

Commentary on issues raised  
in submissions regarding the  
Commerce Commission's  
MTAS investigation and during  
the conference on  
2 and 3 September 2009

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## Management Summary

### Introduction

1. This report has been prepared by WIK-Consult on behalf of the Commerce Commission of New Zealand. It consists of commentaries on issues that were raised in submissions by interested parties regarding the Commission's MTAS Investigation and during the Commission's Conference on 2 and 3 September 2009.

### Benchmarks

2. In developing its cost of termination benchmark the Commerce Commission used the median of costs modelled for regulators in nine different countries on the basis of bottom-up cost modelling exercises. If these cost estimates were unbiased and randomly distributed this approach would lead to an appropriate and reasonable result. In fact, however, the use of the median will bias the estimate upwards. Using as measure the average of the lowest three values would have been more appropriate.
3. Differences in country-specific conditions make for differences in the costs of termination. However, our own bottom-up model as applied for the Commission shows that the costs for a large and sparsely populated country are higher than those for a small and densely populated country, but by no more than 30%. This demonstrates that the more than 300% difference shown in the benchmarks of the nine countries cannot be attributed to this kind of country-specific differences.
4. The fact that exogenous country-specific factors only account for cost differences of around 30% also proves that the request of some carriers to use the 75<sup>th</sup> percentile value instead of the median for the termination cost benchmark should be considered as biasing the estimate upwards without any justification. Instead of the 75<sup>th</sup> percentile this analysis shows it would be more appropriate to use the 25<sup>th</sup> percentile, which would happen to be the value for Australia.

### The Australian benchmark

5. Australia is closer geographically to New Zealand than other benchmark countries. WIK-Consult has examined in detail the TSLRIC of the MTAS in Australia and based on our detailed understanding of the mobile networks in Australia we developed a mobile network bottom-up cost model for the ACCC. On the basis of that model the ACCC calculated a TSLRIC for the efficient operator of 6.5 NZcpm in its recent MTAS determination. Looking at some

relevant cost drivers of a mobile network, there are strong reasons to assume that the TSLRIC of the MTAS in New Zealand are lower than those in Australia or to put it in other terms, we strongly believe that the TSLRIC for the MTAS in Australia is an upper benchmark for the costs in New Zealand. Three major reasons, among others, support our view:

- a. New Zealand has a higher population density and a similar degree of urbanisation as Australia.
- b. The TSLRIC determination in Australia is for a market share of 31% of the efficient operator. The relevant market share of MNOs in New Zealand is around 50% at the current market structure and will only change slowly due to the new market entry as any international experience shows. The larger market share of MNOs in New Zealand alone accounts to a 6% to 10% lower MTAS cost as compared to Australia.
- c. The subscriber density of cellsites is higher in New Zealand compared to Australia. This signals lower cost in New Zealand, in particular because cellsites represent by far the largest costs of a mobile network.

#### Types of cost included in the cost of termination

6. It is a virtually universal practice of having one single rate for the termination of calls in a national mobile network. When this rate is cost-based regulated, the cost used as basis must have been calculated in a way that takes into account that not all terminated calls have exactly the same cost structure. A certain proportion of calls will be handed over at the location of the MSC/MGW from which they will also be routed down to their destination base stations, and another, smaller, proportion will be handed over at a MSC/MGW distant from the one from which they will be routed to their destinations. The cost of the latter type of termination has a few cost elements more than the former, in particular the cost of transport between the different MSCs/MGWs. The cost models used for determining the cost of termination take care of this by calculating a blended cost that is a weighted average of the costs of the two types. The WIK mobile cost model achieves this by assigning appropriate values to the relevant coefficients of the routing matrix. Our understanding is that essentially the same approach is used in all other cost models.

#### Cost and glide paths

7. The Commission assumes a cost path for the movements in cost-based MTRs over time of 10% per annum. On the basis of projections of future volumes and of future input prices and the corresponding elasticities WIK-Consult considers

an annual decrease of cost of about 6% per annum as realistic. If this annual percentage change is applied to establish the cost path starting from the lower benchmark suggested by WIK-Consult, the resulting cost value ends in 2015 at practically the same value as the Commission's.

#### Costs to support "minute+second" or "second+second" pricing

8. The cost of a call consists of the cost of the network during the holding time of the call plus an up-front part due to setting up the call. In most cost modelling exercises, the set-up cost is apportioned to the per-minute cost of the holding time. The per-minute price for a call then covers also the set-up cost. Sometimes the set-up cost is determined separately and a separate price element is charged for this. Then the per-minute price should be lower because it does not need to cover this cost element. Sometimes, instead of charging separately for the set-up cost, an approximation is used in that for short calls, those lasting less than a minute, a full minute of the per-minute price is charged. The extra revenue thus generated is to cover the set-up costs of all calls. This approach is called "minute+second" pricing as opposed "second+second" pricing when the per-minute price also covers the set-up cost, and all calls, also the first minute, are charged precisely according to seconds used up.
9. If the benchmarked cost-modelled rates include call set-up costs, the resulting rates would be "second+second" rates; if the cost-modelled rates do not include -call set-up costs, the resulting rates would either be "minute+second" rates or a separate call set-up cost would be justified. The per-minute cost benchmarks collected by the Commission, with one exception, include an apportioned share of the set-up cost. Further allowance for recovery of such costs, such as through a "minute+second" pricing structure, is not required.

#### The European Commission's pure LRIC approach

10. In a recommendation published in May 2009, the European Commission introduces a new interpretation of the LRIC cost standard which has since the discussion on it started several months ago already been dubbed the "pure" LRIC approach. WIK-Consult considers this new interpretation of the LRIC cost standard as ill-founded. There is no reason to assume that termination is the last service for which an operator provides capacity in its network. Also, from the perspective of the economy at large, there is no reason to assume that calls provided end-to-end on the same network and calls that are provided across different networks should systematically be valued differently, respectively, that the resources used for them have different value.

#### The waterbed effect

11. In the submissions the Commission received on its Draft Report a wide range of arguments were made against the way the Commission dealt with the so-called waterbed effect. The size of waterbed effects depends on the competitiveness of the mobile market structure: There is no waterbed effect under a monopoly (or collusive duopoly) market structure and the effect, if any, should increase with the intensity of competition in the mobile retail market. Given the market structure in New Zealand, there is good reason to assume a low quantity of a waterbed effect. The empirical evidence on the waterbed effect is not conclusive. The empirical evidence is in a range between 0% and 100%. It gives reason to assume the existence of some waterbed effect, but it looks definitively to be incomplete. If MNOs react to cuts in termination rates by increasing (some) retail prices they seem to take care of marginal customers which are mainly located in the pre-paid segment. In particular the emergence of a new entrant in the New Zealand market would make it difficult for the incumbent MNOs to increase mobile subscription prices. In the event that the incumbent MNOs do raise subscription prices, the new entrant will have an incentive not to follow such pricing behaviour, in order to attract such customers. Therefore, there is no reason to expect detrimental effects of a decrease in MTRs on marginal subscribers in New Zealand. The market structure in New Zealand as well as theoretical and empirical evidence supports the waterbed assumptions of the Commission in its cost benefit analysis of regulation. Even if a waterbed effect is complete, a decrease of excessive termination rates will increase welfare. The change of the mobile pricing structure due to a decrease in termination rates increases welfare. Together with reducing further inefficiencies and distortions this effect may even compensate the reduction in consumer welfare due to an increase of the level of mobile retail prices. Neither the existence of a waterbed effect nor its potential magnitude should have an impact on the need to regulate MTRs at a cost-based level. This is regulatory best practice around the world.

#### FTM pass-through

12. Vodafone claims that the pass-through assumptions of the Commission (75% up to 100% in 2015) are inconsistent with observations in overseas jurisdictions, are not guaranteed, are too optimistic and should realistically be assumed to amount to just 41%. The Commission's assumption rests on the expectation that competition in the fixed-line market will increase over time also induced by the cost-based regulation of MTRs. Given the level of FTM prices in New Zealand, this assumption might in our view even be too conservative. In our view, the Commission should not exclude the scenario of a decrease in price levels going beyond the decrease in the termination rate. If competition in the fixed-line market increases there is no reason to assume that the currently excessive margins earned with FTM calls will be unaffected.

### On-net / off-net price differentials

13. Despite its conclusion that above cost off-net MTM calls and SMS is likely to contribute to the creation of a significant barrier to market entry and competition, the Commission did not consider preventive measures against discrimination between on-net and off-net pricing. The Commission took the view that a cost-based MTR would solve the competitive problems sufficiently and non-discrimination provisions are not required. The analysis of the Commission regarding on-net/off-net price differentials is strongly supported by economic theory and empirical evidence. Its conclusion represents regulatory best practice around the world.

### Recommendations

14. Our report and analysis leads to the following recommendations to the Commission:

- Instead of the median, the Commission should use the average of the lowest three benchmarks from the country sample (Section 2).
- The Commission should consider the cost estimate for Australia as the upper limit for the cost of mobile termination in New Zealand (Section 3).
- The Commission should consider the cost benchmarks for termination from its country sample to also include the cost elements due to the transport between different MSCs/MGWs in the core network segments of the corresponding mobile networks (Section 4).
- A cost glide path of 6 % per annum should be regarded as justified. When applied to the proposed benchmark (representing the average of the lowest three benchmarks in the country sample), the resulting cost per minute in 2015 would be almost identical to the Commission's target value for this year (Section 5).
- The Commission should opt for "second+second" pricing since this is the standard most consistently used internationally. Also, the benchmarks from its country sample all represent costs that include an element for the call set-up cost (Section 6).
- WIK-Consult considers the European Commission's new interpretation of the LRIC standard not to be based on sound economic analysis. The Commission should not apply it (Section 7).
- Neither the existence of a waterbed effect or its potential magnitude should have an impact on the need to regulate MTRs at a cost-based level. This is

regulatory best practice around the world. For that reason, the Commission should not deviate from its TSLRIC orientation due to any waterbed effect considerations (Section 8).

- The Commission should not exclude the scenario of a decrease in price levels going beyond the decrease in the termination rate. If competition in the fixed-line market increases, there is no reason to assume that the currently excessive margins earned with FTM calls will be unaffected (Section 9).
- The analysis of the Commission regarding on-net/off-net price differentials is strongly supported by economic theory and empirical evidence. Its conclusion represents regulatory best practice around the world and should not be changed (Section 10).

## 1 Introduction

This report has been prepared by WIK-Consult on behalf of the Commerce Commission of New Zealand. It consists of commentaries on issues that were raised in submissions by interested parties regarding the Commission's MTAS Investigation and during the Commission's Conference on 2 and 3 September 2009.

## 2 Benchmarks

The issue of benchmarks is treated in both the present section and the following one. While this section focuses on the whole sample of cost estimates underlying the Commission's own benchmark, the following one deals specifically with the cost estimates from Australia as an appropriate reference for determining an upper bound for the estimate for New Zealand. Given this approach, there is some overlap of material used in the two sections.

In its Draft Report, the Commerce Commission has used as benchmarks for the cost of termination the estimates from bottom-up cost modelling exercises that were carried out for regulators in nine different countries.<sup>1</sup> On the (implicit) assumption that the estimate values are randomly distributed, it picked a central moment as an unbiased estimate of its own benchmark. When actually using the median it took into consideration the concern that the mean (the alternative central moment) would give too great a weight to extreme outlying values which the median does not do. It is our opinion that – on the basis of the assumption that the observations from the nine countries are unbiased – the use of the median for the Commission's own estimate is reasonable. Unbiasedness means here that there is a common underlying expected value for the cost of termination and the variation of observed values is caused by random effects that are distributed around this expected value according to a normal distribution. If this holds true then one can use the mean or median as what is called an unbiased estimate of the expected value of termination. An assumption like this is often justified if the number of observed values is large. If the number is relatively small, as is true here, then it can easily be the case that the deviations of the observed values from the expected value, which is unknown and which we want to determine using the mean or median, are strongly affected by a factor that systematically tends to pull the observed values in a particular direction. The mean or median will then not be an unbiased estimate for the variable in question, here the cost of termination. Below we will show that this risk exists in the sample assembled by the Commission, with the implication that the use of the median will result in an estimate for the cost of termination that is higher than if that

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<sup>1</sup> See Commerce Commission (2009), p. 122.

systematic effect were not present. As we have proposed at an earlier occasion,<sup>2</sup> the use of the average of the lowest three values in the sample as estimate would therefore be more appropriate.

The arguments that we are going to develop will with even greater force demonstrate that the claims presented by the incumbent mobile operators and their consultants, which would tend to generate even more upwardly biased estimate values, are equally not warranted. These claims are summarised by the following two points:

- (1) Differences in country-specific conditions make for great differences in the costs of termination. Choosing the median of the estimates for these countries as the relevant estimate for New Zealand would have to be based on the assumption that its country specific conditions somehow correspond to the average of these nine countries. This could not be assumed. One specific claim (Vodafone) is that the relevant estimate for New Zealand could even lie outside the range covered by the estimates from the nine countries.
- (2) Because of the uncertainty implied by the above, and given the stakes involved whereby erring on the low side in respect of the rate of termination would entail a greater risk than erring on the high side, the 75th percentile value instead of the median should be used.

Point (1) above is actually the argument that the differences shown in the nine estimates are not random deviations from some common median or mean but are differences due to systematic differences in underlying conditions. We would tend to agree with this in general, emphasising however that these systematic differences are of a quite different kind than claimed by the incumbent operators and their consultants. Their arguments imply that the presumed differences in conditions are of an exogenous character which are outside the control of the operators in question, residing in geography, distribution of population, per-capita income, and other macroeconomic variables. The great differences shown between the nine estimates, however, cannot be explained by the differences in such exogenous conditions. Below this point will be illustrated with results obtained with the WIK bottom-up cost model.

The WIK bottom-up model was applied to two very different types of countries, one small and densely populated, the other very large and sparsely populated, where one should expect that the latter has conditions making for substantially higher costs. When keeping other things equal except these truly exogenous conditions, the results are that the costs for the large and sparsely populated country are in fact higher than those for the small and densely populated country, but they are higher by no more than 30%.<sup>3</sup>

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<sup>2</sup> See WIK-Consult (2009).

<sup>3</sup> See WIK-Consult (2008).

This demonstrates that the more than 300% difference shown in the benchmarks of the nine countries cannot be attributed to this kind of country-specific differences.

It may be argued that exogenous factors could in fact cause higher differences than in the order of 30%. For the reasons that follow we do not consider that differences of greater than 30% are likely. Country-specific differences residing in geography and distribution of population should mainly have an impact on two aspects of mobile networks: (a) on the share of coverage-driven cells, i.e. cells with low traffic volumes relative to the investment for the BTSs; (b) large distances that make for relatively high transmission costs. The following facts explain why the corresponding cost differences should not be so high thereby corroborating the results from the WIK model:

- (a) Although relatively fewer people live in rural areas of a large and sparsely populated country, nevertheless the share of a mobile network's coverage-driven cells for this type of country is not so much bigger than for a small and densely populated country. This implies that the increase in cost due to low population density remains relatively small. This was for example confirmed by the French regulator in its most recent consultation on mobile termination rates.<sup>4</sup>
- (b) Although the aggregation, backhaul and core networks have each much greater length in the large and sparsely populated country, and although the cost of transmission may be substantial, it is well known that this type of cost has become a much reduced cost factor with the technical developments of recent decades. In other words, the great distances in the large country do not have that large an impact on total costs.

In its report for Vodafone New Zealand of 27 July 2009, Covec questioned this analysis arguing that "(i)n particular, the 20% cost difference between the 'large sparse' and 'small dense' countries [the authors: in one of WIK-Consult's small country/large country comparisons the difference was in fact only 20 %] is associated with an almost three times greater volume of traffic in the large country compared to the small country. Given the economies of scale that exist in mobile networks, this increase in volumes will offset much of the additional costs required to cover a larger area in the large country". This argument ignores the fact that in mobile networks economies of scale are mainly realised at the level of individual cells, dependent on the volume of traffic that on average flows through the base stations in these cells, and does not occur at the level of the whole territory served. It is the distribution of traffic-driven and coverage-driven cells that is important for the degree of economies of scale and not total volume of traffic in a country. As an example, consider the extremes of a city state with a few cells the sizes of which are determined by an intense level of traffic and a country with a 100-times larger volume of traffic which, however, is all realised in cells that have been put

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<sup>4</sup> See ARCEP (2008), p. 50.

in place to provide coverage and the sizes of which are not determined by the volume of traffic. The network serving the city state will quite obviously realise a much higher degree of economies scale and thus have lower per-minute cost than the network in the large country despite the fact that total volume would only be a fraction of that in the large country.

As far as differences in per-capita income as an explanation for large differences in costs are concerned, one first observation is that these can only be regarded as proximate causes for higher costs. The implied argument is that low income means low demand, low demand means low volumes of traffic and therefore low utilisation of network facilities, and this means high costs. This chain of reasoning leaves out one important factor which is the operator and its effort to be an efficient and cost effective manager of its network. There are examples of mobile network operators doing business in countries with per-capita incomes much lower than New Zealand (India and Bangladesh are two examples, in one of which by the way one of the New Zealand incumbent operators is also active) where demand is extremely high (in India for example about 4,500 minutes per subscriber), a fact which contradicts the claim that differences in per-capita income necessarily imply higher costs in mobile networks, i.e. independently of the business and marketing policies of the operators. While it might be argued that the high demand for mobile services in such countries is primarily due to the absence of a fixed network, this argument is contradicted by the fact that one has observed similarly intensive use of and switch to mobile services in Austria where coincidentally also a very low cost per minute of termination was determined (as will be discussed further below).

WIK-Consult has developed the bottom-up cost model which was used to determine the cost of mobile termination in Australia.<sup>5</sup> It is one of the benchmarks in the Commission's sample and belongs to the three lowest in that sample. We submit that the cost so determined by the WIK model is a valid estimate of the cost of an operator in Australia. This is substantiated by the following facts:

- The number of base stations determined by the model was, as far as we know since the actual numbers were kept confidential, not dramatically different from the number of equipment actually in place.
- Capital expenses (capex), as far as equipment items were concerned, were based on world market prices and, as far as towers and real estate were concerned, on the corresponding local prices. A standard approach was used for the annualisation of capex.

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<sup>5</sup> See WIK-Consult (2007).

- The expenses for operations and maintenance (opex) were estimated in relation to the replacement value of investment, i.e. being equal to 10% of this value. The value was derived from the cost accounting records of mobile operators in other jurisdictions and for this reason is necessarily dated. Due to advances in making the operation and maintenance particularly of electronic equipment more and more cost effective, this 10% value must be considered as quite conservative tending to bias total costs upwards. The approach was used because due to information constraints a genuine modelling approach was not feasible.<sup>6</sup>
- For organisational common cost, network costs were marked up by 10%. This again appears to be a quite conservative value meaning that total costs are biased upwards.

We also submit that the cost determined on the basis of the WIK-Consult cost model for Australia should be considered an upper value for the cost in New Zealand for the following reasons:

- The average number of minutes of use per subscriber is about the same in the two countries.<sup>7</sup> At the same time, the degree of urbanisation is about the same in the two countries. These two facts would imply that the distribution traffic-driven and coverage-driven cells are about the same and therefore cost levels would be about the same.
- New Zealand's territory has, however, a substantially smaller share of sparsely populated areas implying a smaller share of coverage-driven cells. This should make for somewhat lower costs in New Zealand.
- Average link distances are in New Zealand on average shorter than in Australia. This should also make for somewhat lower costs in New Zealand.
- The calculations in Australia were for an operator with 31% market share while the two incumbent operators in New Zealand each have a market share of about 50%. Due to the economies of scale that an operator with larger market share under

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<sup>6</sup> As an indirect support for this assertion, it can be observed that an increasing number of operators are having their networks both built and run by the manufacturers of their equipment giving as argument that these companies can do this job more cost effectively. If operators do not use this option this means that they can achieve the corresponding cost effectiveness with their own operations. The 10% relation of opex to the investment value stems from a time when this did not yet apply from which follows that using this rate will lead to an overstated amount for opex.

<sup>7</sup> Merrill Lynch (2009) shows 191 minutes of use per subscriber and month for New Zealand and 218 minutes for Australia, which would amount to 2,292 minutes and 2,616 minutes respectively on an annual basis. The results of the WIK-Consult model for Australia are based on a substantially lower number, i.e. 1,469 minutes per subscriber and annum (see WIK-Consult, 2007, p. 107), so that on this account the cost in both countries should with current usage be lower than were at the time the calculations were carried out.

otherwise similar conditions enjoys, this should make for lower costs for the New Zealand operators.

To answer the question why the cost estimates for most of the other countries turned out substantially higher than the one for Australia, one would need to carry out similar aspect-by-aspect evaluations as just done for Australia and – in comparison – for New Zealand. This would have been the appropriate approach instead of referring in a summary fashion to such global factors like country-specific circumstances (which as shown above would in any case not be sufficient to account for more than something like 30% of these differences). The scope of our brief does not include to carry out such a detailed assessment. Below we mention, however, a number of reasons that could arguably account for these differences.

- The number of base stations underlying the calculations may be larger than actually required. Since base stations account for the largest share of total cost, this could have a substantial upward bias.
- Information on the volumes of traffic provided by the operators may have been used to determine the cost per minute of traffic. Since the cost per minute is essentially equal to <total cost> divided by <number of minutes>, if a smaller volume of minutes than actually warranted is used, this would have an upward bias on cost. Due to the information asymmetries which in general exist between the regulatory authority and operators, the former is in a poor position to check the validity of the data provided on the relevant volumes of traffic.
- Larger amounts of opex than justified may have been used due to the fact that essential information regarding this cost is derived from the cost accounting records of the regulated operators. The same observation then applies as in the bullet point above, i.e. that the existing information asymmetries make it difficult for the regulatory authority to verify the validity of the submitted data.
- Part of the cost of 3G operations, which would necessarily still be at an inefficient level, may have been rolled into the cost of 2G operations. We know that this happened in the case of the UK.<sup>8</sup>

All of the above reasons concern aspects that would be endogenous to the operations and under the control of the operators; they would not be due to exogenous factors that the operators in question could not do anything about (and that in any case could account for no more than 30% of a difference between any two cost estimates). Further, while the above list focuses on reasons that may have made for relatively high costs, it would of course equally be instructive to analyse the reasons that in the case of Israel

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<sup>8</sup> See Ofcom (2007).

and Malaysia made for relatively low costs. The presumption is that these reasons would lie in the same areas as above, only with an impact in the opposite direction: a realistic, i.e. not too high, number of base stations, high volumes of traffic, and low opex.

From the above, but in particular from the argument in respect of the estimate for Australia, it follows that as regards the claim listed above under (2) that the 75<sup>th</sup> percentile benchmark from the Commission's sample be used, becomes irrelevant. Even the median, as proposed by the Commission, should be considered as biasing the estimate upwards. Instead of the 75<sup>th</sup> percentile it would be more appropriate to use the 25<sup>th</sup> percentile benchmark, which would happen to be the value for Australia. In a previous report, WIK-Consult has suggested to use the average of the lowest three benchmarks from the Commission's sample, i.e. those from Malaysia, France and Australia.<sup>9</sup> We still believe that this would be the correct approach, given that the benchmarks from the first two countries capture aspects that are relevant but are not taken into account by the benchmark for Australia, as outlined below:

- *Malaysia*: This country has a lower rate of urbanisation and lower per capita income than Australia. Everything else equal, the first aspect should make for a higher share of coverage-driven cells and the second for lower demand per capita, both in turn meaning relatively low use of the network and therefore higher costs which, however, is not the case. In fact, everything else is not equal, in particular it can be presumed that operators in Malaysia are more efficient and offer lower prices to their customers meaning high demand – despite low per-capita income – and therefore lower cost.
- *France*: The French regulatory authority ARCEP determined a range from 2.4 to 2.9 €c per minute for the cost of termination of which the Commission picked the average value of 2.65 €c. The latter value corresponds to the base rate of 2.64 €c calculated by ARCEP's bottom-up cost model for a yearly volume of 1,860 minutes per subscriber.<sup>10</sup> ARCEP notes one result from its model which is of particular interest. When the assumption was made that there are no rural areas to be covered, which would presumably eliminate all coverage-driven cells, the decrease in total cost was only 9%, much less than is usually claimed by operators to justify the high costs of mobile services. This substantiates the observation made earlier in this report that country-specific factors, which to a large extent make themselves felt through different shares of coverage-driven areas, do not account for that much.

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<sup>9</sup> See WIK-Consult (2009).

<sup>10</sup> See ARCEP (2008). While it is true that the cost estimate adopted by the ARCEP is also based on historical cost, this, as pointed out by ARCEP, accounts for only a 2% difference relative to the exclusively bottom-up estimate.

If the Commission in fact used the average of the benchmarks for Australia, Malaysia and France, its own benchmark for the cost of termination would turn out to be 5.53 NZc instead of 7.2 NZc per minute.

In concluding this section, we turn to the question whether the sample should be considered as complete. On principles of sampling theory this should actually be a mute question. At the time the Commission decided on its composition, it appeared to be the sample of bottom-up cost modelling results the median of which promised to provide an unbiased estimate of the cost of termination in New Zealand. A sample never claims to cover the total population of observations; this is what samples are not supposed to do. There are of course more such models around, a proportion of which will show results above the median of the current sample, another proportion will show results below that number. WIK-Consult is aware of such model results on both sides of the divide, some of which are however not in the public domain. A claim that the number of observations in the sample should be amended – after the analysis of the sample has provided a particular result – harbours the risk of introducing a bias working in a particular direction.

Now, the incumbent operators and their consultants assert that additional benchmarks from Greece and Hungary, both claimed to have been determined according to the criteria set by the Commission, should be included in the Commission's sample. As these two cost estimates have values in the upper ranges of the sample, this would increase the median and thereby the Commission's own benchmark. Independent of the above arguments based on sampling principles, the question of whether the benchmarks for these two countries would qualify to be included in the sample rests on whether the corresponding cost determining exercises were actually based on bottom-up cost models. In this context it is worthwhile to cite from documents of the European Commission.

- *Greece*

EU Commission (2008b): "EETT (Greek Regulator) intends to base this cost model on the historic costs of the actual operators. However, in its response to the request for information EETT explained that, in setting the prices, it corrects the costs in order for them to reflect an average scale operator and to compensate for the differences in spectrum costs. Therefore, according to EETT, the proposed price control corresponds to the costs of an average scale efficient operator. (Footnote: EETT further noted in its response to the request for information that it uses an economic depreciation method to ensure that the cost recovery profile calculated in the model is consistent with current and forward-looking costs.)"

EU Commission (2009d): During the period 1 January 2009 - 1 January 2011, mobile termination rates will be reduced by an average of 50% in order to reach the

targeted maximum symmetric rate of €0.0495/min. The termination rates were calculated on the basis of a bottom-up LRIC model.

- *Hungary*

EU Commission (2008a): "While the model takes asset costs at their gross replacement value into account, the costs relating to concession fees - as part of the capital expenditures - are based on the values actually paid by operators, i.e. on historic/sunk costs (Footnote: In its reply to the request for information, NHH explains that it has decided to set historic prices in the model and not to reevaluate concession fee since concession is not tradable (only by selling the whole company), thus the calculation of market price holds great uncertainty. For the 900MHz frequency band NHH used the price set by the minister in 2007 for renewing the concession of two operators for another 7.5 years. In the case of the 1800MHz frequency band the concession period has not expired yet, so NHH used the purchase prices of 1999.)

EU Commission (2009e): "Following the designation of all MNOs in 2005 as operators with SMP in the wholesale mobile call termination market, on 4 October 2006 the NCAH required the MNOs to gradually decrease their MTRs following a specific glide path towards symmetry between the operators and in cost-oriented MTRs by 1 January 2009 (at HUF 16.84 (about €0.067)). The glide path is based on a bottom-up LRIC model.

In the light of these somewhat ambiguous statements, and given our earlier argument, it appears to be the more advisable to stay with the original composition of the sample.

There has also been the question raised whether the result of the recent cost determination by the Austrian regulator should be included in the sample. Because the cost figure is relatively low this would have the effect of decreasing the median and therefore the Commission's benchmark. From the available information regarding this cost determination it appears that the costs were derived from the actual cost accounting records of the relevant operator, not from a bottom-up model as would be required by the Commission's criteria. In addition, from this information it is not possible to verify whether the cost estimate is really on a TSLRIC basis, i.e. including all relevant common and joint cost elements. It further appears that the low cost estimates are due to a very heavy substitution of mobile for fixed network calls and a strong surge in data communications, developments which it may not be warranted to expect in the case of New Zealand. For these two reasons, in addition to the one based on sampling principles, we do not suggest that the cost estimate arrived at by the Austrian regulator should be included in the sample.

### 3 The Australian benchmark

Australia is closer geographically to New Zealand than other benchmark countries. WIK has examined in detail the TSLRIC of the MTAS in Australia and based on our detailed understanding of the mobile network cost in Australia we developed a mobile network bottom-up cost model for the ACCC in 2006.<sup>11</sup> The model adopted a scorched-earth approach to the network design which deployed best-in-use 2G technology that had proven its operational feasibility and was cost-effective. This model calculated the cost of (among other mobile services) the MTAS for various market share assumptions. Depending on the calculation scenarios the results were in a range of 5.0 to 7.3 cent (in AU\$). An efficient operator having a 31 per cent market share showed a cost of voice termination of 5.3 cpm. However, in its 2007 Pricing Principles<sup>12</sup> the ACCC calculated a TSLRIC for the efficient operator of 6.1 cpm for the 31 per cent market share scenario. On the basis of an updated model version including the latest population data and updated more recent parameter values, the ACCC arrived at a slightly lower estimated cost for supplying the MTAS of 5.8 cpm for the 31 per cent market share scenario in 2009. Using the Commission's exchange rate of 0.8872,<sup>13</sup> the corresponding value in New Zealand \$ is 6.5 cpm.

Looking at some relevant cost drivers of a mobile network, there is strong reason to assume that the TSLRIC of the MTAS in New Zealand are lower than those in Australia or to put it in other terms, we strongly believe that the TSLRIC for the MTAS in Australia is an upper benchmark for the costs in New Zealand. Three major reasons support our view:

- (1) New Zealand has a higher population density and a similar degree of urbanisation as Australia. There are more sparsely populated areas in Australia than in New Zealand. More network elements (in particular base stations) are needed to provide coverage for a given customer base and less network elements are capacity driven in Australia. This aspect reduces the efficiency of the network and increases the cost per unit at a given degree of coverage. Model simulations which we have done on the degree of coverage and other relevant parameters like the number of subscribers and the amount of traffic supports the relevance and quantitative significance of this effect.
- (2) The TSLRIC determination in Australia is for a market share of 31% of the efficient operator. Market share has an impact on costs. Increasing the market shares from 31% to 44% decreases costs by 6% in Australia. The relevant market share of MNOs in New Zealand is around 50% at the current market structure and will only

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11 See WIK-Consult (2007).

12 See ACCC (2007).

13 See Commerce Commission (2009), p. 123.

change slowly due to the new market entry as any international experience shows. The larger market share of MNOs in New Zealand alone accounts for a 6% to 10% lower MTAS cost as compared to Australia.

- (3) From the Commission's Draft Report<sup>14</sup> on the one hand and our model calculations for Australia on the other, we know that Vodafone New Zealand appears to have a significantly more cost efficient network compared to the 31 per cent market share operator in Australia. Figure 11 of the Report shows a number of around 2,200 subscribers per Vodafone cellsite in New Zealand while the corresponding number of the 31 percent market share operator in Australia is lower. The more subscribers there are in a cellsite, the more traffic is generated and the lower the cost per minute in a cellsite. As the Commission correctly points out, a higher number of subscribers per cellsite enables the MNO to spread the costs of each cellsite over a greater number of minutes per traffic. The cellsites account for the highest share of costs in a mobile network. The direct cost share of cellsites amounts to around 65% of the total TSLRIC cost. If one adds the indirect costs like BSC and links to connect cellsites to BSCs the cost share of cellsites increases to around 75%.<sup>15</sup> The subscriber density of cellsites therefore signals relevant lower costs in New Zealand compared to Australia.

At the Commission's Conference on September 2 and 3 there was some discussion on the issue whether the model calculations for Australia represent TSLRIC for the Australian market, in particular considering that the ACCC set the indicative prices for the MTAS in 2007 and also in its most recent determination<sup>16</sup> for 2009 to 2011 at the higher level of 9 cpm. First of all, it is important to mention that the pricing principles of the ACCC for the MTAS have two elements:<sup>17</sup> The first principle sets cost-based pricing principles as the general approach to be adopted in determining indicative prices for the MTAS. According to the second principle TSLRIC+ is regarded as an appropriate methodology in informing of the efficient cost of supplying the MTAS. The ACCC then argues that model estimates of the TSLRIC+ may not be achievable by all operators in the market, e.g. the smaller operators. Therefore, while model based cost estimates "provide important information, they cannot be considered conclusive in determining an appropriate indicative price".<sup>18</sup> The ACCC recognises that efficient operators may be able to price somewhat above their costs. The ACCC therefore used the cost model results as a "floor price" or a "reasonable lower bound estimate of the cost of the MTAS". In conjunction with model estimates it used other tools like international

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14 See Commerce Commission (2009).

15 See our model calculations for Australia in WIK-Consult (2007) which are similar to other cost model results.

16 See ACCC (2009).

17 See ACCC (2009), p. 30.

18 See ACCC (2009), p. 17.

benchmarking and Regulatory Accounting Framework data to arrive at its indicative price.

It may be worthwhile to take up Telstra's view on mobile termination cost in Australia. Telstra is Australia's largest MNO and the fixed-line incumbent. Telstra concludes in its submission that "the WIK model ... remains the best means of determining the efficient costs of the MTAS available to the Commission and industry ..." and further that "the WIK model is the best tool the Commission currently has available to it to approximate the TSLRIC of providing the MTAS service".<sup>19</sup> Telstra further argues that "... to consistently apply the TSLRIC pricing principle for the MTAS ... will necessarily result in an indicative price of 6 cpm for 1 January 2009."<sup>20</sup> Telstra heavily criticised the ACCC for deviating from the TSLRIC pricing and to set indicative prices which exceed forward-looking efficient costs<sup>21</sup> and which take into account besides TSLRIC costs other factors in addition (like benchmarking and RAF data). There is no reason to assume that an MNO like Telstra has incentives to ask for regulated prices below TSLRIC.

#### **4 Types of cost included in the cost of termination**

It is a virtually universal practice of having one single rate for the termination of calls in a national mobile network. When this rate is cost-based regulated, the cost used as basis must have been calculated in a way that takes into account that not all calls have exactly the same cost structure. A certain proportion of calls will be handed over at the location of the MSC/MGW from which they will also be routed down to their destination base stations, and another, smaller, proportion will be handed over at a MSC/MGW distant from the one from which they will be routed to their destinations. The cost of the latter type of termination has a few cost elements more than the former, in particular the cost of transport between the different MSCs/MGWs. The cost models used for determining the cost of termination take care of this by determining a blended cost that is a weighted average of the costs of the two types. The WIK mobile cost model achieves this by assigning appropriate values to the relevant coefficients of the routing matrix, as discussed in some detail below. Our understanding is that essentially the same approach is used in all other cost models. We therefore recommend that the Commission considers the benchmarks from its sample as being derived correspondingly.

The cost of termination is composed of the costs of all network elements involved in providing the service. For a particular call that is delivered to a base station within the

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19 See Telstra (2008), p. 22 and 23.

20 See Telstra (2008), p. 25.

21 See Telstra (2008), p. 22.

catchment area of the mobile switching centre or media gateway (MSC/MGW) to which it is handed over, these network elements are:

- MSC/MGW
- Link between MSC/MGW and relevant BSC/RNC
- BSC/RNC
- Link between BSC/RNC and relevant base station
- Base station in the radio access network

For a call that is handed over at a distant MSC/MGW, the following network elements are used in addition:

- Link between the two relevant MSCs/MGWs
- MSC/MGW at which the call is handed over as distinct from the one from which it will be routed to the corresponding BSC/RNC and base station

The cost of terminating a mobile call is then calculated on the basis of the costs of these network elements and a so-called routing matrix reflecting above usage. The fact that a given percentage of calls use the MSC/MGW twice and in addition the link between two MSCs/MGWs is factored into this matrix in a way that the resulting cost is a weighted average of the two types of calls. For example, if distantly delivered calls make 30 % of all calls, the routing factor for the MSC/MGW will be 1.3, given that at least one MSC/MGW is used for all calls and a second one in 30 % of cases, and the routing factor for the link between MSCs/MGWs will be 0.3, given that only 30 % of calls will use such a link. The routing factors of all the remaining network elements will be given a value of one.

## 5 Cost and glide paths

In its Draft Report the Commission expresses the view that the likely movements in cost-based MTRs over time will be reductions of 10% per annum starting from its current benchmark of 7.2 NZc per minute for 2009. On this basis the MTR would be equal to 3.8 NZc per minute in 2015. The Commission used as reference for the 10% rate of reduction the cost path reported by the Swedish regulator. This projection has been criticised by the incumbent operators and their consultants with the argument that 10 % reductions in the cost of mobile services and in particular of termination would be unrealistic. In addition, it was criticised that the Commission's adjustment path started at an MTR level equal to the corresponding cost level while it would be general

international practice to start with the existing level of the MTR and have it slide over time along a so-called glide path toward the future target cost level. In the following discussion we will endeavour to shed more light on both of these aspects.

A cost path describes the trajectory of the cost of a service over time, as service volumes increase and the prices of inputs change. If then the MTR at the point in time from which the adjustment path starts equals the cost of termination then the trajectory of the MTR would correspond to the cost path. To know more about what a realistic cost path should be, it is necessary to project the development of future volumes and of future input prices. As regards volumes, WIK-Consult considers growth rates between 5 and 10% as realistic. Concerning prices of inputs, it is usually expected that the prices of electronic equipment will continue to decrease while those for infrastructure (mainly real estate and towers) will increase in step with overall inflation; on balance WIK-Consult considers an annual decrease in input prices of about 5% as realistic. In the following we use the midpoint of 7.5% of the above range for volume growth rates and the just mentioned 5% as the estimate for price decreases. Results from the WIK cost model then show that the elasticities with which mobile network costs react to these changes is about -0.5 for volume changes and about 0.5 for price changes. Combining these elasticities with the corresponding expected percentage changes in volumes and prices leads to an annual decrease of cost of about 6% per annum. If this annual percentage change is applied to establish the cost path starting from the benchmark suggested above by WIK-Consult, the resulting trajectory is as shown in the first line of Table 1. The Commission's cost path is shown in the second line. The cost path determined by WIK differs from that of the Commission in that it starts from a lower value, but it ends in 2015 at practically the same value.

Table 1:

Cost path according to:	2009	2010	2011	2012	2013	2014	2015
WIK	5.53	5.20	4.89	4.59	4.32	4.06	3.81
Commission	7.20	6.50	5.80	5.20	4.70	4.30	3.80

In order to compare above results with what regulators have actually been implementing, we consider the cases of the UK and Sweden<sup>22</sup> that in the European Union appear to be the only ones where regulators apply adjustment paths that correspond to projected cost paths. (We restrict ourselves to European Union as information from these countries is readily available.) Table 2 shows the trajectories as

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<sup>22</sup> See Ofcom (2009) and PTS (2008). While the rate for the UK includes a mark-up for the effect of the network externality, we assume that this mark-up remains constant and does not materially affect the relative changes in the MTR over time.

reported in the corresponding regulatory documents. In both cases, the cost figures are reported in terms of real prices (indicated in Table 2 as being in “real pence” or “real SEK” per minute), i.e. they do not take into account the general inflation which needs to be factored into the value for future years to arrive at nominal rates which, as far as relative changes from year to year are concerned, make them comparable with trajectories of both the Commission and WIK. In the case of the UK, Ofcom stated that it assumed a rate of inflation of 2.8%, while for Sweden a rate of inflation of 2% is here used which has been the expected rate of the Swedish central bank. The last line of each country block shows the adjustment paths, in terms of nominal cost paths, that result from this adjustment.

Table 2:

Country	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
UK (Vodafone, O2)						
Real pence/minute	5.2	4.7	4.4	4.0		
<i>Nominal pence/minute</i>	5.2	4.83	4.65	4.35		
Sweden						
Upper limit, real SEK		0.428	0.375	0.358	0.341	0.325
Lower limit, real SEK		0.307	0.244	0.196	0.167	0.140
Average, real SEK		0.368	0.309	0.277	0.254	0.237
<i>Average, nominal SEK</i>		0.368	0.315	0.288	0.270	0.257

In the case of the UK, the implied average annual decrease in the cost-based MTR is about 6% which corresponds to the results from the exercise with the WIK model. In contrast, in the case of Sweden, the implied average annual decrease is about 9%, which is higher than suggested by the WIK model exercise but somewhat lower than assumed by the Commission. It seems that the reason for the higher annual cost decrease in the Swedish case is attributable to forecasts of relatively strong increases in volumes of both voice and data services, where it is important to note that the data volumes are presumably carried by the same network elements as voice services.

As regards the general issue of the application of a glide path vs. a cost path, Table 3 provides a summary overview over regulatory practice in the European Union. While in a majority of countries (18 out of 27) the MTRs are being adjusted toward some future target rates, in most of these cases the trajectories are glide paths since the starting points are existing but not necessarily cost-based MTRs so that the individual annual adjustments usually include an element to correct for the deviation of the initial MTR from the relevant cost level. Only in the two cases referred to already above, i.e. those of Sweden and the UK, it appears that currently applied adjustment paths correspond to true cost paths. By the way, when considering the details of the trajectories of some MTR decreases, our impression tends to be strengthened that some of the cost estimates underlying the corresponding MTRs cannot be genuine cost estimates. For

example, the recent determination of the Danish regulator orders a decrease of the dominant operator's MTR from 0.54 DKR effective in 2009 to 0.43 DKR effective for the period from 1 January to 30 April 2010.<sup>23</sup> This corresponds to a decrease of more about 20% over a period that is substantially less than a year, while the decrease from 2008 to 2009, thus covering a whole year, was only 13%. This must be considered as a very unlikely trajectory for actual cost reductions.

Table 3: Glide paths and cost paths in EU Member States

Country	Adjustment path*	Path starts from		Target is		
		a price equal to cost: "cost path"	an existing price level: "glide path"	a cost estimate**	a benchmark	Other
X = "yes" / No entry and shaded = "no" or "not applicable"						
Austria	X		X	X		
Belgium						
Bulgaria	X		X		X	
Czech Republic	X		X			X°
Cyprus	X		X	X		
Denmark°°						
Estonia	X		X		X	
Finland						
France	X		X	X		
Germany						
Greece	X		X	X		
Hungary	X		X	X		
Ireland						
Italy	X		X	X		
Latvia						
Lithuania						
Luxembourg	X		X		X	
Malta						
Netherlands	X		X			X^
Poland	X		X		X	
Portugal	X		X		X	
Romania	X		X			X^^
Slovakia						
Slovenia	X		X	X		

23 See EU Commission (2009a).

Spain	X		X	X		
Sweden	X	X		X		
UK	X	X		X		

- \* For the purpose of this table, an adjustment path is identified if there is a future target and there is a defined path over which the target is to be reached. There will, for example, be no adjustment path if current prices are equal to cost and in each future year the price is determined on the basis of a cost determination then to be carried out.
- \*\* This target may be based on bottom-up or top-down modelling, and be according to either the current-cost of fully-allocated-historical-cost standard.
  - ° The Czech regulator provisionally set a target on the basis of a price cap; it announced, however, that by the time of the target, i.e. 2010, a cost-based target will have been established.
  - °° The Danish regulator has recently determined the rates for 2010 which, however, appear to have been determined specifically for that year and do not correspond to a target that had been determined beforehand.
  - ^ The regulator in the Netherlands had a bottom-up cost model developed that informed the price determination process, in the end, however, excepted termination rates that were negotiated between the parties. The target level is also the result of negotiations.
  - ^^ The regulator in Romania determined that there be a glidepath, the target, however is to still to be determined.

Source: WIK-Consult and EU Implementation Reports.

## 6 Costs to support “minute + second” or “second + second” pricing

This issue arises because in order to establish a connection the network has to engage in set-up activities which entail a cost in addition to the cost of the holding time of the connection itself. As far as cost determination is concerned, it is a question of the convention for cost allocation used in the corresponding costing exercise whether the set-up cost is identified separately from the cost of actually carrying the call over the network or whether this cost element is averaged over all minutes of use and rolled into the per-minute costs of the services carried by the network. For example, in the WIK mobile cost model, the latter has been implemented.

Now, “minute + second” pricing implies that for any call the price charged will be at least for a minute, and charging per second will start only after completion of the first minute. This implies that for this type of calls the revenue is more than required to cover the corresponding network costs of holding time. In terms of total revenue, this can be an important factor if the share of calls of less than one-minute duration is relatively large. The practice is justified with reference to the need to cover the set-up cost that is incurred for all calls. In contrast, “second + second” pricing assumes that the per-minute price (which for the number of seconds beyond the last full minute would be applied on a proportionate basis) also covers the set-up costs. Note that the “minute + second”

pricing approach could be called “cost-based” if the per minute cost rate is based on a cost estimate for holding time that does not include any element of the set-up cost, and that the extra revenue obtained by charging a full minute whenever the calls lasts less than a minute corresponds to the total set-up costs arising on account of all calls. This would, however, be the case only by accident; the extra revenue could be more or less than that cost. In other words the approach of “minute + second” pricing is also only an approximate approach and per se not superior to including the cost in the price for holding time and applying “second + second” pricing. Further, to reiterate, it implies that the per-minute charge for holding time does not also cover any cost element for set-up.

According to our knowledge, the Commission has sought and compiled benchmarks that correspond to the costs per minute of termination that also cover the set-up costs which are included as an element averaged over all relevant minutes. This would be consistent with the Commission's position that the benchmark it derived is an appropriate estimate for the cost underlying the MTR to be applied in New Zealand – without any further element to be added to cover set-up cost. The question that needs to be answered is then whether the benchmarks that were in fact used for the cost estimates include the set-up cost or not. It appears that all benchmarks in the Commission's sample cover this cost. It is true that in Norway operators apply a set-up charge in addition to the charge for holding time. Nevertheless, the cost modelling results of the Norwegian regulator that the Commission actually used include a component to cover the relevant cost.

Concerning the general questions to what extent charging separately for the set-up cost is practiced internationally, we carried out a survey based on information available at WIK which covers 15 EU member countries (not including those from Eastern Europe) plus Norway and Switzerland. Of these countries, it is only Norway in which, as already mentioned, a separate set-up charge is applied, and only Spain where the first minute is charged in full independent of the duration of the call. In the remaining 15 countries, “second + second” pricing is the rule. From this follows that charging separately for the set-up cost is not a general international practice.

In any case, as needs to be reiterated, if there were to be a separate charge for the setting up of calls in addition for the charge for holding time, the cost bases according to which the different price elements were to be set would also have to be established separately. In the benchmarks of the Commission's sample, the corresponding costs – with one exception – have been rolled into the costs for holding time, and this holds for all the three benchmarks that WIK-Consult proposes should form the Commission's own benchmark.

## 7 The European Commission's pure LRIC approach

In a recommendation published in May 2009, the European Commission (EC) introduces a new interpretation of the LRIC cost standard which has since the discussion on it started several months ago already been dubbed the "pure" LRIC approach. The EC's motivation for the new interpretation is the significant variety in the chosen costing tools and the different practices in implementing those tools, having the effect of widening the spread between wholesale termination rates applied across the Union. Further it states that "the absolute level for mobile termination rates remains high in a number of Member States compared to those applied in a number of countries outside of the European Union, and also compared to fixed termination rates generally, thus continuing to translate into high, albeit decreasing, prices for end-consumers".<sup>24</sup> This interpretation was developed by EC staff but also underwent consultation with member states and apparently quite a few have supported the introduction of the approach so that its implementation in a number of jurisdictions may be expected relatively soon.

The crucial aspect of the approach is that it considers termination as the service that the operator has, as it were, taken into its portfolio as the very last service. As a result, it would be justified to assign to it only those costs that would not be incurred if termination were not provided. The effect is that the cost of termination so determined would benefit the most from all the economies of scale and scope that have been reaped due to the relevant network's overall size while the costs of all other services, in particular on-net calls, would have to include all the cost components that arise due to indivisibles and overhead activities.

In order to provide an impression of the implications of this interpretation, we cite below some of the specific rules that it spells out:

- "From the traffic related costs only those costs which would be avoided in the absence of a wholesale call termination service being provided should be allocated to the relevant termination increment. These avoidable costs may be calculated by allocating traffic-related costs first to services other than wholesale call termination (e.g. call origination, SMS, MMS, etc.) with only the residual traffic-related costs being allocated to the wholesale voice call termination service."
- "The incremental cost of wholesale voice call termination services should ... exclude coverage costs but should include additional capacity costs to the extent that they are caused by the provision of wholesale voice call termination services."

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<sup>24</sup> See EU Commission (2009b), recital 3.

- “Costs which would be included in the termination service increment would include ... additional mobile switching centres (MSCs) or backbone infrastructure directly required to carry the terminating traffic for third parties.”
- “(T)he additional spectrum costs and wholesale commercial costs directly related to the provision of the wholesale termination service to third parties would also be taken into account.”
- “(C)overage costs, unavoidable business overhead costs and retail commercial costs are not included.”<sup>25</sup>

WIK-Consult considers this new interpretation of the LRIC cost standard as ill-founded. There is no reason to assume that termination is the last service for which an operator provides capacity in its network. Also, from the perspective of the economy at large, there is no reason to assume that calls provided end-to-end on the same network and calls that are provided across different networks should systematically be valued differently, respectively, that the resources used for them have different value. But that is what the European Commission's standard would imply as it effectively declares termination to be a service that somehow causes costs differently than other services. For example, one of the consequences would be that a call from Auckland to Wellington carried by a carrier on-net would "cost" more than the same call that was handed over from the originating network to another network for termination, where this call would be using very much identical facilities. Further, additional network elements necessary to provide wholesale services would have to be determined statistically, they could never be *directly* identified. From a statistical perspective, however, termination services place the same pressure – in terms of time and location – on scarce capacity as on-net services do which means that they cause costs in the same way as the latter.

Simulations with the WIK mobile cost model indicate that if the cost of termination is derived in the way proposed by the European Commission the result would be a “cost” figure that could be lower than relevant cost by more than 50 %.

LRIC is a long-run concept in which all costs are in the long-run variable, including the costs of overheads, and variations in those costs are due to the overall activities of the company of which termination is a part as all other services are. From this follows that the service of termination should be assigned its share of this cost as any other. It should be obvious that if this rule were not followed, and the EC's new standard were applied, this would have adverse incentive effects as it would make the provision of termination services less attractive with implications for the quality of service and adequate provision of capacity for it.

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25 See EU Commission (2009b), annex.

The implications of the EC recommendation will be advantageous for new market entrants as these will in the beginning heavily depend on being able to terminate calls in other networks and termination rates determined according to the recommendation would necessarily be lower than otherwise. These operators would in general be expected to be in favour of the recommendation; the converse is to be expected from incumbent operators. WIK-Consult's position is that there exists no reason to tamper with cost determination principles and that the cost of termination should be determined by giving it the same status as, and assigning to it exactly the same types of cost elements as for on-net services.

## 8 The waterbed effect

In the submissions the Commission received on its Draft Report a wide range of arguments were made against the way the Commission dealt with the so-called waterbed effect. The waterbed effect describes the following reaction of MNOs: To compensate themselves for a reduction in termination revenues MNOs increase all or some of their mobile retail prices to keep the level of profits which they materialised before the decrease in the MTRs. A waterbed effect is said to be complete if MNOs are able to recover the reduction in termination revenue through increases in other prices to their retail customers. To begin with we briefly recognise the Commission's assessment of the waterbed effect.

Based on information on retail mobile prices supplied by Vodafone and Telecom for the last few years the Commission concluded "that any waterbed effect in recent years has been small".<sup>26</sup> The Commission has observed that retail subscription prices have continued to decline as wholesale MTRs have fallen. For its quantitative assessment of the costs and the benefits of regulation the Commission assumed a range for the waterbed effect of 0% to 50% (i.e. between 0% and 50% of lost termination revenues are recovered through higher retail prices). The Commission bases its assumptions on the assessment that competition between MNOs in New Zealand is unlikely to be sufficient to ensure that termination profits are competed away and transferred to mobile subscribers. In quantitative terms the Commission calculated a 2% increase of subscription prices induced by a 50% waterbed effect to recover the reduction in MTRs.

There is the clear result in the literature that the existence and magnitude of a waterbed effect depends on market structure. There is no waterbed effect in the sense described above under a monopoly market structure:

- According to theory, a monopolist would in its retail on-net market set charges to extract the maximum surplus or profit *independently* of what the operator could get in the regulated wholesale termination market. Actually, what we observe is that

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<sup>26</sup> See Commerce Commission (2009), p. 16.

operators offer on-net services at relatively low prices to lock in customers in order to be able to extract that maximum profit in the long- run.

- In its retail off-net market, if the monopolist sets charges at the point where marginal revenue meets marginal cost, its response to a lower mobile termination rate would in fact be a lower retail rate.

Thus, if the mobile termination rates are changed, the profit maximisation level of prices of a monopolist should on balance actually be affected in the downward, and not in the upward, direction.<sup>27</sup> The same argument holds for a (collusive) duopoly.

The waterbed effect may exist in competitive retail markets that are, however, still beset by inefficient levels of subsidisation of prices through above-cost revenues from wholesale termination services. In these markets, increased penetration say through low prices of handsets or through low or non-existing fixed access charges are paid for by the margins from above-cost termination revenues. There is no reason to assume that demanders for off-net calls should be prepared to pay for this higher, the efficient level exceeding, rate of penetration. If through lower termination prices the sources of this cross subsidisation dry up and operators have to finance any of it through their normal channels of financing, the price for these retail services may indeed go up. This is, however, nothing to complain about as in this case the adjustment in prices simply means that prices move to better reflect the scarcity value of resources which in turn means that such prices changes are welfare improving. In other words, when due to lower termination rates off-net calls become less expensive, so that their demand increases, while due to decreasing levels of cross subsidisation handsets and/or access may become more expensive (the waterbed effect) and therefore penetration may decrease somewhat, the effect on welfare will on balance be positive.

The above argument implies that on the practical level the debate on the relevance of the waterbed effect often ignores the impact of excessive termination charges on the retail pricing structure. Excessive termination rates generate an inefficient retail service pricing structure and therefore distortions of customer choice. Excessive termination rates lead to inefficiently high charges for calls to mobiles to cover at least the over-priced wholesale termination charges. High termination charges create a floor on the price of mobile-to-mobile off-net calls. They lead to higher charges for off-net calls compared to on-net calls. Once again the choice of consumers between the two call

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<sup>27</sup> It appears that NERA argues similarly when pointing out during the Commission's conference that a reduction in MTRs will reduce the marginal revenue for a monopolist, and given the profit-maximising condition for a monopolist (marginal revenue = marginal cost), this results in a change in price and output. Given that the change in marginal cost is downwards (a decrease in the MTR), the change in price would be in the same direction. For the NERA comment, see pp. <http://www.comcom.govt.nz/IndustryRegulation/Telecommunications/Investigations/MobiletoMobileTermination/ContentFiles/Documents/MTAS%20Conference%20Transcript%20-%20203%20September%202009.pdf>

types are distorted as well as the competition between MNOs of different size. Furthermore, if there is a (complete) waterbed effect, MNOs use the excessive termination revenues to subsidise other mobile services like subscription and handsets. These price distortionary effects are relevant and present even if there were a complete waterbed effect.

What will be the effects of a reduction in wholesale mobile termination rates on the structure of mobile retail prices? First of all, the mobile usage prices will decrease because the marginal cost of terminating a call in another mobile network decreases. Because on-net calls are unaffected by the decrease in termination rates, the degree of on-net/off-net price differentiation will decline.<sup>28</sup> In case of a waterbed effect retail subscription charges may be increased and/or handset subsidies may be reduced. Given the different price elasticities of demand for these mobile services, such restructuring of retail prices by itself would increase total welfare. Furthermore, inefficiencies and distortions in the handset market due to subsidisation will be decreased. Even the reduction of on-net/off-net price differentials may further increase efficiency. These differentials generate tariff-mediated externalities to particular networks. Customers subscribe to two (or more) networks to internalise these differentials to the largest degree to minimise their communications budget. Reducing the differentials reduces incentives for demanding multiple SIM cards. Multiple SIM cards increase total cost of communication and increase transaction costs of customers. A more efficient pricing structure reduces the multiple SIM card phenomenon, reduces these inefficiencies and increases welfare. Pervasively, this increase in welfare goes hand in hand with a reduction in penetration of mobile subscription, usually measured as the penetration of SIM cards, although the mobile networks in total may not lose any (real) customer.

A decrease in termination charges may also motivate MNOs to reduce customer acquisition costs to keep their former level of profits. Less competitive mobile markets often show high degrees of churn induced by financial and other incentives for customers to churn. Excessively high customer acquisition costs are a form of a rent seeking behaviour of MNOs in less competitive markets and not an expression of (efficient) competitive behaviour; therefore it generates inefficiencies.<sup>29</sup>

If there is an increase in the level of mobile retail prices due to a proposed waterbed effect and welfare is reduced due to this price increase, this decrease in total welfare may even be overcompensated by the increase in total welfare due to the efficiency gain in rebalancing the pricing structure and the reduction of distortions.

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<sup>28</sup> Such price restructuring has been observed in many markets. See e.g. Ofcom (2009), p. 37.

<sup>29</sup> Churn may be a sign of vigorous competition and, provided switching costs are low, be as sign of welfare increases.

As we will show in a summary of the latest empirical analyses, there is a wide range of results regarding a potential waterbed effect. In sum these results are not conclusive.

Genakos and Valetti (2009) tested the existence and the size of a waterbed effect both by estimating the effect of differences in the level of MTRs on price and on profitability. The authors estimate that a reduction in termination rates of 10% led to an increase in mobile outgoing prices ranging from a minimum of 2% up to a maximum of 15%. They conclude that the waterbed effect is shown to be high. Their analysis, however, also provides evidence that the effect is not complete: Accounting measures of profit (EBITDA) are positively related to MTR, which means that MNOs tend to keep part of termination rents instead of passing them on to their customers and thus suffer from a decrease in termination rates. Genakos and Valetti's results also reveal some important insights on the dependency of a waterbed effect from national market characteristics: Competition and market saturation have an impact on the size of a waterbed effect. The waterbed effect is stronger the more intense competition is. The authors also show that the waterbed effect has a differential impact on different customer types: The waterbed effect is stronger for post-paid than for pre-paid customers. This result is in line with the theoretical analysis that pre-paid customers show a higher price elasticity of demand for calls. Therefore MNOs take care that they do not lose these customers.<sup>30</sup>

We see some relevant limitations or problems in the econometric results derived by Genakos and Valetti due to the data sources and data they used. Genakos and Valetti use Teligen data for the assessment of the total bills paid by customers. This is relevant, in as much as Teligen's data are limited to the tariffs of the two largest mobile operators – this means Genakos and Valetti's results are limited to large operators; one could expect, however, different effects on late entrants with smaller market shares.

A cut of the termination rate results in lower charges for incoming FTM and off-net MTM calls (and therefore lower earnings) and in lower costs for outgoing off-net MTM calls (and therefore lower expenditure).

The net effect on a given mobile operator depends on the relative balance among these factors. Moreover, that balance is dynamic and complex – any changes in retail price will also influence usage patterns, as a result of demand elasticity.

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<sup>30</sup> This argument may appear to be in contrast with the claim brought forward by Vodafone (2009, p. 94) that it would in particular be prepaid customers that may suffer from the waterbed effect. This is supposed to be due to prepaid customers themselves being low spenders and predominantly being receivers of calls. If operators stand to earn less on incoming calls due to lower termination rates, they would tend to increase charges to these customer in a way that would hurt these customers more than corresponding increases would hurt pospaid customers. Besides it being an empirical issue to what extent the waterbed effect may vary according to customer group, efficiency requires that also the prepaid market be not unduly subsidised.

One factor that influences the relative number of off-net calls is the market share of a given operator. We assume that operators with large market shares will tend to have a larger fraction of on-net calls (both incoming and outgoing) in comparison to operators with small market shares. With regard to the balance of earnings and expenditures associated with downward changes in termination rates, large operators are likely to be affected differently than operators with small market shares. Those with small market shares have to deal with a relatively larger fraction of outgoing off-net MTM calls. They receive a relatively smaller fraction of off-net MTM calls, to which the revenues associated with any FTM calls must be added.

Even though Teligen/OECD data is often used there is reason to doubt that the Teligen data is a meaningful reflection of real costs to real consumers. They represent hypothetical prices for a hypothetical basket of services, using the least expensive services for that basket from the two largest mobile operators in the market. They do not reflect (1) how much service an average customer in a given country uses; (2) how customers are divided among operators; (3) how customers are divided among pricing plans within an operator; (4) which customers have which plans (and whether customers have plans that are appropriate to their usage – a number of studies suggest otherwise); and (5) most likely, there are details of the price plans that are not fully captured.

Andersson and Hansen (2009) tested the Waterbed effect by the hypothesis that a change in mobile termination rates does not affect the overall profitability of mobile operators (profit neutrality assumption). The hypothesis assumes that the fall in the call prices following a decrease in the termination rates will be exactly matched by an increase in the subscription fee leaving profits unchanged. To reach their hypothesis, Andersson and Hansen extended the theoretical literature on the case of asymmetric market structure, which is the reality in mobile markets. The profit neutrality assumption so far has only been derived for the case of a symmetric duopoly. Andersson and Hansen show the relevance of the profit neutrality assumption in the case of many mobile networks with asymmetric market share holds if (1) demand for calls is inelastic, (2) calling patterns are uniform and (3) all consumers subscribe to a mobile network. In their econometric test the authors cannot reject the hypothesis that profits are unaffected by an identical change in all mobile termination rates in the market.

We are sceptical on the relevance of Andersson and Hansen's results for three reasons. First of all, the assumptions under which the profit neutrality assumption has been derived, are fairly restrictive. It is simply not the reality that demand for calls is so inelastic as they would like us to believe.<sup>31</sup> Second, profits are not only affected by price changes. If call volumes increase due to a decrease in termination rates, costs per

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<sup>31</sup> See Annex I of this report.

call also decrease and profits increase at a given level of call charges. Furthermore, MNOs may also keep subscription rates unchanged and keep their profit level by lowering acquisition costs. For these reasons profit changes is not a good proxy for price changes. Third, Andersson and Hansen only tested for an identical change in all MTM termination charges; they did not include a change in FTM termination charges. In Europe regulators usually do not determine different rates or charges.

In a study conducted for Ofcom, CEG (2009) also tested the relationship between wholesale arrangements for mobile termination (charging regime and level of MTR) and key mobile market outcomes including retail prices, take-up of mobile services and usage. CEG measure the results on the take-up of mobile services as the number of SIM cards per capita. They find that the take-up of SIM cards will tend to be higher, (1) the higher the level of MTRs, and (2) if a country has adopted a CPNP regime rather than a BAK regime. This result suffers from the way take-up or penetration is measured. SIM card take-up includes as we have stated already multiple SIM cards per customer and is therefore a poor measure of penetration, in particular for countries which have a relevant degree of tariff mediated multiple SIM cards (like New Zealand)<sup>32</sup>.

Although CEG find that CPNP regimes tend to lead to lower usage, they did not find robust statistical evidence on the relationship between usage and level of MTRs.

The most important result in our context here is that CEG did not find strong evidence in relation to effects on prices. When correcting for termination fees as part of revenues per minute CEG did not find a robust relationship between the level of MTRs and retail prices.

WIK's own economic assessment on the existence of a waterbed effect is based on data on 61 MNO's from 16 Member States of the EU. These results are reported as Annex I and Annex II to this document. Our results suggest that there is no waterbed effect in the form in which Genakos and Valetti define it between termination rates and retail charges. Instead, the service based revenue per minute shows a strong positive correlation with the decrease of the MTRs.

It is regulatory best practice not to ignore the waterbed effect totally but to give it only a certain weight when calculating the welfare economic benefits of regulating the MTR. Given the theoretical and empirical results in this area regulators cannot and usually do not rely their waterbed assumptions on some uniform, quantitative number. They

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<sup>32</sup> Ofcom (2009, Annex 5) therefore uses the distinction between subscription and ownership penetration.. Subscription penetration is measured as the number of SIM cards in the population Ownership penetration on the other hand measures the proportion of population that makes use of a mobile phone. The difference between the number of subscriptions and mobile ownership can be significant. Ofcom shows for European countries differences of more than 30 percentage points in penetration on that basis.

develop their waterbed assumptions on the basis of the concrete competitive situation of the mobile market in their respective national environment. Even under the very competitive market structure in the UK which is regarded as one of the most competitive mobile market in Europe and in the world if not the most competitive, Ofcom recognises “that a significant waterbed effect is unlikely to be complete”.<sup>33</sup> Despite this assessment Ofcom decided not to rely heavily on any assumption of an incomplete waterbed effect given the lack of conclusive evidence.

In its 2007 Pricing Principles Determination the ACCC even considered that a waterbed effect was not apparent in an Australian context due to lower average retail prices and increases in handset subsidies.<sup>34</sup> The ACCC also noted the continued existence of two integrated operators in the Australian market as being not conducive to a waterbed effect.<sup>35</sup> Telstra, the largest mobile operator in Australia, supported ACCC's view “claiming that no waterbed effect exists in the Australian mobile services market”.<sup>36</sup>

After assessing the theoretical and empirical evidence as well as the status of the mobile markets and mobile competition in Europe the EU Commission came to the following conclusion on the relevance of the waterbed effects in its impact assessment on the Regulatory Treatment and Fixed and Mobile Termination Rates in the EU:<sup>37</sup> “While some retail pricing adjustments may occur, MTR reductions can be expected to ultimately translate into lower retail prices for fixed and mobile calls. As the proposed approach implies aligning termination rates to efficient cost and operators will have strong incentives to compete for subscribers, suggestions of a strong waterbed effect seem unjustified. Furthermore ... it is not expected that any initial price restructuring would negatively impact on subscription by low-end-customers.”

Our final conclusions and recommendations to the Commission regarding the waterbed effect are the following:

1. The size of waterbed effects depends on the competitiveness of the mobile market structure: There is no waterbed effect under a monopoly (or collusive duopoly) market structure and the effect, if any, should increase with the intensity of competition in the mobile retail market. Given the market structure in New Zealand, there is good reason to assume a low quantity of a waterbed effect.

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33 See Ofcom (2009), p. 28.

34 See ACCC (2007), p. 14.

35 Ibid., p. 13.

36 See ACCC (2009), p.27.

37 See EU Commission (2009c), p. 42.

2. The empirical evidence on the waterbed effect is not conclusive. The empirical evidence is in a range between 0% and 100%. It gives reason to assume the existence of some waterbed effect, but it looks definitively to be incomplete.
3. If MNOs react to cuts in termination rates by increasing (some) retail prices they seem to take care of marginal customers, who are mainly located in the pre-paid segment. In particular the emergence of a new entrant in the New Zealand market would make it difficult for the incumbent MNOs to increase mobile subscription prices. In the event that the incumbent MNOs do raise subscription prices, the new entrant will have an incentive not to follow such pricing behaviour, in order to attract such customers. Therefore, there is no reason to expect detrimental effects of a decrease in MTRs on marginal subscribers in New Zealand.
4. The market structure in New Zealand as well as theoretical and empirical evidence supports the waterbed assumptions of the Commission in its cost benefit analysis of regulation.
5. Even if a waterbed effect is complete, a decrease of excessive termination rates will increase welfare.
6. The change of the mobile pricing structure due to a decrease in termination rates increases welfare. Together with reducing further inefficiencies and distortions this effect may even compensate the reduction in consumer welfare due to an increase of the level of mobile retail prices.
7. There is another argument, why the waterbed effect is significantly incomplete derived from the MNOs own behaviour. If the waterbed were complete (or even very significant) this would imply that the MNOs' profits would be invariant or independent of the termination charges because any excess termination profits would simply be passed through to mobile subscribers and vice versa. If that were the relevant scenario, MNOs would be unconcerned about the level of termination charges. Given the heavy opposing argumentation of the MNOs against lowering the MTRs in New Zealand, this is, however, clearly not the case.
8. Neither the existence of a waterbed effect or its potential magnitude should have an impact on the need to regulate MTRs at a cost-based level. This is regulatory best practice around the world.

## 9 FTM pass-through

Fixed-line carriers like Telecom or TelstraClear claim in their submissions that the Commission takes a too narrow view of pass-through. Given the significant market relevance of bundles where FTM calls are an integrated part thereof, the Commission's concentration on just FTM call charges underestimates the effective degree of pass-through. Vodafone on the other hand points out that fixed-line customers are best off under the current MTR deeds which foresee a mandatory 100% pass-through rate obligation for Telecom and Vodafone. According to Vodafone, any regulatory approach towards MTRs would abandon this contractual pass-through obligation and will make fixed-line customers worse off. Vodafone furthermore claims that the pass-through assumptions of the Commission are inconsistent with observations in overseas jurisdictions, are not guaranteed, are too optimistic and should realistically be assumed to amount to just 41%. The expectation of the Commission that lowering MTRs would intensify competition in the fixed-line market is according to Vodafone not based on evidence and cannot justify any increase in the degree of assumed pass-through.

For the purpose of assessing the costs and benefits of regulating MTRs the Commission considers that under the factual of regulation pass-through levels are assumed to increase at a faster rate than historically observed. From the historically observed level of 75% the Commission assumes a yearly increase up to a level of "full" pass-through in 2015 of 100%. This assumption rests on the expectation that competition in the fixed-line market will increase over time as a result of cost-based regulation of MTRs.

Given the level of FTM prices in New Zealand, this assumption might even be too conservative. In our view, the Commission should not exclude the scenario of a decrease in price levels going beyond the decrease in the termination rate. If competition in the fixed-line market increases there is no reason to assume that the currently excessive margins earned with FTM calls will be unaffected. Under the 100% pass-through assumption for 2015 the price of a retail FTM call is calculated by the Commission at around 20 cpm compared to a cost of supplying a retail FTM minute of less than 10 cpm (including the MTR).<sup>38</sup> The net margin for a FTM minute of calls therefore amounts to 100%. It is unrealistic to assume that such excessive margins remain unchanged if competition increases. There is reason to assume that lowering MTRs would increase the competitive position of a fixed-line only competitor. Its costs for FTM calls will decrease while the costs of the integrated fixed-line incumbent will be less affected. The competitor(s) has(ve) clear incentives to pass-through this decrease in costs (or even more than that) to their customers to improve their competitive position. The intensified competition in the fixed market and the increased competition

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38 See Commerce Commission (2009), p. 159 and 165.

in the mobile market will induce pressure not only on the level of pass-through but also on the margins of FTM calls. This intensified competitive pressure can and in our view will result in decreases of prices that relative to the decrease in mobile termination rates may amount to more than 100%.

It is regulatory best practice to be concerned about a non-complete pass-through of cuts in MTRs to retail FTM customers. All regulators we know, however, don't see a non-complete pass-through as a reason for keeping excessive MTRs.<sup>39</sup> Instead, besides fostering competition in fixed-line markets they are considering certain regulatory measures regarding FTM retail rates.

The ACCC, for instance, recognised that reductions in FTM retail prices since 2004 have been slow in Australia compared to the regulated reductions in the MTAS price.<sup>40</sup> Although the ACCC recognised that cost savings can also be passed through via reductions in the price of other services provided in the bundle of preselected fixed-line services, the ACCC was disappointed with respect to reductions in retail FTM prices. Some FTM prices even increased. In any case the degree of pass-through remains lower than could be expected given the reductions in MTAS prices. The ACCC noted that additional regulatory mechanisms may be necessary to ensure a greater pass-through of reductions in MTAS prices, for example price control sub caps, particularly in the less competitive segments.

In its impact analysis on the Regulatory Treatment of Fixed and Mobile Termination Rates the EU Commission<sup>41</sup> assumed in a conservative estimate a relatively low level of FTM pass-through of 20% intended to mirror the fact that competitive forces are considered to be relatively weak on the fixed markets. The Commission also calculated for pass-through rates of 50% and 80%. The assumption of a relatively low value of pass-through did not hinder the Commission from choosing a far reaching approach to cut MTRs in the EU.

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<sup>39</sup> Vodafone (2009, p. 57) points out that the ACCC was disappointed at the low level of pass-through in the Australian mobile market and may for this reason have refrained from decreasing the termination rate by more than it actually did. Regarding the first part of Vodafone's claim, the ACCC's statement (ACCC, 2009, p. 24) runs as follows: "While the ACCC appreciates that there are other costs associated with delivering FTM services and that MTAS cost savings can be passed through via reductions in the bundle of pre-selected fixed line services, the Commission is of the view that the degree of pass through to FTM retail prices remains lower than could be expected given the reductions in MTAS prices. The Commission notes that additional regulatory mechanisms may be necessary to ensure a greater pass through of reductions in MTAS prices to FTM retail prices. For example, price control sub caps, particularly in the less competitive segments, may be appropriate." The statement makes it clear that the ACCC's complaint is about the low degree of competition in the fixed market and that it might consider there additional competitive remedies, but it says nothing about the low degree of pass-through being a reason for mobile termination rates to be decreased to a lesser extent.

<sup>40</sup> See ACCC (2009), p. 24.

<sup>41</sup> See EU Commission (2009c), p. 20.

## 10 On-net/off-net price differentials

In its Draft Report the Commission pointed out that on-net traffic accounted for more than 80% of all MTM voice traffic in 2008, and an even higher proportion for SMS.<sup>42</sup> The Commission attributed this high share of on-net traffic in New Zealand at least partially to excessive MTRs, which result in higher retail charges for off-net calls compared to on-net calls. This induced structure of traffic leads to a distortion in consumer demand because relatively too few off-net calls and too many on-net calls are being made. Furthermore, the Commission recognised that such distortions and high on-net/off-net price differentials have negative competitive implications, in particular with regard to a new entrant: An entrant will have limited ability to compete with low on-net prices and to offer customers similar attractive price plans. An entrant or small operator will have a relative high proportion of off-net calls and therefore has to give significant higher discounts on such calls to provide an attractive price plan for its customers. In doing so it further increases traffic asymmetries to its own disadvantage.

Despite its conclusion that above cost off-net MTM calls and SMS is likely to create a significant barrier to market entry and competition, the Commission did not consider preventive measures against discrimination between on-net and off-net pricing. The Commission took the view that a cost-based MTR would solve the competitive problems sufficiently and non-discrimination provisions are not required.

In its submission and cross-submission Vodafone argues that on-net price discounting is a usual pricing tool of any mobile operator and is an important way in which mobile operators compete to attract more customers to their networks, and has resulted in significant benefits for New Zealand consumers. Even BAK pricing is not likely to stop on-net price discounting, such pricing even appears in BAK countries like the US, Canada, Singapore and Hong Kong. Vodafone argues, that on-net/off-net price differentials have even been an important competitive tool for entrants to gain market share and in many markets it has even been introduced by them first.

2degrees highly emphasises its competitive disadvantages caused by on-net/off-net price differentials. Large on-net price discounts require large off-net price discounts for small networks to provide equivalent calling packages to customers. This would increase net out-payments and even subsidies from the small to the larger networks. The flow of traffic becomes endogenous and depends on the respective price for off-net calls. Concept Economics on behalf of 2degree works out that the coupling of high termination rates with deep on-net discounting can lead to foreclosure as the historic example of Slovenia exhibits. For that reason 2degrees argues in favour of direct regulatory intervention and remedies against on-net/off-net price differentials.

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<sup>42</sup> Commerce Commission (2009), p. 12.

The analysis of the Commission regarding on-net/off-net price differentials is strongly supported by economic theory and empirical evidence. Its conclusion represents regulatory best practice around the world.

It is a well established result in the regulatory economic literature<sup>43</sup> that the combination of high MTRs and on-net/off-net price differentials can generate strategic barriers to entry. Excessive MTRs can lead to much higher charges for off-net calls compared to on-net calls. Although differentiated on-net/off-net prices may be a usual pricing instrument of MNOs, excessive MTR levels incentivise to extend the price differential over and above its efficient level. As long as on-net costs are lower than the external costs of off-net calls, operators have an incentive to primarily sell on-net calls independent of their market share.

Besides the critical competitive implications, excessive on-net/off-net price differentials cause tariff-mediated externalities or network effects. These effects generate distortions in customer choice and other forms of inefficiencies. Large on-net/off-net price differentials incentivise customers to subscribe to several networks to maximise the budget benefits of the price differentials. The differentials create tariff-mediated externalities towards each operator's network. Thus, the benefits of interconnected systems decrease and inefficiencies due to multiple SIM cards and handsets and other transaction costs for other users emerge. Vodafone is right in arguing that there are good and efficient reasons for multiple SIM cards. It is, however, obvious that major parts of this phenomenon can be attributed to tariff mediated network effects. This assessment is supported by empirical studies.

In their empirical tests Birke and Swann (2006) examine the importance of social networks. They find that by far the main determinant of network choice was the choice of other household members. Furthermore, they find that, where on-net/off-net price differentials exist, customers tend to coordinate their subscription decisions. Their results also indicate that the importance of social networks decrease when the on-net/off-net price differential is low.

Ofcom (2009) has observed for the UK that the difference in the level of on-net and off-net charges appear to have declined together with the decrease of MTRs. Ofcom expects any remaining differences between on- and off-net call charges to continue to shrink. Off-net calls will increasingly be included in monthly bundles. In a study on the US market Ofcom has identified that in the US (a BAK country) there is often little or no difference between on- and off-net call charges, since the volume of inclusive minute buckets are so large that a per minute call charge applies to off-net calls only if consumption is particularly high.

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43 See for instance Hoernig (2007), Calzada/Valetti (2008).

It is common sense among European regulators, the ERG and the EU Commission, that excessive termination rates lead to inefficiently high on-net discounts which then create competitive distortions to the disadvantage of smaller networks. Their usual conclusion is not to control, restrict, or even forbid such differentials but to cut termination rates such that the incentives for distortive levels of on-net discounts are avoided. That is the regulatory best practice approach which the Commission is intending to apply and which we strongly recommend. This does not exclude observing the development of the level of on-net discounts. If that level is not declining together with a cut on MTRs such pricing behaviour would signal a competitive abusive and discriminatory behaviour and the Commission should reserve the right to act in such case.

## 11 Recommendations

Our report and analysis leads to the following recommendations to the Commission:

- Instead of the median, the Commission should use the average of the lowest three benchmarks from the country sample (Section 2).
- The Commission should consider the cost estimate for Australia as the upper limit for the cost of mobile termination in New Zealand (Section 3).
- The Commission should consider the cost benchmarks for termination from its country sample to also include the cost elements due to the transport between different MSCs/MGWs in the core network segments of the corresponding mobile networks (Section 4).
- A cost glide path of 6 % per annum should be regarded as justified. When applied to the proposed benchmark (representing the average of the lowest three benchmarks in the country sample), the resulting cost per minute in 2015 would be almost identical to the Commission's target value for this year (Section 5).
- The Commission should opt for "second+second" pricing since this is the standard most consistently used internationally. Also, with one exception, the benchmarks from its country sample all represent costs that include an element for the call set-up cost (Section 6).
- WIK-Consult considers the European Commission's new interpretation of the LRIC standard not to be based on sound economic analysis. The Commission should not apply it (Section 7).
- Neither the existence of a waterbed effect or its potential magnitude should have an impact on the need to regulate MTRs at a cost-based level. This is regulatory best

practice around the world. For that reason, the Commission should not deviate from its TSLRIC orientation due to any waterbed effect considerations (Section 8).

- The Commission should not exclude the scenario of a decrease in retail FTM price levels going beyond the decrease in the termination rate. If competition in the fixed-line market increases, there is no reason to assume that the currently excessive margins earned with FTM calls will be unaffected (Section 9).
- The analysis of the Commission regarding on-net/off-net price differentials is strongly supported by economic theory and empirical evidence. Its conclusion represents regulatory best practice around the world and should not be changed (Section 10).

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## Annex I

### Effects of lower mobile termination rates: Description of early results<sup>44</sup>

Our analysis on the effects of lower mobile termination rates draws on two data sources, ERG data on MTRs, and the Merrill Lynch Global Wireless Matrix. The Merrill Lynch Global Wireless Matrix displays quarterly data on company level for MNOs. We focus on information on minutes of use, voice revenue per minute, and subscriber market share. The ERG publishes its MTR snapshot every 6 months and displays country average values.

As of yet, we have accomplished two empirical assessments. The first aimed at assessing the demand elasticity for mobile voice services. The second analysed the relationship between MTRs and retail prices charged by MNOs.

#### Demand elasticity for mobile services

Our analysis is based on Merrill Lynch data on average minutes of use and average service based revenues per minute of use. The latter are PPP adjusted in accordance with the purchasing power parities published by the OECD and serve as a proxy for the retail price per minute for a mobile call. Our sample combines 61 MNOs from 16 Member States.<sup>45</sup> The period under review lies between the first quarter 2003 and the third quarter 2008. See Table 4 in the Annex II.

To estimate the elasticity of demand for mobile services, we apply the well-established Houthakker-Taylor Model (Houthakker and Taylor, 1970). This model allows for path-dependencies in usage behaviour and differentiates between short run and long run demand elasticities. This is important because post-paid mobile phone contracts usually last for at least one year and do not support easy switching. Following Dewenter and Haucap (2007), we use a dynamic GMM panel data estimator introduced by Arellano and Bond (1991). This approach allows us to include the previous period's quantity as a lagged endogenous variable without suffering from autocorrelation problems or an endogeneity bias.

We observe a short run elasticity of -0.293 and a long run price elasticity of -0.441 for the entire sample. The respective values for Germany are -0.208 and -0.738. We therefore conclude that the demand for mobile voice services is moderately elastic. This

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<sup>44</sup> The econometric estimates as well as this text has been provided by our colleagues Christian Growitsch and Scott Marcus. The full text of their work is going to be published soon in the WIK Discussion Paper series: Growitsch, Christian, Marcus, Scott and Wernick, Christian: The effects of lower Mobile Termination Rates (MTRs) on retail price and demand, WIK Discussion Paper forthcoming

<sup>45</sup> These Member States are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom.

result is in accordance with recent findings by Dewenter and Haucap (2007) on the demand elasticity on the Austrian mobile market.<sup>46</sup>

### Connection between MTRs and retail charges

Our analysis builds on PPP adjusted Merrill Lynch data on service based revenue per minute and country average MTRs published by the ERG<sup>47</sup>. Service based revenues per minute are used as a proxy for retail charges. The period under review lies between the fourth quarter 2003 and the third quarter 2008.

To identify the influence of MTRs on retail charges, we use a robust variance estimator (cf. Froot 1989 and Williams 2000). This approach avoids inconsistency problems due to possibly cluster-correlated data and allows for heteroscedasticity, both between and within clusters, as well as serial correlation.

Using PPP-adjusted logarithmised data we receive a highly significant coefficient for the MTRs of 0.85. This parameter value can be interpreted as a direct measure of the elasticity of the retail charges. Confirming first findings of a simple correlation analysis with a correlation coefficient of 0.80, our results contradict the paper on the waterbed effect published by Genakos and Valletti.<sup>48</sup> If the mobile operators raise their retail charges after MTRs are decreased due to regulatory intervention ('Waterbed Effect'), this would lead to a negative or insignificant or at most a slightly positive influence of MTR on service based revenues per minute of use (SBRM). Our results suggest that there is no waterbed effect (in the form in which Genakos and Valletti define it, which is significantly different from the way that many other authors define waterbed effect)<sup>49</sup> between termination rates and retail charges, which is in accordance with predictions made by the two path-breaking papers on network interconnection published by Jean-Jacques Laffont, Patrick Rey, and Jean Tirole (2004)<sup>50</sup>. Instead, consumers benefit from lower MTRs in terms of decreasing retail charges. This does not mean, however, that there are necessarily no negative effects on consumer welfare at all (e.g. with

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<sup>46</sup> See Dewenter, Ralf and Haucap, Justus (2007): Demand Elasticities for Mobile Telecommunications in Austria, Ruhr Economic Papers No. 17, Bochum.

<sup>47</sup> Country average values seem appropriate for two reasons: Mobile network operators are subject to symmetric MTR regulation in several Member States. Furthermore, termination rates of each individual operator are relevant for any operator either as revenue (with regard to incoming off-net calls) or as costs (with regard to outgoing off-net calls).

<sup>48</sup> See Genakos, Christos and Valletti, Tommaso (2009): Testing the "Waterbed" Effect in Mobile Telephony.

<sup>49</sup> Much of the literature defines waterbed effect as the tendency for an decrease in MTR to lead to a partially off-setting increase in monthly fees, or a decrease in handset subsidies. Our results do not disprove the existence of a relationship between MTRs and handset subsidies.

<sup>50</sup> See Laffont, Jean-Jacques, Rey, Patrick and Tirole, Jean (1998a): Network Competition: I. Overview and Nondiscriminatory Pricing, in: Rand Journal of Economics, Vol. 29, pp. 1-37; and Laffont, Jean-Jacques, Rey, Patrick and Tirole, Jean (1998b): Network Competition: II. Price Discrimination, in: Rand Journal of Economics, Vol. 29, pp. 38-56.

regard to a shortening of handset subsidies),<sup>51</sup> but the service-based revenue per minute,<sup>52</sup> which is measured in our analysis, shows a strong positive correlation with the decrease of the MTRs.

The different results can be explained by the use of different data sources. Genakos and Valletti use Teligen data for the assessment of the total bills paid by customers. This is relevant, inasmuch as Teligen's data are limited to the tariffs of the two largest mobile operators – this means Genakos and Valletti's results refer to large operators only; the ML data set, which has been used here, displays information on all operators independent of their market share. It is also impossible to know the degree to which the Teligen prices correspond to the manner in which end-users actually use voice services. The Merrill-Lynch data are not perfect,<sup>53</sup> but they reflect actual usage. We therefore present a more balanced sample with a higher validity for the market for mobile communications in Europe.

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<sup>51</sup> Since the Merrill Lynch data do not consider equipment prices, our results do not exclude that lower MTRs lead to higher handset prices (less subsidy), which is likely the case.

<sup>52</sup> Service-based revenue per minute includes (1) retail fixed monthly fees, (2) usage-based per-minute fees, and (3) wholesale termination revenues, but not equipment revenues or subsidies.

<sup>53</sup> They include not only retail revenues, but also wholesale revenues from the MTRs themselves; however, we estimate that this wholesale revenue is only about 15% of the total, so its inclusion should not introduce a large systematic bias.

## Annex II

**Table 4: Data used to compute the demand elasticity for mobile services**

Company	Country	Average Subscriber Market Share	Average Minutes of Use	Average ARPU (ppp adjusted)	Average MTR (ppp adjusted)	Average Revenue per Minute (ppp adjusted)
Mobilkom (Telekom Austria)	Austria	40,88%	147	38,93	0,12	0,23
T-Mobile	Austria	35,06%	165	35,59	0,12	0,20
Connect Austria	Austria	21,04%	N.A.	30,73	0,12	N.A.
Drei	Austria	3,48%	N.A.	N.A.	0,12	N.A.
Proximus	Belgium	48,32%	167	42,42	0,14	0,21
Mobistar (Orange)	Belgium	32,26%	N.A.	40,44	0,14	N.A.
Base	Belgium	19,43%	118	24,66	0,14	0,18
Telefonica O2 CZ	Czech Republic	41,28%	100	36,32	0,22	0,30
T-Mobile	Czech Republic	40,45%	91	33,90	0,22	0,31
Vodafone	Czech Republic	18,27%	106	45,05	0,22	0,39
TDC Mobil	Denmark	47,71%	148	21,63	0,10	0,13
Sonofon (Telenor)	Denmark	28,78%	178	26,02	0,10	0,14
Orange	Denmark	11,96%	N.A.	27,88	0,10	0,16
Telia	Denmark	17,81%	184	28,62	0,10	0,13

3 (Hutchison)	Denmark	2,37%	N.A.	N.A.	0,10	N.A.
Sonera	Finland	50,42%	268	32,61	0,08	0,11
Elisa	Finland	32,94%	284	33,93	0,08	0,11
Telia	Finland	8,43%	N.A.	N.A.	0,08	N.A.
DNA	Finland	16,28%	N.A.	26,90	0,08	N.A.
Orange	France	47,58%	178	37,30	0,11	0,18
SFR (Vodafone)	France	35,91%	291	41,46	0,11	0,13
Bouygues	France	16,51%	277	46,78	0,11	0,14
T-Mobile	Germany	38,34%	67	23,94	0,13	0,29
D2 (Vodafone)	Germany	36,42%	85	25,42	0,13	0,25
E-Plus	Germany	13,97%	101	22,74	0,13	0,21
O2	Germany	11,28%	124	29,02	0,13	0,18
Vodafone Panafon	Greece	34,54%	135	40,65	0,20	0,26
Wind Hellas	Greece	27,61%	112	33,17	0,20	0,27
Cosmote	Greece	37,86%	147	39,41	0,20	0,24
Vodafone	Ireland	50,14%	222	47,61	0,11	0,22
O2	Ireland	37,64%	223	45,91	0,11	0,16
Meteor	Ireland	12,22%	N.A.	36,95	0,11	N.A.
TIM	Italy	41,88%	120	30,49	0,15	0,21
OPI Vodafone	Italy	34,21%	138	31,27	0,15	0,19
Wind	Italy	18,06%	146	22,93	0,15	0,14
3 Hutchison	Italy	6,12%	136	37,12	0,15	N.A.
KPN Mobile	Netherlands	44,48%	128	34,14	0,14	0,23

Vodafone	Netherlands	23,66%	150	40,92	0,14	0,24
Telfort	Netherlands	12,94%	N.A.	27,32	0,14	N.A.
Ben (T-Mobile)	Netherlands	16,69%	169	38,62	0,14	0,19
Orange	Netherlands	10,89%	80	28,94	0,14	0,32
PTC (T-Mobile)	Poland	34,54%	84	31,89	0,26	0,39
Polkomtel	Poland	31,70%	87	33,52	0,26	0,39
PTK Centertel (TP SA)	Poland	33,16%	84	28,41	0,26	0,33
Play (Novator)	Poland	1,95%	N.A.	21,04	0,26	N.A.
TMN	Portugal	45,34%	120	31,91	0,21	0,23
Telecel Vodafone	Portugal	34,23%	119	35,84	0,21	0,27
Optimus	Portugal	20,42%	115	30,03	0,21	0,23
Telefonica Moviles	Spain	47,88%	144	42,45	0,14	0,26
Vodafone	Spain	29,20%	172	45,15	0,14	0,23
Orange	Spain	22,67%	131	35,22	0,14	0,23
Xfera	Spain	0,72%	N.A.	N.A.	0,14	N.A.
Telia	Sweden	46,14%	152	23,28	0,08	0,14
Tele 2	Sweden	33,98%	135	18,97	0,08	0,14
Telenor	Sweden	16,47%	171	33,14	0,08	0,18
3 (Hutchison)	Sweden	3,56%	N.A.	N.A.	0,08	N.A.
Vodafone	UK	24,73%	154	37,68	0,11	0,20
O2	UK	24,15%	158	35,67	0,11	0,17
Orange	UK	22,75%	149	34,53	0,11	0,19

T-Mobile (One2One)	UK	24,33%	160	31,34	0,11	0,16
3 (Hutchison)	UK	4,04%	N.A.	55,56	0,11	N.A.