REPUBLIC OF CROATIA

GOVERNMENT OF THE REPUBLIC OF CROATIA

Strategy for Broadband Development in the Republic of Croatia for 2012 – 2015

Zagreb, October 2011

Title of the document

Strategy for Broadband Development in the Republic of Croatia for 2012-2015

Purpose of the document

The establishment of strategic objectives for the development of broadband networks and services as one of the key branches of economic development and the definition of guidelines and tasks for institutions competent for the implementation of this Strategy, including the deadlines for their execution

Status

Final document

Source

Working Group for the drafting of the proposal of the Strategy for Broadband Development in the Republic of Croatia, established by a Decision adopted by the Minister of the Sea, Transport and Infrastructure of 27 November 2008 (Class: 080-01/08-01/140; Reg.No: 530-10-08-9 KA)

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CONTENTS

Introduction

"The expansion and accumulation of knowledge and awareness depends on the establishment of a developed communications network for high-speed and efficient data transfer."[1]

The development of fast and ultra fast access networks today has a revolutionary impact equivalent to that of a transport network or a power supply network a hundred years ago. Services have been converging towards a digital world, they are universally available on any device, including so-called smart phones, personal computers, digital radio or high-definition television (HDTV). According to forecasts, by 2020, digital contents and applications will be almost exclusively delivered over the internet.

Such great potential of information and communication technology may be set off by means of a well-regulated and efficient activity cycle. Attractive contents and services must be available in an interoperable environment and online environment without limits. This results in an increasing demand for access speed and capacity, which serves as a basis for investment into fast and ultra fast communications networks. The application and acceptance of fast and ultra fast communications networks in practice opens the path towards new innovative services and contents using higher access speeds.

Because of the global economic crisis, governments of many countries, including the European Union, bearing in mind the positive effects of use of broadband access infrastructure to the economy in general, have established special funds or ensured special financial resources for the development of this infrastructure, in particular by building wired and wireless next generation networks in areas without internet access or in areas where such construction is not profitable.

Part of such activities includes efforts invested by the European Commission and EU Member States to develop a broadband development strategy with a view to speeding up the upgrading and expansion of electronic communications networks.

Committed to the principles of a knowledge-based society, which is based on a balanced social and economic development and respect for the principles of democracy and rights and needs of individuals, as well as on the principles of (a) free market economy and active European Union accession policy, the Government of the Republic of Croatia has chosen a balanced and straightforward policy for the development of broadband access infrastructure and broadband services, which will be consistently implemented by the competent institutions (state administration bodies and other public bodies and all other participants in the implementation of this policy) within the scope of their competences. This first of all refers to continuous monitoring and implementation of the policy for the development of information society and its technological infrastructure in the European Union, the adjustment of national legislative and regulatory frameworks, and other activities aimed at encouraging broadband development and promotion.

[1] Strategy for Sustainable Development of the Republic of Croatia (Official Gazette, No. 30/09)

The Strategy for Broadband Development in the Republic of Croatia for 2012 – 2015 (hereinafter: the Strategy) describes in its Chapter 1 the starting points for its adoption and implementation in accordance with benchmarks of the Digital Agenda for Europe[2], which refer to broadband access, to the broadband development situation in the Republic of Croatia up to 2011, and to the expected economic impacts of broadband development at the national level. Chapter 2 lays down the main principles for implementation of this Strategy, such as the principles of service and technological neutrality, including the net neutrality principle. Chapter 3 of the Strategy describes the main elements of the value chain in the broadband area, including users, services and contents, as well as electronic communications networks and network connection services. The main elements of the value chain represent a starting point for the determination of the main and specific objectives of the Strategy, which are provided in Chapter 4 together with measures for the implementation of Strategy objectives, which are then elaborated in Chapter 5. Chapter 6 contains an assessment of financial and overall feasibility of the Strategy, and Chapter 7 provides the contents of the Implementation Programme for the Strategy as well as the system for monitoring and evaluation of implementation of the Strategy and Implementation Programme. Chapter 8 contains a list of used abbreviations, and the Annex, which makes a constituent part of this Strategy, provides an assessment of the current situation of broadband access development in the Republic of Croatia.

This Strategy represents a document intended for the business sector, the civil society, state administration bodies and other public bodies, for academic and educational institutions, that is, for all market participants that have been, or will be involved, in the development and promotion of information society development. All competent state administration bodies and all other public bodies are invited to follow the principle of efficient and responsible interventions to encourage the development of efficient competition and to promote and encourage a balanced development of broadband Internet access, together with the effective implementation of the principle of reduction of the digital divide between the Republic of Croatia and Member States of the European Union.

Therefore, the intention of the Strategy is to continue positive broadband development envisaged in the *Broadband Development Strategy in the Republic of Croatia by the year 2008*[3] , and to improve the quality and scope of this development by means of greater involvement in the elimination of the noticed obstacles and problems, in particular at the level of local and regional self-government, which must be allowed to actively participate in the promotion and development of broadband access.

The main values achieved through the implementation of this Strategy include infrastructure development for the provision of public services, such as e-government, e-health, e-education, e-business and others, as well as support to the development of rural areas, areas of special state concern and business zones in the Republic of Croatia.

[2] EC Communication "A Digital Agenda for Europe", European Commission, Brussels, 19 May 2010

[3] Broadband Development Strategy in the Republic of Croatia by the year 2008, Government of the Republic of Croatia, 13 October 2006

1 Main starting points for the Strategy

1.1 A Digital Agenda for Europe

In relation to broadband development at the European Union level, A *Digital Agenda for Europe* for the first time introduces concrete measures and objectives, as well as recommended time limits for the fulfilment of these objectives in order to achieve the greatest benefits from this development for the economy and citizens of the European Union.

Key performance targets of *A Digital Agenda for Europe* are the following:

1. Broadband availability:
   a) basic broadband ⇒ 100% of EU citizens by 2013,
   b) fast broadband (30 Mbps or more) ⇒ coverage for 100% of EU citizens by 2020,
   c) ultra-fast broadband (100 Mbps or more) ⇒ coverage for 50% of EU households by 2020;
2. Digital single market;
3. Digital inclusion:
   – increase regular Internet use to 75% of EU population by 2015;
4. Public services;
5. Research and development:
   – increase public investment into the development of information and communication technology to EUR 11 billion;
6. Low carbon economy.

Member States of the European Union have adopted their own national plans and broadband development strategies in the last few years, irrespective of European Commission efforts to promote broadband development. National plans and strategies differ between Member States, but they all contain the following common characteristics:

- plans and strategies refer to three- to five-year periods for basic broadband, and seven or more years for fast and ultra-fast broadband access;
- objectives refer to coverage of a certain percentage of the population, that is, households with broadband access of a certain or lowest speed;
- objectives differ according to basic broadband access and fast and ultra-fast broadband access;
- plans and strategies promote, for the purpose of achievement of the above-mentioned objectives, the introduction of next generation networks with the application of fibre technology based on the FTTx standard in fixed communications network, and the allocation and use of the available RF spectrum for the development of mobile communications networks;

- funds for the achievement of the set goals are ensured.

The availability of basic broadband in national strategies of EU Member States mostly refers to 100% coverage of the population with access speed from 512 kbps to 2 Mbps by the end of 2010.

The availability of fast and ultra-fast broadband in national strategies of EU Member States mostly refers to 100% coverage of the population with access speed from 20 kbps to 100 Mbps by the end of 2015.

1.2 Environment for further development of broadband access in the Republic of Croatia

The development of broadband services is of particular importance for the economic development of the Republic of Croatia and it is of key importance for the development of a knowledge society in the Republic of Croatia. The newest broadband services (online education, social networking, high-definition television, working from home and other) require certain transfer capacity (more than 20 Mbps) which may be achieved by means of fibre access infrastructure and appropriate wireless next generation technologies.

The required environment is created through the implementation of priorities from the Regional Development Strategy which refers to development and improvement of information and electronic communications infrastructure. Local and regional self-government units align their development documents, in particular county development strategies and development plans, with this Strategy in order to enable the preparation of projects corresponding to their needs for broadband access.

This means that adequate incentives need to be created for investment into wired and wireless next generation networks in the first place by ensuring physical planning preconditions which do no restrict further development of these networks. Since construction of electronic communications infrastructure and associated facilities in mobile communications networks has been slowed down due to the lack of appropriate physical planning preconditions, the planning of these networks needs to be encouraged in the upcoming period, which includes amendments to physical planning documents that will allow their further development.

The analysis of development of broadband access in the Republic of Croatia shows that it is lagging behind in the number of broadband connections in relation to the average in European Union Member States. The number and density of broadband connections is unevenly distributed in counties resulting from an unfavourable demographic structure, lack of knowledge about information and communication technologies by some citizens, and insufficient availability of broadband infrastructure in all Croatian regions. The analysis of current penetration of technology indicates the domination of one type of access related to the existing copper network, which satisfies the existing capacity but does not permit more significant progress in broadband availability and access speed.

Therefore, the following key challenges for broadband development in the Republic of Croatia may be recognised:

- the alignment of development strategies and development plans at the local and regional level with this Strategy;

- the lack of appropriate physical planning preconditions which do not restrict further development of electronic communications infrastructure and associated facilities, but encourage broadband access;
- the lack of computer skills, including Internet and broadband access, as well as unawareness about possibilities offered by information and communication technologies;
- insufficient and uneven regional distribution of personal computers and broadband connections and of availability of broadband access infrastructure;
- limited offer of electronic communications services and contents, in particular in Croatian, which require broadband access;
- unsatisfactory usage of information and communication technologies among citizens and in the economy;
- personal computers and broadband Internet access are not affordable for all households.

Complete switchover to digital technology in the RF band intended for broadcasting[4] released the radiofrequency spectrum of the digital dividend with very favourable propagation features and offering optimum balance between transfer capacity and coverage range. The digital dividend may satisfy the increasing need for new wireless communications services, allow the expansion of broadcasting services and ensure the necessary radio frequency spectrum for other social and economic purposes. Broadband application may help overcome the digital divide by ensuring equal access to new information and communication technologies to the entire population of the Republic of Croatia. The digital dividend may be used as an incentive in broadcasting and wireless communications industry as well, and it may exert significant influence on competition and development and on social and cultural changes. In order to benefit from this opportunity, future use of this part of the spectrum needs to be based on coordinated access in any scenario of possible use of the digital dividend:

- in broadband networks;
- for digital television;
- for radio microphones, short-range wireless devices and similar applications.

1.3 Impact of the Strategy on the Croatian economy

The purpose of the objectives and measures of this Strategy is the creation of preconditions for further development of broadband Internet access and the familiarisation of citizens and the business sector with broadband use and all the advantages offered by broadband use in different segments of society, such as education, health and public administration.

The introduction of broadband services into different segments of society contributes to their efficiency. Furthermore, the development of broadband access will contribute to the

[4] Analogue to Digital Broadcasting Switchover Strategy in the Republic of Croatia, Government of the Republic of Croatia, 31 July 2008

competitiveness of some jobs and economic branches. The availability of broadband access services, both in the geographical and financial sense, as well as the quality of the service, are important factors for foreign investors when adopting decisions on whether to invest in a certain country.

Greater efficiency and the increase of competitiveness in all segments of society are a main precondition for the development of a knowledge-based society, which includes the development of study programmes and academic activities aimed at raising the level of knowledge about broadband technologies and services based on broadband infrastructure in academic institutions, in particular of activities and programmes within the framework of life-long education concept. This contributes to the economic growth and development of the Republic of Croatia and to its long-term competitiveness at the international level. Therefore, the development of broadband services must represent a basis for development of the Republic of Croatia, which is the aim of the objectives and measures of this Strategy in the upcoming period.

Investment into broadband access development are promising if approached in a responsible way, which is proven by the results of numerous studies. According to the results of a research conducted for the European Commission[5], the increase in the number of broadband users influences the growth of gross domestic product (GDP) and the more developed the country the greater the influence. Forecasts predict a possible GDP growth of 0.47% in countries with less developed broadband access, of 0.63% in countries with fast-developing broadband access, of 0.70% in big industrial countries and 0.89% in the most developed countries, which are using all the possibilities offered by the knowledge society to their full extent. It is also expected that investment into broadband access by 2015 will create about one million new jobs in EU Member States and thus provide incentives for the economy amounting to EUR 850 billion[6].

Other studies[7] elaborate in more detail the above-mentioned assumptions and mention four indicators directly related to the creation of benefits from broadband access - average income, number of computer users, number of smart phone users and network coverage. On the basis of assessments of direct and indirect benefits from broadband development, the analyses show that, in the period between 2010 and 2019, the Republic of Croatia could enjoy direct benefits amounting to between EUR 2.2 and 3.2 billion. The studies also say that, generally speaking, a 10% increase in the number of broadband users leads to 1.38% GDP increase, which, in turn, leads to the increase in the number of jobs related to network development and maintenance, and to the increase of general economic activity resulting from increased usage of electronic services provided by broadband access.

Consequently, the implementation of this Strategy, as well as the adoption of related strategic decisions, must be observed from the point of view of necessary investment, in particular into electronic communications infrastructure and associated facilities in mobile and fixed communications networks, but also from the perspective of expected impacts and benefits that might arise from such strategic decisions.

[5] "The Impact of Broadband on Growth and Productivity", MICUS Management Consulting GmbH, 2008

[6] "Commission earmarks €1bn for investment in broadband – Frequently Asked Questions", MEMO EC, 2009

[7] "The impact of broadband in Eastern and Southeast Europe", Frontier Economics Ltd, 2010

2 Strategy implementation principles

The Government of the Republic of Croatia, state administration bodies and other public bodies and competent institutions, together with the bodies of local and regional self-government units, contribute to the creation of conditions for the fulfilment of objectives laid down in the Strategy by applying the following basic principles. This Strategy recognises and recommends the application of three basic principles which are further elaborated in the following text:

- the principle of service and technological neutrality,
- the principle of net neutrality,
- the principle of inclusion of broadband Internet access among universal services, depending on future development of the relevant regulatory framework of the European Union following a previous market analysis procedure.

The application of the principle of service and technological neutrality, as one of the basic principles underlying this Strategy, is aimed at achieving the following:

- not giving preference to any particular type of service of technology,
- ensuring conditions for balanced development and building of infrastructure for broadband access on the basis of the principle of openness, equality and compliance with the legislative framework,
- encouraging supply and demand for services that will be provided on the basis of broadband infrastructure,
- ensuring effective competition in the electronic communications sector.

The appearance of certain measures of network operators which, first in the United States of America, and then, to a lesser extent, in some European countries, including Croatia, resulted in the violation of the basic principles of Internet as an open and neutral network allowing access to all standardised equipment which permits using applications and services selected by end-users and equal treatment of the entire internet traffic passing through the network, initiated a global debate about the preservation of neutral and open characteristics of Internet. The above-mentioned measures were aimed at discriminatory blocking and slowing down of Internet traffic, blocking of certain applications or opening of space for the creation of new business relations between network operators and providers of services and contents, which would also be based on the application of the above-mentioned discriminatory measures. These measures, which may be regarded as threatening net neutrality and Internet openness, were most frequently applied in such a manner that end-users were not appropriately informed of their use.

Therefore, in the process of building and use of the communications network for broadband Internet access in the Republic of Croatia, the principle of net neutrality must be applied and it comprises the following:

- measures for managing network traffic must be proportionate and appropriate and may not contain unjustified discrimination,
- the selection of user access to legal contents and services, as well as the use of applications of their choice,
- the informing of users and service providers about all measures for network traffic management which influence their access to contents, applications and services,
- the possibility to dispute decisions about network traffic management by users and service providers and the possibility to ask, where appropriate, for possible compensation of damage.

When the market reaches a certain level of development, that is, when certain broadband penetration is achieved, depending on the future development of the relevant European Union regulatory framework in the area of universal services, the principle of inclusion of broadband within the scope of universal services should be considered. The application of this principle could additionally increase the number of users of broadband services in the Republic of Croatia thus encouraging greater demand for products and services and better use of economic, social and cultural potential of a knowledge society.

The application of the principle of inclusion of broadband Internet access within the scope of universal services in the future might include the following:

- the provision of certain services to individual end-users at prices different from prices resulting from usual market conditions,
- the provision of services of access to a fixed public telephone network to users upon their request, at an affordable price, without restrictions in terms of technical means of ensuring connection, regardless of whether wired or wireless technologies are involved,
- undertaking measures, where necessary, to ensure that data connection may support data transfer speed which is sufficient to enable effective Internet access while taking into account special market circumstances, including the most frequent Internet access speed used by the majority of users, and technical feasibility, provided that the measures in question are aimed at reducing market problems.

3 The value chain

Users, services and contents, electronic communications networks and network connection services are the basic elements in the broadband value chain which represent a starting point for the definition of objectives and measures for the achievement of these objectives.

Contents, services and electronic communications networks are planned, designed, constructed and developed depending on the needs and expectations of users because user experience with the quality of an individual service is at the same time the criterion for the quality of services and communications networks. User demands and expectations may include availability, transfer speed and communications network response, as well as reliability and safety.

The provision of broadband access requires parallel development of all of the above-mentioned elements of the value chain while respecting the fact that user requests and expectations change depending on the needs of target groups of users (economy, education, health, public administration, etc.). Reliability and safety of services, that is, of communications networks, is of key importance in the areas of e-banking and e-business, which implies more than broadband access alone. E-entertainment, as opposed to e-banking, places more emphasis on transfer speed and network response. However, broadband communications networks alone do not have the appropriate effect if not accompanied by appropriate contents and services on the supply side, and if on the demand side (user side), terminal equipment does not permit appropriate (in particular, simple and user-friendly) access to these contents and services.

The use of broadband access services depends on the availability of broadband access, the extent of offer of information society services, and the developed habit of users to use these services. The awareness of users about the existence of information society services is also important, as well as knowledge about the ways of using information society services. Within the framework of the value chain, the education of users for safe and effective use of services and communications networks is a basis for all segments of the value chain (elementary and secondary education, university education, life-long education).

3.1 Users

Under the framework of this Strategy, the target group of users includes all citizens and business entities to whom broadband access in business and everyday life is provided, regardless of their location, level of education, age or interest, which implies greater broadband penetration, sufficient speed and affordable prices.

A key target group of users of broadband services, which is of particular importance for this Strategy, consists of places where larger groups of people meet. These include educational institutions (schools, nursery schools and libraries), state administration bodies, local and regional self-government units, research and development institutions, health care institutions, cultural institutions, etc.

An important target group for the introduction of broadband access services consists of users from suburbs and rural areas familiar with the possibilities of the use of information

society services, which significantly contributes to balanced development of all Croatian regions.

3.2 Services and contents

Nowadays, broadband services, applications and contents make an important constituent part of information society, that is, of knowledge-based society that we have been systematically developing.

The following types of services are most important for the development of broadband access:

- information services (news, sport, weather, traffic information, entertainment, interesting facts, local information, electronic programme guide, etc.),
- communications services (instant messaging (IM), electronic mail, multimedia messages (MMS), videoconferences, forums, chat rooms, social networks, etc.),
- audiovisual services (IPTV, video on demand, personal video recording devices, audio on demand, etc.),
- entertainment services (games, games of chance, interactive game shows, etc.),
- services for the elderly and for persons with special needs ("live link", surveillance, etc.),
- e-education,
- e-business (e-commerce, e-banking, etc.),
- e-health,
- e-government,
- other services.

Broadband services are particularly important in the following areas:

- work and business (e-government, e-business, etc.),
- education,
- entertainment.

Nowadays, electronic communications services have been increasingly converging. The result of this convergence are integrated platforms for business, work, education and entertainment.

3.3 Electronic communications networks and network connection services

Broadband services may be provided over various electronic communications networks.

The most important electronic communications networks include:

- wired networks:
  - the existing telephone networks (xDLS – copper networks),

  - next generation networks (FTTx – fibre networks),
  - cable operator networks (coaxial networks),
  - hybrid fibre-coaxial networks (HFC).
- wireless networks:
  - GSM/GPRS/EDGE – second generation mobile networks,
  - UMTS/HSDPA/HSPA+ – third generation mobile systems,
  - Wi-Fi – wireless local networks,
  - WiMAX – wireless access,
  - LTE – fourth generation mobile system,
  - satellite broadband access.

Broadband access for small offices/home offices (SoHO) is ensured over xDSL technologies and cable technologies, as well as via some alternative technologies (Wi-Fi, WiMAX, etc.). Fibre networks are used, as a rule, for business users. New access networks are, as a rule, built as fibre networks regardless of the type of end-users.

3.3.1 Development of Next Generation Networks (NGN)

It is necessary to invest into new wired and wireless communications infrastructure and more efficient technologies and methods of use of the existing access infrastructure in order to satisfy market demand and fulfil requirements for access to high-quality broadband services. Current technological development will require the building of fibre networks and upgrading of wired and wireless networks by new technologies.

The infrastructure of Next Generation Networks (NGN) provides a sound basis for the development of electronic communications services and follows the development trend of modern electronic communications systems towards one single network, that is, the migration of the existing voice and data traffic towards single communications infrastructure for "traditional" voice communication, and for the provision of new, more advanced, communications services. The main concept of NGN is a single network conveying all types of information and services (voice, data, video, etc.). The concept of NGN changes physical and logical architecture of electronic communications networks depending on the manner of construction of network infrastructure.

The European Commission presented on 20 September 2010 *a Recommendation on regulated access to Next Generation Access Networks (NGA)*[8] which is aimed at encouraging access to next generation networks, and recommending national regulatory authorities how to regulate the access network. This Strategy recommends carrying out regulation of next generation access networks in the Republic of Croatia by means of market analysis of the market for wholesale network infrastructure access and of the

[8] European Commission Recommendation on regulated access to Next Generation Access Networks (NGA)

wholesale broadband access market in compliance with the above-mentioned Recommendation.

3.3.2 Increased availability of broadband access over existing access infrastructure

Although new transfer media currently permit higher speeds than copper, it is envisaged that copper will be used at least for a few more decades, that is, that it will have a significant influence on the development of broadband services in the Republic of Croatia up to 2015. Significant penetration of copper access infrastructure and application of xDSL technologies offers wide possibilities for providing quality broadband services to a large number of end-users throughout the world, with minimum necessary investment. The replacement of copper access infrastructure with fibre infrastructure requires, among other things, significant investment because of considerable construction, which still makes investment into the development of equipment using copper access infrastructure reasonable. This is supported by the fact that today xDSL technologies are prevailing and the most popular broadband technologies. However, it is imperative to improve xDLS technology for it to be able to compete with other broadband access technologies and face greater and stricter heterogeneous demands for the quality of service.

The availability of broadband access over the existing copper access network and broadband access speed may be increased in the following manner:

1. by applying new optimisation methods/algorithms and manners of work, without any changes in loop length – by applying spectrum management networks or L0/L2 modes of operation,
2. by using more advanced xDSL technology, which requires the shortening of the copper pair and lengthening of the end point of the fibre access network (VDSL(2)~FTTC).

The techniques of spectrum and signal coordination, better known as spectrum management, are of key importance for more effective use of the existing access network in the provision of high-quality broadband services. Spectrum management means a group of rules that would permit to different operators the use of mutually competitive transfer systems within one cable, and that would enable competition between operators and between producers of electronic communications equipment while at the same time protecting the existing services. Spectrum management methods may be divided into static spectrum management (SSM) and dynamic spectrum management (DSM) in copper cables.

In case of long copper pairs (local loops), transfer bandwidth may be increased by shortening the length of copper pairs (sub-loop) or by their gradual replacement with fibre cables (for example, the FTTC concept), if possible, to the end-user (FTTH). In other words, the unbundling in the sub-loop is a logical continuation of already conducted activities of local subscriber loop unbundling and it permits further liberalisation of the electronic communications market, increases transfer speed, and thus expands the selection of broadband services that may be offered to users. Sub-loop unbundling may also result in the increase in the number of users who may have access to new broadband services of high transfer speed.

3.3.3 Readiness for introduction of version 6 Internet protocol (IPv6)

Internet has grown exponentially in the recent years, as well as the number of users and types of technologies used for access to the network of all networks. The integration of classic data networks based on the IP protocol with other user communications networks and interfaces creates new needs and requirements for IP network protocol which may not be satisfied by the existing IPv4 version. For example, the number of Internet users over mobile communications networks has been significantly growing due to the expansion of next generation mobile devices (PDA, MDA, laptops, iPad, etc.). Since IPv4 protocol may no longer satisfy demands for an increasing number of Internet users because of its limited addressing capacity (IPv4 addressing space permits about 4.2 billion of IP addresses), the lack of addressing space will be efficiently resolved through the application of IPv6 protocol. It is expected that available (free) IPv4 addresses will be exhausted in 2011 or 2012 and it is, therefore, necessary to prepare and encourage the plan for migration to IPv6 protocol in accordance with decisions of competent European and international bodies[9][10].

[9] Declaration of the Committee of Ministers of the Council of Europe on the management of the Internet protocol address resources in the public interest, 2010

[10] Resolution WGPL/8 of the ITU Plenipotentiary Conference (Guadalajara, 2010) – "Facilitating the transition from IPv4 to IPv6"

4 Main and specific objectives of the Strategy

4.1 Main objective of the Strategy

The main objective of this Strategy is to create preconditions for fast development of infrastructure for broadband Internet access and of services requiring high access speed, as a basis for further development of information society and knowledge-based society, while ensuring availability of broadband access services under equivalent conditions in the entire territory of the Republic of Croatia.

The existing communications networks must be used in the best possible manner to achieve this objective for public benefit, which means that all networks must be built in a manner that will allow openness to all subjects offering information society services for the entire life cycle of these networks. The offer of existing communications networks to other subjects on the basis of the openness principle depends on market conditions and the market position of the subject that built the network.

It will also be ensured that communications networks, which have been built with state aid, are immediately open for all market participants offering information society services from the date of their putting into operation and for their entire life cycle.

The existing communications networks must be open at the lowest possible level to achieve the best possible use in the sense of openness, which will be regulated appropriately by implementing legislation and regulatory decisions adopted on the basis of implemented analyses of the relevant markets.

The state may provide incentives for the construction of broadband networks in the form of co-financing the construction of these networks or by other mechanisms, in accordance with rules on state aid. Furthermore, it must be ensured that all efforts aimed at building an effective broadband infrastructure are coordinated, including efforts to overcome obstacles.

The appearance of social differences in society may be mitigated by ensuring basic electronic communications services under equivalent conditions and at affordable prices in the entire territory of the Republic of Croatia, in particular to citizens in rural (geographically isolated) areas, to youth, to the elderly and to persons with special needs (disabled persons and persons with special social needs, such as low-income households).

The above-mentioned tasks must be carried out at all levels of government, from local to state level, with the associated responsibilities concerning implementation, whereby local and regional self-government units must be able to build their own strategies and/or plans for broadband development and to use assistance provided by the central government.

Consequently, the achievement of the main objective of this Strategy will enable the Republic of Croatia to maintain and further strengthen its leading position in relation to broadband services and technologies in the region of South East Europe.

4.2 Specific objectives of the Strategy

Specific objectives arising from the main objective of this Strategy are the following:

- ensuring effective competition,

- ensuring availability of broadband access,
- encouraging demand for broadband services and use of broadband access by citizens and business entities.

4.2.1 Ensuring effective competition

The objective is to develop open-type infrastructure together with an appropriate offer of broadband services that may be used by all participants on the electronic communications market. In areas lacking sufficient interest for investment into broadband infrastructure it is proposed to use state incentives, and, where possible, resources from the EU pre-accession funds, as well as funds from European Union structural and cohesion funds after accession, in order to encourage the building of infrastructure in those areas of the Republic of Croatia. Competition may take place at technologically different platforms, but the existence of a corresponding level of competition development is desirable at identical technological platforms.

In 2011, there is a satisfactory number of users and operators in major cities who are able to access broadband access infrastructure based on xDSL technology. There is also a possibility of access by means of other broadband access technologies, in particular by encouraging sharing of electronic communications infrastructure and associated facilities. In other parts of Croatia, due to limitations of the existing infrastructure and insufficient investment into network equipment, the availability of xDSL access is limited, particularly for xDSL high-speed access. Furthermore, other technologies, such as cable networks and wireless networks, are under-represented in these parts of the country.

In addition to increasing availability and penetration of electronic communications infrastructure of existing technologies, it is also necessary to enable and ensure competition that will result in the building and use of wired and wireless next generation networks with special attention dedicated to sustainable infrastructure-based competition.

The development of next generation networks, which implies the development of new technologies via FTTx solutions, is of extreme importance for the economic development of the Republic of Croatia. Encouraging development of next generation networks in areas lacking sufficient interest for investment into infrastructure of the above-mentioned technologies, will make possible the creation of new services that will significantly contribute to wider use of broadband services.

The offering of new services in mobile electronic communications requires appropriate capacities for broadband access. Increased capacity which satisfies the needs of broadband may be provided by new technologies which are currently used by mobile communications operators, such as UMTS, HSDPA and HSPA+, and "forward-looking" technologies such as LTE and WiMAX. Speeds offered by these technologies in mobile communications may be compared to speeds in fixed networks (e.g. the highest speed that may be provided by HSPA+ technology amounts to 21 Mbps).

A significant advantage of mobile broadband access is the freedom of movement and instant availability of information for the end-user. If mobile broadband access will be offered at affordable prices, it is expected that the number of users of these services will grow significantly.

Mobile broadband access may significantly contribute to the reduction of the digital divide, that is, it may ensure equivalent availability of broadband access in various Croatian regions. Rural and poorly inhabited areas, which may not achieve broadband access over fixed network, may satisfy their communications needs via mobile networks.

One of the measures for encouraging efficient competition is the management of the existing electronic communications infrastructure of companies in majority ownership by the Republic of Croatia for the purpose of optimum use of available communications capacities and their placement on the market, which would enable all interested operators of electronic communications to use these capacities under equivalent conditions.

4.2.2 Ensuring availability of broadband access

The objective is to ensure availability of broadband Internet access with target values listed in Table 1. It is recommended that broadband with speed of at least 2 Mbps be regarded as basic broadband access in the Republic of Croatia.

Indicator/Target value[11]	2013	2015
Availability of fixed connections for broadband access (share of inhabitants to which the service is available)	75% (≥2 Mbps)	35% (≥30 Mbps)
Availability of broadband access (share of inhabitants to which the service is available)	90% (≥2 Mbps)	50% (≥30 Mbps)

Table 1. Target values of availability of broadband Internet access

This objective may be achieved by investment into existing communications networks and the building of new infrastructure for broadband access, whereby account must be taken of principles of service and technological neutrality and net neutrality.

Wider availability of broadband access in areas lacking sufficient commercial interest for investment into broadband access infrastructure may be achieved through targeted projects at the regional and local level. Furthermore, the building of broadband access infrastructure must be included in projects for building of new and upgrading of existing transport and utilities infrastructure.

The availability of broadband access to all citizens of the Republic of Croatia in the future may be achieved by including broadband Internet access among universal services, depending on the development of the relevant European Union regulatory framework and by applying the principle of net neutrality. The degree of market development will be

[11] These indicators correspond to indicators prepared on the basis of market review carried out by HAKOM

preliminary analysed and monitored, as well as the percentage of penetration of broadband connections and other appropriate indicators necessary for the adoption of appropriate decisions.

4.2.3 Encouraging demand for broadband services and use of broadband access by citizens and business entities

The objective is to efficiently encourage demand for broadband services in order to increase the number of users of broadband access in the wider population, with target values given in Table 2.

Indicator/Target value[12]	2013	2015
Total number of fixed connections	1,000,000(≥2 Mbps)	500,000(≥30 Mbps)
Total number of mobile connections	500,000(≥2 Mbps)	700,000(≥2 Mbps)
Share of broadband connections in the total number of connections	50%	75%

Table 2. Target values of the number of broadband users

This objective may be achieved by actively encouraging demand for broadband services and broadband access use by citizens and business entities in business and everyday life through specific training on the use and benefits of use of broadband access and through overall IT introduction into the public administration system at all levels.

Targeted policies and programmes must also ensure the availability of public services to the wider population by means of broadband access to these services, in particular to youth, the elderly and persons with special needs, regardless of their location, level of education, age or interests, which implies increased penetration of broadband access, availability, sufficient speed, affordable prices and a sufficient amount of content in Croatian.

Furthermore, increased demand for broadband services emphasises the need for the protection of personal data, copyright and related rights and intellectual property rights, which are areas where negative consequences of unauthorised use and abuse of electronic data and contents have been noticed. This requires continuous activities aimed at further education of both the owners of data and authors of contents, as well as of potential users.

[12] These indicators correspond to indicators prepared on the basis of market review carried out by HAKOM

5 Measures for implementation of Strategy objectives

5.1 Measures for implementation of the main objective of the Strategy

The achievement of the main objective of the Strategy requires the use of all available capacities in order to eliminate the noticed problems and obstacles which are slowing down its achievement. It is also necessary to provide additional assistance to local and regional self-government units for the strengthening of their own administrative and organisational capacities.

The main objective may be achieved by means of programmes and plans of competent state administration bodies and other public bodies, bodies of local and regional self-government units, as well as by using state incentives, and, where possible, funds from the EU pre-accession funds, followed by, after accession of the Republic of Croatia to the European Union, the use of funds from structural and cohesion funds of the European Union envisaged for this purpose.

5.2 Measures for implementation of specific objectives of the Strategy

5.2.1 Measures for ensuring effective competition

Measures for ensuring effective competition include, in particular:

- continuously keeping up to date with legislation in the electronic communications sector in the European Union, with a special emphasis on regulations on broadband access and state aid and alignment of Croatian legislation in this area with amendments in the relevant European Union legislation;
- monitoring and implementation of regulatory obligations imposed on the operator with significant market power on the market of wholesale network infrastructure access and wholesale broadband access market in relation to fixed (wired) access network based on copper and fibre infrastructure (FTTx);
- carrying out of relevant analyses of markets of wholesale network infrastructure access and wholesale broadband access;
- monitoring and implementation of obligations arising from the Ordinance on technical requirements and conditions of use of optical distribution networks;
- ensuring access to data on the existing electronic communications infrastructure and available electronic communications capacity in the Republic of Croatia;
- preparing and regularly updating a publicly available integral database of the existing electronic communications infrastructure and broadband communications network (owned by the electronic communications operator, local and regional self-government units, including utilities companies owned by local and regional self-government units, and companies in majority ownership of the Republic of Croatia);
- ensuring pre-conditions for RF spectrum allocation in the 790-862 MHz band (digital dividend) for broadband access on a technologically neutral basis;

- allocating funds to research and technological projects aimed at improving the existing and developing new information and communication technologies and services;
- aligning Croatian legislation in the area of physical planning, construction, utilities and ownership in order to facilitate investment and encourage the building of electronic communications infrastructure.

5.2.2 Measures for ensuring availability of broadband access

Measures for ensuring availability of broadband access include, in particular:

- increasing availability and speed of broadband access over the existing copper access network in accordance with the analysis of the relevant market for wholesale network infrastructure access;
- ensuring the adoption of physical planning documents permitting construction of infrastructure for mobile and fixed communications networks;
- monitoring the allocation of the overall capacity of broadband access between Internet access and access to managed services with guaranteed quality of service;
- continuous monitoring of possible difficulties related to net neutrality, such as user complaints against blocking or slowing-down of Internet access;
- aligning legislation on net neutrality with a view to ensuring complete transparency towards end-users of services and the determination of the minimum level of quality of service;
- building of multi-purpose and multi-user centres in areas of special state concern, mountain and highland areas and on the islands;
- connecting of public bodies to broadband access;
- providing the service of broadband Internet access at premises of public bodies;
- the preparation of financing models and incentives for investment in broadband access infrastructure;
- encouraging interest at the local and regional level for the increase of availability of broadband access infrastructure;
- encouraging the participation of bodies of local and regional self-government units in the establishment of a favourable environment for the development of broadband access infrastructure;
- incorporating the design and financing of projects for the development of broadband access infrastructure into projects for the building of transport and utilities infrastructure at the local and regional level;
- encouraging the development of broadband access infrastructure in areas lacking sufficient commercial interest for such investment;
- preparing for financing of broadband access infrastructure development from European Union funds;

- imposing the obligation of coverage in the process of RF spectrum allocation in the 790-862 MHz band for areas lacking sufficient commercial interest for investment into broadband access infrastructure;
- the preparation of proposals for the alignment of provisions on the scope of universal service, depending on future development of the relevant regulatory framework of the European Union, market development level and the penetration of broadband connections.

5.2.3 Measures for encouraging demand for broadband services and use of broadband access by citizens and business entities

Measures for encouraging demand for broadband services and use of broadband access by citizens and business entities include, in particular:

- ensuring additional sources of financing of technological projects for the development of new services based on broadband access;
- the procurement of e-learning programme related to the use of information society services and the Internet;
- the preparation and implementation of programmes in cooperation with the governmental and non-governmental sector aimed at educating citizens, entrepreneurs and public officials on personal data protection, copyright and related rights, intellectual property rights, electronic business and other areas related to further development of broadband access;
- the preparation and implementation of programmes in cooperation with authors' and publishers' associations at the national, regional and local level aimed at education about copyright and related rights and on-line intellectual property rights;
- the preparation and implementation of programmes in cooperation with operators of Internet access services aimed at reducing the scope of illegal downloading of Internet contents (films, music, games, e-books, etc.);
- the preparation and implementation of programmes for encouraging the development of digital contents in the Croatian language;
- ensuring the availability of broadband access to users of services in public areas;
- ensuring the availability of quality user-oriented public services through the implementation of a comprehensive IT introduction into the public administration system at all levels;
- informing users of services on all possibilities for digital television development (including high-definition television, mobile multimedia services, etc.);
- establishing the IPv6 Forum the main task of which is to prepare a document on technical procedures and methods for migration towards IPv6 networks;
- migration towards IPv6 networks in state administration bodies, the academic community and other public bodies.

6 Assessment of financial and overall feasibility of the Strategy

The most important role in the development of broadband access services is played by a liberalised market. In areas lacking sufficient commercial interest for investment into broadband access infrastructure, state incentives need to be ensured as well as appropriate administrative capacities (authorities competent for electronic communications, for information society development, for regional development, rural development, for the economy, etc.) for the preparation and implementation of projects on the basis of which funds from European Union funds and other sources would be used (European Bank for Reconstruction and Development, the European Investment Bank, etc.).

The digital divide between regions in the Republic of Croatia and towards European Union Member States may be decreased by means of investment into broadband infrastructure, regardless of access technology, in all parts of the Republic of Croatia, with a special emphasis on underdeveloped rural areas, islands and mountain and highland areas.

The achievement of the targeted 75% availability of fixed broadband connections (with speed of at least 2Mbps) by the end of 2013 will be difficult without a significant participation of the state and local and regional self-government. Therefore, the involvement of local and regional self-government is necessary for the development of individual Croatian regions because integrated development of infrastructure may significantly lower costs, in particular in the case of new networks based on fibre technology. The development of a fibre network per household connection amounts from HRK 8,000 to 12,000 in urban areas, and from HRK 15,000 to 18,000 in rural areas, due to prices of construction. If electronic communications infrastructure already exists, the costs of building a fibre network amount to a minimum of HRK 3,000 per household connection, which includes fibre cable placement.

In areas where an optical network may not be constructed due to low population density or a very inadequate terrain, competent authorities will encourage further development of the existing copper pair by shortening the loop, by applying more advanced xDSL technologies (VDSL(2)) and by adding DSLAM devices (a precondition for the provision of broadband services), the price of which is between HRK 200 and 350 per connection, or through better usage of the copper pair by means of the application of new technologies/spectrum management methods (e.g. dynamic spectrum management).

In areas where fixed communications infrastructure is lacking, it is suggested to ensure broadband access by applying mobile communications technologies, such as UMTS, WiMAX, and later also LTE technology. The basic precondition for the development of the most advanced wireless broadband access technologies is ensuring the building of mobile communications networks infrastructure. It is therefore necessary for the electronic communications infrastructure and associated facilities to be planned in physical planning documents in a way that does not restrict its further development, both in rural and less populated areas, and in developed, in particular, urban areas.

Pursuant to the European Commission recommendations, and in order to achieve the objectives from *A Digital Agenda for Europe*, significant funds must be invested so that all households in the European Union would have broadband Internet access of 30 Mbps speed by 2020. The European Commission estimated that investment amounting from HRK 280 do 420 billion are necessary at the European Union level to achieve this objective.

Investment amounting to a minimum of HRK 652.5 million are necessary for the achievement of the objective set for the Republic of Croatia of at minimum of 1,000,000 fixed broadband connections by the end of 2013, under the assumption recommended in this Strategy that at least 20% of broadband connections are based on fibre networks at locations with the existing electronic communications infrastructure, and the remaining 80% connections are realised by applying xDSL technology.

Additional HRK 900 million are necessary to achieve the final objective of 500,000 fixed broadband connections based on the fibre network by the end of 2015, provided that 200,000 households are already covered by the fibre network and that electronic communications infrastructure already exists.

6.1 Measures for assessment of financial and overall feasibility of the Strategy

- The preparation and implementation of broadband infrastructure development projects by using funds from European Union pre-accession funds, where possible, and funds from the European Union structural and cohesion funds, the European Bank for Reconstruction and Development (EBRD) and other sources shall require appropriate administrative capacities at the national level and at the level of regional and local self-government.
- The areas lacking sufficient interest for investment into broadband access infrastructure must be provided state incentives or must be encouraged to prepare projects for financing from European Union pre-accession funds, where possible, or from the European Union structural and cohesion funds, the European Bank for Reconstruction and Development (EBRD) and other sources.

7 Implementation Programme of the Strategy

The Government of the Republic of Croatia adopts an Implementation Programme on the basis of the Strategy, separately for the period from 2012 to 2013, and separately for the period from 2014 to 2015, with a view to achieving the objectives laid down in the Strategy.

The Implementation Programme of the Strategy contains, as a starting point, an analysis of strengths, weaknesses, opportunities and threats (the so-called SWOT analysis), the list of state administration bodies and other public bodies competent for the implementation of the Strategy, measures for the implementation of specific objectives of the Strategy elaborated per planned activities, responsible authorities for implementation, time limits for implementation, expected outcomes, performance indicators and sources of funds, as well as the financial framework for the realisation of the Implementation Programme of the Strategy.

Measures and activities of the Implementation Programme have been divided in accordance with specific objectives of the Strategy into the following three areas:

- measures for ensuring effective competition,
- measures for ensuring availability of broadband access,
- measures for encouraging demand for broadband services and use of broadband access by citizens and business entities, in business and in everyday life.

Monitoring and supervision of the implementation of the Strategy and Implementation Programme are carried out in the following manner:

1. through the Commission for the Monitoring and Supervision of the Implementation of the Strategy and Implementation Programme (hereinafter: the Commission) established with the Ministry of the Sea, Transport and Infrastructure. The Commission is chaired by a representative from the Ministry of the Sea, Transport and Infrastructure, and Commission members are representatives of authorities responsible for specific measures – competent state administration bodies and other public bodies. Pursuant to the Decision on the amount of the remuneration for members of committees, councils, working groups and other similar bodies, members of the Commission from central state administration bodies may not be remunerated for their work in the Commission. The authorities responsible for the implementation of specific measures shall submit to the Commission semi-annual reports on the implementation of measures and activities under their competence;
2. as a part of the annual reporting on the implementation of the Strategy – the Ministry of the Sea, Transport and Infrastructure shall prepare, on the basis of the submitted reports and information provided by all the competent state administration bodies and other public bodies (authorities responsible for specific measures), an annual report on the implementation of the Strategy which is delivered to the Government of the Republic of Croatia for adoption, within three months from the expiry of the period covered by the Implementation Programme of the Strategy.

The Government of the Republic of Croatia shall carry out extensive supervision over the implementation of the Strategy by means of regular annual reports, and the Commission shall carry out regular management, supervision and monitoring of the implementation of the Strategy. The Government of the Republic of Croatia may also request from the Ministry of the Sea, Transport and Infrastructure to prepare an integral report on the implementation of the Strategy for a period shorter than one year.

8 List of abbreviations

Abbreviation	Original name
DSLAM	Digital Subscriber Line Access Multiplexer
EDGE	Enhanced Data Rates for GSM Evolution
FTTx (FTTB, FTTC, FTTH, FTTN)	Fibre-to-the-x (Building, Curb, Home, Node)
GPRS	General Packet Radio Service
GSM	Global System for Mobile Telecommunications
HFC	Hybrid Fibre-Coaxial
HSDPA	High Speed Downlink Packet Access
HSPA	High Speed Packet Access
IM	Instant Messaging
IP	Internet Protocol
IPTV	Internet Protocol Television
LTE	Long Term Evolution
MMS	Multimedia Messaging Service
NGN	Next Generation Networks
SoHo	Small Office – Home Office
UMTS	Universal Mobile Telecommunications System
VDSL	Very High Speed Digital Subscriber Line
Wi-Fi	Wireless-Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
xDSL	Digital Subscriber Line

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ANNEX

Assessment of the Current Level of Broadband Access Development in the Republic of Croatia

In October 2006, the Government of the Republic of Croatia adopted the *Broadband Development Strategy in the Republic of Croatia by the year 2008*, which was accompanied by two annual action plans for the implementation of the Strategy, for 2007 and 2008 respectively. The above-mentioned Strategy and the accompanying action plans obliged the competent state administration bodies and regulatory bodies to implement measures and activities from their competence within the time limits laid down in the action plans. The main strategic objective of the Government of the Republic of Croatia in the area of broadband access was to achieve broadband penetration of at least 12% in relation to the number of inhabitants by the end of 2008, which means that the number of broadband connections should have reached at least 500,000 connections in that period.

At the end of 2008, the number of broadband connections totalled 683,207, which indicated a penetration of 15.4% in relation to the total estimated number of inhabitants in the Republic of Croatia, which means the main strategic objective of the Government of the Republic of Croatia in relation to broadband access has been fulfilled. Furthermore, the number of broadband connections in fixed communications network amounted to 524,683 at the end of 2008, which indicated a penetration level of 11.83%. The number of broadband users over mobile communications networks also increased significantly and, at the end of 2008, it amounted to 158,524 users (penetration of 3.57%). The growth trend in relation to the number of broadband connections continued in 2009 as well. In mid-2009, the number of broadband connections totalled 813,913, which indicated a penetration of 18.35% in relation to the total estimated number of inhabitants in the Republic of Croatia.

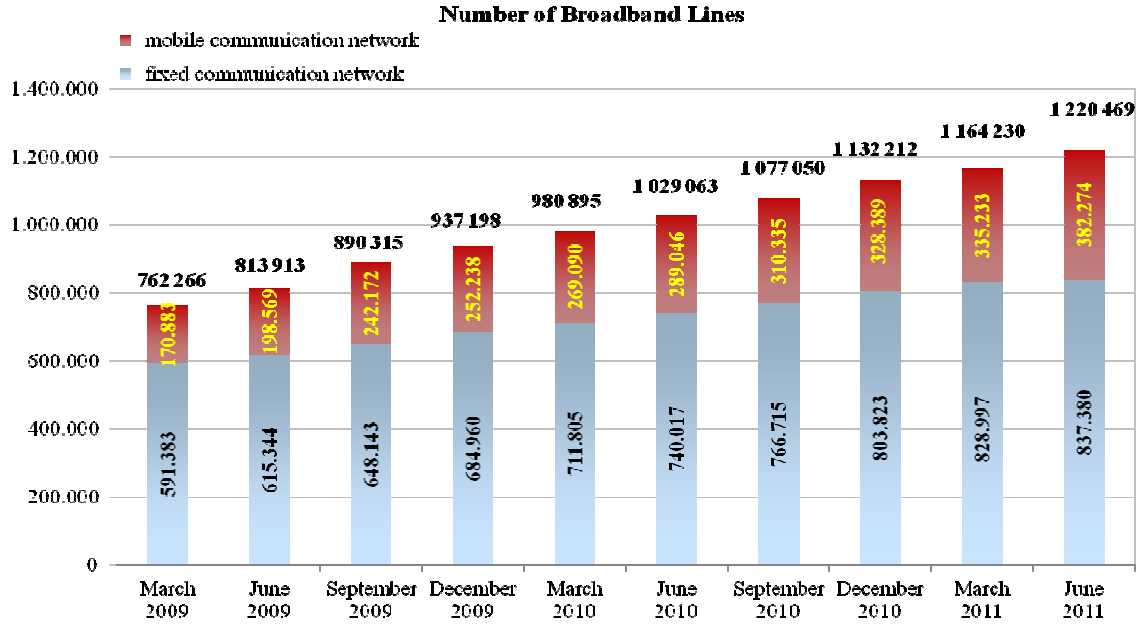

Figure 1. Number of broadband connections

The number of broadband connections in the fixed communications network and mobile communications network in the period of two years (from 2009 to 2011) is illustrated in Figure 1. In mid-2011, the number of broadband connections totalled 1,220,469, which indicated a penetration of 28.45% in relation to the total number of inhabitants in the Republic of Croatia. The number of broadband Internet users over fixed communications network totals 837,380, indicating a penetration of 19.53%, while the number of broadband connections in mobile communications network amounted to 382,274, indicating a penetration of 8.91% in relation to the total estimated number of inhabitants in the Republic of Croatia.

The comparison between the number of broadband connections in fixed and mobile communications networks is illustrated in Table 1, which provides a comparison between the second quarter of 2011 and the first quarter of the same year. It is noted that xDSL technology is the dominant means of broadband access in the fixed communications networks, with a share of more than 88% compared to other technologies. The growth of broadband connections over mobile communications networks compared to fixed communications networks has also been noticeably faster.

Number of connections / penetration	I quarter 2011	II quarter 2011	% of change II/I quarter
Total number of broadband Internet connections	1,164,230	1,220,469	4.83%
Number of broadband connections over fixed networks	828,997	837,380	1.01%
Number of xDSL connections	735,741	742,256	0.89%
Number of xDSL connections over own access network	587,039	587,719	0.12%
Number of xDSL connections over unbundled access to the local loop	126,499	131,117	3.65%
Number of xDSL connections over shared access to the local loop	843	719	-14.71%
Number of xDSL connections over bitstream access service	21,360	22,701	6.28%
Number of connections over cable networks	60,862	63,596	4.49%
Number of connections by means of other access technologies	32,394	31,528	-2.67%
Number of connections over mobile networks (UMTS, HSDPA, etc.)	335,233	382,274	14.03%
Broadband Internet penetration	26.24%	28.45%	8.42%

Table 1. Quarterly comparable data on the broadband Internet access market

The analysis of the regional penetration of broadband connections in fixed communications network still shows an uneven number and penetration of broadband connections in individual counties. However, differences in broadband penetration have noticeably decreased, which indicates a positive trend. For example, in mid-2009, the penetration of connections in the Požeško-slavonska County amounted to 6.96% compared to 20.14% in the County of Zagreb and the City of Zagreb. Differences in broadband penetration between the least and the most developed counties in mid-2009 amounted to more than 13%, while in mid-2011, it was a little over 11%. The biggest penetration rate was recorded in the City of Zagreb and in the County of Zagreb, followed by the Primorsko-goranska County, Istria County, Dubrovačko-neretvanska County and Splitsko-dalmatinska County. The lowest penetration rate was recorded in the Požeško-slavonska County, Virovitičko-podravska County, Brodsko-posavska County and Ličko-senjska County. Figure 2 shows the penetration of broadband connections in the fixed communications network per Croatian counties. It also illustrates an average broadband penetration in the Republic of Croatia, that amounted to 19.52% in mid-2011, which means that the majority of Croatian counties has below-average penetration rate of broadband connections.

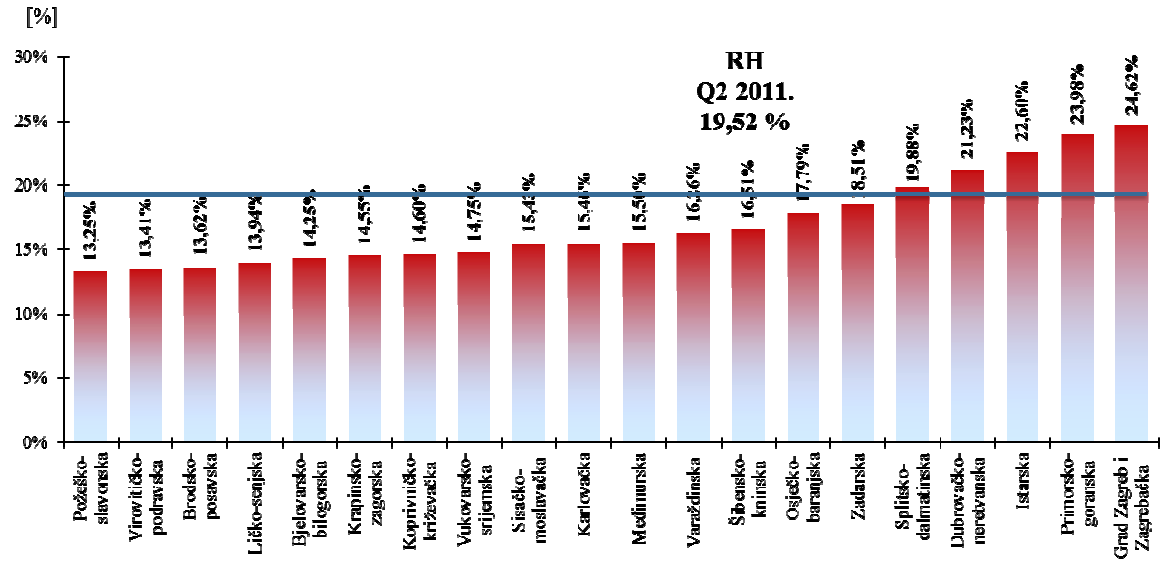

Figure 2. Penetration of broadband connections per Croatian counties

Dominant technologies on the international broadband access market currently include digital subscriber lines (xDSL), in particular its versions ADSL and VDSL. They are followed by broadband access over cable television networks, then fibre access, wireless and satellite access and finally, access to power line communication (PLC). Increasing introduction of next generation networks (NGN) is expected in the future.

Figure 3 shows the percentage share of broadband connections by access technology and connection speeds, where it is obvious that xDSL access has the biggest share.

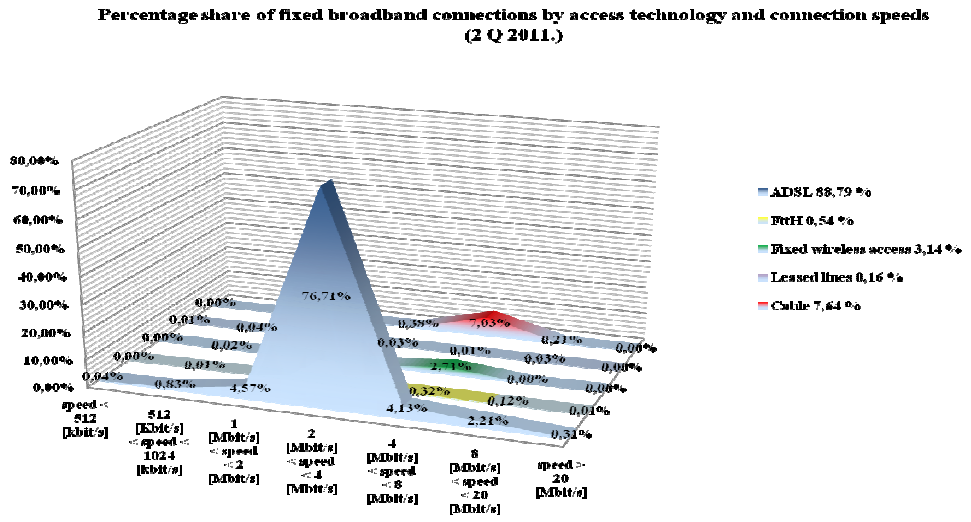

Figure 3. Percentage share of broadband connections by access technology and connection speeds

If the number and penetration of broadband connections in the Republic of Croatia are compared to indicators in the European Union, it is still obvious that Croatia is significantly lagging behind the average penetration level in the EU Member States. The historical data show that this gap in relation to the European Union has decreased since the end of 2008, but at the end of 2010, it still amounted to approximately 8.5%, as illustrated in Figure 4.

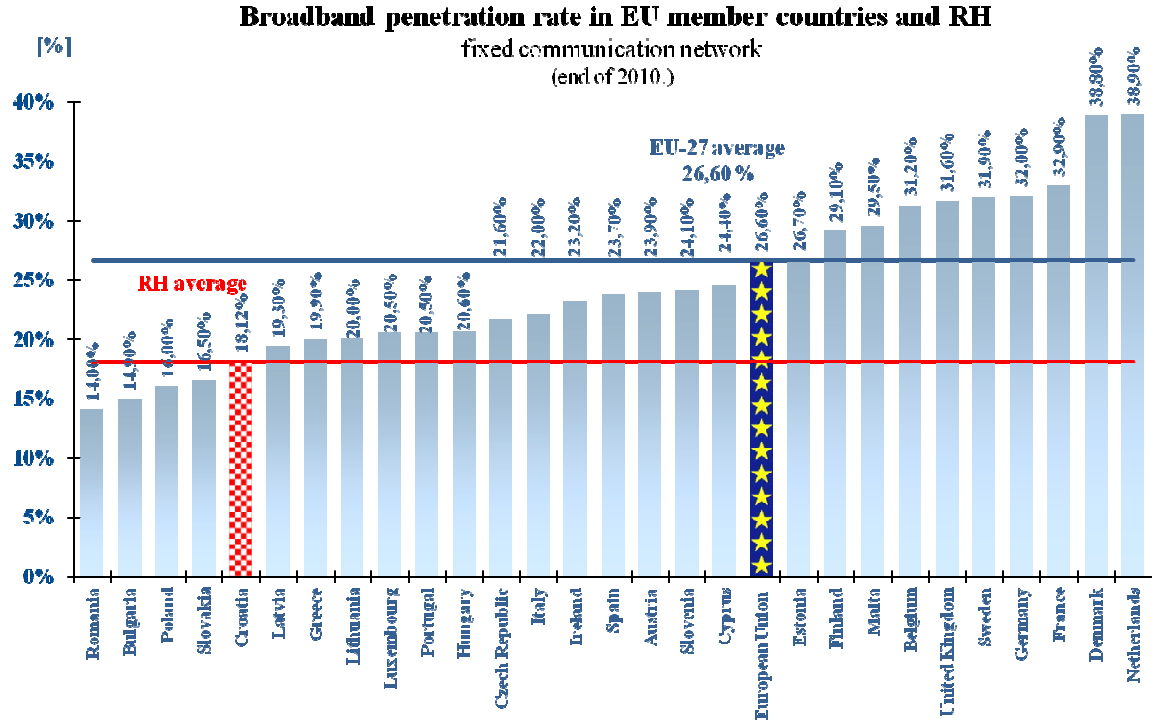

Figure 4. Comparison of broadband penetration in EU Member States and Croatia