

IRAC

INTERNATIONAL REGULATORY AFFAIRS CONSULTING

Recommendations for a Five year strategy of AEK

Draft

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1 VISION AND FUNDAMENTAL STRATEGIC APPROACH

1.1 Introduction

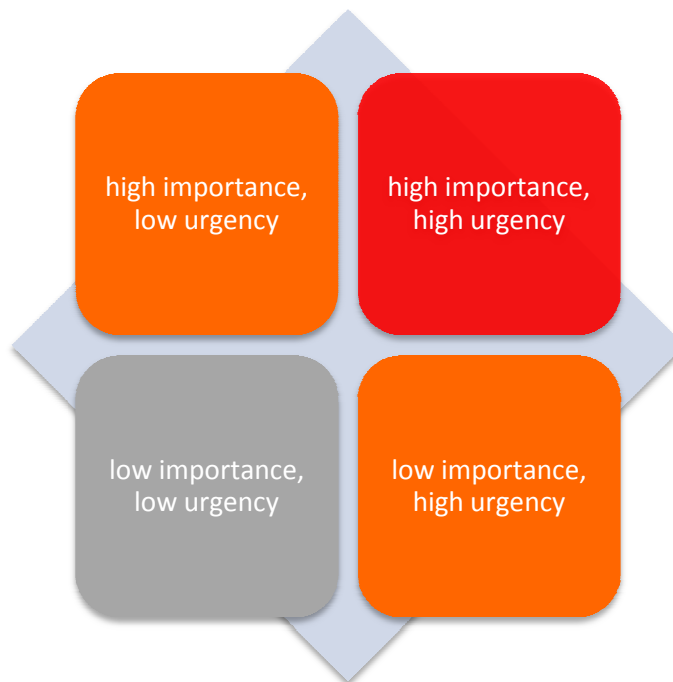
Strategies serve as guidelines for actions. The regulatory strategy of AEK contains the guidelines for their regulatory actions. The regulatory strategy is directed to AEK herself by specifying how AEK should behave as regulator. At the same time the strategy is providing information to the public, which 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.

As already described in our Inception Report, a regulatory strategy “*can be regarded as a series of contingent decisions for each step in the process. Contingent means dependent on the state of the market and the behaviour of the market parties.*”

There must be an objective function to evaluate the decisions, which are taken at each step of the decision tree. We suggest for the problem at hand to use social welfare as defined as the sum of consumer rent and producer rent as objective function. We know that there is no reasonable way to give exact estimates for the impacts of individual decisions of the NRA on social welfare, but we can make estimates of the order of the welfare effects of regulatory decisions.

We will be using a very crude classification for this purpose. Individual regulatory decisions will be classified by their importance, as 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

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 leads then 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 our general “vision” for the strategy and a general consideration of topics covered. In a further chapter we will describe the state of competition on the Macedonian electronic communications markets before we introduce our suggestions for the strategy of AEK on fixed and mobile communications markets in separate chapters.

In a further chapter our suggestions are evaluated using our importance-urgency scheme and a time frame for individual elements is given.

In Chapter 6 Summary of AEK action plan from 2012 to 2016, the strategic elements are broken down into an implementation plan (“action plan”), estimates for financial and human resources for implementing the strategy are given. The degree of detail of the action plan will be decreasing with progressing time, since uncertainty is increasing over time.

1.2 Vision

Any strategy ultimately should serve a well-defined purpose, or in other words, any strategy should have a “vision”. We have studied the relevant strategic documents of the Ministry of Transportation and Communication and the basic documents of the European Commission and the European Council and Parliament and we try to express the basic intentions of these documents. They 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. We take them as defining next generation networks (NGA) as the dominant strategic goal for the activities of AEK for the next five years.

We interpret these statements in the light of i2010¹ and EU 2020². These EU strategy documents highlight amongst others the crucial importance of broadband communications for productivity, job creation, and social inclusion.

Taking all that together, we think that the vision goal of the regulatory strategy of AEK in 2012—2016 should be to:

by appropriate regulation and other activities the support 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.***

Our 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.

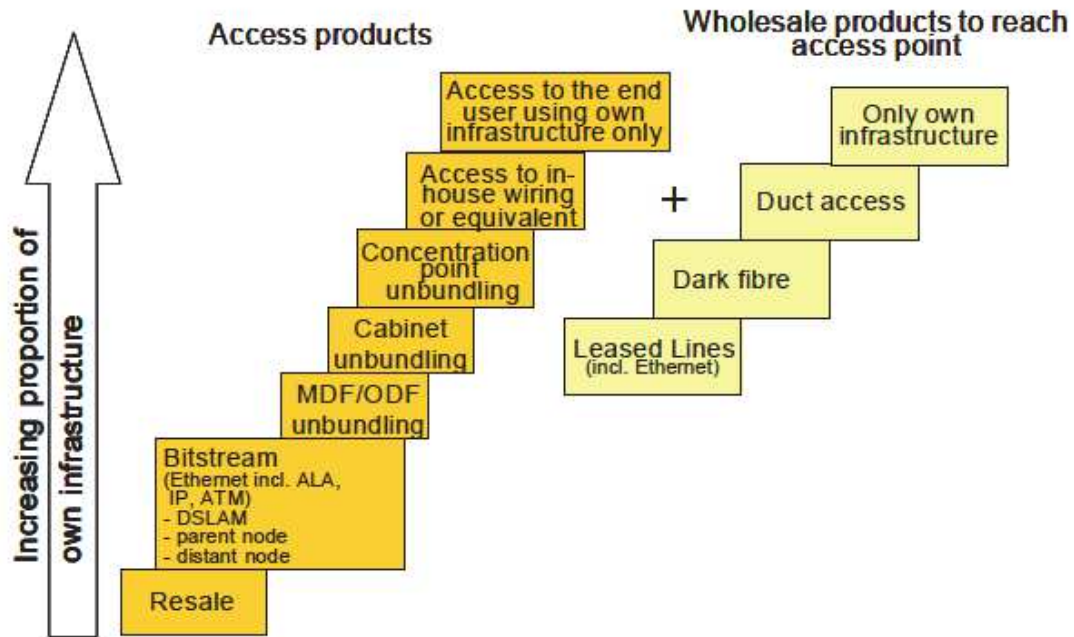
The regulatory strategy for fixed networks is based on the economic concept of the ladder of investment. In the past the concept of the ladder of investment has already been implemented in the EU Member States for the development of competition on voice and broadband access markets. As explicitly mentioned in the Commission Staff Working Document³ explaining, the reasoning for the Commission Recommendation on NGA Networks⁴ is based on this concept. For the purpose of developing a regulatory strategy for NGA networks, the 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.

¹ 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.

² Communication From the Commission Europe 2020 A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final. Brussels, 03.03.2010.

³ Commission Staff Working Document Accompanying document to the Commission Recommendation on Regulated Access to Next Generation Access Networks (NGA)

⁴ 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

We are convinced 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 we strongly recommend to 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 availability of frequency spectrum of the Digital Dividend for mobile services 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 refarming⁵ 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.

The strategy has to use the status of regulation in Macedonia as its starting point. As we already have shown in the Assessment Report and will be showing in Chapter 0: .

State of competition on the markets for electronic communications in Macedonia, there is a body of regulation in force that has to be amended to allow for climbing the traditional and *a fortiori* to climb the amended ladder of investment. Rebalancing of access and call prices in voice telephony as well as review of fixed and mobile termination rates will be of crucial importance.

⁵ 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.

1.3 Structure of the medium term regulatory strategy 2012—2016

The regulatory strategy which we are proposing needs as a first step the amendment of existing decisions to eliminate existing distortions in the electronic communications markets. Chapter 0: .

State of competition on the markets for electronic communications in Macedonia, will be dealing with this issue. We will in detail analyse the state of competition and explain distortions in the markets. 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 medium term strategy for 2012—2016 will be developed. The issues connected with the medium term strategies for fixed and mobile networks will be discussed in separate Chapters 3 and 3.4.1.

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 analysed:

Retail markets for calls and messages in mobile networks

Retail broadband access market

The most notable omissions 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 evaluation of the effectiveness 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

Report⁶ 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

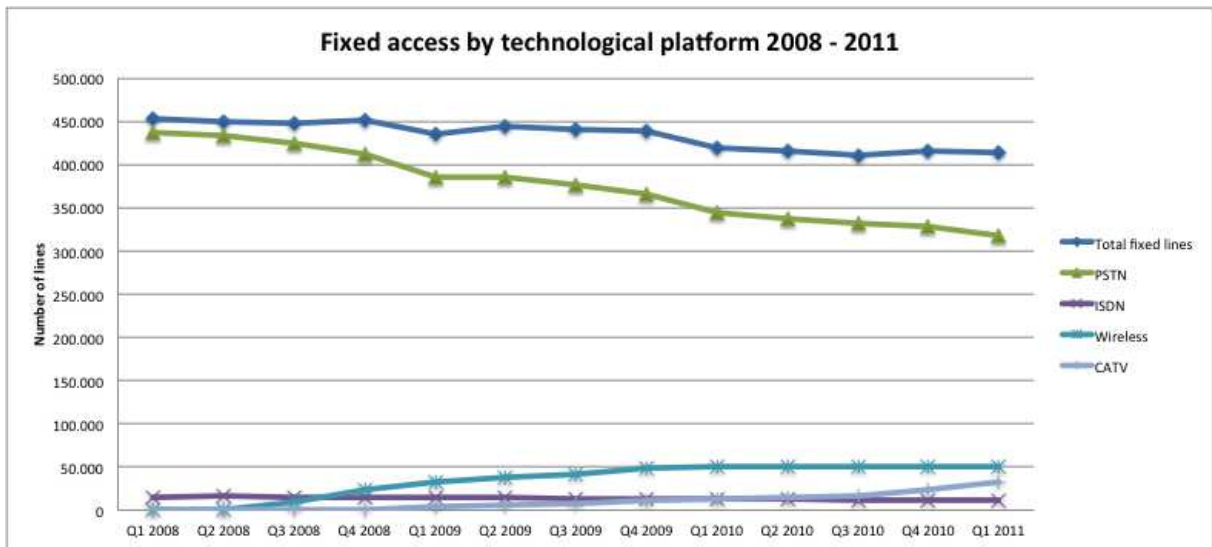
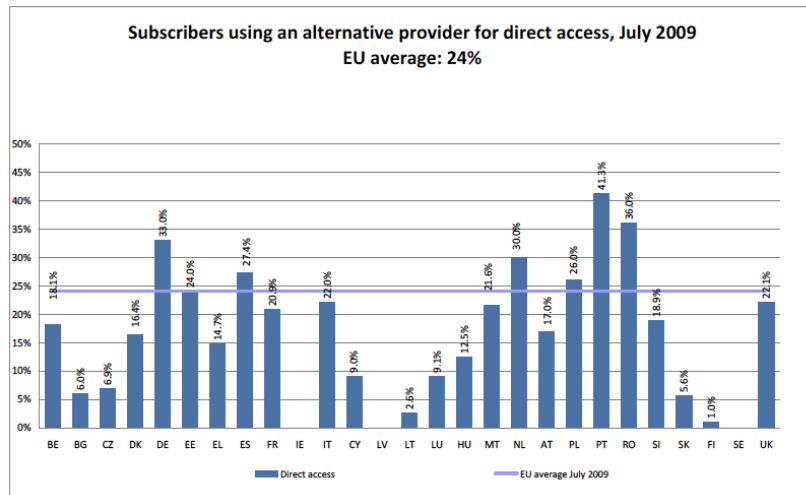


Diagram 2-1 shows the development of fixed retail access in Macedonia since Q1 2008. The total number of lines giving access to the public telephony network dropped by 30.000 lines during the observation period, the number of PSTN lines has been dropping by 120.000. On the other hand – a country specific 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. This picture is familiar to almost all telecommunications markets in the EU, showing the competitive situation between fixed and mobile communication networks. According to the 15th Implementation Report⁷ the average percentage of customers using an alternative operator is approximately 24 %. This includes all technological access platforms to the fixed public telephony network.

⁶ Извештај за развојот на пазарот на електронски комуникации во првиот квартал од 2011 година, page 5

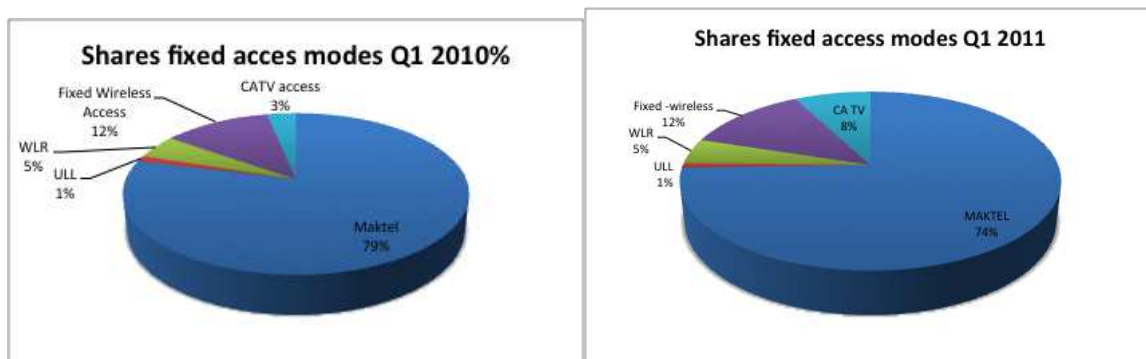
⁷ See: 15th Implementation Report, 2nd Working Document, p46

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 access⁸, which is normally not present in EU Countries and the negligible share of unbundled lines of 1 % of all access lines. Fixed wireless access can be seen as an access mode, which is predominantly used in areas with low population density and is somehow complementary to standard PSTN access. This leaves WLR, ULL and CATV as access modes of ANOs, which have increased in total from 9 % in 2010 to 14 % in 2011. The shares of fixed wireless access, WLR and ULL are stable, whereas there is a steady increase of access lines provided by CATV operators. The incumbent operator MT and some alternative operators offer multiple play bundles including digital/analogue TV, HD TV channels, fixed telephony and Internet access. The share of WLR (indirect) access has been stable at around 19.000 lines. According to internal statistics of AEK this access mode is primarily used by two alternative operators, ONE and On-net⁹, which offer a bundle of voice and Internet (based on L4 Bitstream) to their customers.

⁸ Fixed GSM access is offered by One, a subsidiary of Telekom Slovenija based on a license for fixed wireless access in the GSM band.

⁹ On-net has been bought by One in 2011

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. 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 as described in our Assessment Report. 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 adequate 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, one can find these elements of the ladder of investment in the regulatory approach of AEK. In several decisions, the regulator has imposed the obligation on MT to implement CS and CPS, WLR and ULL. Unfortunately, the rebalancing of retail access prices and retail prices for local calls has not yet been completed.

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 cost oriented and well below costs of providing retail access. In contrast to the retail price, the wholesale price for the monthly fee of an unbundled local loop of 332 MKD is based on an LRIC calculation. The price of WLR of 279 MKD 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 rates¹⁰ 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. Alternative operators have no incentive to invest into own access infrastructure or into unbundling infrastructure and into backhaul and backbone infrastructure. Equally, the incumbent operator has no incentive to invest into access infrastructure, be it copper or fibre, since the end user 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 addition this situation tends to slow down the development of NGA networks.

It must be noted here that a retail access price, which is below cost not only distorts intra-platform competition, but also distorts inter-platform competition. A too low access price to the public telephony system offered by classical telecom operators deteriorates the business case for all other access technologies, since operators using these alternative access technologies have to compete with this distorted access price. This is true for traditional access through copper, coaxial (CATV), fibre (NGA) and wireless access.

¹⁰ In addition, co-location and upfront payments for installation of interconnection links etc., have to be considered.

Using the terminology of the “ladder of investment” theory, there is an urgent need to rebalance the retail access price to allow competitors to leave the lowest rung of the investment ladder, which is basically resale of services.

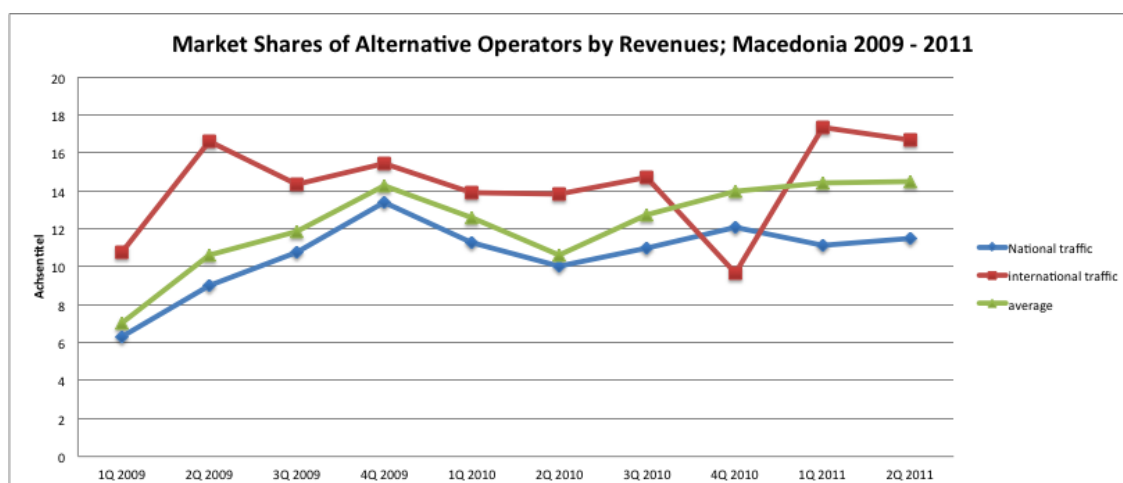
2.3 Fixed networks: wholesale and retail call markets

The 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 by AEK 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. 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 engineering model underlying the Deloitte Zagreb model incorporates a Forward Looking¹¹ Bottom Up Long Run Incremental Cost+ (BULRIC+) approach to calculate interconnection costs. Since the approach allows for 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. As already pointed out in our Assessment Report, this approach is not in line with the EC Recommendation¹² on fixed and mobile termination, which advocates a “pure” LRIC methodology.

Together with AEK’s decisions on CS, CPS, WLR and ULL there is a 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

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



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

¹¹ 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.

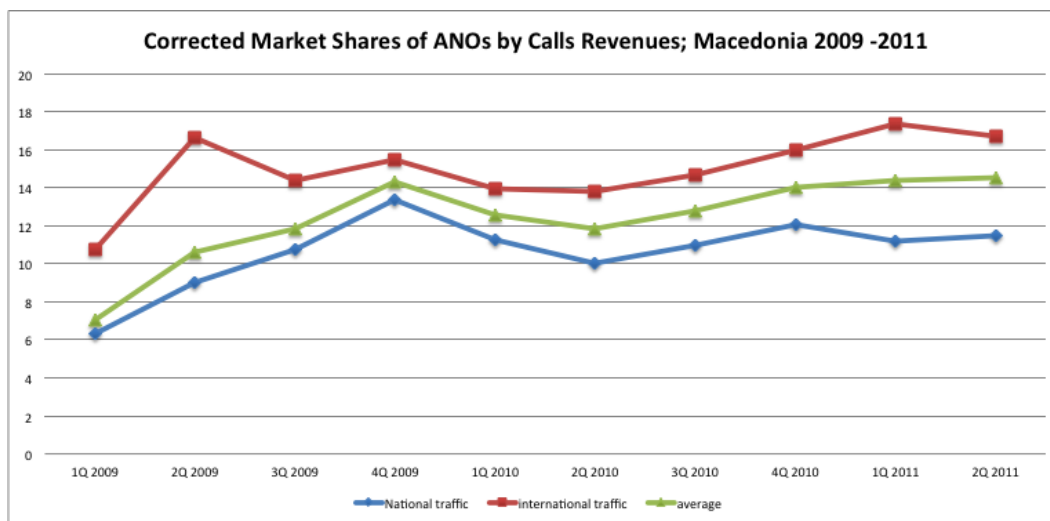
¹² Commission Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU; C(2009) 3359 final.

The development of ANO's market share in 2008 cannot be shown in an accurate way, due to a lack of consistent data. 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. According to AEK the average figures 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. Also the market share is slightly increasing; 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 the existing retail and wholesale regulation of fixed networks. The crucial elements here are the not yet rebalanced retail access and local calls retail prices. The extremely low local access price 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, 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 rebalanced retail prices for local calls and the comparably high fixed termination rates. As we have shown in the Assessment Report, p 29, in some cases there is a high probability of a margin squeeze created by too low retail 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. There is in addition 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 by smaller operators.

Since CATV operators have no out payments for call origination and very low cost for originating calls in their own networks¹³, 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 termination are regulated by AEK. In addition to the regulation of wholesale services the market entry into mobile markets is restricted by regulatory decisions. In many countries these decisions are driven by the scarcity of available radio spectrum. The market situation in Macedonia is characterized by the existence of three mobile operators:

- 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 endowments¹⁴. T-Mobile and ONE cover a very high percentage¹⁵ 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.

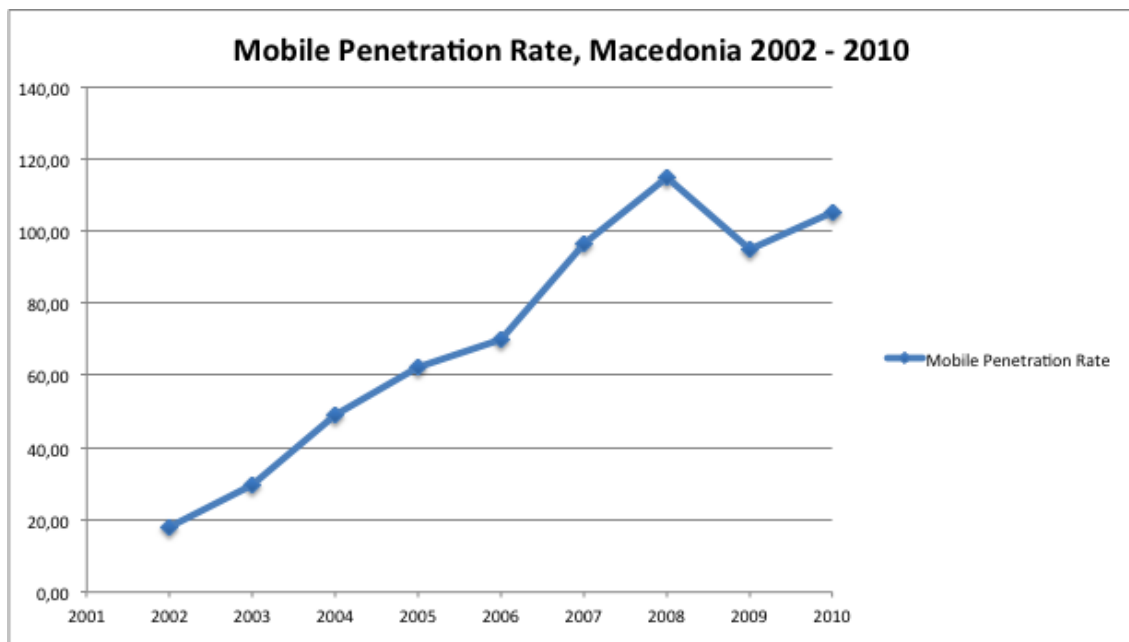
The Macedonian mobile market is well developed, penetration rates oscillate around 100 % in the last years (see: Diagram 2-6: Mobile penetration Rate, Macedonia 2002 – 2010).

¹³ CATV operators typically use VoIP technology for call conveyance in their networks, which consumes significantly less resources than PSTN technology.

¹⁴ See IRAC Est.(2011): Assessment Report, pp34

¹⁵ T-Mobile coverage, see: <http://www.t-mobile.mk/public/map-of-coverage.nsp>
ONE coverage, see: <http://www.one.mk/en/default.aspx?SectionID=96>

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



Source: AEK

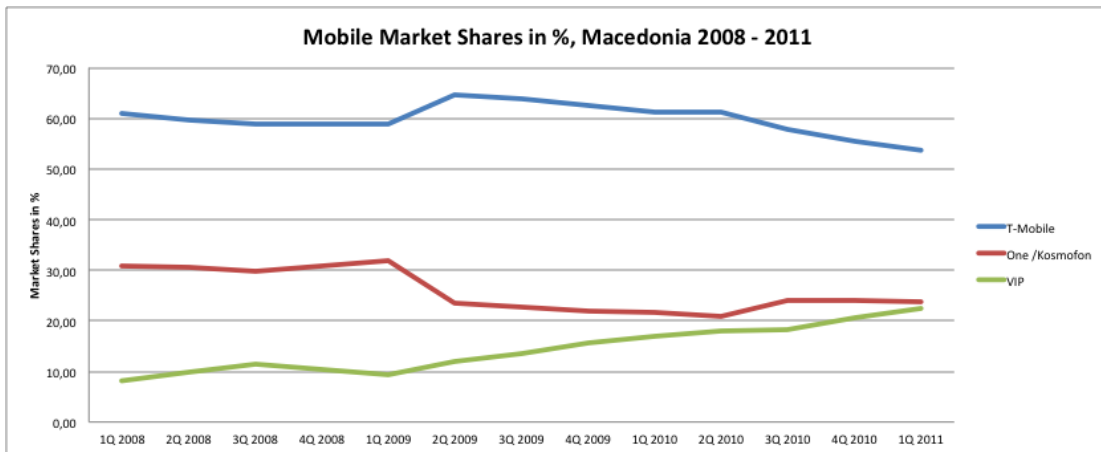
There is some ambiguity in these figures; in particular the “kink” from 2008 to 2009 can only be explained by changes in measurement methods¹⁶. Furthermore, all data for the Years 2002 to 2007 are actually values from January of the following year, whereas 2008 following are values from end of Q4 of the respective years.

The state of competition can *inter alia* be shown by market shares (expressed in % of active SIM cards) of the three operators. Data for earlier years than 2008 are not available. The development 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 taken together hold a smaller market share than as the incumbent operator. Econometric literature¹⁷ suggests that first mover advantages are present in mobile communications and show significant persistence. These findings offer a good explanation

¹⁶ 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.

¹⁷ 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

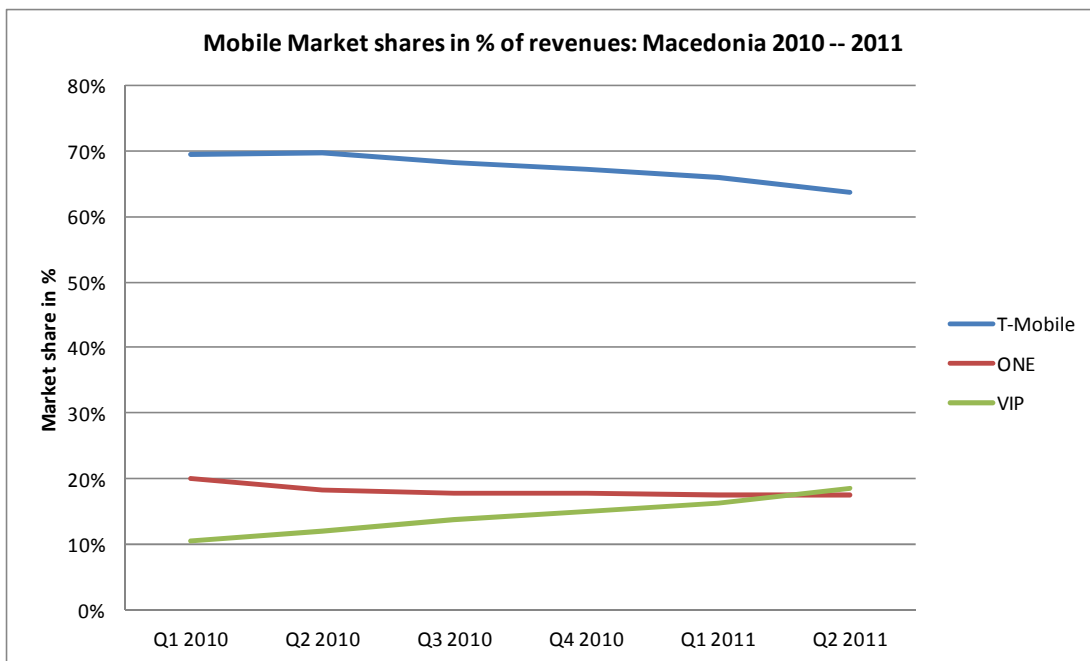
Diagram 2-7: Mobile Market Shares in %, Macedonia 2008 – 2011



Source: AEK

for the high market share of the incumbent 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



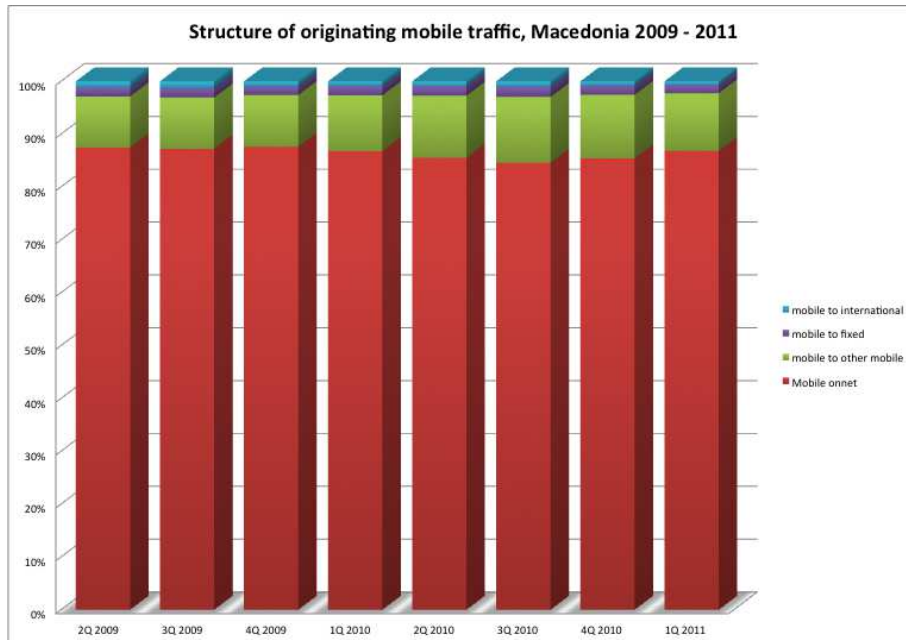
Source: AEK

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 part of its voice services and all of its mobile broadband data services over T-Mobile's network. Applying the usual criteria as market share, development of market shares, interrelations between operators, financial situation etc. indicates 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 4.2.2 Competitive safeguards in our description of a possible strategy for the mobile markets.

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 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 point towards a further possible market distortion of cross subsidisation of on-net traffic from other revenue sources, primarily from termination revenues from fixed networks and from international incoming traffic revenues. Although the recent AEK decisions on MTRs significantly reduce the potential for cross-subsidization, 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 mobile termination markets 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 Commission¹⁸. This Recommendation promotes a “pure” LRIC methodology for the calculation of termination rates. The reasoning uses standard microeconomics to show that a profit maximizing

¹⁸ Commission Recommendation of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU; C(2009) 3359 final

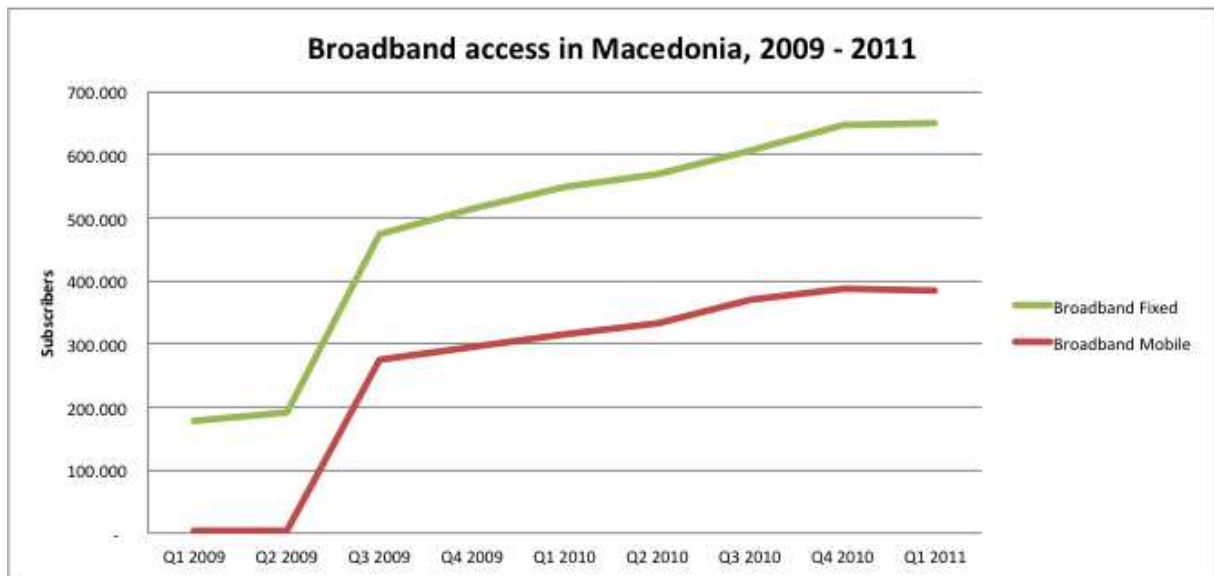
firm running an existing business will be offering a new service (in this case: termination of calls from other networks) if the incremental revenues earned by offering this service are at least as high as the incremental cost of this new service. Under competitive conditions, termination prices will 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, which are to some extent a result of the SMP position of each mobile network operator. This leads to a situation, where the cross subsidization of on-net calls can no longer be financed 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 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 price. In addition, all the inefficiencies, as multiple mobile phones and multiple numbers etc., created by artificially separated network user groups as multiple mobile phones and multiple numbers etc will be discarded as too costly. Finally, “pure” LRIC MTRs are a strong incentive to run efficient networks and consumer decisions are no longer heavily influenced by the relative size of mobile network operators 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.

2.7 Broadband wholesale and retail markets

Internet usage started to boom worldwide after the introduction of broadband access, which effectively replaced narrowband, dial-in Internet access. 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.

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

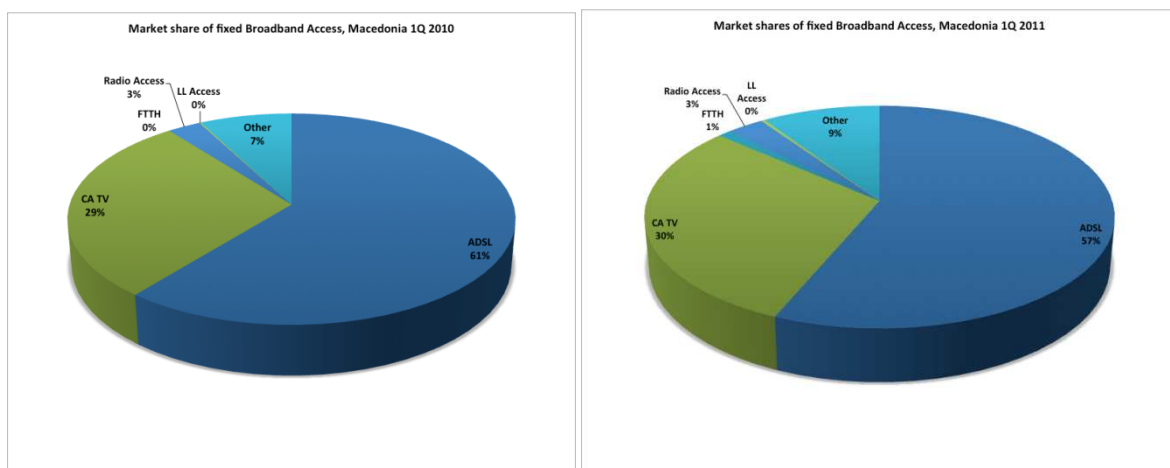


2.7.1 Fixed Broadband Access

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,...), which together have increased their compound market share by 4 % points in a growing market.

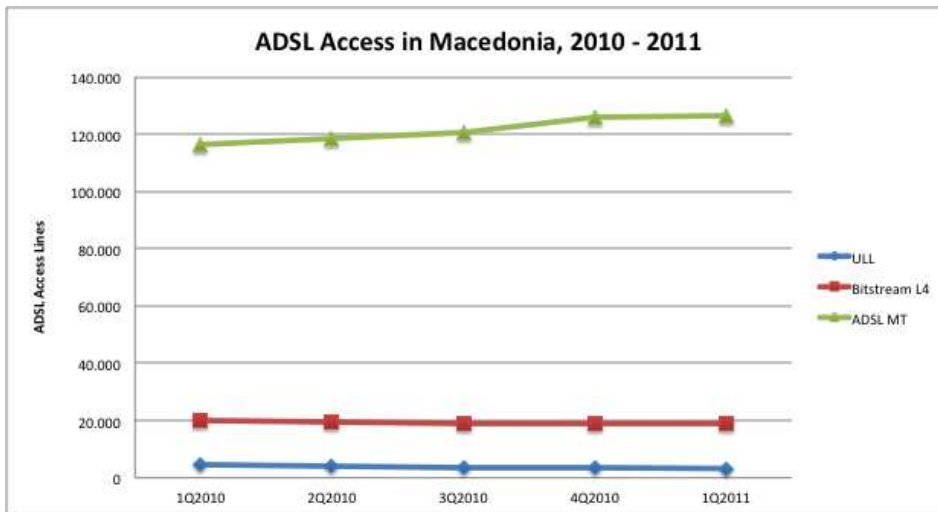
Diagram 2-11: Market Shares of Fixed Broadband Access, Macedonia 2010, 2011



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 has not yet been rebalanced and is not consistent with the cost oriented price for ULLs. As we have shown in our 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 ULL Market 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

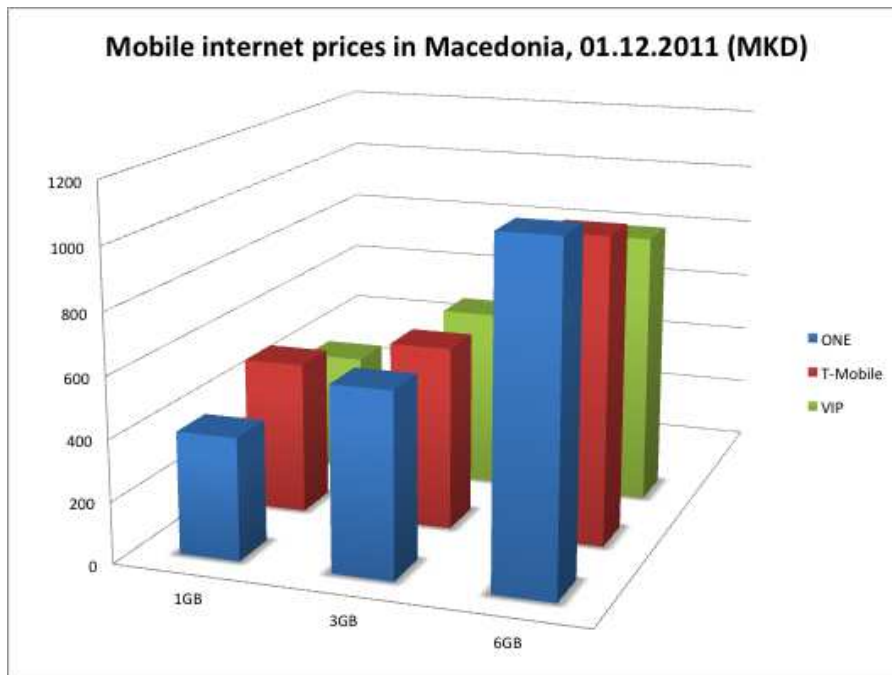
Our data on broadband access in Macedonia is covering fixed and mobile access, although in many countries these are considered as separate retail markets. The number of mobile broadband subscribers seems to be grossly overstated and has to be taken with caution. All subscribers of data services are counted 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. VIP¹⁹ offers their services on the basis of national roaming on T-Mobile’s network. The actual 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

¹⁹ VIP has not acquired 3G frequencies in the past.

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 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 – amongst other goals – 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 a strategy for AEK since they create obstacles to competition and prevent efficient investment. The most important issues are:

- Rebalancing of retail access prices
 - Developing cost models, which allow end user price regulation
- Rebalancing of local retail calls prices
 - Developing cost models, which allow end user price regulation
- 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

2.8.1 Rebalancing

It is economic common sense that price distortions always decrease social welfare. Unfortunately, the correction of “wrong” prices will lead in the short run to an increase of the retail end user access fee (monthly rental) and of the retail price for local calls. On the other hand, 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. The price increases triggered by rebalancing are in most countries not highly welcome by the public and by policy makers, whereas price reductions are taken as a given and are not accounted as a benefit of rebalancing. Unfortunately, policy makers and the public tend to overlook the medium term and long term advantages of these regulatory decisions. Rebalanced access prices and rebalanced local call prices allow a level playing field on the wholesale and retail access and calls markets. ANO’s 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. The un-rebalanced access price acts like a brake on the implementation of newer access technologies and therefore restricts innovation and investment and as a consequence reduces social welfare. The rebalancing of retail access and calls prices should be based on a cost oriented approach.

High and positive long-term effects have to be expected 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 un-rebalanced retail access to the public telephony network, which is one of the most important access modes. In addition and most importantly, rebalancing the 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 broadband access (LTE), which has to compete with too low access prices for comparable speeds in wire-bound networks.

2.8.2 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 2.8.1 Rebalancing, the retail monthly rental for access to the public telecommunication network is definitely not a competitive price and does therefore not reflect costs of access to the public telecommunication network. This implies that the WLR, which is derived by

subtracting 30 % from the retail monthly rental, cannot properly reflect costs of access. 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”. We do not advocate a special version of calculating it (efficient alternative operator or incumbent), but we strongly recommend basing the CPs on a cost study. The ongoing attempts of AEK with regard 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 best solution would be to replace the used “Retail Minus” methodology by a proper cost based modelling approach.

2.8.3 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 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 LRAIC 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 procedure is not in line with the reasoning of the relevant European Commission Recommendation²⁰, which advocates to only taking the volumes of 3rd party origination and termination into account. Any necessary changes to the existing models should be made to allow for calculation of “pure” LRIC origination and termination rates.

In conjunction with rebalancing of retail access prices and local call prices this should create a level playing field for service operators and infrastructure-based operators.

2.8.4 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 should 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

Our considerations on the “vision” of a regulatory strategy for AEK suggest 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 creation of additional

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

models as described in Chapter 1.5. The second area deals with the regulatory framework for the implementation of NGA networks.

3.1 Amending existing regulation

Summarizing, we suggest here, that AEK continues 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 should eliminate all inconsistent retail (access, calls) and wholesale prices (WLR, Bitstream). This could be done by completing Market analysis for Markets 1 and 2 and by amending remedies decisions for Markets 7 and 8.

Saying the recalculation of fixed origination and termination rates by means of the adapted Deloitte model should 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 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 Section 3.1.9 of our Assessment Report AEK is 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+ 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 Makedonski Telekom 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 final²¹. 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 Core²². 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 we conclude that the number of PoIs (Points of Interconnections) will be gradually reduced to one single PoI for the whole of Macedonia.

The introduction of an NGN with one 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 we strongly suggest

²¹ 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.

²² ERG Common Statement on Regulatory Principles of IP-IC/NGN Core, ERG (08) 26 final NGN IP-IC CS 081016, Brussels, 2008.

to AEK to immediately commission a costing study for the introduction of IP-based interconnection. In addition we strongly suggest that parallel to the commissioning of the cost study AEK is reopening market analysis on market 4 and immediately requires an update of the existing RIO to accommodate the technology switch-over.

As a consequence of the introduction of NGN, we expect that there will be only single-tandem interconnection and that the single-tandem interconnection cost will be well below the present single-tandem interconnection cost. AEK has to investigate whether the reduction of the number of PIs is cost efficient, weighing the additional costs induced by moving up PI 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 should be some consideration about potentially sunk investments of alternative operators in the existing locations of PIs. AEK should try to calculate the financial impacts of these sunk investments.

We also expect a change of the service portfolio on the retail level. As a consequence of the reduction of the number of PIs we would expect for the future that local calls will disappear from the service portfolio.

As a consequence there will basically 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.

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

3.2.1 Welfare impacts of amending existing regulation

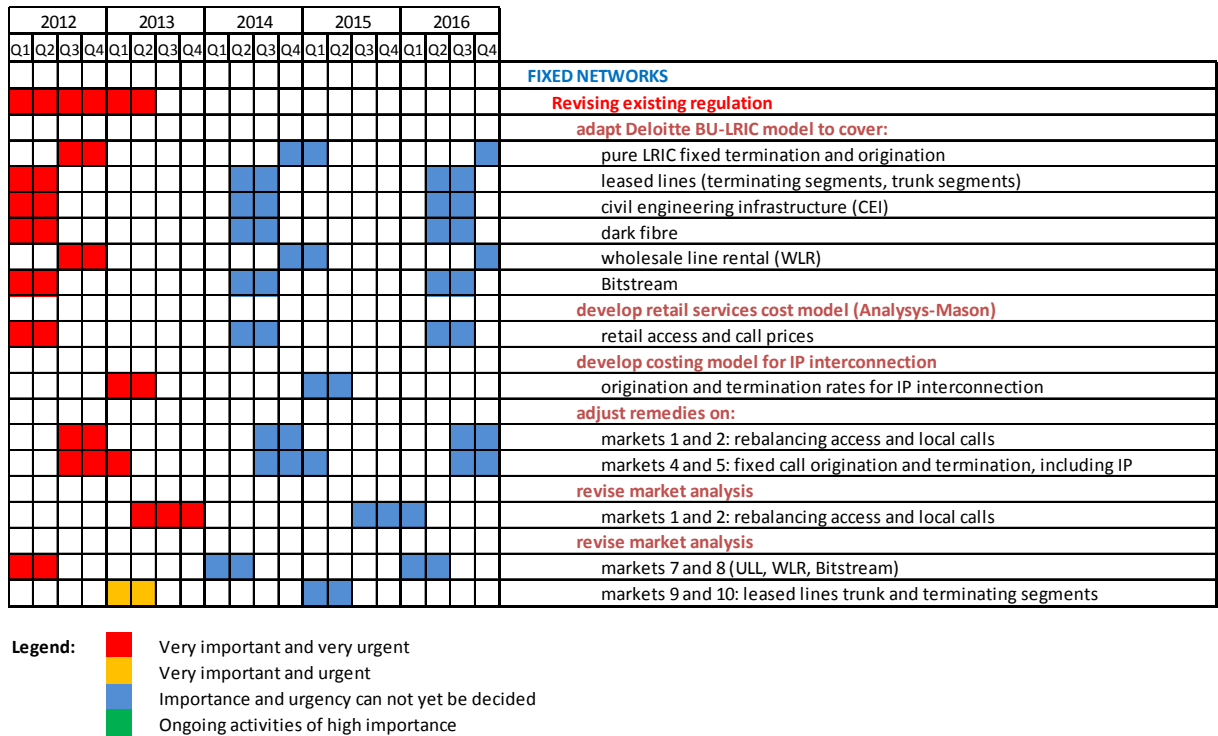
As explained in Chapter 1.1, we are classifying the expected effects along two dimensions:

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

According to this approach we believe that measure related to the rebalancing of retail access and call prices as well as the correction of the 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. We believe 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



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 should prepare to tackle the regulatory challenges of the advent of NGA networks. In the EU there have been lengthy discussions 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 should 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 networks²³ and finally ended for the moment with the European Commission NGA Recommendation²⁴.

²³ Judgment of the Court (Fourth Chamber) of 3 December 2009 — European Commission v Federal Republic of Germany (Case C-424/07)

²⁴ 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

Before entering into the discussion, we will repeat the definition of NGA provided by the EC in recital (11) of their NGA Recommendation²⁵:

"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 technological base.

The NGA Recommendation will be taken as the main source for our recommendations for AEK's fixed network strategy, since it represents the EC position and is comprehensive. We will first discuss the major provisions of the Recommendation in the following sections. 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 we will present our strategic approach for the NGA regulation in Macedonia.

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 are recommended. The Recommendation covers:

- 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

²⁵ 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

- 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 Reference Offer by complements to existing LLU Reference Offer

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:

- VDLS access can be mandated for copper sub-loops
- 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 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 tries to specify 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 mandates – again subject to the usual principles²⁶ – also 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.

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, could be exempted from regulation, by excluding them from the list of relevant markets, because there would be no SMP operators on these 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.

²⁶ cost orientation, transparency, equivalence of access

3.4 Proposed NGA strategy for AEK

The NGA Recommendation had been published by the EU Commission on 20.09.2010 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 Recommendation²⁷ 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. This does not mean that NGA will not be deployed in Macedonia. Quite the contrary, MT and cable operators are already offering high bandwidth internet connections, explicitly based on fibre optical cables²⁸. We conclude from these offers that the introduction of NGA networks is not a matter of principle but just a question of timing and we believe that significant NGA rollout can be expected to start latest in 2014.

To guarantee regulatory certainty we strongly recommend that AEK completely adopts the NGA Recommendation. The NGA Recommendation presents a comprehensive set of regulatory measures which should be implemented as a whole. We explicitly do not recommend implementing isolated pieces of the Recommendation. 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.

We recommend that – as soon as possible - AEK makes a clear statement that it will apply the provisions of the NGA Recommendation and provides 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.

Having already adapted the existing BU-LRIC+ model AEK should start to 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 should start early to 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 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

²⁷ BoR (11) 43 BEREC Report on the Implementation on the NGA Recommendation, Riga, October 2011.

²⁸ See: http://www.t-home.mk/mk/144/Internet/Optic_paketi.html

components not yet represented by asset prices. The recalculation of the WACC should be subject of a separate project to deliver a revised WACC calculation model.

We recommend to plan one year 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 should engage in the promotion of NGA networks by publicly pointing at crucial issues as information on existing CEI, building licenses and public investment²⁹ 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.

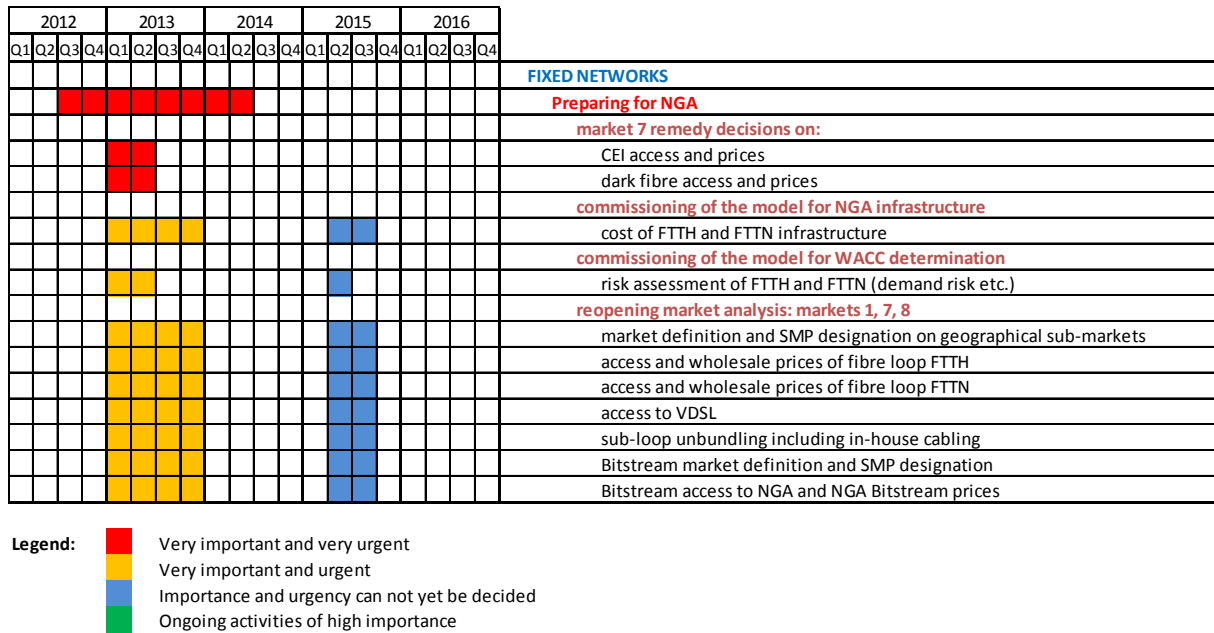
3.4.1 Welfare impacts of NGA regulation

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 growths and jobs. We agree with these statements and consider all regulatory steps necessary to promote NGA networks as highly important. On the other hand, the state of development in Macedonia does not yet allow to speak of significant NGA penetration. The figures are well below 5000, although growing. Therefore it appears to us that AEK can use the time to thoroughly prepare its regulatory actions on Markets 1, 7, and 8 in the advent of NGA networks. We therefore consider for the time being all the preparatory and regulatory just as urgent, but not as very urgent.

²⁹ See: European Union, Regional Policy; Guide to broadband investment, Brussels, September 2011.

3.4.2 Action plan for NGA

Diagram 3-2: Action plan for NGA



4 MOBILE NETWORKS STRATEGY

Our vision of a regulatory strategy for AEK 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 major topic is dealing with questions of refarming and infrastructure and frequency sharing.

4.1 Amendment of existing regulation of mobile termination rates

As already described in Chapter 2.8.4, we strongly recommend updating the existing BU-LRIC + modelling for mobile termination rates to allow for "pure LRIC" calculations of mobile termination and origination rates.

Results of a model upgrade should be used for adjusting the existing glide path³⁰ 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.

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

Taking into account that 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 mobile termination rates for voice and SMS will lead to lower prices of these

³⁰ See our Assessment Report, pp.25

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 we believe that these changes should be introduced as soon as possible since the glide paths 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

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																			
Revising existing regulation																			
adapt Deloitte BU-LRIC+ model to cover pure LRIC for:																			
mobile voice and SMS termination and origination																			
revise remedies decision																			
markets 11 and 12: mobile access and origination, termination																			
markets for SMS origination and termination																			
open market analysis																			
market 11: mobile access and origination																			

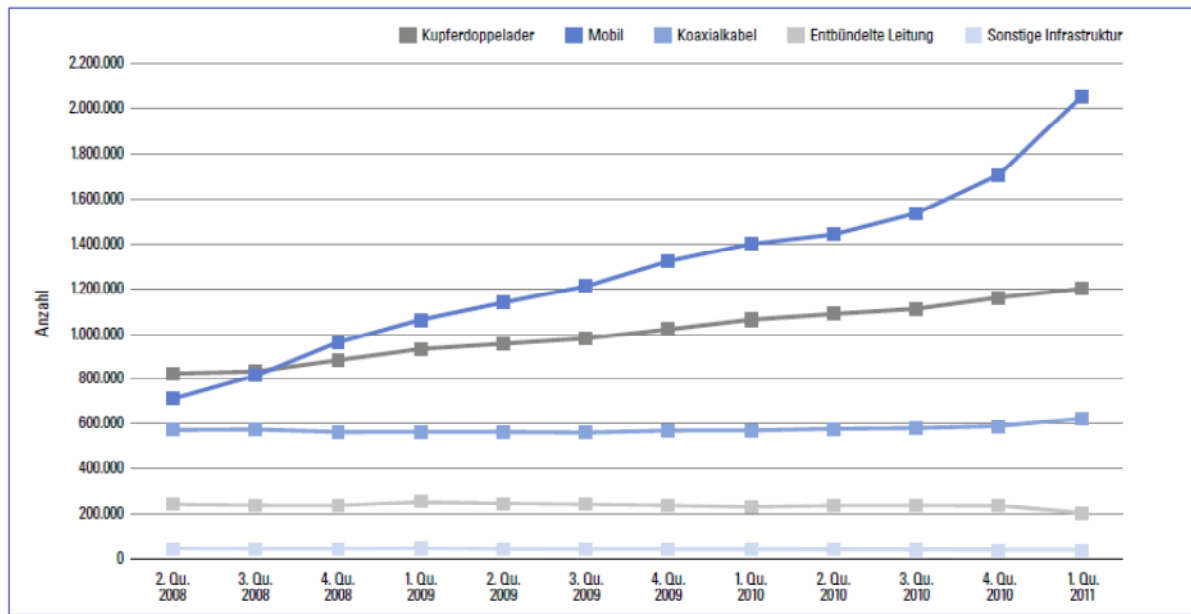
Legend:

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

4.2 Introducing fast mobile broadband

We are 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.

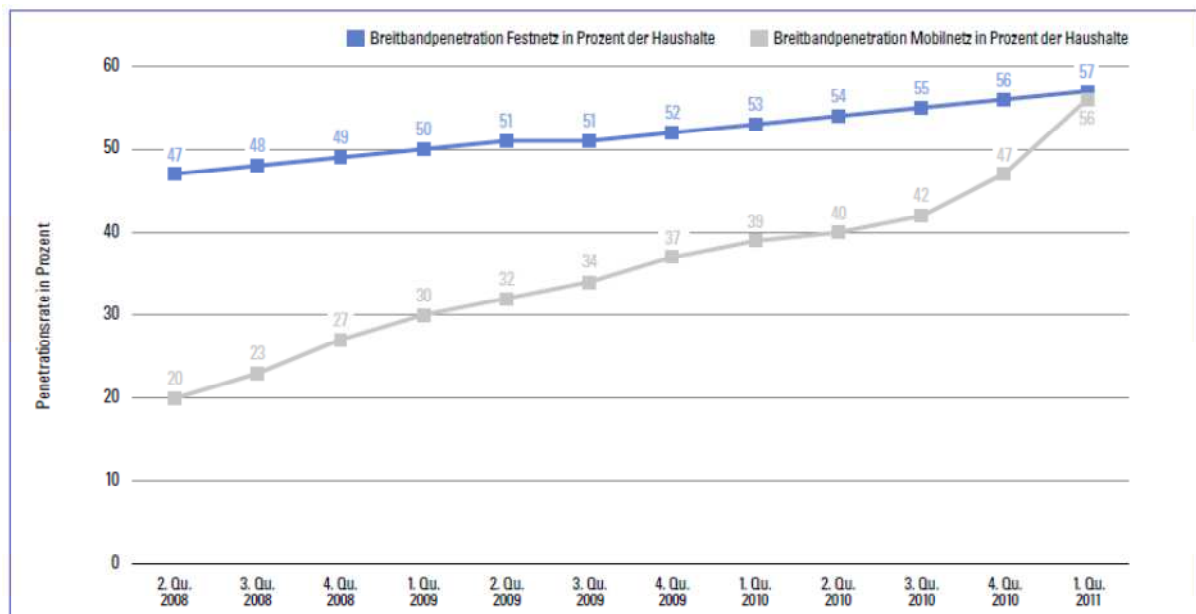
Diagram 4-2: Broadband access in Austria in number of lines



Source: RTR Telekom Monitor 2011

As seen from Diagram 4-2 and Diagram 4-3, the number of mobile broadband accesses in Austria³¹ (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

³¹ 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 most 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, which 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 % market share of T-Mobile moved to the two competitors. If one of these two competitors would be failing or leaving the market, the Macedonian mobile end-user market would have the structure of an asymmetric duopoly. 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

Our strategy tries to reconcile the existing asymmetric market situation, including existing imbalances in frequency allocations with the growth potential of high speed mobile broadband. We suggest a strategy which uses competitive safeguards against attempts of collusive behaviour and / or re-monopolisation of the mobile market in combination with a level playing field for all operators with regards to frequency allocations.

4.2.2 Competitive safeguards

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 (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*. We suggest that AEK makes a reservation of a complete set of frequencies which allow a new mobile operator to enter the market with a similar frequency endowment as the existing operator. We know 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 interfere with the existing market situation since there is still a significant amount of unused spectrum available. Should one or both of the smaller operators fail on the market, 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.

In a situation where operators command over enough frequency resources to carry the whole market demand on their networks, the probability of collusive behaviour is low, since each operator can significantly increase its traffic and revenues by making better offers to the consumers. At the same time attempts to re-monopolise have a good chance to be successful, because the largest operator would have enough spare capacity to carry the whole traffic of the market on his network at decreasing average unit costs.

With exponentially increasing demand for data traffic existing operators will have higher capacity utilisation of their frequency resources, which leads to a higher potential of collusion and to lower potential of re-monopolisation. In both cases the proposed competitive safeguards will be acting against increased concentration the market either by collusion or by take-overs.

Based on the data from the AEK web page 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.

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 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 enough frequency capacity for expansion of existing operators.

4.2.3 Efficient use of frequencies and level playing field

Frequency allocations are made under the provision of the effective and efficient frequency usage³². In the Macedonian situation there are some doubts that all frequency spectrum allocated to mobile

³² 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), Annex B.3.

operators is actually in efficient use³³ or will be put in efficient use in the near future. AEK should review the efficiency of frequency usage of all mobile operators including expected frequency usage for the following three years.

A level playing field with regard to frequency allocations would require a review of the efficient use of allocated frequency spectrum. Hoarding of unused frequency spectrum or inefficient use of frequencies is anti-competitive and precludes the use of this spectrum by other mobile operators and therefore constitutes a violation of the provisions of the Authorisation Directive³⁴, which require efficient frequency use and allow Member States to revoke the exclusive rights for usage of the frequencies. By transposition of the Authorisation Directive, AEK is empowered to amend existing authorisations in the case of inefficient use of frequencies as specified in Art. 72 of the Electronic Communications Act 2005.

Equal access to frequencies constitutes the next important step towards a level playing field in mobile communications markets. In practice, this means that it is not the actual frequency allocation which counts, but it is the equal right to acquire authorisations for exclusive use of frequencies. This means the goal of the regulator is not to establish an equal distribution of frequencies for existing mobile operators. The regulator should rather strive to establish procedures, which allow flexible reaction to demand for frequencies. This should be done by allocation procedures which guarantee efficient use of frequencies and by suitable rules for secondary frequency trading.

As already observed in our assessment report the license periods of mobile operators in Macedonia are significantly different. To avoid imbalances AEK should use its power to create a level playing field with regards to license periods.

We expect that replacing the existing allocation procedure (beauty contest) by appropriate auction designs will contribute significantly to a level playing field. 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.

We suggest proceeding 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 should be a permanent task of AEK.
- Step 2: Periodical initiation of new frequency allocation procedures for existing and potential new mobile network operators. Allocation should be based on auctions to ensure efficiency of frequency usage. Frequencies should be auctioned in a simultaneous procedure covering the reserved frequencies for new operators and frequencies for enlarging the existing allocations if needed. These procedures should include the 800 MHz frequency band. A more detailed recommendation for the auction design would by far exceed the scope of this exercise.

³³ 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 2x5MHz frequency blocks in FDD and 1x5MHz frequency block in TDD upon request of ONE.

³⁴ 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

The timing of both steps is critical. According to our experience and recent evidence we do 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.

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 procedures are expected to lead to a reallocation of some idle parts of the spectrum. The periodical auctions foreseen in Step 2 require two changes of the Electronic Communications Act. 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. 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 smaller than NPV of the net cash flows from the business case of the mobile operator attached to the frequencies to be acquired. In such a case no frequencies would be allocated under the rules in force. This could mean that not all welfare gains from mobile communications can 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 an unsuccessful attempt to allocate frequencies needed in the market.

In contrast to administrative pricing procedures, auctions are starting at a very low reservation price. The participants in the auction then determine the economic value of the frequency spectrum in a competitive procedure. There is no risk for failed allocation procedures as it is in the case of administrative price setting of frequency usage fees.

4.2.4 Allocation of 800 MHz frequency spectrum

Based on the Commission Decision³⁵ of 6 May 2010 on harmonised technical conditions of 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. We expect a complementary relation to wire-bound broadband services in rural areas. In contrast, there will a significant degree of substitution to xDSL services in densely populated areas. Very high speed broadband services provided over fibre, VDSL, or DOCSIS 3.0 will not be substitutable by LTE based services. Nevertheless there will be significant uptake of LTE because of the possibility of mobile or nomadic usage.

³⁵ 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.

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 2010³⁶, p12.

Part of Step 2 of our Strategy is to offer 800 MHz frequencies to the market to enable fast mobile broadband services in rural areas and to support these services in the cities. We expect that there will be demand for these frequencies and that they will be put to an efficient use. Due to our strategic competition safeguard not all of the 800 MHz spectrum will be offered to existing operators.

4.3 Refarming and infrastructure and frequency sharing

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

4.3.1 Refarming of 900 MHz and 1800 MHz frequency bands to LTE

According to the Macedonian frequency allocation plan³⁷, refarming of the 900 MHz and 1800 MHz frequency bands to 3G services had already been allowed in September 2011. LTE technology has been made available not only for 3G frequencies but also for all frequency bands in use for mobile communications (800 MHz, 900 MHz, 1800 MHz). 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).

Refarming 900 MHz frequency bands to LTE 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 a ubiquitous service.

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 options are immediate refarming and refarming after the first round of frequency auctions in Step 2 of our mobile networks strategy.

If AEK, after careful investigation of the efficient use of frequency use and of the market situation on mobile end-user markets, comes to the conclusion that the competitive safeguard of introduction of a fourth operator is not necessary, it is advisable to allow refarming immediately after the conclusion of these investigations. If the auction envisaged in Step 2 should include a fourth operator, refarming

³⁶ 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.

³⁷ План за намена на радиофреквенциските опсези во Република Македонија, Note M39, AEK, September 2011.

should be postponed shortly after the completion of the allocation procedure. The reason for postponing is not to disadvantage the new operator by not being able to offer 4G services at the same time as the existing operators.

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 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 Europe³⁸. It must be in the interest of the 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.

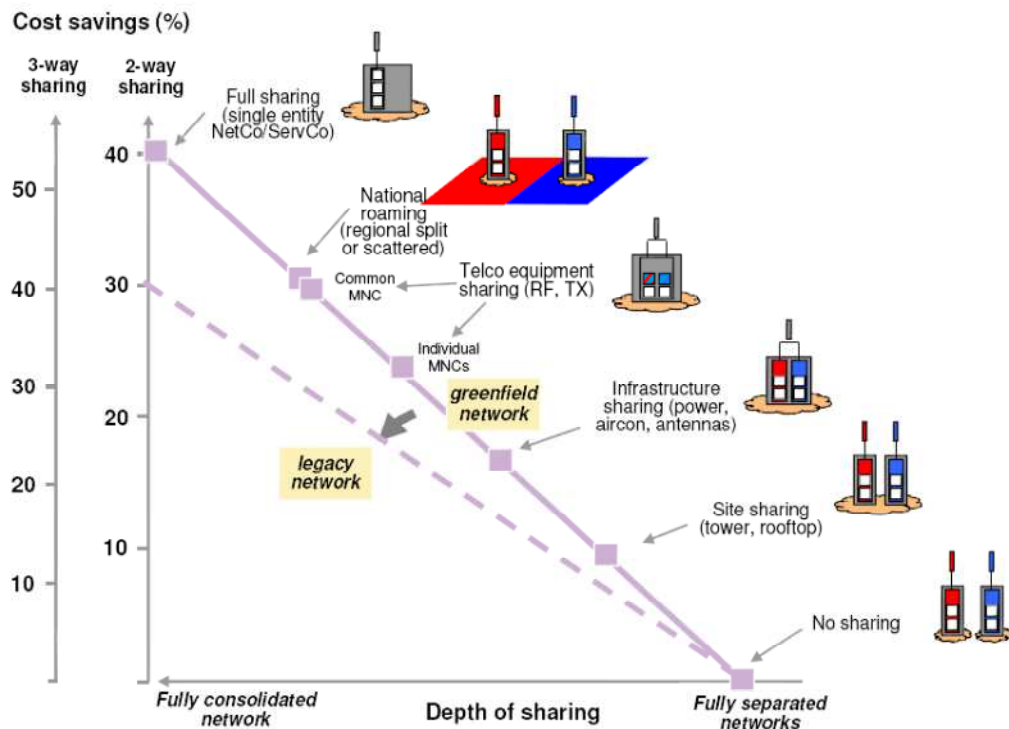
As indicated in BEREC-RSPG (2011) industry sources suggest that, depending on the geographical or quantitative extent of network sharing, potential savings for passive sharing alone can be as high as 60 % of yearly site capital expenditure, improving the network coverage at the same time. In addition, operational expenditure can be drastically reduced by network sharing. 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 MNOs³⁹ 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 most favourable network structure and management and reducing the competitive independency of smaller operators.

³⁸ BEREC-RSPG report on infrastructure and spectrum sharing in mobile/wireless networks, BoR (11) 26 – RSPG11–374, 16.06.2011.

³⁹ 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/functionality 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 percent 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 competitors⁴⁰. 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 competitors⁴¹, 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 concentration⁴². 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 is 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 CFI⁴³ 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 – conclusions

In the interest of a broad and fast roll-out of LTE services in Macedonia we recommend that AEK promotes 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 we are

⁴⁰ BEREC-RSPG report on infrastructure and spectrum sharing in mobile/wireless networks, p14

⁴¹ 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.

⁴² Case No COMP/M.5650 – T-MOBILE/ ORANGE Notification of 11/01/2010 pursuant to Article 4 of Council Regulation No 139/20041

⁴³ Case T-328/03 – O2 v EC

considering the roll-out of broadband networks in rural areas. In combination with the allocation of the 800 MHz frequencies and refarming of the 900 MHz frequencies we advocate 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, including:
 - MSCs,
 - backbone transmission,
 - multimedia GWs
- and excluding frequency sharing.

The sharing of the RAN has to take care that only equipment is used 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.

We do 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 a spectrum of several regulatory actions, as we have described in the previous chapters. We suggest the following sequence of actions to provide for an efficient development of the regulatory framework of the mobile broadband.

One of the preconditions for an effective frequency policy is the permanent supervision of the efficient use of the frequency spectrum which should be started immediately. After a first round of supervision and possible regulatory actions the frequency spectrum for mobile services available should be established in detail. Our regulatory strategy foresees regulatory safeguards and frequency auctions at regular time intervals. We recommend that AEK should commission a consultancy project to develop an auction design which allows efficient allocation of frequencies embodying our competitive safeguards. The auction design should be targeted to create a level playing field for all mobile operators with regard to frequency endowments. There should be to allow actions as a standard type of frequency allocation procedures AEK should strongly support a change of the Electronic Communications Law under review. In a next step AEK should prepare and execute the first frequency auction using the results of auction design.

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. If the preparation of the first frequency auction shows no signs of market exits or collusion, or strategies for foreclosure of the market, AEK should allow refarming even before the first frequency auction. In all other cases we recommend to wait until the frequency auction has been closed.

We suggest that AEK consents to network sharing as described in Chapter 4.3.2.

4.4.1 Social welfare effects of fast mobile broadband regulation

Our 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 guaranteeing a level playing field for all mobile operators and to prevent market exit, 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 we rate all components of our frequency policy 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 on the market, whereas at the same time there is demand for frequencies in other frequency bands.

The second part of our strategy mainly is touching upon cost efficiency of mobile broadband networks. We firmly believe that refarming and infrastructure sharing as proposed will contribute significantly to the timely implementation of 4G mobile broadband services. Therefore we conclude 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 for all available frequencies																			
preparing and executing frequency auction for all available frequencies																			
decision for refarming 900 MHz for 4G ¹																			
decision for network sharing in all frequency bands																			
review of the decision for refarming 900 MHz for 4G ¹																			
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

Note 1: Point in time for implementation depends on the results of market analysis

5 MISCELLANEOUS REGULATORY ISSUES

5.1 Bill and Keep

There is an ongoing 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 arrangements⁴⁴.

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 the BEREC documents of 2010.

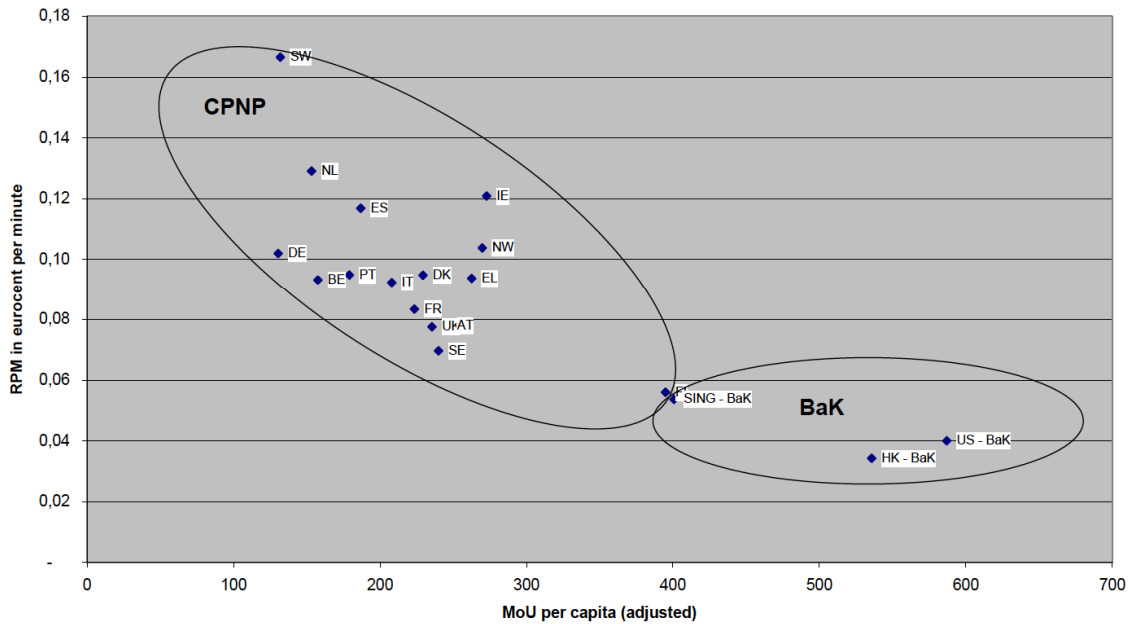
The discussion demonstrated that one has to distinguish between *level* and *system* effects. The *level* effect deals with the effects of reducing termination fees close to or equal to zero. The general opinion is that these effects are highly positive, doing away with monopoly rents and market distortions as described earlier in (Chapter 2.8.3 and Chapter 2.8.4 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 BaK⁴⁵ as shown in Picture 5-1.

⁴⁴ See: Ingo Vogelsang, Abrechnungssysteme und Zusammenschaltungsregime aus ökonomischer Sicht, Studie für die Bundesnetzagentur (BNetzA), 2006

⁴⁵ 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 customers⁴⁶. Although Vogelsang (2006) originally pointed to high transition costs, this topic disappeared from the radar screen entirely. 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

⁴⁶ A complete analysis of welfare effects can be found in BEREC: BoR (10) 24 Rev 1, Riga, June 2010, Chapter 5, pp23

of safeguards⁴⁷ 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.

The EC Recommendation on fixed and mobile termination rates can be seen as a first step to a transition to a BaK regime with its additional positive system effect on social welfare. So our strategic recommendation to AEK to immediately revising fixed and mobile termination rates according to the “pure” LRIC principle can be seen as consistent with the ongoing 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 our strategic recommendations we advocate 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 Plan⁴⁸ 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 BEREC⁴⁹, starting in 2009 on alternative charging mechanisms and culminating in the BEREC Common Statement referred to above.

We strongly recommend that AEK 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,

⁴⁷ 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

⁴⁸ See: Federal Communications Commission: National Broadband Plan, Chapter 8: Availability, p8, Washington D.C. ; or FCC: National Broadband Plan, Executive Summary p XIII, Washington

⁴⁹ 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

- PPP projects,
- public investment,
- broadband as universal service obligation.

We consider a combination of commercial roll-out, PPP and public investment as the most favourable option to move towards a digital society. We do have significant doubts for the effectiveness of including broadband access into the list of universal service obligations.

The main reason for our doubts is a potential distortion of a competition in a broadband market. In this case, MakTel 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. MakTel would be entitled to a refund of the net costs of this universal service obligation. The funding would be provided by a universal service fund⁵⁰ 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 roll-out with the exception of MakTel, they have to base their business in the respective regions on regulated access.

Instead of including broadband access into the list of universal service obligations we strongly suggest to support the roll-out of mobile broadband services by regulatory measures as described in Section 4.3.3. In addition to that we suggest to 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. We note 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 near future – in fact a new Electronic Communications Act will be discussed in 2011 – we 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

⁵⁰ 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.

BEREC⁵¹ 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. We urge AEK to 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 ACTION PLAN FROM 2012 TO 2016

According to our considerations of our regulatory strategy of AEK we have 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. We have compiled these individual time plans into an action plan for AEK for 2012 and the following four years. AEK required us to provide for a detailed action plan in 2012 and for an overview for the following years. We have tried to develop a detailed action plan for 2012 and 2013, because we believe that for this period regulatory action could be dated with sufficient precision. For the period further in the future we tried at least tentatively to locate all foreseeable regulatory actions which were discussed in this strategy.

⁵¹ See: BEREC: A framework for Quality of Service in the scope of Net Neutrality, BoR (11) 53

Diagram 6-1: Summary of AEK action plan from 2012 to 2016

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																			
adjust remedies on:																			
markets 1 and 2: rebalancing access and local calls																			
markets 4 and 5: fixed call origination and termination, including IP																			
revise market analysis																			
markets 1 and 2: rebalancing access and local calls																			
revise market analysis																			
markets 7 and 8 (ULL, WLR, Bitstream)																			
markets 9 and 10: leased lines trunk and terminating segments																			
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																			
MOBILE NETWORKS																			
Revising existing regulation																			
adapt Deloitte BU-LRIC+ model to cover pure LRIC for:																			
mobile voice and SMS termination and origination																			
revise remedies decision																			
markets 11 and 12: mobile access and origination, termination																			
markets for SMS origination and termination																			
open market analysis																			
market 11: mobile access and origination																			
Introducing fast mobile broadband networks																			
supervision of the efficient use of the frequency spectrum																			
commissioning of an comprehensive auction design for all available frequencies																			
preparing and executing frequency auction for all available frequencies																			
decision for refarming 900 MHz for 4G ¹																			
decision for network sharing in all frequency bands																			
review of the decision for refarming 900 MHz for 4G ¹																			
review the decision for network sharing in all frequency bands																			
MISCELLANEOUS REGULATORY ISSUES																			
Supporting the creation of the new Electronic communications Law																			
Supporting public authorities with the deployment of broadband access networks																			
Infrastructure cataster creation and maintenance																			
International cooperation BEREC, ITU, regional associations																			

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

Note 1: Point in time for implementation depends on the results of market analysis

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