30 June 2008

On the introduction of a symmetric MTRs structure in the Greek mobile market

A position paper for Wind Hellas

NERA
Economic Consulting

Dante Quaglione
Associate Director

NERA Economic Consulting
Via Basento 37,
2nd Floor
Rome 00198, Italy
Tel: +39 06 488 8101
Fax: +39 06 48 5838
www.nera.com

Contents

Executive Summary i

1. Introduction 2

2. MTRs' structure: guidance at the European level and review of the international experience 3

2.1. The orientation at the European level 3

2.1.1. The opinion of the European Commission on MTRs' structure 3

2.1.2. ERG's position on the structure of mobile termination charges 4

2.2. Review of the international experience on MTRs structure 6

2.2.1. Description of the collected information 6

2.2.2. Comments on the results of the international comparison 8

3. Our view on the EC and ERG guidance 13

4. Is current MTRs asymmetry in Greece justified? The specifics of the Greek context 14

4.1. Differences in costs between Greece and EU countries 14

4.1.1. Topographic differences between Greece and other European countries 14

4.1.2. Cumbersome Licensing regime for BTS 15

4.1.2.1. Business costs prompted by the BTS Licensing regime 17

4.1.2.2. Further, asymmetric, effects of the Licensing framework 18

4.1.3. Seasonal traffic 19

4.2. Source of exogenous cost differences between Wind Hellas and other Greek mobile operators 21

4.2.1. Wind Hellas' gap in spectrum endowments 21

4.2.2. Interference problems affecting Wind Hellas' quality of signal 25

4.2.3. Wind Hellas access to suboptimal sites to install mobile access equipment 28

4.2.4. Asymmetric burdens of the BTS Licensing framework 29

4.2.5. Wind Hellas' low market share 30

5. How Wind Hellas' MTR should be revised in the next future? 34

6. Conclusions 38

Appendix A. On the importance of knowing actual operators costs in setting MTRs 39

Executive Summary

The European Commission (EC) and the European Regulators Groups (ERG) have recently made public their orientation on the structure of Mobile Termination Rates (MTRs). While taking a strong position against unjustified MTRs asymmetry, which they recommend to phase out in a reasonable amount of time, they argue that MTRs asymmetry has to be retained in case justified by objective cost differences, out of operators' control.

We agree with the orientation of EC and ERG in that MTRs symmetry has to be adopted only when the right conditions hold, which guarantee the achievement of full benefits by consumers. In cases exogenous cost differences exist, MTRs asymmetry has to be retained.

We performed an international benchmark on MTRs structure and cost accounting obligations adopted by national regulators. Our findings show that most of the selected countries do not adopt MTRs' symmetry, neither plan to adopt it in the next future. Actually, due to the existence of exogenous objective cost differences, in most of these countries regulators adopt 'group wise' symmetric MTRs based on actual operators' costs.

We discussed what exogenous objective cost differences characterize

- Greece, as opposed to other EU countries: *ceteris paribus*, deploying and operating mobile networks in Greece requires network costs higher than other EU countries due to topographical differences, BTSs licensing regime and traffic seasonality. We therefore conclude that, *ceteris paribus*, Greek MTRs should be higher than those of other EU countries

- Wind Hellas, as opposed to other Greek mobile operators: Wind Hellas is likely to incur in costs that are higher than its competitors due to exogenous sources of costs, i.e., poor spectrum endowments, significant interferences problems, access to suboptimal sites, burdens of the BTS licensing framework, and low market share. On the basis of our findings we conclude that the current MTRs structure in Greece is justified.

Unlike the cost differences arising between Greece and other European countries, we strongly believe that most of the exogenous cost differences that are currently observed among Greek operators could be removed or reduced by regulatory intervention.

To this purpose, we believe that a structured regulatory process is needed. The aim of such process, which we predict may take between 16 and 23 months to be completed, would be to allow EETT reaching a sufficiently informed view, without which MTRs setting is likely to be illegitimate and unreliable.

At the end of the identified process, MTRs symmetry will have to be imposed only if the causes of cost asymmetries will have been successfully removed by regulatory intervention and if MNOs costs are objectively symmetric. Note that the causes of the Greek cost asymmetry compared to the rest of Europe cannot be removed by regulatory intervention and Greek costs will always be different from other countries' costs.

A similar approach has been already adopted by Agcom in Italy with regard to Fixed Termination Rates and recently approved by the EC successfully.

1. Introduction

On January 23rd 2008, the Greek regulatory authority (EETT) launched a consultation process to update the cost accounting model used to calculate mobile termination rates (MTRs) in Greece. The model to be updated is a LRIC model, designed under a Bottom Up approach.

Recently, the European Regulators Group (ERG) and the European Commission (EC) argued that still too many countries adopt asymmetric charges and that this may not be justified considering that the technological platforms for the delivery of mobile services are pretty much the same and barriers to technology adoption are negligible across European countries. In order to retain it, MTRs asymmetry has to be justified on the basis of the existence of higher costs that are out of operators' control.

In view of the guidance that EC and ERG provided, EETT seems oriented to reconsider the structure of MTRs in Greece, in order to adopt remedies that, in the years to come, will lead to the achievement of MTRs' symmetry.

In this context, Wind Hellas asked NERA to write a position paper on the introduction of MTRs symmetry in the Greek mobile market. To this purpose, we will

- comment on EC's and ERG's documents, focusing on the rationales EC and ERG provided in support of their orientation, as well as on the conditions that have to apply in order to successfully adopt MTRs' symmetry,
- discuss what has to be taken into account in implementing EC's and ERG's guidance to the Greek mobile market.

The present document is structured as follows:

- Section 2 illustrates the EC's and ERG's orientation on MTRs' structure and presents the results of an international comparison on this subject across 12 European countries,
- Section 3 presents our position on the guidance set forth by EC and ERG and raises two key questions that have to be addressed in deciding the structure of MTRs in Greece:
  - Is current MTRs asymmetry in Greece justified?
  - How Wind Hellas' MTR should be revised in the next future?
- Section 4 addresses the first question by discussing the specifics characterizing the Greek context (i.e., the sources of the exogenous objective cost differences across European countries and Greek MNOs),
- Section 5 addresses the second question and suggests that a structured regulatory process is needed in order to understand how to revise MTRs' structure,
- Section 6 provides our conclusive remarks.

2. MTRs' structure: guidance at the European level and review of the international experience

2.1. The orientation at the European level

2.1.1. The opinion of the European Commission on MTRs' structure

Recently the European Commission published a document commenting on the experience earned from the market review process.[1] In its Communication, the EC discusses some issues relating to the imposition of remedies, arguing that there is room for making regulation more effective and uniform across member states.

The Commission observes that National Regulatory Authorities (NRAs) across Europe have widely accepted the principle that mobile network operators have Significant Market Power (SMP) on their networks in the market for termination services.[2] NRAs have, therefore, imposed to those mobile operators found as having SMP, some regulatory remedies that include, but are not limited to, price control obligations on termination charges.

The large share of fixed costs in the telecommunication industry together with the increase in traffic volumes has lead to a decrease of termination rates across Europe. However, the EC noticed that

> "*a large spread in average mobile termination rates still exists across Member States*".[3]

Although such divergence may be justified by objective cost differences across operators, the EC is of the view that often differences in mobile termination rates are due also to differences in the cost accounting methodologies used to estimate termination charges, as well as in different timeframes adopted by regulators to bring termination charges down to the cost of an efficient operator.

Moreover, EC argues that allowing asymmetric termination charges for small mobile operators, mainly justified right after market entry on the ground that, due to their small size, small operators didn't benefit from economies of scale,

> "*..may constitute a disincentive to gain market share at retail level, as the enlargement of the customer base would lead to lower regulated termination rates*".[4]

---

1 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on market reviews under the EU Regulatory Framework (2nd report) – Consolidating the internal market for electronic communications. Brussels, July 11, 2007 (*COM(2007) 401 final*).

2 Market n. 16, Recommendation 2003/311/EC.

3 European Commission, Communication on market reviews under the EU Regulatory Framework (2nd report), COM(2007) 401 final, 11/7/2007, par. 4.2.2, pag. 7.

4 *Ibidem*.

The EC argues that such disincentive can be removed by adopting symmetric termination charges and retaining charges' asymmetry only in presence of objective cost differences that are out of operators' control:

> *"[…] termination rates should, as a principle, be symmetric, whereas asymmetry requires an adequate justification. The Commission recognizes that, in certain exceptional cases, asymmetry might be justified by objective cost differences which are beyond the control of the operators concerned, e.g. unalterable differences in key network elements."*[5]

The EC concludes that in case the observed charges' asymmetry does not reflect objective cost differences, it should be gradually reduced and brought down to symmetry:

> *"[…] If asymmetry in termination rates are not based on objective cost differences, they must be phased out within a reasonable time frame"*[6]

EC's communication, therefore, is against harmful and unjustified charges asymmetry, which recommends to phase out in a reasonable amount of time. However, in case it is justified by objective cost differences that are out of the operators' control, EC is of the view that charges' asymmetry can be retained.

2.1.2. ERG's position on the structure of mobile termination charges

ERG recently published a document on termination rates' symmetry.[7] With specific regard to mobile termination, ERG argues that the adoption of symmetric termination rates have advantages on a long term basis in that it can contribute to the achievement of economic efficiency and, therefore, to consumer welfare's maximization:[8]

> *"in the long run symmetric mobile termination rates may contribute to enhancing static economic efficiency (limiting allocative and productive inefficiencies), investment, innovation, regulatory certainty, and, lastly, overall welfare."*

The above argument relies on the tenet that a homogeneous products sold in a competitive market should be priced symmetrically (i.e., the price of each producer's product in the market would have to be the same). The reason of this is that competition would drive prices down to the cost of producing the product that the "efficient" producer would incur in. Asymmetric prices, therefore, would necessarily imply a loss of efficiency and consumer welfare:

> *"Assuming that the market for mobile termination is competitive should lead to symmetric rates for MTRs, considered as homogeneous products (unless*

---

5 *Ibidem*.

6 *Ibidem*.

7 ERG, "ERG's Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rates", ERG (07) 83 final 080312, 28th February 2008.

8 Ibidem, par. 3.1 pag. 81.

> *proven otherwise). In fact, in a perfectly competitive set-up, entrants are price-takers and therefore face strong incentive to reduce their costs to the efficient level."*

ERG, however, recognizes that there may be situations where asymmetric charges are justified:[9]

> *"…under some circumstances asymmetric mobile termination rates may be justified for example to take into account differentiated conditions of spectrum allocation or to encourage the growth of a new entrant on the market, which suffers from a lack of scale due to late market entry where such promotion of competition is needed and justified."*

Charges asymmetry in these cases would be beneficial in dynamic terms to both, market development and consumer welfare:

> *"Indeed, asymmetric mobile termination rates allow higher expected profits in the short term and strengthen the relative competitive position of those MNOs permitted to charge higher MTRs, thereby leading to increased competition in the long term to the benefit of end users. In other words, in certain circumstances it may be appropriate for a regulator to allow asymmetric rates for a limited time period – where the positive effects for competitors benefiting from asymmetric MTRs more than offset the risk of competitive distortion, and trading off short-term inefficiency for long-term objectives (such as long term efficiency)"*

ERG warns also on the some drawbacks that may arise if the regime of asymmetric charges remains in place too long:

> *"In any case, regulators should bear in mind that asymmetric regulation is sustainable only on a transitional period, because asymmetric regulation can also result in a number of drawbacks, among which an increase of off-net tariffs of the incumbent operators, competitive distortion, lower incentives to invest and innovate, risk of inefficient entry, etc. Furthermore, when opting for such an entry-friendly policy, the regulator must be able to commit itself on a sunset clause (for transparency of the regulatory signal)."*

ERG observes also that whenever the conditions to remove charges asymmetry apply, the adoption of a transparent and gradual phasing out of MTRs asymmetry may be in order:

> *"…temporary asymmetries reflecting the different start points for different operator's glide paths can also be legitimate. NRA's take a range of factors into account when specifying glide paths and, in certain circumstances, requiring gradual convergence from historically asymmetric MTRs may be appropriate"*

---

[9] Ibidem, par. 3.2 pag. 82.

The specification of the glide path has to be carried out such as to avoid unnecessary and harmful disruptions on MNOs operations, as well as the arising of regulatory risk:

> *"…the instantaneous removal of asymmetries in MTRs that had previously been permitted may (but not necessarily) unduly disrupt an MNO's operations or undermine regulatory certainty."*

ERG's position, therefore, indicates that MTRs symmetry should be achieved only in presence of certain conditions and, even when such conditions hold, MTRs asymmetry has to be gradually phased out. In cases where the conditions for achieving MTRs symmetry don't hold, (e.g., existence of exogenous objective cost differences across operators) ERG points out that charges' asymmetry can be retained.

2.2. Review of the international experience on MTRs structure

This section presents the results of an international comparison on MTRs' structure including 12 European countries (Austria, Belgium, Finland, France, Germany, Italy, Portugal, Spain, Sweden, the Netherlands, Norway and UK). The information we provide below has been collected from regulator's websites, official determinations and direct contacts with NRAs.

The purpose of the comparison is twofold: describing the

- MTRs' structure that is currently in charge, with the aim at identifying
  - the countries where MTRs are currently fully symmetric, those where, instead, MTRs are 'group wise' symmetric (i.e., charges are set symmetric within groups of operators that for some respects appear to be homogeneous, but are heterogeneous with respect to the remaining operators), and finally, those where MTRs are asymmetric,
  - the cost accounting methodologies used to set the MTRs currently in charge;
- MTRs' structure that will come into charge in the future, with the aim at identifying
  - the countries where MTRs will become fully symmetric, those where will instead retain some degree of asymmetry (in the form of either 'group wise' symmetric charges or asymmetric charges),
  - the cost accounting methodologies used to set future MTRs (whether they are symmetric, group wise symmetric or asymmetric).

2.2.1. Description of the collected information

For each country, we collected the following information relating to the MTRs structure that is currently in charge:

- MNOs' market shares: markets shares have been calculated on the basis of the number of customers subscribing each operator's service,[10]

- Current MTRs' structure: MTRs can be fully symmetric (all operators charge the same MTR), group wise symmetric (homogeneous groups of operators charge the same MTR, while operators characterized by some degree of heterogeneity charge a different MTR)[11], asymmetric (all operator charge different MTRs),

- Current MTRs: data report the MTRs that are currently in charge in each country for each operator,

- Cost Accounting Methodology used to set current MTRs: Cost Accounting Methodologies adopted by regulators can be of five types, i.e., Fully Distributed Cost under Historical Cost Accounting (FDC/HCA), Fully Distributed Cost under Current Cost Accounting (FDC/CCA), Long Run Incremental Cost (LRIC) under a Top Down approach, Long Run Incremental Cost (LRIC) under a Bottom Up approach, Hybrid LRIC approach which consists of a LRIC Bottom Up approach calibrated with capital costs and operational expenditures calculated on the basis of the information available in MNOs' accounting systems.

For each country, we collected the following information relating to the MTRs structure that will come into charge in the future:

- Future MTRs structure: as above, MTRs can be fully symmetric, group wise symmetric, or asymmetric,

- Arguments in support of the decision taken: when available, we report the rationale that regulators used to motivate their decision on the MTRs structure,

- Future MTRs: where applicable, data report the symmetric MTR that regulators set for upcoming years in each country,

- Future MTR Cost Accounting Methodology: as above, Cost Accounting Methodologies regulators can be of five types (FDC/HCA, FDC/CCA, LRIC Top Down, LRIC Bottom Up, and Hybrid LRIC),

- Lag between the year of NRAs' decision on symmetric MTRs and the year of introduction of MTRs' symmetry: when available and applicable, the data report the lag between the year in which the regulator decided to converge toward MTRs symmetry and the year in which MTRs symmetry was (will be) achieved.

---

[10] For completeness, market shares include also only-3G MNOs. However, only-3G MNOs have not been considered in the rest of the table as they receive different regulatory treatment from NRAs compared to only-2G or 2G-3G operators due to their specifics on the spectrum and network they operate.

[11] An example might be establishing the same MTR for all operators in a country that are endowed only with GSM 1800 MHz spectrum allocation (like it happens in UK).

2.2.2. Comments on the results of the international comparison

Table 1 - Table 3 present the results of the international comparison across the above mentioned countries. Tables include also information on Greece, to allow a comparison with the Greek case.[12]

The results of the international comparison show that MNOs' markets shares have quite different values, with the largest operator often holding a market share that is about twice as big as that of the third largest operator. Differences between the first and the second largest operator appear to be smaller and, at times, nearly equal (e.g., Finland, Germany, and UK). UK is the only country where all operators hold a very similar market share (the range of values being 21% - 24%).

Differences in market share often imply heterogeneities across operators, among which, notably, differences in unit costs. Indeed, by looking at the MTRs' structure, we find out that all countries included in the sample, with the exception of Sweden, do NOT adopt symmetric MTRs. In particular, out of the 12 countries in the sample we have that the MTRs' structure is

- asymmetric in Austria, Belgium, Spain, and Norway,
- 'group wise' symmetric in Finland, France, Germany, Italy, Portugal, the Netherlands, and UK,
- symmetric in Sweden only.

The cost accounting methodology that regulators adopted to set the MTRs currently in charge often draws from information available in MNOs' accounting systems.[13] Regulators preferred to set charges on the basis of actual costs documented by MNOs, instead of alternative approaches that are either based on "theoretically efficient" cost information (typically used in LRIC Bottom Up models) or on international benchmarks. In France and Norway, in particular, NRAs rely on both, models that build on MNOs accounting data and "theoretically efficient" cost information.

The situation described with regard to current MTRs' structure is going to change in the next years. Countries currently adopting asymmetric MTRs' structure will soon switch to symmetric or group wise symmetric MTRs.

In particular, in the next few years, 2 countries will adopt symmetric MTRs (Austria and UK with charges that will range between 5.72 and 6.27 €c/min.), 3 countries will adopt group wise symmetric MTRs (Belgium, Spain and Norway). The remaining 7 countries will retain the current MTR structure (symmetric for Sweden and group wise symmetric for Finland, France, Germany, Italy, Portugal, and the Netherlands).

Regulators that decided to switch to a symmetric MTR structure motivated their decision either with the aim to mimic the outcome of a perfectly competitive market, or with the aim

---

[12] The information on Greece is repeated in each of the three tables to make the comparison easier.

[13] Regulators relied on MNOs accounting information in 10 out of 12 jurisdictions.

to promote competition. Regulators that, instead, adopted a group wise symmetric MTRs' structure argued that exogenous cost differences still exist and have to be taken into account in setting MTRs. Therefore, the adoption of a fully symmetric MTRs' structure would have been inappropriate in presence of non negligible exogenous objective cost differences.

Where available, cost accounting methodologies used to set future MTRs are unchanged. The two regulators that, in the next future, decided to switch to symmetric MTRs thought that the cost accounting methodology had to rely on actual MNOs' capital costs and operational expenditures.

Finally, we notice that the switch to symmetric MTRs' structure has been decided much earlier than the date at which MTRs' structure has (or will) become symmetric. In fact, the lag between the dates at which NRAs' decision on symmetric MTRs was taken and symmetric MTRs come into charge ranges from 1.5 to 4 years for Austria and UK, respectively.

Table 1 – Comparison of provisions on MTRs adopted in selected European countries

	Greece	Austria	Belgium	Finland	France
MNOs Market shares	1) Cosmote 37,9% 2) Vodafone 33,9% 3) Wind Hellas 28,2%	1) Mobilkom 40,97% 2) T-Mobile 34,31% 3) One 19.67% 4) H3G 5,05%	1) Belgacom 42,97% 2) Mobistar 30,99% 3) Base 26,04 %	1) Telia Son. 40,77% 2) Elisa 39,37% 3) DNA 19,60% 4) Alands 0,26%	1) Orange 45,02% 2) SFR 36,23% 3) Bouygue 17,85% 4)Tele2M 0,90%
Current MTRs structure	Asymmetric	Asymmetric	Asymmetric	Group wise symmetric	Group wise symmetric (i)
Current MTRs (€c/min.)	Cosmote 9,98 Vodafone 9,91 Wind Hellas 10,41	Mobilkom 5,72 T-Mobile 7,02 One 7,64	Belgacom 8,02 Mobistar 8,84 Base 10,36	Telia Son. 5,1 Elisa 5,1 DNA 6,0 Alands T.6,0	Orange 6,5 SFR 6,5 Bouygue 8,5 Tele 2M: n.a.
Current MTR Cost Accounting Methodology	Decrease of MTRs decided by MNOs (effective Feb. 1 2008)	LRIC Top-down	LRIC Top-down	FDC/CCA	Joint considerations of FDC HCA, benchmark and LRIC Bottom Up
Future MTRs structure	Under consultation	Symmetric (January 2009)	Group wise symmetric (end of 2008)	Same as now	Same as now
Arguments in support of the decision taken	n.a.	Replication of the competitive outcome	Exogenous cost diferences due to frequencies	Aim to promote competition in the mobile market	Exogenous cost diferences due to frequencies and date of entry
Future symmetric MTRs (€c/min.)	n.a.	5,72 (January 2009)	n.a.	n.a.	n.a.
Future MTR Cost Accounting Methodology	n.a.	Same as now (ii)	Same as now	Same as now	Same as now
Lag between NRA's symmetry decision implemetation	n.a.	1,5 years	n.a.	3 years	n.a.
Sources	n.a.	TKK Austria (Decision 09/07)	IBPT (Decision Aug. 2006)	FICORA (Ficora's Principles for assessing mobile trermination pricing, 2006)	ARCEP (Decision 07 -0810 Decision 07-0128)

(i) Orange and SFR
(ii) MTR set at the lowest level among national LRIC costs

Source: NERA analysis on data collected from NRAs

Table 2 - Comparison of provisions on MTRs adopted in selected European countries (cont.)

	Greece	Germany	Italy	Portugal	Spain
MNOs Market shares	1) Cosmote 37,9% 2) Vodafone 33,9% 3) Wind Hellas 28,2%	1) TMobile D. 36,95% 2) Vodafone 34,88% 3) E/Plus 15,13% 4) O2 13,04%	1) TIM 40,38% 2) Vodafone 33,32% 3) Wind 17,50% 4) H3G 8,81%	1) TMN 45,61% 2) Vodafone 37,66% 3) Optimus 16,74%	1) Telef. Mov. 45,70% 2) Vodafone 31,54% 3) Orange 22,26% 4) Xfera 0,49%
Current MTRs structure	Asymmetric	Group wise symmetric (iii)	Group wise symmetric (iv)	Group wise symmetric (v)	Asymmetric
Current MTRs (€c/min.)	Cosmote 9,98 Vodafone 9,91 Wind Hellas 10,41	T-Mobile 7,92 Vodafone 7,92 E-Plus 8,8 O2 8,8	TIM 9,97 Vodafone 9,97 Wind 11,09	TMN 7,50 Vodafone P. 7,50 Optimus 9,00	Telef. Mov. 8,66 Vodafone 8,74 Orange 9,05 Xfera 13,05
Current MTR Cost Accounting Methodology	Decrease of MTRs decided by MNOs (effective Feb. 1 2008)	LRIC Top down	Joint considerations of LRIC Top Down FDC HCA/CCA	International Benchmark	Hybrid LRIC
Future MTRs structure	Under consultation	Same as now	Same as now	Same as now	Group wise symmetric (2009) (vi)
Arguments in support of the decision taken	n.a.	Different frequencies; Different market shares	Exogenous cost diferences due to frequencies, market shares, date of entry and access to financial resources	Operators are group wise heterogeneous. Symmetric MTRs based on efficient cost to promote competition. Asymmetric MTRs due to different scale economies and date of entry.	Replication of the competitive outcome
Future symmetric MTRs (€c/min.)	n.a.	n.a.	n.a.	n.a.	n.a.
Future MTR Cost Accounting Methodology	n.a.	Same as now (vii)	Same as now	Same as now	Same as now
Lag between NRA's symmetry decision implemetation	n.a.	n.a.	n.a.	n.a.	3 years
Sources	n.a.	BNETZA interviews	AGCOM (Delibera 3/06/CONS Delibera 628/07/CONS)	ANACOM (Decision Feb. 2005)	CMT (Resolucion Sept. 2006)

(iii) TMobile-Vodafone and O2-Eplus
(iv) TIM and Vodafone
(v) Vodafone-TMN
(vi) All MTRs symmetric expect for Xfera's MTR
(vii) Iincumbents MTRs set at OLOs' LRIC cost minus 10%

Source: NERA analysis on data collected from NRAs

Table 3 - Comparison of provisions on MTRs adopted in selected European countries (cont.)

	Greece	Sweden	Netherlands	Norway	UK
MNOs Market shares	1) Cosmote 37,9% 2) Vodafone 33,9% 3) Wind Hellas 28,2%	1) Telia Son. 47,04% 2) Tele2 29,36% 3) Telenor 18,09% 4) Hi3G 5,52%	1) KPN Mobile 51,23% 2) Vodafone 21,77% 3) TMobile 14,76% 4) Orange 12,23%	1) Telenor 65,87% 2) Netcom 34,13% 3) Teletopia (Oslo only)	1) Vodafone 24,82% 2) O2 24,74% 3) T-Mobile 23,5% 4) Orange 21,28% 5) H3G 5,66%
Current MTRs structure	Asymmetric	Symmetric	Group wise symmetric (viii)	Asymmetric	Group wise symmetric (ix)
Current MTRs (€c/min.)	Cosmote 9,98 Vodafone 9,91 Wind Hellas 10,41	All opeartors at 5,1 (x)	KPN Mobile 10,00 Vodafone 10,00 T Mobile 11,40 Orange 11,40	Telenor 7,54 Netcom 8,79 (xi)	Vodafone 6,87 O2 6,87 T-Mobile 7,5 Orange 7,5
Current MTR Cost Accounting Methodology	Decrease of MTRs decided by MNOs (effective Feb. 1 2008)	LRIC Top Down (xii)	LRIC Bottom-up	Joint considerations of LRIC Top Down LRIC Bottom Up (xiii)	Hybrid LRIC
Future MTRs structure	Under consultation	Same as now	Same as now	Group wise symmetric for the two incumbents. (July 2008) (xiv)	Symmetric (2010/2011) (xv)
Arguments in support of the decision taken	n.a.	Replication of the competitive outcome	Exogenous cost diferences due to frequencies	Operators are group wise heterogeneous	Replication of the competitive outcome
Future symmetric MTRs (€c/min.)	n.a.	Same as now	n.a.	n.a.	6,37
Future MTR Cost Accounting Methodology	n.a.	Same as now (xvi)	Same as now	Same as now (xvii)	Same as now
Lag between NRA's symmetry decision implemetation	n.a.	3 years	n.a.	n.a.	4 years
Sources	n.a.	PTS (Aug. 2007)	OPTA (TN/2007/201479, July 2007)	NPT (Decision May 2007)	OFCOM (Mobile call termination statement 2007)

(viii) KPN-Vodafone and Orange-Tmobile
(ix) Vodafone-O2 and Orange-Tmobile. H3G is only 3G operator. Exchange rate £/€ = 0,8 (Apr.24)
(x) SEK 0,55 (Exchange rate SEK/€ = 9,28, Apr. 24)
(xi) Exchange rate NOK/€ = 0,1256 (24 Apr.)
(xii) MTRs set at the highest level within the national benchmark
(xiii) Only for the incumbent. OLOs' MTRs set on incumbent's rates plus mark up
(xiv) Milder regulation (reasonable prices) for new entrant.
(xv) Linear glide path toward symmetry
(xvi) Symmetric MTR set at the highest cost among those calculated for each operator
(xvii) Applied to Telenor and the resulting cost appleid also to NetCom

Source: NERA analysis on data collected from NRAs

3. Our view on the EC and ERG guidance

EC and ERG's opinion on MTRs symmetry is motivated on the basis of sound economic principles: charging services at efficient costs, under ideal conditions, allows achieving allocative and productive efficiency.[14] We agree that when such conditions apply, a symmetric MTRs' structure allows the achievement of economic efficiency.

However, in case some of the hypotheses underlying a perfectly competitive market (e.g., equal access to factor input, product homogeneity, absence of switching and transaction costs, etc.) doesn't hold, the adoption of symmetric charges is likely to produce results that are not optimal and even detrimental to market developments.

EC and ERG, again correctly, explicitly argue that, in case such circumstances arise, symmetric charging would not be appropriate and a temporary retention of charges' asymmetry would be required. In particular, charges' asymmetry would have to be retained until the circumstances violating the hypotheses underlying perfectly competitive markets are removed, by regulatory intervention and as a result of operators' actions subsequent to that.

The implementation of the approach proposed by EC and ERG, therefore, doesn't imply the adoption of MTRs symmetry at all costs, but only when it is able to produce its benefits. Indeed, the imposition of MTRs symmetry to regulate markets for which the necessary requirements don't hold, will likely produce undesired results and prevent the achievement of the objectives for which MTRs symmetry was to be introduced.

We therefore believe that the correct implementation of the principles embedded in the guidance by ERG and EC requires a careful analysis of the specifics characterizing the relevant business and regulatory context.

EC and ERG don't provide detailed instructions on how such analysis should be performed and how results of the analyses should be taken into account in deciding if and when move toward MTRs symmetry. In absence of guidance by EC and ERG, we believe that NRAs would have to

- assess the specifics of the business and regulatory contexts: this activity would allow the NRA to verify if the hypotheses underlying a perfectly competitive market, which are needed in order to apply successfully symmetric MTRs across EU countries and national operators, indeed hold. This assessment would consists of
  - the analysis of the differences in costs between the country in which MNOs operate and the other EU countries, due for instance to countries' topography and traffic seasonality,
  - the discussion of the exogenous objective cost differences characterizing each MNO, such as spectrum constraints and allocation, interference, access to best sites, and market shares;

[14] Allocative efficiency is achieved when the firm prices its services at cost, i.e., earn no extra profits. Productive efficiency is achieved when the firm incurs efficient costs.

- design a regulatory process that, if proper conditions hold, leads to a reduction of MTRs asymmetry. The process would have to be designed such as to reflect the outcome of the assessment analyses discussed above. At the end of such process, MTRs symmetry will be achieved only if regulatory intervention will have been able to eliminate the sources of costs' asymmetry. Conversely, MTRs will still be asymmetric if regulatory intervention will not be able to eliminate the sources of costs' asymmetry. Whenever MTRs symmetry were achievable, the date at which MTRs will be symmetric would have to be decided on the basis of the time that the

  – regulator may take to remove the sources of costs' asymmetries,

  – operators may need in order to take advantage of such removal.

  The implementation plan should also identify the glide path of regulated charges.

We discuss below the specifics of the Greek context. We argue that there are several exogenous and objective reasons why termination costs may be different between Greek and other EU countries and across Greek mobile operators. Several of the exogenous cost differences we discussed could be removed by regulatory intervention. A structured regulatory process is needed, in order to plan how such exogenous cost differences can be removed and, subsequently, decide how future MTRs' structure should be revised.

4. Is current MTRs asymmetry in Greece justified? The specifics of the Greek context

In order to discuss if, and to what extent, the introduction of MTRs symmetry in Greece is appropriate, we believe that two options of symmetry have to be discussed:

- Symmetry across European countries, whereby Greek MTRs would be set at the same level as that in charge in other European countries;

- Symmetry across Greek mobile operators: whereby, regardless of their level across European countries, MTRs are the same for all Greek mobile operators.

This section presents the results of our study of the Greek context. We have analyzed a number of issues that may prompt asymmetries in costs across countries (e.g., country's topography, unworkable licensing regime for BTS, and traffic seasonality) and across Greek mobile operators (e.g., low spectrum endowments, interference problems, access to suboptimal sites for installing mobile access equipment, low market shares).

4.1. Differences in costs between Greece and EU countries

4.1.1. Topographic differences between Greece and other European countries

Greece differs from many countries in being around 80% mountainous with great altitude variations per sq km, and having numerous islands, with impact for mobile network design. This is an exogenous effect, and therefore should be taken into account when comparing Greek rates with rates elsewhere in Europe. That type of terrain morphology implies more sites (BTS roll-out) in order to fulfil coverage requirements.

This effect is especially evident on the rugged islands of the Aegean, many of which, fjord-like, are heavily indented, and separated by higher ground, often steeply rising. Towns and harbours at the head of the ‘fjord’ have to be served by a BTS positioned to illuminate the settlement, but which usually cannot illuminate other settlements on the other side of the higher ground.

As a result, more BTSs are required to serve the occupied areas of Greece than there are in other countries.

Demand also exists at sea, off the coasts - 'coastal coverage'. Callers from Athens, say, will want to reach users while they are on ferries and ships.

Customers demand this service, and expect to make and receive calls while on the ferries –

[●]

To serve the sea effectively BTSs need to cover more than merely the area of dry land. This places extra area coverage requirements in addition to the land mass, and also means that traffic capacity has to exist on TRX sectors which cover the sea as well as the land.

Sectors which cover the sea are not predicted by a model, such as used by regulators elsewhere in Europe which bases prediction on theoretical reach only over the declared land area. (EETT’s 2004 model, which also took the approach used elsewhere in Europe, did not take account of coastal coverage and as a consequence systemically understated the costs of providing coverage and capacity on coastal TRX sectors.)

As a result, mobile termination costs in Greece would not be expected to be the same as elsewhere in Europe, since the costs of serving Greece are not the same as elsewhere.

Such cost difference must be recovered by MTRs, which, *ceteris paribus*, have to be necessarily higher than those in charge in other countries that have an easier topography.

4.1.2. Cumbersome Licensing regime for BTS

- Although the New Law 3431/2006 on electronic communications has been adopted, the licensing problems are still unsolved. According to Wind Hellas[●]

The licensing regime for BTSs is unusually cumbersome and involves authorisations from numerous organisations that do co-ordinate their activities or responses. Wind Hellas claims that Greece is the only country in Europe that:

- Classifies antennae in the same category as industrial premises as far as environmental licenses are concerned, and
- Where a civil aviation permit is required for all antennas, whether in proximity of airports or not.

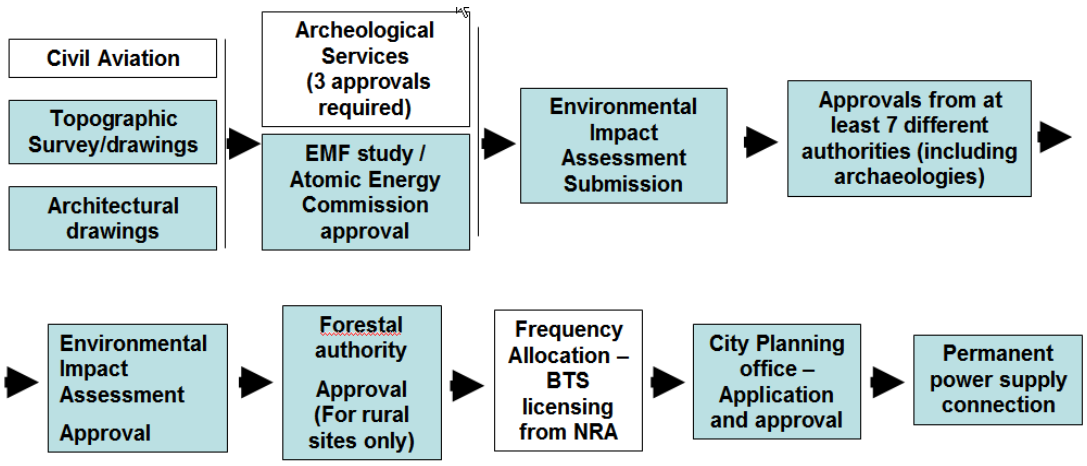
Wind Hellas tells us that, in Greece, BTS authorisations are required from:

- Civil Aviation approval,

- Classic/Modern/Byzantine Antiquities Archaeological Service approvals,
- Forestal service permit,
- Hellenic Atomic Energy Commission approval,
- NRA frequency allocation,
- NRA license,
- City Planning office permit, and
- Environmental Impact Assessment approval by the Prefectures

This multiplicity of approvals is illustrated in Figure 1.

Figure 1 - Licensing approvals required for BTSs in Greece

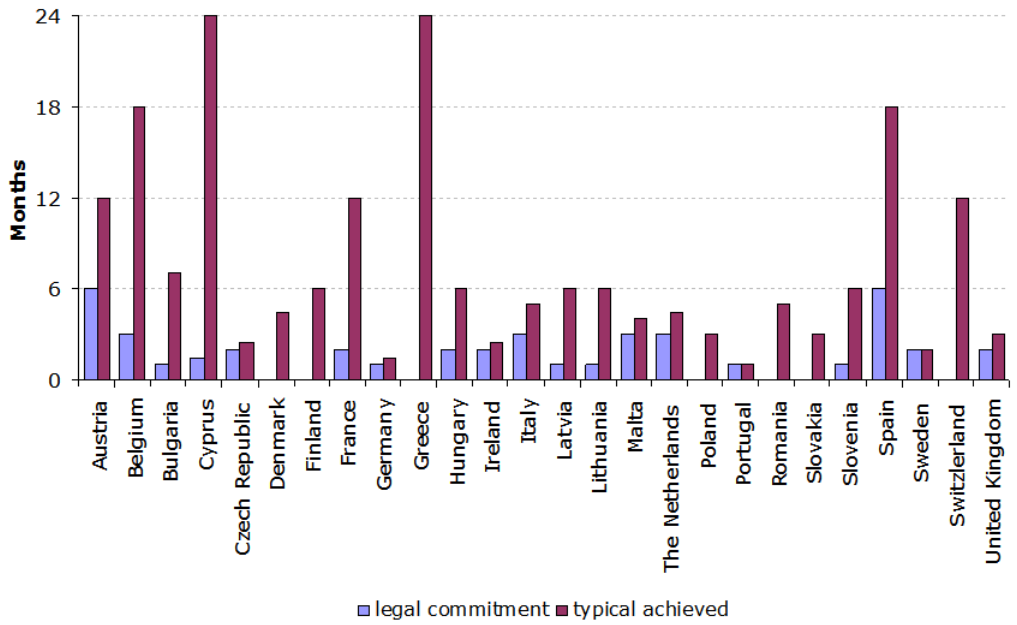


Source: Wind Hellas

The current situation where different authorities grant different complementary authorizations/clearances at different time scales creates an unworkable regulatory framework for operators. A recent survey by OVUM published for the GSM Association in 2007 highlights the differences between countries' performance in licensing BTSs; Greece stands out.

Figure 2 - Ovum's survey of European BTS Licensing timescales

Figure II.1 Comparison between legal commitment and achieved timescales for granting planning permission on a per country basis



Source: Ovum for GSME Study

Among the multiplicity of approvals lies another difficulty, specific to Greece: the (much awaited) new law on telecommunications was voted in February 2006 (L.3431/2006), but, according to a key provision, all the existing BTSs had to be re-licensed and proven to be compliant to new lower EMF emission standards (30% to 40% more restrictive then the ones adopted from EU, WHO, ICNIRP).

Because of this further reduction of EMF emission values to 60% of the limit adopted by the EU in the urban areas, new EMF studies had to be submitted for all existing BTSs. This has resulted in Greek operators *unavoidably* incurring more cost to provide extra analyses that have not been required elsewhere in Europe.

4.1.2.1. Business costs prompted by the BTS Licensing regime

Delays to BTS Licensing cause costs [●].

The traffic loss due to the closure of BTSs generates a loss of revenues. We estimated such revenue loss by computing the value of the lost traffic using minimum per minute rates observed across Europe that we researched in a study performed in 2007. These varied from € [●] to € [●]. We conclude that the revenue loss, arising from failing to carry the traffic at unlicensed sites, will lie in the range € [●] mln to € [●] mln, as shown in Table 4.

Table 4 Potential revenue lost at halted sites

[●]

Source: NERA analysis

The above estimate has to be taken as conservative, in that the range of per minute price that has been used (i.e., € [●] - € [●]) were drawn from minimum per minute rates documented for pre-paid and post paid services in each country: average rates might be expected to be higher.

In deriving this estimate we used network Erlang statistics to measure average daily traffic this year (2008) between 1 January and 16 May, on 2G macro BTS sites, in both Rural and for Urban conditions. Wind Hellas assumed that [●]% of the Erlangs represented conversational traffic.

NERA notes that the traffic measurements that Wind Hellas undertook averaged out the effects of weekdays and weekends to produce a 'blended' average daily figure. Considering the [●] rural sites and [●] urban sites that Wind Hellas has built [●], the total traffic from these [●] sites is calculated to be [●] Erlangs per day.

Wind Hellas notes that some of this displaced traffic may be carried by adjacent cells, though NERA considers this may be unlikely during the busier periods of the day.

Cost calculations are conservative also for reasons other than those discussed above. Namely, not included in these estimates are costs of:

- [●].
- 3G traffic loss (Only 2G traffic loss is considered. approx. [●]% of the total traffic is generated by 3G and almost all Urban sites unlicensed are dual band).
- The operating expenditures of lease contracts concerning unlicensed sites.

These costs are not incurred due to any inefficiency by the operators. Operators are not creating the licensing delays. Rather, it is the licensing regime that is creating these costs, which appear unnecessary and harmful to MNOs.

These costs are therefore exogenous to Greek MNOs and represent a source of charges' asymmetry for Greek MTRs compared to those of other European countries.

4.1.2.2. Further, asymmetric, effects of the Licensing framework

The negative effects of the licensing framework are also, to some extent, felt asymmetrically *within* the Greek mobile industry.

Licensing delays, and the wasted resources of BTS build pending licensing, potentially affect all operators equally. But the effects of the reduced EMF requirements, and any subsequent legal intervention, are felt more by those operators most susceptible to them.

The asymmetries in effect of the licensing framework on the different operators in Greece are discussed in section 4.2.

4.1.3. Seasonal traffic

Mobile operators in Greece (Wind Hellas, as well as the other operators) experience unusually 'peaky' traffic in the Aegean islands, a favourite holiday destination for most of Europe. Therefore, Wind Hellas (as well as the other Greek mobile operators) have to deploy sufficient capacity to handle traffic during holiday times.

Mobile operators incur the costs for making such capacity available during all year, even when the network during the winter season remains under-used. However, they are able to recover these costs mainly during the summer season, when traffic grows.

The capacity costs incurred by operators facing seasonal traffic peaks is an exogenous objective cost difference for Greek operators compared to other countries that do not experience traffic seasonality. As such, these capacity costs have to be taken into account when comparing the costs of providing mobile termination services in Greece to those of providing the same service in other European countries.

The costs differences described above are likely to be exacerbated with the recent advent of more affordable roaming rates imposed by the European Commission. In fact, as roaming charges decrease, holidaymakers are likely to make more calls during the summer.[15]

[●]. The figure shows that in week 33 roamers peak at a factor of over 16x compared to week 3.

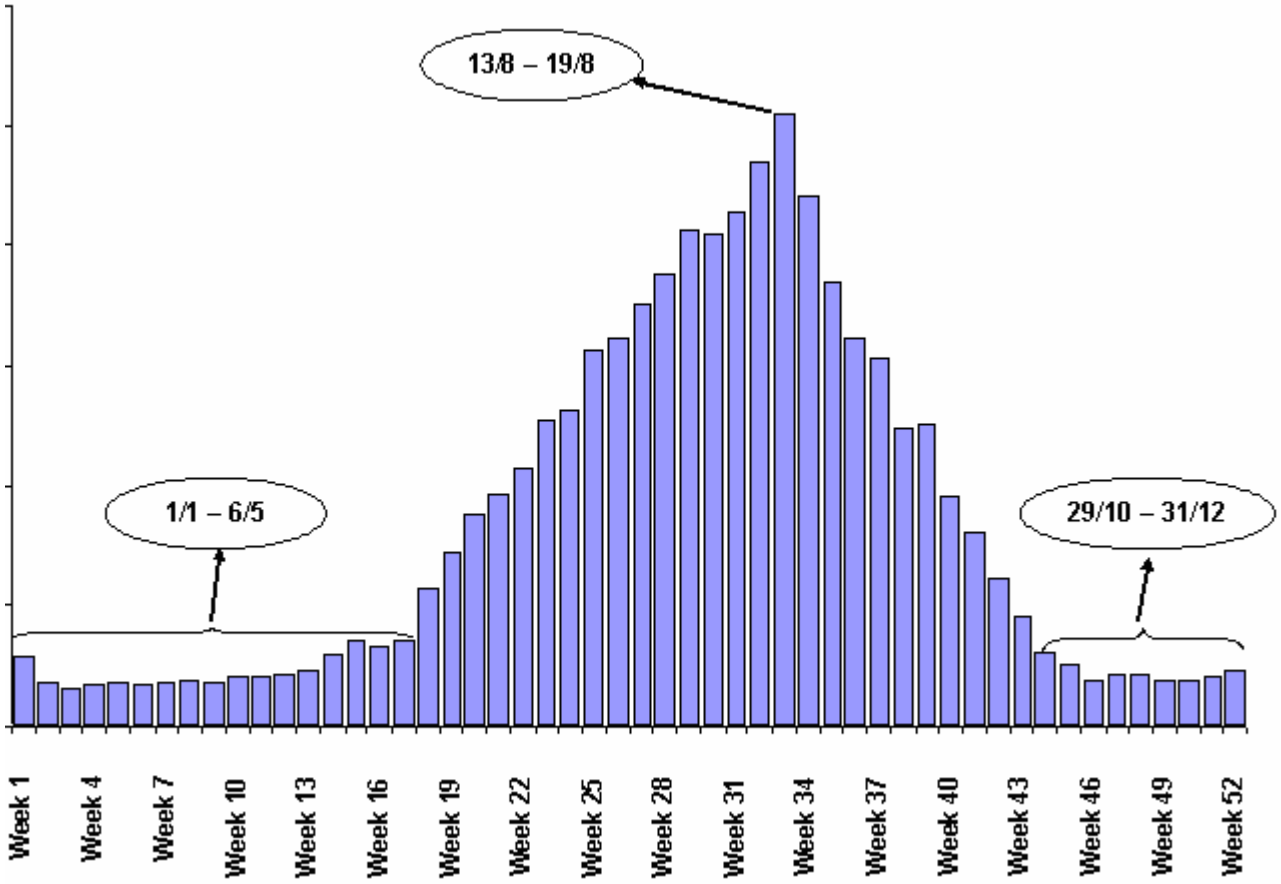
Call charges and interconnection rates, including MTRs, have to be set to recover network costs, including those costs of the network that have been incurred to be able to serve peak traffic levels with an appropriate quality of service. Such costs have to be recovered even though such capacity is under-used at periods of lower traffic level.

This exogenous effect differentiates Greece from other European countries, and explains in part why, *ceteris paribus*, termination rates in Greece require to be higher than most other European countries.

Such cost difference must be recovered by MTRs, which, *ceteris paribus*, have to be necessarily higher than those in charge in other countries that do not experience traffic seasonality.

[15] More affordable roaming charges are likely to exacerbate also the difference between summer traffic and winter traffic. While in fact in the summer traffic levels will increase in holiday destinations, no increase in traffic levels is expected in holiday destinations during the winter season.

Figure 3 – Number of roamers for Wind Hellas in 2007



Source: NERA analysis on Wind Hellas' data

4.2. Source of exogenous cost differences between Wind Hellas and other Greek mobile operators

4.2.1. Wind Hellas' gap in spectrum endowments

Table 5 presents the development over time of the spectrum endowments of the Greek mobile operators from the year of the first market entry (1993 by Wind Hellas) until 2007. The table clearly shows that Wind Hellas has had less spectrum than the other operators. The asymmetric spectrum allocation is particularly marked in 1998 when Cosmote entered the market, with 25 MHz of spectrum compared with 10 MHz for Wind Hellas (and Vodafone).

A large gap is still observed in 2001, when Vodafone and Cosmote had a much large spectrum endowment than Wind Hellas (30 MHz and 25 MHz, vs. 15 MHz, respectively). Wind Hellas' gap with respect to Cosmote would have increase even more in 2002, as Cosmote received further 5 MHz in the 900 MHz band and reached the same amount of spectrum assigned to Vodafone. However, in 2007 Wind Hellas actually reduced its gap after merging with Q-Telecom, which allowed increasing its spectrum endowment to 25 MHz, 5 MHz less than Vodafone and Cosmote.

Table 5 – Development of 2G spectrum endowments of Greek operators (MHz)

Operator	Band	1993	1998	2001	2002	2007
TIM / Stet	900	10	10	10	10	10
	1800	0	0	5	5	5
Q	900			0	0	0
	1800			10	10	10
Wind Hellas (*)		**10**	**10**	**15**	**15**	**25**
Vodafone	900	10	10	15	15	15
	1800	0	0	15	15	15
	Total	**10**	**10**	**30**	**30**	**30**
Cosmote	900	0	0	0	5	5
	1800	0	25	25	25	25
	Total	**0**	**25**	**25**	**30**	**30**

(*) TIM/Stet, plus Q after the 2007 merger
Source: NERA analysis of Wind Hellas data

Asymmetry exists in 3G spectrum as well. Considering the FDD band, 1920 & 2110 paired, (the generally used band for normal services), Figure 4 shows that Vodafone has most, Cosmote next, and Wind Hellas the least amount of 3G spectrum. The TDD band, 1900 unpaired, is not usable for commercial services, at present.

Figure 4 - 3G Spectrum Endowments in Greece

3G spectrum endowment	Vodafone	Cosmote	Wind Hellas
FDD MHz	20	15	10
(carriers)	*4*	*3*	*2*
TDD MHz	5	5	5

Source: Wind Hellas

One of the problems often arising when spectrum endowment is poor is the increase in network costs that are prompted by the [●]. In order to be able to discuss if and how the gap in spectrum endowments suffered by Wind Hellas required the systematic adoption of [●], Figure 5 provides a comparison between SIM growth for both, Wind Hellas and the entire Greek mobile market, and the Wind Hellas' gap in 2G spectrum endowments versus Vodafone and Cosmote.

Figure 5 shows that Wind Hellas spectrum gap versus Cosmote has always been substantial and equal to 15 MHz (with the exception of 2001 in which it reduced to 10 MHz due to the assignment to Wind Hellas of 5 MHz of spectrum in the 1800 band).[16] Wind Hellas suffered the largest impact of such a gap from 1998 to 2002 when market growth has been largest and Wind Hellas, due to its poor 2G spectrum endowment, had to satisfy market and traffic growth by exacerbating frequency re-use.

Wind Hellas didn't suffer any gap on 2G spectrum endowments versus Vodafone between 1998 and 2000. However, in 2001 Vodafone was assigned further 5 MHz in the 900 MHz band, and 15 MHz in the 1800 MHz band, while Wind Hellas was assigned only further 5 MHz in the 1800 MHz band. Wind Hellas suffered the largest impact of such a gap after 2001, and in particular, in the years 2006 and 2007 when market growth increased almost at [●]% a year.

The only option available to Wind Hellas to circumvent the lack of spectrum was relying on tight frequency re-use. Such a strategy was certainly sub-optimal compared to the one of using more spectrum, should this have been available. In fact, many sites, have been re-engineered and have had to be sectorised to avoid co-channel interference from frequencies, necessarily re-used due to limited spectrum, nearby.[17]

[●]

[●]

[16] The gap of 15 MHz was restored in 2002 when Cosmote was assigned another 5MHz in the 900 MHz band.

[17] Sectorisation allows a cell to be split into several (normally 3) sectors pointing in a different direction. This ensures that the same frequency that has to be used elsewhere because there are so few available do not 'point at' the BTS receivers that operate the same frequency for local service in a differently facing direction.

Furthermore, the lack of spectrum has exacerbated the problems arising from interference etc (described later). The frequency re-use plan is tight. Without sufficient spectrum to allow for frequency re-assignments in particular circumstances, difficulties arise in re-planning coverage and traffic handling in conditions of interference.

[●]

[●]

The exogenous cost difference due to spectrum endowment might be removed by regulatory intervention to ensure that all companies have equivalent spectrum. One remedy might be to [●].

Figure 5 – Comparing spectrum endowments gap to market growth

[●]

Source: NERA Analysis on Wind Hellas' data

4.2.2. Interference problems affecting Wind Hellas' quality of signal

Wind Hellas experiences significant disturbance from interference, mostly in the 900 MHz band, less at 1800 MHz and 2.1 GHz (UMTS). The measure of interference we refer to is the number of complaints submitted by operators to EETT. Every interference episode has to be communicated to EETT by means of formal complaint.

Wind Hellas maintains a register of the interference cases it suffers, and provides a monthly reminder to EETT of open cases in addition to the formal complaints in respect of each instance. For example, the interference cases that were open in February 2008 were [●] in GSM 900, [●] in DCS 1800 and [●] in the UMTS band.

Table 6 - Interference cases affecting Wind Hellas in February 2008

Band	Cases open in February 2008
GSM 900	[●]
DCS 1800	[●]
UMTS	[●]

Source: Wind Hellas monthly summary

Most likely, the interference seems to affect [●]. In fact:

- [●]
- [●]
- [●]

Interference is caused by:

- Transmission links by other Non Mobile operators (e.g., microwave point-to-point links);
- Radio transmissions that used to operate on 900 MHz frequencies. "Illegal" stations create a lot of interference problems. Such illegal operation arises both from:
  - Non Mobile Operators that use a given spectrum although they have no right to do that;
  - Non Mobile Operators transmitting in allowed spectrum, but infringe some operational rules (e.g. transmitting signals at a power higher than allowed, no use of proper filters, no proper maintenance of transmitting equipment etc).
- Non-Mobile organisations. Transmissions causing, usually, large scale interference in GSM 900 band appear during military operations. Additionally, interference caused by jammers used from non-GSM organizations, is also evident in 900 MHz spectrum in Greece. In these cases EETT might have not clearly defined jurisdiction (i.e. organisations related to national security), and resolution of the interference problems

arising from such uses can be difficult.[18] From interviews with Wind Hellas' network staff, we understand that examples of non-GSM organizations using 900 MHz spectrum bands include,

– [●]

– [●]

In spite of interference problems, customers continue to expect to use mobile services that ensure a satisfactory quality of service. Customers will desert a mobile network if they cannot make and receive calls where they need to do so, moving instead to another network, [●].

In order to ensure proper services' quality and avoid, if possible, losses of clients, Wind Hellas has [●].

Once Wind Hellas deploys extra mobile access equipment to deal with interference problems, the costs associated with it (which include both capital costs and operational expenditures – such as maintenance) will affect the amount of costs borne by Wind Hellas in the next years to come.

Moreover, such higher costs will be persistent over time, unless the causes of interference will be removed by intervention of the competent authorities.

In presence of interference problems, Wind Hellas faces the following options:

- have its [●],
- incur extra costs to deploy mobile access equipment [●].

Table 7 shows the numbers of Wind Hellas' BTSs affected, at present, by interference.

Table 7 – Number of Wind' Hellas' BTSs affected by interference

[●]

Source: NERA analysis of Wind Hellas' data

With the purpose to provide a rough estimate of the traffic loss due to interference problems in the GSM band we have considered typical city cells at 900 MHz and 1800 MHz.[19]

We assumed that all the carriers in that sector would be affected – this would be the case, for example, for transmitters creating interference across much of the GSM band.

---

[18] Up to a year ago different authorities were in charge for different spectrum uses. For example, broadcasting was subject to an authority and radio/TV to another. Now EETT is the only authority in charge of any spectrum use (other than military/security uses in the 900 MHz band).

[19] We recognise that in some circumstances reflections, or sector orientation, might result in 2, possibly even 3 sectors, being affected, but to keep the calculations representative we assumed that only one sector was affected.

We used the average daily traffic figure that Wind Hellas measured for its calculation of the potential traffic losses due to the BTS Licensing problems to calculate a typical week's traffic on a busy urban sector, assuming that the traffic is evenly distributed over 3 sectors of an urban BTS. This is the traffic that could be lost if Wind Hellas did not attend to the interference problem. Assuming that, on average, cases take around 4 months to resolve (though some may take longer), we quantified the traffic loss over 17 weeks (i.e.,4 months).

Table 8 shows the results of our simulation exercise and our estimate of a traffic loss during 2007 of, potentially, about [●]%.

Table 8 – Indicative estimate of the traffic loss due to interference problems

[●]

The estimate has been obtained by calculating the traffic loss per week for a single urban sector to be [●] minutes, and applying this figure to the number of cells affected by interference during 2007. During a typical 4 month period, this amounts to nearly [●] minutes, potentially [●]% of Wind Hellas' annual traffic.

We did not undertake any minutes estimate for UMTS, though Wind Hellas is experiencing interference in the UMTS band (which carries around [●]th as much traffic again as the GSM bands), so more traffic loss is potentially occurring than we have estimated.

Note that not all cells affected will suffer interference on all frequencies in the sector (though some will, depending on the nature of the interference).

Our estimate is, of necessity, approximate for those reasons, as well as because in practice the numbers of BTSs affected at any time may vary slightly, and particular cases may take longer or shorter periods of time to resolve.

Nevertheless, the issue is not whether cases take 17 weeks to resolve on average, or 19 weeks or 15 weeks, or even whether more than one sector on a BTS is affected, or whether all frequencies are affected or only some frequencies in certain cases, but that the effect of interference on traffic is real, and noticeable.

Interference remains significant, a source of

- Revenue loss,
- [●], and
- An imperative to incur in extra costs, to overcome the difficulties.

Such additional costs (which sometimes can be new microsites, sometimes extra carriers and TRXs, sometimes wholesale re-arrangements of sites and frequency plans) prompts high [●].

[●]

Such network inefficiency, however, is not under Wind Hellas control. Rather, it is an exogenous cost difference that Wind Hellas is incurring and cannot avoid it, despite it would be happy to.

[●]

The exogenous cost difference can be removed by regulatory intervention. Competent authorities could strengthen the interference control framework to protect the GSM bands and ensure operation free from interference throughout the State[20].

4.2.3. Wind Hellas access to suboptimal sites to install mobile access equipment

A mobile operator that is first entrant in the mobile communication market has typically a significant strategic advantage over later entrants in that he has access to the best sites to install its mobile access equipment. This situation arises in many European countries with particular emphasis in urban and highly dense areas, which require widespread deployment of access equipment. In such areas, the need to deploy more BTSs and the scarcity of sites (e.g., rooftops) makes the advantage of the first entrant even bigger.

In the case of the Greek mobile communication market, Wind Hellas hasn't fully enjoyed the advantage that first entrants usually enjoy, due to the fact that [●], owns a large number of buildings in highly dense (urban) areas to which it has retained exclusive access for a long time. Since 1998, [●].

[●]:

- [●]
- [●]
- Wind Hellas' backhauling costs higher than those incurred in by [●]:[●].

These buildings are much better than others because for interconnection to leased lines. [●] access to better facilities and [●] prime sites gives it an advantage over Wind Hellas [●], who, as a result, face higher opex (and in some cases higher capex) in network deployment.

In view of the above considerations, we believe that there are likely exogenous objective cost differences on which EETT may further investigate before taking any decision on MTRs symmetry and glide path. Such cost differences could be removed only by regulatory intervention, and in particular, [●].

[20] The scale of interference suffered by mobile operators in Greece may differ from elsewhere in the EU, and may also represent another exogenous difference between Greek MNOs compared to other countries' MNOs.

EETT has now published its "Regulation on Collocation". The Regulation, which is effective from May 14th 2008, represents the basic regulatory provision needed to address the collocation issue effectively.

However, it will take time in order for such a provision to prompt the effects for which it has been introduced [●]. MNOs will have to decide how many pieces of mobile access equipment could be efficiently relocated on [●] buildings and, once this will have been decided, they will have to operate the migration of such pieces of equipment.

In view of the above, the effects of introducing the regulation on collocation will not be significant until cost savings begin to work through from non-discriminatory collocation access to [●] sites.

However, even if EETT does enforce on [●] the obligation to provide MNOs with access to its sites, the higher network costs for Wind Hellas due to the present (and past) unavailability of [●] sites would not disappear. 'The damage is done' and such damage would continue to exist for Wind Hellas due to the consequential costs of the earlier refusal to lease BTS roof space which prompted higher costs to provide coverage and traffic capacity.

Only over time, Wind Hellas might be able to migrate part of its mobile access equipment to [●] sites that will be accessible in collocation and reduce its costs to provide coverage and capacity. However, changing a site involves significant cost, and may be an 'avoidable' and inefficient cost. Once a second-choice site is acquired and built, it becomes difficult to justify further expense replacing it, especially where long leases have had to be agreed.

EETT would have to carry out a detailed cost-benefit analysis to assess if, and to what extent, BTSs migration would be desirable, for consumers, over the current network layout.

The extra network costs that Wind Hellas had to bear, and will keep bearing in the future, due to the impossibility of access to [●] sites (and that [●] doesn’t have to bear because it has access to [●] sites) are exogenous to Wind Hellas and justify the existence of an asymmetric MTR structure.

The exogenous cost difference due to sub-optimal access to sites can be overcome in the medium term by regulatory intervention ensuring that

- non-discriminatory access is actually provided by [●], and that
- the costs of restructuring the network to benefit consumers through the use of newly available [●] sites, are recovered from traffic charges during the network evolution phase.

4.2.4. Asymmetric burdens of the BTS Licensing framework

The burdens of the new BTS Licensing framework asymmetrically affect mobile operators, because different operators are more or less susceptible to the burdens.

[●]

In practice, not all the operators are equally susceptible. Some of the BTS licensing provisions may be being applied differently in respect of different operations in similar locations.

[●]

[●]

[●]

[●]

The extra network costs that Wind Hellas is likely to bear in order to manage the burdens of the licensing framework (and that Cosmote does not have to bear for the reasons explained above) justify the existence of an asymmetric MTR structure.

Competent authorities, instead, may intervene and remove this source of asymmetric cost difference across Greek mobile operators by revising the licensing process. In absence of such intervention, it is likely that Wind Hellas will experience enduring higher costs than Cosmote due to BTS licensing problems.

4.2.5. Wind Hellas' low market share

Differences in market shares are commonly regarded as a source of differences in costs, which, to a large extent, are out of operators' control. Differences in costs arise because high market shares allow enjoying economies of scale that are larger than those that a low market share operator would enjoy.

Table 9 presents data on the development of the market shares of Greek mobile operators from 2001 to 2007. Wind Hellas and Vodafone were first entrants in the Greek mobile market back in 1993. Cosmote, instead entered later on, in 1998.

A comparison of market shares confirms that neither of the two early entrants (Vodafone and Wind Hellas) are currently the largest mobile operator in Greece. In fact, in 2007 while Vodafone and Wind Hellas show a market share of [●]% and [●]% (the latter including Q-Telecom market shares), Cosmote, shows a market share of [●]%.

Table 9 – Market shares' development (2001-2005)

[●]

Source: Wind Hellas

By looking at the development of market shares of Greek mobile operators since 2001 we observe that:

- Vodafone, in 2001 showed a market share lower than Cosmote's market share. Moreover, in subsequent years, Vodafone's market share decreased, while Cosmote market share increased. In 2007, they ended up to [●]% and [●]%, respectively;

- Wind Hellas, already in 2001 was characterized by a market share substantially lower ([●]%) than the first two operators (Cosmote [●]%, Vodafone [●]%). Moreover, in subsequent years, Wind Hellas' market share decreased by more than [●]% and reached [●]% in 2005, possibly as consequence [●]. In 2006 and 2007, Wind Hellas increased its market share by [●]% while Q-Telecom consolidated its market share above [●]%.

In 2007, Wind Hellas merged with Q-Telecom and formed a new entity. Last line of Table 9 provides the market share of the new entity resulting from the merger. The data in Table 9 confirm that in 2007 the market share of the new entity is slightly below [●]%.

The analysis of the last column of Table 9 reveals that from 2001 to 2007, the most successful operator in terms of market share levels and growth was Cosmote, which was the last entrant in the Greek mobile market.[21] On the other hand, Vodafone has experienced a loss of its market share of about [●]% compared to 2001 and of [●]% from 2006-2007.

[●].[22]

The explanation we provide for the historical development of operators' market shares is also consistent with operators' churn rates (Table 10):

- Cosmote's churn rate averaged [●]% in 2001-06 and went down even further to [●]% in 2006,
- Vodafone's churn rate averaged [●]% in 2001-06 and went slightly down to [●]% in 2006,
- Wind Hellas' churn rate shows the highest churn rate, which averaged [●]% in 2001-06 and remained roughly constant in 2006 ([●]%).

Table 10 – Churn rates of Greek mobile operators

	2001-2006	2006
Cosmote	[●]%	[●]%
Vodafone	[●]%	[●]%
Wind Hellas	[●]%	[●]%.

Source: Wind Hellas

In view of the above considerations, we believe that Wind Hellas' low market share may be likely considered a source of exogenous objective cost differences compared to other mobile

[21] We consider Q-Telecom as part of the new entity Wind Hellas and for this reason is not considered as the last market entrant.

[22] Such an advantage was acknowledged also by the European Commission in its competitive assessment in relation to the proposed concentration between Tim Hellas Telecommunications (owned by TGP Advisors IV Inc. and Apax Partners Holdings Ltd) and Q-Telecommunications. See par. (18) Case No. COMP/M.4036, 13/1/2006.

operators, which EETT may wish to further investigate before taking any decision on MTRs symmetry and glide path.

The cost difference arising from Wind Hellas' lower market share cannot be removed by regulatory intervention. Actually, we believe that, by merging with Q Telecom, Wind Hellas adopted the only strategy able to allow an immediate and substantial increase in market share, needed in order to achieve in the longer term a reduction of services unit costs through larger economies of scale.

Moreover, the merger between Wind Hellas and Q-Telecom is likely to enhance market competition and create benefits for consumers, as the European Commission envisioned in its Competitive Assessment that led to the decision not to oppose the proposed merger:

> *"The Commission's market investigation revealed that even though the transaction would lead to a reduction in the number of market players from four to three, overall the market remains at least as competitive as it was before, TIM Hellas remaining the third largest supplier but, following the merger, in a stronger position to compete with the two main players, Cosmote and Panafon-Vodafone."*[23]

EC argued that the merger will not introduce distortions in the competition among operators in the Greek mobile market:

> *"Competition on the Greek market for mobile telecommunication services takes place among four active suppliers (Mobile Network Operators): Cosmote, Panafon- Vodafone, TIM Hellas and Q-Telecommunications […] The two large rival operators, Cosmote with [35-40%] market share and Vodafone-Panafon with around 35-40% share, would still be the strongest players on the Greek mobile telephony market. Cosmote is the former fixed telephony incumbent in Greece and has a strong customer base, while Vodafone-Panafon's strength lies in the integrated European network of the Vodafone mother company. Both companies are well-placed to continue to compete effectively."* [24]

Rather, in the opinion of several of the third parties the merged company may spur further competition for the benefits of consumers:

> *"This argument was unanimously embraced by third parties in the market investigation. Many even argued that the strengthening of TIM Hellas would narrow down the gap between the two leading operators and the third alternative, and would thus further sharpen the competitive situation on the market, ultimately benefiting the customers with better prices and higher quality."* [25]

---

[23] Par (16) Case No. COMP/M.4036, 13/1/2006.

[24] Par (18) Case No. COMP/M.4036, 13/1/2006.

[25] Par (19) Case No. COMP/M.4036, 13/1/2006.

In the short and medium term (2 or 3 years), the costs of the merged operator may be increasing due to the existence of some inefficiencies (e.g., network redundancies arising from the merger of two networks initially designed and deployed to ensure coverage on the same area).

EETT may want to explore if and at what extent the higher costs due to redundancies have to be recovered in part by MTRs. In regulatory best practice, economists and practitioners advanced arguments in favour and against the recovery of such costs in regulated charges. One attempt to find a solution that is able to balance the two opposing arguments described above, and that we recommend EETT to consider, may be to allow the merged company recovering the cost of redundancies only for a limited period of years.[26]

[26] For a more extended discussion of this subject see Peterson C. R. and McDermott K. A. - "Mergers and acquisitions in the US electric industry: state regulatory policies for reviewing today's deals", The Electricity Journal, January 2007.

5. How Wind Hellas' MTR should be revised in the next future?

In Section 4.2 we discussed several sources of exogenous objective cost differences that affect Wind Hellas' costs and that make, at the moment, the adoption of MTRs' symmetry inappropriate. In view of these, we concluded that at this stage in Greece MTRs' asymmetry has to be retained.

In Section 4.2 we argued also that most of the exogenous objective cost differences can be removed by regulatory intervention (e.g., controls on the quality of the spectrum to avoid interferences, providing access to OTE's sites through imposing to OTE collocation obligations, etc.). This implies that EETT can adopt remedies to favor converging MTRs in the future.

In this context, a number of questions arise:

- is the current level of MTRs' asymmetry in the Greek mobile communication market appropriate in view of the existing exogenous objective cost difference?[27] In other words, is the current degree of charges' asymmetry too small or too large in view of the exogenous cost differences that we have discussed? If not appropriate, how should it be changed?

- what are the actions that EETT can undertake in order to remove the sources of exogenous objective cost differences? How these actions will impact on MTRs' structure?

- how should MTRs' asymmetry develop over time to ensure that asymmetry exists only in presence of exogenous objective cost differences?

Answering such questions is key in order to understand the next steps that are in order and their timing when applying what envisioned by EC and ERG. In our opinion, in order to tackle the above questions and make the answer to each question coherent with the guidance and the principles set forth by EC and ERG, a structured regulatory process is needed.

We believe that the above questions can be addressed by means of the following four-step regulatory process, which we expect it might take between 16 to 23 months to be completed:

- <u>Step 1: identification of the exogenous objective cost differences of Greek MNOs</u>. This step is needed to understand if exogenous objective cost differences exist and if they are expected to be relevant. If such cost differences exist, the regulator would have to understand which of them can be removed, how, and by whom. We believe that in several cases, exogenous objective cost differences can be removed by EETT or other Greek competent authorities (e.g., Ministry of Communications, etc.) through the adoption of specific remedies. We recommend that EETT launches a public consultation in which it shares with MNOs and other stakeholders (e.g., Greek telecommunication operators,

[27] The exogenous objective cost differences we discussed in section 4 refer to Wind Hellas. The question we raise here refer not only to Wind Hellas' exogenous objective cost differences but to all operators' ones.

spectrum users, etc.) the identified exogenous objective cost differences and the viable actions to remove them (e.g., regulatory intervention, etc.). We estimate that the time needed to complete Step 1 ranges between 4 and 6 months;

- Step 2: Quantification of the cost differences. We recommend that EETT assess the size of the cost differences on the basis of the actual operators' costs calculated on the basis of the FDC/HCA cost accounting methodology, with input data drawn from operators accounting systems. EETT would have to calculate FDC/HCA costs at a certain 'base year' (e.g., 2008). We understand from Wind Hellas that EETT never imposed Greek MNOs FDC/HCA cost accounting models. Therefore, EETT doesn't know actual operators costs, as would result from the application of a widely accepted cost accounting methodology such as FDC/HCA. This gap must be filled, otherwise the assessment of MNOs' cost differences and the adoption of remedies will likely be inaccurate and imperfectly calibrated. All this would probably trigger undesirable competitive distortions. Appendix A discusses the matter more thoroughly. We estimate that the time needed to complete Step 2 ranges between 2 and 3 months;

- Step 3: identification of regulatory remedies. There could be different regulatory remedies that EETT may want to consider in order to remove, or at least reduce, the exogenous objective cost differences identified in Step 1. EETT may find that more than one of the identified remedies would be appropriate. In order to select the most appropriate remedy and gauge its implications, EETT would have to carry out a cost-benefit analysis. Then, it would be necessary to estimate the time needed to EETT to implement the identified remedies and to MNOs to reduce their costs after the source of exogenous cost differences has been removed or reduced. We recommend that EETT launches a public consultation in which it shares with MNOs and other stakeholders the proposed regulatory remedies, the outcome of the cost-benefit analyses and the draft time schedule. We estimate that the time needed to complete Step 3 ranges between 6 and 8 months;

- Step 4: MTRs glide path and target values. Once remedies have been identified and consulted upon, EETT would have to address the following questions: is MTRs symmetry achievable? If, so, by when? If not achievable, would a group wise symmetry be achievable? If so, by when? Finally, in case neither symmetry nor group wise symmetry are achievable, which is the appropriate degree of MTRs' asymmetry that must be retained? We recommend that EETT calculates MNOs' costs for the next few years (3 to 5) on the basis of its Bottom Up LRIC model, populated with MNOs' traffic and accounting information. [28] The model would have to take into account also the existing exogenous cost differences on a year by year basis, as well as the remedies that EETT and other Greek competent authorities plan to introduce in order to eliminate or reduce such exogenous cost differences. If the model will predict that all MNOs' termination costs will be converging toward the same level, MTR symmetry can be imposed starting from the year at which the model predicts that termination costs will reach the same level. Conversely, if the model will predict that MNOs costs will not be converging, or will be converging without reaching similar values, MTRs asymmetry will have to be retained. Once the MTRs target values will be identified, EETT would have to specify a glide path

[28] ERG defines such a model a 'Hybrid LRIC' (p. 69, 'Common Position on symmetry of fixed call termination rates and symmetry of mobile call termination rates' ERG, February 2008).

of MTRs that provide the development of MTRs from the year base (in which costs are FDC/HCA based) and the target year (in which costs are Hybrid LRIC based). The identified glide path would have to take into account the time MNOs take to reduce their costs after the removal of the sources of the exogenous objective cost differences they were suffering. We recommend that EETT launches a public consultation in which it shares with MNOs and other stakeholders the Hybrid model, its results, and MTRs' glide path. We estimate that the time needed to complete Step 4 ranges between 4 and 6 months.

The proposed approach shares many features with the one designed by the Autorità per le Garanzie nelle Comunicazioni (Agcom), the Italian NRA, in reference to the regulation of Fixed Termination Rates (FTRs) in Italy:

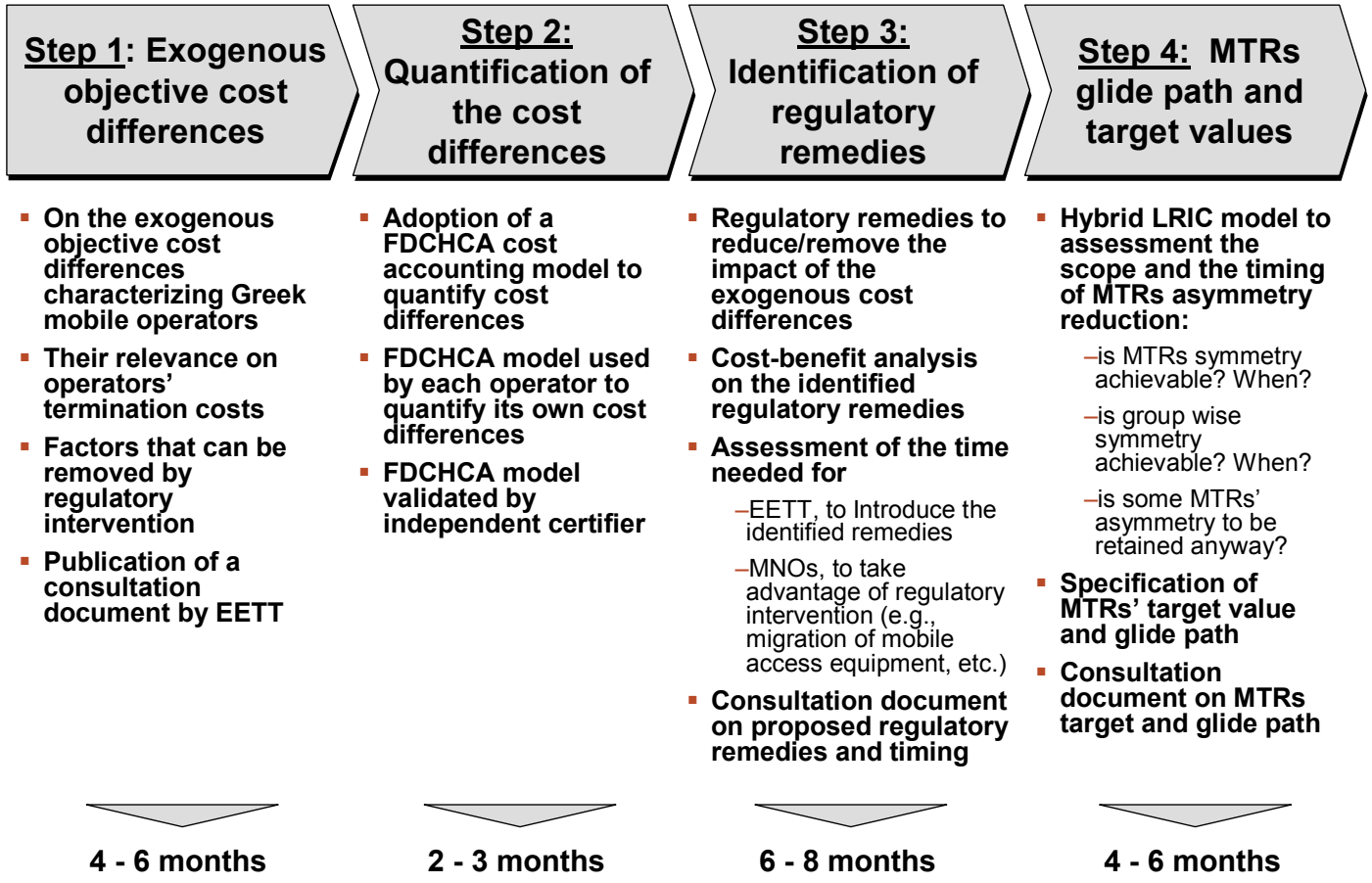
- The termination rates set at the base year is FDC/HCA based,
- The termination rate set at the target year is Hybrid LRIC based,
- The duration of the glide path, which regulates the development of termination rates between the base and the target years is multi-annual.[29]

The Agcom approach has been recently approved by the EC.[30]

[29] According to Agcom's proposal approved by EC, the duration of the glide path in Italy is 3 years (i.e., the base year is 2006/07 and the target year is 2010/11).

[30] Press release, EC 'Telecoms: Commission supports move to lower termination rates in Italy, highlights inconsistency across EU', IP/08/55, Brussels April 10, 2008. See also Agcom press release at http://www.agcom.it/comunicati/cs_100408.htm

Figure 6 – Steps of the regulatory process to specify MTRs structure and glide path



Source: NERA analysis

6. Conclusions

The two main European institutional bodies on telecommunications (the EC and ERG) have recently made public their orientation on the structure of termination charges. They take a strong position against unjustified charges asymmetry, which in their view should be phased out in a reasonable amount of time. However, they also recommend that, in case justified by objective cost differences that are out of the operators' control, charges' asymmetry has to be retained.

We agree with what EC and ERG envision in their document: MTRs symmetry has to be adopted, but only when the right conditions hold, which guarantee the achievement of full benefits by consumers.

We performed an international benchmark which showed that most of the selected countries do not adopt MTRs' symmetry, neither plan to adopt it in the next future. Actually, most of them will retain MTRs' asymmetry, mainly through the adoption of 'group wise' symmetric MTRs based on actual operators' costs. The reason for such decisions is the existence of exogenous objective cost differences.

We discussed the existence of exogenous objective cost differences with regard to Greece, as opposed to other EU countries, and to Wind Hellas, as opposed to other Greek mobile operators. Our analysis confirms that, *ceteris paribus*, deploying and operating mobile networks in Greece requires network costs higher than other EU countries due to topographical differences, licensing regime, and traffic seasonality. On the basis of our findings we conclude that, *ceteris paribus*, Greek MTRs should be higher than those of other EU countries.

Moreover, our analysis confirms also that Wind Hellas is likely to incur in costs that are higher than its competitors due to the following exogenous sources of costs: 1) poor spectrum endowments, 2) significant interferences problems, 3) access to suboptimal sites, 4) burdens of the BTS licensing framework, and 5) low market share. On the basis of our findings we conclude that the current asymmetric MTRs structure in Greece is likely to be justified.

We strongly believe that most of the exogenous cost differences that are currently observed could be removed or reduced by regulatory intervention. To this purpose, a structured regulatory process is needed, which we predict may take between 16 and 23 months to be completed. Such a process, launched and coordinated by EETT, will ensure that MTRs structure and levels be decided on the basis of a sufficiently informed view.

In particular, we believe that any decision on the structure of Greek MTRs (symmetric vs. asymmetric across Greek MNOs) would have to be taken at the end of the identified regulatory process: symmetry will have to be imposed only if the causes of cost asymmetries will have been successfully removed by regulatory intervention and if MNOs costs are objectively symmetric. Note that the causes of the Greek cost asymmetry compared to the rest of Europe cannot be removed by regulatory intervention and Greek costs will always be different from other countries' costs.

Such an approach, similar to what has been already adopted by Agcom in Italy with regard to Fixed Termination Rates, has been recently approved by the EC.

Appendix A. On the importance of knowing actual operators costs in setting MTRs

In order to ensure that the cost models developed are reliable, we believe that the starting point of this process is to calculate actual costs, based on a Fully Allocated Cost model prepared on a Historical Cost basis. Such model has the advantage that cost estimates are verifiable against the costs actually incurred and reported by operators. The validity of LRIC Bottom Up models, instead, cannot be easily verified.

A robust method to set interconnect charges should incrementally build upon the results of a Fully Allocated Cost model and should lead to results that are more reliable and therefore justifiable.

Developing directly a LRIC Bottom Up model may yield invalid results because the accuracy of the Bottom-Up model cannot be sufficiently checked against an operator's Fully Allocated Costs, and/or separated accounts. Pursuing such an approach means that there is no guarantee that the Bottom-Up model represents the underlying costs of the mobile operators in Greece, especially in the case of Greek mobile termination charges which, so far, have never been set to reflect mobile termination costs.

In addition, we believe the following should be take into account:

- the development of a LRIC Bottom-Up model is a more complicated process than the development of a Fully Allocated or Top-Down LRIC Cost model which further adds to its uncertainty. This is because the Bottom-Up cost model requires many more datasets that need to be carefully developed and checked with the mobile operators in order to ensure accuracy.

- It therefore typically requires a process that takes account of operators' data in an iterative process. For example, if the dynamics of the provision of the underlying network are to be sufficiently captured it implies that the datasets that the Bottom-Up model require will take longer to develop as they may need to be generated from scratch.

- Bottom-Up models require a more sophisticated set of data than either a Top-Down LRIC or a Fully Allocated approach. For example, the capacity and workings of the underlying network elements need to be sufficiently understood for their dynamics to be captured within the Bottom-Up model. As such, there is an even greater need for the results and workings of the Bottom-Up model to be checked against the results of Fully Allocated Cost models.

In view of the above, there is a high risk that the LRIC Bottom Up model produces illegitimate results that cannot be relied upon to estimate the cost of interconnection charges and in particular Call Termination.

From an economic efficiency point of view, setting charges that are too low is as bad as setting charges that are too high. When charges are too low, the regulated firm doesn't recover its costs appropriately. This may induce the firm to skimp on service quality, or may undermine investment incentives, as long as the firm is not sure to earn enough money to recover its costs, including a reasonable return on invested capital.

We therefore believes that it is necessary to produce accurate and robust results from the cost modelling if they are to be relied upon to set the charging levels. Failure to do so might inhibit operators' ability to recover their costs appropriately and reduce operators' incentive to invest.

NERA
Economic Consulting

NERA Economic Consulting
Via Basento 37,
2nd Floor
Rome 00198, Italy
Tel: +39 06 488 8101
Fax: +39 06 48 5838
www.nera.com

NERA Srl
Iscritta CCIAA il 27/09/2001 REA 987475
Codice Fiscale e Partita IVA 06748971006