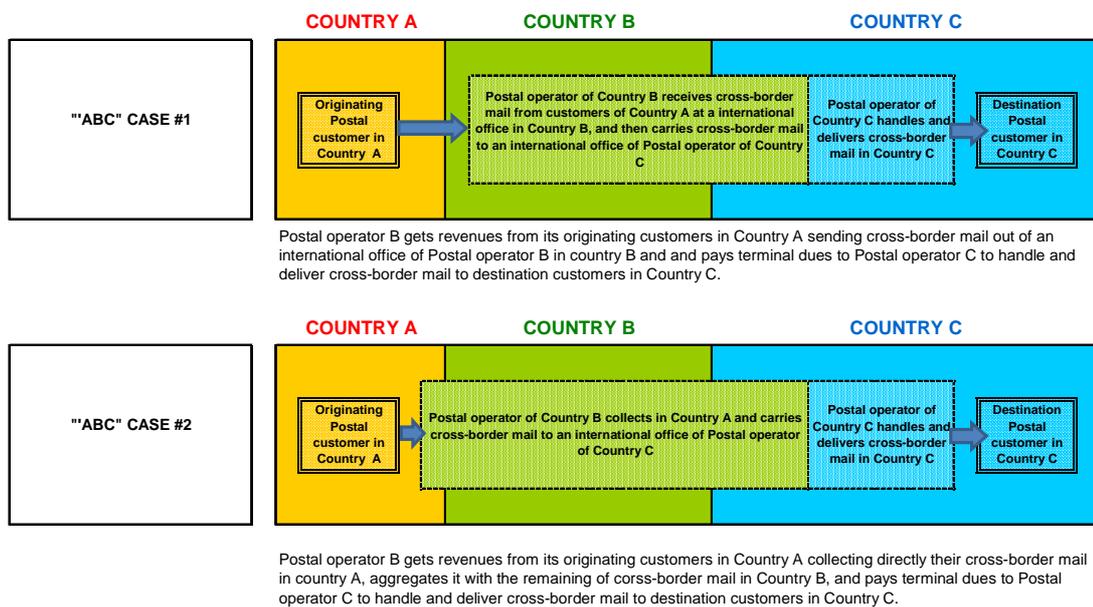
The ABC arbitrage strategy consists in exploiting differences in conveyance costs caused by the coexistence of different regulatory schemes for pricing the handling and delivering of cross-border mail in the country of destination (REIMS compliant or not). It is analogous to the arbitrage strategies observed in the USA with respect to long distance calls, using either PSTN or VoIP technology³⁷⁶ : a country A – country C mail is transformed into a country A – country C mail.

In practice, big customer A delivers its international post at some specified location(s) of postal operator B in country B or the postal operator B collects (and gets paid for this) the international post at some specified location(s) of big customer A in country A³⁷⁷.

³⁷⁶ See 7.3 United States of America: different interconnection schemes for circuit-based voice and IP-based voice in fixed networks.

³⁷⁷ In some instances, postal operator B can also directly collect cross border mail in country A and directly deliver at an international office in country C of postal operator C, herewith not transiting at all in country B.

Figure 47: Arbitrage strategies type ABC followed by postal operators in the “terminal dues” (CPNP like) scheme for international post



Source: TERA Consultants analysis

- **Arbitrage strategies type “ABB” (cf. Figure 48)**

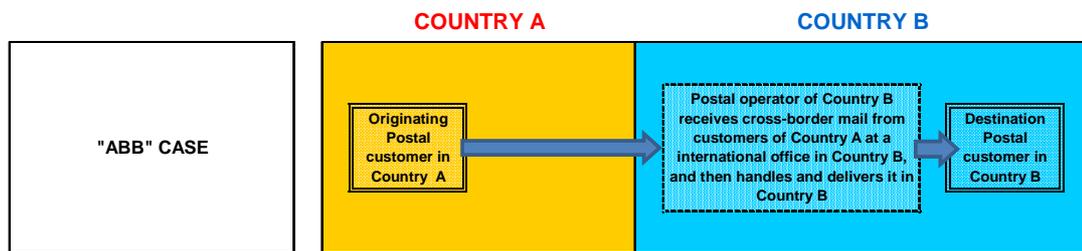
A postal operator of country B is proposing to a big customer of country A to convey its international post to country B (as an alternative to postal operator of country A).

The **ABB** arbitrage strategy consists in by-passing completely the terminal dues schemes in a situation where the retail price of international mail to a given destination is less cost-based than the retail price of domestic mail in this country of destination. It is analogous to the arbitrage strategies observed in France with respect to mobile-to-mobile calls, using mobile gateways, transforming fixed-to-mobile calls into mobile-to-mobile calls³⁷⁸: country A – country B mail is transformed into country B – country B mail.

In practice, big customer A delivers its international post at some specified location(s) of postal operator B in country B or the postal operator B collects (and gets paid for this) the international post at some specified location(s) of big customer A in country A.

³⁷⁸ See 7.1 France: different interconnection schemes for fixed-to-mobile / fixed-to-fixed (CPNP with access mark-ups) and mobile-to-mobile (BAK) followed by a move to CPNP with access mark-ups overall.
2009-70-MR-EC-Future of Interconnection Charging Methods

Figure 48: Arbitrage strategies type ABB followed by postal operators in the “terminal dues” (CPNP like) scheme for international post



Postal operator B gets revenues from its originating customers in Country A sending cross-border mail and then handle and deliver cross-border mail to destination customers in Country B. No terminal dues are paid.

Source: TERA Consultants analysis

The change from a BAK-like to a CPNP-like scheme for international post has induced two types of arbitrage strategies, exerting additional competitive pressure:

- the ABC strategy induced primarily by the coexistence of two types of pricing for handling and delivering cross-border mail in the country of destination (complying or not complying with REIMS). It is analogous to the to the arbitrage strategies observed in the USA with respect to long distance calls, using either PSTN or VoIP technology.

- the ABB strategy aiming at transforming an international post delivery into a national post delivery in the destination country. It is analogous to the arbitrage strategies observed in France with respect to mobile-to-mobile calls, using mobile gateways transforming fixed-to-mobile calls into mobile-to-mobile calls.

11.6 The legal and regulatory basis for Bill And Keep in the United States – The coexistence of regulated termination rates under Calling Party Network Pays and Bill And Keep in the United States

In the United States regulated termination rates coexist with numerous Bill And Keep arrangements, and the coexistence of the two regimes has not been considered as problematic by the FCC or by state regulatory authorities.

From a regulatory standpoint, the coexistence of two different regimes in the United States results from three factors:

- A regulatory requirement that termination rates should be set at low LRIC levels: the termination rate set by state regulators for the local fixed network incumbent becomes de facto the reference for other operators.
- A strong presumption that rates should be symmetric, even as between fixed and mobile operators;
- An express reference in the U.S. telecommunications law to Bill And Keep as an acceptable form of reciprocal compensation arrangement.

11.6.1 The legal and regulatory basis for interconnection charging in the United States

Section 251(b)(5) of the Communication Act imposes an obligation on all local fixed operators ("LECs") "to establish reciprocal compensation arrangements for the transport and termination of telecommunications." Section 252 obligates incumbent LECs to negotiate with other carriers that request interconnection or other services pursuant to Section 251. If the parties cannot reach an agreement, Section 252 gives state commissions the authority to arbitrate the unresolved issues and provides the state commissions with guidance on certain issues. For example, it directs that the reciprocal compensation arrangements required under Section 251(b)(5) shall only be deemed just and reasonable if they "provide for the mutual and reciprocal recovery by each carrier of costs associated with the transport and termination" of calls, and if those costs are determined "on the basis of a reasonable approximation to the additional costs of terminating such calls." However, in a "Rules of Construction" provision, Section 252(d)(2)(B) notes that the above guidance "shall not be construed to preclude arrangements that afford the mutual recovery of costs through the offsetting of reciprocal obligations, including arrangements that waive mutual recovery (such as bill-and-keep arrangements)."

The FCC has developed detailed rules dealing with how reciprocal compensation should be dealt with by operators and state public regulatory commissions.

Most of the relevant rules are contained in Part 51 of the FCC's rules:

- Each LEC (not just ILECs) must establish reciprocal compensation arrangements for traffic termination when requested by any telecommunications carrier (including mobile operators (“CMRS” providers)). §51.703
- An incumbent LEC’s transport and termination rates may be established, by the state commission, based on one of the following: the LEC’s forward-looking economic costs; default proxies; or bill-and-keep arrangements. §51.705³⁷⁹
- Termination rates must be symmetrical unless the non-ILEC carrier proves to the state commission (on the basis of a cost study using the forward-looking economic cost based methodology) that its costs exceed the LEC’s costs. Where the switch of the non-ILEC carrier serves an area comparable to the area served by an ILEC’s tandem switch, the carrier is entitled to the ILEC’s tandem interconnection rate. §51.711³⁸⁰ (.)
- Bill-and-keep arrangements may be imposed by a state commission if it determines that the traffic is roughly balanced, is expected to remain so, and there has been no showing of asymmetrical termination costs. The state commission may presume that traffic is balanced unless a party rebuts such a presumption. §51.713
- When a carrier requests transport and termination from an ILEC (where there is no existing interconnection agreement), the ILEC shall provide it immediately under an interim arrangement, pending resolution of negotiation or arbitration of rates and approval of such rates by a state commission under Sections 251 and 252 of the Act. If the state commission has not established rates based on cost studies and has not established default rates, the ILEC shall set the interim rates at the default ceiling for end-office switching, tandem switching and transport. §51.715
- For CMRS-LEC / LEC-CMRS terminations, these rules apply if the call originates and terminates within the same Major Trading Area (“MTA”). MTAs are relatively large geographic areas that often cross LATA boundaries. There are 51 MTAs throughout the United States. Where a LEC-CMRS or CMRS-LEC call terminates within the same MTA, the call is not treated as long distance and the access charge regime (applicable to long distance) does not apply. §51.701

Section 20.11 of the FCC rules (governing CMRS) also contains similar provisions:

- LECs and CMRS carriers must comply with the principles of mutual compensation, paying “reasonable compensation” for the termination of traffic.
- LECs may not impose termination charges by tariff (i.e., agreements must be negotiated).

³⁷⁹ For determining forward-looking economic costs, the methodology contained in §§51.505 and 51.511 is used.

³⁸⁰ See also 11.6.2 regarding the “Sugrue Letter”.

- CMRS carriers have an obligation to negotiate interconnection agreements in good faith with any requesting ILEC, and must submit to arbitration if requested. (This mirrors the obligation of ILECs contained in Section 251 and 252 of the Act.)

11.6.2 The 2001 Sugrue Letter

In 2001, the chief of the Wireless Telecommunications Bureau responded to a letter from Sprint PCS seeking FCC clarification that CMRS providers are entitled to receive terminating compensation for all of their additional costs in terminating traffic, noting that some state commissions were not allowing costs for certain network components because they were not considered “equivalent” to LEC facilities.

The Sugrue Letter cited a recent Intercarrier Compensation NPRM (FCC 01-132 (Apr. 26, 2001)) in clarifying that wireless network components need not be reviewed on the basis of their relationship to wireline network components. “Rather, the determination of compensable wireless network components should be based on whether the particular wireless network components are cost sensitive to increasing call traffic.” Thus, the CMRS carrier bears the burden of submitting a cost study to prove, for example, that “the costs associated with spectrum, cell sites, backhaul links, base station controllers and mobile switching centers vary, to some degree, with the level of traffic that is carried on the wireless network.” (quoting FCC 01-132 at para. 104)

We doubt any CMRS providers have been successful since issuance of the Sugrue Letter in convincing a state commission to approve asymmetrical rates for LEC-CMRS termination because proving the case with state commissions, pursuant to the cost studies noted in the Sugrue Letter and in light of the presumption in favor of symmetrical termination rates, would have been an extremely difficult and costly endeavor.

CMRS providers would have been required to develop individual cost studies for each state based on state-specific market variables. It would likely have been cost-prohibitive in the absence of more guidance from the FCC for CMRS providers to conduct multiple state cost studies, as these studies could cost as much as \$300,000 a piece. The CMRS providers would also have been required to disclose confidential business information in submitting the cost studies. In sum, without more concrete guidance from the FCC, the cost study approach would not have been a viable option.

11.6.3 Wireless industry attempts to push CPP at the retail level

In the late '90s, the wireless industry in the US sought action from the FCC that would facilitate carriers' ability to implement CPP offerings to consumers. The industry believed that a CPP option would encourage cost-sensitive subscribers to leave their mobile phones turned on, and would therefore increase mobile traffic. As an initial matter, carriers wanted CPP to be declared a CMRS service in order to preempt most state regulation over the offering.

The FCC made such a finding in a 1999 Declaratory Ruling. Along with that Ruling, the FCC issued a Notice of Proposed Rulemaking which sought comment on many other issues that would need to be resolved to make CPP a viable offering. These issues included: how would callers be notified that they were dialing a CPP customer and would incur additional charges; would the notification be sufficient to establish an "implied in fact" contract between the caller and the terminating CMRS provider; should consumers be protected from excessive CPP rates, and how would terminating CMRS providers bill and collect from the originating callers.

In a 2001 order, the FCC terminated the proceeding without taking any further action, but made it clear that nothing in its existing rules would prevent a carrier from offering CPP. In deciding not to take any action, the FCC noted the diverse views among commenters and the fact that CMRS subscribers now have pricing options that were "generally unavailable when we started this proceeding, such as flat-rate pricing plans," thus reducing the need for CPP as an option to increase mobile usage.

11.7 Public consultation on the draft final study report

In the course of assessing the need for Community measures, relevant stakeholders had to be consulted. In the executive summary of the Draft Final Study Report, available at <http://www.teraconsultants.fr/en/EU-Study.html>, stakeholders' views were kindly requested to comment with respect to the 10 following questions.

Consultation question 1:

Do you agree that the improved CPNP, when the Recommendation of 7 May 2009 will be fully implemented, will bring termination rates closer to underlying incremental costs of call termination?

Consultation question 2:

Do these findings with respect to merits and demerits of cost-based CPNP vs. BAK miss any relevant issue?

Consultation question 3:

What are your views with respect to the impact of BAK vs. cost-based CPNP on the interconnection regulatory costs? Please specify the type of interconnection regulatory costs you are referring to.

Consultation question 4:

Do you expect to see more RPP elements in retail prices, if BAK is implemented?

Consultation question 5:

Suppose that the Recommendation will be effectively implemented, so that termination fees will approach the « pure » LRIC level.

What would then be the additional benefit / efficiency of BAK **in absence** of a move from CPP to RPP at retail level?

What would then be the additional benefit / efficiency of BAK **in presence** of a move from CPP to RPP at retail level?

Please provide details on expected additional benefit / efficiency.

Consultation question 6:

Do you agree that under today's European regulatory framework it appears difficult for an NRA to impose BAK?

Consultation question 7:

Do you agree that BAK arrangements should be permitted by NRAs only once termination tariffs have reached pure-LRIC levels?

Consultation question 8:

Do you agree that if BAK is adopted on a voluntary basis in a given Member State, this could give rise to competitive distortions and arbitrage, but that these distortions and arbitrage will diminish or even disappear across the EU when termination rates reach pure-LRIC levels?

Consultation question 9:

Do you agree the most natural way to introduce BAK at European level on a uniform basis would then be through an amendment to Article 13 of the Access Directive allowing NRAs to impose BAK in appropriate cases?

Consultation question 10:

Do the findings presented here miss any other relevant issues?