



Five years regulatory strategy of AEK

in cooperation with

IRAC

INTERNATIONAL REGULATORY AFFAIRS CONSULTING

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1 VISION AND FUNDAMENTAL STRATEGIC APPROACH

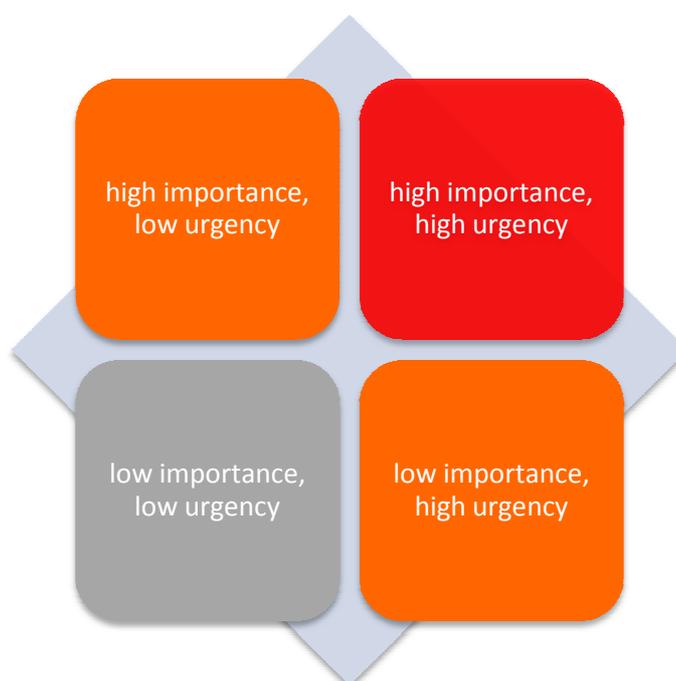
1.1 Introduction

Strategies serve as guidelines for actions. The regulatory strategy of AEK contains the guidelines for our regulatory actions. The regulatory strategy is directed to AEK herself by specifying how we should behave as regulator. At the same time the strategy is providing information to the market parties and the public, which helps to create regulatory certainty and helps to promoting investment, competition and innovation in electronic communication markets in Macedonia by providing regulatory certainty. This is a very important role and to be able to perform this task the strategy must be comprehensive and clear.

A regulatory strategy can be regarded as a series of contingent decisions for each step in the regulatory process; “contingent” means dependent on the state of the market and the behaviour of the market parties. Decisions, which are taken at each node of the decision tree, have to be evaluated by a so-called “objective function”. AEK will use “social welfare” as objective function, whereby “social welfare” is defined as the sum of consumer surplus and producer surplus¹. It is very difficult to create exact estimates for the impacts on social welfare of individual decisions of the NRA, but the order of magnitude of the welfare effects of regulatory decisions can be estimated.

Based on these estimates a simple classification scheme will be used for the purpose of the evaluation of decision alternatives. Individual regulatory decisions will be classified by their “importance”, defined by the size of expected welfare effects implied by the decision, and by their “urgency” as defined as the welfare loss implied by delaying the decision by one period.

In its crudest form one can envisage a “window” with four panes:



Picture 1-1: Evaluation of strategic actions

¹ For an easily accessible description of these economic concepts, see: Krister Ahlertsen, Essentials of Microeconomics, chapter 10; downloadable from bookboon.com

The red windowpane contains those actions, which should be taken on by the NRA immediately; they are highly important and highly urgent as well. The grey lower left corner contains actions, which should not be considered at all, being neither important nor urgent. The orange windowpanes contain actions which are either highly important, but not urgent or less important, but urgent. It is also a matter of available resources of the regulator, which actions in the orange windowpanes he will take on first.

Each of these elements of a strategy must be specified in detail, which then leads to an action plan. An action plan describes all the necessary steps to implement a strategy along the time axis and specifies the required resources.

The following chapter will introduce a general “vision” for the strategy and a general consideration of topics covered. In a further chapter the state of competition on the Macedonian electronic communications markets will be described before the introduction of the strategy of AEK on fixed and mobile communications markets in separate chapters.

In each chapter the strategic decisions are evaluated using the before mentioned importance-urgency scheme and a time frame for individual elements is given.

In Chapter 6: Summary of AEK's action plan from 2012 to 2016, the strategic elements are broken down into an implementation plan (“action plan”). The degree of detail of the action plan will be decreasing with progressing time, since uncertainty is increasing over time.

1.2 Vision

Ultimately, any strategy should serve a well-defined purpose, or in other words, any strategy should have a “vision”. The relevant strategic documents of the Macedonian Ministry of Transportation and Communication and the basic documents of the European Commission and the European Council and Parliament have been analysed for their strategic content. These basic intentions can be represented by a few quotes, which nicely show the spirit and intentions of the policy makers in Macedonia. The first – older – quote from the National Strategy (2007), p22:

"Taking into consideration the unfavourable position at the start, it is more than obvious that the Republic of Macedonia must make some additional efforts in order to achieve the growth of broadband penetration with significantly accelerated pace."

shows the awareness of Macedonian policy makers that broadband is a key technology, which has to be implemented at an accelerated pace. The next quote from Broadband Nation (2009), p8 shows that Macedonia focuses on NGA and clearly envisages the potential damages by delaying necessary developments:

"The development and transition towards the next generation of the broadband internet is an imperative that the Republic of Macedonia has to support. The delay of starting such process shall create conditions for increasing the digital gap not only in the country but also in the development countries."

Both quotes put a strong focus on the development of broadband markets in Macedonia, the later explicitly names next generation internet as important instrument. These documents define next generation networks (NGA) as the dominant strategic goal for the activities of AEK for the next five years.

These statements were interpreted in the light of i2010² and EU 2020³. These EU strategy documents highlight amongst others the crucial importance of broadband communications for productivity, job creation, and social inclusion.

Taking all that together, the vision of the regulatory strategy of AEK in 2012—2016 is:

by appropriate regulation and other activities to support the provision of electronic communication services, in particular broadband services

***at the highest possible bandwidth,
in shortest possible time,
at feasible prices,
to as many people as possible.***

The proposed regulatory strategy will be different for fixed and mobile networks. The differences have their roots in different wholesale services, capacity, cost, roll-out time and different types and quality of retail services. These differences are already present in different markets for fixed and mobile services.

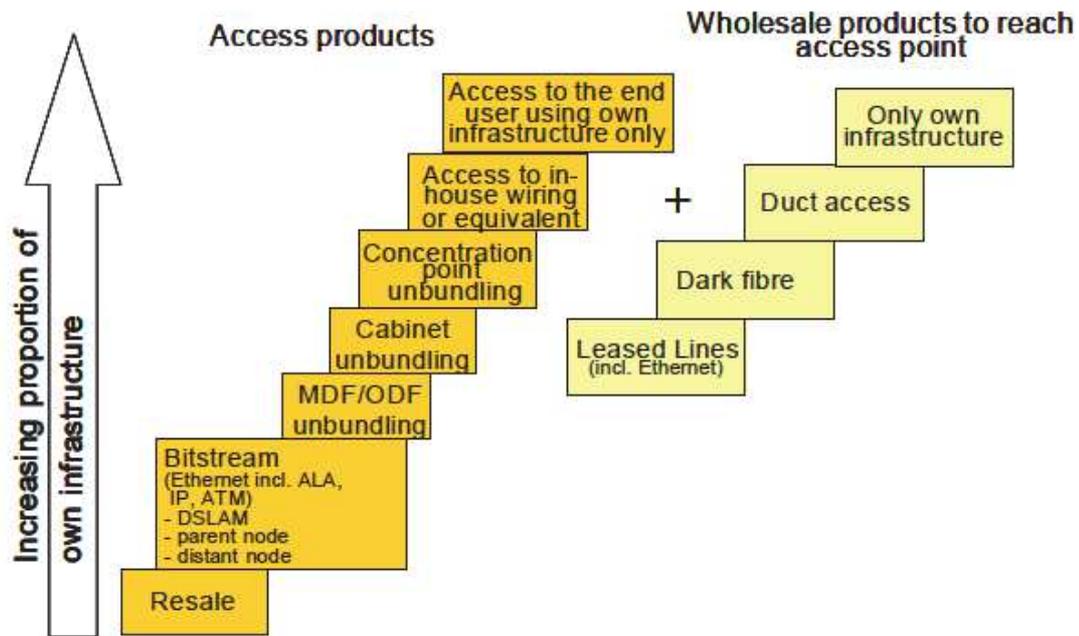
The regulatory strategy for fixed networks is based on the economic concept of the ladder of investment. In the past the concept of the ladder of investment has already been implemented in the EU Member States for the development of competition on voice and broadband access markets. As explicitly mentioned in the Commission Staff Working Document⁴ explaining the background considerations of the Commission Recommendation on NGA Networks⁵, this Recommendation is based on an amended concept of the ladder of investment. For the purpose of developing a regulatory strategy for NGA networks, the original ladder of investment has to be amended to include the technology of optical fibre access. The amendment does not concern the basic structure, which recommends wholesale access at different “rungs” of the ladder in both versions. In the amended ladder of investment, the ladder itself has different rungs corresponding to different wholesale services at different levels of the value chain. The details can be seen in Picture 1-2, which shows a significantly changed and enriched menu of wholesale products, which finally should lead to access to the end user using own infrastructure of ANOs.

² Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions “i2010 – A European Information Society for growth and employment”, SEC(2005) 717, COM(2005) 229 final, Brussels, 01.06.2005.

³ Communication From the Commission Europe 2020 A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final. Brussels, 03.03.2010.

⁴ Commission Staff Working Document Accompanying document to the Commission Recommendation on Regulated Access to Next Generation Access Networks (NGA).

⁵ Commission Recommendation of 20 September 2010 on Regulated Access to Next Generation Access Networks (NGA), Official Journal of the European Union, (2010/572/EU), L 251/35, Brussels, 20.09.2010.



Source: BEREC NGA-Implementation Issues, March 2010, p11

Picture 1-2: Amended ladder of investment

It is evident that mobile broadband access to the Internet will play a major role as an alternative access mode. New technologies (i.e. LTE) will provide sufficient speed to mobile Internet users in the near future. The major regulatory task will be to provide for a level playing field to mobile operators, whether existing or new. This has to be achieved by creating an adequate regulatory setup and by an adequate frequency policy. As a first step AEK will adjust regulation of MTRs on the basis of the “pure” LRIC approach as explained below in Chapter 2.4: Mobile voice wholesale and retail markets. The available frequency spectrum of the Digital Dividend will contribute significantly to low coverage costs of mobile broadband services in rural areas and better in-house penetration in metropolitan areas. The issue of refarming⁶ will have to be considered to provide for maximum additional social welfare. Modern mobile communications equipment allows for new ways of infrastructure sharing in mobile networks. This may lead to significant cost reductions for operators without sacrificing the effectiveness of competition if properly implemented. Therefore, our strategy will also cover the most important issues of mobile infrastructure sharing.

The strategy has to use the status of regulation in Macedonia as its starting point. As already been shown in IRAC’s Assessment Report⁷, we will be showing in Chapter 2: State of competition on the markets for electronic communications in Macedonia, that there is a body of regulation in force, which has to be amended to allow for climbing the traditional and *a fortiori* for climbing the amended ladder of investment. Removal of price distortions between retail access /call prices and

⁶ See Art. 1 and 2 of the Directive 2009/114/EC of the European Parliament and of the Council of 16 September 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community, OJ L 274/25, 20.10.2009.

⁷ Assessment Report (2011); 13.12.2011, IRAC Est., FL.

wholesale access prices in voice telephony as well as review of fixed and mobile termination rates will be of crucial importance.

1.3 Structure of AEK's medium term regulatory strategy 2012—2016

The regulatory strategy needs as a first step the amendment of existing decisions to eliminate existing distortions in the electronic communications markets. Chapter 2 State of competition on the markets for electronic communications in Macedonia, will be dealing with this issue. The state of competition will be analysed in detail and distortions in the markets will be explained. Possible solutions for the elimination of these distortions will be proposed.

In addition to this first step of amending and correcting existing regulatory decisions, the second step of medium term strategy for 2012—2016 will be developed. The issues connected with this second step of the medium term strategies for fixed and mobile networks will be discussed in separate Chapters 3 and 4.

1.4 Review of AEK's medium term regulatory strategy 2012—2016

As the future will unfold, unexpected developments will occur, inevitably. This creates the necessity to foresee a periodical review of the strategy. AEK will undertake an annual review of the strategy and will invite market parties to contribute to the updating of the strategy.

2 STATE OF COMPETITION ON THE MARKETS FOR ELECTRONIC COMMUNICATIONS IN MACEDONIA

2.1 Introduction

This section analyses the state of competition on the relevant electronic communication markets in Macedonia and tries to establish the effectiveness of regulatory actions of AEK in these markets. The markets covered here are mainly the markets as recommended by the European Commission:

- Market 1: Retail Access to the public telephony network
- Market 2: Retail calls from fixed networks
- Market 4: Wholesale call origination in fixed networks
- Market 5: Wholesale call termination in fixed networks
- Market 7: Wholesale access to physical network infrastructure of fixed networks (ULL)
- Market 8: Wholesale Broadband access (Bitstream access)
- Markets 9 and 10: Wholesale leased lines; trunk segments, terminating segments
- Market 11: Wholesale access and call origination in mobile markets
- Market 12: Wholesale mobile termination

In addition to these “relevant” markets the following retail markets will be reviewed, although they are not contained in the list of relevant markets:

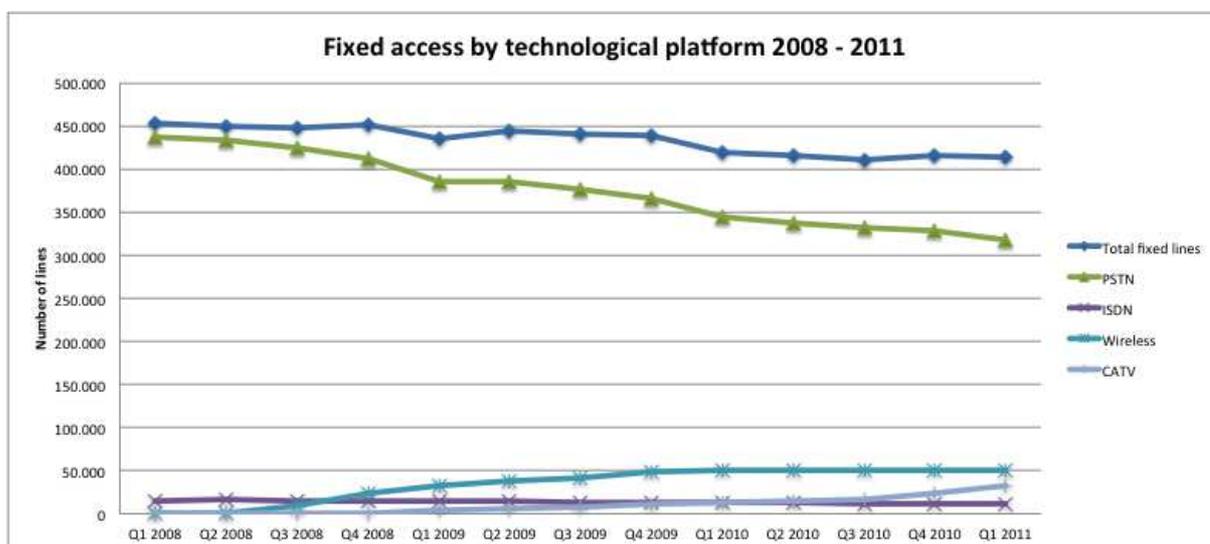
- Retail markets for calls and messages in mobile networks
- Retail broadband access market

These markets have to be closely reviewed, because margin squeezes cannot be detected without scrutinizing the respective retail markets. The most notable omissions from the list of relevant markets are the market for “the minimum set of leased lines”, the wholesale transit market and the former Market 18: Broadcasting transmission. All of these markets do only have peripheral and restricted relevance for the core problems of regulation on electronic communication markets in Macedonia.

2.2 Fixed networks: retail and wholesale access to fixed networks

With the liberalization of electronic communications a significant number of operators entered the market for retail access to fixed electronic communication networks. According to AEK’s Quarterly Report⁸ for Q1 2011, out of 41 notified operators 36 operators offer their services to the public. These operators use different access infrastructure to offer their services to the end users.

Diagram 2-1: Fixed access by technological platform 2008—2011



Source: AEK

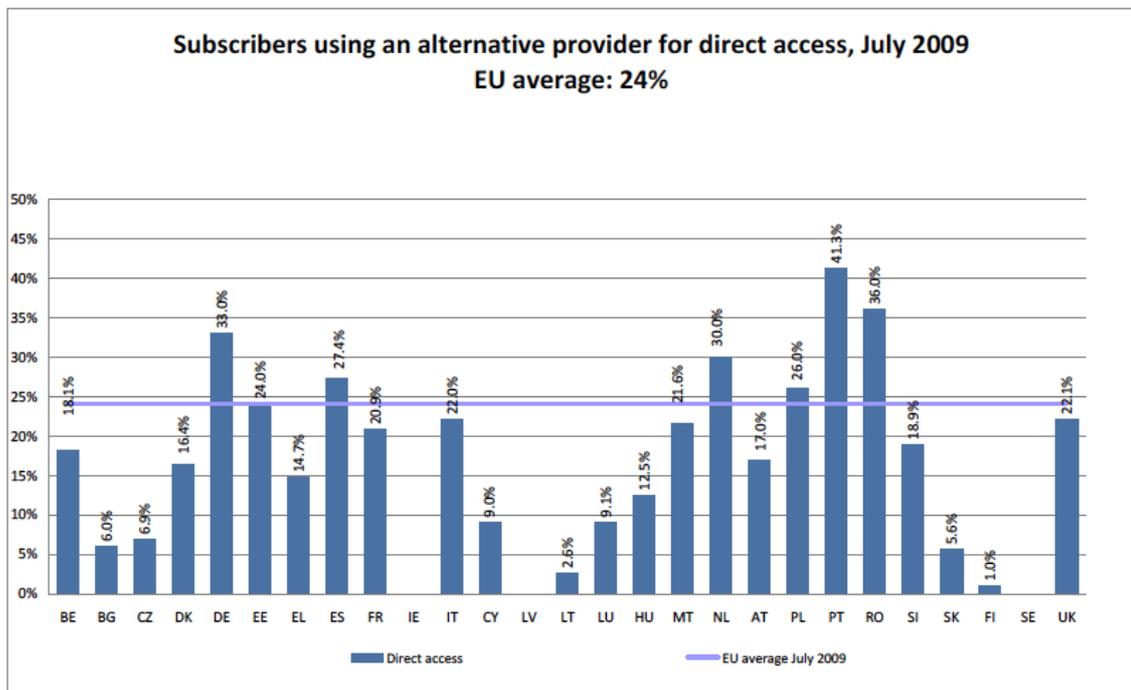
Diagram 2-1 shows the development of fixed retail access in Macedonia since Q1 2008. The total number of lines giving access to the public telephony network dropped by 30.000 lines during the observation period; the number of PSTN lines has been dropping by 120.000. On the other hand – a country specific of Macedonia – the number of lines for fixed wireless access has increased from zero in 2008 to approximately 50.000 lines in 2011. A similar development can be seen for access via CATV networks. The number of connections over CATV has steadily increased over the whole period.

The share of alternative operators around 25 % is according to the 15th Implementation Report⁹ very close to the average percentage of customers using an alternative operator in EU Member States. This includes all technological access platforms to the fixed public telephony network.

⁸ Извештај за развојот на пазарот на електронски комуникации во првиот квартал од 2011 година, page 5.

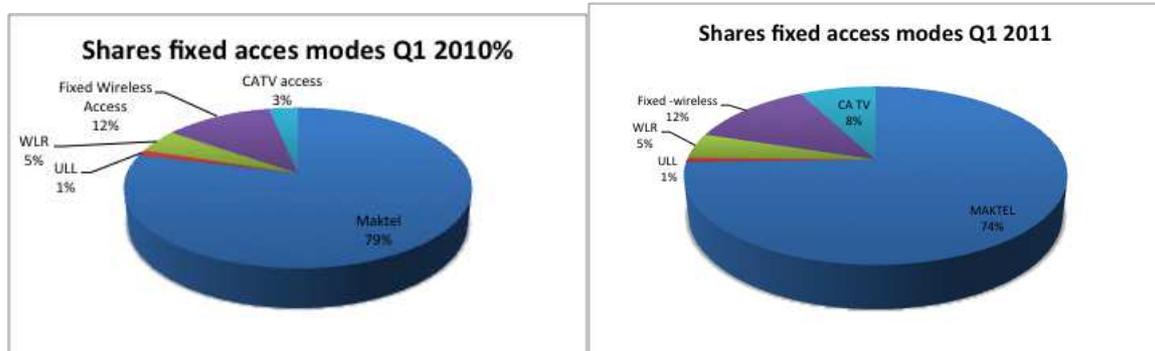
⁹ See: 15th Implementation Report, 2nd Working Document, p.46.

Diagram 2-2: Share of ANOs of direct access in the EU



The structure of access to the fixed telephony network in Macedonia is shown in Diagram 2-3: Shares of fixed access modes, Q1 2010—Q1 2011.

Diagram 2-3: Shares of fixed access modes, Q1 2010—Q1 2011



Source: AEK

The country specifics of Macedonia in the access market are the large share (12 %) of fixed wireless access¹⁰, which is normally not that high in EU Countries and the negligible share of unbundled lines of 1 % of all access lines. Both access modes have almost identical shares in 2010 and 2011. A similar situation can be found for WLR, which has been stable at around 19.000 lines and kept a market share of 5 % during 2010/2011. According to internal statistics of AEK this access mode is primarily used by one alternative operators, ONE¹¹, which offers a bundle of voice and Internet (based on L4 Bitstream) to their customers. The most remarkable change is the increase of CATV as access modes of ANOs, which have increased in total from 3 % in 2010 to 8 % in 2011, with growing tendency. The

¹⁰ Fixed GSM access is offered by One, a subsidiary of Telekom Slovenija based on a license for fixed wireless access in the GSM band.

¹¹ On-net, which has to a small amount be using WLR, has been bought by One in 2011.

incumbent operator MT and some alternative operators offer multiple play bundles including digital/analogue TV, HD TV channels, fixed telephony and Internet access.

In many EU Member States competition in the retail market for access to the public telephony network is based on a combination of indirect access (WLR in combination with Carrier Selection/Pre-selection) and direct access by means of fully or partially unbundled local loops and CATV access. The fundamental idea behind this approach is to create a regulatory environment, which allows new operators first to rely on “service” competition and in a further step to climb the “ladder of investment” to become an infrastructure based operator. In addition to this version of promoting “intra-platform” competition, competition by other technical platforms as wireless access and access through a TV Cable network is promoted by a lenient authorization policy, by frequency allocation procedures and proper regulation of interconnection services. These remarks pertain equally to broadband Internet access as well and appear even more important in the context of broadband access.

In principle, AEK has implemented basic elements of the ladder of investment in the regulatory approach in the past. In several decisions, AEK have imposed the obligation on MT to implement CS and CPS, WLR and ULL. Unfortunately, price distortions between retail access prices/call prices and wholesale prices have not yet been completely resolved.

This leads to a situation, where the existing retail rate of 399 MKD for basic access to the public telephony network, which has been “inherited” from the past is not wholly consistent with the wholesale price for the monthly fee of an unbundled local loop of 332 MKD, which is based on an LRIC calculation. The price of WLR of 279 MKD, which has been calculated by means of a Retail Minus rule, is significantly lower than the price for an ULL. Taking into account the investment costs incurred with unbundling, this implies that there is no business case for unbundling in Macedonia, which is clearly shown by the low and stagnating figures of ULLs. In addition, the CP of 30 % for the calculation of the WLR appears to be on the higher side, compared to an average of EU countries, which is around 15 %. This in turn suggests that there is a business case only for simple resale of services, which is clearly visible in the access statistics. But the profitability of resale is not only dependent on the WLR. Also the price relations between wholesale prices as origination/termination rates¹² and retail prices, and the price relations between wholesale prices for broadband services and market prices for the respective end user services are important for the profitability of such a business case. This will be dealt separately in the subsequent chapters.

One direct consequence of this distorted price system is a lack of investment into access to the fixed public telephony network and possibly the high share of fixed GSM access. Alternative operators have no incentive to invest into own access infrastructure or into unbundling infrastructure as well as into backhaul and backbone infrastructure. Equally, the incumbent operator has no strong incentive to invest into access infrastructure, be it copper or fibre, since the price is not covering cost. This implies that ANOs will remain at the lowest rung of the ladder of investment, with no incentive to climb up to become an infrastructure based operator. In effect this situation also tends to slow down the development of NGA networks.

It must be noted here that distortions between retail access price and wholesale prices, not only distort intra-platform competition, but also distorts inter-platform competition. An access price to the public telephony system offered by classical telecom operators compared with distorted wholesale prices deteriorates the business case for all other access technologies, since operators

¹² In addition, co-location and upfront payments for installation of interconnection links etc., have to be considered.

using these alternative access technologies have to compete with this distorted price situation. This is true for traditional access through copper, coaxial (CATV), fibre (NGA) and wireless access.

Using the terminology of the “ladder of investment” theory, AEK recognizes an urgent need to correct these price distortions between retail access prices/call prices and wholesale prices to allow competitors to leave the lowest rung of the investment ladder, which is basically resale of services.

2.3 Fixed networks: wholesale and retail call markets

2.3.1 Fixed wholesale markets

One major precondition for functioning retail markets is a set of rules for interconnection, which allow new entrants to offer their services to the public. These rules have been set by AEK in a series of decisions on wholesale access, call origination and call termination. The set of remedies imposed on the SMP operator MT consists of obligations on transparency (RIO), non-discrimination, accounting separation, regulatory cost accounting and price control based on the principle of cost orientation. On the termination markets, all other network operators have the same obligations except for the accounting obligations. The resulting interconnection rates are symmetrical for all operators. The decisions on price control were taken on the basis of a cost model, developed by Deloitte Zagreb. The Deloitte Zagreb model incorporates a Forward Looking¹³ Bottom Up Long Run Incremental Cost+ (BULRIC+) approach to calculate interconnection costs. Since the approach allows for the allocation of joint and common costs (this is the “+” in BULRIC+) and takes the predicted volumes of all services as the relevant increment, the model in effect calculates Fully Distributed Costs (FDC) based on current cost accounting and a WACC reflecting a risk assessment of the fixed network business of MT. This approach is not in line with the EC Recommendation¹⁴ on fixed and mobile termination, which advocates a “pure” LRIC methodology.

2.3.2 Fixed retail markets

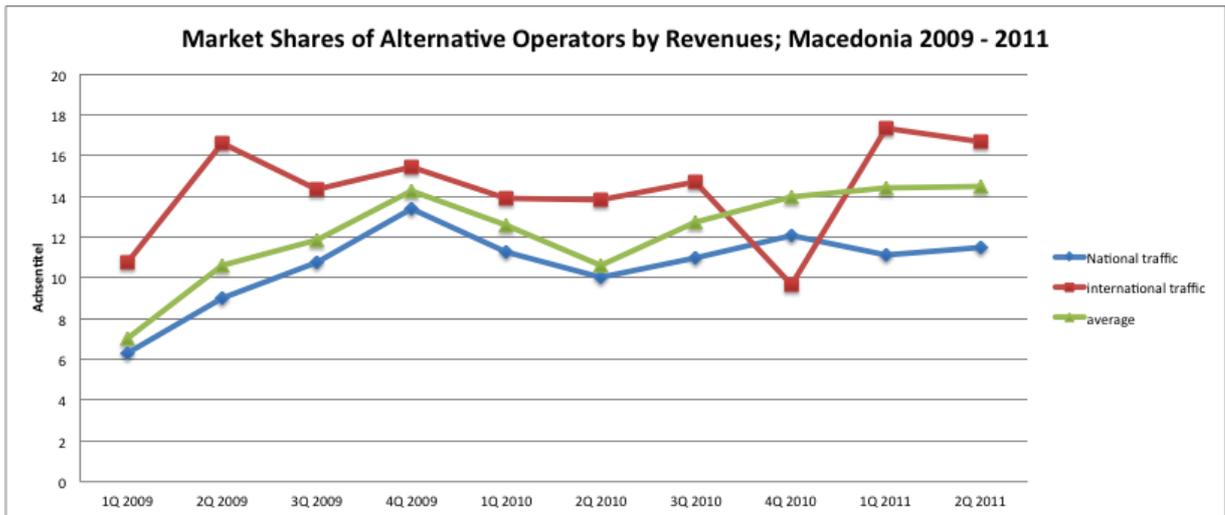
The decisions on wholesale access and interconnection combined with AEK’s decisions on CS, CPS, WLR and ULL create the regulatory framework to open up and support competition on the Macedonian retail calls market.

The development of competition in the retail calls market in Macedonia is shown in Diagram 2-4: Market Shares of ANOs, 2009—2011.

¹³ The Deloitte Zagreb model is a scorched node model, based on the most efficient available and proven technology and is not necessarily reflecting the implemented technology of MT’s network.

¹⁴ Commission Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU; C(2009) 3359 final.

Diagram 2-4: Market Shares of ANOs, 2009—2011



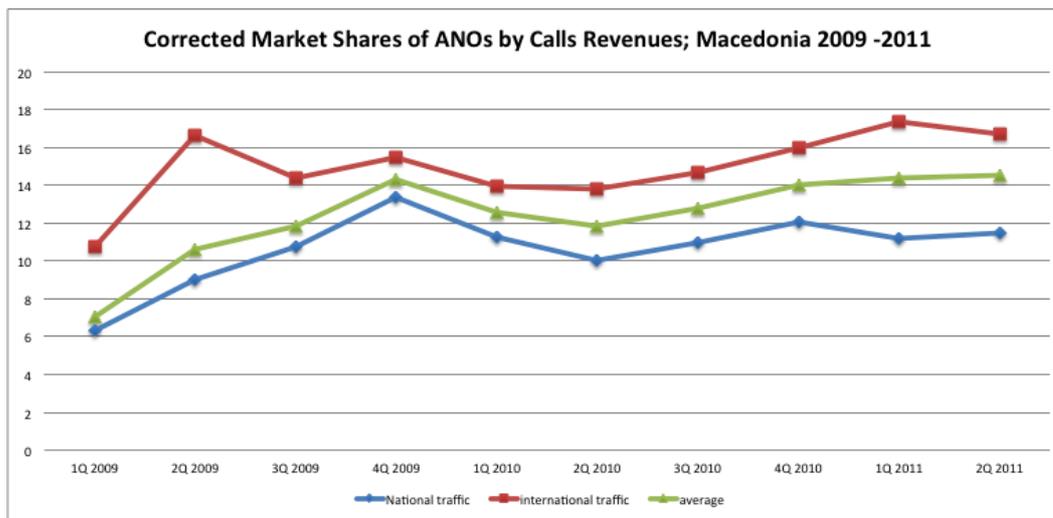
Source: Quarterly Report on Market Development for Quarter 4 2010, internal data of AEK

Due to a lack of consistent data before 2009, the development of the market shares of new entrants cannot be shown in an accurate way. For the period 2009—2011 there are consistent data, but there appear to be two instances of erroneous data reports from operators. They relate to international traffic in 2Q 2009, which appears to be too high and 4Q 2010, which is definitely too low. Our data suggest that the figures for the average market share of alternative operators are unbiased, although the value of 2Q 2010 is questionable, too. Using an interpolation of the weight of national traffic revenues, these data can be corrected. The corrected values are shown in Diagram 2-5: Corrected Shares of ANOs by Calls Revenues, 2009—2011.

The data show a rather quick increase in market shares until the end of 2009 and some oscillation around the end-of-the year value from there on. Although the market share is slightly increasing, for the time being there is definitely no strong trend towards further significant growth of the market share of alternative operators.

These findings are perfectly in line with the results in Section 2.2: Fixed networks: retail and wholesale access to fixed networks. Both show a similar picture. After an initial period of growth in 2008 and 2009 there is almost stagnation in 2010 and 2011. The basic reason for this result can be seen in distorted wholesale and retail prices, which does not allow efficient investment into access to the public telephone network with one notable exemption, which is TV Cable. In this case, additional investment necessary to create access to the public fixed network is an add-on to investments necessary to provide CA TV services.

Diagram 2-5: Corrected Shares of ANOs by Calls Revenues, 2009—2011



Source: AEK, AEK's own calculations

But this does not answer the question, why there is no growth created by ANOs, which base their operation on service competition (resale operators), since there was significant growth in the EU based on a business case combining WLR with CS/CPS. The stagnating number of CPS enabled WLR connections is most probably caused by the not yet corrected price distortion between retail access prices/call prices and wholesale prices. As shown in IRAC (2011): Assessment Report, p. 29, in some cases there is a high probability of a margin squeeze created by distorted retail prices compared to wholesale prices in the presence of rather high cost oriented termination rates based on AEK's BULRIC+ model. Such a constellation does not allow profitable market entry for companies, which want to use a simple resale business case. In addition there is a scale effect involved. As shown above, local interconnection reduces the pressure created by the margin squeeze. Since local interconnection requires significant investment, which is not dependent on the scale of the operation, only large traffic volumes allow an operator to arrive at a profitable situation. This again creates an entry barrier, which cannot be surmounted easily by smaller operators.

Since CATV operators have no out payments for call origination and very low cost for originating calls in their own networks¹⁵, they are hit by margin squeezes as described above to a much lesser extent than operators using WLR and CPS. This explains their expansion into voice telephony in the last years and the stagnation of WLR and CPS.

2.4 Mobile voice wholesale and retail markets

In contrast to fixed telephony markets there is no regulation of retail markets for mobile services, only the wholesale markets for access and call origination and the markets for mobile call and SMS termination are regulated by AEK. In addition to the regulation of wholesale services, market entry into mobile markets is restricted by regulatory radio spectrum decisions. In many countries these decisions are driven by the scarcity of available radio spectrum, which is not the driving force in Macedonia. The market situation in Macedonia is characterized by the existence of three mobile operators:

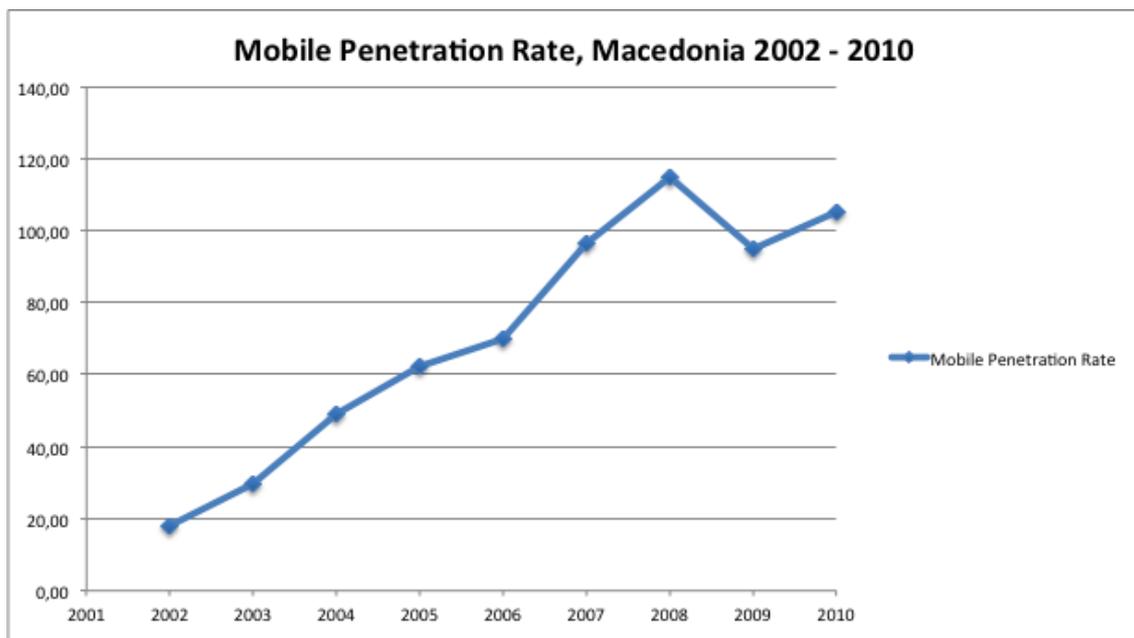
¹⁵ CATV operators typically use VoIP technology for call conveyance in their networks, which consumes significantly less resources than PSTN technology.

- T-Mobile Macedonia (subsidiary of T-Mobile),
- One (subsidiary of Telekom Slovenija),
- VIP (subsidiary of Telekom Austria),

which have entered the Macedonian market at different points in time and which have different frequency endowments¹⁶. T-Mobile and ONE cover a very high percentage¹⁷ of the population, whereas VIP has not yet rolled out its network completely and uses a national roaming agreement with T-Mobile to offer their customers service in the uncovered areas. An MVNO is expected to enter the Macedonian market in the next few months.

The Macedonian mobile market is well developed; penetration rates oscillate around 100 % in the last years (see: Diagram 2-6: Mobile penetration Rate, Macedonia 2002—2010).

Diagram 2-6: Mobile penetration Rate, Macedonia 2002—2010



Source: AEK

There is some ambiguity to these figures; in particular the “kink” from 2008 to 2009 can only be explained by changes in measurement methods¹⁸. Furthermore, all data for the Years 2002 to 2007 are actually values from January of the following year, whereas 2008 following are values from end of Q4 of the respective years.

The state of competition can – *inter alia* – be represented by the market shares (expressed in % of active SIM cards) of the three operators. Although reliable data for earlier years than 2008 are not available, the development from 2008 on is rather interesting. T-Mobile lost in these 3 years 7,32 % market shares as well as ONE lost roughly 7 % market share to the new entrant VIP. This leads to a situation, where the two smaller operators are approximately of the same size of around 23 % and

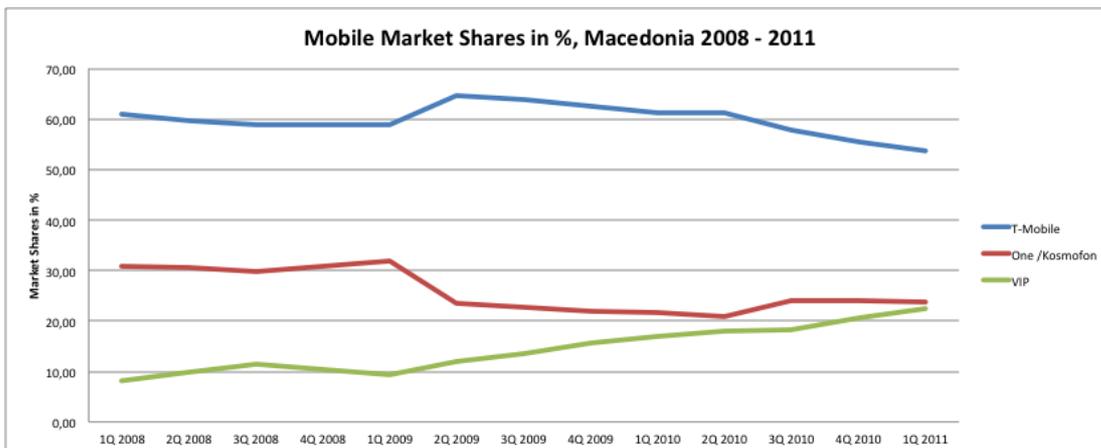
¹⁶ See IRAC Est.(2011): Assessment Report, pp34.

¹⁷ T-Mobile coverage, see: <http://www.t-mobile.mk/public/map-of-coverage.nspx>.
ONE coverage, see: <http://www.one.mk/en/default.aspx?SectionID=96>.

¹⁸ The decrease of the number of mobile subscribers shows in Q2/2009. Before that AEK counted mobile subscribers on the basis of their mobile phone activity in the past year. In Q2/2009 AEK have changed the reference period from one year to three month.

taken together hold a smaller market share than the incumbent operator. Econometric literature¹⁹ suggests that first mover advantages are present in mobile communications and show significant persistence. These findings offer a good explanation for the high market share of the incumbent

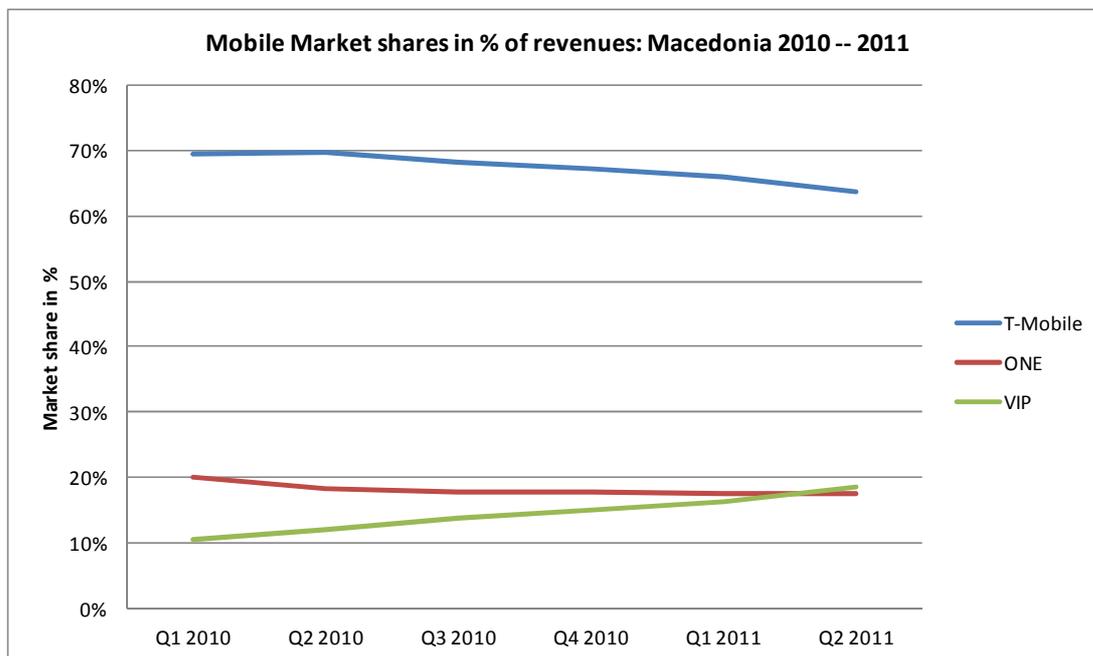
Diagram 2-7: Mobile Market Shares in %, Macedonia 2008—2011



Source: AEK

mobile operator, although the services provided by all operators are rather similar and quality differences are not always perceived by customers. This situation is even more pronounced if market shares are calculated based on revenues (see Diagram 2-8).

Diagram 2-8: Mobile Market shares in % of revenues: Macedonia 2010—2011



Source: AEK

This situation of market shares and their development suggests a closer investigation of the competitive situation on the retail mobile markets. In addition, one has to consider the fact that VIP is providing (a decreasing) part of its voice services and all of its mobile broadband data services over

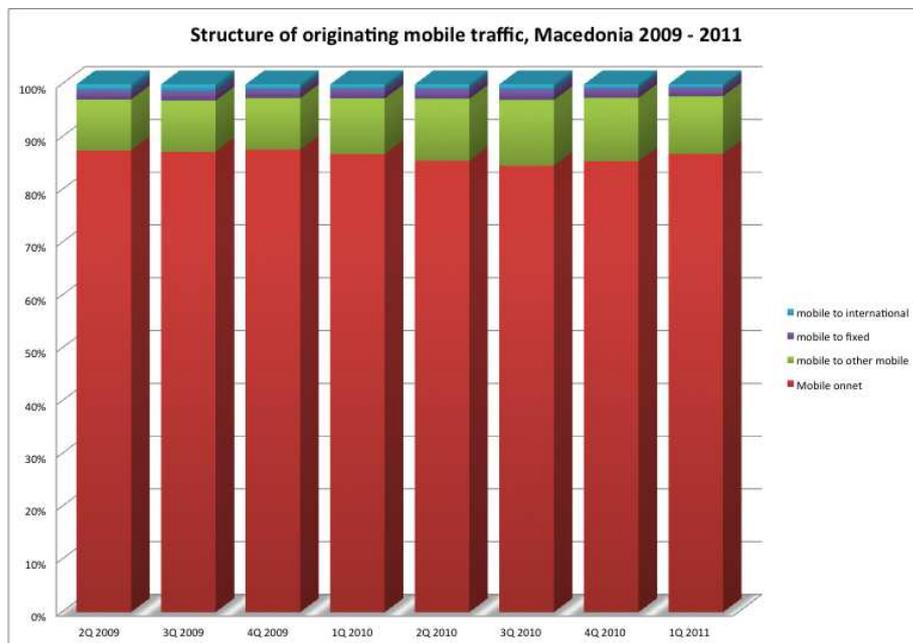
¹⁹ Tobias Kretschmer: First-Mover Advantages in the Mobile Phone Industry: A Consumer-Centric Perspective (with Michal Grajek, ESMT Berlin and JP Eggers, NYU Stern); Aktuelle Fragen zur Regulierung von Energie- und Telekommunikationsmärkten, WU Wien, 14.01.2011.

T-Mobile's network. The usual criteria as market share, development of market shares, interrelations between operators, financial situation etc. indicate at least at first sight a dominant position of T-Mobile on the mobile retail markets. This topic will be taken up later in Chapter 4 Mobile networks strategy in the description of a possible strategy for the mobile markets. AEK is not considering regulation of the mobile retail markets, since the Three Criteria Test will fail on reasons of competitive dynamics and of effectiveness of competition law to discipline market parties.

2.5 Structure of originating mobile traffic

The structure of mobile voice traffic is shown in Diagram 2-9: Structure of originating mobile traffic, Macedonia 2009—2011.

Diagram 2-9: Structure of originating mobile traffic, Macedonia 2009—2011



Source: AEK

The analysis of originating mobile voice traffic in Macedonia consistently shows a share of 85 % of mobile on-net traffic. If one adds mobile traffic to other mobile networks the percentage of voice traffic originating from and termination in a mobile network is in the 95 % range, which in turn suggests that traffic terminating in fixed networks and in foreign networks does not play a significant role in mobile voice telephony in Macedonia. These data indicate a possible market distortion by cross subsidisation of on-net traffic from other revenue sources, primarily by termination revenues from fixed networks, by international incoming traffic revenues and by revenues from international roaming. Although the recent AEK decisions on MTRs significantly reduce the potential for cross-subsidization by mobile termination, it can be estimated as around 2,5mio to 3mio € per year at the prevailing termination rates.

2.6 Regulation of mobile markets in Macedonia

Mobile retail markets are not regulated in Macedonia. AEK only included the markets for mobile voice and SMS termination and the market for mobile access and call origination into its list of markets relevant for regulation. AEK – amongst other items – regulated mobile origination and

mobile termination rates. AEK's decision on MTR is backed by cost studies using a BULRIC+ model for mobile networks provided by Deloitte Zagreb. As already mentioned in the context of fixed termination, this model embodies a TSLRIC+ approach, which does not comply with the relevant Recommendation of the EC Commission²⁰. This Recommendation promotes a "pure" LRIC methodology for the calculation of termination rates. The reasoning uses standard microeconomics to show that a profit maximizing firm running an existing business will be offering a new service (in this case: termination of calls from other networks) if the incremental revenues earned by offering this service are at least as high as the incremental cost of this new service. Under competitive conditions, termination prices will have to be equal to those "pure" LRAICs. The basic, practical difference to Deloitte's BULRIC+ and many other more conventional models is that a "pure" LRIC calculation will not take joint cost and overheads into account, if they are not caused by the introduction of this new service. Only those cost, which are directly caused by the additional service at the predicted demand levels are included. A "pure" LRIC approach produces always significantly lower estimates for the LRAIC than a conventional TSLRIC+ calculation. Changing the costing methodology to "pure" LRIC will not only deliver a better approximation of the incremental costs of terminating third party traffic, but will also eliminate the market distortion created by too high MTRs that were calculated by the standard models.

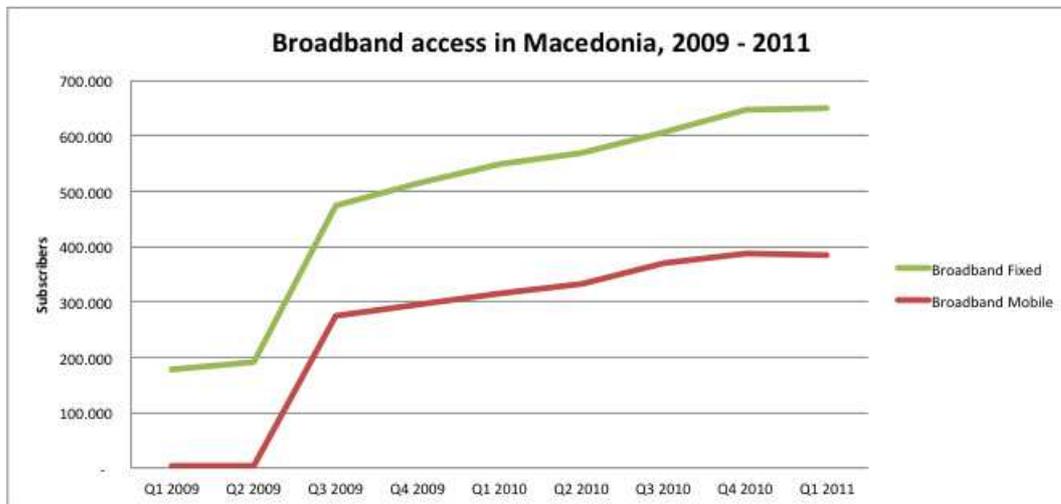
The economic consequence of such a transition to MTRs based on "pure" LRIC is a reduction of termination revenues. This leads to a situation, where on-net calls can no longer be cross – subsidized by termination revenues from other networks. The expectation is that mobile operators will offer bundles, which do not differentiate between on-net and off-net traffic. The immediate consequence will be that churn rates (and competition intensity) will increase, because – from the point of view of mobile subscribers – all mobile networks can in terms of call prices be regarded as one network. The so called (positive) network externality – the additional utility a customer can enjoy by being able to reach a larger number of subscribers – will increase, since all other mobile subscribers can now be reached at the same or at a very similar price. In addition, end users will discard as too costly all inefficiencies as multiple mobile phones and multiple numbers etc. Finally, "pure" LRIC MTRs are a strong incentive to run efficient networks and consumer decisions will no longer be heavily influenced by the relative size of mobile networks and by considerations about who is subscriber in which network. Price and service quality are expected to be the most important determinants of consumer decisions. AEK has already recognized its role in creating transparency on network quality and will periodically provide independent information on network quality in Macedonia.

2.7 Broadband wholesale and retail markets

Internet usage started to boom worldwide after the introduction of broadband access, which effectively replaced narrowband, dial-up Internet access. For this strategy document, broadband is considered as access with speeds above 256 kb/s. By their regulatory decisions for Market 1: Retail access to the public telephony network, Market 7: Wholesale access to physical network infrastructure of fixed networks (ULL) and Market 8: Wholesale Broadband access (Bitstream access) AEK provided rules for competitors on broadband markets.

²⁰ Commission Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU; C(2009) 3359 final.

Diagram 2-10: Broadband Access in Macedonia, 2009—2011

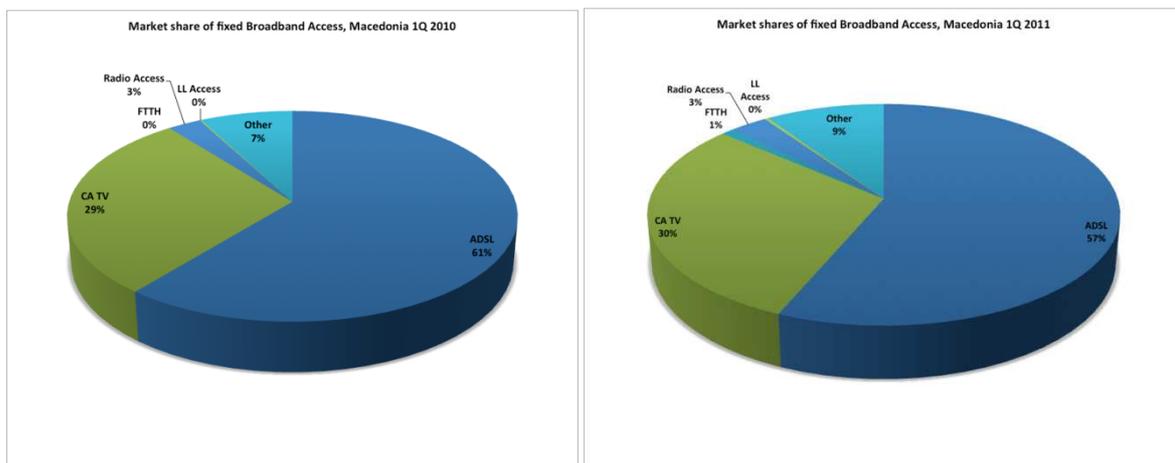


2.7.1 Fixed Broadband Access

Fixed broadband access to the Internet is offered over a variety of platforms in Macedonia. The structure of different platforms is shown in Diagram 2-11: Market Shares of Fixed Broadband Access, Macedonia 2010, 2011.

One can see that ADSL is still the dominant platform for Fixed Broadband access in Macedonia; market shares have not significantly changed during the last year. The winners are CATV, direct fibre access (NGA) and “other” access modes (Ethernet, etc.), which together have increased their compound market share by 4 % points in a growing market.

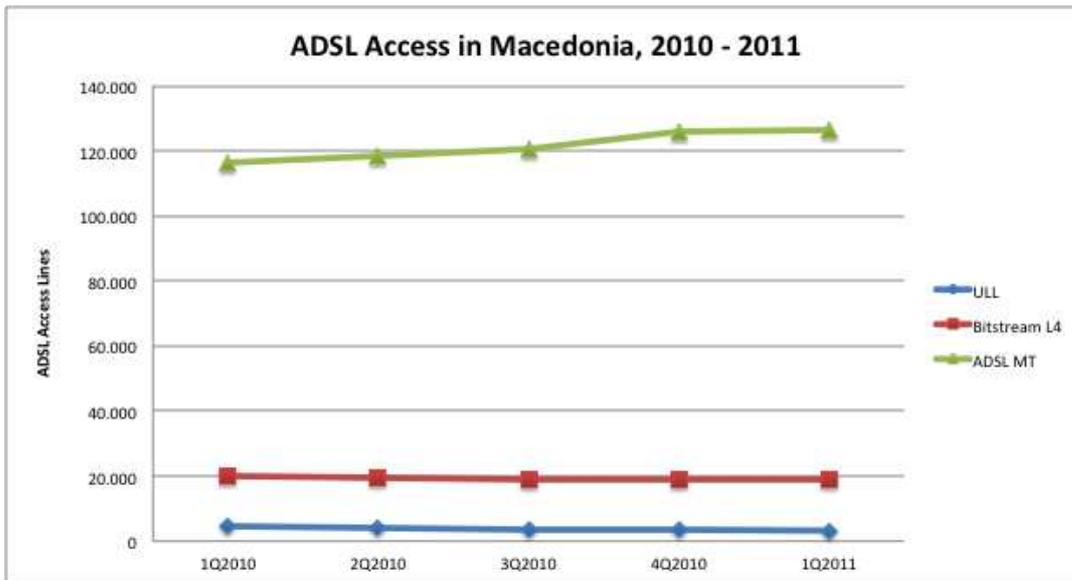
Diagram 2-11: Market Shares of Fixed Broadband Access, Macedonia 2010, 2011



Source: AEK

MT is still the dominant operator selling directly to end users and supplying its access services to competitors. It is highly remarkable, that ULL plays virtually no role with around 3.600 unbundled lines and that practically only one operator – ONE – is offering broadband services based on wholesale (WLR plus Level4 Bitstream) offers of MT. No use at all is made of lower level Bitstream access offers and Naked DSL.

Diagram 2-12: ADSL Access in Macedonia, 2010—2011



Source: AEK

The situation on the fixed broadband retail market is primarily caused by price distortions between wholesale and retail access as already pointed out in Chapter 2.2 Fixed networks: retail and wholesale access to fixed networks, and by distorted relative prices between different types of Bitstream access. The monthly retail access fee is not consistent with the cost oriented price for ULLs. As shown in IRAC's Assessment Report, Chapter 3.1.7 and 4.5, the wholesale price structure for Bitstream services is itself biased towards high-level Bitstream access. Given the basic parameters as determined by AEK's decisions on the Retail Access Market, the Market 7: Wholesale access to physical network infrastructure of fixed networks (ULL) and on the Broadband Access Market there is no viable business case for offering broadband services based on ULL and/or on lower level Bitstream Access and naked DSL as well. This means that there is only very limited scope for intra-platform competition and there is no incentive for ANOs to climb up the Ladder of Investment to higher rungs, which require investment into local access and backhaul infrastructure. The situation of the access to the fixed public telephony system is paralleled here on the broadband retail markets.

2.7.2 Mobile Broadband Access

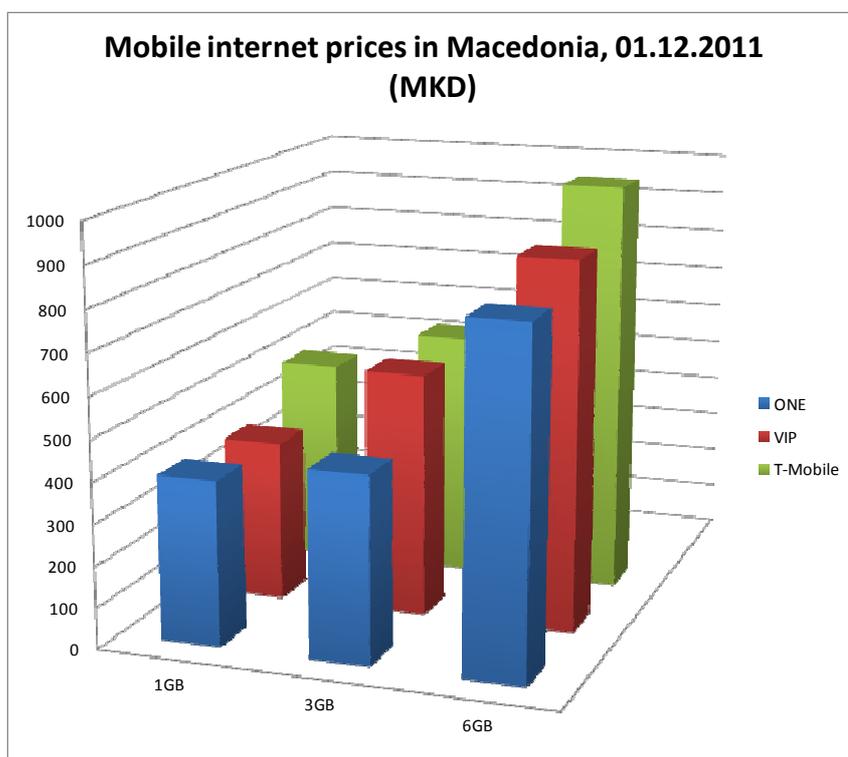
Data on broadband access in Macedonia is covering fixed and mobile access, although in many countries these are considered as separate retail markets. In the past, the reported number of mobile broadband subscribers appears to be grossly overstated and has to be taken with caution. The reason for this overstatement lies in the fact that all subscribers of data services of a given mobile network are counted as mobile broadband users, if the network of their choice has implemented 3G, irrespectively of the capability of their access terminals (smart phones, "dongles") and the state of 3G rollout.

After having been awarded with an authorization for 3G/UMTS, ONE has started provision of broadband services in August 2008, while T-Mobile introduced their 3G services almost one year later, on 11.06.2009. This explains the huge jump in the second quarter of 2009. It is obvious that this jump is a statistical artefact created by the counting method used. In 2011 all three mobile operators

are offering 3G mobile Internet access. VIP²¹ offers their services on the basis of national roaming on T-Mobile’s network. The true penetration of mobile broadband at the end of year 2011 is not known with certainty. Since modem prices have been dropping significantly and are offered for free or almost for free to a majority of customers, most of the older 2G dongles will have been replaced by 3G dongles by the end of 2011. Therefore one can assume that actual figures for mobile broadband are close to the figures shown in Diagram 2-10: Broadband Access in Macedonia, 2009—2011.

Operators try to target different users by offering special packages for mobile broadband usage. Prices vary accordingly between types of packages and operators. A comparison of standard packages for PC use, normalized to 1 GB / 3 GB / 6 GB of transferred data, shows the following price structure, as shown in Diagram 2-13: Mobile Internet Prices in Macedonia, 01.12.2011 (MKD).

Diagram 2-13: Mobile Internet Prices in Macedonia, 01.12.2011 (MKD)



Source: Webpages of ONE, T-M Macedonia, VIP Macedonia

These prices are above the corresponding prices of comparable packages in EU Member countries.

2.8 Summary of wholesale and retail voice and broadband markets

AEK has the obligation to remove all obstacles to competition and to promote efficient investment. The preceding chapters suggest a list of regulatory topics and actions, which must be included in AEK’s strategy since they create obstacles to competition and hinder efficient investment. The most important issues are:

- Removal of price distortion of retail access prices in relation to wholesale prices
- Developing cost models, which allow removal of this distortion (margin squeeze tests)

²¹ VIP has not acquired 3G frequencies in the past.

- Removal of price distortion of local retail calls prices in relation to wholesale prices
 - Developing cost models, which allow removal of price distortion (margin squeeze tests)
- Reviewing wholesale fixed access prices (ULL, WLR, Broadband)
 - Developing cost models, which allow cost oriented calculation for WLR and Bitstream products
- Reviewing TRs for fixed interconnection (origination and termination)
 - Reviewing existing BULRIC+ Model to allow for “pure” LRIC
- Reviewing MTRs
 - Reviewing/adjusting existing BULRIC+ Model to allow for “pure” LRIC calculations

It is economic common sense that price distortions always decrease social welfare. Where a margin squeeze procedure detects a margin squeeze between wholesale and retail access prices, the SMP operator is asked to rectify the situation. The decision as to how this should be rectified lies with the SMP operator. Formally, the retail offer is suspended until wholesale and retail prices are properly aligned. In some cases, this distortion will have to be addressed by adjustments of wholesale prices. In situations, where wholesale prices appear to be at their correct level, retail conditions of the offer will need to be modified by the SMP operator. If decreased wholesale prices do not create a level playing field for the development of the market for electronic communication in Macedonia then AEK has the choice to increase retail access prices.

The correction of “wrong” prices for retail services will in the short run lead either to a decrease of wholesale prices (needed by alternative operators to replicate the retail offers of the dominant operator) or to an increase of the retail end user access fee (monthly rental) and/or of the retail price for local calls or both. A downward adjustment of wholesale access prices will lead to increased competition for access customers via ULL and to more competition on retail calls markets, increasing social welfare by reducing prices and expanding quantities simultaneously. If retail prices for access and local calls are increased, triggered by additional competition in retail calls markets, these price increases will be counteracted – also in the short run – by dropping prices for national calls and international calls. The short term overall effect on social welfare will be modest, but still positive.

Correcting these distortions by an increase of retail prices in most countries are not highly welcome by the public and by policy makers, whereas price reductions of wholesale services are taken as a given and are not accounted as a benefit. Unfortunately, policy makers and the public tend to overlook the medium term and long term advantages of these regulatory decisions. Correction of price distortions allows a level playing field on the wholesale and retail access and calls markets. ANOs will have the chance to create a business case by investing in access and backhaul infrastructure. This in turn will in the medium and longer term contribute to better and cheaper services, investment and innovation. These long-term dynamic effects of intensified competition are significant and substantially contribute to economic welfare. Distorted access prices act like a brake on the implementation of newer access technologies stifling innovation and investment and as a consequence reducing social welfare. In any case, the correction of distortions of retail access and calls prices on one side and wholesale prices on the other side should be based on a cost oriented approach and on margin squeeze tests.

High and positive long-term effects have to be expected also for broadband services. As explained above, the current situation of intra-platform competition (xDSL) and inter-platform competition (CATV, wireless broadband access, 3G broadband access and other access modes) suffers from the

distorted prices between retail access to the public telephony network and wholesale prices, which is one of the most important access modes. If corrections of the wholesale access prices are the appropriate remedy for this price distortion, primarily intra-platform competition will be positively affected, by allowing alternative operators to profitably enter the xDSL based broadband market via ULL and Bitstream, not merely by reselling. Correction of the price distortion between retail access prices and wholesale prices by adjusting retail access prices will definitely improve the prospects of new investment into alternative access technologies including FTTx, which can be seen as one of the access technologies being capable to deliver 50 Mb/s to large numbers of customers. This is also true for 4G mobile broadband access (LTE), which has to compete with too low access prices for comparable speeds in wire-bound networks.

2.8.1 Reviewing wholesale fixed access prices

AEK's regulation of wholesale fixed access prices is based on two different principles. AEK is using LRIC type cost orientation for unbundled local loops and the Retail Minus approach for Wholesale Line Rental and Bitstream Access at all levels. This mixture of approaches to cost oriented wholesale prices has the potential to create serious problems, whenever there is no efficient competition on end user markets and whenever the "Minus" is not determined properly, whatever calculation method ("equally efficient competitor", "reasonably efficient competitor") is used. As already pointed out in Section 2.8, the retail monthly rental for access to the public telecommunication network might give rise to a margin squeeze by not being cost oriented. This implies that the WLR, which is derived by subtracting 30 % from the retail monthly rental, might not properly reflect costs of access, too. In addition, the "Control Percentage" of 30 % should be calculated using one of the usual approaches. A comparison with European countries shows that the average CP would be around 15 %. This points to the second problem of properly determining the "Minus". A special version ("equally efficient competitor", "reasonably efficient competitor") of calculating the "Minus" it is not necessary, but the calculations should be based on a cost study. AEK's on-going attempts to broadening the scope of their cost models should take utmost care of this point to avoiding unnecessary discussions about the internal consistency of regulated access prices. The intended solution will replace the "Retail Minus" methodology in use by a proper cost based modelling approach allowing for margin squeeze tests.

2.8.2 Reviewing Fixed Origination and Termination Rates

AEK uses a very elaborate BU-LRIC+ model for the determination of origination and termination rates in fixed networks. This model embodies an optimization algorithm to calculate the optimal network design and dimension for given levels of demand for services (bottom up). In addition, it allocates all costs to the services provided by the SMP operator. In an LRIC model the "increment" has to be properly specified. The model used by AEK is a Total Service LRIC (TSLRIC) model, which allows including joint and common cost into the calculation of incremental cost. "Total Service" indicates that the chosen increment is the predicted amount of all services. Therefore the calculated LRAIC²² for origination and termination services are equal to average costs using a Fully Distributed Cost approach on the basis of an optimized network and of current asset valuation at a given WACC. This

²² LRAIC: Long Run Average Incremental Cost, LRIC per minute.

procedure is not in line with the reasoning of the relevant European Commission Recommendation²³, which advocates to only taking the volumes of 3rd party origination and termination into account. AEK is planning to make the necessary changes to the existing models to allow for calculation of “pure” LRIC origination and termination rates.

In conjunction removal of price distortion of retail access prices in relation to wholesale prices should create a level playing field for service operators and infrastructure-based operators.

2.8.3 Reviewing Mobile Termination Rates

AEK has undertaken costs studies for mobile origination and mobile termination rates in Macedonia using a BULRIC+ model provided by Deloitte Zagreb. All the remarks on Deloitte’s BULRIC+ model for fixed termination rates pertain also to mobile termination rates. This implies that the existing decision will be revised using a “pure” LRIC version of the Deloitte model. It has to be expected that MTRs will drop significantly under a “pure” LRIC approach and might induce a change of business models of mobile operators. At least the distortions induced by discriminatory on-net tariffs will be reduced or even completely abandoned.

3 FIXED NETWORKS STRATEGY

The “vision” of AEK’s regulatory strategy suggests two main areas for the fixed network strategy. The first area contains the necessary amendments and corrections of existing regulation with the necessary adaptations of existing cost models as well as the creation of additional models as described in Chapter 2.8. The second area deals with the regulatory framework for the implementation of NGA networks.

3.1 Amending existing regulation

Summarizing, AEK will continue its efforts to adjust (Deloitte BULRIC+ for fixed termination to “pure” LRIC) and broaden (Leased lines, terminating and trunk segments, civil engineering infrastructure, dark fibre, Bitstream) existing models and as well to develop a new model for retail services (Analysys—Mason). Based on the results of model calculations, AEK will eliminate all inconsistent retail (access, calls) and wholesale prices (WLR, Bitstream). This will be done by completing Market analysis for Markets 1 and 2 and by amending remedies decisions for Markets 7 and 8.

The recalculation of fixed origination and termination rates by means of the adapted Deloitte model will be used to revise the existing decision for origination and termination rates on markets 4 and 5.

The models developed in this first step of the fixed strategy will also be put to use for purposes of calculation of elements of civil infrastructure in the course of the preparation of the regulatory framework for NGAs.

As already described in IRAC Assessment Report (2011) Section 3.1.9, AEK for past decisions was using an approach that did not allow to separately calculate wholesale prices for trunk and terminating segments of leased lines. The planned upgrade of the existing fixed network BU-LRIC+

²³ Commission Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU; C(2009) 3359 final.

model will also allow performing these calculations. Therefore the remedies specified in Markets 9 and 10 should be adjusted to the results from the updated cost model.

3.2 Transition to NGN

By letter of 05.12.2011 MT announced their plans to transform their core network into a Next Generation Network (NGN). This will transform the existing TDM based network into a converged all-IP based network.

Such a conversion implies replacement of PSTN switching equipment by IP-based packet switching network elements as described in Part III of ERG (08) 26b final²⁴. The transition from PSTN to NGN creates regulatory challenges. These are extensively discussed in the ERG Common Statement on Regulatory Principles of IP-IC/NGN Core²⁵. According to their letter of 05.12.2011, MT plan a step-wise removal of local PSTN switches in the period from 2011—2013 and replacement by entirely IP-based range of Network Elements. From the same document it can be concluded that the number of PoIs (Points of Interconnections) will be reduced to a single PoI for the whole of Macedonia.

The introduction of an NGN with a single PoI will have far-reaching consequences on types of interconnection services and on end-user services. Since the network structure and the network elements of the new NGN will be significantly different to the existing network, AEK considers to immediately commission a costing study for the introduction of IP-based interconnection. In addition, AEK plans in parallel to the commissioning of the cost study to reopen market analysis on market 4 and to immediately require an update of the existing RIO to accommodate the technology switchover.

As a consequence of the introduction of NGN, it is expected that there will be only single-tandem interconnection and that single-tandem interconnection cost will be well below the present single-tandem interconnection cost at the level of existing local interconnection. AEK will have to investigate whether the reduction of the number of PoIs is cost efficient, weighing the additional costs induced by moving up PoI to the higher hierarchy level against the cost savings triggered by the reduction of the number of interconnection points in an NGN network structure. There will be consideration about potentially sunk investments of alternative operators in the existing locations of PoIs. AEK will try to calculate the financial impacts of these sunk investments.

AEK also expects a change of the service portfolio on the retail level. As a consequence of the reduction of the number of PoIs it would be expected that in the future local/regional calls will disappear from the service portfolio.

As a consequence on retail calls markets there will be only three types of calls:

- standard national call,
- call to mobile networks,
- international call,

notwithstanding emergency calls, calls to premium services and calls to non-geographic numbers and corporate networks.

²⁴ Supplementary Document to the ERG Common Statement on Regulatory Principles of IP-IC / NGN Core – A work program towards a Common Position, ERG (08) 26b final NGN IP-IC CS sup doc 081016, Brussels, 2008.

²⁵ ERG Common Statement on Regulatory Principles of IP-IC/NGN Core, ERG (08) 26 final NGN IP-IC CS 081016, Brussels, 2008.

AEK will have to use its powers to regulate end-user prices in order to create an undistorted playing field for alternative operators and MT.

3.2.1 Welfare impacts of amending existing regulation

As explained in Chapter 1.1, the expected welfare effects are classified along two dimensions:

1. Importance – size of welfare effects
2. Urgency – welfare loss of postponing

According to this approach, AEK believes that regulatory measures related to the removal of price distortion of retail access prices in relation to wholesale prices for wholesale line rental and Bitstream prices are of high importance and urgency. They have an immediate effect on all subscribers of the related retail services and have a huge potential to create significant positive welfare in the near future. The same is true for the revision of fixed origination and termination rates. The revision of wholesale leased line prices cannot be easily classified since these markets still appear to be underdeveloped. AEK believes that the welfare effects are of medium size but the revision is urgent. Wholesale leased lines are very often used for the backhaul services in mobile networks. Wrong prices for wholesale leased lines would distort "buy-or-make" decisions of mobile operators. This is of significant importance in a phase where backhaul capacities have to be upgraded as a consequence of the strong growth of mobile broadband services.

3.2.2 Action plan for fixed networks regulation

Diagram 3-1: Action plan for fixed networks regulation

2012				2013				2014				2015				2016			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
FIXED NETWORKS																			
Revising existing regulation																			
adapt Deloitte BU-LRIC model to cover:																			
pure LRIC fixed termination and origination																			
leased lines (terminating segments, trunk segments)																			
civil engineering infrastructure (CEI)																			
dark fibre																			
wholesale line rental (WLR)																			
Bitstream																			
develop retail services cost model (Analysys-Mason)																			
retail access and call prices																			
develop costing model for IP interconnection																			
origination and termination rates for IP interconnection																			
remove price distortion on:																			
markets 1 and 2: access and local calls																			
markets 4 and 5: fixed call origination and termination																			
revise market analysis																			
markets 1 and 2: access and local calls																			
markets 4 and 5: fixed call origination and termination, including IP																			
revise market analysis																			
markets 7 and 8 (ULL, WLR, Bitstream)																			
markets 9 and 10: leased lines trunk and terminating segments																			

Legend:

	Very important and very urgent
	Very important and urgent
	Importance and urgency can not yet be decided
	Ongoing activities of high importance

3.3 Preparing for NGA

The second area deals with the future regulatory challenges posed by the implementation of NGA networks. After the first round of – corrective – regulatory actions, AEK will tackle the regulatory challenges of the advent of NGA networks. In the EU there have been lengthy discussions about whether and how access to NGA networks should be regulated. As already mentioned in the introduction, the crucial question is again to reconcile the need to create and sustain effective competition as the motor for social welfare creation with specific needs of investors into these NGA networks. As replacing existing copper networks by fibre networks requires high investment expenditure, the existing regulatory framework has to be adapted to promote these investments. In addition, access obligations have to be adjusted to accommodate the changes in technologies used by NGA networks. Again the economic concept of the amended ladder of investment will be used as guidance for the regulatory design for infrastructure based competition. The discussion in the EU started as early as 2004 and triggered two public consultations by the European Commission, produced one decision by the European Court, which decided that Germany infringed European Law by restricting regulation of NGA networks²⁶ and for the moment culminated in the European Commission NGA Recommendation²⁷.

Before entering into the discussion, AEK will repeat the definition of NGA provided by the EC in recital (11) of their NGA Recommendation²⁸:

"Next generation access (NGA) networks" (NGAs) means wired access networks which consist wholly or in part of optical elements and which are capable of delivering broadband access services with enhanced characteristics (such as higher throughput) as compared to those provided over already existing copper networks. In most cases NGAs are the result of an upgrade of an already existing copper or coaxial access network.

This definition covers all types of FTTx, including FTTH based on PoP and PoN architectures, as well as FTTN and upgraded CATV networks using DOCSIS 3.0 as their technological base.

The NGA Recommendation will be taken as the main source for the recommendations for AEK's fixed network strategy, since it represents the EC position and is comprehensive. In the following sections the major provisions of the Recommendation will be discussed. The Recommendation concentrates on Market 4: Access to physical network infrastructure (in Macedonia Market 7), and on Market 5: Wholesale Broadband Access (in Macedonia Market 8). In Section 3.4 AEK's strategy to promote the introduction of NGA networks AEK's strategic approach for NGA regulation in Macedonia will be presented.

3.3.1 Access to wholesale physical network infrastructure

If market analysis leads to the finding of SMP in Market 7, several obligations to give access to physical network infrastructure are recommended. The Recommendation covers:

²⁶ Judgment of the Court (Fourth Chamber) of 3 December 2009 — European Commission v Federal Republic of Germany (Case C-424/07).

²⁷ Commission Recommendation of 20 September 2010 on Regulated Access to Next Generation Access Networks (NGA), Official Journal of the European Union, (2010/572/EU), L 251/35, Brussels, 20.09.2010.

²⁸ Commission Recommendation of 20 September 2010 on Regulated Access to Next Generation Access Networks (NGA), Official Journal of the European Union, (2010/572/EU), L 251/35, Brussels, 20.09.2010.

- access to civil engineering infrastructure
 - cost oriented, equivalent access to civil engineering infrastructure (CEI)
 - reference offers for access to CEI
 - NRAs should encourage or oblige SMP operators to install sufficient capacity for other operators
 - NRAs should cooperate with other authorities to create a data base of existing civil engineering infrastructure
- access to terminating segment of FTTH networks
 - In addition to mandated access to CEI, transparency on and cost oriented, equivalent access to terminating segments including wiring inside buildings
 - Mandated consultations with access seekers about location of distribution points and space requirements at distribution points
 - NRAs should encourage or oblige (where legally possible) the SMP operator to deploy multiple fibre lines in the terminating segment
- unbundled fibre access in FTTH networks
 - cost oriented unbundled access to the fibre loop irrespective of the network architecture and technology implemented by the SMP operator, access at the MPoP
 - exceptions from fibre unbundling only for areas where several other existing NGA infrastructures are likely to result in effective competition in downstream markets
 - Transparency by an updated LLU Reference Offer
 - Costs should incorporate any additional and quantifiable risk of the SMP operator, reflected in a premium included in the WACC
 - Pricing schemes, which diversify the SMP operator's risk and are based on upfront payments or on quantity discounts can only be allowed if all relevant information has been supplied and if they do not constitute a margin squeeze.
 - Equivalent and cost oriented access must be prevalent in the case of joint deployment of FTTH networks even in geographical areas, where effective competition can be assumed by the presence of several NGA infrastructures.
- Access to in the case of FTTN
 - Cost oriented access to the copper sub-loop, supported by backhaul remedies (LL)
 - Ancillary remedies as non discriminatory access to facilities for co-location or equivalent co-location
 - Transparency by updating the existing LLU Reference Offer to cover all access products.

3.3.2 Wholesale broadband access (Market 8)

In general the same rules for wholesale broadband access, which are used for copper loops should be applied for NGA networks. In particular the following rules seem of significant importance:

- VDSL access can be mandated for copper sub-loops, if VDSL is implemented
- Mandated wholesale products should optimally reflect properties inherent in the NGA infrastructure to enable effective competition by ANOs
- Cost orientation for wholesale products, except for situations, where functional separation makes this effectively unnecessary

- In geographical areas with effective access to the unbundled fibre loop, NRAs should consider removing Bitstream obligations
- Adequate wholesale broadband offers must be available 6 months before the SMP operator is allowed to launch its own NGA based services

3.3.3 Migration from copper to fibre loops

These obligations described by the EC Recommendation take care of potential discrimination of access seekers during the period of migration from copper to fibre loops.

- Existing obligations on SMP operators in Markets 7 and 8 should stay in force unless agreement on an appropriate migration path is reached between the SMP operator and the access seekers. ANOs must receive information about planned decommissioning of access points to the copper loops (MDFs, local exchanges ...) at least 5 years in advance unless fully equivalent access is provided at the point of interconnection.
- NRAs should transparently manage the transition from copper to fibre by a proper and transparent framework.
- NRAs should impose transparency obligations on SMP operators to ensure that ANOs timely receive all relevant information to adjust their own networks and network extension plans. The information requirements cover any modification plans that might affect the competitive conditions in a given market or sub-market.

3.3.4 Summary of recommended regulation of NGA networks

In principle, the EC Recommendation does confirm the validity and applicability of the existing regulatory framework of the EU. The Recommendation does not change the list of markets susceptible to regulation and concentrates on the markets for access to wholesale physical infrastructure and for wholesale broadband access.

The recommendation stresses the enormous importance of access to CEI and specifies rules for this type of access. For ETNO, access to CEI would be sufficient to create effective competition in NGA network markets. The EC does not agree with this view and also mandates – again subject to the usual principles²⁹ – access to the terminating infrastructure and to fibre loops, wherever possible (FTTH architecture). The same is *mutatis mutandis* true for access obligations in the case of FTTN networks.

The most important innovations of the Recommendation cover:

- the problem of “geographic areas where the presence of several alternative infrastructures, such as FTTH networks and/or cable, in combination with competitive access offers is likely to result in effective competition on the downstream markets”,
- the explicit recognition by the NRA of risks of SMP operators investing into NGA networks,
- cooperative investments,
- functional separation.

Finally, the Recommendation takes care of a host of issues, which are likely to occur in the period of transition between copper and fibre access networks.

²⁹ cost orientation, transparency, equivalence of access

The EC explicitly recommends defining separate geographical submarkets for access to physical infrastructure if the competition conditions are significantly different. Significant differences are defined in terms of presence of alternative NGA infrastructures. Those geographic sub-markets with more than one NGA infrastructure, which would lead to effective competition on the downstream retail broadband markets, should be exempted from regulation, because there would be no SMP operators on these geographical sub-markets.

A similar recommendation is part of the section on wholesale broadband access, where the EC considers it acceptable not to impose access to FTTN in those cases, where in a certain geographic area, there is effective access to the unbundled fibre loop and this access is likely to result in effective competition in the downstream market.

The EC devotes a whole annex to the question of appropriate recognition of demand risk in WACC calculations or in other contractual agreements between the SMP operator and ANOs.

In the case of cooperative investments, the EC insists that equivalent access has to be established and request the NRA to intervene in cases, where this is not correctly implemented.

Functionally separated access networks should not be subject to regulation, if they guarantee truly equivalent access to the fibre loop.

3.4 AEK's strategy to promote the introduction of NGA networks

The EU Commission on 20.09.2010 has published the NGA Recommendation and EU Member States have started to revisit their market analyses of markets 7 and 8 closely after that. The progress of these efforts is documented in the recent BEREC Report on the NGA Recommendation³⁰, which shows moderate progress due to the short time since the adoption of the NGA Recommendation. There is a significant gap in Purchasing Power (PP) between the average EU citizen and Macedonian citizens, but this does not imply that NGA will not be deployed in Macedonia in the next future. Quite the contrary, MT and cable operators are already offering high bandwidth Internet connections, explicitly based on fibre optical cables³¹. AEK concludes from these offers that the introduction of NGA networks is not a matter of principle but just a question of timing and AEK believes that significant NGA rollout can be expected to start latest in 2014.

To guarantee regulatory certainty AEK completely adopts the NGA Recommendation. The NGA Recommendation presents a comprehensive set of regulatory measures, which should be implemented as a whole. One main reason to favour the implementation of the NGA Recommendation is the fact that it is based on a broad discussion and that it will be part of AEK's legal framework in the case of Macedonia entering the EU. It does simply not make sense to use a different approach than EU Member States or an approach of partial implementation, which have to be revised after accession. Any other strategic approach would create uncertainty in this very sensitive area.

The NGA Recommendation does not allow for ample room to move. This might be seen as a restriction to the powers of AEK, but has an important advantage. By joining the efforts of EU NRAs AEK can learn from the implementations of NGA networks in EU Member States and can use experience made by other NRAs for its own work.

³⁰ BoR (11) 43 BEREC Report on the Implementation on the NGA Recommendation, Riga, October 2011.

³¹ See: http://www.t-home.mk/mk/144/Internet/Optic_paketi.html.

AEK will – as soon as possible – make a clear statement that it will apply the provisions of the NGA Recommendation and will provide for a timetable for the implementation of the Recommendation. This will give a clear signal to all potential investors into NGA networks, what they have to expect from regulation in this case.

After the already commissioned adaptation of the existing BU-LRIC+ model AEK will immediately apply the results to Market 7 and calculate wholesale prices for civil engineering infrastructure (CEI) and dark fibre.

In preparation of the fibre loop unbundling in FTTH and FTTN environments AEK will in good time commission the development of a BU-LRIC model for fibre unbundling. It can be expected that these type of model cannot be bought "from the shelf" and require longer time to be developed. The reason for this extended time requirement is that these models are not yet standard in the consultancy industry. The scope of the model should allow analysing costs of fibre loop unbundling in an FTTH and FTTN environment. In addition, VDSL access (if applicable) and sub-loop unbundling from the street cabinet to the end-user should be included.

The risk assessment as it is done in standard models by analysing capital markets and deriving a value for the WACC from this analysis has to be amended to allow for the incorporation of additional risk components not yet represented by asset prices. The recalculation of the WACC will be the topic of a separate project to deliver a revised WACC calculation model.

One year is planned for the development of those two models, starting in Q3 2012. This would allow reopening or repeating Market Analysis of Markets 1, 7, and 8 in late 2013 or early 2014. An earlier date for Market Analysis does not seem to be realistic. The following major decisions have to be taken in the course of reopened Market Analysis:

- market definition and SMP designation on potentially separated geographical sub-markets;
- access and wholesale prices of fibre loop FTTH;
- access and wholesale prices of fibre loop FTTN;
- access to VDSL;
- access to unbundled sub-loop including in-house cabling;
- Bitstream market definition and SMP designation on potentially separated geographical sub-markets;
- Bitstream access and prices.

Supporting the “pure” regulatory tasks, AEK will engage in the promotion of NGA networks by publicly pointing at crucial issues as information on existing CEI, building licenses and public investment³² into fibre networks in areas, where commercial roll-out cannot be expected. These are tasks that must be undertaken continuously to support the successful implementation of AEKs strategy. In addition, AEK is already heavily involved in the development and implementation of CEI database, which provides information on existing CEI in Macedonia.

3.4.1 Welfare impacts of NGA regulation

As pointed out several times by the European Union, the development of broadband and ultra-fast broadband as well has significant positive welfare effects by stimulating innovation growth and jobs. AEK agrees with these statements and considers all regulatory steps as highly important, which are

³² See: European Union, Regional Policy; Guide to broadband investment, Brussels, September 2011.

necessary to promote the rollout of NGA networks. On the other hand, the state of development in Macedonia does not yet allow speaking of significant NGA penetration. The figures are well below 5000 lines, although growing. Therefore, AEK will use the available time to thoroughly prepare its regulatory actions on Markets 1, 7, and 8 in the advent of NGA networks. AEK therefore considers for the time being all the preparatory and regulatory just as urgent, but not as very urgent.

3.4.2 Action plan for NGA

Diagram 3-2: Action plan for NGA

2012				2013				2014				2015				2016			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
FIXED NETWORKS																			
Preparing for NGA																			
market 7 remedy decisions on:																			
CEI access and prices																			
dark fibre access and prices																			
commissioning of the model for NGA infrastructure																			
cost of FTTH and FTTN infrastructure																			
commissioning of the model for WACC determination																			
risk assessment of FTTH and FTTN (demand risk etc.)																			
reopening market analysis: markets 1, 7, 8																			
market definition and SMP designation on geographical sub-markets																			
access and wholesale prices of fibre loop FTTH																			
access and wholesale prices of fibre loop FTTN																			
access to VDSL																			
sub-loop unbundling including in-house cabling																			
Bitstream market definition and SMP designation																			
Bitstream access to NGA and NGA Bitstream prices																			

Legend:

- Very important and very urgent
- Very important and urgent
- Importance and urgency can not yet be decided
- Ongoing activities of high importance

4 MOBILE NETWORKS STRATEGY

The vision of AEK’s regulatory strategy suggests several major topics for the mobile networks strategy. The first topic deals with the necessary amendments to the existing regulation of mobile termination rates. The second topic is frequency policy and the third group of major topics consists of refarming and of infrastructure and frequency sharing.

4.1 Amendment of existing regulation of mobile termination rates

As already described in Chapter 2.8.3, updating the existing BU-LRIC+ modelling for mobile termination rates to allow for "pure LRIC" calculations of mobile termination and origination rates is a major task and will be started in 3Q2012.

Results of a model upgrade should be used for adjusting the existing glide path³³ of the mobile termination and origination rates based on pure LRIC calculations. At the same step market analysis for the SMS wholesale market can be finalised by using results of a pure LRIC model for SMS termination rates.

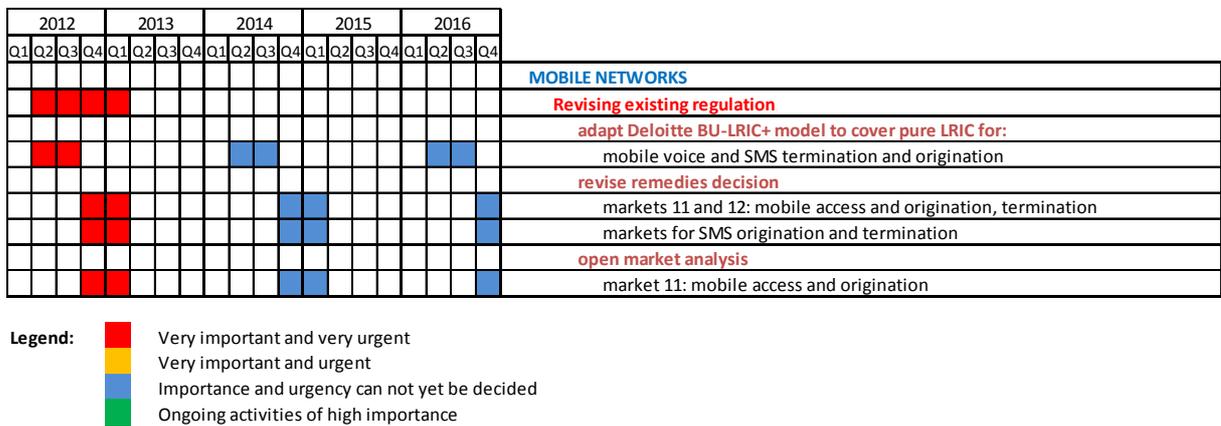
³³ See IRAC (2012): Assessment Report, pp.25.

4.1.1 Social welfare impacts of the amendment of existing regulation of mobile termination rates

Taking into account that the penetration rate of mobile services is beyond 100 % of the population, almost all citizens of Macedonia will enjoy reduced call prices for mobile calls. There is no doubt that the expected decrease of mobile termination rates for voice and SMS will lead to lower prices of these services and consequently to increased traffic volumes, creating massive positive welfare effects. The amendment of the existing regulation of mobile MTRs must be rated as very important. With regard to the timeframe, AEK is convinced that these changes should be introduced as soon as possible since the glide path as foreseen in the existing regulation is already postponing those welfare effects, as already discussed in Chapter 2.6.

4.1.2 Action plan for amendment of existing regulation of mobile termination rates

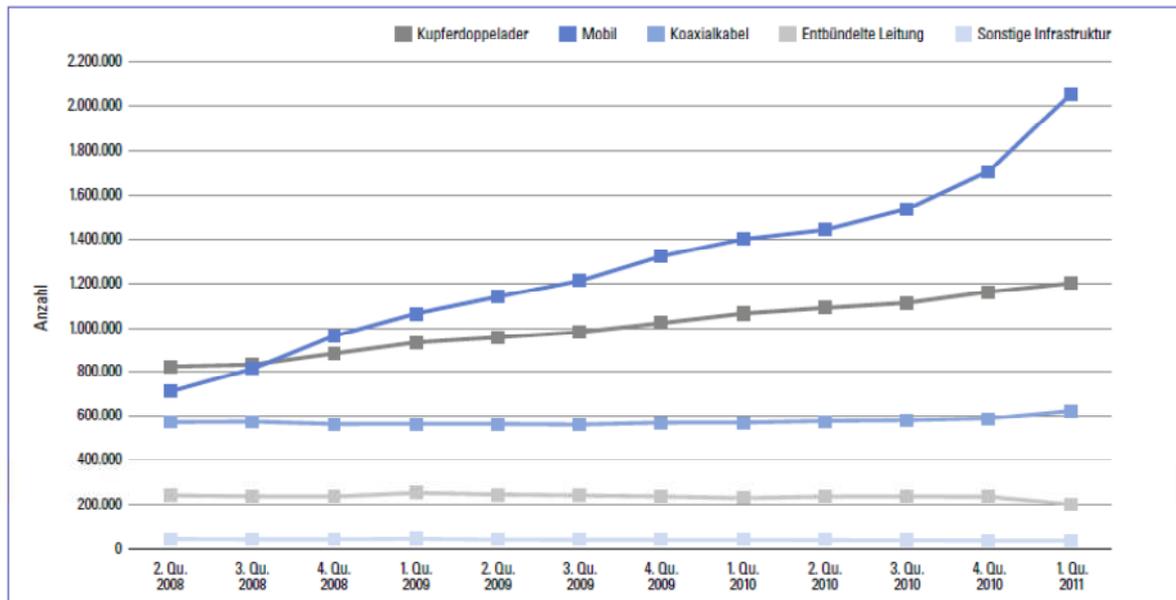
Diagram 4-1: Action plan for amendment of existing regulation of mobile termination rates



4.2 Introducing fast mobile broadband

AEK is expecting a massive take-off of mobile broadband services triggered by higher speed of mobile broadband access. The following example of the development in Austria may serve as good blueprint for potential developments in Macedonia.

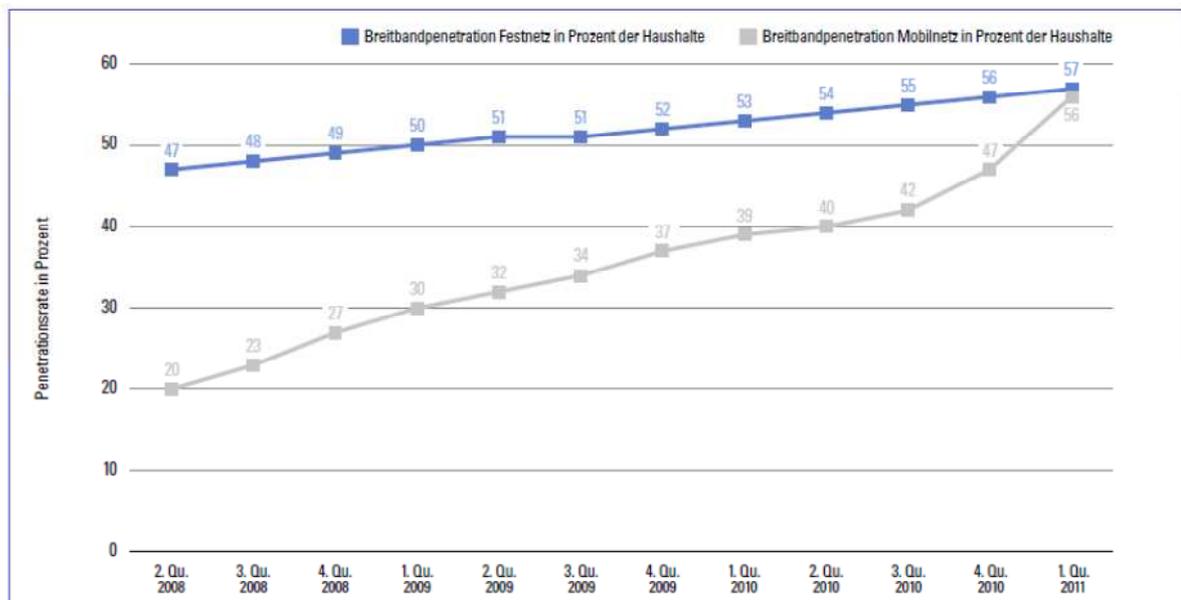
Diagram 4-2: Broadband access in Austria in number of lines



Source: RTR Telekom Monitor 2011

As can be seen from Diagram 4-3 and Diagram 4-3, the number of mobile broadband accesses in Austria³⁴ (as an example) has been rising much faster than the number of all fixed accesses together and has reached 50 % of all broadband accesses in March 2011. The development of mobile broadband in Austria can be seen as indicating mobile broadband future in Macedonia although there is no guarantee for extent and the timeframe of these developments in Macedonia. The Austrian experience shows a highly competitive mobile broadband market with one company (Hutchinson 3G) triggering the development of the market.

Diagram 4-3: Percentage of fixed and mobile broadband access in Austria



Source: RTR Telekom Monitor

³⁴ RTR Telekom Monitor, Vienna, March 2011.

Therefore, one of the major preconditions for successful implementation of high-speed mobile broadband is effective competition on mobile end-user markets. As shown in Chapter 2.4 Mobile voice wholesale and retail markets, there are strong indications for a dominant market position of T-Mobile in the mobile voice market, as shown in Diagram 2-8: Mobile Market shares in % of revenues: Macedonia 2010—2011. By all standards of competition analysis a market share of 65 % in a market with three operators could be interpreted as constituting a dominant position. In addition the two smaller operators are not gaining significant market shares from T-Mobile in total. Since VIP is using national roaming for coverage of some rural areas and for mobile broadband, they are heavily dependent on T-Mobile. This reinforces the very strong position of T-Mobile on the mobile end-user markets. The history of the mobile market in Macedonia shows a period of duopoly between T-Mobile and Cosmofon, when Cosmofon enjoyed a market share of up to 35 %. Cosmofon's former market share is now split between ONE (successor of Cosmofon) and the new entrant VIP. Only 5-8 % market share of T-Mobile moved to the two competitors. The Macedonian mobile end-user market would have the structure of an asymmetric duopoly if one of the smaller competitors would be failing or leaving the market. Such a market is heavily prone to either collusion or attempts by the dominant operator to foreclose the market. A strategy for the development of mobile broadband has to take into account this special situation of the mobile market in Macedonia and has to provide competitive safeguards.

4.2.1 Frequency policy for fast mobile broadband

Frequency policy should provide for a framework, which

- allocates frequencies to the market parties according to efficient use of frequencies;
- allows for a level playing field for all market parties;
- does not preclude market entry or artificially create entry barriers for new market entrants;
- allows AEK to quickly react on failure or exit of market parties and on attempts to monopolize the mobile end user markets by one (foreclosure) or by implicit collusion by several market parties;
- provides the market parties with frequencies required for the desired fast rollout of fast broadband.

The following sections will give the basic reasoning behind the strategic statements.

4.2.1.1 Efficient frequency allocations and level playing field

The first two requirements concentrate on efficiency of frequency usage and on preventing unjustified imbalances of frequency allocations to individual operators. In the Macedonian situation there are some doubts that all frequency spectrum allocated to mobile operators is actually in efficient use³⁵ or will be put in efficient use in the near future. Hoarding of frequencies, which is one variant of inefficient use of frequencies is clearly anticompetitive behaviour and will be addressed by appropriate monitoring of frequency usage. To avoid anticompetitive new allocations of frequencies, AEK will promote competitive allocation procedures, which are based on the market valuation of frequencies and should replace the existing allocation procedures of frequencies for mobile communications. In particular, AEK will strongly promote to use of frequency auctions as standard procedure to allocate spectrum for mobile communications. This involves changes in the Electronic

³⁵ Rešenje AEK broj 08-57/2, Skopje, 13.01.2012.

Note: By this decision AEK is revoking the use of radio frequency spectrum in the 2x5 MHz frequency blocks in FDD and 1x5 MHz frequency block in TDD upon request of ONE.

Communications Act, which is currently under review. On the other hand, the high annual administrative fees for frequency usage may create a tilted playing field for smaller operators. In the present situation, the net present value (NPV) of frequency fees is dominated by annual frequency usage fees. It could well be the case that the NPV of the stream of frequency fees payments is higher than the NPV of the net cash flows from the business case attached to the frequencies to be acquired of a smaller mobile operator. In such a case no frequencies would be allocated under the rules in force (but also with other allocation procedures) to smaller operators. On the other hand, for a bigger operator it could still be profitable to buy frequencies, if he can expect that smaller operators cannot buy frequencies and consequently in the future will not be able to offer certain services to the markets. This would mean that not all welfare gains from mobile communications could be reaped. Summing up: If the annual frequency fees set by administrative procedures are too high compared to net cash flows this could create the situation of distorted frequency allocations. AEK will continue its efforts to reduce annual frequency to a level, which is sufficient to finance AEK's operations.

4.2.1.2 No entry barriers for new market entrants

The third requirement addresses potential market entry into mobile communication markets. Allocation procedures should not be structured in a way to serve only existing operators. There should be provisions that allow market entry by making frequencies available also for new market parties in a non-discriminatory way. This goal should be supported by allocation procedures, which allow a potential entrant to acquire the types of spectrum in the desired quantities. A separated allocation procedure for e.g. 800 MHz frequencies will not meet this requirement. The first three requirements highlight the necessity of changes in the legal provisions for frequency allocations for mobile communications. A combination of a reduction of annual usage fees and a replacement of beauty contests by auctions appears to AEK as the key for more adequate allocation procedures in the future. AEK expects that replacing the existing allocation procedure (beauty contest) by appropriate auction designs will contribute significantly all five criteria for appropriate frequency policy. The design of auctions requires excellent knowledge of the mobile markets in Macedonia and deep knowledge of auction theory and practice. It has to be analysed for each case separately which auction design would lead to efficient allocation of frequencies.

4.2.1.3 Competitive safeguards

The fourth requirement can be regarded as competitive safeguard against a list of competition problems on the mobile retail markets. Competitive safeguards should enable AEK in the case of apparent tacit collusion or of attempted market foreclosure to exert a disciplining pressure on the market parties. Normally, competition authorities are in charge to discipline dominant market players. This is done *ex-post* by checking for abuse of the dominant market positions or by investigating collusive behaviour on the market or even of formation of a cartel. Since this is done *ex-post* it can only be a corrective measure which has only limited preventive power. In such a situation it would be wise to have additional competitive safeguards, which can be used *ex-ante*. For a limited time AEK will reserve of a complete set of frequencies which allow a new mobile operator to enter the market with a similar frequency endowment as existing operators. Making a reservation of a set of frequencies is similar to the third provision of not discriminating potential new entrants, but is stronger than this non-discriminatory policy. It explicitly shows AEK's determination to invite a new operator, should market failure or market exit, or tacit collusion or even explicit behaviour to restrict competition occur. AEK knows that this does not appear as a very strong threat in the given situation. By making these reservations of frequency spectrum for a new entrant, the mobile markets remain

contestable. This exerts a disciplining effect on existing operators not to engage in collusive behaviour and / or attempts to re-monopolise the market. Putting aside a complete set of frequencies for an additional operator does not significantly interfere with existing frequency demand since there is still a significant amount of unused spectrum available. In the case of failure of one or both of the smaller operators, AEK could immediately react to such a situation by offering the reserved frequencies on the market and prevent further damage of re-monopolisation due to the market failure.

These safeguards can only be upheld for limited time. The limiting factor is the availability of unused spectrum and future expected demand by existing operators. Whenever the development of mobile communications, in particular of mobile broadband creates high demand for frequencies in certain bands, AEK will take a decision to release the reserved frequencies.

For the time being there is still a significant amount of unused spectrum for mobile communication services. The available frequency spectrum, including the spectrum in 800 MHz band, is shown in Table 4-1: Available frequency spectrum.

Table 4-1: Available frequency spectrum

Frequency band [MHz]	Service	Available spectrum
790—820 (792—822) / 832—862	LTE — 4G	790—820 (792—822) 832—862 MHz
880—915 / 925—960	GSM 900 — 2G FDD	—
1710—1785 / 1805—1880	DCS 1800 — 2G FDD	1720—1730 / 1815—1825 MHz 1740—1785 / 1835—1880 MHz
1900—1920	IMT-2000 / UMTS — 3G TDD	1900—1905 MHz 1915—1920 MHz
1920—1980 / 2110—2170	IMT-2000 / UMTS — 3G FDD	1920—1935 / 2110—2125 MHz 1965—1980 / 2155—2170 MHz
2500—2570 / 2620—2690	IMT-2000 / UMTS — 3G FDD / TDD	2500—2570 / 2620—2690 MHz

This frequency situation allows to reserve a frequency endowment for a potential new entrant which duplicates the average endowment of existing operators. As an example one could foresee:

- 2 × 2 × 5 MHz in 800 MHz band,
- 3 × 2 × 5 MHz in DCS 1800 band,
- 2 × 2 × 5 MHz in UMTS FDD.

which still leaves frequency capacity for expansion of existing operators.

4.2.1.4 Roll-out of fast mobile broadband

The fifth requirement describes the necessity for AEK to adequately provide spectrum for the roll-out of fast mobile broadband services. This should be put into relation to AEK's strategic position with regard to the refarming of frequencies in the 900 MHz band and with the allocation of 800 MHz spectrum. Based on the Commission Decision³⁶ of 6 May 2010 on harmonised technical conditions of

³⁶ Commission Decision of 6 May 2010 on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union (notified under document C(2010) 2923) (Text with EEA relevance) (2010/267/EU), OJ L 117/95.

use in the 790-862 MHz frequency band, the EU Member States will allocate the Digital Dividend spectrum (790—862 MHz) to mobile communications. The propagation characteristics of this spectrum allow MNOs to roll-out cost effective coverage in low population density as well as deep in-house penetration in urban areas. This is the main driver for demand for this spectrum. It could be used to roll-out 4G services (LTE) in rural and metropolitan areas. AEK expects a complementary relation to wire-bound broadband services in rural areas. In contrast, there will be a significant degree of substitution to xDSL services in densely populated areas. There is significant doubt that very high speed broadband services provided over fibre, VDSL, or DOCSIS 3.0 can be substituted by LTE based services. Nevertheless there will be significant uptake of LTE because of the possibility of mobile or nomadic usage.

In addition to 4G (LTE) services WiMAX can be seen as a competing technology to 3G and partially to 4G networks. As such WiMAX can play a significant role in mobile broadband networks roll-out, providing a competitive alternative to 3G and 4G networks both in rural and metropolitan areas. Although WiMAX was initially designed as a fixed wireless access technology, recent work by IEEE³⁷ added mobile capabilities to the WiMAX standards. WiMAX networks operate in the 2,3 GHz, 2,5 GHz and 3,5 GHz spectrum, making the technology similar to 3G and 4G networks, but providing lower mobility and higher data rate.

The frequency spectrum assigned to existing WiMAX networks is unique regardless of the fixed or mobile use. Therefore AEK will convert the existing WiMAX licences for fixed access to licences for fixed and mobile access without any additional one-time and annual fee.

Roll-out of 800 MHz based broadband services can contribute to the explicit goal of reducing investment costs of broadband infrastructure as envisaged by the Commission Communication on Broadband 2010³⁸, p12.

In some EU Member States, the allocation of 800 MHz frequencies was connected to license obligations to first roll-out 4G services in areas with low population densities. At the same time the liberalization of usage conditions of the 900 MHz (refarming) frequency bands was tied to the allocation procedure of 800 MHz frequencies to avoid competitive disadvantages of operators not in possession of 900 MHz frequencies. If in such a case refarming of 900 MHz frequencies were allowed immediately this would create a major time to market advantage for all operators in possession of 900 MHz spectrum. In Macedonia, all operators already in the market do have 900 MHz spectrum, so the date of permission of refarming depends on the results of AEK's assessment (See: Chapter 4.3.1) of the competitive situation on mobile markets, which will lead to a decision on keeping or releasing frequencies put aside for a competitive safeguard.

³⁷ 802.16-2009 – IEEE Standard for Local and metropolitan area networks Part 16: Air Interface for Broadband Wireless Access Systems, 2009.

³⁸ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, European Broadband: investing in digitally driven growth, COM(2010) 472 final, Brussels, 20.09.2010.

4.2.2 AEK's spectrum strategy

AEK will proceed in two steps:

- Step 1: Review of efficiency of frequency usage of all mobile operators including expected frequency usage in the next three years, revoking of exclusive rights of use whenever indicated by the results of the review. Reviewing the efficiency will be a permanent task of AEK.
- Step 2: Periodical initiation of new frequency allocation procedures for existing and potential new mobile network operators. AEK plans to auction some available frequencies at regular time intervals of two years. Frequencies, which are not sold in an earlier auction will be reoffered at the following spectrum auction. Before each auction AEK will analyse the frequency situation and the development of mobile retail markets. Special consideration will be given to effectiveness of completion and to the development of market demand for voice, narrow band and broadband data services. Allocation will be based on auctions to ensure efficiency of frequency usage. The auction design will depend on the results of the market analysis and the decision of AEK on the inclusion of the competitive safeguard or the releasing of the reserved frequency. Without any prejudice for the auction design, frequencies will be auctioned in a simultaneous, multiple rounds auction covering – if necessary – the reserved frequencies for new operators and frequencies for enhancing the existing allocations if needed. These procedures will include part of the 800 MHz frequency band. The auction design is a core element for successful spectrum auctions and has to be prepared very carefully. A more detailed statement on the intended auction design would be premature and would by far exceed the scope of this strategy document.

The timing of both steps is critical. According to AEK's experience and recent evidence AEK does not believe that operators are using all allocated spectrum efficiently. But with the expected fast growth of mobile broadband there will be significant demand for frequencies in the near future. That strategy will make sure that all frequency demands from market parties will be served in a timely and efficient manner at prices, which represent the market value of spectrum.

Mobile operators could avoid procedures of revoking frequency spectrum by using the existing legal provisions for frequency trading in Article 71 of Macedonian Electronic Communications Law.

The proposed efficiency checks have the potential to increase the efficiency of spectrum usage either by restitution of idle spectrum or by reallocation of some idle parts of the spectrum between operators. The periodical auctions foreseen in Step 2 require two changes of the Electronic Communications Act 2005. The first change should allow for auctions as allocation mechanism of frequency spectrum and the second change should restrict usage fees for frequency spectrum to the costs of managing and supervising frequencies and frequency usage.

4.3 Refarming, infrastructure and frequency sharing

Refarming as well as infrastructure and frequency sharing allows mobile network operators to increase their cost efficiency. Both activities can significantly contribute to a broader and faster roll-out of 4G services. On the other hand both cost reducing activities have potential implications on the competitive situation on the mobile end-user markets. The pros and cons of both approaches and their implications for AEK's mobile strategy will be discussed.

4.3.1 Refarming of 900 MHz and 1800 MHz frequency bands to 4G (LTE)

According to the Macedonian frequency allocation plan³⁹, refarming of the 900 MHz and 1800 MHz GSM frequency bands to 3G services had already been allowed in December 2009, no decision on refarming of these frequency bands for 4G (LTE) technology has been taken so far. LTE technology can be used not only in 3G frequency bands but also in all frequency bands allocated for mobile communications (800 MHz, 900 MHz, 1800 MHz, 2,6 GHz). In addition, state-of-the-art 4G equipment can simultaneously emulate GSM, UMTS, and LTE in all frequency bands. This creates the opportunity to implement the new technology swiftly and without running into additional costs for premature exchange of end-user terminal equipment (handsets and modems).

Allowing the use of 4G technologies also for GSM frequency bands offers a cost effective opportunity of introducing LTE services in areas covered by 900 MHz networks. The cost savings originate from the significantly larger cell size of 900 MHz networks compared to higher frequency bands networks. These cost savings are enormous and contribute highly to the profitability of the introduction of LTE as an ubiquitous service. Since 1800 MHz frequencies have propagation properties similar to 2,1 GHz (UMTS) frequencies, refarming of 1800 MHz frequencies will not result in similar cost savings, but allows enhancing transmission capacity in densely populated areas.

There is no doubt that refarming of 900 and 1800 MHz bands to LTE should be allowed, but the point in time when this refarming should take place has to be considered. The respective legal source of the EU⁴⁰, i.e. §9 of Directive 2009/140/EC requires that “all types of technology used for electronic communication services may be used in the radio frequency bands, declared available for electronic communication services in the National Frequency Allocation Plans”. Furthermore, Art. 9a of Directive 2009/140/EC specifies transition rules and describes rights and obligations of holders of already existing exclusive rights of exclusive use (“licenses”) and NRAs. In principle, the Directive entitles license holders to submit applications for a reassessment of their rights according to Art.9. This entitlement is restricted for the period between 25.05.2011 and 25.05.2016 and is only applicable, if the period of validity of the license is longer than 25.05.2012.

AEK will implement these EU rules, provided the necessary legal changes will be made by legislation. Before 2016 AEK will reassess restrictions on the rights for usage of radio frequencies and the possibility to allow refarming of 900 and 1800 MHz bands to LTE for any application submitted by frequency holders. AEK, however, will use the principles of transparency and non-discrimination during reassessment of the restrictions on frequencies usage for all submitted application. In addition, AEK will assess competitive developments to avoid distortions of competition created by decisions to liberalize the use of mobile communications spectrum following the provisions of Directive 2009/114/EC.

After 2016, AEK shall take all appropriate measures to ensure that refarming of 900 and 1800 MHz bands to LTE is applied to all authorizations or individual rights of use and spectrum allocations used for electronic communications services.

³⁹ План за намена на радиофреквенциските опсези во Република Македонија, Note M39, AEK, September 2011.

⁴⁰ Directive 2009/140/EC of 25.11.2009, §§9 and 9a; Directive 2009/114/EC of 16.09.2009

4.3.2 Infrastructure and spectrum sharing

Mobile networks show significant economies of scale. This implies that duplications of networks may lead to higher costs than providing services just over one – monopoly – network. On the other hand economic theory suggests that competition is leading to innovation and investment and consequently to high social welfare gains in the long run, which would not occur in a monopoly. Therefore infrastructure and network sharing is significantly contributing to cost efficiency of mobile networks, but must be limited in scale and scope not to interfere with the innovative power of competition. As a matter of fact telecom liberalisation is based on the idea of introducing competition even if there are significant economies of scale and scope.

There is ample evidence on several different models of infrastructure and spectrum sharing in Europe⁴¹. It must be in the interest of any electronic communication markets regulator to allow for infrastructure and spectrum sharing to an extent, which is compatible with competitive independence. This is because the (short run) potential for cost efficiency should be reaped, without compromising the long run benefits created by competition.

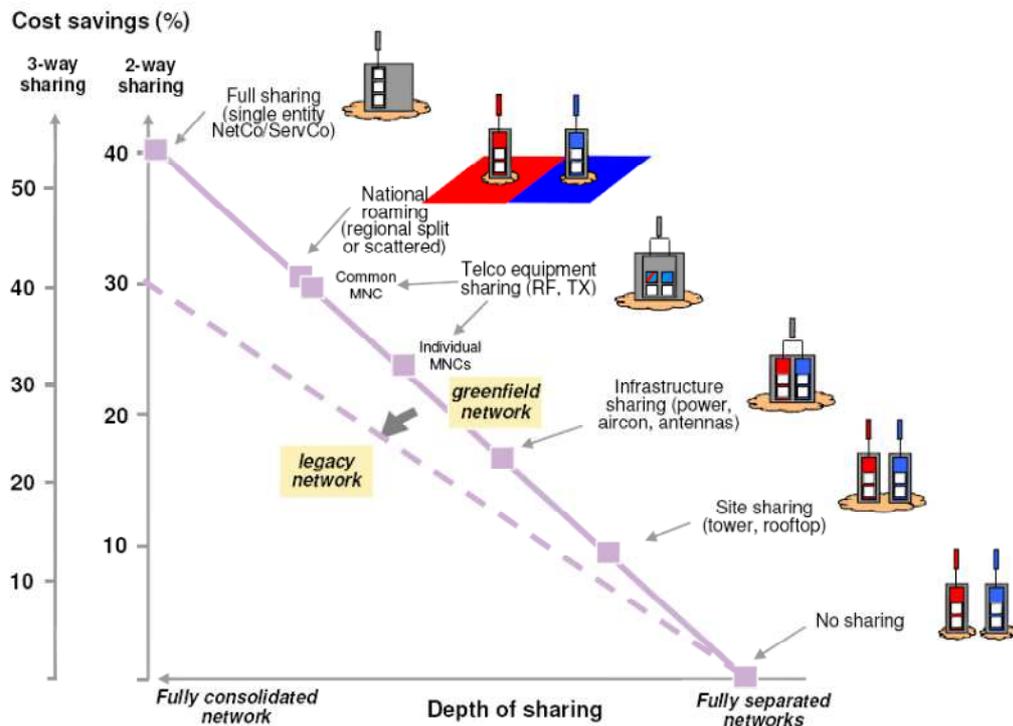
As indicated in BEREC-RSPG (2011) industry sources suggest that, depending on the geographical or technical extent of network sharing, potential savings for passive sharing alone can be as high as 60 % of yearly site capital expenditure, improving the network coverage at the same time. In addition, network sharing can create drastically reductions of operational expenditure. As shown in Picture 4-1, savings increase with the higher degree of sharing and with the higher number of operators sharing their networks, reaching in the extreme case single entity NetCo/ServCo model including the spectrum sharing.

On the other side, active sharing does increase the required degree of coordination between MNOs⁴² and therefore competitive dependency. This seems to be critical, when operators of different sizes share the same network, where most of the network is operated by the biggest operator, offering him the possibility to decide on a most favourable network structure and network management hereby increasing dependency and reducing the competitive independency of smaller operators.

⁴¹ BEREC-RSPG report on infrastructure and spectrum sharing in mobile/wireless networks, BoR (11) 26 – RSPG11–374, 16.06.2011.

⁴² For an example, see BEREC-RSPG (2011), pp9.

Potential Savings of Network Sharing



Remark: Generally lower savings for "legacy network" compared to "greenfield network" are due to one-time dismantling/refurbishment cost on the one hand and due to more limited availability of sharing features/functionalities on the other hand.

Picture 4-1: Potential savings of network sharing

Source: BEREC, from Vodafone

4.3.2.1 Types of infrastructure and spectrum sharing

Passive infrastructure sharing is defined as sharing of the passive network elements, like masts, sites, cabinets, power supply and air conditioning.

Active infrastructure sharing is defined as sharing of active access network elements, like antennas, nodes (BSC), radio controller elements (RNC), backhaul transmission equipment, etc.

Spectrum sharing is defined as a simultaneous usage of a specific common frequency band in a specific geographical area by a number of independent operators. Spectrum sharing as the most advanced capacity sharing can be implemented in several ways. A complex way would be to share the active equipment of the RAN and share common spectrum.

4.3.2.2 Scenarios of infrastructure and spectrum sharing

In EU Member States various degrees of infrastructure and spectrum sharing, ranging from a few percentage points up to 70 percentage points of network elements in Sweden have been found as reported by BEREC-RSPG (2011). Many of these scenarios include passive and active infrastructure sharing and a small number of EU Member States have implemented spectrum sharing. One example is re-use of frequencies in Finland, where operators have minimised or even removed the coordination distance for frequency re-use. This mutual coordination of spectrum sharing has maximised the cumulative service area and improved broadband coverage. Spectrum is still one of the strongest determinants of the independency of operators.

While there seems to be an increasing degree of sharing in terms of numbers and scope of sharing agreements, the regulators will need to improve monitoring of infrastructure and spectrum sharing for the assessment of the expected impacts on competition.

4.3.2.3 Competition aspects

It is necessary to assess possible effects on competition of infrastructure and spectrum sharing case-by-case, competitive independence functioning as the guiding principle. Competitive independence is defined as the ability of mobile operators to differentiate themselves in terms of prices and quality and variety of services from their competitors⁴³. BEREC/RSPG enumerates several indicators for competitive independence including geographic scope of agreements, uni/multilateral agreements, impact on the competitive situation implied by the sharing agreement, independent control over radio planning. The legal source for these considerations are the provisions of the European Competition Law, in particular Article 101 TFEU (former Article 81 TEC), which explicitly forbids all practices of competitors⁴⁴, which may restrict competition amongst them. Furthermore, some of the sharing agreements could be seen as the creation of a joint venture subject to Merger Control. In these cases the planned “concentrations” have to be notified to the competent competition authorities, which have to approve the planned concentration⁴⁵. In practice, the limitations to infrastructure and spectrum sharing have to be measured against competitive independency using some or all of the named indicators. Whenever infrastructure and spectrum sharing activities endanger the competitive independency of operators, these sharing activities would potentially reduce social welfare in the long run and therefore are undesirable.

4.3.2.4 Legal practice

There are a limited number of decisions of the European Commission and the European Court dealing with infrastructure sharing (COMP/38.369 T-Mobile Deutschland/O2; COMP /38/37002 UK Limited/T-Mobile UK Limited). In both cases the EC considered site sharing not as impeding competition. On the other hand, the European Court objected to a EC decision regarding a long term national roaming contract as being anti competitive. In Case COMP/38.369 T-Mobile Deutschland/O2 the CFI⁴⁶ ruled against the EC, establishing that national roaming agreements might be enabling the smallest operator to compete with other operators and are not regarded as anti competitive in this case.

4.3.3 Infrastructure and frequency sharing – strategic conclusions

In the interest of a broad and fast rollout of LTE services in Macedonia AEK will promote sharing of passive and active network elements. The limits of infrastructure sharing should be as in the EU the competitive independence of mobile network operators. In particular AEK is considering the rollout

⁴³ BEREC-RSPG report on infrastructure and spectrum sharing in mobile/wireless networks, p.14.

⁴⁴ BEREC: Further legal and economic criteria that can help analyzing the compatibility of individual co-operation agreements with Article 101 of the TFEU can be found in the Commission Communication (2011/C 11/01) on Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, OJ C of 14.01.2011, p. 1, in particular chapter 2 on general principles on the competitive assessment of information exchange and chapter 4 on production agreements.

⁴⁵ Case No COMP/M.5650 – T-MOBILE/ ORANGE Notification of 11/01/2010 pursuant to Article 4 of Council Regulation No 139/20041.

⁴⁶ Case T-328/03 – O2 v EC.

of broadband networks in rural areas. In combination with the allocation of the 800 MHz frequencies and refarming of the 900 MHz frequencies AEK advocates a model of infrastructure sharing, which:

- **allows for complete sharing of RAN** (Radio Access Network) including:
 - RNC (Radio Network Controllers),
 - backhaul links,
 - nodes,
 - active and passive radio equipment including feeders, antennas, towers, electricity, heating and cooling, etc.
- **but excluding all elements of the core network**, as:
 - MSCs,
 - backbone transmission,
 - multimedia GWs
- **and excluding frequency sharing.**

The sharing of the RAN is limited to equipment, which allows all sharing partners to independently define all parameters of their services. This provision should guarantee for competitive independency and far-reaching cost savings.

AEK does not see a strong case for sharing a RAN in metropolitan and urban areas where existing networks are already highly developed.

Before this strategy is announced and implemented, a careful check with expert competition lawyers and the Macedonian Competition Authority is highly recommended.

4.4 Summary of regulation to promote mobile broadband

The introduction of fast mobile broadband requires several regulatory actions, as described in the previous chapters. The following sequence of actions to provide for an efficient development of the regulatory framework of the mobile broadband is suggested.

One of the preconditions for an effective frequency policy is the permanent supervision of the efficient use of the frequency spectrum which will be started immediately. After a first round of supervision and possible regulatory actions the unused frequency spectrum available for mobile services should be established in detail. The regulatory strategy foresees frequency auctions at regular time intervals. AEK will commission a consultancy project to develop an auction design which allows efficient allocation of frequencies embodying the competitive safeguards, if necessary. The auction should be designed to guarantee efficient frequency allocations and to create a level playing field for all mobile operators with regard to frequency endowments. AEK will strongly support a change of the Electronic Communications Law under review, to allow actions as the standard procedure for frequency allocation in mobile communications. In a next step, AEK will analyze the state of competition of mobile service markets and the development of demand for mobile voice and data services. After the evaluation of the market situation AEK will decide on the necessity of competitive safeguards and will prepare and execute the first frequency auction using the results of auction design study. Frequency auctions will be repeated periodically to meet the demands from the mobile network operators.

Since refarming of 900 MHz frequencies for 4G services has the potential of significant cost reductions, the timing of the decision to allow refarming has to be carefully evaluated. AEK will issue a formal decision to allow network sharing as described in Chapter 4.3.2.

4.4.1 Social welfare effects of fast mobile broadband regulation

The strategy to support the introduction and further roll-out of mobile broadband has two major components. The first component deals with frequency policy which serves the purpose of creating efficient frequency use and guaranteeing a level playing field for all mobile operators and to prevent collusive behaviour or attempts to foreclose the market. The reduction of effectiveness of competition brought about by one or a combination of these items would result in significant welfare losses. Therefore all components of frequency policy are rated as very important. The introduction of a well designed and structured frequency policy is also a very urgent matter as the recent revocation of frequencies upon request of ONE shows. There obviously have been unused frequencies in the market, whereas at the same time there is demand for frequencies in other frequency bands.

The second part of the strategy mainly is touching upon cost efficiency of mobile broadband networks. AEK firmly believes that refarming and infrastructure sharing as proposed will contribute significantly to the timely implementation of 4G mobile broadband services. Therefore AEK concludes that preparing and taking proposed decisions on refarming are very important and very urgent although they have to be taken at the correct point in time.

4.4.2 Action plan for fast mobile broadband regulation

Diagram 4-4: Action plan for fast mobile broadband regulation

2012				2013				2014				2015				2016			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
MOBILE NETWORKS																			
Introducing fast mobile broadband networks																			
supervision of the efficient use of the frequency spectrum																			
commissioning of an comprehensive auction design																			
preparing and executing frequency auction																			
reassessment of restrictions on the rights for usage of radio frequencies																			
decision for network sharing in all frequency bands																			
review the decision for network sharing in all frequency bands																			

Legend:

- Very important and very urgent
- Very important and urgent
- Importance and urgency can not yet be decided
- Ongoing activities of high importance

5 MISCELLANEOUS REGULATORY ISSUES

5.1 Bill and Keep

There is an on-going discussion of different types of interconnection agreements, which focuses on the question, which type of interconnection agreement would maximize social welfare. The discussion compares wholesale arrangements based on the Calling Party's Network Pays Principle (CPNP) with Bill and Keep (BaK) arrangements. CPNP implies that the terminating network has to be compensated for termination costs by the network, where the originated. Under BaK no such compensation is foreseen, all network operators cover only their own costs. There is some ambiguity

about who is paying for the transit costs, which has to be solved by the network operators. CPNP arrangements are in place in the EU in voice telephony markets, whereas wholesale internet services normally use BaK arrangements. In the US, Hongkong, Singapore and some other countries BaK is also used for voice termination services.

In practice, these wholesale arrangements are reflected in retail billing regimes, which are

- Calling Party Pays (CPP) as the retail counterpart of CPNP
- Receiving Party Pays (RPP) as the retail counterpart of BaK.

Under CPP the calling party covers all costs of a call: originating leg, transit (if applicable) and termination. This arrangement is based on the (implicit) assumption that the calling party gains all utility from a call she/he originates and as a logical consequence the receiving party is not gaining any utility at all. Under a “pure” RPP regime the receiving party would pay for all costs of a call. In practice, the calling party pays for the cost of the network, where the call is originating and the receiving party pays for the cost of network, where the call is terminating. This would basically assume, that not only the calling party, but also the receiving party would gain utility from a call. It should be mentioned, that both types of retail billing regimes could be implemented under both types of wholesale arrangements⁴⁷.

The CPNP gives rise to the well known “termination bottleneck”, which in effect means that for each access network there is a market for terminating calls on that network and that the network operator does have a dominant position for call termination on his access market. Since the CPNP is based on the idea that the called network has to be compensated for its termination cost, this “termination bottleneck” is the ultimate reason for the regulation of termination markets in the EU Regulatory Framework and most other regulatory frameworks.

Under a BaK regime there is no compensation for the costs of the terminating network and each network has to cover its own costs for calls, which originate from or terminate in the network. Although a subscriber of a certain network still can only be reached on the respective network, the terminating network cannot exert market power on other networks by means of charging a termination fee. This effectively does away with the regulation of termination markets, with costs of regulation and with regulatory uncertainty.

There was significant reluctance and even open resistance by many operators against the introduction of BaK as the basic institutional arrangement for wholesale intercarrier billing with regard to voice services. An excellent overview of pros and cons is given in BEREC: BoR (10).

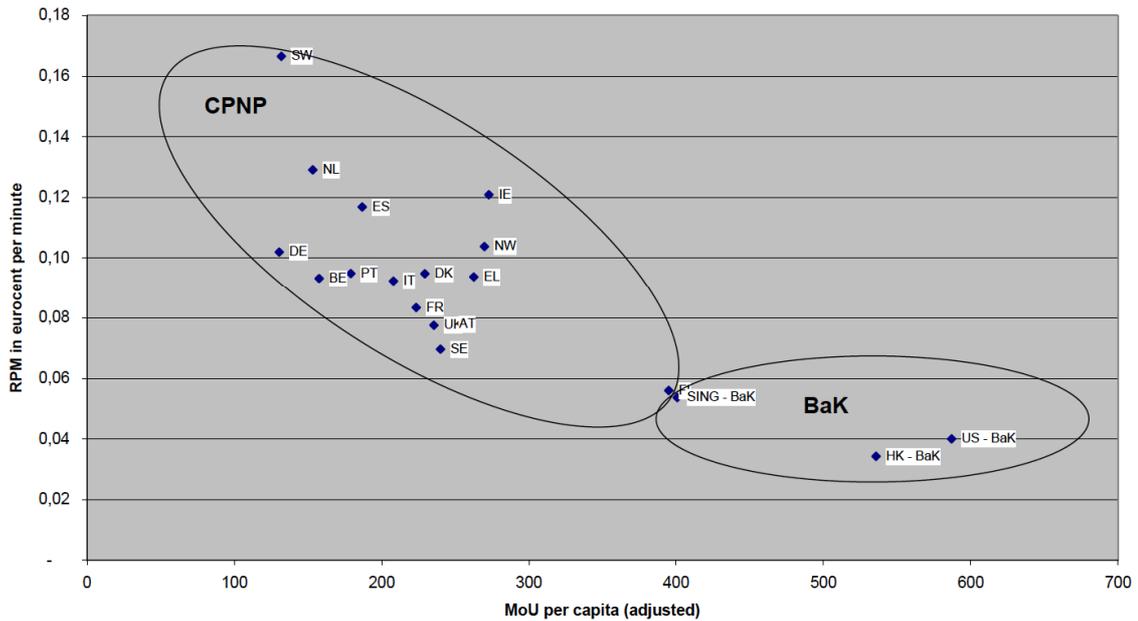
The discussion demonstrated that one has to distinguish between *level* and *system* effects. The *level* effect deals with the effects of reducing termination fees close to or equal to zero. The general opinion is that these effects are highly positive, doing away with monopoly rents and market distortions as described earlier in (Chapter 2.8.2 and Chapter 2.8.3 on revising FTR and MTR regulation). The most important reasoning is based on a comparison of prices, call volumes and participation rates in countries with CPNP and BaK⁴⁸ as shown in Picture 5-1.

⁴⁷ See: Ingo Vogelsang, Abrechnungssysteme und Zusammenschaltungsregime aus ökonomischer Sicht, Studie für die Bundesnetzagentur (BNetzA), 2006

⁴⁸ See: BEREC: BoR (10) 24 Rev 1, Riga, June 2010, p21

revenue per minute
transferred for \$ to euro
at 1,51 exchange rate

MoU versus RPM (Merill Lynch 2008 Q3 data)



Source: BEREC: BoR (10) 24 Rev 1, Riga, June 2010, p21

Picture 5-1: The adjusted revenue per minute (proxy of retail price) and minutes of use per capita (proxy for usage) plotted for CPNP (Europe) and BaK countries

There is a striking difference in minutes of usage and price per minute between CPNP and BaK countries – even if one controls for the lower €/ \$ exchange rate in 2012, which implies a significantly higher contribution to social welfare under BaK than under CPNP. A significant share of these welfare effects can be allocated to the level effect, since termination rates effectively are set to zero under BaK. Although participation rates in BaK countries tend to be lower than in CPNP countries, this does not seem to mitigate the welfare effects significantly.

The fact that BaK countries generally have lower RPM than CPNP countries casts significant doubt on the validity of the “waterbed effect” reasoning, stipulating that reducing termination rates to zero would raise retail prices. BaK obviously does not lead to higher end user prices, by the ultimate reason that the cost that have to be covered do not increase.

The system effects are also seen as very positive in terms of social welfare. There is sufficient support for the opinion that BaK gives stronger incentives for efficient network operation than CPNP, since all costs have to be recovered from own customers⁴⁹. Although Vogelsang (2006) originally pointed to high transition costs, this topic entirely disappeared from the radar screen. Most interesting is the result that BaK is better placed than CPNP to incorporate the so called “call externality”, meaning that not only the calling party is gaining utility from a call, which creates a significant contribution to the positive system effect.

The most frequently mentioned criticism of BaK is the “hot potato” routing, supposing that BaK would lead to more intensive attempts of operators to hand-over traffic, which is designated to terminate on another network, as quick as possible to reduce own network cost. Careful analysis shows that BaK does not create additional incentives for hot potato routing and that there are plenty

⁴⁹ A complete analysis of welfare effects can be found in BEREC: BoR (10) 24 Rev 1, Riga, June 2010, Chapter 5, pp23.

of safeguards⁵⁰ to prevent hot potato routing. Taken together, BaK appears as a very attractive arrangement for voice termination, which is capable of delivering substantial positive welfare effects.

Many analysts see the EC Recommendation on fixed and mobile termination rates as a first step to a transition to a BaK regime with its additional positive system effect on social welfare. So the strategic position of AEK to immediately revising fixed and mobile termination rates according to the “pure” LRIC principle can be seen as consistent with the on-going discussion in the EU. The transition to IP-based core networks (NGN) in both fixed and mobile networks will contribute to a further significant reduction of termination costs. This transition to NGN has been announced by MT recently for the period 2011 to 2013, see Section 3.2 above. In addition, the upcoming technology swap in the mobile industry (see above Chapter 3.4.1) to LTE will also contribute to lower fixed and mobile termination rates. In its strategic recommendations AEK advocates a swift implementation of the “pure” LRIC concept for fixed and mobile termination rates, as well as an immediate revision of AEK’s fixed BU-LRIC+ model to also cover NGN technology.

These measures will AEK put into the position to implementing a consistent regulatory framework for fixed and mobile termination rates in 2012, to exploiting a large percentage of the level effects of reduced termination rates and to preparing for a soft landing at a BaK termination regime.

With regard to international developments the National Broadband Plan⁵¹ of the FCC clearly envisages to phase out “per-minute rates for the origination and termination of telecommunication traffic” between 2017 and 2020. It can be expected that the EC will take a similar initiative to introduce a discussion with the goal to create a transition from CPNP to BaK in the next few years. ERG/BEREC started already this discussion as early as 2005 with first considerations of VoIP regulation and in particular by a series of documents of ERG and BEREC⁵², starting in 2009 on alternative charging mechanisms and culminating in the BEREC Common Statement referred to above.

AEK will continue to monitor the discussion of charging mechanisms for interconnection and proactively discusses the issues connected to a transition to BaK with the stakeholders in Macedonia.

5.2 Broadband USO

The Digital Agenda requires EU Member States and to a certain extent also candidate countries to roll-out broadband services and network in the whole country.

There are several options to provide broadband coverage for the vast majority of the citizens:

- commercial roll-out by fixed and mobile operators,
- PPP projects,

⁵⁰ For example COBaK (Central Office BaK) as originally proposed by DeGraba (2000): Bill and Keep at the Central Office as efficient interconnection regime, OPP Working Document Series, No. 33, FCC, December 2000.

⁵¹ See: Federal Communications Commission: National Broadband Plan, Chapter 8: Availability, p8, Washington D.C.; or FCC: National Broadband Plan, Executive Summary p XIII, Washington.

⁵² BoR (10) 24rev1 BEREC Common Statement on Next Generation Networks Future Charging Mechanisms / Long Term Termination issues.

BoR (10) 24b Consultation Report to the Common Statement "Next Generation Networks Future Charging Mechanisms / Long Term Termination issues".

ERG (09) 34 Draft CP on NGN Future charging mechanisms / Long term termination issues.

- public investment,
- broadband as universal service obligation.

AEK considers a combination of commercial roll-out, PPP and public investment as the most favourable option to move towards a digital society. AEK also does have significant doubts on the effectiveness of including broadband access into the list of universal service obligations.

The main reason for these doubts is a potential distortion of competition in retail broadband markets. In this case, MT as universal service operator would be obliged to roll-out broadband access networks on the whole territory of Macedonia to meet all potential reasonable demand for access to broadband services. MT would be entitled to a refund of the net costs of this universal service obligation. The funding would be provided by a universal service fund⁵³ which itself is funded by all network operators proportionally to their revenues. This would lead to a situation that although all network operators have co-financed the broadband rollout, all of them excluding MT have to base their business in the respective regions on regulated access.

Instead of including broadband access into the list of universal service obligations AEK will support the rollout of mobile broadband services by regulatory measures as described in Section 4.3.3. In addition to that AEK will consider imposing obligations on licenses for 800 MHz and 900 MHz frequency bands, in particular, the permission to refarm 900 MHz networks to 4G services could be made contingent on the prioritised roll-out of 4G in areas with low broadband penetration and "white spots". The same could be applied to the licensing procedures in 800 MHz. AEK is aware that this will reduce the government revenues from upfront payments for 800 MHz licenses.

Since, according to their own statements, T-Mobile and ONE are offering almost 100 % coverage, this is a very effective approach, since it only requires a technology swap. The cost of such technology swap is significantly lower than cost of new broadband network. Since VIP can rely on a national roaming contract, this would not change VIP's competitive situation.

5.3 Net Neutrality

The heated debate on Net Neutrality originating first in the US and then swapping over to all countries is all about quality of service of the Internet. Since Macedonia as a Candidate Country will be confronted with the implementation of the EU Legislation of 2009 in the near future – in fact a new Electronic Communications Act is already under discussion – AEK will concentrate on the potential issues to be covered. The EU Regulatory Framework contains two major legal statements on this issue:

Article 8 (4) (g) Framework Directive (2009) *“promoting the ability of end-users to access and distribute information or run applications and services of their choice”*

Article 22 (3) Universal Service Directive (USD 2009): *“In order to prevent the degradation of service and the hindering or slowing down of traffic over networks, Member States shall ensure that national regulatory authorities are able to set minimum quality of service requirements on an undertaking or undertakings providing public communications networks...”*

The first reference specifies the obligation of Member States to make sure that any end user should be able to run any application or be able to access and distribute information on the Internet. The

⁵³ See, Electronic Communication Law, Art. 39.

second quote empowers and obliges NRAs to ensure that no degradation of the quality of certain services may occur. Taken together that means that access providers are not allowed to restrict access to certain services (Google, iTunes, VoIP services) and in addition are not allowed to degrade the quality of the Internet as “best effort” service.

BEREC⁵⁴ has suggested a three-stage procedure to be applied by NRAs to cope with the particular problems of service quality degradation in violation of Net Neutrality. AEK will timely bring up this issue in the discussion of Net Neutrality during the process of creating the new Macedonian Electronic Communications Act.

6 SUMMARY OF AEK'S ACTION PLAN FROM 2012 TO 2016

According to the considerations of the regulatory strategy, AEK has created a timeline of actions for each of the major regulatory tasks in the next five years. All regulatory measures and their timing have been discussed in detail in the previous Chapters. These individual time plans have been compiled into an action plan for AEK for 2012 and the following four years. A detailed action plan for 2012 and 2013 has been developed, because we believe that for this period regulatory action could be dated with sufficient precision. For the period further in the future AEK tried at least tentatively to locate all foreseeable regulatory actions which were discussed in this strategy.

⁵⁴ See: BEREC: A framework for Quality of Service in the scope of Net Neutrality, BoR (11) 53

7 REFERENCES

1. Ahlertsen Krister: Essentials of Microeconomics, chapter 10; downloadable from bookboon.com.
2. BEREC (2010a): BEREC Common Statement on Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues, BoR (10) 24 Rev1, Riga, June 2010.
3. BEREC (2010b): Consultation Report to the Common Statement "Next Generation Networks Future Charging Mechanisms / Long Term Termination issues", BoR (10) 24b.
4. BEREC (2011a): BEREC Report on the Implementation on the NGA Recommendation, BoR (11) 43, Riga, October 2011.
5. BEREC (2011b): BEREC: A framework for Quality of Service in the scope of Net Neutrality, BoR (11) 53.
6. BEREC-RSPG (2011): BEREC-RSPG report on infrastructure and spectrum sharing in mobile/wireless networks, BoR (11) 26 – RSPG11—374, 16.06.2011.
7. DeGraba (2000): Bill and Keep at the Central Office as efficient interconnection regime, OPP Working Document Series, No. 33, FCC, December 2000.
8. ERG (2008): ERG Common Statement on Regulatory Principles of IP-IC/NGN Core, ERG (08) 26 final NGN IP-IC CS 081016, Brussels, 2008.
9. ERG (2009) Draft CP on NGN Future charging mechanisms / Long term termination issues, ERG (09) 34.
10. ERG(2008) Supplementary Document to the ERG Common Statement on Regulatory Principles of IP-IC / NGN Core – A work program towards a Common Position, ERG (08) 26b final NGN IP-IC CS sup doc 081016, Brussels, 2008.
11. European Commission (2005): Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions "i2010 – A European Information Society for growth and employment", SEC(2005) 717, COM(2005) 229 final, Brussels, 01.06.2005.
12. European Commission (2009): Commission Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU; C(2009) 3359 final.
13. European Commission (2010a): Commission Decision of 6 May 2010 on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union (notified under document C(2010) 2923) (Text with EEA relevance) (2010/267/EU), Official Journal of the European Communities L 117/95.
14. European Commission (2010b): Commission Recommendation of 20 September 2010 on Regulated Access to Next Generation Access Networks (NGA), Official Journal of the European Union, (2010/572/EU), L 251/35, Brussels, 20.09.2010.
15. European Commission (2010c): Commission Staff Working Document Accompanying document to the Commission Recommendation on Regulated Access to Next Generation Access Networks (NGA), (Text with EEA relevance), C(2010) 6223, SEC(2010) 1037 final, Brussels, 20.09.2010.

16. European Commission (2010d): Communication From the Commission Europe 2020 A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final. Brussels, 03.03.2010.
17. European Commission (2010e): Communication from the commission: Europe 2020; A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final, Brussels, 3.3.2010.
18. European Commission (2010e): Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, European Broadband: investing in digitally driven growth, COM(2010) 472 final, Brussels, 20.09.2010.
19. European Commission (2011): 15th Implementation Report, 2nd Working Document, European Commission.
20. European Commission (2011a): Commission Communication (2011/C 11/01) on Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements, Official Journal of the European Communities, Brussels, 14.01.2011.
21. European Commission DG COMP (2010): Case No COMP/M.5650 – T-MOBILE/ ORANGE Notification of 11/01/2010 pursuant to Article 4 of Council Regulation No 139/20041.
22. European Court of Justice (2009): Judgment of the Court (Fourth Chamber) of 3 December 2009 — European Commission v Federal Republic of Germany (Case C-424/07).
23. European Court of Justice: Case T-328/03 – O2 v EC, Luxembourg.
24. European Union (2011): Regional Policy; Guide to broadband investment, Brussels, September 2011.
25. European Union(2002): Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services (Authorisation Directive), Official Journal of the European Communities, L 108/21, 24.04.2002.
26. European Union(2009): Directive 2009/114/EC of the European Parliament and of the Council of 16 September 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community, Official Journal of the European Communities L 274/25, 20.10.2009.
27. Federal Communications Commission (2009): National Broadband Plan, Chapter 8: Availability, p8, Washington D.C.
28. Federal Communications Commission (2009): National Broadband Plan, Executive Summary p XIII, Washington.
29. http://www.t-home.mk/mk/144/Internet/Optic_paketi.html
30. IEEE (2009): 802.16-2009 – IEEE Standard for Local and metropolitan area networks Part 16: Air Interface for Broadband Wireless Access Systems, 2009.
31. Ingo Vogelsang (2006): Abrechnungssysteme und Zusammenschaltungsregime aus ökonomischer Sicht, Studie für die Bundesnetzagentur (BNetzA), 2006.
32. IRAC (2011): AEK Assessment Report (2011), IRAC Est.; 13.12.2011, Vaduz, FL.
33. ONE coverage, see: <http://www.one.mk/en/default.aspx?SectionID=96>

34. Republic of Macedonia (2005): Electronic Communication Law.
35. Republic of Macedonia, Ministry of Transport and Communications (2009): Broadband Nation; National Strategy for Development of the Next Generation Broadband Internet with an Action Plan (Ministry of Transport and Communications), Draft 2009.
36. Republic of Macedonia, Ministry of Transport and Communications (2007): National strategy for the development of electronic communications with information technologies, Strategic Directions.
37. REŠENIE AEK broj 08-57/2, Skopje, 13.01.2012.
38. RTR (2011): RTR Telekom Monitor, Vienna, March 2011.
39. T-Mobile coverage, see: <http://www.t-mobile.mk/public/map-of-coverage.nspx>
40. Tobias Kretschmer (2011): First-Mover Advantages in the Mobile Phone Industry: A Consumer-Centric Perspective (with Michal Grajek, ESMT Berlin and JP Eggers, NYU Stern); Aktuelle Fragen zur Regulierung von Energie- und Telekommunikationsmärkten, WU Wien, 14/01/2011.
41. Извештај за развојот на пазарот на електронски комуникации во првиот квартал од 2011 година, page 5.
42. План за намена на радиофреквенциските опсежи во Република Македонија, Note M39, AEK, September 2011.