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Mobile Termination Rates in Austria
A review of RTR's cost model

A Report for Mobilkom Austria, Orange Austria and T-Mobile Austria

March 2009

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1. Executive Summary

1.1. Terms of reference

Mobilkom Austria, Orange Austria and T-Mobile Austria ("the operators"), have engaged Ovum Consulting ("us", "we") to produce a report on the cost models produced by RTR and the proposed regulation of mobile termination rates. Specifically we were asked to examine the extent to which RTR's cost model differs from the cost models relied on by other European regulators and the potential impact of relying on RTR's model in the event that it produces results that are inconsistent with those observed in other European countries.

1.2. Scope of review

Our review has been subject to time pressure as a result of the need to present our report to RTR by Friday 6th March. As a result of this deadline, the time available to produce our report was limited to 10 days. This had an impact on the type of analysis we performed.

Within the 10 day period, it would not have been possible to take the Austrian-specific model inputs, transfer them to an alternative cost model and produce robust outputs. This is because cost models, especially those which are bottom-up in nature, are extremely sensitive to changes in inputs. Before one can rely on the outputs of a cost model, one has to be extremely careful that the demand, network size and network costs are all internally consistent and also consistent with the real-world operating conditions which the operators are subject to. We do not believe it would have been possible to reach the required level of robustness within such a short period of time.

Our analysis focused on the key modelling choices adopted by RTR and sought to answer the question – What would the modelled termination rate be if alternative modelling choices had been adopted? We then sought to identify further alternative choices that could be factored into our analysis, but which time or lack of data prevented us from reflecting in our quantitative analysis. Finally, we considered the potential impact of termination rates being reduced to the level proposed by RTR, in the event that the proposed basis for regulating termination rates was deemed to be out of line with observed practice in other European countries.

1.3. Key findings

We believe that RTR's cost modelling and proposed price setting is inconsistent with the work being performed by other European regulators and is potentially detrimental not only to the Austrian mobile operators, but also to the Austrian economy and consumers of mobile communications in general.

We have reached our conclusion based on the following key points:

- **The use of H3G as the benchmark operator is inappropriate**. H3G has a cost-base that is different to the other operators in that;
  - it has an incomplete network causing it to rely on national roaming,
  - it doesn't have any 2G network costs,
  - it was able to obtain some of the network assets of tele.ring at below cost prices, and
  - even though it is the stated aim of the 3 group to reduce termination rates, the cost inputs it provided to RTR have not been the subject of independent scrutiny
- **RTR's model does not fully explore the relationship between costs and volumes.** Given that the H3G model is not an appropriate benchmark, the next best model (in terms of producing the most efficient mobile termination rate benchmark) is Mobilkom's model. In this model, RTR have assumed that the level of cost assumed in 2009 should also be applied in 2010 even though traffic is forecast to grow by 27% during that year. Given that the model assumes that both costs and volumes will rise in 2008 and 2009, assuming that volumes will rise in 2010 but costs will remain constant is unreasonable.
- **The model relies on historic cost accounting information.** The use of historic cost accounting information for the valuation of assets and determining their associated cost recovery profile has been rejected by most European regulators that have examined the issue in detail. Instead they have chosen to reflect an economic approach to the recovery of costs taking into account the economic lives of assets, the lifetime demand for the assets, and the extent to which the price of the asset changes over its lifetime. Differences between model outputs based on economic depreciation and historic cost accounting depreciation are material and should not be ignored.
- **The allocation of cost to data is too formulaic.** RTR's model results in a far higher share of cost being allocated to data than is observed in other countries. Part of the reason is because there is more demand for mobile data in Austria. However, going forward RTR continues to forecast strong growth in the demand for mobile data. Additionally, the extent to which data traffic absorbs network costs is relatively higher in RTR's model than in other models. A more prudent approach to forecasting data growth and the extent to which it absorbs network costs would result in a significantly higher modelled cost of mobile termination.
- **The model is an average cost model.** By adopting an average cost approach, RTR has ignored the difference between incremental costs – i.e. those which respond to changes in traffic/service mix, and fixed common

costs[1]. This approach has generally been appropriate in the past when the vast majority of network traffic related to voice services. Even then, an average approach was not free from criticism given the debate about Ramsey pricing. With the development of data services, it is no longer necessarily appropriate to adopt an average approach to allocating costs. Data services and voice services have very different demand characteristics and adopting such an approach might result in an allocation of cost that the industry cannot support. We believe there is a need to fully understand the underlying cost structures of the mobile operators and allocate fixed common costs in a manner that the industry can sustain and which allows it to compete with other providers of broadband services. If this is not done, there is a risk that mobile operators will not be able to develop mobile data services effectively. This is inconsistent with the way fixed operators were allowed to develop ADSL services, which were not required to cover the fixed common costs that are shared between voice and data services, e.g. the costs of copper and duct in the access network.

Our analysis shows that by adopting alternative approaches to cost modelling (and pricing), an appropriate industry mobile termination rate for 2010 lies in the range of **€0.043** to **€0.058**. The proposed rate of €0.02 would have a detrimental impact on Austrian mobile operators who would be forced to reassess their business plans. This is likely to have a negative impact on the Austrian mobile industry, the consumers of mobile communications in Austrian and the Austrian economy in general.

We recognise that our analysis has been performed at a high-level and the range shown above does not represent a stand-alone piece of costing analysis that meets the degree of robustness that a regulator would typically seek. The main conclusions from our analysis are:

- The work **performed by RTR is not sufficiently robust**
- The modelling approaches which have not been reflected in RTR's work would result in **a materially higher modelled termination rate**
- **A rate of not less than €0.045 in 2010 appears sensible** in the context of:
  - The high-level analysis that we have performed
  - Average European mobile termination rates, and Austria's current position at the low end of the spectrum
  - The current proposal for termination rates in 2009 (€0.045)

[1] For the avoidance of doubt, when an incremental cost approach is advocated, it means an approach which appropriately identifies the incremental service costs, but also appropriately allocates the fixed and common costs to ensure full cost recovery is achieved.

- If RTR is still uncertain as to what constitutes an efficient level of termination rates based on the various sources of costing information available to them, then a far **more detailed costing exercise should be performed**. Such an exercise should build on our analysis and seek to appropriately assess the economic costs of providing the mobile termination service.

1.4. Structure of report

Our report is structured as follows:

In section 2 we set out our experience in the field of mobile termination rates.

In section 3 we analyse the RTR model, both qualitatively and quantitatively

In section 4 we describe the potential impact of the proposed regulation

In section 5 we present our conclusions

In Annex 1 we provide further details of the calculations that support our analysis

In Annex 2 we provide an alternative WACC calculation

In Annex 3 we provide an example of the impact of below cost MTRs

2. Ovum's expertise

2.1. Regulatory expertise

Ovum is an independent research and consulting company, established in London in 1985, with offices in London, Melbourne, Boston, Paris, Cologne, Hong Kong, Tokyo and Seoul. We have more than 100 analysts and consultants worldwide, dedicated to delivering authoritative analysis and tailored consultancy services to over 10,000 customers in more than 50 countries around the world.

Ovum has a long track record of providing policy and regulatory advice in telecommunications. We provide consulting services to governments, regulators, incumbent operators and new entrants. We keep abreast of the latest technical, commercial and regulatory developments in all major country markets.

Ovum's regulatory and policy practice consulting portfolio and expertise lies in the following areas:

1. Regulatory policy, licensing and frameworks
2. Market analysis and review
3. Economic and competition analysis
4. Regulatory cost modelling
5. Tariff regulation and accounting separation
6. Interconnection
7. NGN & NGA regulation
8. Regulation & convergence
9. Benchmarking
10. Spectrum policy and Digital dividend issues
11. Regulatory training
12. Extensive knowledge of best practice regulatory approaches and of regulatory regimes around the world

2.2. Cost modelling expertise

Ovum has worked on cost modelling studies, involving top-down, bottom-up and hybrid models, for operators and regulators around the world. Over the last 5 years, Ovum have conducted more than 30 LRIC modelling assignments in France, Romania, Austria, Norway, Denmark, Ireland, Poland, Sweden, Jordan, Oman, Hong Kong, Korean, Caribbean, Pakistan,

2.3. Regulatory price-setting expertise

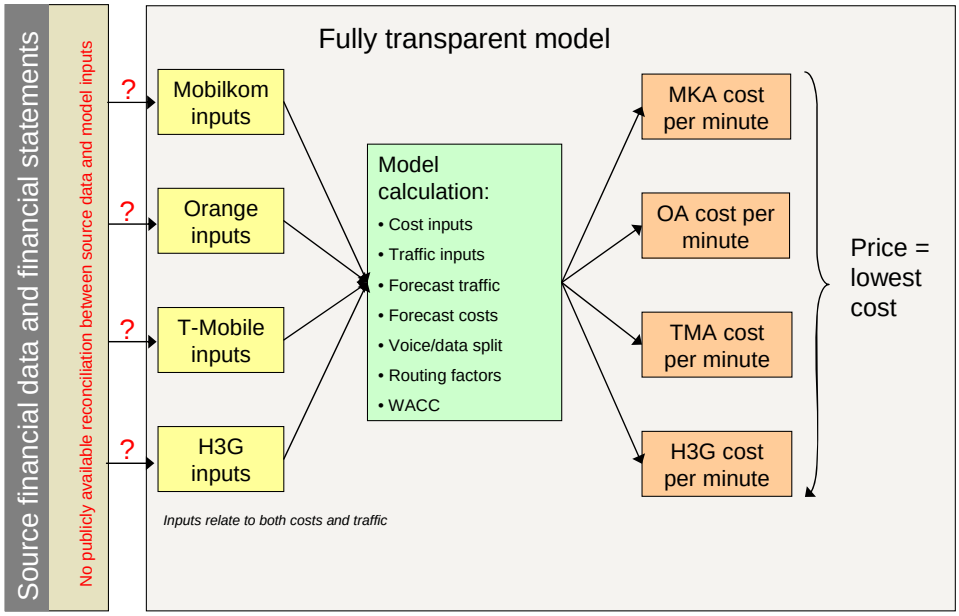
Ovum has provided regulatory advice and conducted economic analysis in supporting a number of operators and regulators in public consultation processes related to Interconnection price setting. We have developed arguments regarding the impact of potential changes in termination rates, the appropriate methodology to be considered in setting interconnection rates. benchmarking of termination rates, consideration of symmetrical and asymmetrical remedies, comparisons and economic analysis with comparable operators in other countries etc. Ovum have extensive experience with benchmarking of interconnection rates and we have carried out work on international benchmarks for interconnection prices for clients in Germany, Austria, Ireland, Norway, Denmark, the Netherlands, Peru, Poland, Argentina, Venezuela and the UK. We have also carried out reviews of mobile - fixed interconnection rates world-wide for international mobile operators in Canada, the USA, Korea, Italy, Spain, South Africa, Mexico and Japan.

3. Qualitative description of RTR model

3.1. High level model schematic

The RTR model was established a number of years ago by the RTR's own cost modelling experts. The model has been updated to reflect the latest cost and traffic data provided by the operators. The flow of data through the model is shown in the diagram below:

RTR Model schematic



Source: Ovum

The modelling process is entirely transparent from the operator-specific input stage, with each operator seeing the other operators' models. However, there is no reconciliation showing how those inputs are consistent with the data in the operators' financial systems and their financial statements and what, if any, adjustments have been made.

Additionally, we understand that no external auditor/consultant is engaged to check the data inputs for the following key characteristics:

- Accuracy
- Completeness

- Consistency across operators (in terms of interpretation of the data requirements, e.g. which costs go into which cost pools)

We believe this presents a significant risk that the different operator models are not strictly comparable. Whilst RTR bears the ultimate responsibility for the cost modelling and its inputs, to the extent that operators have significant concerns over those inputs there should be a clear process as to how those concerns can be eliminated.

3.2. Description of key modelling elements

The following are the key modelling elements:

- Cost inputs
- Traffic inputs
- Voice/data split
- Routing factors
- WACC
- Model type
- Costing standard

We briefly discuss each of these elements below.

Cost inputs

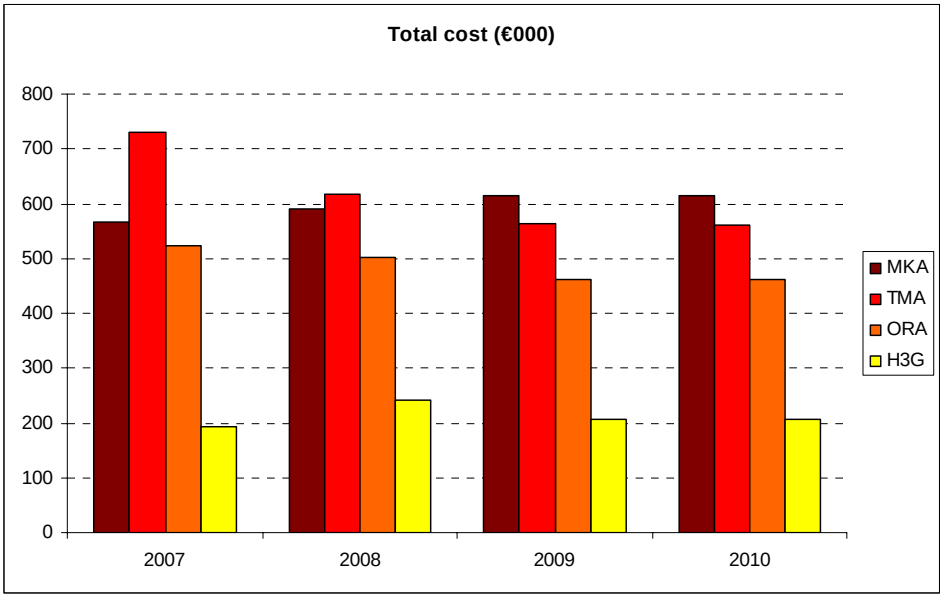
The cost inputs are provided by each of the operators for the years 2007 – 2009. The cost inputs are split between a small number of network elements (between 10 – 20 depending on which operator). For each of the network elements the cost inputs relate to:

- Book value (which is multiplied by WACC to generate the return on capital)
- Depreciation
- Operating costs

The assets in the model are valued using the historic cost accounting (HCA) convention and the depreciation of the assets is straight line depreciation. Whilst this allows for direct reconciliation with the operators financial systems and financial statements, this is not in accordance with modelling best practice. This is set out in more detail in section 4.1.

The cost inputs are a mix of both actual and forecast data. Given the timing for delivery of the data to RTR, it is likely that 2007 is entirely actual data, 2008 is a mix of actual and budget data and 2009 is forecast data. We understand that the operators did not provide a forecast for 2010 so RTR adopted their own traffic forecast and assumed that 2009 costs also apply in 2010.

Total network cost evolution



Source: Ovum analysis

Traffic inputs

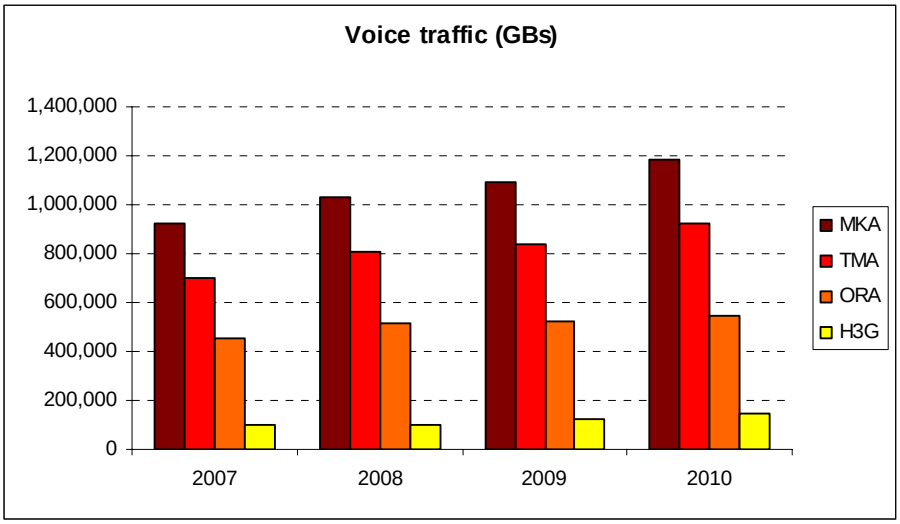
Traffic inputs are provided in detail for the various voice services. The voice services are broken down according to the calling characteristics, e.g. Mobilkom GSM to other network GSM, Mobilkom UMTS to fixed etc.

Data services are not explicitly modelled, i.e. the traffic assumptions for SMS, MMS, 3G data are not featured in main calculation elements of the model. Instead, the model assumes a voice:data split for each of the network elements and only incorporates the voice element in the model calculations. The method of estimating the voice:data split is described below.

The operators provided traffic data for 2007-2009 based on a mix of actual, budget and forecast data. RTR made its own assumptions for traffic in 2010.

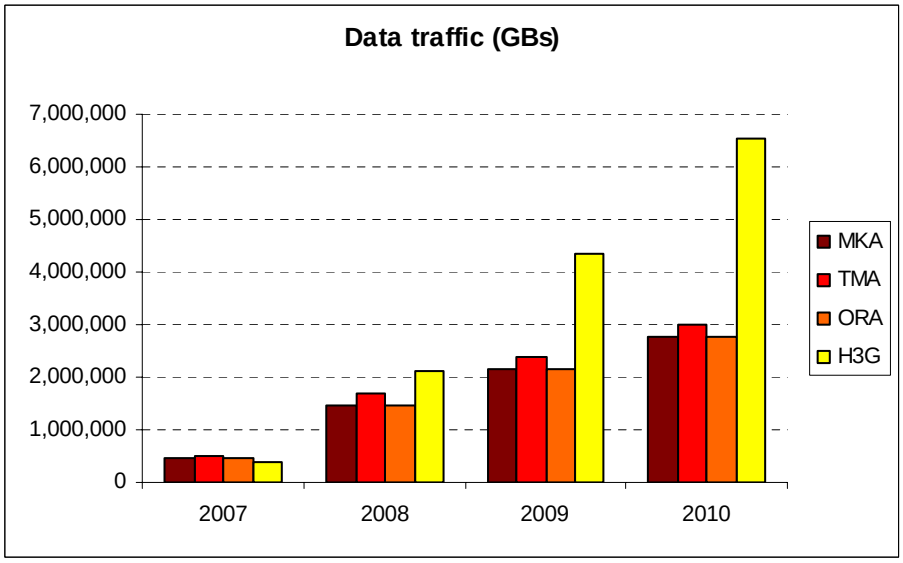
The following graphs show how traffic evolves over the four year period:

Voice traffic evolution



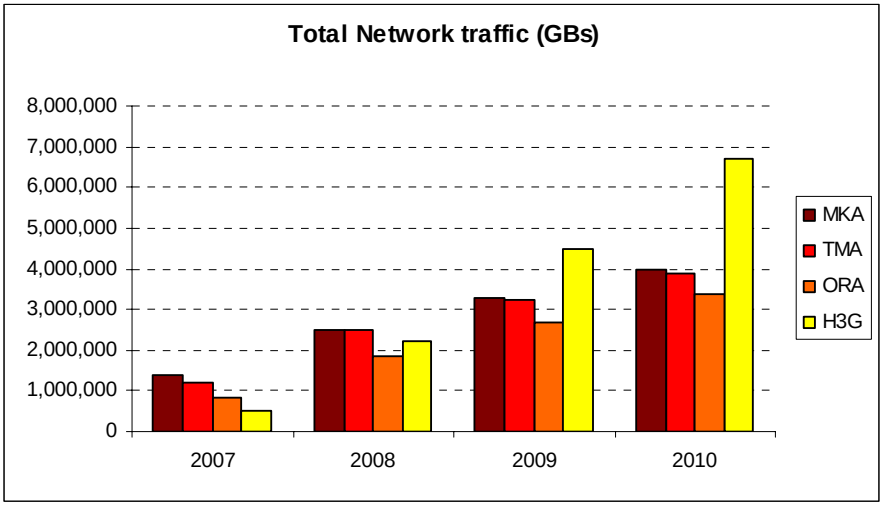
Source: Ovum analysis

Data traffic evolution



Source: Ovum analysis

Total network traffic evolution



Source: Ovum analysis

Voice/data split

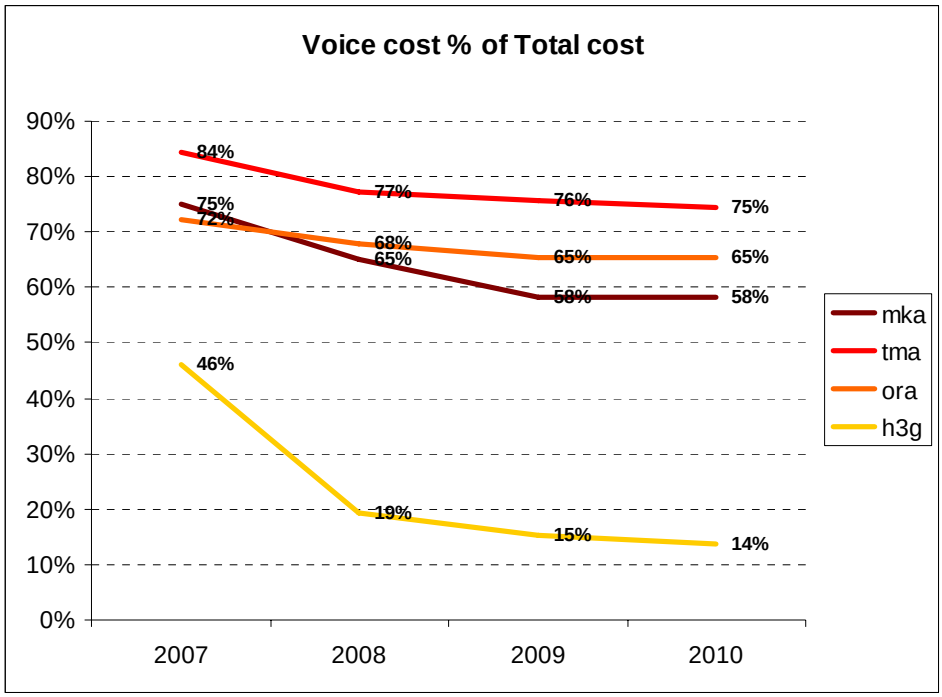
The model does not explicitly model the costs of data services. All cost elements that are specific to data products, e.g. SMSC, SGSN, GGSN are excluded from the model calculations. Where a network element is used to provide both voice and data services, an adjustment is made to the total cost of the network element to exclude the part which relates to the provision of data services. This adjustment is based on the split of annual traffic in the network. In order to assess the split, all voice traffic is converted to a data equivalent by using the following conversion:

Data rate of voice traffic: 12200 bps

Number of bytes in a minute of traffic = 12200/8*60 = 91500

This conversion factor is applied to both GSM and UMTS voice traffic and is also applied in both the core network and radio network. The graph below shows the proportion of costs that are allocated to voice in each of the models

Share of voice cost as % of total cost



Source: Ovum analysis

Routing factors

Having established the amount of cost that needs to be allocated to voice products, the model uses a combination of total demand and routing factors to allocate the costs on an element-by-element basis.

WACC

Each operator has its own assumption for WACC as shown below;

H3G	16.02%
Mobilkom	12.77%
Orange	12.88%
T-Mobile	12.89%

Model type

The RTR model is a forward-looking top-down model. Regulators typically have to choose between top-down and bottom-up models. Most regulators in Europe have adopted a bottom-up approach with top-down financial and operational data used

to check that the model outputs are not unrealistic. This hybrid approach to modelling is often deemed to be ideal as it allows the regulator to consider forward looking forecasts based on established engineering and costing principles. At the same time, the outputs of the model are reconcilable to actual data to ensure that it is not producing levels of efficiency that are unachievable in the real world.

The only other example of a **forward-looking** top-down model that we are aware of is the model built for the BIPT in Belgium. However, in this model, the top-down data was only used to generate a base year for the model. For the forward-looking elements, cost volume relationships were used to forecast costs. Additionally, accounting depreciation was not used in the model. Instead, economic depreciation was used. It is also interesting to note that BIPT have only used a top-down model in a previous mobile costing exercise. They are currently in the model of renewing their mobile costing analysis and have decided to rely on a bottom-up model instead.

We do not believe using a forward-looking top-down model based on operators' estimates is appropriate. The results of such an exercise are not sufficiently robust for the purpose of setting future termination rates. When setting budgets and forecasts there is often a temptation to over-estimate demand and under-estimate costs. We believe a more rigorous forecasting approach is necessary if RTR want to rely on any top-down information other than the historical data provided by the operators. It is already clear at the start of 2009 that the market conditions are vastly different to those that were forecast a year ago. We do not believe these conditions are reflected in the explosive growth that is forecast in each of the operators' models.

Costing standard

The costing standard used in the model is the average cost standard. The RTR makes no distinction between either variable and fixed costs or incremental and joint costs. The typical approach adopted by other European regulators is the long-run incremental cost approach (LRIC) or the long-run average incremental cost (LRAIC) approach.

3.3. Model outputs

The table below sets out the modelled termination rates for each operator for each year:

RTR model outputs

€cents	**2007**	**2008**	**2009**	**2010**	***CAGR %***
H3G	8.32	4.52	2.71	2.01	-38%
Change %		-46%	-40%	-26%	
Mobilkom	3.72	3.04	2.73	2.47	-13%
Change %		-18%	-10%	-9%	
Orange	4.44	3.86	3.56	3.43	-8%
Change %		-13%	-8%	-4%	
T-Mobile	7.30	4.77	4.02	3.63	-21%
Change %		-35%	-16%	-10%	

Source: Ovum

The table shows large reductions in the modelled cost per minute of mobile termination, especially for H3G.

3.4. Pricing methodology

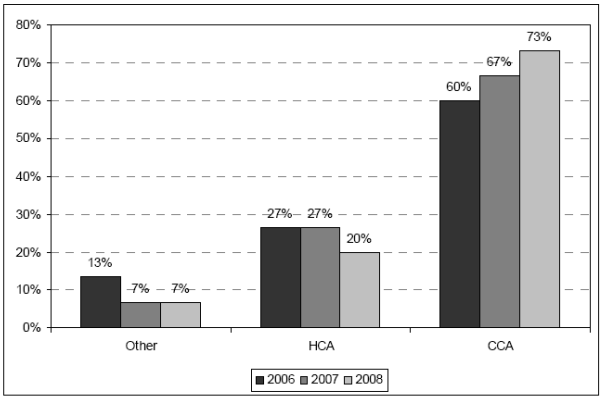
The price level for the market is set at the lowest cost per minute from each of the four operator-specific models. In this case, it is the cost per minute of H3G that is the lowest and RTR is proposing that all operators migrate to a MTR of €0.02 in 2010.

3.5. Summary of European NRAs' models

The ERG has prepared a detailed study looking at the modelling choices adopted by European NRAs[2]. The table below shows that in adopting an average cost approach based on historic cost data, RTR is out of line with the approach adopted by most European NRAs, which is to adopt a LRIC (plus mark-up) approach using current cost data. The graphs below, which are taken from the ERG study show that 67% of respondents adopted a LRIC model and 73% revalued assets to reflect current prices, which is part of the economic depreciation calculation.

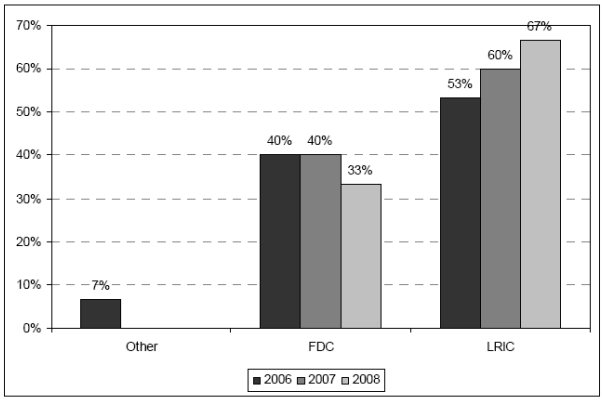
[2] http://www.erg.eu.int/doc/publications/erg_08_47_final_ra_in_practice_081016.pdf

Figure 11 - Cost Base Mobile Call Termination (Mkt 7, previously Mkt 16)



Source: IRG 2008 RA database
Number of countries: 15

Figure 12 - Accounting methodology Mobile Call Termination (Mkt 7, previously Mkt 16)



Source: IRG 2008 RA database
Number of countries: 15

4. Analysis of RTR model

4.1. Quantitative analysis

In this section we set out the impact – in terms of the modelled cost of termination – of the modelling choices that RTR has adopted. We set out the rationale for our analysis and its outputs in this section.

The key modelling choices that we have been able to perform quantitative analysis on are:

- The use of H3G as a benchmark
- Relationship between costs and volumes
- Depreciation/Valuation methodology
- Allocation of costs to voice and data
- The adoption of an average cost approach

We deal with each of the above issues in turn.

The use of H3G as a benchmark

It is our opinion that the H3G model does not necessarily provide an appropriate pricing signal that can be applied to the other network operators for the following reasons:

- H3G has a national roaming arrangement with Mobilkom and as such it's cost per minute, *ceterus paribus,* is unlikely to be achievable by the other network operators
- H3G acquired tele.ring's infrastructure assets for a below cost price
- H3G, as a 3G only operator, does not have the same cost structure as the other operators
- H3G's modelling inputs have not been subject to external, independent scrutiny

Each of the above reasons is dealt with in turn below.

The impact of national roaming

Where one (or more) of the network operators relies on national roaming instead of building out its own national coverage network, the NRA must be extremely cautious when considering the cost outputs of either the network(s) that relies on national roaming, or the network(s) that provides national roaming. This is

because either of these operator types might be generating a level of cost efficiency that is not achievable by other players in the market.

We have produced a simplified example to demonstrate the above point. The details of this example are contained in Annex 1. The example assumes that the only difference between the operators is that one operator relies on national roaming and one operator provides it. Otherwise traffic and cost assumptions are identical for each operator. Whilst this is clearly not consistent with the real world conditions that the Austrian industry operates under, it isolates the impact of using an operator that relies on national roaming as the cost benchmark. In our opinion, the impact of national roaming (in isolation) results in an expected cost benchmark that is not achievable for the industry as whole. Therefore, RTR should not use H3G's model output as the market rate unless it can unequivocally demonstrate that the expected effect is not actually observed. We are not aware of RTR having produced any such analysis.

The key points that arise from the simplified example are:

- The average cost per minute for a national roaming operator is expected to be the lowest in the market
- Using the national roaming operator's cost per minute as the industry rate results in the other operators making economic losses
- It is also possible to argue that the national roaming provider is not a good benchmark for the rest of the industry

We believe the impact of national roaming alone is sufficient to generate significant doubt as to the appropriateness of the H3G cost per minute as an industry benchmark.

The purchase of tele.ring's infrastructure assets

We understand that H3G acquired Tele Ring's assets at a significant discount to the market price for those assets. We also understand that the value of these assets has not been restated to market value with respect to the cost inputs in H3G's model. As a result, using H3G's model would result in a level of cost efficiency that would not be achievable by even the most efficient operator in any market. We believe that this reason alone is sufficient to render the use of H3G's model as an inappropriate benchmark for the industry as a whole.

The impact of using a 3G-only operator

When setting a cost benchmark, it is vital that the benchmark is achievable by the rest of the industry. We are not aware of any regulator in Europe setting a cost benchmark for 2G/3G operators on the basis of a 3G only operator. The EC draft recommendation on termination rates does not recommend setting termination rates on the basis of a 3G-only operator. In most cases a 2G/3G operator is selected because the observed unit costs of the 3G only operators are typically higher – due to scale effects – than the unit costs of 2G/3G operators.

In this case, the observed unit costs of the 3G only operator are the lowest, and therefore seemingly the most efficient. If RTR wants to set the industry benchmark on this basis, it must allow the 2G/3G operators to become "efficient". It is not possible to switch off a 2G network overnight and migrate all traffic onto the 3G network instantaneously. There will be significant decommissioning costs associated with switching off the 2G network as well as the costs of migrating customers onto 3G handsets.

It is our opinion that the H3G modelled costs are not sufficiently reliable as a basis for setting industry-wide prices. However, if H3G's modelled costs are deemed sufficiently reliable, and they are the most efficient network operator, the fact that they only operate a 3G network would make their cost efficiency unachievable in the short term, and RTR would need to allow longer than one year for the 2G/3G operators to achieve that level of efficiency.

External review of cost modelling inputs

Each operator is responsible for providing RTR with the model inputs. It is our understanding that no independent checks have been performed to ensure that the data provided by each of the operators is accurate, complete and free from interpretation errors. We understand that some checks are performed by RTR's experts, but these checks do not constitute a complete independent review.

We are aware that H3G are part of an international group that has the stated strategy of reducing termination rates. Additionally, the cost per minute observed in H3G's model is low by international standards. Therefore, we believe it is only appropriate to rely on H3G's model inputs if they are subject to independent checks.

As noted in section 3.1 RTR bears ultimate responsibility for the const inputs that it uses in its model. However, given that the industry is going to be regulated on the basis of that model, it should take into account any concerns the industry has over the inputs to the model.

We believe that the four reasons set out above are each sufficient in their own right to negate the possibility of using H3G as the benchmark operator for the industry. When applying all the reasons in combination, we believe there a very strong case against using the H3G model. If RTR continue to advocate the use of the H3G model, they would be concluding that a 3G-only operator with the stated aim of lowering termination rates, that was able to obtain network infrastructure at a discount to cost should be able to influence the industry level of termination rates on the basis of the unaudited cost inputs that it provides. We do not believe that this is a supportable conclusion.

The appropriateness of using Mobilkom to set the market price

The next lowest modelled termination rate is that of Mobilkom. Whilst the national roaming example demonstrates that an operator that provides national roaming

might enjoy a cost advantage over its rivals, we do not believe that the effect will be significant enough in this case[3]. Therefore, as long as there are no structural cost differences between Mobilkom Austria and the other operators, it is appropriate to use Mobilkom Austria as the benchmark operator for the setting of termination rates. However, in the event that the other operators believe that Mobilkom Austria does have a structural cost difference, it will be incumbent on RTR to examine their claim and provide reasons why Mobilkom is a reliable benchmark. In the event that an alternative cost modelling exercise was performed, we would recommend considering a hypothetical average efficient operator rather than basing industry MTRs on a single player in the market.

The remaining quantitative analysis is performed on Mobilkom's model, given that it appears to be the most appropriate benchmark, based on RTR's method for setting the industry mobile termination rate. We have focused on the forecast cost per minute in 2010 as we believe this is likely to inform the rate that RTR will enforce in 2010, nothwithstanding all the difficulties associated with producing robust forward-looking top-down cost models.

Relationship between costs and volumes

The RTR model has assumed that the forecast costs from 2009 should be held constant in 2010. We do not believe that this is an appropriate assumption, given that costs and volumes had both increased in 2008 and 2009 and volumes were forecast to increase again in 2010.

In the absence of detailed forecast assumptions and cost volume relationships, it is not possible to accurately predict the extent to which costs are likely to increase in 2010. However, we note that costs in both 2008 and 2009 were forecast to increase by 4%. Therefore, we have also increased 2010 costs by 4%. We recognise that this is somewhat simplistic, but we believe it is an improvement to the even more simplistic assumption that costs remain constant between 2009 and 2010. Clearly, a more detailed forecasting exercise would produce more robust results. However, for the purposes of this exercise, we believe that a 4% increase in costs gives a more reliable starting point for assessing the cost of mobile termination.

The impact of this assumption increases the Mobilkom 2010 modelled cost of termination by €0.0012.

Depreciation / Valuation methodology

Application of economic depreciation to capital expenditure

[3] National roaming minutes when compared to total minutes on Mobilkom's network are immaterial. This is not the case for H3G given its lower level of voice traffic.

The model uses historic cost accounting for the valuation and depreciation of assets. As shown in annex 1, we believe that using historic cost accounting provides the wrong pricing signals and can result in material differences between the modelled cost of termination and the price a rational operator would charge under long-run competitive conditions.

The use of economic depreciation in mobile cost models is widespread. The most common form of economic depreciation recovers costs as a function of investment cost, asset price changes and lifetime demand for the asset. This version of economic depreciation has been used by many European regulators including Ofcom, NPT, OPTA, BIPT, NITA, PTS and EETT.

As explained in Annex 1, even though historic cost accounting was used in the past, the effect of doing so is likely to have been less material based on the timing of regulation with respect to the average age of assets. However, at this point in time, the depreciation method is material to the model output and should be in line with industry best-practice.

In order to fully assess the impact of economic depreciation, it would be necessary to analyse Mobilkom's investment and demand profile since the inception of its GSM network. This was not possible in the timeframe allowed for this project. Instead, we have estimated the effect of economic depreciation using the following sources:

1. The publicly available UK model which includes a module that compares economic depreciation and straight line depreciation
2. A non-publicly available Scandinavian model which includes the same module as the UK model
3. A generic example that compares economic depreciation and straight-line depreciation with a set of assumptions that are consistent with the demand and investment profile of a generic mobile operator

When compared to our generic example, we find that the results of the UK and Scandinavian model are not out of line with our expectations. Therefore, in order to estimate the impact of economic depreciation in the RTR model we have increased asset costs by between 22% (UK model) and 60% (Scandinavian model). We have applied this to all the 2010 asset-related costs in Mobilkom's model.

The impact of this assumption increases the Mobilkom 2010 modelled cost of termination by between €0.0028 and €0.0078 depending on whether asset costs were increased by 22% or 60% respectively.

Application of economic depreciation to operating expenditure

In the first instance, we have only adjusted the asset-related costs in Mobilkom's model to estimate the impact of economic depreciation. However, in the regulators' models that use economic depreciation, the methodology has been applied to both capital and operating costs. Whilst the rationale for applying this methodology to operating costs is not made explicit, we believe there is good

economic rationale for such an approach. The distinction between capital costs and accounting costs can be somewhat arbitrary, e.g. there is no real reason why a rational operator (pricing according to long-run considerations) that leases its backhaul network should recover its costs in a different manner to a similarly rational operator that builds its own (identical) backhaul network. However, if economic depreciation is only applied to capital investments, the operator that leases backhaul will not take into account lifetime demand in recovering its backhaul costs whereas the operator that builds its own backhaul network will.

We recognise that adopting such an approach is a step change from the existing accounting-based model that RTR is using. However, there is significant precedent for this approach[4] and we believe it can yield superior cost and price signals. Therefore, we have used the same sources described above to estimate the impact of using the widely-accepted methodology for recovering operating costs. The result is to increase Mobillom's operating costs by between 26% (UK model) and 39% (Scandinavian model).

The impact of this assumption increases the Mobilkom 2010 modelled cost of termination by between €0.0030 and €0.0045 depending on whether the operating costs were increased by 26% or 39% respectively.

Allocation of costs to voice and data

One of the biggest determinants of the modelled cost of termination is the proportion of cost that gets allocated to data products. We believe there are two fundamental questions that need to be answered with respect to the allocation of costs to data:

- To what extent should extraordinary growth in demand for data products be factored into mobile termination rates?
- To what extent should the demand characteristics of the different products be reflected in their pricing, and how can the cost modelling be adapted to reflect those characteristics?

We believe that an alternative approach could have been considered by RTR in answering both of the above questions. We have sought to quantify the effect of both, and as a result we estimate the impact of different approaches to modelling data services in two steps.

Step 1 looks at how other regulators have allocated costs to data products both in terms of the level of demand forecast and how that demand has absorbed costs. Step 2 looks at the modelling approach adopted and examines whether alternative

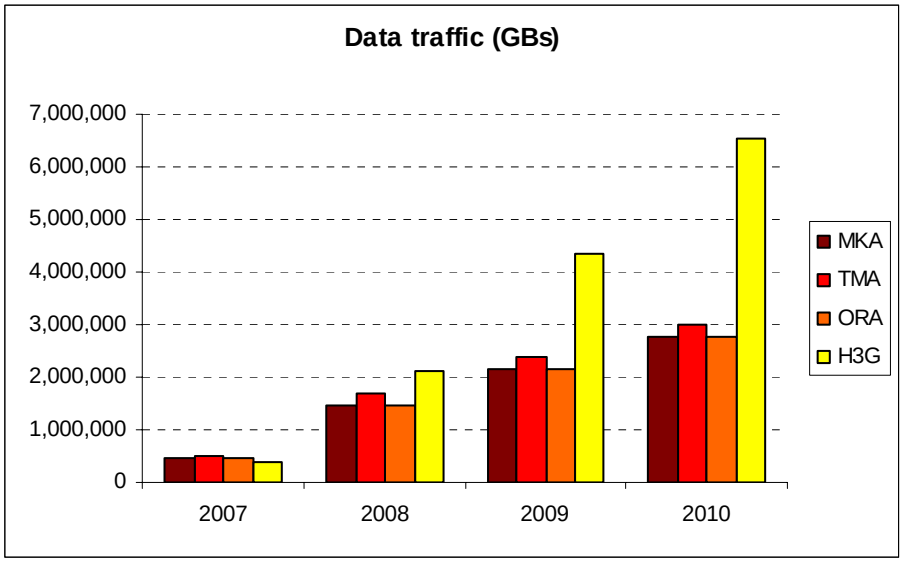
[4] In p. 24 of the ERG report only one NRA responded that it uses current costs for network assets and historic costs for operating expenditure.
(http://www.erg.eu.int/doc/publications/erg_08_47_final_ra_in_practice_081016.pdf)

approaches are required to take into account the different demand characteristics of the services being modelled.

The growth in data services and the extent to which data absorbs costs

RTR has assumed that the explosive growth in data services will continue through the whole modelled period, as shown in the graph below.

Data traffic evolution



Source: Ovum analysis

By 2010, it is assumed that Mobilkom's network will be 70% data and 30% voice in terms of traffic. This compares with only 34% data in 2007.

The table below shows the assumptions other regulators have adopted with respect to the proportion of network traffic that is data:

Share of data traffic

	2007	2008	2009	2010
Arcep (2G, 3G)	14%	22%	29%	35%
Ofcom (2G, 3G)	4%	8%	16%	29%
Scandinavian NRA (2G, 3G)	2%	3%	4%	5%

Source: Ovum analysis

The Scandinavian regulator has adopted a very prudent approach to recognising data in the MTR model. Given that data is already very established in Austria, we have ignored the Scandinavian model from our calculations. We also note that some NRAs, e.g. NPT in Norway and OPTA in The Netherlands, have not included any UMTS data traffic in their MTR models. This results in all costs that are

incurred jointly in providing voice and data services being allocated to voice services. This is discussed further below.

We believe that RTR's assumption of 70% data traffic in 2010 does not reflect the prudence that other regulators are adopting with respect to demand for data services. Whilst we recognise that some of the growth in demand for data has already materialised, RTR still expects a 27% increase in demand for data in 2010. We believe this is difficult to justify given how much data is already demanded, and the current economic position which suggest that many industries will have to scale back their expectations of growth in 2009 and 2010.

Apart from the issue of forecasting demand for data, there is also the issue of how much cost should be allocated to data based on that level of demand. The table below shows the proportion of cost allocated to data (excluding any data specific assets in order to be consistent with the RTR model) in the models analysed above.

Data costs as % of total costs

	Share of data traffic costs to total costs			
	2007	2008	2009	2010
Arcep (2G, 3G)	8%	10%	11%	13%
Ofcom (2G, 3G)	3%	4%	8%	13%

Source: Ovum analysis

When comparing RTR's Mobilkom model to the UK and French models we observe a very different relationship between data traffic and data costs as shown below.

Relationship between data cost % and data traffic %

	Data cost%/Data traffic %
Arcep	0.38
Ofcom	0.46
Average Arcep/Ofcom	0.42
RTR	0.60

Source: Ovum analysis

The table shows that for every % of traffic that is data, the RTR model allocates proportionately more cost than either the Arcep or Ofcom models. If we apply the average Arcep/Ofcom factor to the Mobilkom model, the proportion of costs allocated to data in 2010 reduces from 42% to 30% (i.e. 70% data traffic multiplied by 0.42 = 30%).

As noted above, we also believe that a more prudent approach to forecasting data should be adopted. If the growth in data is reduced to keep the proportion of data traffic at 59% as is assumed for 2008 in Mobilkom's model, the proportion of cost allocated to data in 2010 decreases from 42% to 25%. This is still significantly above the absolute level in the Arcep and Ofcom models, but is in our opinion a more prudent basis for setting termination rates.

If the proportion of cost allocated to data is limited to 30% the Mobilkom 2010 modelled cost of termination increases by €0.0051.

If the proportion of cost allocated to data is limited to 25% the Mobilkom 2010 modelled cost of termination increases by €0.0074.

The adoption of an average cost approach

As noted above, it also important to decide whether the demand characteristics of the different services being modelled should be reflected in either the modelling of cost, or the pricing that follows from the cost analysis.

It has been widely accepted that the best methodology for regulating telephony services is a form of long-run incremental costing (LRIC). There has been much debate about what form of incremental costing should be used and how fixed and common costs should be treated, but the debate hasn't moved away from the notion that regulated prices should be based on a form of incremental costing.

However, many NRAs have not adopted LRIC and have chosen to regulate mobile termination rates using an average cost model. NRAs have not always explained why they have adopted an average costing approach, but there have been two main reasons that have typically been cited:

- LRIC is more complex (i.e. less understood) and more expensive to implement; and
- If you apply an equi-proportionate mark-up (EPMU) to the LRIC, it is usually the case that LRIC + EPMU is approximately equal to average cost[5]

Whilst we recognise that the cost of regulation should not exceed the benefits that it brings, we believe the second reason to be more important, and worth investigating further.

We understand why regulators in the past have not necessarily seen the need to implement LRIC in order to regulate prices. Mathematically, as explained above, it didn't appear to produce significantly different model outputs[6] and therefore the tried and tested approach of average costing appeared favourable.

However, there are some implicit assumptions involved with adopting an average cost approach which we believe were largely acceptable in the past, but are no longer necessarily acceptable.

In adopting an average cost approach, a regulator is effectively saying that all services are comparable and should be treated equally. Costs should be allocated

[5] In fact, if the cost function is linear, LRIC+EPMU = Average cost

[6] It should be noted that small differences in model outputs can have a dramatic impact on an operator's business and therefore we would still advocate a LRIC approach in the first instance.

using an allocation key that doesn't need to consider whether the costs are fixed or variable. Many mobile operators argued with this notion and claimed that the demand characteristics of the different services rendered them unequal and used this to justify their claims that Ramsey pricing should be adopted for allocating fixed and common costs. Many difficulties were encountered in trying to implement Ramsey pricing and regulators adopted either a pure average costing approach or a LRIC+EPMU approach, the outputs of which were broadly comparable.

However, going forward, it is not necessarily the case that the services currently being considered in mobile cost models are comparable. Specifically, we believe that for most mobile operators, data is not necessarily a comparable service to voice.

How to adopt an incremental cost approach

At the extreme, we believe it is possible to argue that data services on mobile networks are not yet viable as stand-alone products. That is to say, if an operator wasn't able to offer voice services, it would not offer data services (and we do not consider voice migrating to data-style products) as the revenue that can be generated from data services would not be sufficient to cover the costs of the network (based on consumers' willingness to pay). However, if an operator was not able to offer data services, it would continue to offer voice services as the revenue they generate is sufficient to cover the costs of the network.

Whilst we recognise that this is an extreme case, we do not believe this is divorced from reality. Fixed broadband (ADSL) was allowed to develop as a product by only absorbing its own incremental costs. Shared costs with voice, such as copper, were not allocated to ADSL services as they were already covered by PSTN line rental. This remains the case for ADSL products that are purchased as part of a bundle of fixed telephony services, allowing fixed operators a degree of flexibility in how they choose to price services which have different demand characteristics. By allocating costs to voice and data without taking into account the demand characteristics of the different services, we believe RTR are removing some of the pricing flexibility that is needed for the development of mobile data services.

We also note, that in producing models without any UMTS data, NPT in Norway and OPTA in The Netherlands have also implicitly adopted this approach.

In annex 1 we set out a mathematical example showing the impact of incremental costing when a service is not viable in its own right. Based on the example, we conclude that adopting an average cost approach when modelling voice and data services in combination gives the wrong pricing signal for mobile operators.

In our opinion, the use of an average cost approach in the RTR model is no longer appropriate given the very different demand characteristics of mobile voice and mobile data products and an approach that properly distinguishes between incremental and joint costs – which are then appropriately allocated – should be adopted.

In terms of quantifying the impact of moving from an average to incremental cost approach, it was not possible to perform such a detailed study in the limited time

allowed for this report. However, we have performed a very high-level estimate of the impact of applying an incremental cost approach with data only able to recover its variable incremental costs and voice (including the termination service) being required to recover its own variable incremental costs and also all the fixed costs[7]. We have only applied this change to the UMTS network costs where we have assumed that the level of costs that are invariant to traffic ranges between 30% and 50%[8]. We believe this to be a prudent estimate given the level of traffic growth observed in the modelled period compared to the growth in cost.

By adopting an incremental cost approach to modelling voice and data, the modelled termination rate increases by between €0.0051 and €0.0085 depending on whether the share of costs that are invariant to traffic are 30% or 50% respectively[9].

It is possible to argue that the incremental approach should be considered over and above the increase which results from the lower data traffic forecasts, and data traffic attracting a lower proportion of cost than voice. We recognise that in producing their cost models, Arcep and Ofcom might have considered the different demand characteristics of voice and data and tried to reflect this in their modelling by adopting prudent data traffic forecasts and prudent[10] methodologies for allocating costs between voice and data. If we combine the impact of the incremental approach with the lower data forecasts and share of network cost, the modelled termination rate increases by between €0.0087 and €0.0122 depending on whether the share of data costs and the percentage of costs invariant to traffic were 30% and 30% respectively or 25% and 50% respectively.

Quantification of demand characteristics

The estimation of demand elasticities is complex and is one of the reasons why regulators have not implemented Ramsey pricing or other approaches that rely on elasticities of demand.

The two main methodologies used to estimate demand elasticities are:

- Statistical methods – typically regression analysis based on historic price changes and their impact on demand. The main shortcoming with this approach is the difficulty of capturing all the relevant factors that have caused

[7] This is a short-cut to the more rigorous approach of allocating the fixed and common costs in inverse proportion to the demand elasticities – i.e. Ramsey Pricing.

[8] It should be noted that costs that are invariant to traffic can still be incremental to a service or group of services.

[9] This effect cannot be seen in the summary table. It represents performing step 5 without performing step 4 first.

[10] Prudent in this regard means a methodology which does not result in an excessive level of cost being allocated to data products, given the demand characteristics of data services when compared to voice services.

demand to change and how to ensure that the observed relationships are statistically meaningful.

- Survey methods – this involves asking a sample of consumers a series of questions to identify their purchasing preferences both with respect to the product in question, but also with respect to changes in the prices of complementary and substitute products. The main shortcoming of this approach is the risk that consumers' actions in the real world differ from the answers they give to theoretical questions.

Although both of these methods are difficult to implement, the impact of demand characteristics should not be ignored. We believe RTR should adopt one of the following three choices:

1. Attempt to estimate the demand elasticities for the different services in conjunction with the mobile operators using one of or both of the methodologies described above. The outputs from such a study can then be used to inform the extent to which data services can absorb fixed and common costs vis-à-vis voice services; or
2. Do not attempt to estimate demand elasticities and accept the operators' view that the price elasticity of demand for data services make it impossible for it to absorb cost alongside voice services on an average basis and therefore voice services absorb a higher proportion of the fixed and common costs; or
3. Perform a detailed analysis of the market for mobile data services vis-à-vis voice services. This will include an analysis of how much Austrian consumers are currently paying – on average – for a MB of data compared with how much they are paying for a MB equivalent of voice communication. Based on this analysis, it will be possible to estimate the implied elasticities that would be required in order to adjust the pricing of data to be consistent with RTR's cost modelling.

We believe that any of the three approaches would be better than simply assuming that voice and data services are comparable services and can absorb costs equally.

Summary of quantitative analysis

The table below summarises the impact of each of the changes described above. We have used a low, medium and high approach whereby low reflects the scenario where asset and operating costs increase by 22% and 26% respectively, data cost is limited to 30% of total cost and 30% of the cost is invariant to traffic, high represents the scenario where asset and operating costs increase by 60% and 39% respectively, data cost is limited to 25% of total cost and 50% of the cost is invariant to traffic and finally medium reflects the average of those two scenarios.

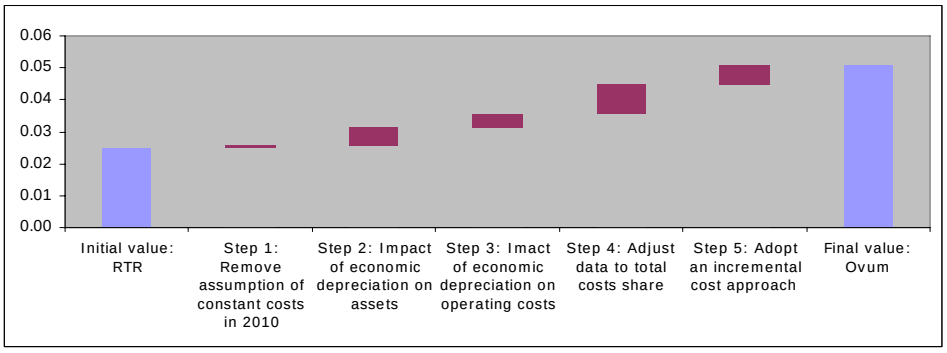
Impact of modelling choices

Adjustments on Mobilkom's 2010 MTR value	Low	Average	High
Initial value: RTR		0.0247	
Step 1: Remove assumption of constant costs in 2010		0.0259	
Step 2: Impact of economic depreciation on assets	0.0289	0.0314	0.0340
Step 3: Impact of economic depreciation on operating costs	0.0321	0.0355	0.0388
Step 4: Adjust data to total costs share	0.0386	0.0446	0.0507
Step 5: Adopt an incremental cost approach	0.0433	0.0508	0.0582
Final value: Ovum	0.0433	0.0508	0.0582

Source: Ovum analysis

The graph below shows the effect of all the changes considered sequentially and in combination.

Cumulative effect of model changes



Source: Ovum analysis

Our analysis demonstrates that a few critical changes to modelling principles can result in an appropriate cost of mobile termination in 2010 increasing from RTR's original position of €0.02 based on the H3G model to a middle value €0.051 based on the Mobilkom model.

As noted above, it could be argued that the adjustment to data share of total costs and the adoption of an incremental cost approach are in fact the same effect and should not be considered additively. In order to counter this claim, we believe a range of termination rates in 2010 from €0.043 to €0.058 should be considered as the output from our quantitative analysis rather than a single specific rate.

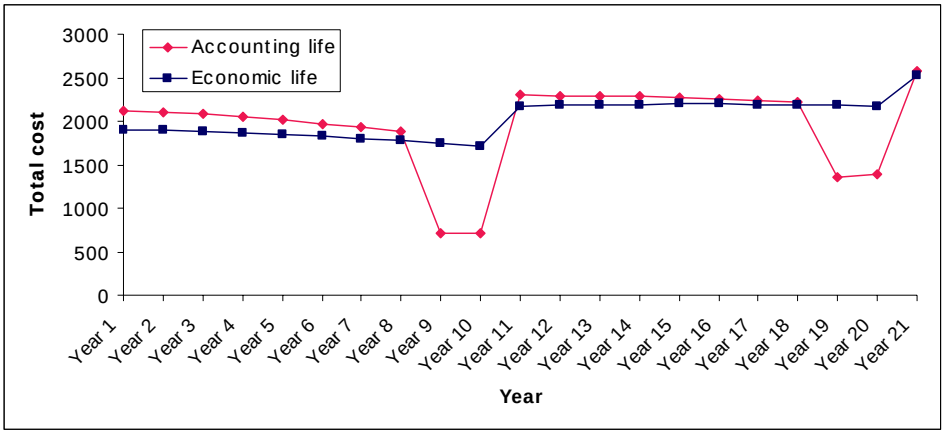
4.2. Qualitative analysis

This section covers some of the issues that RTR should be mindful of when using top-down cost models for setting prices, but which we haven't been able to reflect in our quantitative analysis.

Asset lives

The lives used in the model are accounting lives in that the cost inputs are sourced directly from the operators' financial systems. Regulators have typically avoided using accounting lives in cost models as they do not reflect the true economic lifetimes of assets. Often accounting lives are developed at a time when the true economic life is uncertain and therefore accountants adopt a prudent approach to assessing the period over which the investment should be written off. The diagram below shows the impact of using accounting lives to inform total cost recovery when the accounting life of 8 years is less than the true economic life of 10 years. We have also assumed that the size of the network increases by 5% p.a. and the cost of network equipment decreases by 3% p.a. Both of these assumptions are broadly realistic in the context of mobile network operators based on our cost modelling experience from other countries.

Comparison of accounting and economic lifetimes



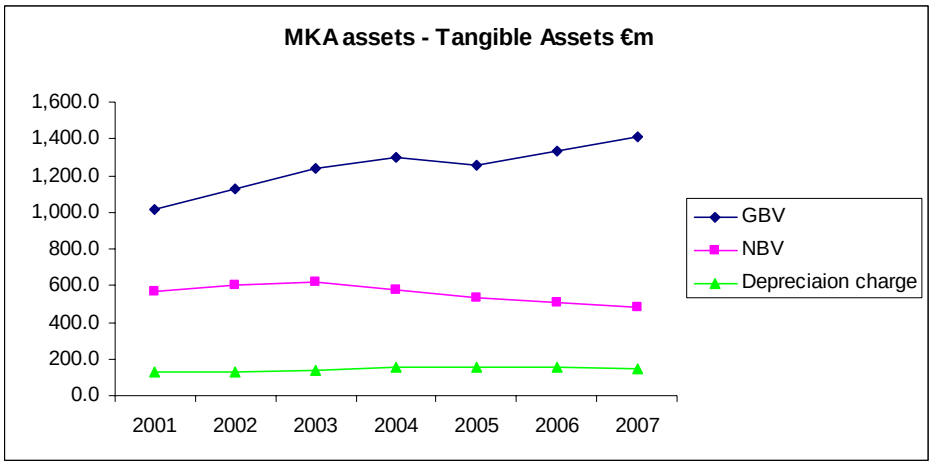
Source: Ovum Analysis

The diagram shows that if accounting lives underestimate the economic lives of the assets, at the end of the asset replacement life-cycle there is a significant risk of computing service costs that are inconsistent with the true economic costs of providing the service.

Having reviewed the cost information in each of the operators' models, we believe that we are observing this effect, i.e. the operators have written down a large proportion of their network assets even though those assets are still in use.

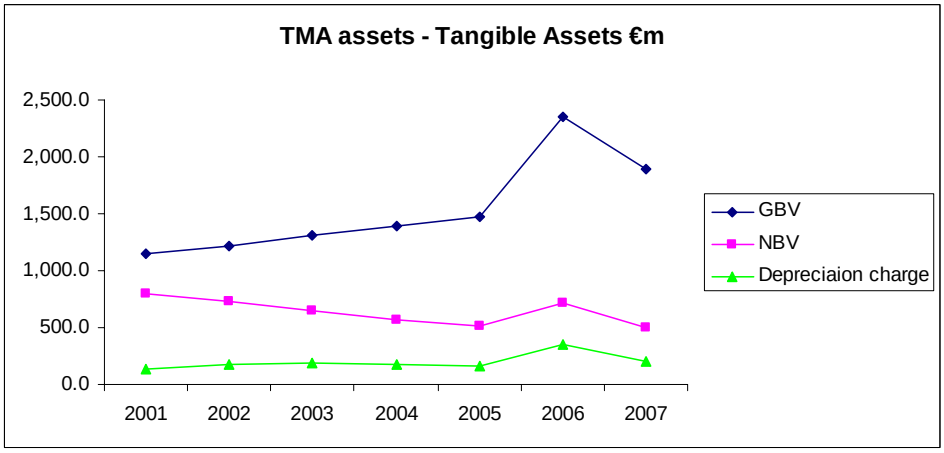
We have analysed the financial statements of both Mobilkom and T-Mobile to determine whether the effect we have described is in fact being observed. The diagrams below shows the evolution of tangible fixed assets since 2001.

Evolution of Mobilkom's tangible fixed assets



Source: Mobilkom financial statements

Evolution of T-Mobile's tangible fixed assets



Source: T-Mobile financial statements

The trends observed in T-Moibile's financial statements are skewed by the inclusion of tele.ring's assets in 2006. However, without these assets, there is a general trend in the financial statements of both Mobilkom and T-Mobile of Gross Book Value (equivalent to network size) increasing, depreciation staying relatively constant and Net Book Value decreasing. When cost recovery is set at Depreciation + (NBV x WACC), we would observe the lowest cost recovery at the

point in time when the network is largest. This is counter-intuitive and demonstrates the risk of relying on accounting data for setting regulated prices.

In the simplified example that we have produced, the impact of using accounting lives can result in cost being underestimated by as much as 60% (i.e. accounting based costs would have to be more than doubled to reflect economic lifetimes). This is observed in years 9 and 10 of the simple example when the original investments are fully depreciated but still in service. We recognise that this estimate is based on very high-level numbers and cannot be assessed for reasonableness against the outputs of other cost models. Even with the analysis of Mobilkom's and T-Mobile's financial statements, it has not been possible to produce a robust estimate of the impact of using accounting lives. Therefore, we have not reflected this effect in our analysis. We view this as a conservatism in our approach, and in the event that a further analysis of the operators' cost information was performed, we would recommend asset lives and the historic evolution of accounting based asset information to be considered very carefully.

Static v dynamic cost models

The RTR model present a static view of the world. It takes cost and traffic forecasts and assumes that what held true in developing the forecasts will still hold true once the implications of those forecasts, i.e. new cost-based MTRs, have been implemented. In general, regulators have not needed to develop dynamic mobile costing models because they have given operators sufficient time to gradually adjust their pricing structure to reflect the new price of the regulated service. However, in this case, the proposed reduction to MTR results in a reduction of over 50% in a single year. If operators seek to adjust the prices of their other services, especially data services, to reflect the shortfall in revenue from mobile termination, it is unlikely that the original data forecasts will materialise. The likelihood of operators adjusting their prices to compensate for lower MTRs is considered further in section 5.

Producing a dynamic costing model that includes all relevant elasticities of demand is complex and is not achievable in a short period of time. Therefore, we have not directly included any dynamic effects in our analysis.

It could also be argued that the adjustments we made to the proportion of cost allocated to data services are instead of a dynamic approach to cost modelling.

Exceptional depreciation

We have not been able to perform a complete analysis of the depreciation charged in each of the operators' accounts on a year-by-year basis, especially those of H3G. It is possible that some operators might have taken an exceptional depreciation charge if the carrying value of the assets was above their economic value. Alternatively, operators might have taken accelerated depreciation charges at a time of market uncertainty. If there have been any exceptional write-offs of network assets (including licences) or accelerated depreciation charges, they

should be reversed for the purposes of calculating the per minute cost of mobile termination[11].

Whilst making such an adjustment would improve the pricing signal observed from a model that uses historic cost valuation and straight line depreciation, it would still not be sufficient to overcome the limitations of using such methodologies for setting prices.

4.3. Impact of economic crisis on WACC

The impact of the economic crisis on the WACC is a debate that is still in its infancy. From a purely intuitive perspective, one might expect the calculated WACC to increase in the short term as debt spreads widen. In the longer run, the current crisis might result in an increase in the equity market risk premium.

For the purposes of this exercise, we have analysed RTR's WACC calculation and performed an alternative calculation. We believe a WACC of 15.1% for Mobilkom is supportable. This would result in the modelled 2010 termination rate increasing from €0.0247 to €0.0255.

We have not included this calculation as part of our quantitative analysis for two reasons:

1. The evidence relating to WACC increasing as a result of the economic crisis is still being developed; and
2. Given that part of our quantitative analysis sought to remove the aggressive growth forecasts – i.e. to "de-risk" the forecasts, it is not clear that we should be including an allowance for additional risk in the form of a higher WACC.

We believe that the forecasts are not without risk, and therefore a higher WACC could be applied, but have adopted a prudent approach and only included it in our qualitative analysis.

Details of our alternative WACC calculation are included in Annex 2.

4.4. Impact of economic crisis on demand forecasts

The RTR models assume that there will be strong growth in demand in both 2009 and 2010. Given the current global economic conditions, demand forecasts that were deemed to be reasonable a year ago are now likely to be unachievable. We

[11] This assumes that no extraordinary pricing adjustment is made to allow the write-off to be recovered in the year it was booked and that such adjustment was also applied to all operators.

understand that the start of 2009 has already seen demand decline in some key segments, e.g. international roaming. There have also been a large number of cancelled subscriptions as a result of business insolvencies. We believe these effects are indicative of what will happen for the remainder of 2009 and 2010. As companies and individuals scale back expenditure, demand for international telephony and domestic telephony will almost inevitably be effected.

It is not possible for us to provide a revised forecast for 2009 and 2010. We believe RTR could be more prudent in forecasting demand for 2009 and 2010 and any scaling back of demand forecasts will have a direct impact on the modelled termination rate. We believe this is an issue for the operators and RTR to resolve by assessing the best available traffic data as soon as it becomes available.

4.5. Limitations of analysis

The quantitative analysis we have produced has, by necessity, been performed at a high level. As noted in section 1.2, it is not possible to take Austrian-specific data and transpose it into an alternative cost model and produce model outputs that are sufficiently robust. We believe our approach was the most sensible given the amount of time available.

In performing our analysis, we have sought to eliminate the risk of double-counting any of the effects. We believe that all the effects that we have identified are valid in their own right, and analysis of all the effects in combination does not include any double counting. However, our analysis has not been performed on an asset-by-asset basis[12] and there is always the risk that a more detailed analysis will yield different results. We do not believe our results are biased, and a more detailed approach could yield a higher or lower effect.

The high-level approach that we have adopted provides significant insight into the extent to which the modelled cost of mobile termination will differ if a modelling approach that is more in line with the approaches adopted by other European NRAs is followed by the NRA. Our analysis highlights the potential need for a more rigorous analysis of the costs of mobile communication services and their pricing implications rather than being a substitute for such analysis.

[12] For example, we have not looked at the relationship between accounting depreciation and economic depreciation for different asset classes. It is possible that the effect is more dramatic for assets which are more voice intensive. Therefore, if we would have adopted an asset-by-asset approach to adjusting for economic depreciation, we might have found that the total cost allocated to voice increases. This would then reduce the impact of the adjustment for the allocation of cost to voice that we subsequently make.

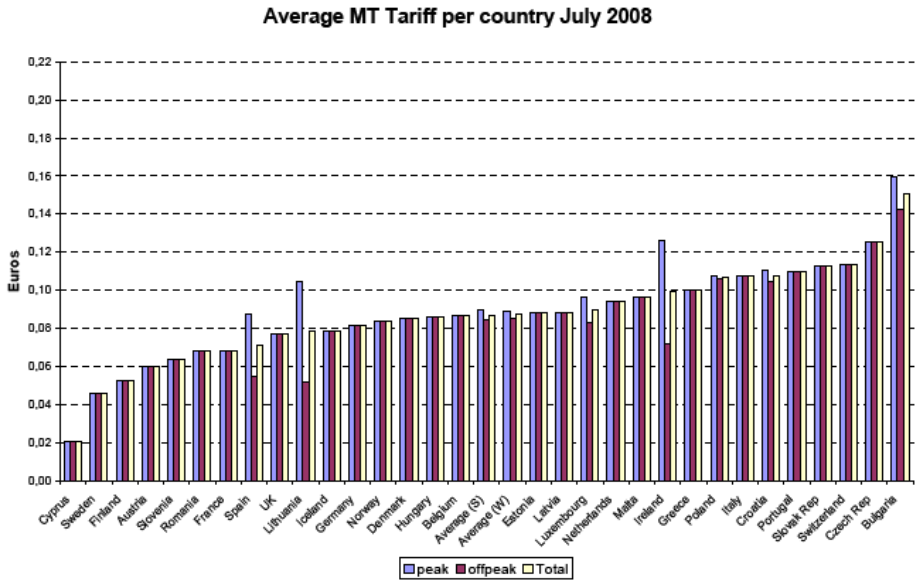
5. The potential impact of proposed regulation

5.1. Current trends in MTR regulation

Mobile termination rates have been the source of intense regulatory scrutiny for a number of years and that scrutiny is likely to continue for the foreseeable future. The European Commission is currently proposing changes to the way in which mobile termination rates are calculated and was hoping to see those changes take effect by 2011 by which time it was hoping to see mobile termination rates reduce to a level closer to fixed termination rates which are currently around €0.01. However, the Commission's draft recommendation has not been widely welcomed with suggestions that the proposed modelling methodology is inconsistent with long-established economic principles. The level of industry lobbying and criticism by EU member states has resulted in the timetable for implementation slipping, and it is unclear whether the draft recommendation will go through in its current form.

Whilst there is some uncertainty over the future of termination rates, the present picture shows the current termination rates in Europe and Austrian rates are already lower than the average observed in Europe.

Average MTRs – EU27



Source: ERG– July 2008

If RTR were to cut termination rates to €0.02, Austria would have the lowest termination rate among the EU27. In our opinion this would be a result of the modelling choices adopted by RTR rather than any fundamental cost advantage being enjoyed by the Austrian mobile industry

5.2. Potential for below cost MTRs

Based on our analysis, we believe there is a significant risk that the proposed regulation of MTRs will result in a price that is below the true economic cost of providing the service. In the simplest sense, imposing below cost pricing should not be within the remit of a regulator on fairness grounds. A below cost price for one service means the price of another service must be increased to make up for the shortfall in cost recovery. This is not always possible in the short term. In the medium term, if the prices of other services increase, the assumptions which underpinned the original cost calculations might not materialise.

Even if all the forecasts in RTRs models materialise, the three main providers of voice services in Austria will be required to provide the mobile termination service at a level which is below their own costs of providing the service. Whilst imposing a glidepath to incentivise operators to improve efficiency is common practice by regulators, it appears unlikely that the operators will be able to achieve such gains in efficiency by 2010 given that RTR's own models estimate that their costs will be 23% (Mobilkom), 71% (Orange) and 81% (T-Mobile) higher than H3G's costs on which the MTRs would be based.

There are circumstances when below cost pricing can be appropriately imposed, e.g. to reflect public policy issues (modelling the impact of the call externality). These circumstances are not common and require the regulator to perform detailed analysis, not only on the service being regulated, but also on the services that will be indirectly impacted by the revised price of the regulated service. We do not believe that any such analysis has been performed by RTR.

5.3. Inequitable money flows

If below-cost[13] MTRs are introduced, there will in effect be a subsidy from the mobile operators to the fixed operators, e.g. every minute of traffic that a fixed operator sends to a mobile operator will result in the mobile operator having to increase the price it charges for other services to make up for the below cost price it is receiving for the mobile termination service. This would be an inequitable outcome given that mobile operators compete with fixed operators for the Austrian voice and data communications market.

[13] The current proposal of €0.02 in our opinion represents a price that is below the economic cost of providing the service.

A detailed analysis of this waterbed effect is given by Genakos and Valletti (2007, Testing the "Waterbed" effect in mobile telephony). They have examined the impact of regulatory intervention when cuts are made to termination rates of calls from fixed lines to mobile phones and found a strong waterbed effect (10% on average) using a panel of mobile operators' prices and profit margin across more than 20 countries over a period of 6 years.

Beyond the workings of the Austrian communications market, it is also important to consider the position of Austrian operators in the global market for communications. If RTR imposes below cost MTRs in the near term, and other regulators allow their domestic operators to adjust to cost-based rates by implementing a glide path, RTR will be putting Austria operators at a disadvantage compared to its European peers. In terms of international traffic, even where traffic is balanced between an Austrian operator and in international operator, each minute of traffic received in Austria will result in the cost of other mobile communication services increasing, and each minute of traffic sent by an Austrian operator will allow the international operator to lower the cost of its domestic services (subject to the waterbed effect being observed).

In effect, by going to "true" cost-based MTRs too quickly, and in the case of the current RTR model, going below a "true" cost-based MTR, it is likely that a combination of the Austrian operators and Austrian consumers will be subsidising the domestic communications services of other European countries.

In analysing the impact of below cost MTRs on the Austrian mobile industry, we have developed a simple example to show what would happen to other prices. The details of our example are in annex 3. Our example is based on the premise that operators are not earning super-normal profits and are currently pricing voice services to cover incremental and fixed costs and are pricing data services to cover incremental costs.

The first order effect of setting MTRs at €0.02 in 2010 is to require voice services to increase by 16%. This would be sufficient to cover fixed and common costs without any elasticity effects. When including simple elasticity effects, we find that the increase in prices necessary is approximately 18%.

We have also considered a scenario where 30% of the fixed costs are recovered from data services. In this scenario we find that an equilibrium position isn't reached in which data can recover this share of the fixed costs.

These price increases indicate that reducing mobile termination rates significantly will impact other prices and therefore the level of subscription and take-up of new services. Whilst our example is simplistic, we believe it demonstrates the importance of fully understanding the implications of the proposed MTR regulation.

5.4. Delayed/cancelled investments

If below cost MTRs materialise, we do not believe the operators will be able to adjust their tariffs in the short to medium term to such an extent that will allow the

shortfall in termination revenue to be recovered elsewhere. The mobile industry is still relatively young yet is already anticipating its fourth generation technology. In an industry that has such a heavy requirement to reinvest, it is crucial that regulators do not over-regulate. The risk of over-regulating is that the equilibrium balance of return and reinvestment is disturbed preventing operators from generating the necessary funds to invest in the new technologies that will continue to provide economic growth. At a time when funds from the capital markets are shrinking, RTR must be especially cautious when considering regulation that will dramatically alter the way in which mobile operators are able to generate funds internally to meet their reinvestment requirements.

The impact of RTR's proposed regulation has clear pricing effects as described above. However, in the event that the regulation results in delayed or cancelled investment in new technologies, the second-order effects could also be significant. Access to mobile technologies is a big contributor to economic growth, and in the event that the Austrian mobile sector falls behind in the development of new mobile services, there is a risk that the economic growth that such development brings will be lost.

5.5. Evidence of impact of "low" MTRs

There has been significant debate about the impact of "low" MTRs. There are those that argue that low MTRs will result in increased usage of mobile telephony in a way that is currently observed in the United States where average Minutes of Use per subscriber are significantly above European levels and average revenue per minute is significantly below European levels.

Whilst on the face of it both these outcomes are desirable, they do not come without a cost. Penetration in the United States is significantly lower than in Europe and there are concerns about the depth of network coverage – which is possibly a result of the lower profitability that is observed among American mobile operators.

We believe the risks of digital exclusion and under-investment in new technologies require RTR to examine all cost evidence very carefully before deciding on a level of MTR that is out of line with most other European countries.

The impact of low MTRs will be discussed in the months ahead as part of the debate surrounding the European Commission's recommendation on calculating termination rates. Some European operators have already looked at the impact of the recommendation and what "below-cost" MTRs might mean for consumer welfare[14]. Below cost MTRs would require a dramatic shift in the business strategy of mobile operators. It is unlikely that imposing such a shift is in the remit of either the European Commission or National Regulatory Authorities, and therefore

[14] http://www.frontier-economics.com/_library/publications/Frontier%20publication_MTRimpact.pdf

it is essential that regulated MTRs properly reflect the economic costs of providing the service.

6. Conclusion

We have analysed RTR's cost models and proposed regulation of mobile termination rates. Based on our analysis we believe RTR has not fully considered all the costing and pricing issues that should be taken into account when regulating mobile termination rates. Our analysis shows that the modelled cost of mobile termination will be significantly higher than the proposed rate of €0.02 in 2010 if best practice economic principles are considered.

We recognise that our work has been performed at a reasonably high-level. However, we believe the results we have produced are indicative of the results that would be observed if a detailed costing study was performed to take into account the effects that we have highlighted.

In the absence of such a study, we believe RTR should not implement any further cuts to mobile termination rates. If any further cuts are implemented, we believe it will be to the detriment of the Austrian mobile industry, the consumers of mobile communications in Austria, and the Austrian economy as a whole.

Annex 1 – Detailed calculations

1.1. Impact of national roaming

As described in section 4.1, RTR's pricing methodology is to implement a cost-based MTR based on the lowest MTR in the market. In this case it is the MTR of H3G in 2010 that will set the market rate.

We have prepared an example that isolates the impact of national roaming on cost-based MTRs. The example demonstrates that, *ceterus paribus*, the national roaming operator is likely to have the lowest cost per minute in the market. The example relies on the following assumptions:

i) All operators have an equally sized (in terms of base stations and associated costs) network in urban and rural areas, except for the operator that relies on national roaming, which doesn't have a rural network

ii) Each operator has an equal share of end-user minutes, and therefore has the same mix of minute types

iii) The price that is charged for national roaming minutes is equal to the average network cost observed from the cost and traffic information of the other 3 operators, prior to the implementation of national roaming

iv) The operators with rural networks all have sufficient spare capacity in these networks to be able to offer national roaming without having to invest in the network

The table below shows the impact of using the national roaming operator's MTR as the industry benchmark:

Impact of using national roaming operator as industry benchmark

	Operator 1			Operators 2, 3			Operator 4		
	URBAN	RURAL	Total	URBAN	RURAL	Total	URBAN	RURAL	Total
No. of BTS	1	1	2	1	1	2	1	0	1
Own network cost	100	100	200	100	100	200	100	0	100
Other network cost per minute	0	0	0	0	0	0	0	0.040	
Traffic	4000	2000	6000	4000	1000	5000	4000	1000	5000
Own Network cost			200			200			100
Other network cost			0			0			40
Total cost			200			200			140
Cost per minue			0.033			0.040			0.028
Retail revenue per minute	0.028								
Wholesale revenue per minute	0.040								
Retail minutes			5000			5000			5000
Wholesale minutes			1000			0			0
Total retail revenue			140			140			140
Total wholesale revenue			40			0			0
Total network cost			200			200			100
Total wholesale cost			0			0			40
Profit/(loss)			**-20**			**-60**			**0**
Industry losses	**-140**								

Source: Ovum analysis

We have assumed that no geographic disaggregation is performed when calculating the price for national roaming access. We believe this is a reasonable assumption as the price for this service is subject to competitive pressure between the 3 operators, who all stand to gain from providing this service. In the example above, the incremental cost of providing this service is zero, and therefore, under perfect competition, the price of this service would be zero. Whilst in practice this would not be the case, we believe that using a long run average cost assumption is prudent, given that the service is priced using short run incremental cost considerations.

The analysis above clearly demonstrates that the operator that uses national roaming sets a benchmark that is unachievable for the rest of the industry. Whilst this analysis is static in nature, it provides the starting point for considering whether any structural differences between operators are observed. In this case, given that H3G ends up with a lower modelled termination rate than any of the other operators, it is quite possible that it is benefiting from this cost advantage that is not available to the other operators. Therefore, RTR needs to fully analyse the impact of national roaming on the modelled results.

It is our view that an operator relying on national roaming is not an appropriate benchmark for the industry as a whole, and therefore RTR should not be setting termination rates on the basis of H3G's model unless it is fully satisfied that the above effects are not embedded in the model output.

1.2. Depreciation/Valuation methodology

The RTR model uses straight line depreciation as the basis for setting the annual costs that operators are allowed to recover. The use of straight line depreciation is not consistent with best practice that is observed in other mobile cost models. The decision as to which depreciation and valuation methodology to use is crucial in terms of ensuring that the correct pricing signal is communicated to the market.

The reason why regulators have chosen to consider alternative valuation and depreciation methodologies is best explained with reference to a simple example. If we consider a single asset that cost €1000 and has a life of 5 years, the total allowable cost in each year is as follows

Straight line depreciation example

Value	*1000*
Life	*5*
WACC	*10%*

	Year 1	Year 2	Year 3	Year 4	Year 5
Opening value	1,000	800	600	400	200
Depreciation	200	200	200	200	200
Closing value	800	600	400	200	0
Cost recovery:					
Depreciation	200	200	200	200	200
WACC x op. value	100	80	60	40	20
Total cost recovery	300	280	260	240	220
Present value of cost recovery	*1,000*				
Profit and loss account					
Revenue	300	280	260	240	220
Depreciation	200	200	200	200	200
Profit	100	80	60	40	20

Source: Ovum analysis

Whilst the total cost recovery appears to be fair in terms of the present value of costs recovered being equal to the investment made, the profile of cost recovery results in declining annual profits, even if the asset is equally productive in each year.

One way of resolving the issue of declining profits for an asset that is equally productive over its life, is to use an annuity depreciation calculation.

Under an annuity method, the annual cost recovery is held constant. This results in constant annual revenue and constant profit, as shown in the table below.

Annuity depreciation example

Value	*1000*
Life	*5*
WACC	*10%*

	Year 1	Year 2	Year 3	Year 4	Year 5
Opening value	1,000	836	656	458	240
Depreciation	164	180	198	218	240
Closing value	836	656	458	240	0
Cost recovery:					
Annuity depreciation	164	180	198	218	240
WACC x op. value	100	84	66	46	24
Total cost recovery	264	264	264	264	264
Present value of cost recovery	*1,000*				
Profit and loss account					
Revenue	264	264	264	264	264
Straight-line depreciation	200	200	200	200	200
Profit	64	64	64	64	64

Source: Ovum analysis

The annuity method has the desirable feature that revenues and profits are constant year on year. However, regulators have still had reservations about using this methodology, in the event that the price of the asset is not constant over time. Regulatory pricing is meant to mimic the workings of a competitive market. In the event that the asset price is increasing over time, setting cost recovery using the simple annuity based approach would result in a price being set from year 2 onwards that could not be matched by a hypothetical new entrant. Alternatively, if asset prices are going down, the cost recovery will be above the level that would be set by a hypothetical new entrant. For this reason, regulators have sought an approach that adjusts the cost recovery profile to reflect the cost trend of the underlying asset.

One method for this is the tilted annuity calculation. The tilted annuity formula is:

$C_t = I_t \times (WACC - T) / \{ 1 - [(1 + T)/(1 + WACC)^L]\}$

Where,

C_t = Annual cost recovery in year t

I_t = Asset price in year t

T = Asset price trend

L = Asset life

In the example shown below, the asset price is falling, forcing the operator to bring forward some of its cost recovery (and accounting profits), to ensure it is able to compete if alternative operators enter the market.

Tilted annuity example

Value	*1000*
Life	*5*
Price trend	*-3%*
WACC	*10%*

	Year 1	Year 2	Year 3	Year 4	Year 5
Asset replacement cost	1,000	970	941	913	885
Opening value	1,000	822	634	435	224
Depreciation	178	188	199	211	224
Closing value	822	634	435	224	0
Cost recovery:					
Annuity depreciation	178	188	199	211	224
WACC x op. value	100	82	63	43	22
Total cost recovery	278.5	270.1	262.0	254.2	246.6
Present value of cost recovery	*1,000*				
Profit and loss account					
Revenue	278	270	262	254	247
Straight-line depreciation	200	200	200	200	200
Profit	78	70	62	54	47

Source: Ovum analysis

Until now the three valuation and depreciation methodologies have ignored any changes in the utilisation of the asset over its life. However, if the asset is relatively under-utilised in early years, then the cost for a unit of capacity will change significantly over time, as shown in the table below:

Comparison of unit costs

Production	100	120	160	200	220	
Total cost						
Straight line	300	280	260	240	220	
Annuity	264	264	264	264	264	
Tilted annuity	278	270	262	254	247	
Unit cost						CAGR
Straight line	3.0	2.3	1.6	1.2	1.0	-24%
Annuity	2.6	2.2	1.6	1.3	1.2	-18%
Tilted annuity	2.8	2.3	1.6	1.3	1.1	-20%

Source: Ovum analysis

For all of the different valuation methods, the increase in demand over the life of the asset results in significant changes to the unit cost of production. This has caused regulators to seek an alternative depreciation and valuation methodology that takes into account both the way the price of the asset changes over time, and also the level of production of the asset over time. An example of this is the economic depreciation that has been used by many European regulators including Ofcom (UK), PTS (Sweden), BIPT (Belgium), OPTA (Holland), NPT (Norway), ITST (Denmark), EETT (Greece). The depreciation formula cannot be expressed with a simple formula. Conceptually, this economic depreciation methodology seeks to recover the cost of an asset as a function of both the change in the price of the asset and the production of the asset. When production is constant, the result would be the same as the annuity formulae (depending on whether the asset price is changing). However, when production and price trends are changing, the total cost recovery profile is very different to that of the other depreciation and valuation methodologies as shown below:

Economic depreciation example

Value	*1000*
Life	*5*
Price trend	*-3%*
WACC	*10%*

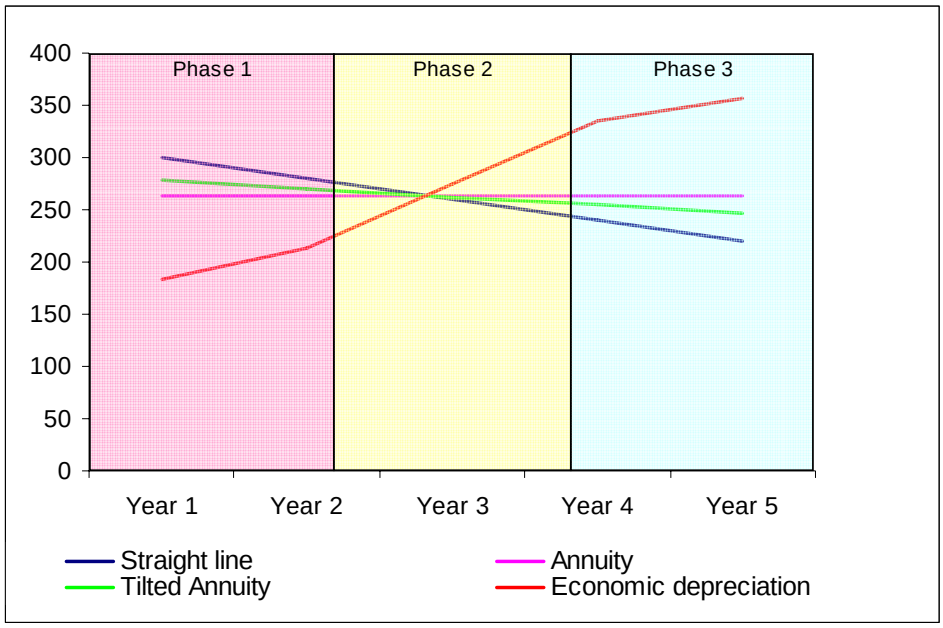
	Year 1	Year 2	Year 3	Year 4	Year 5	
Asset replacement cost	1,000	970	941	913	885	
Opening value	1,000	917	795	599	324	
Depreciation	83	122	196	275	324	
Closing value	917	795	599	324	0	
Cost recovery:						
Annuity depreciation	83	122	196	275	324	
WACC x op. value	100	92	80	60	32	
Total cost recovery	183.2	213.3	275.8	334.4	356.8	
Present value of cost recovery	*1,000*					
Profit and loss account						
Revenue	183	213	276	334	357	
Straight-line depreciation	200	200	200	200	200	
Profit	-17	13	76	134	157	
						CAGR
Unit cost	1.83	1.78	1.72	1.67	1.62	-3%
Production	100	120	160	200	220	

Source: Ovum analysis

The asset price trend is the same as the change in unit cost giving a unit cost profile that many regulators have concluded is the most consistent with the competitive, technological and commercial constraints that mobile operators are subject to in the real world.

When putting all the cost recovery profiles together we can consider 3 different phases of cost recovery:

Phases of cost recovery



Source: Ovum analysis

Phase 1 represents the pre-regulation phase. Prices are typically unregulated and therefore there is little incentive to consider alternative depreciation and valuation methodologies.

Phase 2 represents the onset of regulation. In this phase differences between depreciation and valuation methodologies are important, but it is not possible to know the relative profiles of cost recovery without knowing where you are in terms of the network life cycle. Even though differences are observed, this is the period of least difference, and no method is unambiguously higher than another.

Phase 3 represents the renewal of regulation. This takes place at the end of the network life cycle (as can be argued is the case now with respect to GSM networks). In this phase, the depreciation method chosen is absolutely crucial as large differences are observed and straight-line depreciation is likely to give the lowest annualised cost.

Based on the analysis above, we do not believe it is appropriate to use straight-line depreciation as the basis for setting regulated prices for mobile services.

1.3. Product that is not viable on stand-alone basis

We have produced a simple example that shows the effect of regulating a single service on an average basis when a second service is offered, but which is not viable in its own right.

The table below shows the starting point pre-regulation. There are two services which have a combination of variable incremental costs (VIC) and shared costs. They have the same demand, but the price of service A is significantly higher than service B.

Pre-regulation example

	Service A	Service B	Shared
Base volume	1000	1000	
Base price	1	0.2	
Incremental variable cost per unit	0.15	0.15	
Fixed cost			500
Revenue	1000	200	
Incremental variable cost	150	150	
Contribution	850	50	
Share of fixed common costs	250	250	
Average cost (= VIC+EPMU)	400	400	
Profit/loss	600	-200	
Incremental cost	650	150	
Incremental cost per unit	0.65	0.15	

Source: Ovum analysis

The allocation of shared cost is arbitrary and has no real business impact. Overall profits are earned and both services more than recover their incremental costs.

If the price of service A is then regulated to an average cost level, the post-regulation position is very different:

Post-regulation example

Post-regulation - average cost			
	Service A	Service B	Shared
PED	-0.3	-2.5	
Base volume	1180	1000	
Base price	0.4	0.2	
Incremental variable cost per unit	0.15	0.15	
Fixed cost			500
Revenue	472	200	
Incremental variable cost	177	150	
Contribution	295	50	
Share of fixed common costs	271	229	
Average cost (= VIC+EPMU)	448	379	
Profit/loss	24	-179	

Source: Ovum analysis

In the post-regulation world, as a result of the elasticity effect, the demand for service A has increased, but not sufficiently to make-up for the shortfall in revenue. The business response to this might be to change the price of service B. However, given the price elasticity of demand (PED) there is no price that will allow the operator to achieve profitability as shown in the table below:

Optimal contribution

Price	0.1	0.12	0.14	0.16	0.18	0.2	0.22	0.24	0.26
Demand	2250	2000	1750	1500	1250	1000	750	500	250
Revenue	225	240	245	240	225	200	165	120	65
Incremental cost	337.5	300	262.5	225	187.5	150	112.5	75	37.5
Contribution	-112.5	-60	-17.5	15	37.5	50	52.5	45	27.5

Source: Ovum analysis

The table above shows that the operator optimises the contribution of service B when it increases the price to 0.22. However, this level of contribution is not sufficient to allow all costs to be recovered.

In this example service B is not a viable product in its own right, i.e. if service A was not offered, service B would not be offered. Service A is a viable service in its own right based on the pre-regulation position and if service B wasn't offered, the operator would continue to offer service A.

In the event that a service is not viable in its own right, the fixed costs are deemed to be specific to the service that is viable it its own right, in this case service A and

therefore the incremental costs of service A would include all the fixed common costs. These are service specific fixed costs.

Whilst this example is somewhat simplistic, it highlights the importance of understanding the demand characteristics of different services and their impact on the appropriateness of using an average cost approach vis-à-vis an incremental cost approach.

Annex 2 – WACC calculation

The WACC establishes the annual return on capital employed (ROCE) that a firm requires if it is to be able to fund its future developments. The WACC is a key component of every *Long Run Incremental Cost (LRIC)* model that are broadly used in setting interconnection charges. The value of WACC directly affects the call termination charges and a slight change in the WACC is likely to cause a significant change in costs due to the high levels of capital investment in the telecoms industry. From a regulatory point of view, licensed telecoms operators are entitled to a fair, risk-adjusted return on the capital they employ. The economically efficient rate of return is the minimum level such that the service providers will continue to carry on investing to obtain this return. It is at this level that regulators attempt to set the WACC. **If the WACC is set correctly, it encourages efficient investment and does not discriminate against either the service provider or others who are seeking access to its services**.

The current economic climate has made it more difficult for telecommunication operators to raise capital – either from debt or through equity. This implies a high risk involved in the financing of capital intensive telecommunication projects. The fall in the markets is due to the negative sentiments created from the liquidity crunch resulting from the sub prime crisis and fall in the worldwide financial markets and this has also been reflected on the level of WACC values.

Below we look at each of the WACC related parameters and provide our views on how these values could be adjusted to account for the difficulties that Austrian mobile operators face and the higher risks that investors require to invest in communication operators.

Risk free rate

It is common international practice to consider that 10-year maturity government bonds provide a better estimate of the risk-free rate. Evidence from advance economies have shown that the standard response to recession is the decrease in interest rates and increase in the money supply in order to face liquidity problems. The following graph presents the variation of the government bond yields over the last year.

Austrian risk-Free rate

Source: Reuters

What can be observed is that risk-free rate was around 4.9% during June to July 2008 while current rate is around 4.2%. The current values of government bonds yields is the best estimate of a forward looking risk-free rate, therefore we believe that a rate of 4.2% is an applicable risk-free rate for Austria. **The value of RFR that RTR have considered of 4.18% is therefore a reasonable estimate.**

Debt Risk Premium

As a result of the current financial crisis, it is more difficult now to raise debt compared to the past and when it happens it is only at high interest rates. RTR have considered a DRP of 1.54% for Mobilkom, 3.19% for Orange and T-mobile and 0.94% for H3G. **It is our view that Mobilkom's DRP is very low and a value closer to the values of Orange and T-Mobile could be an applicable DRP estimate for Mobilkom.**

Asset beta

RTR have considered an un-levered beta value of 1 for Mobilkom, T-Mobile and Orange and a value of 1.7 for H3G. According to IRG[15], European mobile operators' asset beta values are likely to vary within the range of 0.8 to 1.4. In a recent WACC determination, the Swedish NRA estimated a range of asset beta values for

[15] IRG, "Regulatory Accounting, Principles of Implementation and Best Practice for WACC calculation", February 2007:

http://www.irg.eu/streaming/erg_07_05_pib_s_on_wacc.pdf?contentId=543314&field=ATTACHED_FILE

mobile operators of 1.1 – 1.3 with a midpoint of 1.2[16]. In the same report it is quoted that in previous regulatory decisions an asset beta value of 1.35 had been considered for mobile operators in Austria.

It is our view that a value of 1.2 is an applicable estimate of asset beta for mobile operators in Austria.

Equity Risk Premium

Equity Risk Premium is the premium required above the risk-free rate that an investor would require to bear the additional risk inherent in equity returns on a risky asset. The determination of risk premium can be difficult due to the fact that the forward-looking measure is not directly observable. To estimate the risk premium, ex-post estimations (based on historical investment returns) or ex-ante estimations (based on forward-looking considerations) can be used. In most countries, regulators have estimated Equity Risk Premiums on historical basis after assuming that historic data can be a reliable indicator of future market behaviour. Although this may have been the case in the past, we believe that under the current financial crisis, a historical CAPM model may not be appropriate to reflect the prevailing market conditions.

The value of 5.5% that RTR has considered for ERP is the same as IRG's estimate for 2007. A number of recent studies show that current ERP estimates have increased significantly over the last months. Below we quote a number of these studies. Professor Damodaran[17] has estimated the geometric average of Historical ERP values for the US over the period 1927 – 2007 and found it to be 4.79%. Damodaran has also estimated the implied ERP over the period of 12/9/08 and 16/10/08 and have found it to vary from 4.2% to 6.39%. Evidence from brokers (e.g. Credit Suisse18) highlights that implied current ERP in Austria has increased significantly over the last months. Although they submit that a long-term historic average ERP for Austria is 4.5%, current market implied ERP is 6.3%.

To sum up, historical values of ERP are not expected to change (or change slightly) if we take into consideration the latest period's financial crisis that led to higher values of ERP. Evidence from a number of studies suggests that the current financial crisis has pushed implied ERP up. Although the majority of regulators around the world, in assessing the cost of capital for telecommunication network operators, are following the historical premium approach on ERP, it should be fair, to take into consideration the current financial crisis, and adjust the historical ERP by adding an additional premium. In our opinion the implied ERP will not be kept at

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[16] Copenhagen Economics (2008), Cost of capital for Swedish mobile telecom networks http://www.pts.se/upload/Ovrigt/Tele/Prisreglering/mobil-wacc-rapport-080318.pdf

[17] Aswath Damodaran, "Equity Risk Premiums (ERP): Determinants, Estimation and Implications, September 2008 (with an October update reflecting the market crisis)"

[18] Credit Suisse, Telekom Austria: 2 January 2009

these high levels, but it is likely to drop and stabilize at a lower rate. Apart from the historical ERP approach, IRG quotes the survey premium approach. Under this approach, we ask the investors what they require as expected returns in order to invest in risky assets today, as well as their expectations for the future. Although this approach is very subjective and there is a danger of bias due to the sample of investors chosen, it is expected that would result in higher ERP values as investors are likely reluctant to invest now. At the same time companies have less incentive to raise capital though the market when the shares are undervalued as they will not be able to raise as much funds as under normal market conditions. We conclude that the survey approach on ERP will result in higher levels or ERP.

Although it is very uncertain what the value of Austrian ERP will be over the next years, we could consider that a forward looking approach in estimating the ERP may add a premium of 0.5% on top of the 5.5% value that RTR have estimated based on historical evidence.

Conclusions on WACC

The value of the WACC is a very important input of LRIC models and a slight change of it can change significantly the interconnection rates. If WACC is set correctly, then it encourages efficient investment and does not discriminate against either the service provider or others who are seeking access to its service. The current economic climate has made it more difficult for telecommunication operators to raise capital – either from debt or through equity and as a result the value of cost of capital has increased. Mobile network operators WACC is high compared to other utilities operators especially due to the high regulation of the sector. The uncertainties in terms of the regulatory regimes increase the investment risk and therefore the WACC. The regulatory regime that RTR is planning to apply in Austrian mobile market is expected to damage the market's confidence in the regulatory regime and investor's confidence in telecommunications sector.

In light of the current financial crisis, a forward looking approach in estimating the cost of capital of mobile operators is needed. The table below summarises our proposed adjustments to Mobilkom's cost of capital, estimated by RTR.

	RTR	Ovum recommendation
Risk Free Rate	4.18%	4.18%
Asset Beta	1.0	1.2
Equity Beta	1.06	1.28
Market Returns	9.68%	10.18%
Market Risk Premium	5.50%	6.00%
Cost of Equity post Tax	**10.03%**	**11.84%**
Debt Risk Premium	1.54%	3.19%
Cost of Debt pre Tax	**5.72%**	**7.37%**
Tax	25%	25%
Gearing / Debt Share	7.90%	7.90%
WACC pre Tax	**12.77%**	**15.13%**

Annex 3 – Below cost MTR example

In this example we describe in two stages:

- the effect of below cost price regulation on cost recovery and prices;
- the impact of the allocation rule of fixed costs between two different services facing very different PED (Price Elasticity of Demand).

In the absence of a precise estimate for voice and data PED on Austria's mobile market, we make the assumption that data PED is greater than voice PED (more mature market, high penetration), as take-off in data demand has only materialised in the context of price reduction (penetrating pricing).

We assume for the simplicity of calculations that PEDv is near 0 and PEDd is equal to -0.5. This means that voice demand will be relatively sluggish to a change in price whereas data demand will react more.

We consider an operator with these characteristics:

Assumptions on termination prices and costs (EUR)

Incremental cost of mobile leg	0.04
Price of fixed termination	0.01
Price of international termination	0.1
Post-regulation MTR	0.02
Mobile fixed costs	150

Price and Demand profile (minutes)

	Demand	Price pre regulation
Out – mobile	4000	0.1
Out – fixed	2000	0.06
Out – International	500	0.11
In – mobile	2000	0.05
In – fixed	2000	0.05
In – international	500	0.05
Data (minute equivalent)	5000	0.01

The table below presents the market equilibrium before mobile termination regulation:

Traffic	Demand	Price pre-reg	Revenue	Costs pre-reg	Costs	Contribution pre-reg
Out – mobile	4000	0.1	400	0.08	320	80
Out – fixed	2000	0.06	120	0.05	100	20
Out – International	500	0.11	55	0.1	50	5
In – mobile	2000	0.05	100	0.04	80	20
In – fixed	2000	0.05	100	0.04	80	20
In – international	500	0.05	25	0.04	20	5
Total Data	5000	0.01	50	0.01	50	0
Total Voice	-	-	800	-	650	150

In that case the profit is zero and all fixed costs (150) are recovered.

The table below summarizes the static effect of introducing below costs regulated price for mobile termination:

Traffic	Demand	Price post-reg	Revenue	Costs post-reg	Costs	Contribution post-reg
Out – mobile	4000	0.1	400	0.07	280	120
Out – fixed	2000	0.06	120	0.05	100	20
Out – International	500	0.12	60	0.1	50	10
In – mobile	2000	0.02	40	0.04	80	-40
In – fixed	2000	0.02	40	0.04	80	-40
In – international	500	0.02	10	0.04	20	-10
Total Data	5000	0.01	50	0.01	50	0
Total Voice	-	-	670	-	650	60

In this case the effect of a below costs mobile termination charge is that the profit is now equal to 60-150=-90. The fixed costs are not entirely recovered. In order to recover these and to return to the market equilibrium we now allocate the

remaining costs to be recovered (EPMU) to outgoing voice costs and calculate the price effect:

	% of unrecovered cost to allocate	Contribution post regulation	Revenue	Price post regulation	Price increase
Out – mobile	68%	181	461	0.12	15%
Out – fixed	21%	39	139	0.07	16%
Out – International	11%	20	70	0.14	16%
In – mobile	0%	40	40	0.02	0%
In – fixed	0%	40	40	0.02	0%
In – international	0%	10	10	0.02	0%

The direct effect, ceteris paribus is an increase of unregulated prices to cover the fixed costs. To what extent this increase in prices for outgoing services can affect the demand if we release the assumption that voice PED is equal to 0 but instead equal to -0.3 for outgoing voice services (we do not consider the case of mobile data services to catch the linkages between outgoing and incoming calls).

The dynamic effect of an increase of outgoing prices is shown below:

PED outv = -0.3	Price post regulation	Demand	Revenue	Costs	Profit (before fixed costs recovery)
Out – mobile	0.12	3816	440.1	267.1	172.9
Out – fixed	0.07	1904	132.5	95.2	37.3
Out – International	0.14	460	64.0	46.0	18.0
In – mobile	0.02	2000	40.0	80.0	-40.0
In – fixed	0.02	2000	40.0	80.0	-40.0
In – international	0.02	500	10.0	20.0	-10.0
Total	-	-	726.6	588.4	138.2

Following this 16% price increase, and after fixed costs recovery we end up with a loss of 11.8 (138.2-150) given the effect on market demand which is a 5% decrease in outgoing calls. In a second stage, this implies that another increase of

2% of prices for outgoing services must occur to return to market equilibrium (this gives an average 18% price increase in total).

If we now consider that fixed costs recovery has to be shared between data and voice, let assume 70% voice and 30% data, without taking into account any PED on data and following the same calculations principle as above we end up at market equilibrium with this new pricing scheme:

	Price post regulation	Price increase
Out – mobile	0.11	8%
Out – fixed	0.06	8%
Out – International	0.13	8%
In – mobile	0.02	0%
In – fixed	0.02	0%
In – international	0.02	0%
Data	0.019	90%

In the event that the price of data needs to increase to 0.019, there is no market equilibrium that allows all fixed costs to be recovered, as shown in the table below:

PED data	Data Demand	V+D Profit	Data Price
0	5000	0	
-0.1	4550	-4.05	
-0.2	4100	-8.1	
-0.4	3200	-16.2	0.019
-0.6	2300	-24.3	
-0.8	1400	-32.4	
-1	500	-40.5	