Republic of Macedonia
MINISTRY OF TRANSPORT AND COMMUNICATIONS

NATIONAL STRATEGY
for the development of
ELECTRONIC COMMUNICATIONS
with
INFORMATION TECHNOLOGIES

Strategic Directions

VISION AND MISSION

VISION	**The Republic of Macedonia – an advanced Information Society.**
MISSION	**Enabling aggressive introduction and massively and efficient use of electronic communications and information technologies that will contribute to make the Republic of Macedonia a part of the global networked economy and to achieve a significant leap frogging in the economy.**

INTRODUCTION

The industrial world is entering a phase of fundamental changes that concern almost all aspects of life, resulting in the creation of an Information Society. In order to achieve its vision of becoming an advanced Information Society the Republic of Macedonia must resolve many issues, a number of them (those relating to electronic communications) are discussed in this document. In the new information and communication age, the leaders (countries, regions, companies and individuals) will be those that have taken timely the right decisions based on in-depth understanding of these trends. The ones that will not act accordingly risk remaining in stagnation.

The development of the Information Society should be based on partnership among the Government, the civil sector, the private sector, the operators, the local governments and all other stakeholders. Sustainable economic development is a benefit resulting from the development of the Information Society, as well as an instigator of that process. It is also an important factor in the early phases of the development when the critical mass is created of interested stakeholders devoted to the advancement of the Information Society in the Republic of Macedonia.

The National Strategy for Development of Electronic Communications with Information Technologies should be pro-active, that is it should respond actively to each change in the technology, and at the same time it should be consistent and in line with other policies and activities dealing with the development of information society in the country. Hence, the National Strategy for Development of Electronic Communications with Information Technologies and the adopted National Strategy for the Development of the Information Society in the Republic of Macedonia comprise a single concept that will give the directives for the creation of a new digital environment, i.e. they will create a pro-active environment necessary for the development of the new digital economy.

This document focuses on the measures that concern the development of a communication infrastructure as a unique technological platform for the development of the information society, as a precondition for introduction and mass use of all services of the information society (e-Government, e-Education, e-Business, e-Health, etc.) and digital contents that finally aim at improving the quality of life in the Republic of Macedonia.

Although this document gives priority the development of electronic communications, the converging of technologies makes it necessary to deal also with issues related to information technologies and media. This document does not include a strategy for supporting the domestic IT industry, measures for increased penetration of personal computers, nor the issues related to info-communications in the public administration.

Electronic communications play a central role in the development of the Information Society; of critical importance for their development is that the Republic of Macedonia chooses the best option taking into consideration the dominance[1] of the telecommunications sector compared to the information sector on state level. The National Strategy for the development of Electronic Communications with Information Technologies has as a goal to reduce this unbalance as a precondition for the development of the Information Society.

The realisation of the Strategy will be followed through the progress made in achieving the goals of the Strategy:

Measured against all most important ICT indicators, the Republic of Macedonia should achieve:

-80% of the average of the new EU Member Countries in 2010

-90% of the average of the new EU Member Countries in 2012

A precise list of ICT indicators will be made up additionally by the institutions in charge of regulation and development of the information communication technologies in the Republic of Macedonia. When comprising the list, account will be taken of the European and global experiences with regard to measuring aptitude and readiness for the development of the Information Society. Due to the enormous importance of broadband internet access, the percentage of families in Macedonia that have such type of internet access from their homes will be considered a most important indicator.

Within 3 months following the adoption of this Strategy, a detailed Action Plan will be prepared by a Working Group consisting of representatives of all interested sectors that will provide detailed directives for the systematic realisation of the measures set forth in this Strategy.

Activities and measures defined in this document primarily concern the period from the middle of 2007 to the middle of 2010, however, the complete effects that they will have

[1] IDC Adria research on the situation in the ICT sector in 2005.

produced as well as the success rate will be measured through the results achieved by the end of 2012.

Measures, directions, determinations set forth in this document are not fixed and may be amended, revised and further developed so as to achieve the main vision of this document.

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I. Need for Adopting a Pro-Active Strategy for the Development of Electronic Communications and Information Technologies in the Republic Of Macedonia

The need for adopting a National Strategy for Development of Electronic Communications and Information Technologies stems from the Law on Electronic Communications (Official Gazette of RM 13/2005) and the basic generally accepted premises pertaining to the future development of the Republic of Macedonia. According to the Law, the Assembly of the Republic of Macedonia should adopt the Strategy, for the competent institutions to fully implement it.

The obligation to create a proactive ambience and environment to support the development of the information society is also defined in the Initiative i2010 of the European Union. The National Strategy for the development of Electronic Communications with Information Technologies is based on the priorities of the i2010: creation of a single information space with an open and competitive supply market for access to electronic communications services and digital contents, promotion of the development of the information and communication technologies as an engine for the development of the digital society, and the creation of an inclusive Information Society by overcoming the digital divide.

Conditioned by the limited natural resources and the weak competitiveness of the exported products produced mainly by the labour-intensive industries of the economy, a clear determination of the Republic of Macedonia, as one of it's strategic determinations for an accelerated economic development, is to direct and use human resources and knowledge capital as backbone for achieving the goal that it has set for itself. This corresponds with the priority given to accelerating the economic growth by providing equality (by satisfying the needs and resolving the challenges that people face, in both urban and rural environments, different ethic communities and equality in the right to access information) and ultimately reducing poverty.

The National Strategy's mission is to include the economy of the Republic of Macedonia on the world map of networked economies, *to create conditions for leap frogging by way of aggressive introduction and massively and efficient use of electronic communications and information technologies*, that will allow in the following 5 years the Republic of Macedonia to approximate the average of the new EU Member Countries, measured against all more important indicators, including both ICT indicators and the purely economic indicators.

Taking account of the fact that the introduction of the Information Society in the Republic of Macedonia is directly dependent on the level of development on the supply-side, i.e. on the advancement of the communication infrastructures and technologies and the level of development on the demand-side, i.e. the use of services and contents, the two strategies (The National Strategy for the development of Electronic Communications with Information Technologies and the National Strategy for Development of the Information Society) will represent a strong instigator for a balanced economic process

that will result in establishing the Information Society in the Republic of Macedonia on both demand-side and supply-side (mainly broadband internet understood as a technological service, that is as a foundation for the realisation of all advanced services).

The level of development on the supply-side, i.e. the development of communication infrastructures, is directly dependent on the process of liberalisation and the development of the competition on the market of electronic communications.

As concerns use of services, a crucial role is given to the development of broadband networks by way of policies that will stimulate the demand of various types of services of the information society. These policies may enable financial stimulations, improvement of administration services via e-Government, e-Health, e-Education, education of citizens, development of innovative public services, provision of protection and confidence systems, connection of the public administration, the schools, the hospitals, the small and medium enterprises, etc.

Taking into account all of the foregoing, the National Strategy for Development of Information Society (NSIS) was adopted with consensus by the Assembly of the Republic of Macedonia on 21 September 2005. For the Republic of Macedonia this Strategy represents a document of the highest priority. By full implementation of the projects, measures and activities defined in this Strategy there is a real possibility for the country to overcome the digital divide and in short time to achieve leap frogging in the economic growth, in the reduction of the unemployment and poverty, in the development of the digital economy, in research and in partnerships with the industry.

The need for such a Strategy concurs also with the necessity not to repeat certain mistakes[2] from the past that have hampered the development of the telecommunications market in the Republic of Macedonia, which indirectly influence the entire economic development.

I.1. Digital Convergence

The digital convergence is a trend where the differences between historically divided activities in processing, archiving, distribution, emission and receipt of information in the form of text, picture, speech, audio and multimedia format are gradually decreasing. From a technical point of view, the digital convergence occurs between communication infrastructures, media, contents, services and digital terminal devices[3]. As a consequence of convergence, the interoperability between platforms, terminal devices and services becomes significantly important.

[2] (privatisation of the national operator without first having provided an efficient legal frame for creation of a competitive telecommunications market and having established an independent regulatory authority with full powers to regulate the market)

[3] Equipment for access to e-services and digital content (for example computers, mobile equipment, digital set-top-boxes etc)

Today, the digital convergence occurs at various levels. On one level there is the convergence between networks projected for transfer of speech and those for data transfer. In the beginning, there was transfer of digital signals through analogue (speech) networks, which was conducted by modems, which are now a standard equipment of any computer. However, today the totally opposite process happens, transfer of speech via network designed for data transfer (VoIP).

Creation of new, advanced infrastructures, combined with new technologies for compressing contents, has created the condition for appearance of the second level of convergence that between telecommunications and broadcasting. Namely, telecom operators more aggressively invade the broadcasting market by distribution of audio/visual content through electronic communications infrastructures. The profit gained so far by telecom operators from the fixed telephony rapidly decreases; it is compensated by offering new types of multimedia applications and services via electronic communications networks. On the other hand, cable operators, as traditional distributors of radio/TV programmes, started to invade the electronic communications market, i.e. they have started to offer a triple play, i.e. radio/TV, Internet and voice telephony (VoIP).

Television and radio programme services, movies, games, music, electronic books, etc., are already available on the list of services offered by fixed and mobile telecom operators, as well. As a result of the aforementioned, the so called terminal convergence becomes more notable – devices have been added to PCs and TVs which provide various types of electronic communications services and alike.

The third level of digital convergence occurs between telecommunication and consumers' (audio/video) electronic devices, i.e. advanced digital technologies open opportunities for easy connection and access of different devices to multiplatform communications networks.

The digital convergence provides for creation of new rich media contents in new different formats adjustable to different platforms, available to anybody, regardless of the location or time and personalized according to the user and his/her priorities or needs.

The digital convergence stimulates the development of new innovative applications[4] for info-communications technologies, which on the other hand cause tectonic changes in institutional administration, provides for opportunities for strengthening society capacities in managing the democratic processes of equality and creates sustainable economic development.

As a result of the digital convergence new value added products are being produced which represent a basis for sustainable economic growth, based on reduction of differences, promotion of equal opportunities, increased democratization, improvement of the life quality. From these reasons arises the inevitable need to establish an environment for their further development.

[4] Services for the information society (in particular e-citizenship participation, e-democracy)

The digital convergence, new digital content, services and business models become the driving force of the production and creation of new jobs.

Generally speaking, the digital convergence changes the life style of modern man.

I.2. Challenges in Bridging the Digital Divide

Nowadays, in spite of the fast development and spread of electronic communication networks and information technologies, many people of different social classes, geographic regions and countries have very reduced access to info-communications technologies, and consequently less opportunity to feel the benefits provided by such technologies, i.e. the benefit of the digital convergence.

People who do not have access to information and knowledge, i.e. those who do not have access to ICT remain in the zone of stagnation

This difference, which occurs as a result of those who have and those who do not have access to information, is known as “digital divide” and significant efforts have been made to bridge this digital divide. Digital divide exists not only among different countries, but it can also exist between regions in the same country, between cities, villages and between people as individuals.

The digital divide appears on two levels: the level of access to information which is bridged by access to ICT infrastructures and the level of using e-services[5].

Info-communication technologies ensure the bridging of digital divide on the level of access to information by providing access to ICT infrastructure, i.e. they enable connection of individuals, small and medium enterprises, farmers or craftsmen in underdeveloped and isolated parts of the country and provide for equal promotion of a common national and global market. Info-communications technology provides for globalisation, i.e. opportunity for launch of the local market on a world level, or equal participation in the world’s networked economy. A voice is given to those who were until now isolated or "invisible", giving them at the same time an opportunity to freely express themselves, regardless of their economic status, sex or place of living.

Complete access to electronic communications infrastructure and information technologies ensures a balanced economic development on the entire territory of the country or poly-centric development, which contributes for good decentralization of local self-government units, building transparent and responsible local administrations, which as a final result will culminate in direct reduction of inequality, unemployment, and gradual reduction of the digital divide in the country. At the same time, it puts borders into perspective and increases cooperation and dialogue with Euro-regions.

[5] Information society services

Overcoming the second level of digital divide, i.e. bridging the divide which occurs as a result of use or non-use of e-services is achieved by promoting the principle of e-inclusion. E-inclusion refers to activities for enabling access to e-services and digital content, including those people for whom the acquisition of knowledge relating to new technologies represent a big challenge due to their level of education, age, limited financial resources, sex, nationality, disabilities (e-accessibility), geographical divide[6] and alike.

In the world as it is today, with bigger opportunities ad potential for e-inclusion, there are still impediments for complete and active participation of citizens. Challenges regarding access, accessibility, usage and usability of tools, as well as the creation of educational content that allows full usage of the benefits of the information society will always represent the main determinants of exclusion. The right to participate will be the greatest challenge for inclusion in the information society. The "design for all" principle should be observed when offering e-services and digital contents.

Currently, in most of the EU countries, 30-40% of population is excluded from the benefits of information society. In Macedonia, this number reaches 50-70% (according to studies[7] made so far, only 50% of the population use computers and only 30% use the Internet). This part of population is called digitally illiterate and has the potential to experience serious repercussions related to employment opportunities and integration in the society. In the case of Macedonia, the economic future of the state, especially the transition to a society based on knowledge, depends on e-inclusion of this group of people in the information society. Due to this fact in Macedonia, the process is forthcoming of mass education in this area.

Most of measures related to bridging the digital divide and reaching an e-inclusive Information Society in the Republic of Macedonia are addressed in the National Strategy for Development of Information Society in the Republic of Macedonia[8], especially in the pillar "e-citizens", with the relevant action plan.

I.3. Creation of Pro-Active Environment Necessary for Creating and Developing Info-Communication Infrastructure for Information Society

The new vision of "society of the future", or the so-called information society promoted by the European Union is expressed in the Lisbon Strategy, and according to it, this society should be based on knowledge and innovations, i.e. a society where all the citizens will have easy and cheap access to information and knowledge via electronic communications infrastructures and digital technologies.

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[6] (including underdeveloped communication infrastructure, as well)
[7] http://www.stat.gov.mk/,
http://www.metamorphosis.org.mk/index.php?option=com_docman&task=cat_view&gid=10&Itemid=16 (second part of the site, series of researches of the Foundation Metamorphoses),
http://217.16.95.5/new/docs/Internet_and_Computer_Usage_%20Report_%20MK.pdf (USAID research)
[8] http://www.kit.gov.mk

Information society should provide for means by which the real threat which exists and leads toward creation of the digital divide will be decreased, it should create real opportunities for support and development of digital convergence and stimulate the creation and development of the digital economy.

State institutions should play a very active role in the process of establishing the information society in the Republic of Macedonia, in defining the policy and coordinating the implementation of the National Strategy.

Taking into account the new trends in info-communications technologies and the convergence between electronic technological platforms and electronic media that develops fast, the necessity for convergence of the state institutions competent for development of information society and media is inevitable.

From the moment when the Ministry of Information Society will have been established, the Ministry of Transport and Communications, the Commission for Information Technology and the National Council for Information society will be the competent institutions for coordination of activities for creating the Information Society and for coordinating the implementation of this Strategy and the Strategy for the development of Information Society.

Measure 1.3.a. The Government of the Republic of Macedonia shall establish the National Council for Information Society

Measure 1.3.b. The National Council for Information Society will follow the implementation of measures provided for in this Strategy, taking into account the relevant indicators; it will prepare a report every 6 months.

Measure 1.3.c. The National Council for Information Society in cooperation with the State Statistical Office will update and follow the list of indicators for development of information society.

II. Electronic Communications Technologies as Basis for Fostering Development of an Information Society

As a technological platform necessary for ensuring accessibility of the new e-services and digital contents, and hence overcoming the digital divide as regards access to information, electronic communications have a central role in the creation and the development of the information society.

Full liberalization and competition ensure the development of electronic communications, decreasing of tariffs for services and, contrary to monopolistic environments, they are the main instigators of new investments, innovations, i.e. of opening new jobs and of economic development.

The measures set forth in this Strategy, are aimed, amongst others, at creating an environment that will foster development of electronic communications in the Republic of Macedonia and consequently at ensuring equal access for all to the communication infrastructures and e-services anticipated with the Strategy for the development of the Information Society.

The multi-platform access to the services of the information society and the digital content (that should be guaranteed in the new "digital society"), the challenging conditions for the design and development of traditional telecommunication networks for voice telephony to change to electronic communications infrastructures where killer applications are the e-services and the transfer of digital content. Consequently, standardization, interoperability and security have a crucial role in the development of information and communication technologies in a country.

Hence, although this document focuses on the development of electronic communications, because of the converging processes it is inevitable that issues related to information technologies and media are also treated.

Taking into consideration that the development of electronic communications networks and services, in particular the fast internet (broadband internet) is the main technological platform for full introduction of the information society, the critical role of this strategy which stresses out the development of broadband fast communication networks is evident.

II.1.Existing Legal Framework for Electronic Communications in the Republic of Macedonia

The Republic of Macedonia has committed itself to approximate its legislation with the EU acquis on electronic communications. As a result of this commitment, in 2005 the Law on Electronic Communications was enacted that is in full compliance with the 2002

EU regulatory package on electronic communications and presents the legal framework for full liberalization of the electronic communications market. The Law on Electronic Communications is complemented by over 45 regulations.

With the Law on Electronic Communications the conditions are ensured for interconnection and access by application of the principles of transparency and non-discrimination, determining operators with significant market power on the relevant market, selection of universal service provider, introduction of a procedure for notification of legal and natural persons prior to construction of public electronic communications networks and provision of communication services, allowing access to services of another operator selected by the subscriber, etc. It also provides the rules for allocation of the limited resources (radiofrequency spectrum, numeric space).

Pursuant to the existing Law on Electronic Communications, agencies in charge of implementation of the rules pertinent to the electronic communications are the Ministry of Transport and communications and the Agency for Electronic Communications, as a regulatory authority in the field of electronic communications.

Under the authority of the Ministry of Transport and Communications is the implementation of the policy of the Government of the Republic of Macedonia in the area of electronic communications, the drafting of legislation in the area of electronic communications in collaboration with the AEC, conducting activities related to development of electronic communications and information technologies, promoting competition in the area of electronic communications and increasing the access to and use of electronic communications and information technologies.

Accessibility of public communications networks, the development and improvement of electronic communication networks and services, market analysis and determination of operators with significant market power, control of tariff regimes, control of services' tariffs, etc.

II.2. Strategic Approach of the Republic of Macedonia toward Legislation and Regulation of Electronic Communications

Considering the strategic determination for future membership of the Republic of Macedonia of the European Union, the need is inevitable for continuing approximation of the Macedonian legal framework with the EU acquis.

While complying with the principles of technical neutrality, the legal framework and regulation should take account of the consequences of the global digital convergence of electronic communications, information technologies and media.

Good regulatory policy is a precondition for efficient development of the market of electronic communications, because it leads to increased competition, new investments and reduction of services' tariffs.

Regulatory policy should be consistent and flexible, should be based on market principles and technological neutrality and should not result in creation of new barriers to free market competition. It should be based on promotion of competition and protection of the interests of the consumers in this area, including the universal access to services.

The regulatory policy should be implemented in a pro-active and transparent manner; it should also be predictable and adjustable to the dynamic trends of technological development. Ex-ante regulation will in the upcoming period represent a strategic approach of the Republic of Macedonia in the area of electronic communications.

In compliance with EU directives, the tendency for reduction of the number of legislative acts that govern electronic communications must continue. The focus of the regulation should shift from a technical base to comprising the organisation and regulation of the market.

The Government of the Republic of Macedonia should regularly follow and assess the development of the market and the work of the regulator and should adjust the legal framework, the institutional system and the governmental programmes to the legal system of the Republic of Macedonia and to the experiences of the countries that have a comparable development path and the applicable experiences of the EU countries.

Under the process of accession to the EU, the state institutions of the Republic of Macedonia should be integrated in the European organisations thus making use of all potential benefits from the membership or the associative membership in the relevant organisations competent for the development of electronic communications[9].

The regulation should:
- Support innovations and must not limit investments in new technologies;
- Avoid imposing of new restrictions on competition and avoid monopolistic situations based on application of new technologies;
- Guarantee the principles of transparency and non discrimination.

Regulator's decisions have direct impact on the liberalization and the competition on the market; hence, the recognition of the independence of the regulator is a vital element.

The work of the regulator should be aimed at creating an efficient and sustainable competition as competition is the basic tool for better serving the interests of the subscribers and for supporting the development of the ICT industry. The market of electronic communications is developing and changing fast, so the regulator should actively follow these conditions.

With respect to the foreseeable steps in the EU concerning the liberalisation of the rules for the management of the frequency spectrum (secondary trading, flexible use, simplified procedures for allocation, etc.), the Republic of Macedonia should take strategic decisions about the time and the extent of their implementation.

[9] for example IRG / ERG and others.

The Strategy and the Action Plan of the regulator, the regulatory procedures and the procedures for implementing the regulatory framework, should be adopted by the regulator and should regularly be updated and made available to the public so as to create a transparent, predictable regulatory framework that will in its turn increase the professional and the public awareness. The regulator must ensure its own further development as a professional and specialized organisation, as well as to ensure transparency and non-discrimination in its operation.

Measure 2.2.a The independent regulatory authority in charge of regulating the electronic communications should develop its own Strategy and Action plan.

Measure 2.2.b State agencies in charge of the development of the Information Society and media should take active participation in the European institutions for development of ICT and Information Society.

II.3. Universal Service

The basic concept of universal service (i.e. universal service obligation) says that all citizens have to access to a basic package of electronic communication services at affordable prices, even when the provision of the service is not profitable in certain geographic areas or with certain groups of users.

Historically viewed, the universal service is most often provided by the dominant telecommunications operators with an implicit understanding that eventual loss in one area shall be compensated by additional profit in other areas. The increase of competition on the market reduces this implicit understanding because it is not logical that one operator should bear the burden for the provision of the universal service. It must be pointed out that this burden for the provision of the universal service is not always obvious. There are also non-financial benefits such as market penetration, access to customers, etc. Hence, attention is called for when undertaking measures for compensation of eventual loss of the operator providing universal service.

The concept of universal service obligation consists of two main elements: access to the basic package and affordability of the main services.

The access may be defined as provision of universal service to all end users regardless of their geographic location, while affordability means the provision of universal service at an affordable price in correlation with the specific economic conditions in the country, which anticipates introduction of equal tariffs regardless of the location and separate tariff options for meeting the needs of the low end users. Affordability also includes the possibility that users have insight in and control over the costs.

The basic package of universal service consists, according to the Law on Electronic Communications, of the following services: providing access to a public telephone network at a fixed location, the directory inquiry service and access to the directory, access to public pay phones and equal access to a public telephone network for persons with special needs.

It can be concluded that availability of the basic package has been ensured. Throughout the territory of the country voice telephony is available and in most cases there are at least two separate infrastructures that enable such access. One infrastructure is the fixed telephony and the other is the mobile telephony. In some areas, in particular in the areas of the larger cities some cable networks experiment with offering telephone service through their networks, by using the so called VoIP technology.

Still, availability has not been completely ensured as prices for telecommunication services are high, in particular compared to the low average income. In the RM, the percentage of income allocated to telecommunications is higher than in the EU countries. After having conducted several researches, it has become clear that telecommunication costs represent a real burden on the income of many families. Consequently, there is a trend of reduced use of the fixed telephony, and an increased use of the mobile telephony. Although the price for a call is higher, payment may be made per call, and in addition, at least for pre-paid packages, there is no monthly subscription.

Pursuant to the Law on Electronic Communications, a Universal Service Fund may be established to which all operators will contribute and that will be used for payment of the additional costs of the operator providing universal service. Still, there are not many examples of the well functioning of such a fund. Although theoretically this is an optimal solution from economic point of view, there are enormous practical difficulties. Therefore, first other solutions should be looked into before applying this option. In practice, if there is not a sufficient institutional capacity to effectively manage such a fund, it may represent a market distortion factor in which case it should be avoided.

In the short-term, it is not necessary to take measures as the increase in competition will lead to reduction in prices and consequently, to reducing the need for compensation of eventual loss of the operator providing universal service.

Measure 2.3. The regulatory authority in charge of electronic communications, following the adoption of this Strategy, should undertake detailed in-depth research and analysis so as to define the optimal universal service strategy for the country.

II.4. Radiofrequency Spectrum

The radiofrequency spectrum is of strategic importance for the development of the information society, i.e. for the societies based on wireless communications. Efficient use and management of the radiofrequency spectrum is a significant element of each strategy for the development of the information society, as radiofrequencies are an important factor for each economy.

It is assessed that, at world level, activities related to radiofrequencies contribute over 1% to the GDP. At European level, this percentage is double and amounts to 2% of the GDP, while in the Great Britain this share is 3%. However, in addition to the economic benefit, wireless communication technologies represent an efficient method for e-inclusion and bridging of the digital divide, in particular in the developing countries.

The impact of wireless communication technologies (economic, e-inclusion) may be even larger, if additional radiofrequency ranges are allocated.

The trend of efficient management of the spectrum in the EU is supported by appropriate legislation and promotion of competition and investments. The creation of a free internal radiofrequency market within the EU is an imperative of the market oriented management of the spectrum. At the same time, efforts are made to increase the coherence and consistency in obtaining approvals for pan-European and regional projects. One of the proposed solutions is the establishment of a European Agency for Radiofrequency Spectrum that will assist in crossing the borders of this telecommunications business that is a driving force of the globalisation. An additional effect of such an action would be the introduction of equal rules on the single European market.

The efficient use of radiofrequencies makes possible the realisation of the goals of such strategies and contributes to the development of the competition and the creation of alternative ways for providing telecommunication services, which consequently results in reduction of prices and improvement of services.

It must be stressed that no contemporary economy can function without a well designed and implemented policy for use and management of the radiofrequency spectrum. The benefits are probably largest for the small and medium enterprises, as they profit from the new services that would otherwise be available only to the large businesses.

Radiofrequencies do not stay confined within the boundaries of national borders and consequently, the use and management thereof must be such so as to eliminate the detrimental effect and optimise their use. The assignment of the right to use a particular radiofrequency must include provision of undisturbed utilisation by the user.

In the Republic of Macedonia, the use of frequencies is conducted in accordance with the National Plan for Assignment of Radiofrequency Ranges and in accordance with the Plan

for Allocation and Use of Certain Radiofrequency Ranges. These plans need to be updated on regular bases by the Agency for Electronic Communications taking account of the development of new technologies.

As radiofrequencies represent an important factor for the development of the economy, it is essential that economic activities are not burdened with excessive costs for use of radiofrequencies. Pursuant to the Law on Electronic Communications the fee for use of radiofrequencies should be an amount sufficient to cover the costs for surveillance, monitoring, measuring and covering the administrative costs of the Agency for Electronic Communications. Adherence to this rule is of exceptional importance and each additional amount will represent a burden for the development of the so called "wireless economy".

The efficient use of radiofrequency spectrum produces benefits for the implementation of the digital radio diffusion, new generations of services of the mobile telephony and wireless broadband internet access. The new methods of compression of audio-visual contents allow ten-fold reduction of the needs for radiofrequency range. On one hand, this allows for a wealth of digital contents, while on the other hand it frees a significant space of radiofrequency ranges for new services on the market[10]. This is defined as digital dividend and is one of the most tangible direct benefits of the digitalisation.

The digital dividend facilitates the overcoming of the digital divide and allows open access to global knowledge and e-services, in particular by respecting the principle of non-discrimination on social and geographic basis. It is necessary that prior to the adoption of the Strategy for Media Digitalisation, an Analysis of the Future Digital Dividend[11] be prepared and made subject to a comprehensive public discussion.

Measure 2.4.a Regulators in charge of electronic communications and media to prepare an Analysis of the Future Digital Dividend that would be obtained after the process of digitalisation of the media.

Measure 2.4.b The regulator in charge of electronic communications shall revise all existing regulations governing the management and allocation of radiofrequencies so as to facilitate the development of the so called "wireless economy".

II.5. The Role of Convergence of Media and Development of ICT

The entrance of new technologies has great impact on the manner of living, producing new types of consumers and new ways of transfer of new audiovisual contents, enriched

[10] such as, for example, new mobile services, wireless broadband internet services, increased coverage with advanced communication services in rural regions, advanced business services

[11] EU countries have already started with the preparation of such analyses so as to maximize the benefit from the digital dividend. Ofcom: http://www.ofcom.org.uk/media/news/2005/11/nr_20051117

with quality which has been impossible to achieve until recently. Taking into consideration the aforementioned, the Commission of the European Parliament adopted a Proposal for Modernisation of the Directive “Television without borders”. The old Directive "Television without borders" is completely outdated.

The advancement of new technologies directly caused convergence of communications networks, contents, and especially the devices, the occurrence of personal video recorders (PVR) and on-line delivery of audiovisual contents. Interactive television, Web TV and films on mobile phones are available now almost for everybody, and they successfully compete with traditional TV programmes with fixed schedule.

Current consumers have a much wider choice of TV programmes and contents, such as sports or films, delivered via cable or satellite, but that is not enough. Now, the consumers use their advanced TV receivers for interaction with medium service providers and/or with the content providers, directly selecting the content according to their own choice, voting and competing in TV show programmes, and alike. More and more consumers need the advantages of video-on-demand system, which reaches them via cable, optic cable or digital subscription line (DSL). The growth of Internet Protocol TV in a number of countries is due to the demand of premium content for which consumers are ready to pay. Other technologies, for example, mobile web streaming will also bring great transformation in audiovisual services.

In order to follow the pace of the technological development, the Commission of the European Parliament defines as such the rules for audiovisual services in the proposed amended Directive for TV without Borders, and not as technology which delivers them. At the same time, in the proposed Directive a difference is made between linear services (fixed schedule, conventional TV, internet, mobile phones…) and non-linear services (video-on-demand, web-based news and information on request…).

New types of services (which are additionally paid) do not represent a threat for free-to-air broadcasting, which is very important for Macedonia, especially in this period. The positive side of the appearance of new types of services can be noticed in the new opportunities for development of the economy in Macedonia.

The Radio Broadcasting Council has been actively involved in modern flows of technological development and convergence, since 2002, when it adopted the Recommendation SRD-TP7 for use of Multimedia Home Platforms (MHP) on new digital platforms. With the introduction of MHP (and alike) an open system is provided which is easy to upgrade and which supports numerous services – linear, highly integrated and non-linear service, as well as Internet search. Special attention has been paid to the stability, security of data and the most important – interoperability.

According to the Law on Radio Broadcasting, there is a need for adoption of a Strategy for the development of Radio Broadcasting Activity in Macedonia, which should also include the digitalisation of radio broadcasting in Macedonia. The Strategy for the development of Radio Broadcasting Activity, the National Strategy for the development

of Electronic Communications and the National Strategy for the development of Information Society should be complementary among them and have the same direction which is the creation of Information Society in the Republic of Macedonia.

Since the Strategy for the development of Radio Broadcasting Activity will be extremely important for creating an enabling environment necessary for support and development of digital convergence, its directions should be carefully selected, based on prior extensive research and analysis of technological and economic conditions in the Republic of Macedonia. The digital dividend should also be taken into account, which by introduction of digital radio broadcasting services will completely free the completely engaged analogue radio broadcasting spectrum, bringing new opportunities for development not only for the producers and broadcasters of audiovisual contents, but also for providers of ICT services. In the course of preparing the Strategy for Developing of Radio Broadcasting Activity, the private and civil sector should be actively involved.

Measure 2.5. The Strategy for the development of Radio Broadcasting Activity should be complementary with the National Strategy for the development of Electronic Communications by Information Technologies and the National Strategy for the development of Information Society. In the course of its preparation, it is necessary that the private and civil sector be actively involved.

II.6. Functional/Structural Separation - Support to the Liberalisation Process and Ensuring Competition

The need of the Republic of Macedonia to achieve a significant step forward in the development of ICT sector requires reviewing and implementing some new innovative solutions. One of the solutions which is being reviewed in many countries in the world[12], and in some already applied with many positive results is the functional separation of regulation of access to infrastructure from the remaining part of the network and services, and separation of operation of the incumbent operator[13].

All available data confirms the fact that competition and open market encourage innovations and investments. New technologies (especially IP based platforms) open opportunities to new regulatory approach: functional separation of regulation of the passive part of the network (cable and cable canalisation) from the active part (servers, routers, etc.).

[12] This approach of functional separation obtained the support of Vivien Redding, European Commissioner for Information Society and Media in June 2006, SPEECH-06-422 and afterwards in December 2006, SPEECH-06-772

[13] Incumbent operator is a communications operator which owns the existing infrastructure to end users (former telecom companies in state ownership).

Reasons for introduction of functional separation arise also from different motives for investment in passive infrastructure and investment in services. The passive infrastructure requires long term planning and long term strategy, which implies a stable environment.

Advantages from introducing functional/structural separation are obvious, since the regulation of the basic passive infrastructure may be separated from regulation of the remaining services, which is completely justified. In this way, the regulation of prices for access to infrastructure will be simplified as well, and will become more efficient for the regulator. On the other hand, it offers a chance for increasing the competition on the market.

The efficiency and the pace of implementation of all measures anticipated in the regulatory strategy of the independent regulator would significantly increase by this measure. Practically, all conditions for healthy competition based on services would be created immediately, and at the same time a more favourable environment would be created which will provide investors with more security when investing in new infrastructural projects, by which competition based on infrastructure will occur much faster.

This is in line with the latest trend in Europe, and even in the USA where the local self-governance institutes take actions for providing accessible infrastructure of the latest generation (the so called muni FTTx projects).

Regarding the treatment of large infrastructural systems, the functional/structural separation in the Republic of Macedonia is nothing new. For example, the functional/structural separation has been carried out in the electric power sector (Electric Power Supply Company of Macedonia, Macedonian Radio and Television, and currently, such process is happening in the Macedonian Railways.

Measure 2.6. Preparation of a detailed study about the needs for introduction of functional/structural separation of electronic communications in the Republic of Macedonia.

II.7. Broadband Internet

II.7.1. Status

Comparison of data obtained from researches[14] shows that in most optimistic conditions, only 1/3 of citizens use the Internet (regardless of the type of access – home, at work, internet café, school, university, mobile device). If the indicators "internet penetration" according to the EU standards[15] would be used, it can be concluded that this percentage of internet users additionally would decline. This represents a significant delay in relation to the growth of internet users on the rank of EU.

Although there are no precise statistical data, it can be concluded that the real percentage of penetration of broadband internet (percentage of households having broadband internet connection) in the Republic of Macedonia is on a lower level than the EU member country ranked on the last place (2%).

Out of several important events, legal acts and projects that had positive impact on improving the status in this field, the following ones are worth mentioning:

- Adoption of the Law on Electronic Communications which provided for increased competition.
- The adoption of the National Strategy for the development of Information Society in the Republic of Macedonia with the respective Action Plan which resulted with increase of quality of e-services to citizens.
- MKConnects[16], a USAID project implemented by the provider OnNet[17] enabled complete connection in the network of all schools on the entire territory of the Republic of Macedonia, regardless of their geographical position. At the same time it ensured competition on the market of broadband internet by installation of a parallel backbone network and access to users via modern technology which does not depend on the copper of the incumbent operator (MakTel).
- In addition to ADSL access provided by Macedonian Telecommunications, competition occurred on the market for broadband internet in the past period from cable operators and remaining providers, but also from informal urban WiFi[18] networks.

In addition to positive effects such as the increased number of users of broadband internet, there are also reasons due to which this growth is disproportionally low compared to EU standards:

[14] http://www.stat.gov.mk/ (not available in electronic form), http://www.metamorphosis.org.mk/index.php?option=com_docman&task=cat_view&gid=10&Itemid=16 (second part of the site), http://217.16.95.5/new/docs/Internet_and_Computer_Usage_%20Report_%20MK.pdf
[15] http://www.sibis-eu.org/files/Sibis_Indicator_Handbook.pdf
[16] www.mkconnects.org.mk
[17] http://www.on.net.mk
[18] http://en.wikipedia.org/wiki/Wifi

- Expensive and inaccessible basic access.
- Insufficiently built-out and available independent optic network throughout the country.
- The insufficiently developed and regulated wholesale markets for broadband internet via the current copper infrastructure is the main reason for non-existence of competition in the ADSL market, as well as in the field of triple play services.
- All construction works (channels, placement of antennas, access to users) for communications services are put into the category of first class construction works, according to the Law on Construction, which unnecessary complicates the construction of infrastructure (especially access to end users) which prolongs the penetration of broadband internet And makes it more expensive.
- The distribution trunks of cable networks are predominantly of copper which make their digitalisation and the offer of advanced triple-play services more difficult.

II.7.2. EU Trends and Strategic Determinants

According to ECTA and EUROSTAT[19] the average of penetration of broadband internet on the level of EU-10 (newly admitted countries in the EU) is approximately 4%. The standard on European level (EU-25) is 12-14%, with a note that the highly developed EU countries have penetration on the level of 20 to 25%. The determination of EU to encourage the competition and use of more advanced technologies such as FTTx, 3G, WiMax, more options for the introduction of competition in xDSL allow for quality and favourable offers for citizens and companies.

The broadband internet enables access to all e-services and represents a basic tool for bridging the digital divide. E-Inclusion can be achieved only by introducing the broadband internet access in all households and companies, and that is the stake of i2010[20], as one of the basic bearers of transformation towards the knowledge based economy.

As one of the measures for bridging the broadband gap, EU also proposes the use of structural funds for enabling broadband access for rural areas, which is more precisely described in "Guidelines on criteria and modalities of use of Structural Funds for electronic communications"[21] of the European Commission.

Additional support for this process comes through the directive for creating national strategies for broadband internet[22] which is being undertaken as an obligation in the eSEE initiative, as well, which encourages the development of broadband in the SEE region. These strategies are based on the regulatory framework, state support for broadband access in rural areas, connection of schools, hospitals, local government units and

[19] http://www.ectaportal.com/en/basic650.html
[20] http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm
[21] http://europa.eu.int/comm/regional_policy/sources/docoffic/working/doc/telecom_en.pdf
[22] Completed obligation by the end of 2004 for all EU-25

stimulation of demand for broadband internet. Advantages for the new and future EU members are clear: educated work force, good experience in the development of information society, strong potential for economic growth due to the transition towards knowledge based economy.

i2010 imposes that the EU should achieve positive growth in the next years and should bridge the broadband gap on geographical and economic level, as well as on the level of attractive digital contents and e-services. 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.

Advantages of broadband internet access in EU is based on its application in: telemedicine and e-health (rural medical centres which engage top experts when needed, immovable patients and on-line monitoring, long-distance diagnostic), e-Government (crucial decentralisation and e-democracy), e-education (informal life learning, portals for e-studying, e-diary, long-distance learning at universities throughout the world), rural development (e-agribusiness applications, tourism, ICT centres and e-points) and e-business.

Redistribution of knowledge and capital as crucial elements of decentralisation will only be possible if the competition in the broadband market is supported and encouraged from a legal point of view and from the point of view of infrastructure on the entire territory of the Republic of Macedonia.

Common access speed in rural areas in EU that should also be accepted in our market varies between the minimum speed which is considered as broadband internet[23] - 144kbps and 512kbps. In urban areas the average in 2005 was 512 – 1024 kbps, with a note that in developed states of EU this speed at the moment varies between 3-16 Mbps on average.

II.7.3. Measures

Preparation of Strategy for Broadband Internet

The preparation of the strategy for broadband internet is an obligation arising from i2010 and eSEE 2005. The preparation of the strategy will be conducted in three phases:

- **Preparatory phase** (analysis, the results of which are necessary prior the commencement of the drafting process of the document, identification of an multi sector expert team which will prepare the strategy, making a comparative analysis of European experiences regarding the design and implementation of national strategies for broadband internet).
    - Prior to the preparation of the strategy, a comprehensive SWOT analysis will be conducted and measuring of indicators related to preparation of

[23] According to EUROSTAT, which means that dial-up and ISDN may not be considered as broadband. The same refers to any internet access which does not meet this minimum speed.

this strategy with as its purposes to obtain a clear zero position and to measure the progress of implementation thereof in a simple way.

- Also, serious analysis of opportunities for "state intervention"[24] in the broadband internet market is needed prior to designing the strategy for broadband internet through assistance of IPA or similar international and domestic (budget) funds, possibly linked to interests of academic networks (MARNet[25] - GEANT2[26]) and private-public partnership in rural areas.

- **Design of strategy for broadband internet** taking into consideration the directions contained in this document, analysis that will precede the process, directions of EU and NSRIO.

  - The Strategy for broadband internet will have to envisage such measures that will result in an environment which stimulates both offer and demand by:
    - creating more favourable conditions for investments of the private sector in broadband internet infrastructure
    - enabling fair conditions for ensuring competition between network providers for broadband internet
    - cooperation between the public and private sector in developing networks in areas which are considered as underdeveloped.
    - activities for using the EU funds for development of broadband infrastructure
    - raising the awareness of users about the benefits from using it and about the development of services, applications and content.
    - Strategy for supporting the creation of accessible, usable, educational and interesting e-contents and e-services
    - Strategy for broadband internet will be based on identification of the most important problems and precise definition of roles of each participant in the process.

- **Monitoring** of the implementation of the strategy (with special focus on the role of NGO sector and the National Council for Information Society)

Measure 2.7.a. Preparation of Strategy for the development of broadband internet in the Republic of Macedonia with action plan[27].

[24] According to analysis of EU, i.e. Chapters "Rationale of public intervention" and "Available instruments" by EC COM(2006) 129 "Bridging the Broadband Gap", http://eur-lex.europa.eu /LexUriServ/site/en/oj/2006/c_318/c_31820061223en02220228.pdf
[25] http://dns.marnet.net.mk
[26] http://www.geant2.net/
[27] Which will be prepared by an expert team with representatives of all interested sectors and participation of the civil sectors.

Measure 2.7.b. Amending all the legal solutions by which all legal and administrative barriers regarding construction works for telecommunication infrastructure will be removed.

Measure 2.7.c. Accelerating the process for promoting the competition for wholesale of broadband internet access (especially for IP bit stream access)

Measure 2.7.d. Initiation of a dialogue between all interested parties for establishing the Internet Exchange[28] as part of MARNet or as an independent institution.

Measure 2.7.3e. Revising the technical standards for construction of telecommunication infrastructure, especially cable operators.

Measure 2.7.f. The business and NGO sector should organize one-day trainings in using the internet and e-services for all interested citizens.

Measure 2.7.g. Administration of .mk to be analysed by the National council for information society[29] which should then prepare recommendations based on European experiences.

Measure 2.7.a. Preparation of an action plan for introduction of IPv6 Internet protocol

Measure 2.7.i. e-Inclusion The principle of ensuring equal chances to all citizens must be respected. Regardless if the issue is about communications systems, ICT, software, content (text, audiovisual) devices for internet access, e-points, software products, mobile telephones, devices for receipt of digital television, the challenge of using new technologies exists especially for social, educational cultural, geographical reasons as well as the disabled persons. A guide book should be drafted for e-accessibility and e-Inclusion, which would serve as basis for initiating a strategic document for e-Inclusion. Preparation of an action plan for introduction of the IPv6 Internet protocol

[28] All providers can exchange via optic cable the mutual traffic on a national level without burdening the expensive international links, which will reduce the price and enable termination of limits of traffic on a national level.
[29] A body that will be established in compliance with NSRIO.

II.8. The Role of the Local Government in Establishing Partnerships between the Public and the Private Sector, and Development of Infrastructure in the Rural Areas

II.8.1 Current ICT situation in the units of local government in the Republic of Macedonia

In their everyday operation, units of local government – municipalities use communication services of the already existing private companies. Namely, for telephony they use the services of Makedonski Telekomunikacii, while for internet access they use the ADSL service of MTnet and the wireless internet access of OnNet[30]. Several municipalities use internet connections of local cable operators. It should be mentioned that a small number of municipalities still use Dial up internet connection due to lack of other services for internet access in their area.

By initiating the process of decentralization in education, the maintenance of schools falls under the venue of the municipalities. Compared to the municipalities, the situation in the primary and the secondary schools is different. For the needs of the education process, the computer laboratories in the majority of the schools in the Republic of Macedonia (460 primary and secondary schools) have wireless internet access provided via the internet provider OnNet, as a donation by USAID through the project "MKConnects". This donation covers the period until September 2007. The usability of these computer laboratories and internet connections in the schools depends on the maintenance of their computer and network equipment.

II.8.2 ICT goals for the units of local government in the Republic of Macedonia until the middle of the year 2010

Municipalities and enterprises founded by them, as well the institutions under the jurisdiction of the municipalities in the Republic of Macedonia should have legal and financial opportunity to construct, develop and use municipal electronic communications networks and systems that are of public interest for the citizens in the municipalities. Municipal electronic communications networks and systems should satisfy the conditions for broadband internet access through a choice of the following possible platforms: WiFi, WiMax, FTTH (Fibre to the Home), FTTP (Fibre to the Premises) and other.

Municipal electronic communications networks will allow technologies and services in to be in full ownership of the municipality or through partnership with the private sector.

For the realisation of the public service of municipal broadband internet access and in general municipal electronic communications networks, the municipalities in the Republic of Macedonia will use the legal framework governing public enterprises and

[30] These connections are part of the donation of ADSL internet access of Makedonski Telekomunikacii as of June 2005 and the donation of wireless internet access of OnNet, the MkConnect and ZELS project from February 2006.

public-private partnerships that will operate under the same conditions applicable to commercial operators and will focus on overcoming the digital divide.

A sustainable manner of overcoming the digital divide taking into account the principle of subsidiarity is the initiative for opening e-points[31], in particular in the rural areas. If these points are combined with the function of outpost offices of the municipality through delegating responsibilities[32] the result will be a multifunctional space that combines all possibilities for access to e-services and digital contents and the classic counter services, in particular for the citizens from the rural areas, with an accent on the obvious benefits from saving time in the performance of the obligations.

At the same time, this generates demand for functioning, efficient and two-way universal e-services and digital contents, both at local and national level (thus increasing the efficiency and functionality of these distribution points and reducing costs).

The municipalities, public enterprises and public-private partnerships should ensure open, equal and fair access for all commercial operators that wish to offer their services to the end users via the passive infrastructure of the municipal electronic communication networks and systems. This will increase the quality and quantity of the services offered by commercial operators to their users.

Municipalities should develop and use municipal electronic communications networks and systems to stimulate rural development and consequently reduce the digital divide in the Republic of Macedonia.

Municipalities in the Republic of Macedonia will practice the right to an inter-municipal cooperation for realisation of joint projects for constructing joint municipal electronic communications networks and systems for the development of the municipalities.

II.8.3 Measures

Measure 2.8.a Local governments shall, within one and a half year, adopt local ICT strategies. The National Information Society Council shall prepare quarterly reports on the progress made as regards adoption of local ICT strategies.

Measure 2.8.b Campaign on the advantages and benefits from constructing and development of municipal electronic communications networks as a basis for an information society.

Measure 2.8.c ZELS and the **NGO** sector in cooperation with the Government, the business sector and the foreign funds shall organize a series of public discussions and trainings for construction of municipal networks and

[31] Public access internet points, tele-centres, digital clubs, terminals. Defined in NSDISAP, pillar e-Citizens
[32] Case study for the e-point with delegated municipal responsibilities in the settlement Orizari – Veles is – developed by the Foundation Metamorphosis and the Municipality of Veles (2007)

pilot municipalities that will implement the concept of Municipal Wireless and Municipal FTTx.

Measure 2.8.d A conference shall be organized for the promotion and establishment of a public-private partnership for the construction and development of sustainable municipal electronic communications networks and systems supported partially by interested donators.

Measure 2.8.e Initiative for inter-municipal border cooperation of municipalities from the Republic of Macedonia with municipalities from the neighbouring countries; in particular, the Euro-regions will be used for the realisation of pilot projects of the sort.

Measure 2.8.f Local government shall put in place the ICT infrastructure necessary for the functioning of the e-points in the rural areas[33].

Measure 2.8.g Local government in cooperation with the **Government of the Republic of Macedonia** shall provide sustainable, controlled and secure internet connection[34] for the primary and the secondary schools, as well as access to education related e-services.

II.9. ICT for Development of Small and Medium Enterprises

II.9.1. Trends and current situation

The pillar of the European economy are the 20 million small and medium enterprises (SMEs). They represent 99% of all EU enterprises and provide approximately 65 million jobs. In the Republic of Macedonia, SMEs represent over 98% of all enterprises and have over 250 thousand employees (over 53% of the total number of employees). Usually, SMEs are divided into:

- dynamic and flexible organisations, with larger power of innovation and large assortment of products and services,
- traditional ones, based on inclusion of the family, included in the local business environment
- starting, vulnerable organisations fighting for survival and existence.

They create added value, new ideas and are the main source of new jobs. By using information and communication technologies (ICT), SMEs have better development opportunities:

- they become able to buy and sell via Internet
- they reduce total costs

[33] having in mind the model described in the case study.
[34] taking into consideration the positive experience with the USAID project - MKConnects

- they increase productivity
- they manage change more efficiently.

The EU efforts defined in the i2010 strategy for the establishment of a competitive and dynamic knowledge-based economy will largely depend on the opportunities for development and the prosperity of SMEs. In this context, ICT not only provide products that are innovative by their nature, but they are also among the major driving forces of change in the contemporary economy.

Knowledge has become a very important production factor in the leading economies. Transition to economy led by new knowledge is a priority of the EU political agenda "go-digital". e-Economy introduces new opportunities for the SMEs, in the ICT industry as well as in other sectors. Its influence varies from sector to sector.

With e-Economy, SMEs can achieve the desired goals:

- much more potential users (B2C),
- to work more efficiently with other businesses (B2B),
- to communicate with the Government (B2G).

Hence, the goal should be two-fold: to improve the competitiveness of the ICT sector on one hand, and to facilitate efficient introduction and application of ICT in the SMEs on the other.

In the last 15 years when the complete transition cycle was underway in the Republic of Macedonia, SMEs became the basis of the economic flows and undertook the role of leader and promoter of the new way of doing business and stimulated competition on the ICT market.

A large number of small and medium enterprises have their own internet web page (although most of them do not have quality content, use outdated technology and design, or are still under construction) they have their own e-mail accounts and develop multimedia contents. However, there is a dilemma – why would they use and invest in advanced electronic communications – Internet, when the number of active users in the country is small and the number of new potential clients is consequently small.

Still, enterprises that cooperate with foreign companies are aware of the advantages of the electronic communications, and how they reduce communication costs and increase the quality of their business operation. Internet became a basic need, and it is safe to conclude that the use of Internet is increasing.

II.9.2. Measures to be taken

In Europe more than two thirds of the SMEs use the ICT services as business tools. Data demonstrate that medium enterprises have already overcome the gap with the large enterprises, while small and micro enterprises are catching up fast.

In order to accelerate this process in the Republic of Macedonia, the Government of the Republic of Macedonia should:

Measure 2.9.a Encourage enterprises, including SMEs, to use ICT on larger scale and to build mechanisms that will enable enterprises to successfully take part in the global market, so as to increase Internet and PC penetration and consequently decrease the VAT for ICT products and services for the citizens.

Measure 2.9.b Encourage establishment of communities of consumers and traders, increase e-confidence and protect consumers through full regulation of consumer rights on the Internet.

Measure 2.9.c Adopt a package of legislative and organisational changes so as to allow e-Work, and distance work and distance learning.

Measure 2.9.d Conduct a campaign for raising the public awareness for efficient use of ICT equipment and information society services from the aspect of the operators and the data centres.

Measure 2.9.e Prescribe measures for obligatory introduction of a Service Level Agreement (SLA) for ICT services.

Measure 2.9.f Identify and eliminate obstacles for the appointment of a Certificate Authority and support modification of electronic documents and signatures in the domestic and cross-border trade as well as in the communication with the Government institutions.

Measure 2.9.g Develop a strategy for introduction of standardized ICT solutions for the small and medium enterprises and directives for their support by the Government.

II.10. Macedonian Academic Scientific Research Network

II.10.1. Status

The information and communication infrastructure for scientific and research activity in the Republic of Macedonia is inadequate and cannot satisfy the needs of scientific and research institutions and of the personnel involved in scientific and research activity.

In the Republic of Macedonia there are still higher education institutions which conduct scientific and research work, but have no access to internet at all.

Improvement of electronic network for the science, research and education and connection to the European network is an imperative without which it is not possible to expect relevant results in the field of science.

Development of the communication and information infrastructure for science and research and integration in GEANT[35] has a priority importance.

II.10.2 MARNet

Macedonian Academic and Research Network (MARNet) has been established with the support by the Ministry of Science of the Republic of Macedonia in 1994, as an organisational unit of the Working Community of the University Ss. Cyril and Methodius in Skopje. Following the example of similar academic network organisations – NREN (National Research and Educational Network) in Europe and in the region, the mission and primary functions of MARNet were more widely defined, covering an organisation of unique academic and research network in the country (NREN for Macedonia).

Goals, mission, organisational structure, as well as the financing of MARNet have been regulated by the MARNet By-Law, which among other issues, covers the following:

- managing the top Macedonian domain on the internet network (ISO 3166 code MK)
- planning, development, organisation and management with the communication infrastructure to the MARNet users
- establishing communication relations with networks of the same kind in other states and international networks
- development, organisation and maintenance of network services
- projecting and supply of computer and communication equipment
- participation in projects important for the academic community, and performance of education and consultant activities for its users
- cooperation and membership in international organisations and associations of academic research networks and alike;

[35] http://www.geant2.net/

In order to realize its goals, MARNet, at the time of its foundation has been included in the most important networks in Europe, EARN (1994), TERENA (Trans-European Research and Education Network Association, and it is also one of the founders of CEENet (Central and East European Academic REsearch Networks).

Although there is a gigabit link to all campuses of the University Ss. Cyril and Methodius in Skopje, there are still a few institutions (faculties and institutes) which cannot feel the benefits from the gigabit network due to the incomplete network equipment in the institutions themselves.

Operation of the network is mainly financed by the Government of the Republic of Macedonia, although significant improvements and modernisation were being conducted in the past several years as a result of the participation of Macedonian experts from UKIM in international projects. Namely, a gigabit optic network has been constructed in Skopje, which connects the five main campuses of the University, financed by funds donated by the Austrian Government, while the active network equipment, as well as radio back-up system was financed by the NATO Program for Science and Peace.

International connection in academic networks of South-East Europe and GEANT has been realized through the projects SEEREN (South East European Research and Educational Network) and SEEREN 2, financed by Sixth Framework Programme of the European Union.

With the full implementation of the Law on Electronic Communications, an opportunity is being opened for reducing the prices of communications services by the entrance of new competitors which will offer broadband services necessary for the functioning of NREN links. Until now no competitor who will offer broadband communications has emerged and due to this reason it can be stated that the greatest improvement made so far is the construction of own communication infrastructure.

II.10.3. Measures

Measure 2.10.a Universities, MARNet, National Council for Information Society and the competent state institutions should make an analysis and propose a model accompanied by a legal solution regarding the institutional transformation of the national academic and research network, which will serve as grounds for overcoming the current financial and infrastructural problems.

II.11. Information Security

II.11.1. Preconditions for information security and communication privacy

All social structures in the Republic of Macedonia need to be aware of the need for security of information and the need for introducing and implementing measures for protection of the occurrence of information "insecurity".

Any social structure (public administration: central and local, private sector, civil society) as well as any citizen of the Republic of Macedonia have the right to be safe from an information point of view and to be responsible at the same time. They take care for implementing the necessary measures for information security and apply the agreed measures for its accomplishment within the scope of their competencies and possibilities. Responsibility for information security is a common obligation and cannot be transferred.

Privacy of communications and protection of personal data are part of the basic freedoms and rights of citizens. Constructors of ICT infrastructure and those who offer the relevant services should take care for preserving these rights within the frames of their competencies and possibilities, and in compliance with the legislation and international experiences.

II.11.2. Priority Determinations and Necessary Measures

II.2.11.2.1. Building social and personal awareness about the existence of the information insecurity and need to construct capacities and to know how to minimize it, i.e. for protecting from it

Competency (knowledge and experience) about information security represents a "new" category of knowledge and skills. In information secure society all entities must be aware of the risks coming form information insecurity, consequences and responsibilities for ensuring the necessary level of information security. An improved information security of the ICT infrastructure in the country results in increasing the competitiveness, especially on the global market.

Measure 2.11.a. Preparation of a National Report and Estimation of the Awareness of Information Insecurity and needs for raising the level of knowledge and skills for increasing the information security in all segments of the society.

Measure 2.11.b. Promotion and recommendations for organisations (public administration, economy, civil sector) for introducing systems for managing information security and the ICT infrastructures which they use.

Measure 2.11.c. Introducing a certificate system for successfully managed and used systems for security of information and ICT systems for organisations, as well as annual mandatory revision.

II.2.11.2.2. Ensuring the Fundamental Human Rights and Protection of National "Intellectual Capital" – Knowledge, Information and ICT Infrastructures

Building an information society by introducing the necessary measures for information security may not be realised by breaking the fundamental human rights and basic principles of democracy. The basic criteria for information security should be observed in this process: confidentiality, integrity and accessibility (C.I. A.)

Measure 2.11.d. Preparation a package for changing the current legislation with the aim for achieving information security from the aspect of ICT, by taking into account, at the same time, the fundamental human rights, freedom of expression, free access to information, protection of personal data.

Measure 2.11.e. RE-evaluation / Revision of current legislation and regulatory framework – whether it provides for sufficient protection of **the national and individual "information capital"** and of the ICT infrastructure.

II.2.11.2.3. Protection of Privacy of Communications and Services

Privacy and protection of personal data of natural persons – users is an integral part of information society. The user of information and communications services should be completely protected from misusing his/her personal data and privacy, by the entity providing the services or by third parties. This means that the organisation i.e. the service provider will undertake all technical and organisational measures in order to protect the privacy of users in compliance with the current legislation in the country.

Measure 2.11.f. Analysis of the current legal framework which has impact on the protection of privacy of electronic communications and services and proposed measures for improving the situation.

II.2.11.2.4. Introducing and Improving the Systems for Risk/Crises Management

Achieving the necessary (legally defined) conditions for information security for any organisation and individual.

Measure 2.11.g. Preparation of a feasibility study about the need for a Monitoring Centre for National and Global Threats and Risks from the aspect of ICT at real time.

Measure 2.11.h. Introducing a system for regular tracking, identification and proposing measures for reducing the "organisational sensitiveness / vulnerability to "information threats" in all sectors of the society.

II.2.11.2.5. Promotion, Readiness and Participation in International Cooperation in the Field of Information Security on National and International Level

"Production" and use of information via relevant ICT technologies enable crossing the international borders, which is basic precondition of the global society. Security implications have no borders, therefore, dealing with information threats and achieving information security on a satisfactory level is a challenge and opportunity for cooperation without any borders or limits. The National Strategy should emphasize the development of international standards relevant for information security and integrity and the contribution of Macedonian entities in this international process.

Measure 2.11.i. The inclusion of the Republic of Macedonia as an active participant in international alliances for "fight against information threats".

II.12. Interoperability

II.12.1. General Notions and Definitions

Information society creates a variety of new information and communications technologies and the interoperability in conditions of separately developed and different systems is of great importance.

Interoperability represents an opportunity for connecting people, data and various systems. This word can be defined from a technical point of view and from a general point of view, taking into account the social, political and organisational factors.

The non-existence of interoperability may cause negative consequences. If the competitive products and services are interoperable, the result can be a monopoly, or even complete distortion of one market. Due to this reason it is necessary that the interoperability is encouraged by the competent state institutions.

According to ISO/EC 2382-01, Information Technology Vocabulary, Fundamental Terms, interoperability is defined as: "ability to communicate, execute programs or transfer data among different functional units where the user does not have to have significant knowledge (does not have to have knowledge at all) about the unique characteristics of those units".

In contrast with such a technical definition of interoperability, it happens very often that the interoperability become an issue of organisation. The following expression can also be found: *interoperability of business processes (IBP) which is a condition where one process follows certain standards by which it achieve its goal regardless of the ownership, location, production or the design of the computer system which is used.* This type of interoperability is one of the most actual ones on a world level. The most

attractive feature of interoperability of business processes (IBP) is the fact that one business process can begin and end at any place in the world regardless of the type of machine or program equipment which is sued for its automation.

More important goals of IBP are:

- Allowing systems and products to operate with other systems or products without additional efforts by the user
- To increase the productiveness by automation of human labour
- To eliminate the unnecessary business processes and multiplication of data
- To minimize the faults from manual processing
- To encourage the development of innovative internet-based business processes
- To improve the privacy by giving to the users complete control over their data, etc.

One of the biggest challenges (and a barrier at the same time) of widely spread of information and communications technologies are the different organisational forms of national, regional and local levels. Interoperability of information societies requires that all these organisation forms be able to exchange information and have access to each other and to services and contents placed on various administrative layers.

Also the need to interoperability on three different levels has been noted:

- Interoperability of administrative processes (organisational interoperability) for:
  - important events for citizens – birth, marriage, insurance, (health, pension…)
  - business events – incorporation of a company, tax payment, announcing tenders…
- Mutual understanding of information (semantic interoperability): Systems should be able to mutually understand their languages. For example: a birth certificate is quite a standardised document, but it looks different in different countries
- Technical Interoperability: computers should be able to "talk" with each other. This level of interoperability is most often achieved by standardization.

If interoperability is ensured, many administrative barriers will be removed and the free movement of businesses and citizens will be facilitated, not only on a national, but also on an international level.

II.12.2. Current Status and Measures

Currently, the Strategy for the development of Information Society has been adopted in the Republic of Macedonia and several projects have been implemented related to e-Government. There is a need for continuation of the e-Government projects according to European standards, with a special emphasis on interoperability of systems.

Public authorities can accelerate the development of information society as legislators, regulators, promoters and public procurement agencies. They must ensure that legislative and regulatory conditions create business enabling environment which attracts investors, they must assist in innovation and economic development and take care of the interests of

consumers. They must have a leading role regarding the demand of services by offering their public services on-line.

Interoperability of **electronic identification is an** especially important aspect. It means that Members of the European Community, as well as the world information society will install a system that will recognise the electronic means of identification of people, of animals and devices. This identification in a unique way will be used in all services offered by the society.

> **Measure 2.12.** Preparation of an analysis and recommendations **about the interoperability of services, in technical, semantic and organisation** sense, taking into account international standards[36].

According to the strategy for the development on the level for Europe by 2008, a standard will be established which all member state will implement for interoperability of electronic identification and electronic services.

II.13. ICT Research

The i2010 Programme lays down three priorities for the establishment of a European Information Society. One of the priorities is innovation and investment in research in the information and communications sector for the purpose of promoting economic growth and increasing the quantity and quality of new employments.

At world level, it has been concluded that countries with a high level of productivity are characterized by large investments in ICT research and development (RD). These countries attract more foreign investments and have more open markets for trading. Successful globalisation and market delocalisation, and consequently attracting of investments, are fully conditioned by the aforementioned investments.

It is known that Europe is lagging behind the most developed countries in the world, such as USA, Japan, and Korea, relating to the percentage of investments in research in the area of information and communication technologies. These countries invest in research in the ICT sector over one third over their aggregate public and private investments in research. In Europe this percentage is around 20.

In order to reduce this gap, the European Commission has recently started two new initiatives for intensifying research in the information and communication technologies, these are the Seventh Framework Programme (FP7) and the Competitiveness and Innovation Programme (CIP). Europe's goal is to achieve an aggregate investment in research and development of 3% of the GDP, and the achievement of this goal calls for grater investment in research in the ICT sector.

The FP7 defines six technological pillars of ICT:

[36] Пример: http://www.oasis-open.org

1. Nanoelectronics, photonics and integrated micro/nano systems.
2. Ubiquitous telecommunication networks and telecommunication networks with unlimited capacity.
3. Embedded systems, calculations and control.
4. Software, networks, security and confidentiality.
5. Knowledge, cognitive and learning systems.
6. Simulation, visualisation, interaction.

Compared to other European countries, the Republic of Macedonia is significantly lagging behind in investment in research and development. In particular, it is necessary to increase investment in the development of information and communication technologies. These effects are two-fold: firstly, the development of ICT creates new jobs and it is one of the most propulsive sectors. Secondly, the development of information and communication technologies ensures new jobs and development of the economy in general.

Especially it is essential to intensify the investment in research of information and communication technologies by the private sector. In the technologically most developed countries (EU-15, USA, Japan), the private sector participates with a far larger investment percentage in research and development compared to the public (3-4 times larger). There are a number of segments in the area of information and communication technologies where small and medium enterprises can participate in the research and development.

It is very important to attract prominent foreign companies that would invest in the Republic of Macedonia, even with small production facilities in the starting period.

II.13.1 Programme for research and development of information and communication technologies as basis for an information society

A strategic determination of the Republic of Macedonia is to become a member of the European Union, and in order to fulfil this determination, Macedonia, in the following 5 to 6 years, should at least achieve the level of development of the new EU Member Countries through accelerated steps and measures.

To achieve this it is necessary to obtain financial support, and the best model for that is the creation of a Programme for ICT Development under the Information Society Development Fund. Each year, the Government will allocate budgetary funds for the Information Society Development Fund and thus, the money of the tax payers, in particular the telecommunication companies, will be invested in the development of this sector. In addition, foreign donors, as one of the major financial sources for development projects, will have more confidence in the projects supported by the Fund, which in turn will result in increasing the annual amount for ICT research projects.

The funds from the ICT Research and Development Programme will be used for financing projects of strategic interest for the Republic of Macedonia and of vital importance for the implementation of the information society related strategies that have been and will be developed in future. The Programme will support projects proposed by

the business sector[37], academic institutions, independent development centres, consulting houses, civil sector, and will co-finance research projects supported by EU and other international foundations and institutions.

By establishing the ICT Research and Development Programme under the Fund for the Development of the information society, the Republic of Macedonia will prove that the determination to develop the information society is not only declarative and that concrete steps for its fulfilment are being undertaken. Without such a Fund, the Republic of Macedonia will hardly be able to achieve the goals laid down in the National Strategy for the development of Information Society and the National Strategy for the development of Electronic Communications with Information Technologies.

Measure 2.13. The Government will propose a Law on the Establishment of an Information Society Development Fund of the Republic of Macedonia. The ICT Research and Development Programme will be one of the pillars of this Fund.

[37] A number of the projects supported by the Program will finance innovative solutions proposed by the small and the medium enterprises

IV. Conclusion

This document, the Strategy for the development of Electronic Communications with Information Technologies was developed in full compliance with the directives, programmes and strategic determinations of the European Union, in particular the Strategic Framework i2010, as concerns the part on ICT infrastructure.

EU directives maintain that each country should develop own programs and strategies that are compliant with the set strategic directions and goals, but with maximum level of respect for the local specificities and the different development levels and needs. This provides us with an opportunity to base the development on our strong features, due to the right decisions brought in the past, and will also allow us to remedy some mistakes that have had adverse effect on the development.

Macedonia entered the nineties with a telecom operator which had an excellent infrastructure, almost fully digitalized, and which was internationally recognized as an acknowledged technological leader in the broader region. This infrastructure (excellent backbone based on the latest IP/optical fibre technology, and cupper trunks, short enough for the broadband internet technologies) is existent today, although utilized only to a small extent as a result of some decisions which were taken without having a long-term strategy in this area.

This Strategy proposes measures, such as the preparation of an analysis of the need for a functional separation[38] of the incumbent operator into one unit that will operate the passive part of the network (cables and cable canalization) and one unit that will operate the active part (servers, routers, etc.). With such a separation the regulation of the incumbent operator will be simplified and it can be expected that prices for access to the infrastructure will become more affordable.

This strategy covers the necessary legal and regulatory environment as basis for the development of the electronic communications and the efficient operation of the regulator. The directives proposed for the operation of the regulator will provide for additional competitiveness on the market of electronic communications as a basic precondition for the development of the information society.

Concurrently with these measures aimed at overall development, under the Universal Service Strategy the Government will ensure that a certain minimum level of service is available to all citizens at an affordable price. The definition of what should be "minimum level of universal service" will periodically be revised, and if the market does not provide that service at an affordable price, an intervention will be made through the Universal Service Fund.

[38] The separation of a powerful telecom operator into several units has been done before. In the first half of the eighties in the USA, the then existing AT&T was separated into seven regional local operators and AT&T Long Lines due to its enormous power and monopolistic position on the market.

The broadband Internet has large importance for the entire economy and can be compared to the importance of the railway and the electrification for the previous century. Being behind in this area means guaranteed absence of progress in the entire country and that we cannot allow; hence, all measures laid down in this strategy must be vigorously implemented. The measures for e-Inclusion will ensure that all citizens enjoy the benefits of the new epoch. The digital divide in any form can be a serious threat and therefore the measures in this Strategy aim at overcoming of this gap.

The Republic of Macedonia must respond appropriately to the future freeing of radiofrequency ranges (digital dividend) that will happen after the forthcoming digitalization of the radio broadcasting sector. These new radiofrequency ranges may be efficiently employed for the liberalization and development of the so called "wireless economy".

Units of local government will have a very important role for fast introduction of broadband internet. This is a novelty for the Republic of Macedonia and it will have to work hard to make it function as soon as possible.

This Strategy is primarily oriented towards residential users and small and medium enterprises, which are expected to be leaders of development in the forthcoming period. Therefore, there is a section in this Strategy that treats SMEs and their specific needs. Scientific and research activities have their place in the Strategy as well; the final resolution of the status of MARNet is expected to provide domestic scientists with the network that is so essential for their work.

Information "insecurity" may represent a significant threat for any ICT scenario; therefore, this issue is planned to be treated on a national level as well.

The successful implementation of all these strategies (the National Strategy for Electronic Communications with Information Technologies, the National Strategy for the development of Information Society and the National Strategy for the development of Radio Broadcasting Industry), will depend on the successful establishment of a new Ministry for Information Society, the National Council for Development of the Information Society and the Information Society Development Fund. Under this Fund, the ICT Research and Development Programme will ensure better competitiveness and sustainability of the Macedonian economy by way of innovative products and services that facilitate the transition to a knowledge-based economy.

Within 3 months following the adoption of this Strategy by the Assembly, the Government of the Republic of Macedonia in cooperation with all competent state agencies, the private and the civil sector, will develop an Action Plan for Implementation of the Measures prescribed with this Strategy. This Action Plan will be developed in accordance with the contemporary methods of planning and monitoring of project activities and will ensure transparency and time management during implementation of the projects.