AN OVERVIEW OF TELECOM MARKET IN THE REPUBLIC OF SERBIA IN 2010

Belgrade, 2011

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Title:
An Overview of Telecom Market in the Republic of Serbia in 2010

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A WORD OF INTRODUCTION

The telecommunications market in the Republic of Serbia was under state monopoly until the establishment of the Republic Agency for Telecommunications (RATEL). Based on the *Law on Telecommunications* passed in 2003 (in line with the 1998 EU Directives), with careful consideration of the relevant experience of other developed countries and in view of the trends in the development of new technology, the regulatory authority (RATEL) has delivered the legal framework for liberalization and opening of the telecommunications market, first in the mobile sector, followed by the Internet and cable distribution systems and, finally, in the broadband access segment.

The liberalization of the mobile communications took place in 2006. At the time, the new technology UMTS (*Universal Mobile Telecommunications System*) created the conditions for new services, resulting in the significant growth of the number of users. In addition to the issuance of new licences, the opportunity was seized to privatize a part of the state owned share in this market. The three mobile operators offered new modern services to the users. All three operators also provide data transmission services or Internet services via newly built UMTS network (3G). The competition contributed to a considerable growth in the number of users (penetration of over 130%), improved quality of services and, also, price cuts.

Since the Internet market was underdeveloped, necessary conditions needed to be created in order to bring the Internet to users. The adopted regulations enabled the commercial provision of low-bitrate Internet in unlicensed bands, and also resolved the issues related to the Internet wholesale. The terms and conditions for the international interconnection authorization issuance were laid down. Furthermore, the issuance of authorization for VoIP service provision was regulated, thereby making available international calls at significantly lower prices. Further promotion of the Internet and ICTs required the conditions for the development of new generation networks (NGNs) and broadband access, which implies considerable financial resources that are provided in the EU countries either from state fund or by increasing the subscription fees. Since, in the times of the world economic crisis, neither of the two methods could be applied in

the Republic of Serbia for providing the necessary assets, the fixed telecommunications market needed to be liberalized in order to attract new operators in the market, ready to invest in further development.

Therefore in early 2010, the company Telenor was awarded a licence for the new fixed operator who would provide fixed broadband network service with the national coverage. In this way, the conditions for the further development of this telecom market segment were created. We can expect that the two prominent operators, Telekom Srbija and Telenor, will enter into an open market competition before long, offering bundled services, inevitably resulting in lower prices.

As for the media content distribution market, new regulations, which stimulate the deployment of new technologies (DTH and IPTV), were adopted in order to tackle the problem of the territorial monopoly of the cable distribution systems (CDS). In the area of the terrestrial distribution of media contents, RATEL created the conditions for the introduction of digital television, as a result of the efforts made in the international coordination, preparation of the necessary documents and studies and the adoption of the required bylaws.

In July 2010, the National Assembly of the Republic of Serbia passed the *Law on Electronic Communications* harmonized with the new EU Directives, to the end of ensuring the optimal and realistic conditions for the further development and application of the information communication system (ICS) or electronic communication services, and thereby rapidly enabling the benefits from and advantages of the modern information society, in line with the digital agendas of the EU and the Republic of Serbia. The Law sets out the following tasks:

- ensure the conditions for the further development of the electronic communication by using the advanced ICSs and a balanced development throughout the territory of the Republic of Serbia,
- create conditions for level-playing field for all market players, both in terms of network neutrality and in terms of market economy,

- ensure further development of the electronic communication market by applying *ex-ante* mechanisms such as to stimulate competition, and, where necessary, also by applying *ex-post* market regulation,
- provide a comprehensive protection of the interest of all market participants, end-users in particular, leading to the provision of new, more affordable services, of higher quality,
- ensure optimal and rational usage of all national resources: frequencies and numbering.

The *Law on Electronic Communications* confers the regulatory role to the Republic Agency for Electronic Communications (RATEL), which is the legal successor of the former Republic Telecommunication Agency (RATEL). The future activities of the Agency are laid down in the 2011 Business Plan, in accordance with the Law and sector-relevant strategies and action plans.

Chairman of the Managing Board

Prof. Dr Jovan Radunović

1. RATEL'S ACTIVITIES IN 2010

Compared with the previous years, 2010 is specific for RATEL in so far as it can be divided into two periods. The first, which corresponds to the first six months of 2010, when the *Law on Telecommunications* (*Official Gazette of RS*, nos. 44/03, 36/06 and 50/09 – as amended by the Constitutional Court) was still in force and RATEL operated under the name of the Republic Telecommunication Agency, and the second period which began with the entry into force of the *Law on Electronic Communication* (*Official Gazette of RS*, no. 44/10), on 8 July 2010, and with the establishment of the Republic Agency for Electronic Communications.

The Law on Electronic Communications (*Official Gazette of RS*, no. 44/10, hereinafter: the Law) is harmonized with the 2001 EU Regulatory Framework and it enables the following:

- greater transparency and legal certainty in the electronic communication sector, in order to stimulate the investments in the sector;
- continuity in the work of the regulatory authority, the Republic Agency for Electronic Communications, as the legal successor of the Republic Telecommunication Agency;
- introduction of the "general authorization" to the end of further liberalization of the electronic communication sector;
- conditions and parameters for identifying markets susceptible to *ex-ante* regulation, along with the criteria for designating operators with significant market power and imposing regulatory obligations on an SMP operator;
- guaranteed quality in the provision of publicly available electronic communication services by stipulating the QoS parameters in greater detail and by setting the minimum QoS, along with the manner in which the information on the offered QoS is to be provided;
- electronic communication networks and services user protection;
- non-discriminatory assignment procedure for addresses, numbering and radio

frequencies, as scarce resources;

- introduction of technological neutrality policy, to the end of further development of the electronic communication sector in the Republic of Serbia.

The Republic Agency for Electronic Communications (RATEL) is an autonomous organization - an independent regulatory authority founded by the Law, and, pursuant to Art. 141 of the Law, it is the legal successor of the Republic Telecommunication Agency.

The process of liberalization and opening of the telecom market in the Republic of Serbia for new entrants continued in 2010. In keeping with the competencies stipulated in the *Law on Telecommunications* and the new Law (*Official Gazette of RS*, nos. 44/03, 36/06 and 50/09-CC, hereinafter: the Law), as well as in the strategic documents and provisions regulating the sector, in 2010, RATEL focused its activities on fulfilling the principles and objectives of the market regulation, along with the implementation of the provisions of the new Law and harmonization of bylaws, in order to provide the conditions for further opening of the market, promotion of competition and protection of users' interests.

In 2010, just like the previous years, RATEL published the annual publication "*An Overview of Telecom Market in the Republic of Serbia in 2009*", with the intention of making available the data that reflect the situation in the telecom sector of the Republic of Serbia, providing necessary information to the operators, relevant public authorities, scientific institutions, investors and users.

RATEL's activities accomplished in the period from 1 January to 31 December 2010, which were the result of activities and tasks defined under the regulations pertinent to the telecom or electronic communications sector and under the 2010 Framework Business Plan, are presented below.

REGULATORY ACTIVITY

In performing its regulatory activity, in the first half of 2010, RATEL adopted the following bylaws: *Rules on costs for radio-station licence issuance* (*Official Gazette of RS*, no. 04/10), *Rules on radio*

frequency usage fees (*Official Gazette of RS*, no. 04/10), *Rules on number portability in public mobile telecommunications networks* (*Official Gazette of RS*, no. 05/10), *Decision on designating operators with universal service obligation* (*Official Gazette of RS*, no. 15/10), whereby, *inter alia*, single emergency number was introduced and low-priority services codes were amended.

Also, pursuant to its legal power, RATEL prepared the amendments to the *Frequency/Location Allotment Plan for Terrestrial Analogue FM and TV Broadcasting Stations for the Territory of the Republic of Serbia* (*Official Gazette of RS*, nos. 74/07 and 27/08), adopted by the responsible ministry on RATEL's proposal and published in the *Official Gazette of RS*, no. 2/10.

In the first half of 2010, before the new Law entered into force, RATEL's Managing Board adopted a series of separate bylaws, within its legally stipulated competences, to the end of telecommunications market regulation.

In the second half of 2010, following the adoption of the new Law, the following bylaws were adopted:

- *Statutes of the Republic Agency for Electronic Communications* (*Official Gazette of RS*, no. 59/10);
- *Rules on radio-frequency usage fees (Official Gazette of RS*, no. 93/10);
- *Rules on fees for the performance of electronic communications activities* (*Official Gazette of RS*, no. 93/10).

The new Law reduces the extent of competence of the Managing Board in the area of separate bylaws, compared with the *Law on Telecommunications*. Separate bylaws, which are adopted in line of duty or upon request of the interested party, stipulating the rights and obligations of operators and users, are passed by the director, pursuant to the Law, whereas the Managing Board is in charge of general bylaws regulating the issues within RATEL's competence, the annual Business Plan of the Agency and other activities which, according to the Law and the Statutes of the Agency, do not fall into the competence of the director.

The provision of Art. 143 of the Law regulates special obligations of RATEL concerning the transitional period following the entry into force of the new Law and the adoption of general bylaws. In particular, Art. 143, para. 5 and 6 of the Law stipulates that the Agency adopts general bylaws based on the authority under the Law, no later than one year following its entry into force, and until the aforementioned bylaws are adopted, the valid general bylaws adopted on the basis of the *Law on Telecommunications* shall be applied, unless contrary to the Law.

Since the Law entered into force on 08. 07. 2010, the deadline referred to in Art. 143, para. 5 of the Law is 08. 07. 2011.

In the second half of 2010, RATEL began with the activities related to the adoption of the bylaws, pursuant to the Law, and the implementation of the provisions of the Law. In addition to the mentioned bylaws regulating the amount of the fee for the usage of radio-frequencies and the amount of fee for the performance of electronic communications activities, which were adopted and published in the Official Gazette of RS, *Draft rules on request forms for the issuance of individual licence for radio-frequency usage* and *Draft rules on general terms and conditions for performing electronic communication activities under general authorization regime* were also prepared in 2010 and put out for public consultation.

The preparation of the set of bylaws regulating the numbering (*Numbering Plan, Rules on the amount of annual fee for the use of numbering, Rules on application form for the issuance of licence for the use of numbering, Rules on number portability in the public telephone networks at a fixed location*) also began in 2010, while the bylaws are expected to be put out to public consultations in the first quarter of 2011, and subsequently adopted and published, in line with the set procedure.

Since, pursuant to the Law, a number of bylaws is adopted by the responsible ministry on RATEL's proposal, in the second half of 2010, as part of the normative activities the *Proposal of the rules on switchover from analogue to digital broadcasting of television programme and access to multiplex in terrestrial digital broadcasting* was prepared and submitted to the ministry for further action. Also, RATEL began with the preparation of the following proposals of bylaws that are designed by RATEL's

Managing Board and passed by the responsible ministry, which are expected to be adopted in the second quarter of 2011:

- *Rules on radio equipment and terminal telecommunications equipment,*
- *Rules on terms and conditions for ensuing EM compatibility,*
- *Rules on universal service,*
- *Rules on manner, terms and conditions for determining the area of electronic communication infrastructure and associated facilities, protection of the area and radio corridors, and the obligations of construction investors.*

Pursuant to the provision of Art. 62 of the Law on Telecommunications, RATEL prepared the *Proposal of the Amendments to the Radio Frequency Allocation Plan* (*Official Gazette of RS*, nos. 112/04 and 86/08) and submitted it to the Ministry of Telecommunications and Information Society for further action in March 2010.

Within the legal authority pertaining to the stipulation of terms and conditions for the usage of RF spectrum, RATEL also prepared the *Proposal of the Amendments to the Frequency/Location Allotment Plan for Terrestrial Analogue FM and TV Broadcasting Stations for the Territory of the Republic of Serbia*, and the revision of the frequency allotment plans for the use of private telecommunications networks.

TELECOMMUNICATIONS NETWORKS AND SERVICES

During 2009, RATEL continued with the activities fostering the creation of a free and open market, striving to provide equal opportunities for all market participants. Based on the adopted regulations and the procedures for the introduction of new technologies and services completed in the previous period, to the end of promoting competition in those market areas where it had been absent, RATEL undertook a series of activities related to the regulation of this sector.

In view of the fact that the necessary provisions regulating the mobile telephony sector had been adopted, appropriate licences had been issued and the introduction of competition had been enabled, in 2010, RATEL focused its activities, *inter alia*, on mobile market analysis, monitoring the compliance of the three mobile operators with the terms and conditions stipulated in the licences.

The same applies to the licences for public fixed wireless access (FWA) telecommunications network in the frequency band 411.875-418.125/421.875-428.125 MHz and voice services, data package transmission and simultanious voice and data transmission granted in mid June 2009 to the Telecommunications Company Telekom Srbija, Joint Stock Co. (hereinafter: Telekom Srbija, Joint Stock Co.) and Media Works, Ltd. In the meantime, the operator Media Works, Ltd. changed the name into Orion telekom, Ltd. and continued operating under the latter name. Both operators began with the commercial service provision within the set timeframe, thereby fulfilling the condition from the licence.

In order to enable further liberalization of the telecom or electronic communication sector in the Republic of Serbia, on 22 January 2010 RATEL's Managing Board passed the decision on granting a licence for public fixed telecommunications network and services for the territory of Republic of Serbia to the company Telenor Ltd. The decision was adopted following the public competition initiated by RATEL on 20 November 2009, pursuant to the *Law on Telecommunications and the Rules on the number of licences for public fixed telecommunications network and services and the period for which the licence is issued, minimum conditions for licence issuance and minimum amount of the one-off licence issuance fee* (*Official Gazette*, no. 87/09). The licence was issued for a 10-year period, with the possibility of extension for another 10 years. Telenor, Ltd. is required to begin with the commercial service provision no later than one year following the licence issuance. The issuance of licence to the second operator of public fixed telecommunications networks and services stimulates a wider range of services available to users, along with the development of an alternative telecommunications infrastructure and broadband access.

Also, in 2010, RATEL adopted the decisions regulating mutual relations between the following operators: Telekom Srbija, Joint Stock Co. and Orion telekom, Ltd. and between Telekom Srbija, Joint Stock Co. and Telenor, Ltd. Once the time limit for operators Orion telekom d.o.o and

Telenor d.o.o. to agree on interconnection terms and conditions with Telekom Srbija, Joint Stock Co. i.e. on the terms and conditions for the access to the infrastructure of Telekom Srbija, Joint Stock Co., had expired without them reaching an agreement, RATEL adopted a decision laying down the elements pertinent to regulation of the interconnection of public telecommunications networks, interconnection service and interconnection tariffs between Orion telekom d.o.o and Telekom Srbija a.d., and a decision regulating mutual relations between Telenor, Ltd. and Telekom Srbija Joint Stock Co. regarding the terms and conditions of interconnection and interconnection tariffs, unbundled access to the local loop (full or shared), collocation, transport capacity usage and leased lines.

In 2010, RATEL issued 23 Internet service provision (ISP) authorizations, 3 radio and television program distribution service provision authorizations, 38 public telecommunications networks authorizations, 6 authorizations for the provision of VoIP service without the use the numbers from the *Numbering Plan* and 1 authorization for data transmission service. Following the entry into force of the Law, 2 operators were recorded in the ISP register and 3 operators were recorded in the radio and television programme distribution register. Furthermore, RATEL issued 6 authorizations for international interconnection with telecommunications networks of operators from the neighbouring countries.

In 2010, RATEL continued to monitor the quality of the delivered services, in particular the control of compliance with the terms and conditions stipulated under the issued licences and authorizations, with the aim of undertaking measures against entities providing telecommunications services without the adequate permit.

However, under the new Law RATEL's monitoring role is somewhat different, hence, pursuant to Art. 131. of the Law, RATEL's competencies include the monitoring of the operators under the obligation to perform electronic communications activities in accordance with the prescribed general requirements for performing such activities, special obligations designated for operators with SMP, conditions stipulated under licences for the use of numbers, individual licences for the use of radio-frequencies, and other obligations stipulated under the Law and bylaws adopted in accordance with it.

In addition, the Agency is authorised to measure and test the operation of electronic communications networks and services, associated facilities, electronic communications network and terminal equipment. If the Agency establishes that an operator's performance is not in accordance with the obligations, it informs the operator about it and sets a time limit for the operator to declare his opinion on the determined irregularities and/or eliminate them and notify the Agency. Should the Agency discover that the operator has not eliminated the observed irregularities within the given time limit, it files a report with the inspectors of the responsible ministry which should be formed according to the Law.

In 2010, 5374 technical permits – certificates and 1692 approvals for the import of goods were issued.

RADIOCOMMUNICATIONS

The activities related to the joint work of the Ministry of Culture, the Ministry of Telecommunications and Information Society (MTIS), the Republic Broadcasting Agency (RRA) and RATEL on preparing the necessary enactments and the creation of conditions necessary for analogue to digital switchover in radio and television programme broadcasting, continued in 2010.

In addition, during 2010, the following documents related to RF spectrum management were prepared:

- signed technical agreement between the administrations of Austria, Croatia, Hungary, Romania, Serbia, Slovakia, Slovenia and Ukraine on borderline frequency coordination for IMT/UMTS systems in GSM range 880-915/925-960 MHz and 1710-1785/1805-1880 MHz;
- signed technical agreement between the administrations of Croatia, Hungary, Romania, Serbia, and Ukraine on frequency coordination in 880-890/925-935 MHz (E-GSM) frequency ranges;

- work on proposal of the *Rules on the amount of fee for radio frequency usage*, to the end of improving the position of the radio and TV broadcasters, telecommunications operators and other RF spectrum users;
- preparation of the proposal of the *Rules on the amount of fees for radio station licence issuance*;
- completed preparation of two proposals for the amendments to the *Allocation Frequency Plan*;
- completed amendments to the *Frequency/Location Plan for Terrestrial Analogue FM and TV Broadcasting Station for the Territory of the Republic of Serbia*;
- revised *Frequency Allotment Plans* for the needs of the Electric Power Industry of Serbia, Serbian Railways and Serbian Hydro Meteorological Institute and other users of the functional radio systems in the territory of the Republic of Serbia.

Also, RATEL prepared over 38 pieces of information and analyses pertaining to RF spectrum management and creation of regulatory provisions.

In addition, RF spectrum management also included the following activities related to the issuance of radio station licences, radio frequency coordination and notification and RF spectrum monitoring:

- 8017 radio station licences, 67 licences for radio stations on ship or other vessel, 19 licences for radio stations on aircraft and 357 amateur radio station licences were issued;
- 1720 user requests were resolved;
- 652 frequency/location coordinations were performed;
- daily FM and TV broadcast monitoring was performed from the spectrum monitoring centres "Beograd" and "Niš", as well as the periodic measuring throughout the territory of the Republic of Serbia. The total number of cases was 520, out of which

412 were processed;

- a detailed database of radio stations operating without a licence was established and activities related to the prevention of such illegal operation were continued;
- a register of taxi services which use radio links in Belgrade and other cities was formed and is continuously updated with data retrieved from measurement and control activities;
- the total of 7310 radio station technical inspections were performed.

In the procedure of banning the operation of radio stations which had been using radio frequencies unlawfully in 2010, 151 decisions on operation ban were adopted, 76 offence proceedings were instigated and 98 decisions on forced execution were adopted.

USER PROTECTION

Just like in the previous years, RATEL continued with the user support services with the aim of resolving the problem of complaints concerning the work of some operators, which involved the analysis of the number of user complaints according to the type of services, preparation of specific enactments and daily communication with the users by e-mail and telephone. In 2010, 511 user complaints were received. Operators responded to 369 complaints, of which 141 complaints were resolved with the positive outcome for the users.

During 2010, activities related to the universal service (US) implementation continued. In the previous year, pursuant to Article 49 of the *Law on Telecommunications* , and on RATEL's proposal, the Ministry of Telecommunications and Information Society passed the *Rules on determining the initial set of services for universal service obligation* (*Official Gazette of RS*, no. 55/09). Consequently, on 12 March 2010, RATEL adopted the *Decision on designating the operators with the obligation of universal service provision* (*Official Gazette of RS*, number 15/10), designating Telekom Srbija, Joint Stock Co., Telenor, Ltd., VIP Mobile, Ltd. and Orion telekom, Ltd. operators with the obligation of universal service provision.

The entry into force of the Law provided the continuity of the US related activities. Having carried out the analysis, RATEL registered the number of communities in the Republic of Serbia without a fixed telephone line or mobile signal or with an unsatisfactory level of telephone line penetration. The meetings with the operators designated for the provision followed, whereby an overall agreement was reached that the operators would divide among themselves the communities where they would have the obligation to provide the access under the same terms and conditions applied to the public fixed telecommunications network users, without the right to compensation of the extra costs, and proportionally to the respective market share. The operators suggested that the radio frequency usage fees be reduces for the microwave links between the base stations used for the access provision within the US. Current US-related activities are focused on technical issues concerning numbering and interconnection, as well as the tariffs for call termination on the fixed networks.

MONITORING AND ANALYSIS OF THE TELECOMMUNICATIONS MARKET

In accordance with the *2010 Framework Plan*, RATEL carried on with the activities pertinent to the analysis and regulation of the telecommunications market. Since Article 9, item 17 of the *Law on Telecommunication*, stipulates RATEL's exclusive competencies pertinent to the task of monitoring the developments in the field of telecommunications, gathering information from telecommunications operators and providing information to users, operators and international organizations, the publication ***An Overview of Telecom Market in the Republic of Serbia in 2009*** represents one of the results of such market analysis.

With the entry into force of the new *Law on Electronic Communications*, markets susceptible to *ex-ante* regulations and the obligations of the operators with significant market power (SMP) were defined. Under the Law, RATEL is required to carry out the analysis of relevant market and, if necessary additional markets, at least every three years, implementing relevant EU recommendations on the market analysis and individual or joint significant market power.

The relevant market analysis, which began in 2010, is carried out through joint work of several RATEL's organization units. The work entails data collection from over 300 operators (mobile, fixed, Internet, CDS, VoIP, CDMA), storing, processing, comparison and presentation of the relevant data in the annual publication. The data are also used for the annual report submitted to the ITU, and biannual reports sent to Cullen International. Special efforts are dedicated to the analysis of causes and consequences of particular market trends, especially to the strategic issues concerning the evaluation of the future telecommunications market development.

Once RATEL determines the absence of effective competition in a relevant market, based upon the conducted analysis, it shall adopt a decision designating an operator with SMP (individual or joint) in the relevant market and imposing on them at least one obligation stipulated under Art. 63 of the Law.

The *Rules on the application of the cost-accounting principle, separate accounts and reporting of a telecommunications operator with significant market power* (*Official Gazette of RS*, no. 103/08) remain to be the basis for pricing the services under RATEL's control even after the new Law on Electronic Communications entered into force. Furthermore, the activities related to the implementation of the Current Cost Accounting (CCA) for SMP operators began.

The implementation of the above Rules so far involves public fixed voice services and CDS markets. Having identifying characteristic parameters of a monopolistic market, RATEL declared Telecommunications Company Telekom Srbija, Joint Stock. Co. an SMP for the public voice service and Serbia Broadband – Srpske kablovske mreže (SBB) an SMP for cable distribution service.

A comparative overview of the number of users and the penetration rate in the public fixed telecommunications network, public mobile telecommunications network, Internet and cable systems for 2008, 2009 and 2010 is given in Table 1 below.

Table 1. Comparative overview for the last 3 years — Source: RATEL

	2008.		2009.		2010.	
	Numbers (thousands)	Penetration (%)	Numbers (thousands)	Penetration (%)	Numbers (thousands)	Penetration (%)
Fixed – lines	3 084.9	41.14	3 105.7	41.42	3 110.3	41.48
Mobile - users	9 618.8	128.27	9 912.3	132.20	9 915.3	132.24
Internet - subscribers	1 619.7	21.60	1 705.7	22.75	2 407.4	32.11
CDS - subscribers	922.3	12	1 080.9	14.42	1 247.2	16.63

ORGANIZATION AND DEVELOPMENT OF RATEL

RATEL was founded pursuant to the Law, as an autonomous organization with the status of a legal entity which exercises public authorities in order to effectively implement the established electronic communications policy, promote competition in the sphere of electronic communications networks and services, enhance their capacity and/or quality, contribute to the development of electronic communications market and protect the interests of users of electronic communications services, in accordance with the Law and the bylaws adopted pursuant to this Law.

RATEL is functionally and financially independent of government authorities, organizations and entities engaged in the electronic communications sector.

The Agency shall operate pursuant to the provisions pertinent to public agencies, and the responsible ministry shall supervise the lawfulness and appropriateness of functioning of the Agency in performing the entrusted duties.

All decisions in RATEL's competence are adopted by the Managing Board and director. The members of the Managing Board are appointed and relieved from office by the National Assembly of the Republic of Serbia at the proposal of the Government, on the basis of the public call for appointment of MB members. Among the five members of the Managing Board one is the Chairperson and one is the Deputy Chairperson, while the term in office is five years. The Managing Board, pursuant to

the Law, passes RATEL's annual business plan and other bylaws stipulated by the Law and performs other tasks which do not fall within the competence of the director.

At the proposal of the Government, the National Assembly of the Republic of Serbia appointed the Chairperson, Deputy Chairperson and the members of the Managing Board of the Republic Agency for Electronic Communications (*Official Gazette of RS*, no. 23/11) on 31 March 2011. Prof. Dr Jovan Radunović was appointed the Chairperson, Dr Zdravko Stanimirović was appointed Deputy Chairperson, while Prof. Dr Miroslav Dukić, Prof. Dr Vlade Milićević and Vuk Vujović, MBA were appointed members of the Managing Board.

The Director is responsible for the lawfulness of RATEL's work, and represents and acts on behalf of the Agency, manages the activities and business operations of the Agency, decides on the rights, obligations and responsibilities of the Agency's employees, prepares and implements decisions of the MB, ensures the transparency of RATEL's work and performs other tasks specified in the Law and in the Statutes of the Agency. The director is appointed and removed from office by the Managing Board, on the basis of a public call for the appointment, pursuant to the Law. The term in the office of the director is five years and he/she can be reappointed. The director is a full time employee with RATEL, he/she is responsible for their work to the MB and submits annual and periodical reports to it.

Following the public call for the appointment, pursuant to the Law and the Statutes, in the session held on 15, October 2010, RATEL's Managing Board unanimously appointed Dr Milan Janković the Director of RATEL.

The following organization units were formed for performing the work within RATEL's competence:

- **Regulation Sector** (with the following departments: Bylaws Department, Technical Regulations Department and Radiocommunications Department),
- **Economic Affairs and Market Analysis Sector** (with the following departments: Market Analysis and Cost-Accounting Department, Accounting and Finance Department and Procurement Division),

- **Logistics Sector** with the following departments: General Affairs Department, e-RATEL Department and Monitoring Department).

The financial assets are provided by RATEL's revenues from the numbering fees, radio-frequency fees, fees for performing electronic communication activities, and revenues from the provision of services within RATEL's competence.

RATEL's annual financial report is approved by the Managing Board and revised by an independent chartered auditor.

The difference between the revenues and expenditures laid down in RATEL's annual financial report is paid into public revenues account of the Treasury of the Republic of Serbia and used by the responsible ministry for the promotion and development of electronic communications and information society. A part of these revenues, proportional to the revenues made by the electronic communication network and services operators in the territory of the Autonomous Province of Vojvodina, is paid into the account of the Province Treasury and used by the province authority in charge of electronic communication for the promotion and development of electronic communication and information society in the territory of AP Vojvodina.

During 2010, RATEL's total revenues amounted to approximately 1 917 million dinars, with the total expenditures of 668 million dinars. Pursuant to Article 27, paragraph 86 of the Law, once the financial reports had been audited, the surplus of 1 249 million dinars was paid into the Treasury of the Republic of Serbia and the Autonomous Province of Vojvodina, in the amount of 1 229 million dinars and 20 million dinars, respectively.

On 31 December 2010, RATEL had 99 employees. RATEL is located in rented business premises in Višnjićeva 8 in Belgrade. The spectrum monitoring centres are located in Dobanovci and Niš.

The upgrade of the existing ICT systems within RATEL continued:

- new website was launched, integrated with the e-Register and portal for user complaints which began with service provision,

- server virtualization and the connection to central data storage of all internal servers of the Agency, strengthening the resistance to hardware failure, were completed;
- preparations related to the set-up of the infrastructure segment of the Central Base of Ported Numbers in Mobile Telephony were completed.

During 2010, 22 sessions of the Managing Board were held. They involved the preparation of 253 items of the agenda. Prior to the entry into force of the new Law, 2 bylaws (rules) were passed, and 897 separate enactments (decisions, decrees, conclusions, etc.), whereas after the adoption of the new Law 15 decisions of the Managing Board and 5 bylaws (rules) were passed. In the period from July until 15 October 2010, the Chairman of the Managing Board adopted 460 general enactments (decrees). From 15 October until the end of 2010, the Agency Director adopted 361 decrees, 7 bylaws (rules), 3 instructions and 4 forms. Also, there were 89 written communications or enactments accompanying general or separate bylaws addressed to the National Assembly of the Republic of Serbia, the Government of Republic of Serbia, the Supreme Court of Serbia, the Constitutional Court of Serbia, the responsible ministries, the Commissioner for Information of Public Importance and other government authorities and public telecommunications operators, etc.

In 2010, RATEL published two issues of the professional-scientific magazine TELEKOMUNIKACIJE. The fifth issue was printed and published in June and the sixth in November of 2010. They are distributed to an increasing number of addresses free of charge and the magazine website is very popular. The authors are established national and foreign experts in the area of telecommunications, information technologies, economics and law.

Observing the principles of transparency in the work and provision of information to all participants of the telecom market, two regular press conferences were held in RATEL's premises:

- ***Overview of RATEL's work from 2005 to 20010,*** held on 18 May 2010,
- ***Presentation of the annual publication - Overview of the Telecom Market in 2010,*** held on 24 August 2010, on the occasion of RATEL's yearly publication issuance.

In addition to the regular press conferences organized by the Agency, RATEL also participated in the following conferences organized by the Ministry for Telecommunications and Information Society:

- Press conference in the occasion of signing the agreement on procurement of computers, computer equipment and software for *Digital School* programme implementation, held in the press hall of the Government of the Republic of Serbia on 23 November 2010,
- Press conference on the implementation of number portability in the mobile network held in the press hall of the Government of the Republic of Serbia on 29 November 2010.

With the purpose of providing transparency in RATEL's work and offering an opportunity to the public to take part in the process of decision-making in the telecommunications sector, in 2010, pursuant to the provision Art. 34-36 of the Law and the Instructions on the Public Consultations Procedure, RATEL organized public consultations prior to the adoption of the following bylaws:

1. Rules on fees for the performance of electronic communications activities
2. Rules on radio-frequency usage fees
3. Rules on request forms for the issuance of individual licence for radio-frequency usage

COOPERATION WITH OTHER INSTITUTIONS AND ORGANIZATIONS

In performing its main role of creating the necessary conditions for the unhindered development of the telecommunications market in the Republic of Serbia, RATEL has established close cooperation with the relevant state and judicial authorities and other entities.

The open and direct cooperation between RATEL and the Ministry of Telecommunications and Information Society (MTIS) has resulted in the efficient performance of the regulatory activity.

Following the entry into force of the Law, the cooperation also involved a joint work on the creation of bylaws adopted by the responsible ministry on RATEL's proposal.

With the aim of ensuring an efficient radio frequency spectrum management and the protection of operation of priority radio services, RATEL has established the cooperation with the Ministry of Telecommunication and Information Society (MTIS), the Republic Broadcasting Agency, the Ministry of Defence, Serbian Armed Forces, the Ministry of Interior and Serbian and Montenegrin Air Traffic Services Agencies.

During 2010, RATEL participated in the activities of work groups, commissions and activities of the Government of Serbia, the most important being:

- National Programme for Integration of the Republic of Serbia in the EU (NPI), the preparation of answers to the European Commission Questionnaire along with the input of RATEL's bylaws in the joint database. RATEL's employees took part in the two-day training programme organized by the European Integration Office: *Legal Harmonisation and Table of Concordance*;
- cooperation with the Competition Commission:
- accession of the Republic of Serbia to the World Trade Organization;
- preparation of the Strategy for the Regulatory Reform in the Republic of Serbia from 2008 until 2011;
- sector meetings between the European Commission and the Republic of Serbia;
- preparation of the materials for the European Communication Monitoring Report 2 - Serbia and Cullen International.

We would like to point out RATEL's participation in drafting the National Programme for Integration of the Republic of Serbia in the European Union (NPI), through its activities within Information Society and Media Group, and also Competition Group and the Group for Free Movement of Goods.

In 2010, the activities mainly involved the preparation of the answers to the European Commission Questionnaire, as well as the activities related to the activities concerning the National Programme for Integration of the Republic of Serbia in the EU. Since NPI provides a detailed overview of reforms and activities to be carried out in the years ahead, it is of great importance for the work of the state institutions, and also for the future business plans of the private sector.

The dynamic development of ICTs, i.e. services and equipment, requires continuous monitoring and introduction of new regulations. This requires advanced and direct international cooperation with the national regulatory authorities (NRAs) and other international institutions in the area and with the EU Member States. For the purposes of the harmonization of regulations, technical provisions, standards and certificates, in 2010 RATEL's experts took an active part in the meetings of several international organizations, among which particularly with the ITU, CEPT and ETSI:

- participation in the work of FM Spectrum Management Workgroup - WG FM;
- participation in the work of the Spectrum Engineering Workgroup - WG SE;
- participation in the work of WG1A, WG1B and WG1C (SG1) of the International Telecommunication Union;
- participation in *the NNA (Numbering, Naming, Addressing) Task Force Number Portability* meenting;
- participation in the work of CEPT WGFM PT22;
- participation in the meeting of the *Joint Task Group 5-6* of the ITU Member States;
- participation in the meetings of the ITU-R WP 5A, WP 5V, WP 5C and WP 6A;
- participation in the work of CEPT WG RA and WGFM PT22;
- participation in the work of ITU-T Study Groups 2, 3, 5, 12, 15 and 17;
- participation in ITU workshop "*Radio monitoring and enhancement of spectrum usage efficincy*";
- training of the employees in the spectrum monitoring centres in the monitoring centre of the German Agency - BnetzA;

- bilateral broadcasting coordination meeting between the Agency for Electronic Communications and Postal Services of Montenegro (EKIP) and RATEL, Podgorica, Montenegro, 15 – 16 December 2010.
- participation in the World Radiocommunications Seminar, Geneva, Switzerland, 6 – 10 December 2010.
- participation in the ITU workshops: "Network Future" and "LTE Systems Technical Aspects", Warsaw, Poland, 16 – 17 November 2010.

RATEL hosted the 54th SE19 Project Team Meeting, dealing with the Broadband Applications in Fixed Service, within WGSE of the Electronic Communication Committee (ECC) and the European Conference of Postal and Telecommunications Administrations (CEPT). The meeting was held on 7 and 8 September in RATEL's premises, it was attended by the representatives of administrations, operators and manufacturers from 13 European countries, and chaired by Jean Philippe Kermoal from the European Communication Office (ECO).

Constant contacts with all participants in the market were maintained through the official institutional participation of RATEL in the meetings and roundtables:

- Telecommunications Forum TELFOR 2010 held from 23 until 25 November 2010 at Sava Centre in Belgrade, where RATEL's representatives held the introductory address titled ***Telecommunications Market: importance and regulation***;
- Within the SEE Regulatory Forum 4, held on 4 November 2010 in Sarajevo, the presentation ***Resolving Operator Disputes*** was held;
- As part of PosTel 2010 symposium, held on 14 December 2010 at the Faculty of Transport and Traffic Engineering in Belgrade, a roundtable ***The Role of Regulation in the Digital Agenda Implementation*** was held, with dr Milan Janković, RATEL's Director, as moderator and Georg Serentschy from the Austrian Regulatory Authority as a panellist.

- Numerous roundtables, upon invitation, and presentation and publication of papers in the national and international conferences and magazines.

RATEL's employees participated in several international and national conferences:

- as part of the state delegation at the 18th ITU Plenipotentiary Conference 2010 (PP-10) which took place in the city of Guadalajara (Mexico);
- in the 5th World Telecommunication Development Conference (WTDC-10), which took place in Hyderabad, India;
- in the Ministerial Summit *Harmonization of the Digital Dividend in SEE*, held in Belgrade, attended by the representatives of the governments and NRAs from South East Europe: Montenegro, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Hungary, Macedonia, Poland, Romania, Slovenia and Turkey, and hosted by the Ministry of Telecommunications and Information Society;
- in the regulator conference organized by the Romanian regulator ANCOM;
- in the *10th Global Symposium for Regulators* – GSR10, in Dakar, Senegal;
- In IEEE MELECON2010, Valetta, Malta;
- In YU INFO 2010, Kopaonik;
- In the forum on electronic document management *Documation*, in Paris, France;
- In EuroDIG – 2010, Madrid, Spain;
- In the IX *Conference* of *Telecommunication, Media and Internet* Techno-*Economics* (CTTE), Ghent, Belgium;
- In ETRAN 2010, held in Donji Milanovac;
- In XV Kongresu JISA, held in Herceg Novi, Montenegro;
- In the Workshop on Telecommunications VITEL 2010, Kranj, Slovenia
- In EUROBRAND 1 and EUROBRAND 2, Srebrno jezero,

- In the *Conference on Relevant Market Analysis as the Requirement for Imposing the Regulatory Obligations on SMP Operators in the Relevant Markets*, held in Budva, Montenegro.

RATEL cooperates with the European NRAs, in particular with the regulators from the region:

- RATEL's representatives participated in the preparation of the technical agreement between the administrations of Austria, Croatia, Hungary, Romania, Serbia, Slovakia, Slovenia and Ukraine on borderline frequency coordination for IMT/UMTS systems in GSM range 880-915/925-960 MHz (GSM900) and 1710-1785/1805-1880 MHz (GSM1800), signed on 28 October 2010 in Budapest, Hungary. The agreement was created based on the relevant provisions of Decision ECC/DEC/(06)13, whereas the coordination principles between GSM and IMT/UMTS systems and between the two IMT/UMTS systems, operating in GSM frequency band, are based on the Recommendation ESS/REC(08)02. In this way, the implementation of new technologies and services in the existing GSM system band was enabled;
- A bilateral meeting on broadcasting coordination between the Agency for Electronic Communications and Postal Services of Montenegro (EKIP) and RATEL was held on 15 and 16 December 2010 in Podgorica, Montenegro.

In its work, RATEL continues the cooperation with all participants in the telecom market: operators, distributers, industry, research and educational institutions as well as with consumer associations.

Director

Dr Milan Janković

2. TELECOM MARKET ANALYSIS

Previously, RATEL adopted the decisions on designating the following operators as having significant market power (SMP), in line with the regulations in force at the time:

1. Telekom Srbija, Joint Stock Co., Belgrade, for the public fixed telephone network service, as of March 2006. Pursuant to the decision, Telekom Srbija was required to obtain consent from the Agency for any price modification for public fixed telephone network services, to the end of preventing or limiting the anti-competitive practice and/or monopolistic behaviour.

2. Serbia Broadband – Srpske kablovske mreže, Ltd. (hereinafter: SBB) for the service of radio and television programmes distribution via cable distribution network, as of February 2007. Pursuant to the decision, SBB was required to obtain consent from the Agency for any price modification for the services of radio and television programmes distribution via cable distribution network, to the end of preventing or limiting the anti-competitive practice and/or monopolistic behaviour.

SMP operators are subject to a special tariff regime, pursuant to the *Rules on the application of the cost-accounting principle, separate accounts and reporting of a telecommunications operator with significant market power (Official Gazette of RS*, no. 103/08), regulating the basic principles, models and methodologies of cost and performance accounting, prime cost calculation and selling price of the regulated services. These Rules stipulate the "cost-plus" pricing method, which involves calculating the unit cost of service and adding on an appropriate profit on the capital engaged in the product production or sales, along with the application of the *Historical Cost Accounting* (HCA) model according to the Top-Down method, based on the functional principle of the *Fully Distributed Cost* (FDC) or *Activity Based Costing* (ABC). Since the *Historical Cost Accounting* (HCA) model had already been implemented in the calculation of selling prices of the SMP operators' services, in 2010 the activities related to the implementation of the *Current Cost Accounting* (CCA) continued. The implementation of CCA should begin in 2013 and should apply to the previous reporting period.

Under the Law on Electronic Communications, RATEL is in charge of market analysis procedure, and the criteria for determining the markets susceptible to *ex-ante* regulation are laid down in Art. 59 of the Law. Relevant markets, as defined by the Law, are determined by RATEL, by applying the relevant EU recommendation. Meanwhile, the markets identified in Art. 145 of the Law shall be susceptible to ex-ante regulation.

On 16 September 2010, the Chairman of RATEL's Managing Board passed a decision forming the Work Group for Relevant Market Analysis in order to determine SMP operators and define the set of regulatory measures for the following markets:

1. retail access to the public telephone network;
2. wholesale call origination on the public telephone network;
3. wholesale call termination on the public telephone network;
4. wholesale (physical) access to network elements and associated facilities (including shared and full unbounded access to the local loop);
5. wholesale broadband access;
6. wholesale leased lines;
7. wholesale call termination on the mobile network;
8. media contents distribution.

In addition to the above markets, in 2010 the analysis of the retail market for publicly available telephone service at fixed location also began. The market for media contents distribution and retail market for publicly available telephone service at fixed location are not defined as relevant in the EU Directives, not under the Law, however since Telekomu Srbija, Joint Stock. Co. and SBB, Ltd. were designated SMP operators in line with the legal provisions in force at the time, the need was recognized for these two electronic communication market segments to be analysed as well.

The identification and analysis of the relevant markets is carried out in line with the European Commission guidelines and recommendations, so as to determine whether the existing SMP operators still hold a dominant position and, hence, whether the regulatory obligations imposed on them should remain in force, in particular the special tariff regime applied to selling prices of the regulated services.

The relevant markets were first defined in terms of the production and geographic dimensions, and then it was determined whether substitution on supply and demand side existed and whether there was any potential competition. The analysis of the identified markets followed by applying the criteria for determining individual and joint significant market power, stipulated under Art. 61. of the Law. In deciding upon individual significant market power, the following shall particularly be taken into consideration:

1. overall size of the company and its competitors, in particular the number of users and total revenues on the relevant market;
2. control over the infrastructure not easily duplicated;
3. technological advantages or superiority allowing the operator to hold a better position on the market;
4. absence of or low countervailing buyer power;
5. easy or privileged access to capital markets or financial resources;
6. diversification of products or services (e.g. bundled products or services, and the like);
7. economies of scale;
8. economies of scope;
9. vertical integration;
10. highly developed distribution and sales network;

11 absence of potential competition;

12 barriers to expansion.

In deciding upon joint significant market power, the following is also taken into consideration: market saturation, stagnant or moderate growth on the demand side, low elasticity of demand, homogeneous products, similar cost structures high, barriers to entry into the market, etc.

Upon the conducted analysis, it was determined that there was at least one SMP operator in each relevant market and the identification of the potential barriers to the competition development in the relevant markets followed. Based on the analysis of the overall results, RATEL will adopt a decision imposing at least one obligation on the SMP operators, with regard to the type and nature of the identified failures, previous and future investments and the possibility for a reasonable rate of return on the invested assets.

According to Art. 63 of the Law, the obligations of an SMP operator may include the following:

1 publication of relevant data;

2 non-discriminatory actions;

3 accounting separation;

4 provision of access and use of parts of the network infrastructure and associated facilities;

5 price control and cost-based accounting;

6 provision of minimum set of leased lines;

7 provision of operator selection and operator pre-selection services;

8 offering retail services under certain conditions.

The relevant market analysis procedure, including the public consultations, will be completed by the end of June 2011, within the legal time frame.

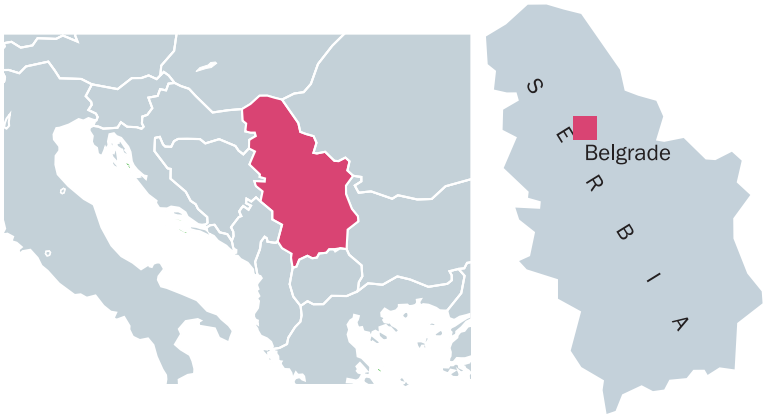
2.1. BASIC CHARACTERISTICS OF THE TELECOM MARKET IN THE REPUBLIC OF SERBIA

Revenues from telecom services 1.46 billion euros

According to RATEL's data, the revenues from telecom services in 2010 amounted to 1.46 billion euros. The average annual growth rate of the telecom sector revenues in the period from 2005 to 2010 was 9.4%. The share of telecom sector revenues in GDP was around 4.98% (cf. 4.76% in 2009). The total investments in the telecom sector in 2010 amounted to 274 million euros.

Data utilized for the telecom market analysis in the Republic of Serbia were retrieved from the reports submitted by the telecom market participants and refer to the territory of the Republic of Serbia without the Autonomous Province of Kosovo and Metohija which is under UN administration pursuant to 1244

Figure 1. Republic of Serbia – Basic Facts
Source: Statistical Office of the Republic of Serbia and RATEL



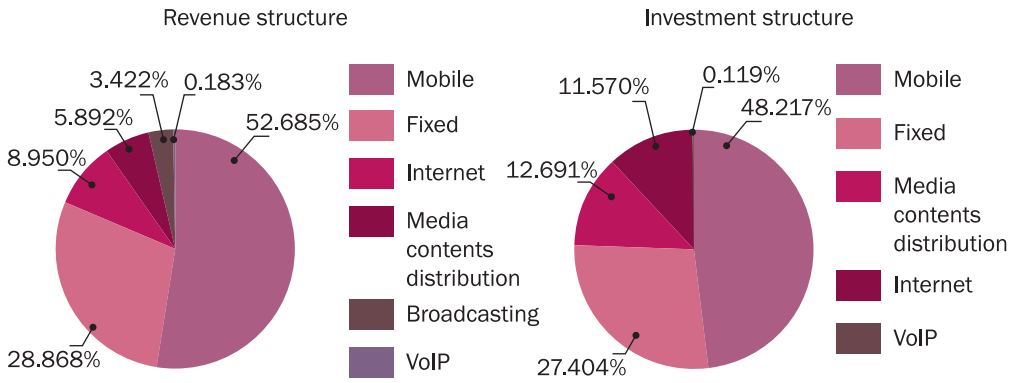
Basic Facts	
Name	Republic of Serbia
Capital	Belgrade
Area	88,361km^2
Population (without AP Kosovo and Metohija), 2002 data.	7,498,001
Country code:	+381
Internet domain:	.rs
GDP for 2010	RSD 3 034.4 bn. (estimate of the Ministry of Finance) Annual real growth 1.8% (estimate of the Statistical Office)
Average net income in 2010	RSD 34 142 (€330) Annual growth 7%
Fixed penetration:	41.48
Mobile penetration:	132.24
ISPs:	192
Network digitalization rate:	97.85%

Security Council Resolution temporarily regulating, *inter alia*, the competencies of the international civil mission in this territory.

In terms of different services, in 2010, the largest share in the total revenues, approximately 53%, goes to the mobile market, whereas VoIP services with 0.2% represent the smallest share. Accordingly, investments in the mobile market have the largest share in the total revenues, 48% in 2010, whereas investments in VoIP only 0.1%. The structure of telecommunications sector revenues is given below (Figure 2).

Tables 2 and 3 illustrate telecom service baskets representing monthly expenditure per subscriber of telecom services in Serbia in 2010 compared with the data retrieved in 2009 and 2008. The low usage basket shows the average monthly expenditure for basic telecom services, which include TV, fixed and mobile telephone services, whereas the high usage basket

Figure 2. Structure and investments by services in 2010 Source: RATEL



shows how much the population spends monthly using Internet and CATV in addition to the basic package. In 2010, the cost of the basic package equalled 4.8% of the average monthly salary, and that of the extended package amounted to appriximatly 13%. Within the basic package, the largest amount goes to fixed-line services - 2.6% of the average salary in December, whereas in the extended package, the biggest expenditure is the mobile (postpaid) service - 5% of the average salary in December.

Table 2. Low Usage Basket Source: RATEL

Low Usage Basket	2008.		2009.		2010.	
	Average bill	% of the monthly salary	Average bill	% of the monthly salary	Average bill	% of the monthly salary
Fixed	725.0	1.9%	877.3	2.3%	1,004.3	2.6%
Mobile (prepaid)	364.5	0.9%	349.9	0.9%	331.3	0.9%
TV (national TV subscription)	387.0	1.0%	387.0	1.0%	500.0	1.3%
Total	1,476.5	3.8%	1,614.2	4.2%	1,835.6	4.8%
Average net salary (in December)	38,626		36,789		39,580	

Table 3. High Usage Basket — Source: RATEL

High Usage Basket	2008.		2009.		2010.	
	Average bill	% of the monthly salary	Average bill	% of the monthly salary	Average bill	% of the monthly salary
Fixed	725.0	1.9%	877.3	2.3%	1,004.3	2.6%
Mobile(postpaid)	1,333.1	3.5%	1,107.9	2.9%	1,948.7	5.0%
TV (national TV subscription)	387.0	1.0%	387.0	1.0%	500.0	1.3%
ADSL	1,178.0	3.1%	1,021.6	2.6%	1,165.0	3.0%
CATV	392.6	1.0%	456.3	1.2%	559.0	1.4%
Total	4,015.7	10.4%	3,850.2	10.0%	5,177.0	13.4%
Average net salary (in December)	38,626		36,789		39,580	

2.2. COMPARATIVE ANALYSIS WITH THE SEE COUNTRIES

Same as the previous years, a comparative analysis of South East Europe countries was carried out in 2010. SEE countries include three EU candidate countries – Turkey, Croatia and Macedonia, and also four Stabilization and Accession Agreement (SAA) signatory countries – Serbia, Montenegro, Bosnia and Herzegovina and Albania.

The value of VAT in these countries remained approximately the same as in 2009. The highest VAT rate was again recorded in Croatia (23%) and Albania (20%), followed by Turkey, Macedonia and Serbia (18%) and finally Bosnia and Herzegovina and Montenegro with the lowest rate (17%).

Croatia has the biggest GDP per capita, followed by Turkey which recorded a considerable growth in GDP per capita year-on-year. As for other countries in the region, there were no significant changes in this indicator, as shown in Figure 3 below.

Table 4. Population and GDP in 2010

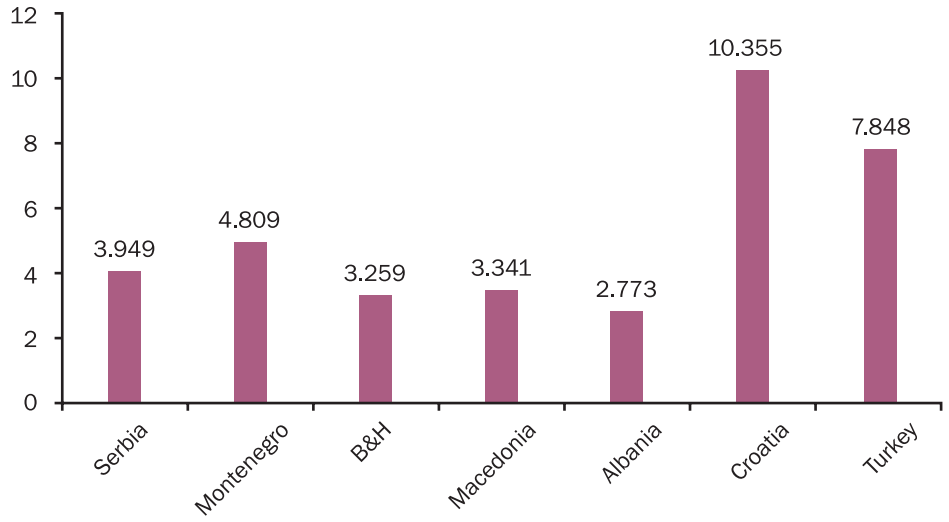
Source: International Monetary Fund (IMF)

Country	Population (mn)	GDP (€ bn)
Albania	3.202	8.88
Bosnia & Herzegovina	3.897	12.70
Montenegro	0.630	3.03
Croatia	4.416	45.73
Macedonia	2.056	6.87
Serbia	7.396	29.21
Turkey	71.341	559.92

Turkey had the largest growth of 26.48% year-on-year. Croatia has the biggest GDP in the region, followed by Serbia and Bosnia and Herzegovina.

Figure 3. GDP Per Capita in 2010 (in thousands of euros)

Source: International Monetary Fund (IMF)



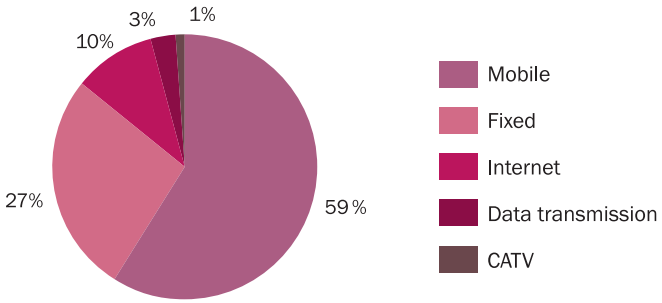
The total telecommunications market value in these countries is estimated to 15.2 billion euros, which is a slight decrease year-on-year. A particular increase was observed within the market segments of Internet and CATV, whereas other segments showed a drop, (Table 5 below).

Table 5. SEE Electronic Communication Market
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)

	2007.	2008.	Sector growth 2007-2008	2009.	Sector growth 2008-2009
Fixed-line telephony	5,411,329,183	4,565,475,249	-15.63%	4,137,152,590	-9.38%
Internet services	965,443,338	1,272,911,860	31.85%	1,513,395,995	18.89%
Mobile telephony	9,013,465,423	9,964,334,200	10.55%	9,028,183,451	-9.40%
Data transmission	384,632,703	440,934,537	14.64%	421,506,883	-4.41%
CATV (cable Internet services excluded)	113,333,302	144,899,460	27.85%	181,364,880	25.17%
Total	15,888,203,949	16,388,555,306	3.15%	15,281,603,799	-6.75%

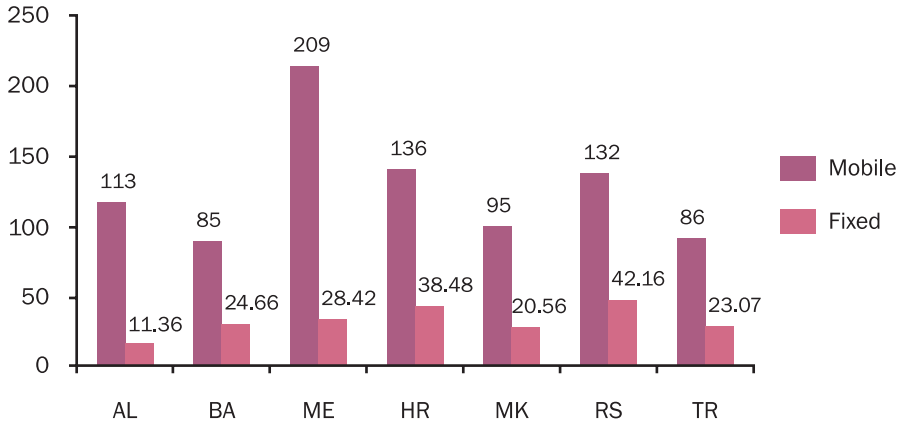
Like in the previous year, the largest share, as much as 59.08% of the total telecom market revenues, goes to revenues from mobile telephony, followed by revenues from fixed telephony, 27.07 and the Internet, 9.90%, which is a slight increase year-on-year. It needs to be noted that the share of CATV is not entirely accurate since the data for Albania and Montenegro were still unavailable at the time of preparing this publication (Figure 4).

Figure 4. Market Share of Electronic Communication Services in 2010
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)



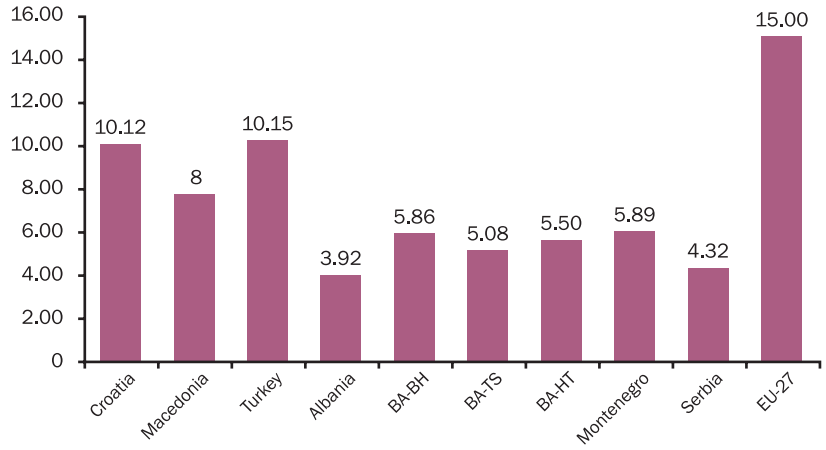
The comparative overview showed that, after a period of constant growth, mobile and fixed penetration (Figure 5) entered into stagnation and even decline in some countries. Croatia experienced a slight drop in the number of mobile users per 100 inhabitants, from 140.9 to 136, while the fixed penetration rate remained unchanged. In Turkey, on the other hand, mobile penetration rate dropped from 89% to 86%, and there was also a slight drop in the fixed penetration rate. Montenegro experienced a significant drop in the mobile penetration rate, from 226.4% to 209%, and yet a slight increase in the fixed penetration from 26.42 to 28.42 users per 100 inhabitants. Macedonia demonstrated both a slight increase in the fixed penetration rate and an increase in mobile penetration from 92 to 95 users per 100 inhabitants. In Albania there was a slight increase in the mobile penetration rate, while the fixed penetration rate remained unchanged. There were no significant changes neither in the fixed nor in the mobile penetration rate compared with 2009.

Figure 5. Mobilne and Fixed Penetraion Rate (countries in the region)
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)



The prices of specific fixed network services provided by the operators in the region and in the EU, as well as the leased line services are given in Figures 6, 7, 8 and 9. The monthly subscription charge is lowest in Albania and highest in Turkey and Croatia (Figure 6) whereas the local call tariff is still by far the lowest in the Republic of Serbia (Figure 7). The highest

Figure 6. Standard Monthly Subscription for Residential Users (€) (VAT included)
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)



annual charges for 2km of national 64kbit/s leased lines are observed in Albania (€2128),), whereas charges for 2Mb/s leased lines are the highest in Macedonia (€12,122).

Figure 7. Price of a 3-minute and a 10-minute Local Call (€) (VAT included)
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)

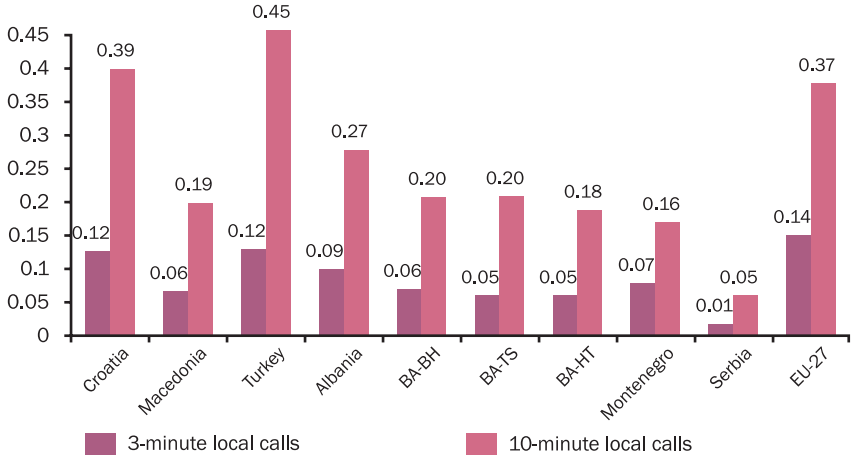


Figure 8. Annual Charges for 64 kbit/s 2 km National Leased Lines (€)
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)

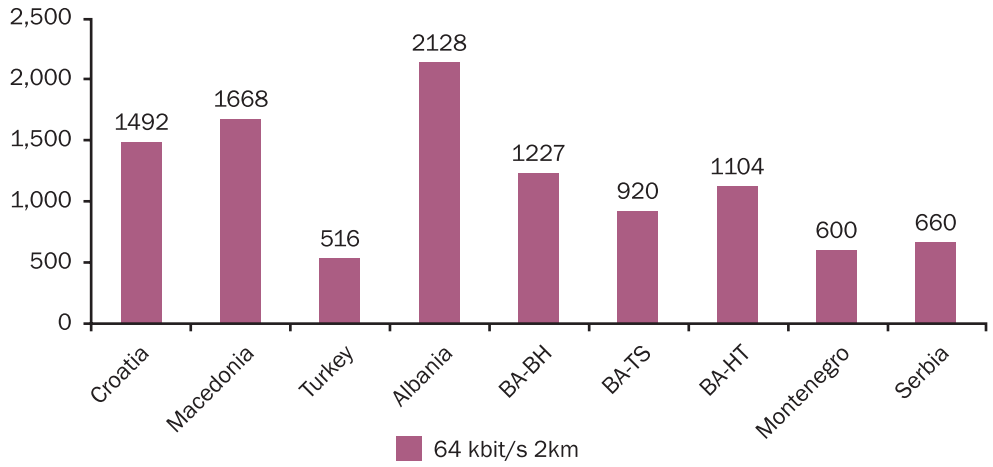
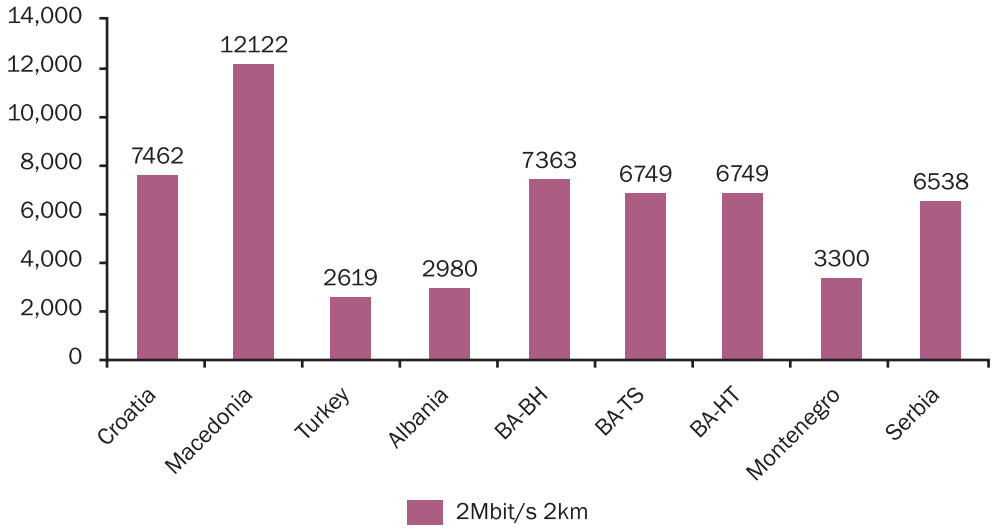


Figure 9. Annual Charges for 2 Mbit/s 2 km National Leased Lines (€)
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)



The number of broadband users in Serbia continued to grow in 2010, amounting to 2 275 900, which is an increase of 33.43% compared with 1 705 716 users in 2009. Due to the ongoing telecommunications development and broadband Internet access, the number of broadband users exceeded the number of dial-up users, a trend recorded in both the EU countries and countries in the region. However, Croatia and Montenegro, where the number of dial-up users still exceeds the number of broadband users, represent exception to this trend.

Figure 10. Total Number of Fixed Internet Connections According to the Type of Connection
Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)

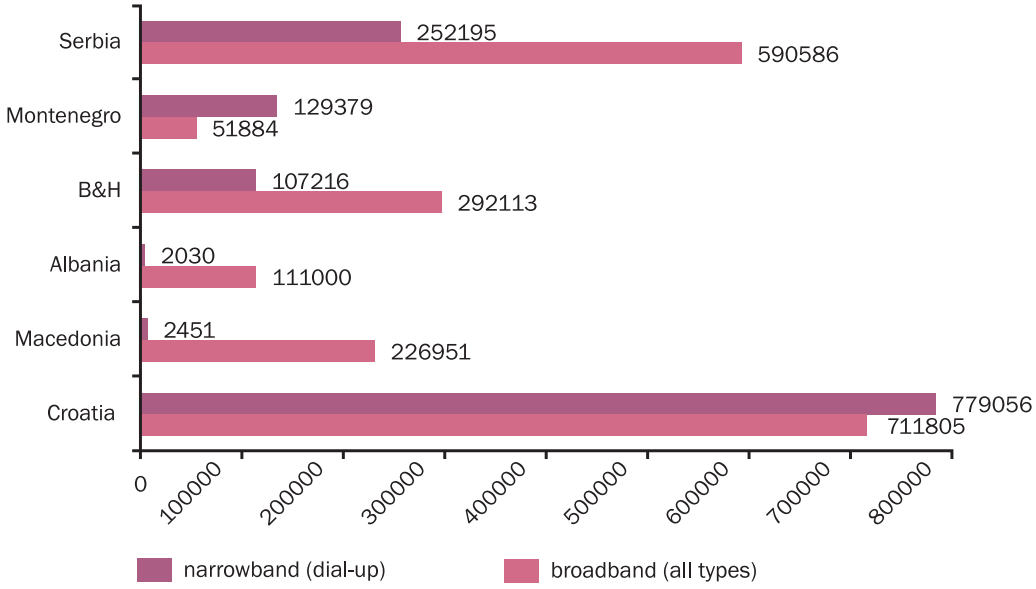
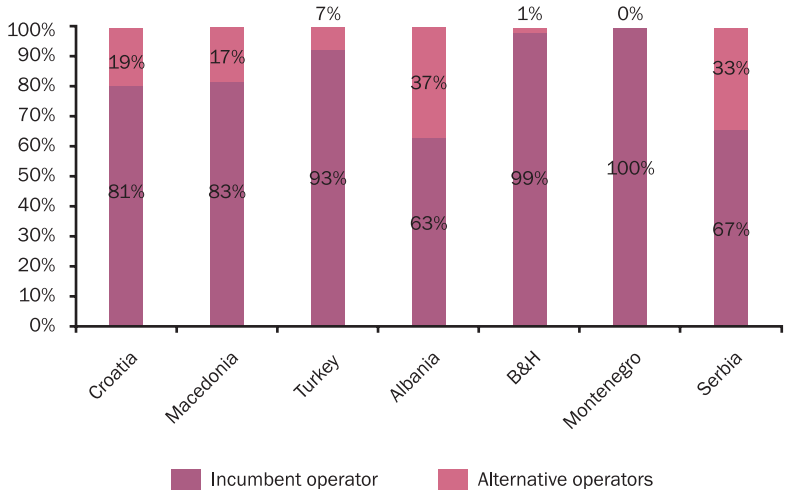


Figure 11 illustrates competition on the retail ADSL market between incumbent operators and other (alternative) operators. As clearly shown, the incumbent operator had absolute ADSL access market share (100%) only in Montenegro, whereas incumbent operators in Bosnia and Herzegovina and Turkey follow with over 98.77% and 92.66%. of shares, respectively. The incumbent operators had the least share in Serbia (66.66%) and Albania (63%).

Figure 11. Retail ADSL Competition

Source: Enlargement Country Monitoring Report 4 Annex (Cullen International)



2.3 ICT DEVELOPMENT INDEX

With the aim of measuring and monitoring the development of information society and determining the digital divide among UN Member States, the International Telecommunication Union (ITU) publishes the indicators of ICT development on a regular basis. In comparison with the previous methodology, when data was usually obtained from the undertakings present in the ICT industry, recent approaches of data collection focus on obtaining relevant indicators on the basis of a representative sample of the telecommunications services users. The following indicators are presented according to the ITU *Manual for Measuring ICT Access and Use by Households and Individuals*, published in 2009, which provides a description of the core indicators and methodology for data collection and analysis. The list of the core indicators on the use of ICTs by households and individuals is given below. The list comprises 12 core indicators, HH1 – HH12, with relevant values for the Republic of Serbia in 2010, and an additional, reference indicator HHR1. RATEL obtained the following results, in cooperation with the Statistical Office of the Republic of Serbia:

Table 6. ICT Development Indicators

Source: Statistical Office of the Republic of Serbia

	Indikatort	Definicije i napomene	2010.
HH1	Proportion of households with a radio	*The proportion of households with a radio* is calculated by dividing the number of in-scope households with a radio by the total number of in-scope households. A *radio* is a device capable of receiving broadcast radio signals, using popular frequencies, such as FM, AM, LW and SW. It includes a radio set integrated in a car or an alarm clock but excludes radios integrated with a mobile phone, a digital audio player (MP3 player) or in a computer.	70 %
HH2	Proportion of households with a TV	*The proportion of households with* a TV is calculated by dividing the number of in-scope households with a TV by the total number of in-scope households. A *TV* (television) is a stand-alone device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. It excludes TV functionality integrated with another device, such as a computer or a mobile phone.	98.7 %
HH3	Proportion of households with telephone	The *proportion of households with telephone* (fixed or mobile) is calculated by dividing the number of in-scope households with a telephone (fixed or mobile) by the total number of in-scope households.	
	Proportion of households with fixed telephone	The *proportion of households with fixed telephone only* is calculated by dividing the number of in-scope households with a fixed telephone only by the total number of in-scope households. A *fixed telephone line* refers to a telephone line connecting a customer's terminal equipment (e.g. telephone set, facsimile machine) to the public switched telephone network (PSTN) and which has a dedicated port on a telephone exchange. It may not be the same as an access line or a subscriber.	86.9 %
	Proportion of households with mobile cellular telephone	The *proportion of households with mobile cellular telephone* only is calculated by dividing the number of in-scope households with a mobile cellular telephone only by the total number of in-scope households. A *mobile cellular telephone* refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, as well as IMT-2000 (3G). Users of both post-paid subscriptions and pre-paid accounts are included.	82.0 %
	Proportion of households with both fixed and mobile cellular telephone		
HH4	Proportion of households with a computer	*The proportion of households with a computer* is calculated by dividing the number of in-scope households with a computer by the total number of in-scope households. A *computer* refers to a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants (PDAs) or TV sets.	50.4 %

HH5	Proportion of individuals who used a computer (from any location) in the last 12 months	The *proportion of individuals who used a computer* is calculated by dividing the total number of in-scope individuals who used a computer from any location in the last 12 months by the total number of in-scope individuals. A *computer* refers to a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants or TV sets.	52.8 %
HH6	Proportion of households with Internet access at home	The *proportion of households with Internet access* at home is calculated by dividing the number of in-scope households with Internet access by the total number of in-scope households. The *Internet* is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.	39.0 %
HH7	Proportion of individuals who used the Internet (from any location) in the last 12 months	The *proportion of individuals who used the Internet* is calculated by dividing the total number of in-scope individuals who used the Internet (from any location) in the last 12 months by the total number of in-scope individuals. The *Internet* is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.	43.6%
HH8	Location of individual use of the Internet in the last 12 months	The proportion of individuals who used the Internet at each location can be calculated as either: the proportion of in-scope individuals or the proportion of Internet users, using the Internet at each location. Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc. Individuals should be asked about all locations of Internet use (that is, the survey question used by countries should specify multiple responses). Note that, except for mobile access, the locations are associated with the equipment used e.g. a PC installed at work or at an Internet café.	
	Home		84.2 %
	Work	Where a person's workplace is located at his/her home, then he/she would answer yes to the home category only.	22.8 %
	Place of education	For students. Teachers (and others who work at a place of education) would report 'work' as the place of Internet use.	9.9%
	Another person's home	The home of a friend, relative or neighbour.	17.7 %
	Community Internet access facility	Internet use at community facilities such as public libraries, publicly provided Internet kiosks, non-commercial telecentres, digital community centres, post offices and other government agencies; access is typically free and is available to the general public.	1.0 %
	Commercial Internet access facility	Internet use at publicly available commercial facilities such as Internet or cyber cafés, hotels, airports etc, where access is typically paid (i.e. not free of charge).	5.5 %

	Any place via a mobile cellular telephone	Use of the Internet at any location via a mobile cellular telephone (including handheld devices with mobile phone functionality).	27.2%
	Any place via other mobile/wireless access devices	Use of the Internet at any location via other mobile access devices, e.g. a laptop computer or handheld device that uses wireless access (at a WiFi 'hotspot') or a laptop computer connected to a mobile telecommunications network.	5.2 %
HH9	Internet activities undertaken by individuals in the last 12 months	The proportion of individuals who undertook each activity can be calculated as either: the proportion of in-scope individuals or the proportion of Internet users who undertook each activity.	
	Getting information about goods or services		50.0 %
	Getting information related to health or health services	Includes information on injury, disease, nutrition and improving health generally.	19.7 %
	Getting information from general government organizations	*General government organizations* should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA "... the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units.	70.3 %
	Interacting with general government organizations	Includes downloading/requesting forms, completing/lodging forms on line, making on-line payments and purchasing from government organizations. It excludes getting information from government organizations. *General government organizations* should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA "... the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units.	57.1 %
	Sending or receiving e-mail		77.8 %
	Telephoning over the Internet/VoIP	The use of Skype, iTalk, etc. Includes video calls (via webcam).	34.3 %
	Posting information or instant messaging	Posting messages or other information to chat sites, blogs, newsgroups, on-line discussion forums and similar; use of instant messaging.	44.5 %
	Purchasing or ordering goods or services	Refers to purchase orders placed via the Internet whether or not payment was made on line. Orders that were cancelled or not completed are excluded. Includes purchasing of products such as music, travel and accommodation via the Internet.	10.6 %

	Internet banking	Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information. Excludes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance.	8.8 %
	Education or learning activities	Refers to formal learning activities such as study associated with school or tertiary education courses as well as distance education involving on-line activities. (A more narrow interpretation is likely to be less meaningful as it could include a range of activities such as using the Internet to search for information.)	21.8 %
	Playing or downloading video games of computer games	Includes file sharing games and playing games on line, either paid or free of charge.	54.8 %
	Downloading movies, images, music, watching TV or video, or listening to radio or music	Includes file sharing and using web radio or web television, either paid or free of charge.	54.8%
	Downloading software	Includes the downloading of patches and upgrades, either paid or free of charge.	16.9 %
	Reading or downloading on-line newspapers or magazines, electronic books	Includes accessing news websites, either paid or free of charge. Includes subscriptions to on-line news services.	41.4 %
HH10	Proportion of individuals who use a mobile cellular telephone	The *proportion of individuals with use of a mobile cellular telephone* is calculated by dividing the total number of in-scope individuals with use of a mobile cellular telephone by the total number of in scope individuals. A *mobile cellular telephone* refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, as well as IMT-2000 (3G). Users of both post-paid subscriptions and pre-paid accounts are included. *Use of a mobile cellular telephone* does not mean that the telephone is owned or paid for by the person but should be reasonably available through work, a friend or family member, etc. It excludes occasional use, for instance, borrowing a mobile phone to make a call.	82.7 %
HH11	Proportion of households with access to the Internet by type of access (narrowband, broadband (fixed, mobile))	This indicator should be calculated as the proportion of in-scope households with Internet access that use each type of access service, for instance, the proportion of households with Internet access that use a broadband service as their means of access. It is expected that countries will collect data at a finer level than shown here. The categories chosen by countries should allow aggregation to total narrowband and total broadband, as well as to fixed and mobile broadband, as defined below. As households can use more than one type of access service, multiple responses are possible.	

	Narrowband	*Narrowband includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256 kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s.* Note that narrowband mobile phone access services include CDMA 1x (Release 0), GPRS, WAP and i-mode.	17.5 %
	Fixed broadband	*Fixed broadband refers to technologies at speeds of at least 256 kbit/s, in one or both directions, such as DSL (Digital Subscriber Line), cable modem, high-speed leased lines, fibre-to-the-home, powerline, satellite, fixed wireless, Wireless Local Area Network and WiMAX.*	27.6 %
	Mobile broadband	Mobile broadband refers to technologies at speeds of at least 256 kbit/s in one or both directions, such us Wideband CDMA (W-CDMA), known as Universal Mobile Telecommunications System (UMTS) in Europe; Highspeed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and CDMA 2000 1xEV-DV. Access can be via any device (handheld computer, laptop or mobile cellular telephone etc.).	N/A
HH12	Frequency of individual use of the Internet in the last 12 months (from any location)	The frequency of individual use of the Internet can be calculated as either: the proportion of in-scope individuals or the proportion of Internet users, using the Internet with each frequency. It is recommended that countries collect this information in respect of a typical period; therefore, respondents should ignore weekends (if they only use the Internet at work) and breaks from their usual routine, such as holidays. Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc.	
	At least once a day	Once a working day for respondents who only (or most frequently) use the Internet from work	72.3 %*
	At least once a week but not every day		21.1 %*
	Less than once a week		6.6 %*
Reference indicator			
HHR1	Proportion of households with electricity	Electricity is not an ICT commodity, but is an important prerequisite for using many ICTs. It is therefore included in the core list as a reference indicator. Electricity access may be enabled by a grid/mains connection, or by power generated locally (including at the dwelling). Local power includes electricity generated by a fuel-powered generator, or from renewable resources such as wind, water or solar. It excludes sole use of energy storage devices, such as batteries (though these may be used to store electricity from other sources).	99.9 %
**Data for 1Q10*			

In 2007, the International Telecommunication Union (ITU) initiated the process of creating a single Index which can be utilized in measuring the development of information society, the so-called ICT Development Index (IDI), which serves as a substitute for the previous two, namely the Digital Opportunity Index (DOI) and the ICT Opportunity Index (ICT-OI). This single IDI Index serves as a benchmarking tool for measuring:

- the development of the ICT market in UN Member States
- digital divide between the developed and developing countries
- developmental potential of the ICT market

This Index combines 11 indicators divided into three sub-groups:

1. ICT Readiness (infrastructure and access)
2. ICT use (primarily by individuals, but also households and undertakings) and the intensity of use
3. ICT Capability (skills necessary for the effective use of ICTs)

Given the fact that these three sub-groups of ICT development cannot be monitored by means of a single index, there is a necessity for the establishment of a single composite index for monitoring the development of information society in each country. Infrastructure, developed to meet the needs of end-users as well as an appropriate level of education, act as prerequisites for the use of ICTs and evolution towards an information society (Figure 12).

The list of 11 indicators is given in Table 7 below, along with reference (normalized) values prescribed by the ITU, sub-indices value and IDI Index value for the Republic of Serbia in 2009. The values of the sub-indices were calculated by normalizing the 11 indicators by means of reference values. The final value of IDI Index is calculated as a sum of sub-indices multiplied by weight coefficients. The ICT Access and ICT use sub-indices are given 40 per cent weight each, whereas the skill sub-index is given 20 per cent weight.

Figure 12. IDI Structure
Source: Measuring the Information Society - The ICT Development Index, ITU

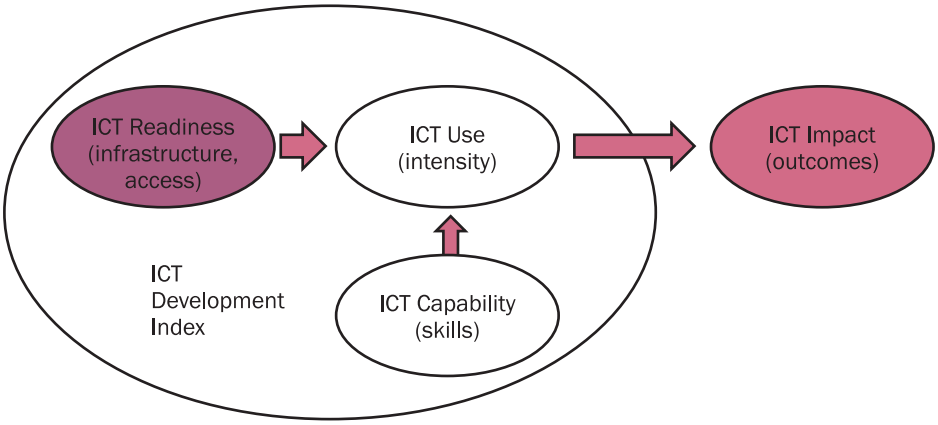


Table 7. 2010 IDI for the Republic of Serbia
Source: RATEL

	Indicator	ITU ideal value	Value for Serbia in 2010
ICT Access			
a	Fixed telephone lines per 100 inhabitants	60	42.57
b	Mobile cellular telephone subscriptions per 100 inhabitants	170	135.70
c	International Internet bandwidth per Internet user	100,000	57,237
d	Proportion of households with a computer	100	50.40
e	Proportion of households with Internet access at home	100	39
ICT Use			
f	Internet users per 100 inhabitants	100	35.29
g	Fixed broadband Internet subscriptions per 100 inhabitants	60	10.99

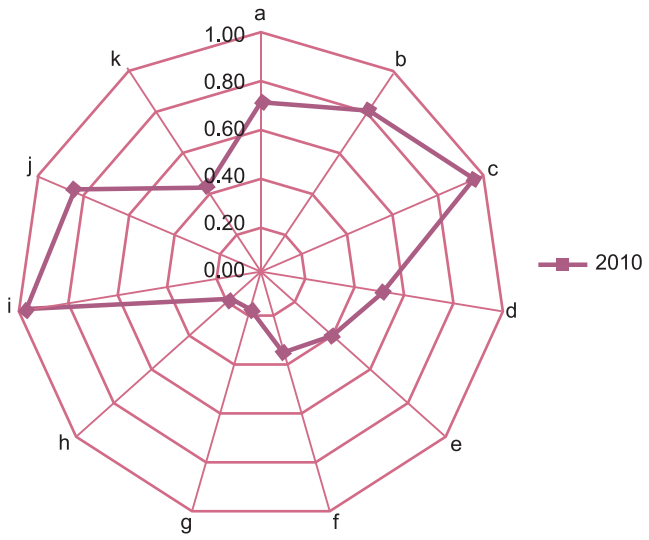
h	Mobile broadband subscriptions per 100 inhabitants	100	17.68
ICT Skills			
i	Adult literary rate	100	96.6
j	Secondary gross enrolment ratio	100	85.1
k	Tertiary gross enrolment ratio	100	41.7
ICT Access – Normalized values		Formula	
z1	Fixed telephone lines per 100 inhabitants	a/60	0.71
z2	Mobile cellular telephone subscriptions per 100 inhabitants	b/170	0.80
z3	International Internet bandwidth per Internet user	log(c)/5	0.95
z4	Proportion of households with a computer	d/100	0.50
z5	Proportion of households with Internet access at home	e/100	0.39
ICT Use – Normalized values		Formula	
z6	Internet users per 100 inhabitants	f/100	0.35
z7	Fixed broadband Internet subscriptions per 100 inhabitants	g/60	0.18
z8	Mobile broadband subscriptions per 100 inhabitants	h/100	0.18
ICT Skills – Normalized values		Formula	
z9	Adult literary rate	i/100	0.97
z10	Secondary gross enrolment ratio	j/100	0.851
z11	Tertiary gross enrolment ratio	k/100	0.417
L	ICT Access – Sub-index	y1+y2+y3+y4+y5	0.671
y1	Fixed telephone lines per 100 inhabitants	z1*0.2	0.14
y2	Mobile cellular telephone subscriptions per 100 inhabitants	z2*0.2	0.16

y3	International Internet bandwidth per Internet user	z3*0.2	0.19
y4	Proportion of households with a computer	z4*0.2	0.10
y5	Proportion of households with Internet access at home	z5*0.2	0.08
M	ICT Use – Sub-index	y6+y7+y8	0.235
y6	Internet users per 100 inhabitants	z6*0.33	0.12
y7	Fixed broadband Internet subscriptions per 100 inhabitants	z7*0.33	0.06
y8	Mobile broadband subscriptions per 100 inhabitants	z8*0.33	0.06
N	ICT Skills – Sub-index	y9+y10+y11	0.737
y9	Adult literary rate	z9*0.33	0.32
y10	Secondary gross enrolment ratio	z10*0.33	0.28
y11	Tertiary gross enrolment ratio	z11*0.33	0.14
IDI	ICT DEVELOPMENT INDEX	((L*0.4)+(M*0.4)+(N*0.2))*10	5.10

The value of IDI Index for the Republic of Serbia in 2010 amounts to 5.10, which is a significant growth compared with 4.23 in 2008 and 4.80 in 2009. Considering the previous ITU data, we may anticipate that, based on the IDI Index value, Serbia will secure a place among the first 40 countries on the list.

Figure 13 illustrates normalized values of 11 indicators with values ranging from 0 to 1, whereby 1 represents the maximum value of an indicator. The fact that ICT access indicators (a to e) have significantly higher values than ICT use indicators (f to h) is quite apparent and serves as an illustration of the disparity between the existing telecommunications infrastructure capacity and the use of such capacity in terms of telecommunications services transmitted by such infrastructure in Serbia, as is the case with the use of broadband Internet services. ICT skills indicators (i to k) are of the appropriate value.

Figure 13. Graphical Representation of 11 Indicators (normalized values) Source: RATEL



3. PUBLIC FIXED TELECOMMUNICATIONS NETWORKS AND SERVICES

In 2010 the following operators were holders of the licence for public fixed telecommunications network and services:

- Telecommunications Company ''Telekom Srbija'' Joint Stock. Co. – licence to build, own and operate a public fixed telecommunications network and provide public fixed telecommunications network services provision – licence replaced in 2006;
- Telecommunications Company ''Telekom Srbija'' Joint Stock. Co. – licence for public fixed wireless access (FWA) network in 411.875-418.125/ 421.875-428.125 MHz frequency bands and voice services, data transmission services and simultaneous voice and data transmission – Licence issued in 2009;
- Media Works, Ltd. which changed the name in Orion telekom, Ltd. - licence for public fixed wireless access (FWA) network in 411.875-418.125/ 421.875-428.125 MHz frequency bands and voice services, data transmission services and simultaneous voice and data transmission – licence issued in 2009;
- Telenor, Ltd. – licence for public fixed telecommunications network and services. The operator was awarded the licence in January 2010, following the public bidding procedure and the payment of the one-off licence issuance fee in the amount of 1 050 000 euros.

In 2010, Telekom Srbija, Joint Stock. Co. was the biggest active operator of the fixed telecommunications network, its business activities being the most important segment of the fixed telephony market, both in financial and technical terms. In addition to the Serbian market, Telekom Srbija is also present in Republic of Srpska and Montenegro. It is owned by two shareholders: the Government of the Republic of Serbia (80%) and OTE, Greece (20%). It still has the status of an SMP operator and, consequently it is required to apply a special tariff regime for the public fixed telephone network services and cost-accounting for telecommunications service pricing.

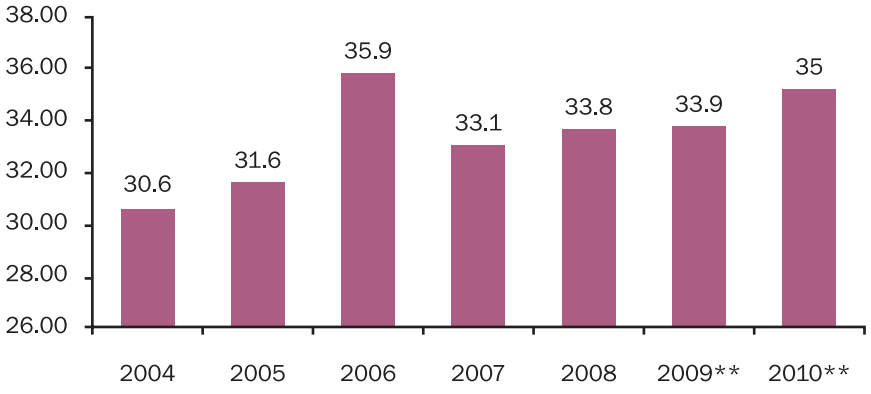
Telekom Srbija, Joint Stock. Co. is required to observe the terms and conditions laid down in the Rules on the application of the cost-accounting principle, separate accounts and reporting of a telecommunications operator with significant market power and the provisions of the Law on Telecommunications (*Official Gazette of RS*, nos. 44/03, 36/06 and 50/09-US).

Telekom Srbija provided services via public fixed telecommunications network and public FWA network. Operator Orion telekom began with service provision via public FWA network in 2010, whereas Telenor is required to begin with the commercial service provision within one year after the licence issuance, pursuant to the terms and conditions from the licence.

The total revenue from fixed telephone services provided by all operators Telekom Srbija and Orion telekom) in the territory of the Republic of Serbia in 2010 amounted to 35.3 billion dinars, where the share of services provided via FWA is 615.9 million. The revenues from the international traffic in 2010 amounted to 8.3 billion dinars, making the total revenue 43.6 billion dinars. The share of revenues from CDMA in the total revenues from fixed telephone service provision in 2010 equals 1.4%.

The investments made in the fixed telephony in 2010 amounted to 7.8 billion dinars.

Figure 14. Growth Tendency of Revenues from Fixed Telephone Services (in billions of RSD)*
Source: RATEL

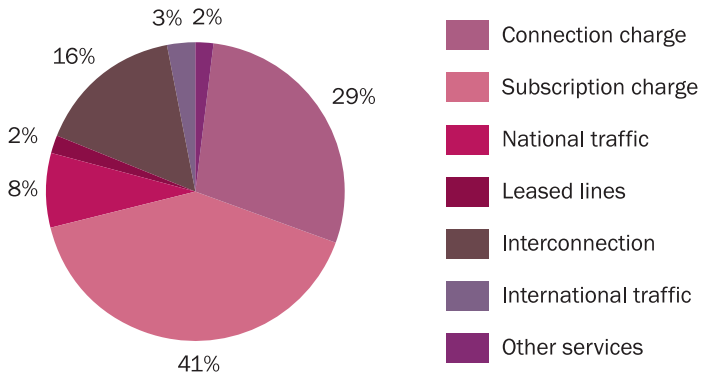


* Revenues from fixed telephone services in the territory of the Republic of Serbia including revenues from CDMA network

** Revenues from wholesale Internet services are illustrated within the chapter titled Internet Services and are therefore excluded from revenues from fixed telephone services

The largest share in the total revenues goes to the national traffic, amounting to around 17 billion dinars and equalling 41% of total revenues from the fixed telephone services, a share that is smaller compared to the 50% in 2009. The biggest increase of share in the total revenues from fixed network concerns the telephone subscription charge with 29% in 2010.

Figure 15. Distribution of Revenues from Fixed Telephone Services in 2010 Source: RATEL



Observing the types of services making up the total revenues from the fixed telephone services, the revenues from subscription charge, which increased by 63%, showed the biggest year-on-year growth, mainly owing to the increase in the amount of charge from 195 dinars to 388 dinars, excluding VAT. The growth can also be observed in revenues from leased lines, by 45%, and the revenues made from the international traffic, by 12%, year-on-year. On the other hand, the revenues from the connection charge and interconnection experienced the biggest drop in 2010, by 23% and 21%, respectively. Revenues from the national traffic dropped by 14%, mainly due to the decrease in the national traffic volume, since there were no modifications in the call-unit price in 2010.

On 3 November 2009 Telekom Srbija submitted a request for approval of the telephone subscription charge modification. Having analyzed the request along with the Annual Report on the Separate Cost Accounting, Financial Report and Report of an Independent Auditor, RATEL concluded that the proposed amount of the monthly charge of 388 dinars (excluding VAT) is within the limits of the maximum selling price obtained by applying the Rules on cost-oriented prices. In February

2010, RATEL's Managing Board passed the decision approving Telekom Srbija to increase the monthly charge from 195 to 388 dinars, excluding VAT, as of 1 April 2010. The monthly charge for residential users includes 150 call-units free of charge.

The connection charge remained unchanged, in the amount of 5 000 dinars for residential and 10 000 dinars for business users, excluding VAT. As for CDMA, the connection charge is 7 000 with Orion telekom, and 12 000 dinars with Telekom Srbija.

Call-unit tariffs for traditional fixed telephone service for residential and business users in 2010 are given in Figure 16. Local call tariffs remained unchanged, the price of peak traffic long-distance calls were reduces from 2.5090 to 2.0215 dinars for residential users, and from 2.5850 to 2.5090 dinars for business users. The prices of off-peak traffic are 50% lower than the peak-traffic prices. The prices of international calls remained unchanged.

The fact that the prices had not been increased to the extent which had been suggested by RATEL in October 2008, resulted in limited investments in fixed telephony, the inability of operators providing other fixed telephony services (VoIP, CDMA) to operate on a commercial basis, the problem of interconnection and fixed network call termination rates for new fixed telephony operators. Per minute call prices, as well as subscription charge, are still among the lowest in Europe.

Figure 16. Prices of Local and Long-Distance Telephone Services, VAT Excluded (RSD/min)
Source: RATEL

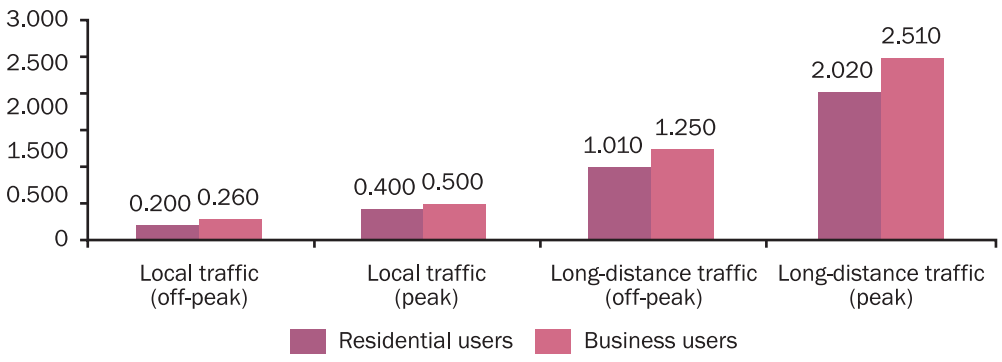
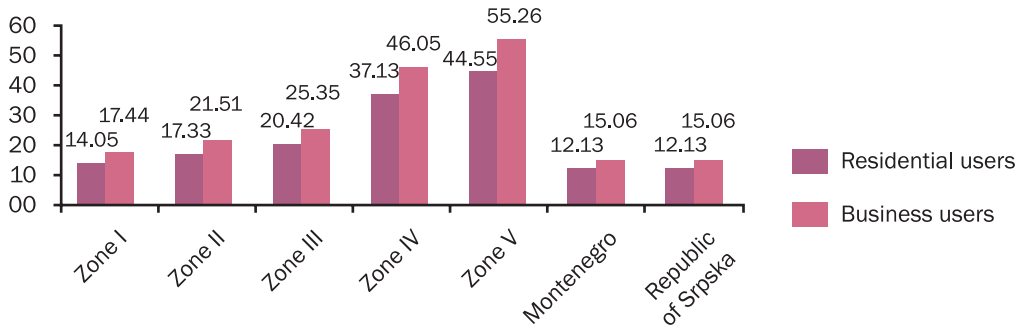


Figure 17. Prices of International Telephone Services in 2010 *, VAT Excluded (RSD/min)
Source: RATEL



*List of countries categorized by zones is given at the following website www.telekom.nadlanu.com

The highest number of residential users (around 43.3%) had monthly bills for fixed-line services ranging between 500 and 1,000 dinars, whereas the number of residential users paying only the subscription charge makes 17% of the total number of subscribers (Figure 18). As for business users, as many as 56.4% of subscribers paid up to 2,000 dinars monthly for fixed-line services, whereas 18.9% paid only the subscription charge (Figure 19).

Figure 18. Distribution of Residential Subscribers According to Monthly Bills in 2010 Source: RATEL

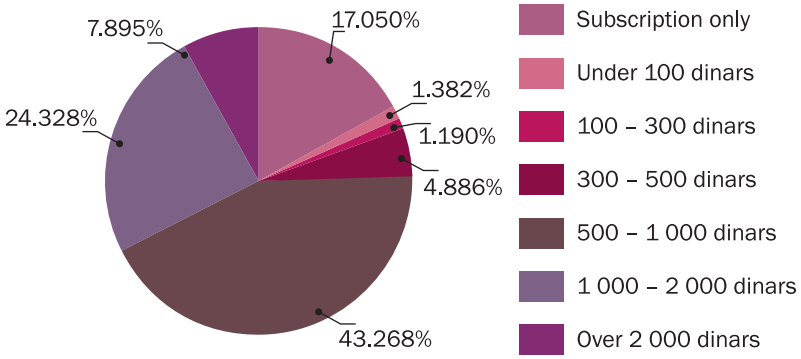
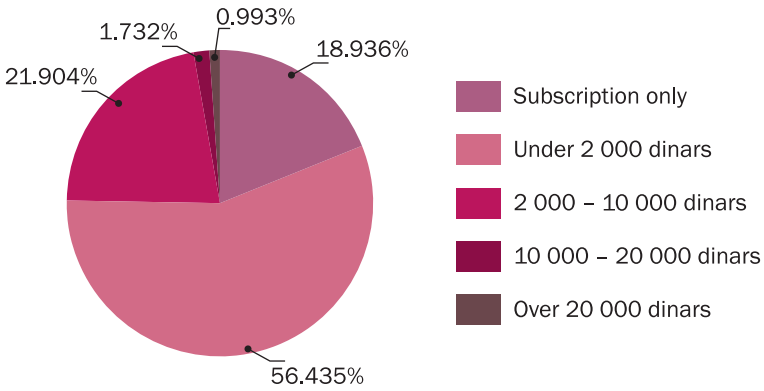


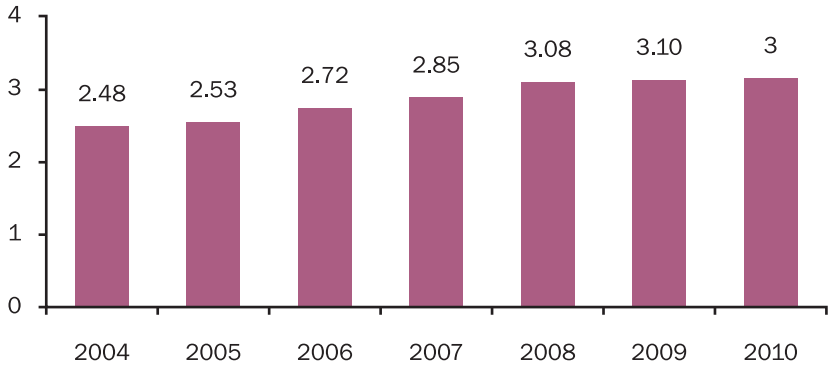
Figure 19. Distribution of Business Subscribers According to Monthly Bills in 2010 Source: RATEL



In 2010, the average monthly bill of residential users was increased by 14.5%, from 877 to 1 004 dinars, which is mainly a consequence of the increase of the monthly charge which makes up a considerable share in the bills of residential users. The average bill of business users in 2010 was increased by 7%, from 2 136 to 2 291 dinars.

The number of main lines slightly increased compared with 2009, amounting to3.11 million. Residential users still prevail with a 90% share in the total number of users, whereas

Figure 20. Number of Main Lines (millions) Source: RATEL

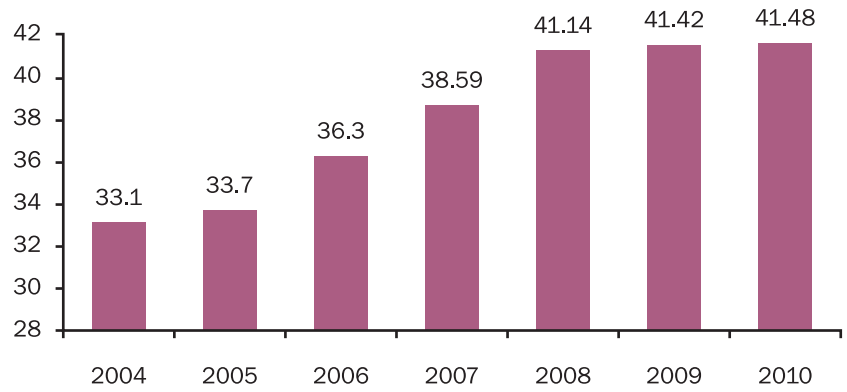


the number of party-lines remained practically unchanged. The digitalization rate rose to 97.85% in 2010.

Figure 21. Share of Residential Users in the Total Number of Fixed-Line Subscribers Source: RATEL

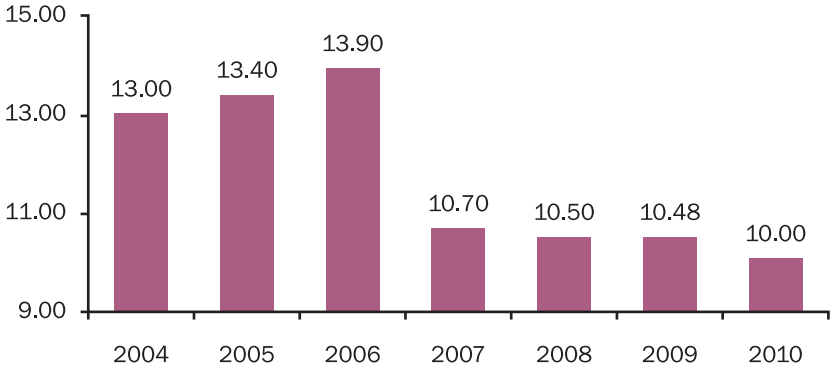
Fixed penetration remained unchanged in respect to the previous year, amounting approximately 41%.

Figure 22. Fixed Penetration (%) Source: RATEL



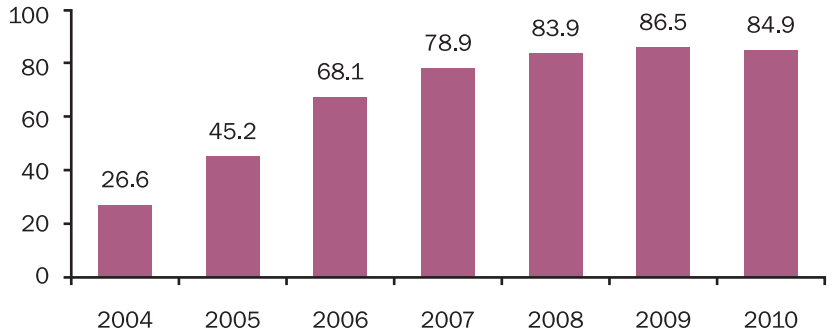
In 2010 the number of public payphones dropped by 159, amounting to 10 321.

Figure 23. Number of Public Payphones (thousands) Source: RATEL



The breakdown of the number of ISDN connections in the period from 2004 to 2010 is given in Figure 24 below. The number of ISDN subscribers in 2010 slightly less than 85 thousand. Around 97% of subscribers have a basic rate access, whereas other users have primary rate access. Residential users make up 65% of basic rate subscribers, whereas the rest are business users. Primary rate access is mainly used by business users. Even though this technology was well advanced in comparison with the dial-up connection at the time it had been first introduced, current modern technologies as well as ADSL connections are likely to limit the further growth of ISDN connections, as reflected by the drop trend in the number of ISDN users.

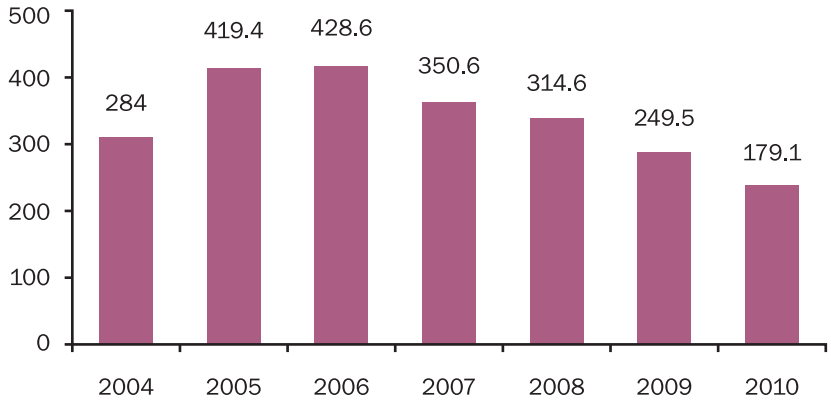
Figure 24. Total Number of ISDN Subscribers (thousands) Source: RATEL



In 2010, the number of unmet requests for new fixed-line connections was around 179.1 thousand, this being a decrease of 28% compared with 2009. The number of malfunctions rose to 33 per 100 lines in comparison with 25 per 100 lines recorded in 2009. The percentage of malfunctions repaired within 24 hours was 67%, which is an increase in respect to 63% in the previous year.

Figure 25. Number of Requests for New Fixed-Line Connections (thousands)

Source: RATEL



The total fixed network traffic in 2010 is estimated to 7.96 billion minutes of national traffic and 1.1 billion minutes of international traffic, which is an overall decrease of 28% year-on-year due to a drop in the minutes of national traffic. As shown in Figure 26, the traffic volume varied considerably in the observed period, showing a decreasing tendency, primarily due to other types of services being offered, such as mobile network, electronic messaging or VoIP, etc.

The average call duration of 3.1 minute remained practically unchanged.

The total number of minutes of fixed network traffic is estimated on the basis of data from the exchanges where it is possible to register the consumed call-units or minutes. Such data are extrapolated according to the total number of users in the network. Out of the total fixed network traffic, 71% was local traffic.

Figure 26. Total Fixed Network Traffic (in billions of minutes) Source: RATEL

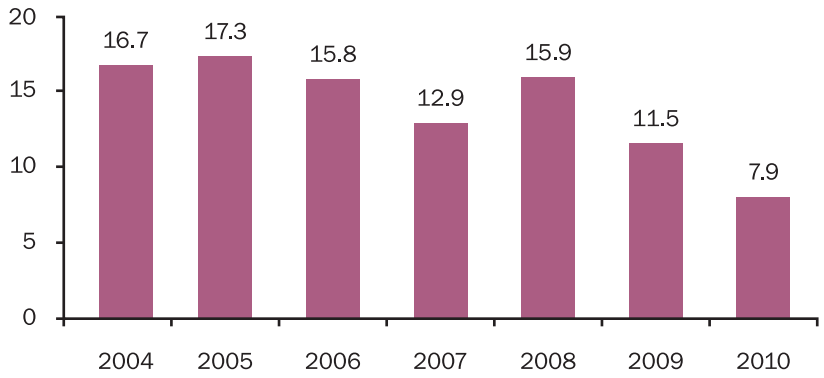
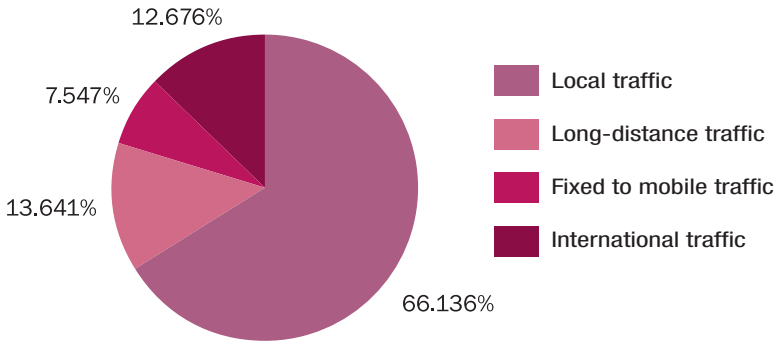


Figure 27. Distribution of Fixed Network Traffic in 2010 Source: RATEL



Compared with the previous year, the share of local traffic slightly decreased from 68% to 66%, the share of long-distance traffic dropped remained 14%. The volume of fixed-to-mobile traffic was decreased by half, whereas its share in the total traffic dropped from 9% to 7.5% year-on-year.

International traffic makes 13% of the total fixed network traffic and its volume remained unchanged. In 2010, international outgoing traffic dropped by 38% and the incoming traffic decreased by 4.5% in respect to the previous year, yet the transit was increased by almost

100%. This is a direct result of the advent of new technologies and operators providing services at an international level.

There were no significant changes in the number of VoIP operators in 2010. There were 80 000 registered users and 23.03 million of minutes of traffic, where a 50% share goes to international outgoing traffic and 50% to the international transit. in The volume of the outgoing international traffic realized through VoIP operators was 100 times smaller than outgoing international traffic realized through the capacities of Telekom Srbija.

4. PUBLIC MOBILE TELECOMMUNICATIONS NETWORKS AND SERVICES

There were three mobile operators in 2010 in the mobile market in the Republic of Serbia:

- **Telecommunications Company Telekom Srbija Joint Stock Co. - Mobilna telefonija Srbije MTS**, owned by Hellenic Telecommunications Organisation a.e., Greece (20%) and owned by the Republic of Serbia – the Government of the Republic of Serbia (80%) (licence replaced on 01. 08. 2006)
- **Telenor d.o.o. Beograd**, 100% owned by Telenor A/S, Denmark, (licence issued on 01. 09. 2006)
- **Vip mobile Ltd.** (member of Mobilkom Austria Group), 100% in the ownership of Mobilkom cee Beteiligungsverwaltung GMBH, Austria (licence issued on 01. 12. 2006)

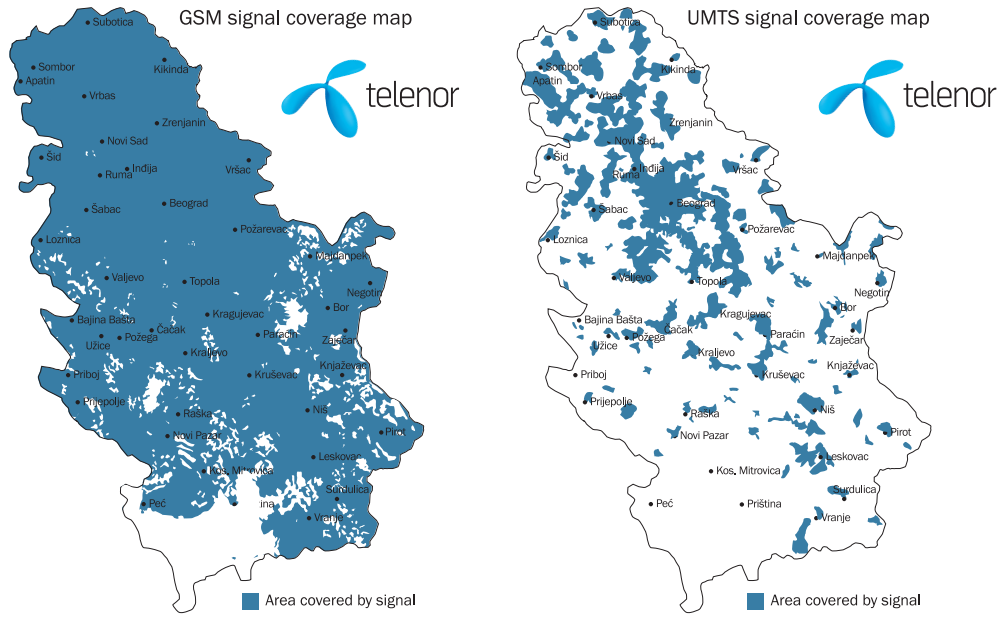
All three operators were granted licences for public mobile telecommunications networks and public mobile telecommunications network services in accordance with GSM/GSM1800 and UMTS/IMT-2000 standards, issued by RATEL. The licences were issued for the territory of the Republic of Serbia, for a period of 10 years, which, upon expiration, may be extended for another 10 years without a special request from the operator, provided the requirements under the licence are fulfilled.

The Norwegian company Telenor has been present in the Serbian telecom market since 31 July 2006, when, following the successful completion of the bidding procedure, it was issued a licence for public mobile telecommunications network and public mobile telecommunications network services in accordance with GSM/GSM1800 and UMTS/IMT-2000 standards.Through this procedure, Telenor also bought the company Mobi63. This has been the biggest direct foreign investment in Serbia so far.

Telenor, as a member of Telenor Group which operates throughout Europe and Asia, has over 203[1] million users. The mobile operators from Telenor Group present in the neighbouring countries are Panon in Hungary and Promonte in Montenegro. In 2007 Telenor began with the com-

[1] Source: www.telenor.com on 11. 04. 2011.

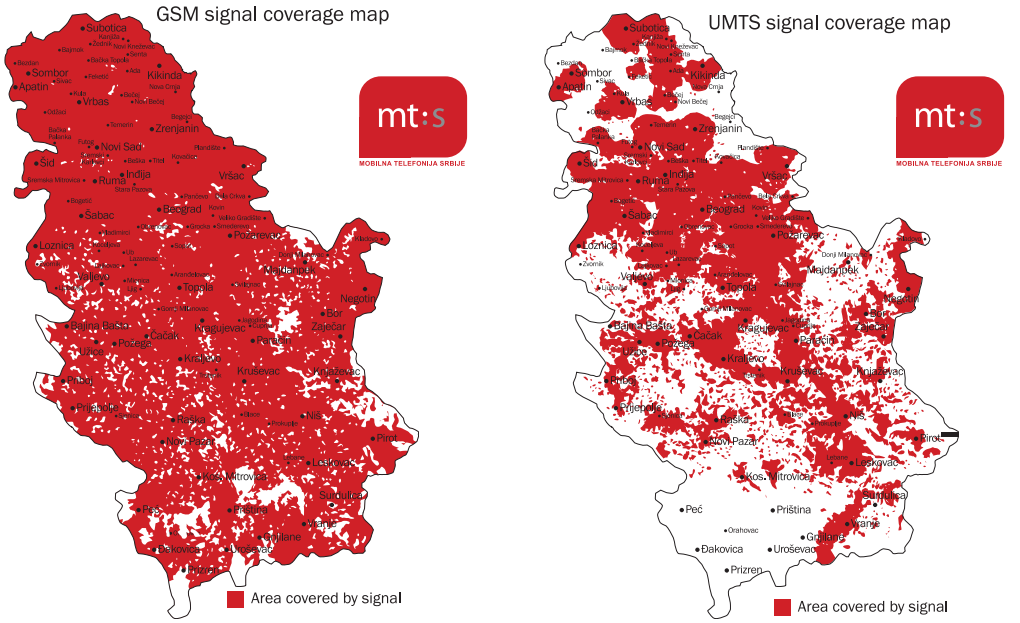
Figure 28. Mobile operator - Telenor — Source: Telenor Srbija



Official data	
Name	**Telenor Limited Liability Co.**
Head office	Belgrade
Ownership	100% Telenor A/S, Danmark
Percentage of territory covered by GSM network signal	85.5%
Percentage of population covered by GSM network signal	93.84%
Percentage of territory covered by UMTS network signal	21.25%
Percentage of population covered by UMTS network signal	55.86%
Number of base stations	3,087

mercial use of UMTS network enabling video calls and additional services based on high-speed data transmission. In 2010, Telenor built 384 new base stations.

Figure 29. Mobile operators – Telekom Srbija Joint. Stock Co. Source: Telekom Srbija



Official data	
Name	**Telekom Srbija Joint Stock Co.**
Head office	Belgrade
Ownership	80% Republic of Serbia – the Government of the Republic of Serbia 20% OTE, Greece
Percentage of territory covered by GSM network signal	87.2%
Percentage of population covered by GSM network signal	99.2%
Percentage of territory covered by UMTS network signal	65.12%
Percentage of population covered by UMTS network signal	84.48%
Number of base stations	3,019

MTS - Mobilna telefonija Srbije, as a branch of the Telecommunications Company Telekom Srbija, was founded in June 1997 and it began to operate through a GSM standard based network in August 1998.

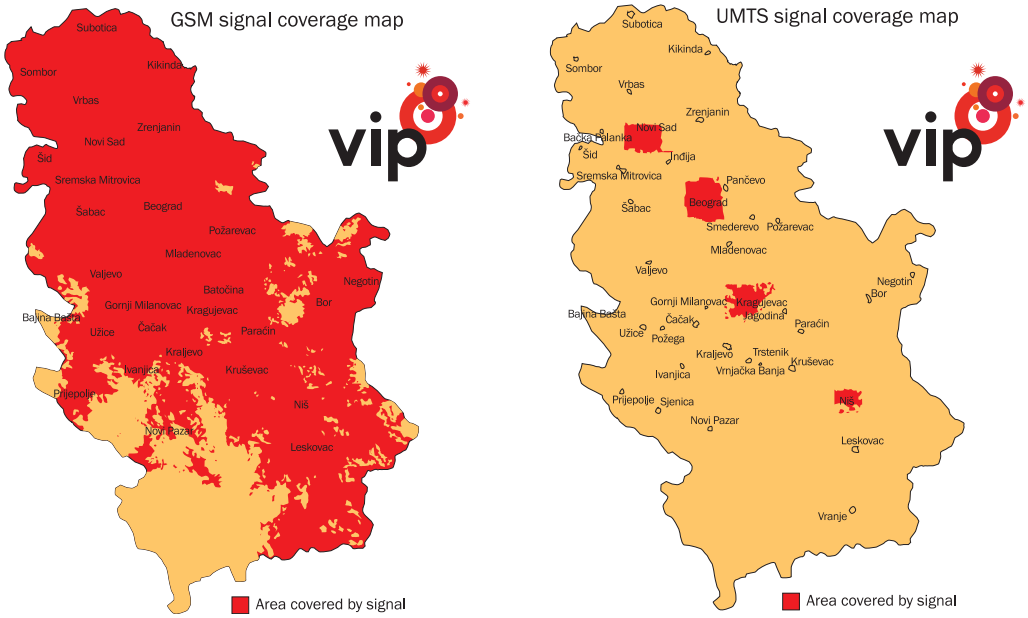
In December 2006, MTS began with the commercial operation of a 3G network with the latest HSDPA technology. During 2008, the operation of the 3G network was intensified.

In addition to the Serbian market, Telekom Srbija is also present as a mobile operator in Republic of Srpska and Montenegro.

In 2010, Telekom Srbija built 978 new base stations.

The third licence for mobile operator was granted to Vip mobile, a member of the Mobilkom Aus-

Figure 30. Mobile operator – Vip mobile Source: VIP



Official data	
Name	**Vip mobile Limited Liability Co.**
Head office	Belgrade
Ownership	100% Mobilkom cee Beteiligungsverwaltung GMBH Austria
Percentage of territory covered by GSM network signal	78.01%
Percentage of population covered by GSM network signal	96.95%
Percentage of territory covered by UMTS network signal	2.76%
Percentage of population covered by UMTS network signal	32.58%
Number of base stations	1,667

tria Group present in eight European countries, including the following countries in the region: Croatia, Bulgaria and Macedonia.

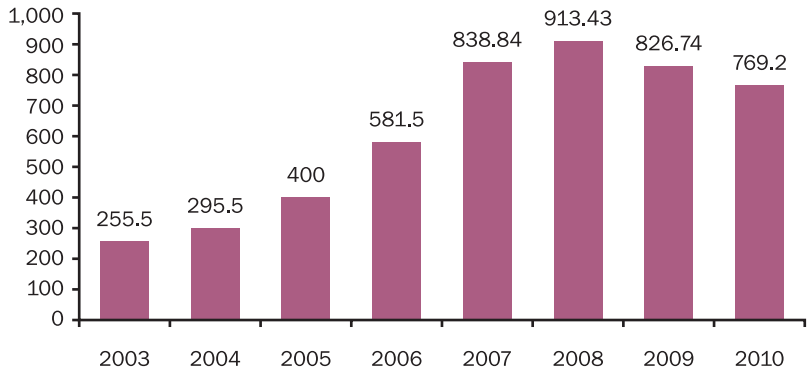
In 2009, VIP mobile significantly increased the percentage of area and population coverage with both GSM and UMTS network signal, having built 405 new base stations.

In addition to 320 million euros paid for the licence, during 2008, Mobilkom Austria made considerable investments in the development of infrastructure and hired a large number of professionals, thus making the biggest greenfield investment in Serbia so far.

The revenues from the mobile network services in 2010 decreased in respect to the previous year and amount to 79.6 bilion dinars or 769.2 million euros (Figure 31). Total investments in the mobile market also exhibit a downward trend in comparison with the previous year and amount to 13.8 billion dinars.

However, it should be noted that the decrease in the revenues from the mobile telephony is, to a certain extent, a consequence of difference in exchange rates. In 2010, euro had average annual value of approximately 103.5 dinars, whereas this value was 94 dinars in 2009. In RSD currency, the revenues were increased by 2.3% in respect to the previous year when the total revenues from mobile telephony service amounted to 77.8 billion dinars.

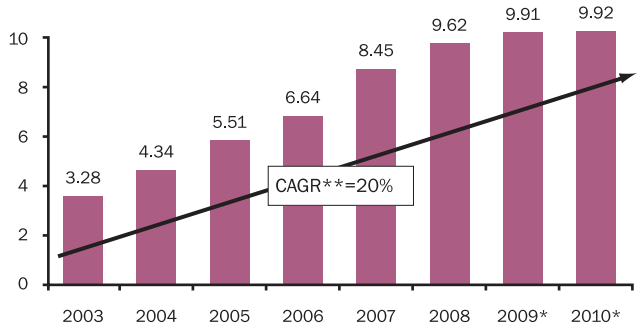
Figure 31. Total Revenues from Mobile Telephony (million euros) Source: RATEL



There was no significant increase in the total number of mobile users in 2010 compared with the previous year, amounting to 9 915 348, indicating that the market had entered saturation phase, which is further confirmed by the downward trend present in the past three years. The average growth rate of the number of mobile users in the period 2003 – 2010 is 17%, which is positive although less than in the period period 2003 - 2009 when it amounted to 20%.

9.92
million users

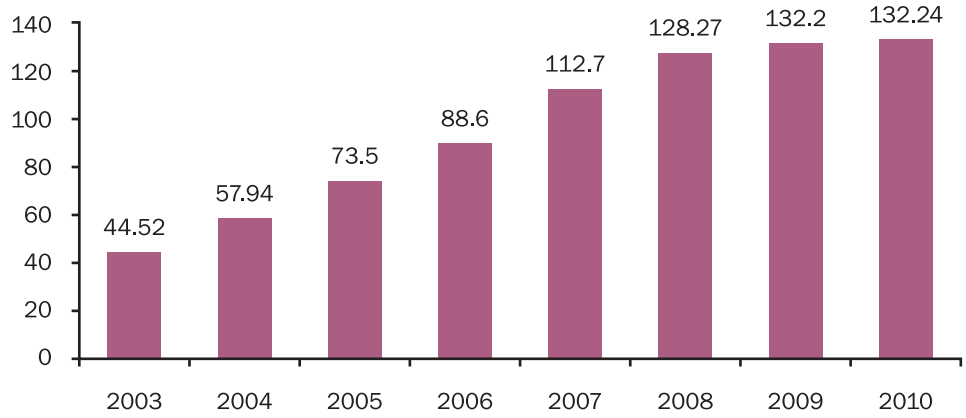
Figure 32. Total Number of Mobile Users (millions) Source: RATEL



* total number of prepaid users is indicated for Telekom Srbija
** Compound Annual Growth Rate

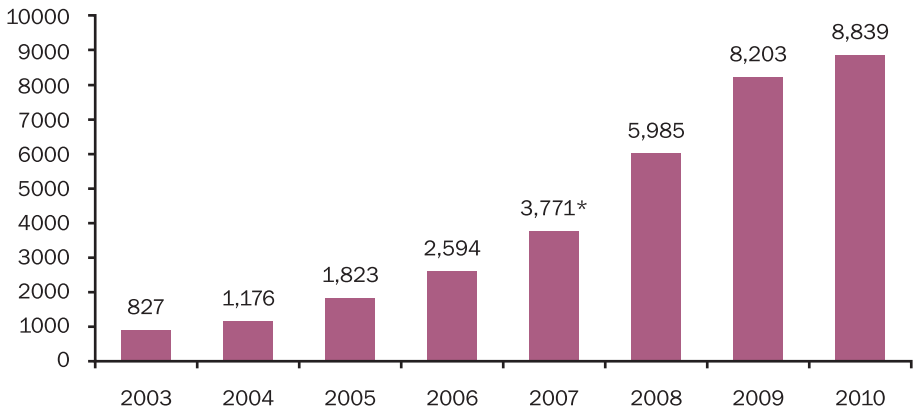
The number of mobile users is still higher than the total number of inhabitants, the penetration rate in 2010 being 132.24%.

Figure 33. Mobile Penetration Source: RATEL



In 2010 the total outgoing traffic amounted to approximately 8.8 billion minutes of calls, which is an increase of approximately 7.8% compared with the previous year. Annual average of traffic per

Figure 34. Total Outgoing Traffic (millions of minutes) Source: RATEL

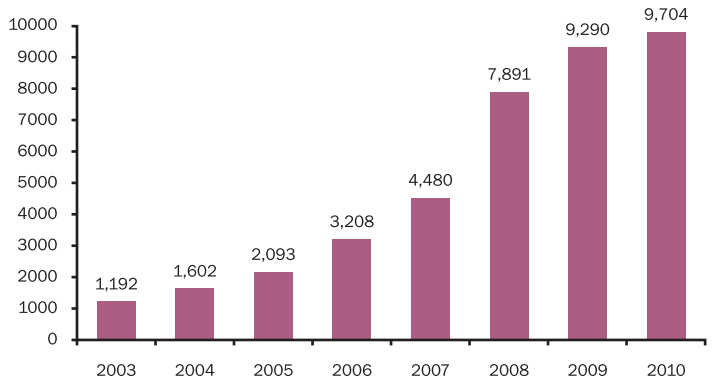


* Total outgoing traffic for 2007 does not include data for Vip mobile

user in 2010 was 891 minutes or approximately 2 minutes and 26 seconds daily, this being an increase of 7.6% in respect to 2009, when each user annually spent an average of 828 minutes talking on the cell phone.

The number of sent SMSs and MMSs continues to grow. During 2010, each user sent 978 SMSs on average, or 2.7 SMSs per day, whereas the total number of SMSs amounted to 9.7 billion. This resulted in an increase of 4% in respect to 2009, when the total of 9.3 billion messages or 937 messages per user were sent. In 2010, there were 26.4 million MMSs sent, which is an increase of 20% in respect to 2009.

Figure 35. Number of SMS messages sent (millions) Source: RATEL



Prepaid/postpaid users ratio is changing to the advantage of the postpaid users, as shown in Figure 37. Since 2010, the calculation includes only those prepaid users active in the past 90 days, pursuant to the revised ITU indicators definitions.

Figures 38 to 41 show the market share of mobile operators in terms of the number of users, share of each operator in the total mobile telephony revenues and share in the total traffic.

The competition in the Serbian mobile market was measured by the Herfindahl – Hirschman-Index (HHI).

Figure 36. The number of MMS messages sent (millions) Source: RATEL

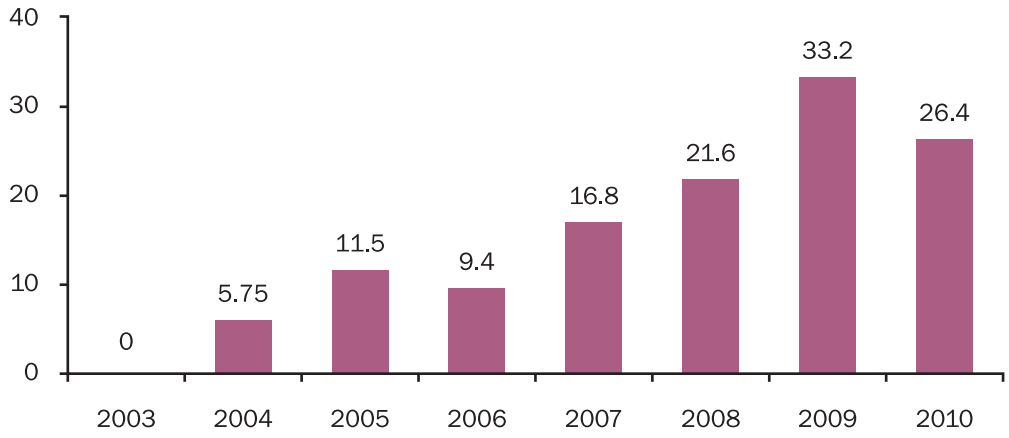
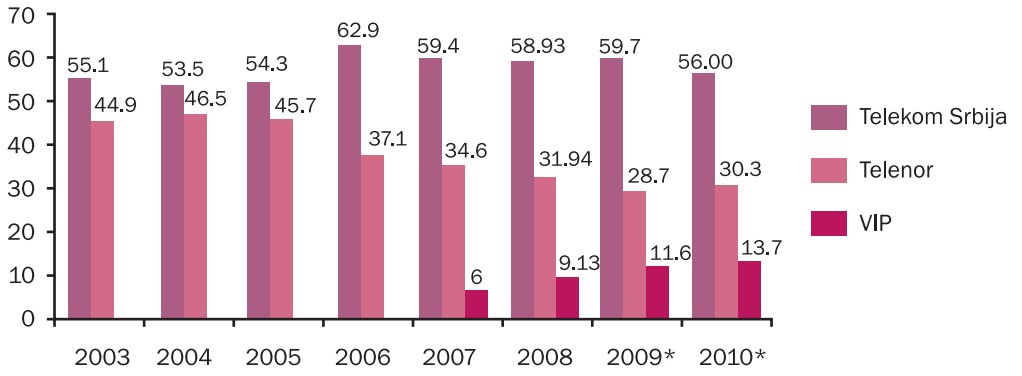


Figure 37. Prepaid/Postpaid Users Source: RATEL

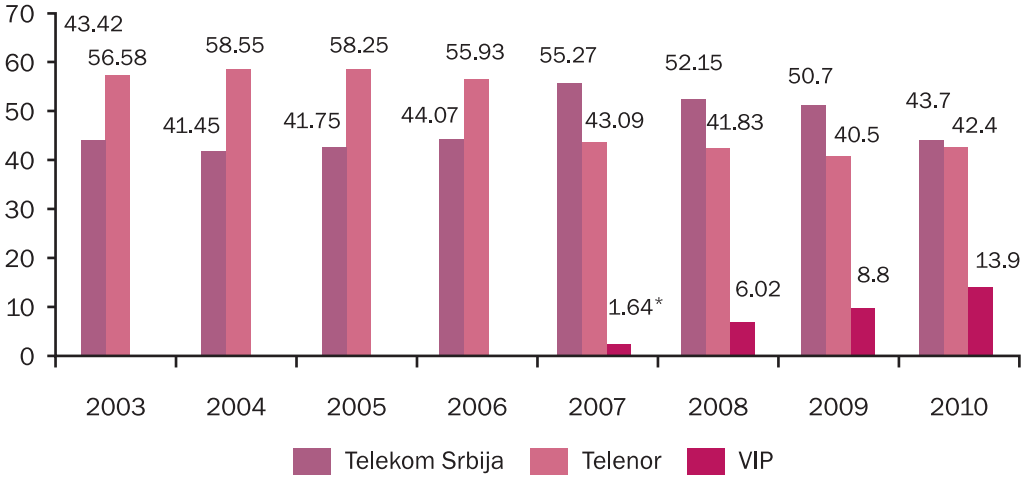
* Since VIP mobile failed to provide prepaid/postpaid user data, the analysis was based on data obtained from Telenor and Telekom

Figure 38. Market Share in Terms of the Number of Users (%) Source: RATEL



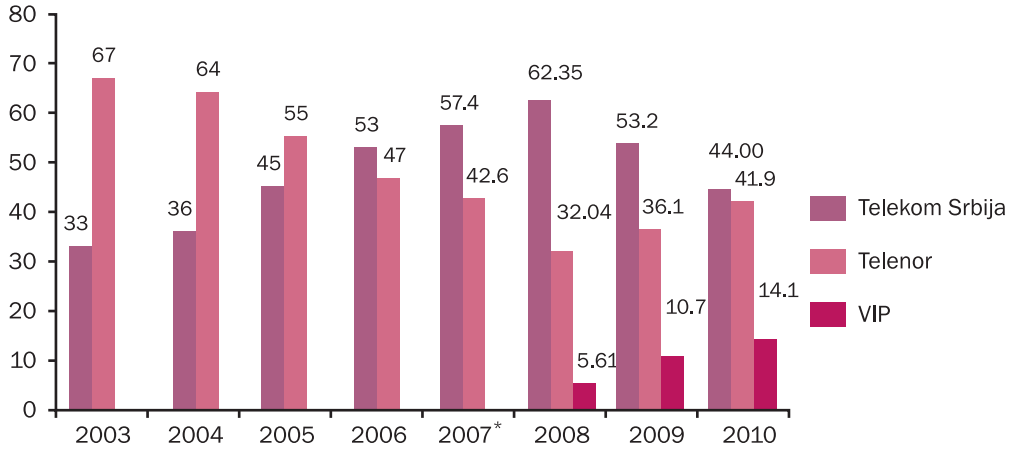
*the data for Telekom Srbija comprises the total number of prepaid users

Figure 39. Share in the Total Revenue from Mobile Services (%) Source: RATEL



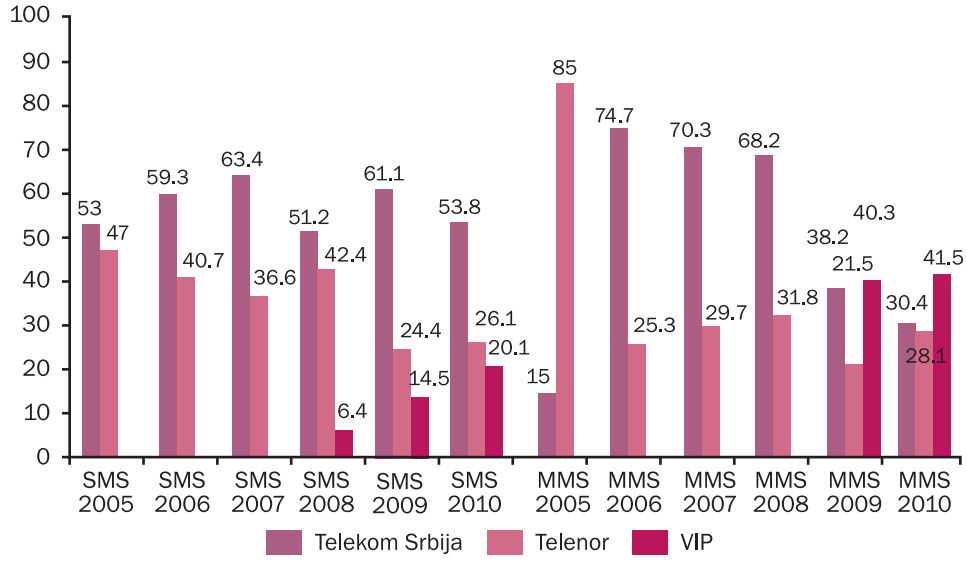
* Vip mobile began operating in June 2007

Figure 40. Share in the Total Outgoing Traffic (%) Source: RATEL



* Total outgoing traffic for 2007 does not include the data for Vip mobile.

Figure 41. Outgoing traffic/Market Share in terms of SMS/MMS * (%) Source: RATEL



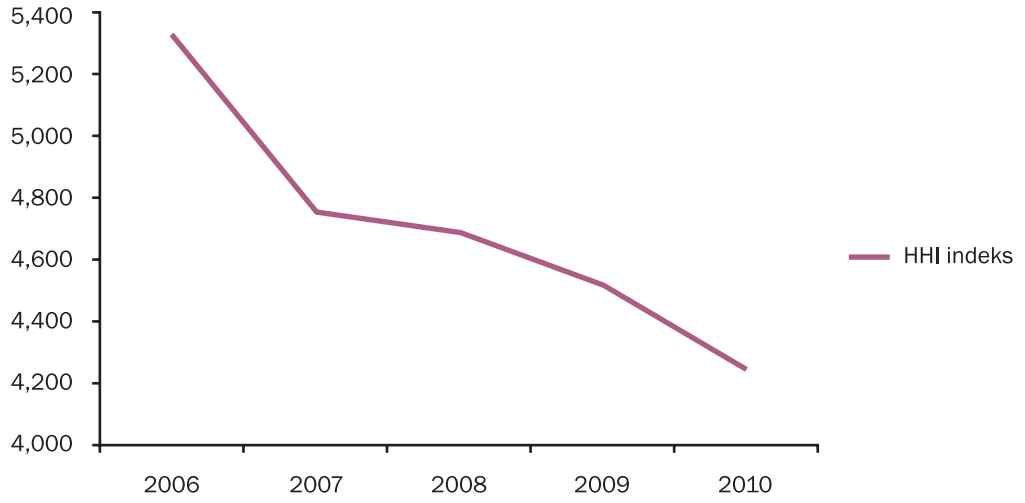
* data on MMS for 2008 and the total outgoing traffic for 2007 do not include data for Vip mobile

HHI is an indicator used for determining the degree of concentration of a given market and it is defined as the sum of the squares of the market shares of each individual market share. The market share was identified by the number of users.

Table 8. HHI Index Values in the period from 2006 to 2010

	2006.	2007.	2008.	2009.	2010.
HHI indeks	5332	4759	4684	4520	4239

Figure 42. HHI Index Values in the period from 2006 to 2010



The additional tax within the mobile telephony sector introduced by the Government of the Republic of Serbia as one of the temporary measures aimed at diminishing the effects of the World Economic Crisis remained in force in 2010. The 10% tax applied to all calls, standard SMS and MMS messages, transmission of data and additional services in the country and abroad, whereby this tax was not included in the calculation of VAT. Such measure resulted in the decelerated growth of the mobile market, which was reflected in the revenues, number of users and traffic volume. With the entrance into force of the Law on Taxes on Using, Keeping and Carrying of Goods (*Official Gazette of RS*, nos. 26/01, 80/02, 43/04, 132/04, 112/05, 114/06, 118/07, 114/08,

31/09, 106/09, 95/10 and 101/10) the additional tax was revoked as of 01. 01. 2011 and the results are expected to be evident in 2011.

The new services introduced in 2010, involved packages that include roaming data transmission, more affordable international calls, mobile prepaid top-up services via fixed line or via web portal, online payments via mobile phone, broadband access via mobile operators' networks.

The Managing Board, in its session held on 25 December 2009, adopted the Rules on number portability in public mobile telecommunications networks and services (*Official Gazette of the Republic of Serbia*, no. 5/10), stipulating the conditions which have to be fulfilled by both the subscribers and the operators of mobile telecommunications networks in regard to national number portability for public mobile telecommunications network services. These Rules regulate in a greater detail the number porting procedure. In 2010 the Public Invitation was published in the *Official Gazette of the Republic of Serbia* no. 44 of 03. 07. 2010. for the public procurement of goods – central database of ported numbers. The contract was signed with the supplier, and the service provision should commence in 2011, and it is expected to enhance the competition in the sector.

5. INTERNET SERVICES

Internet technologies of today represent the most efficient support to the development of information society but also an indispensable, if not a critical factor of economic growth and development of each country. With the purpose of ensuring the exploitation of the full potential of all digital technology services, particularly those of e-Economy, e-Commerce and e-Administration, an inexpensive access to telecommunications infrastructure, particularly in terms of broadband Internet access, should be provided equally well to all business enterprises and citizens.

Base upon the analysis of the number and structure of the Internet connections, and the total revenues from the Internet service provision, the Internet market in 2010 maintained a positive growth trend from the previous years. This trend began in 2008 when the number of broadband connections exceeded the number of dial-up connections, which continued in 2010. The total number of broadband connections in the Republic of Serbia in 2010 amounted to around 995 thousands (without accounting for 3G network subscribers), which equals 90% of all Internet connections (without accounting for 3G network subscribers). However, such allocation of Internet connections was expected, given the increase in volume of data exchanged via Internet and the growing demands of end-users who use the Internet for business or leisure.

ADSL access represented the dominant Internet connection in 2010 with around 536 thousand connections. In addition to the access technologies mentioned, other means available for the Internet access were cable modem, which is another service provided by the CATV operators, directly, via Ethernet, via optical cable, by means of wireless access in the 2.4 GHz and 5.8 GHz unlicensed frequency bands, less often using the 3.4-3.6 GHz frequency band, as well as by UMTS (3G) network of the mobile operators (either via cell phone, or by means of special 3G modems).

In December 2010, there were 192 Internet service providers (ISPs) in Serbia registered within the Authorization Register. Table 9 indicates that the number of ISPs providing the services via optical cable rose from 3 to 11. ADSL access service (bitstream) was provided by 23, cable modem access by 22, wireless access was offered by 115 and dial-up by 42 providers.

Table 9. Number of ISPs by Access Technology — Source: RATEL

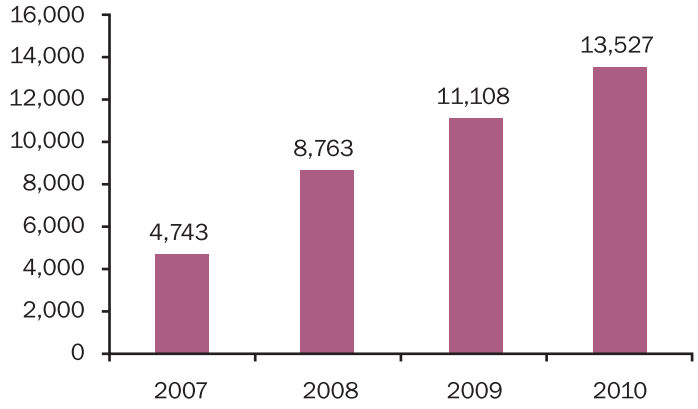
	2007.	2008.	2009.	2010.
Dial-up	60	48	36	42
Cable modem	14	22	20	22
Optical cable	-	-	3	11
Ethernet	-	-	24	25
Wireless access	118	82	78	115
ADSL	23	21	27	23

Table 10. Total Number of ISPs — Source: RATEL

	2007.	2008.	2009.	2010.
Number of ISPs	159	197	199	192

The continued expansion of the Internet market is reflected, not only by the increase in the number of users (Internet connections), but also by the constant increase in the total revenues from the Internet service provision in the past years. The total revenues in 2010 grew by 21% in respect to 2009, amounting to approximately 13.5 billion dinars[1]. If the total revenues from the

Figure 43. Internet Service Revenues (millions of RSD)) — Source: RATEL

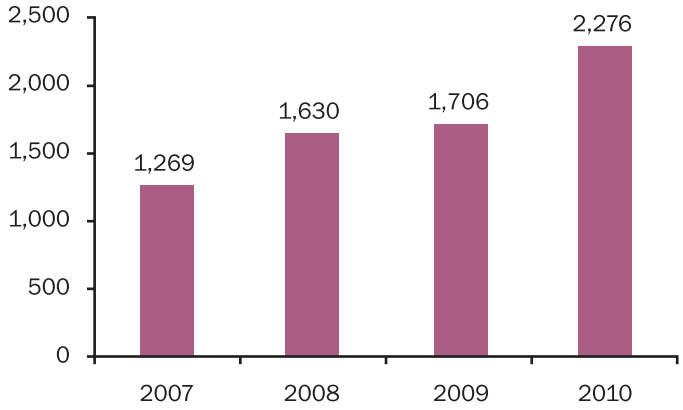


[1] The total revenues include the revenues from the Internet wholesale

Internet service provision in 2010 are compared with the total revenues from 2005 (when the Agency published the first issue of the Overview of Telecommunication Market in the Republic of Serbia) a rather fast and considerable growth of the Internet market in Serbia is evident: the total revenues in 2010 are nine times higher than in 2005. It should be noted that telecommunications are among few sectors in Serbia that did not experience a drop but an increase in 2010, as confirmed by the data given in the Market Overview.

The total number of Internet subscribers in 2010 amounted to approximately 1.1 million. However, if we consider the availability of Internet access using 3G mobile network (via cell phone), the total number of potential subscribers in 2010 amounted to 2.3 million, which is an increase of 33% year-on-year.

Figure 44. The Number of Potential Internet Subscribers (in thousands)* Source: RATEL

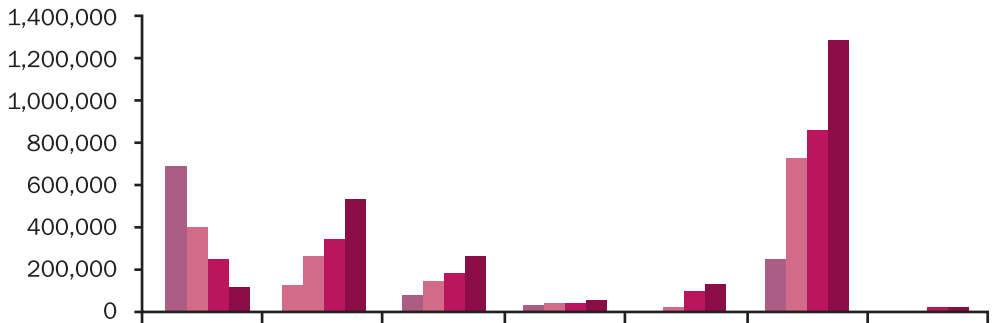


*The total number of subscribers excludes 3G mobile network subscribers.

The total number of broadband connections in Serbia in 2010 was 995 thousand (3G mobile network users excluded), which is approximately 43% more than in 2009. There was a significant increase in the number of subscribers who accessed the Internet using ADSL modem (53%), amounting to 537 thousand connections. There was also an increase in the number of subscribers accessing the Internet via cable modem by 39%.

As far as broadband Internet access via mobile 3G network modem is concerned, the number of subscribers is five times higher than in 2008 (when this type of access first became available in the Republic of Serbia), amounting to 131 thousand in 2010, with the share in the total number of broadband users of 13% (excluding 3G subscribers).

Figure 45. Number of Users According to Access Technology Source: RATEL



	Dial-up	ADSL	Cable modem	Wireless access	Mobile Internet	3G network subscribers*	Other
2007	692,905	132,359	87,731	36,059	0	257,379	2,276
2008	397,202	267,876	151,154	48,130	25,489	738,401	1,135
2009	252,195	351,252	187,923	45,864	100,628	762,307	5,547
2010	120,670	536,796	260,474	58,305	131,475	1,291,887	7,783

*3G network subscribers without mobile Internet

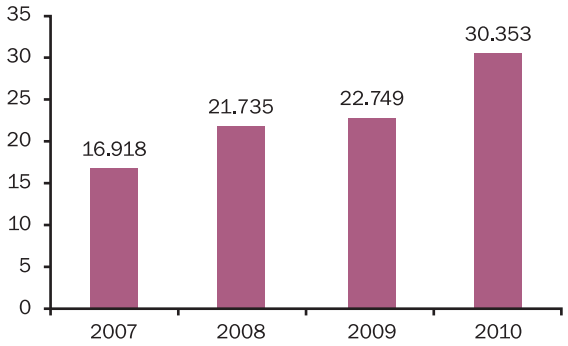
In view of the growing demand for high bit-rate data transmission, the number of dial-up connections has been dropping significantly year after year. In 2006 the total number of dial-up subscribers amounted to 882 thousand accounting for 88% of the total number of Internet subscribers, whereas in 2010 the number dropped to 120 thousand, or 5% of the total number of Internet connections.

Consequently, compound annual growth rate (CAGR) of the number of ADSL connections for the period 2005-2010 is as high as 124%, whereas CAGR for dial-up connections in the same period is -55%.

Figure 46. Share of Internet Connections (3G mobile network subscribers excluded) Source: RATEL

In 2010, the number of Internet connections per 100 inhabitants was approximately 30, whereas the number of broadband Internet connections per 100 inhabitants amounted to 29. However, if the 3G mobile network subscribers are excluded from the total number of broadband subscribers, broadband penetration amounts to 13%, which is above the average of both the SEE countries (9.4%)[2]. However, broadband penetration in Serbia is still below the European Union (EU-27) average of 25%.

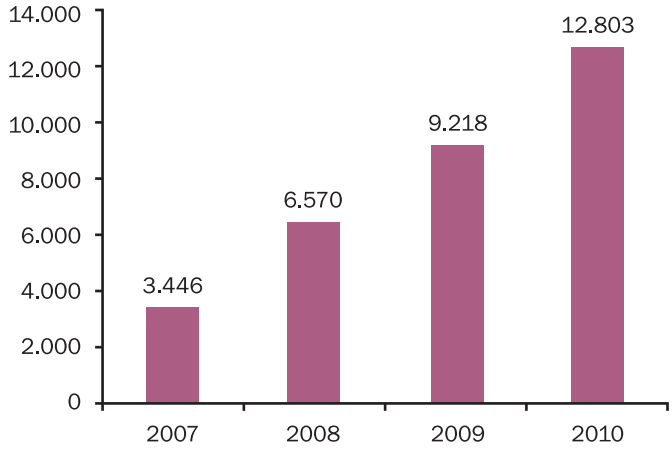
Figure 47. Internet Penetration Rate* Source: RATEL



* 3G mobile network subscribers included.

[2] Source: Enlargment Countires Monitoring Report IV – December 2010, Cullen International

Figure 48. Broadband Internet Penetration Rate* Source: RATEL



The growth of the Internet sector in Serbia is evident both in terms of total revenues and the number of broadband users. Moreover, the choice of access technology revealed a striking tendency towards the use of broadband services which was reflected in the increase of ADSL, cable and mobile Internet access users as well as in the continuous decrease in the number of dial-up users.

Within the services provided to end-users, ISPs offered a variety of bundled services, with 16 Mbps bit-rate in the retail market. The best selling packages included permanent Internet connection and upload/download speeds of 1024/128 kbps, accounting for approximately 550,000 connections or about 57% of all broadband connections.

Comparing the amounts of the monthly subscription fees of various Internet packages as well as the structure with those recorded in the previous years, significant changes may be observed. In particular, the significant decrease in prices, as a result of increased competition and increasingly demanding end-users, had considerable impact on the improvement of Internet service provision which was evident from the constant rise in the number of high-speed Internet connections. For example, in 2009, the monthly subscription fee for permanent Internet connection for 2 Mbps download bit-rate amounted to approximately 1 400 dinars, whereas in 2010 the same price was applied for twice as fast Internet connection of 4 Mbps download bit-rate.

Also, increased competition in the broadband market was reflected in the tariff policy of the companies offering services at similar prices regardless of access technology. Table 11 illustrates the tariffs of some packages available in the market.

Table 11. Monthly Supscription Fees for Permanent Internet Connection in 2009 and 2010

2009.		
Access bit rate	Access Technology	Amount of monthly subscription fee for permanent Internet access (VAT included)
1024/128 kbps	ADSL	1,425.44 din
1536/128 kbps	Cable	1,390.00 din
1024/256 kbps	Wireless (2.4 GHz)	1,299.00 din
5 GB free of charge, and 3.84 RSD for every additional MB	Mobile network	1,480.00 din
2010.		
Access bit rate	Access Technology	Amount of monthly subscription fee for permanent Internet access (VAT included)
1536/256 kbps	ADSL	1,532.82
4096/256 kbps	Cable	1,390.00
1536/256 kbps	Wireless (2.4 GHz)	1,186.00
5 GB free of charge, and 3.00 RSD for every additional MB	Mobile network	1,050.00 –1,364.00

NB: the price list was taken from the websites of the undertakings and applies to physical entities; each package had additional costs and technical requirements pertinent to the closing of subscription contracts and establishment of connection; some of the packages require subscription contracts which stipulate subscriber obligations during a specific period of time.

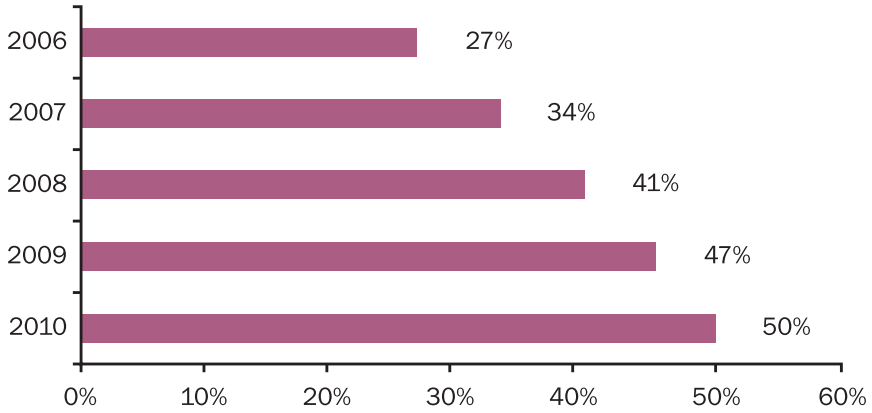
6. USAGE OF ICTs IN SERBIA

The usage of ICTs is an inevitable indicator of the development of both the society as a whole and the individuals. Surveys on the use of information-communication technologies by individuals, households and companies in Serbia are regularly conducted by the Statistical Office of the Republic of Serbia.

In 2010, the survey was conducted by telephone on the sample of 2,400 individuals, 2,400 households and 1,400 companies.

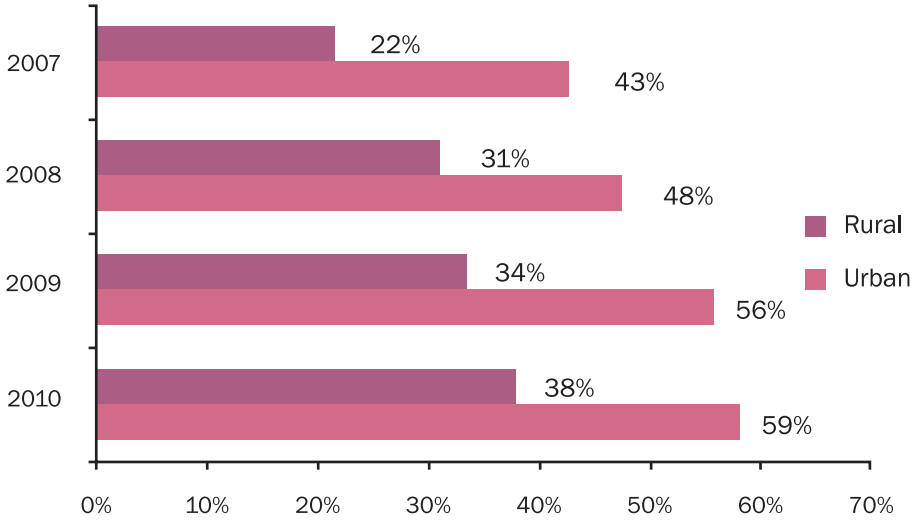
In 2010, in the Republic of Serbia there were 50.4% of the households which owned a computer which is an increase of 3.6% in respect to 2009.

Figure 49. Percentage of Households with Computer
Source: Statistical Office of the Republic of Serbia



The incidence of computers in households varies considerably according to different territorial areas: urban areas it amounted to 58.7%, whereas in rural areas it amounted to 38.3%. The number of households with computer in urban areas grew by 2.7%, while in rural areas, unlike the previous years, the increase was greater, amounting to 4.7%.

Figure 50. Percentage of Households with a Computer according to the Type of Area (Rural of Urban) Source: Statistical Office of the Republic of Serbia

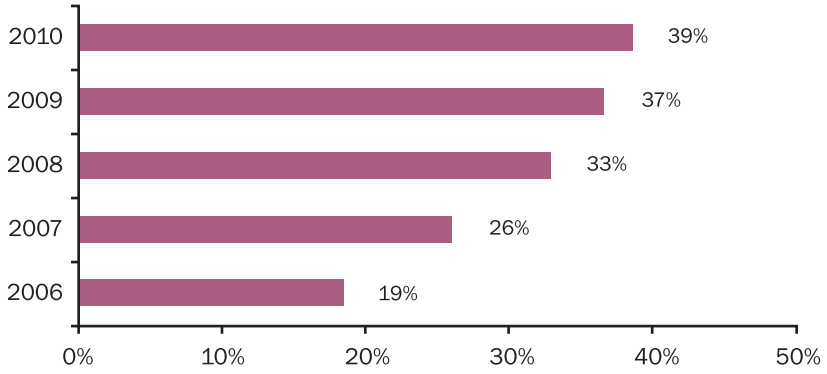


In 2010, 39% of households in the Republic of Serbia with the Internet connection, this being an increase of 2.3% in respect to 2009, or a 5.8% increase in respect to 2008. Once again, significant discrepancies may be observed if we compare the number of households with Internet connection according to the type of area. While in urban areas of Serbia the number of households with Internet connection amounts to 49.3% (cf. 46.9% in 2009), in rural areas only 24.1% (cf. 22.0% in 2009) of households have Internet connection.

The same as the diffusion of computers in households, the Internet connection is also greatly related to the amount of monthly income. Internet connection is mainly used by the households with the monthly income of over 600 euros (83.5%), while the share of households with the income between 300 and 600 euros amounted to 55.7%. Only 19.29% of households with a monthly income of under 300 euros have Internet connection, which is an increase of only 1.3% compared with 2009.

One of the main indicators of ICT development in the EU is the percentage of households with broadband Internet. It is rather encouraging that the greatest increase was seen in the number

Figure 51. Households with Internet Connection
Source: Statistical Office of the Republic of Serbia



of DSL (ADSL) connections, by 7.8% (cf. 39.5% in 2009), which accounted for 47.3% of connections. There was also a slight increase in the number of access via cable Internet (1.1%), and via mobile phones (2%). Accordingly the biggest drop was seen in the number of dial-up connections accounting for 17.50% connections in 2010, compared with 29.3% in 2009 and 51.1% in 2008.

Figure 52. Household Internet Use according to the Type of Connection
Source: Statistical Office of the Republic of Serbia

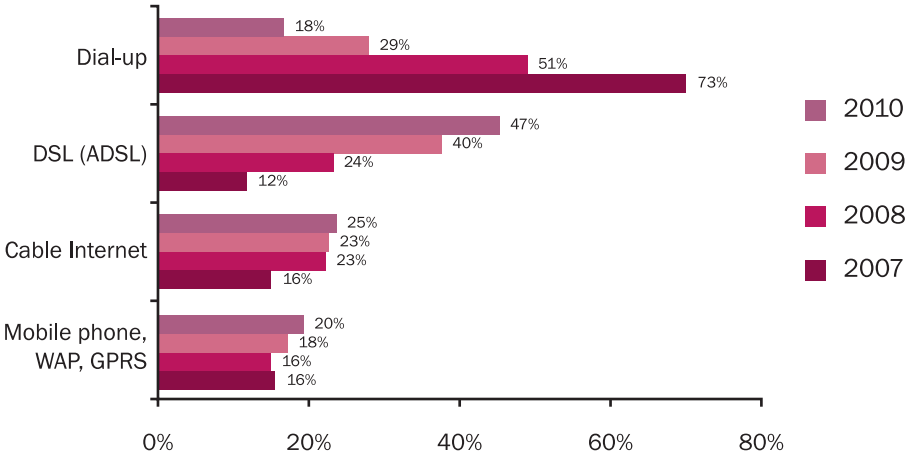
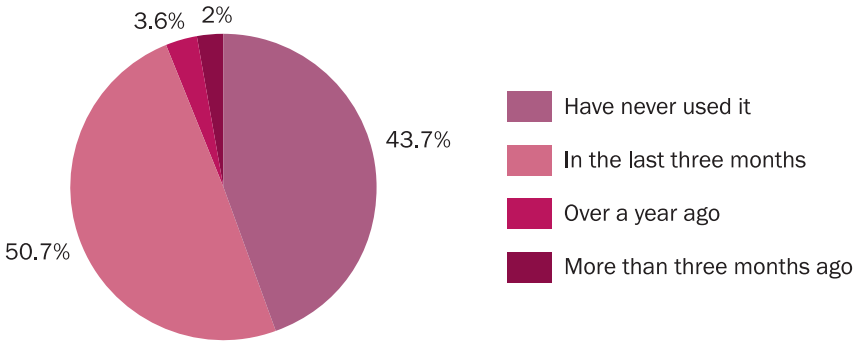


Figure 53 shows the usage of computers by individuals. The survey revealed that 43.7% of the respondents (44.7% in 2009) who participated in the poll had never used the computer, which showed a minimal growth in the Internet users. The percentage of people who had used the computer in the last three months amounted to 50.8% (cf. 49.30% in 2009).

In 2010, the number of computer users increased by 1% in respect to 2009 and by 4.3% compared to 2008.

Figure 53. Individual Computer Use Source: Statistical Office of the Republic of Serbia



In the Republic of Serbia, only 40.9% of people used the Internet in the last three months, 2.7% of the respondents used the Internet more than three months ago and 2.3% of them over a year ago. As many as 54.1% of the respondents said that they had never used the Internet, compared with 56.4% in 2009.

The number of Internet users in 2010 increased by 2.3% in respect to 2009 or by 5.1% in respect to 2008. The survey showed that over 2 360 000 persons had used the Internet in the past three months, which is an increase of over 160 000 users.

In 2010, more than 325,000 individuals used the electronic services of the public administration which is, compared to 2009, an increase of over 40,000 users. An especially alarming result is that as much as 38.5% of the respondents were not interested in using this type of service.

Figure 54. Individual Internet Use Source: Statistical Office of the Republic of Serbia

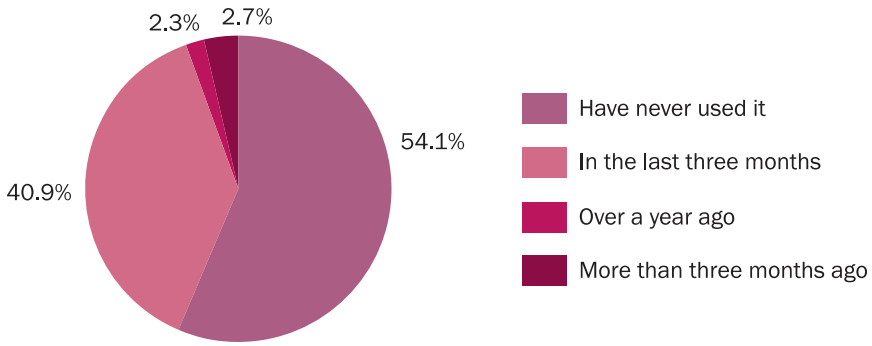
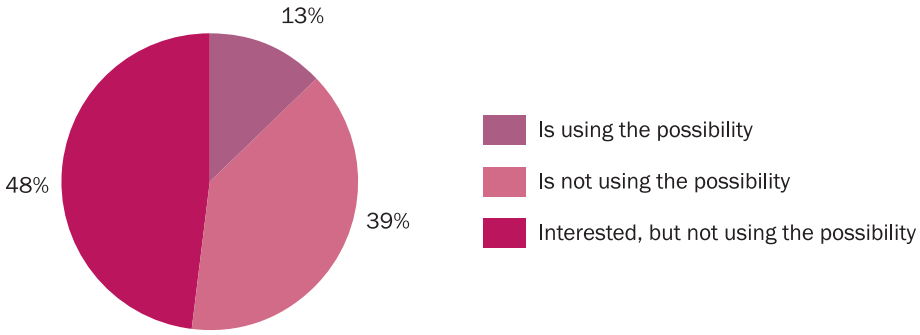


Figure 55. Public Administration Internet Use as opposed to Personal Contact
Source: Statistical Office of the Republic of Serbia



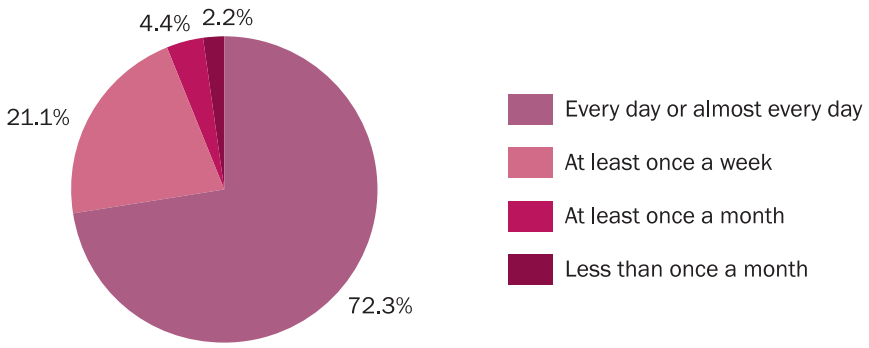
According to the 2020 data, 72.3% (cf. 65.70% in 2009) of respondents used the Internet (almost) every day, 21.1% used the Internet at least once a week, 4.4% used the Internet once a month and only 2.2% less than once a month.

Compared with 2009, there was an increase of 250,000 persons using the Internet every day or almost every day.

Figure 57 illustrates the structure of the Internet users by the level of education. The Internet is mainly used by the individuals with secondary education (56.1%), followed by the users with

Figure 56. Frequency of the Individual Internet Use

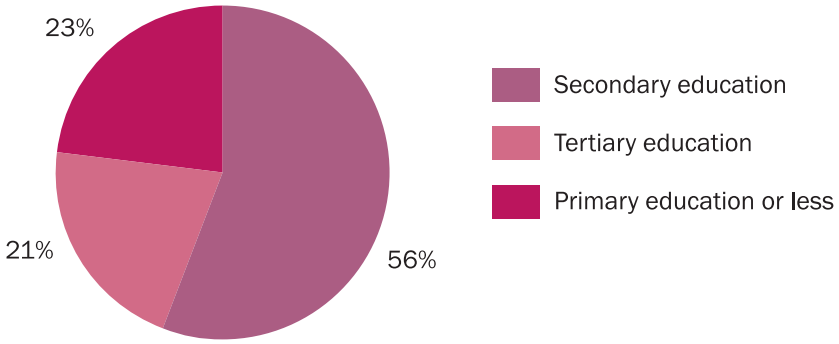
Source: Statistical Office of the Republic of Serbia



higher education or university degree (20.9%), whereas the remaining 23% are users with less than secondary education.

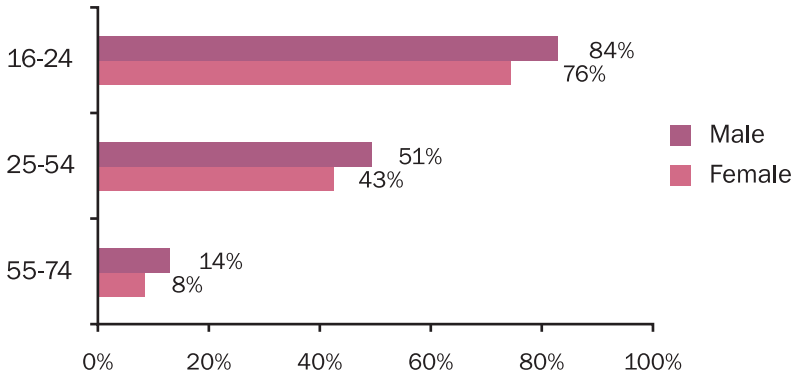
Figure 57. Internet Users by Level of Education

Source: Statistical Office of the Republic of Serbia



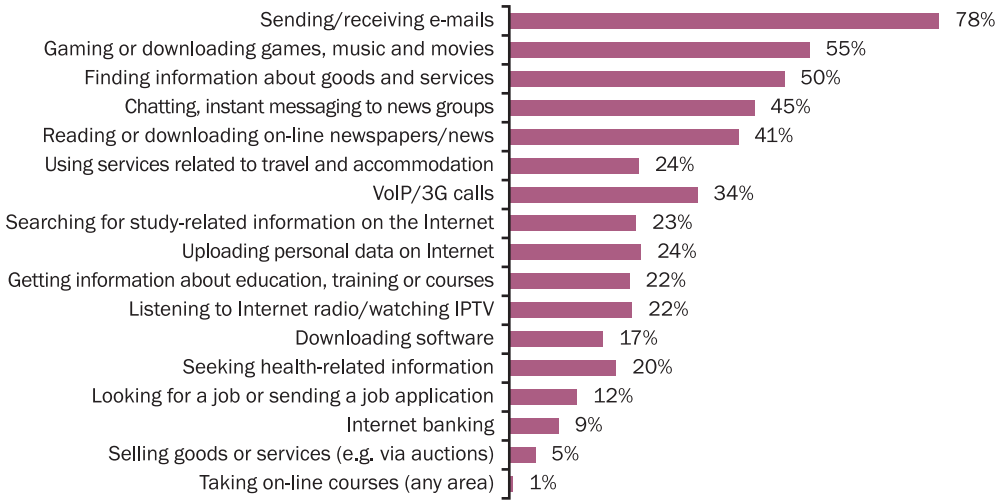
In 2010 there was a greater percentage of male users in respect to female users in all age groups, with the biggest discrepancy in 16-24 age group, whereas in 2009 the widest gap was seen in the 25-54 age group. Also, it can be concluded that the gender-based divide between the users in other age groups varied from 5.5 to 7.5% to the advantage of male users.

Figure 58. Internet Usage by Gender and Age Source: Statistical Office of the Republic of Serbia



The same as the previous years, during 2010 the Internet was mostly used for the following purposes: e-mail communication (77.8% of users), followed by gaming or downloading games, music and films (54.8% which is a decrease compared with 64% in 2009); for obtaining information on products and services (50% of users), instants messenger, chartrooms, newsgroups (44.5% of users), and reading

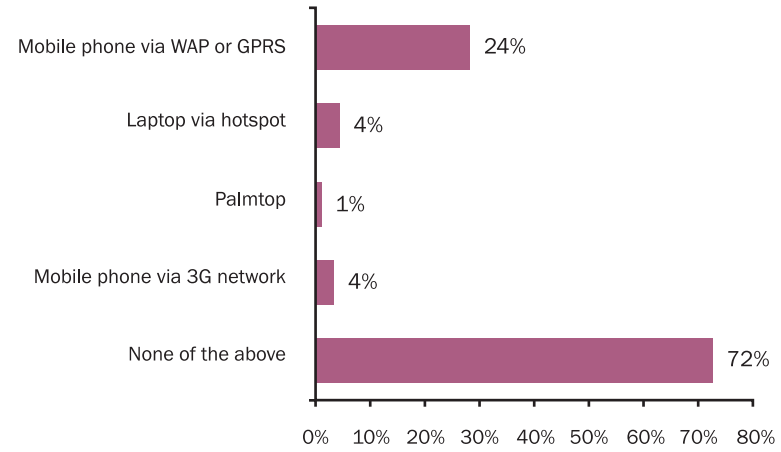
Figure 59. Private Internet Use (in the last 3 months)
Source: Statistical Office of the Republic of Serbia



or downloading online newspapers/magazines (41.4% of users). There was a slight decrease in the number of users who used Internet for the purpose of obtaining education-related information (21.8 compared with 26.4% in 2009), as well as in the number of respondents searching study-related information (22.8% compared with 27% in 2009). Internet banking service was used by 8.8% of users which is a decrease compared with 2009 (12%), while the Internet was least used for selling goods and services (4.9%) and taking on-line courses (0.3%). In 2010, the biggest increase of the number of users was seen in services related to travelling and accommodation, by 11.1% and VoIP, by 7.3%.

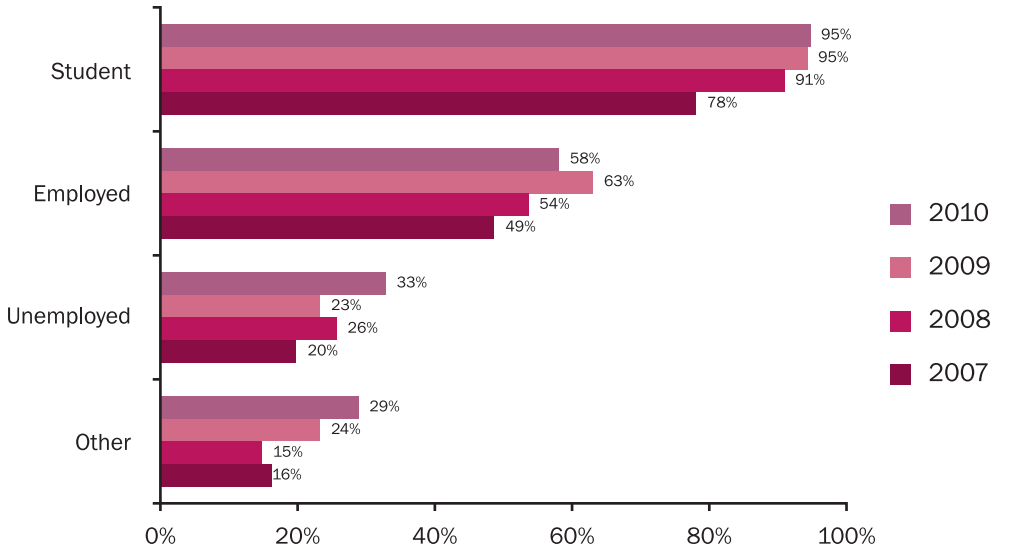
Figure 60 illustrates the use of mobile devices for Internet access with the highest number of users (23.5%) using a mobile phone (via WAP or GPRS) for this type of Internet access, followed by 3G network (3.7%), laptop wireless link (4.4%) and palmtop (0.8%), whereas as much as 71.7% of users said they had never used any of the options given above.

Figure 60. The Use of Mobile Devices for Internet Access
Source: Statistical Office of the Republic of Serbia



The share of the Internet users according to their employment status showed that the Internet is mainly used by students, and that, surprisingly, the number of employed users decreased. The fact that the number of Internet users among the unemployed grew by almost 10% is rather encouraging.

Figure 61. Share of Internet Users according to their Employment Status
Source: Statistical Office of the Republic of Serbia



The survey showed that 97.8% of enterprises used the computer for business in 2010.

Among the enterprises with Internet connection, 74.5% used DSL connection, followed by cable Internet (26.5%) and dial-up (13.5%), whereas only 12.2% of enterprises used mobile connections. A constant drop in the number of dial-up connections is evident, with a proportional increase in the number of DSL (8.6%) and cable connections (2.2%).

The analysis of companies according to their size (Figure 63), revealed that 100% of large and medium enterprises and 97.1% of small-size enterprises have Internet connection.

Figure 64 shows the purposes for which companies use the Internet. In 2010, the companies that used public administration services via Internet were mainly banks and insurance companies (88.2). According to 97.2% of respondents, the main reason for using e-Administration services was to obtain information.

Figure 62. Type of External Internet Connection Source: Statistical Office of the Republic of Serbia

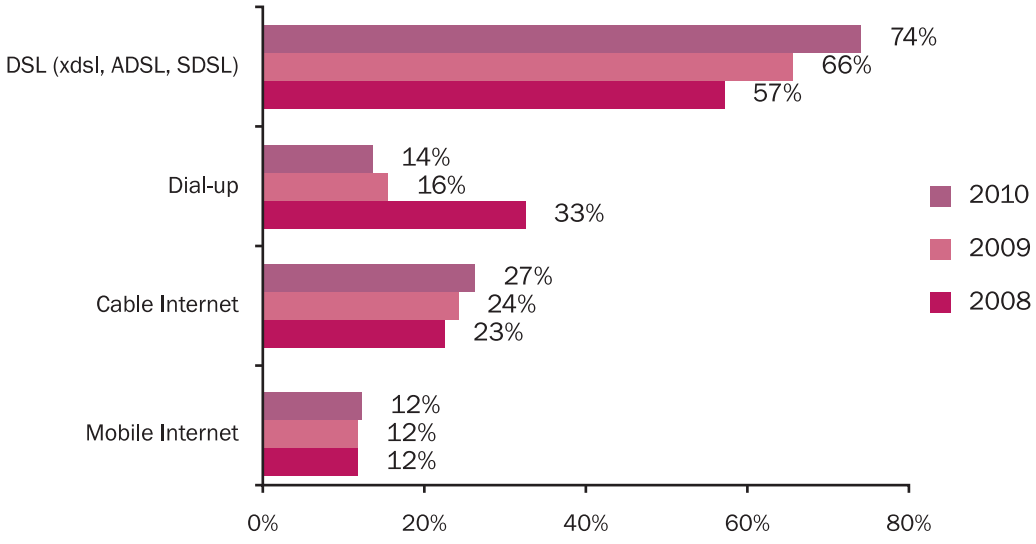


Figure 63. Use of Computer by Company Size Source: Statistical Office of the Republic of Serbia

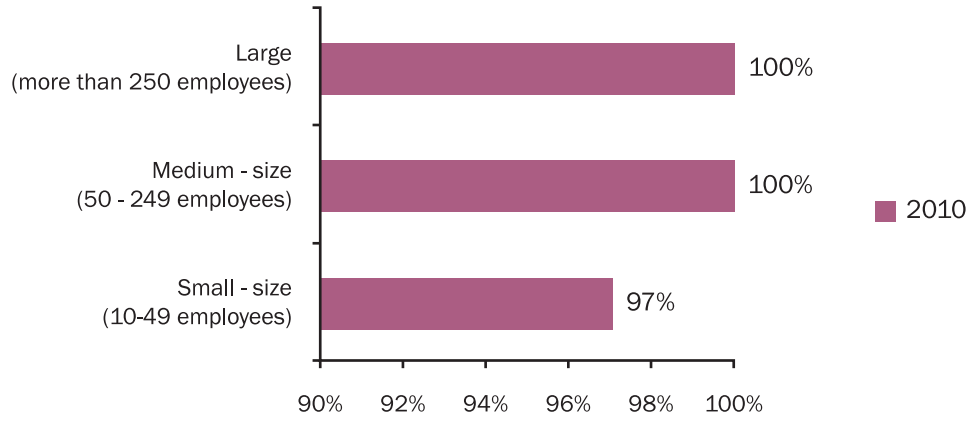
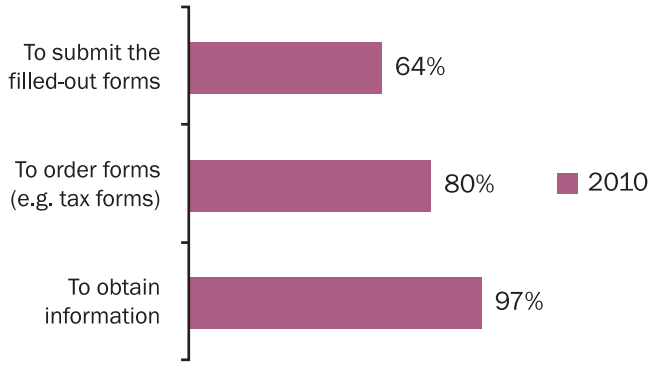
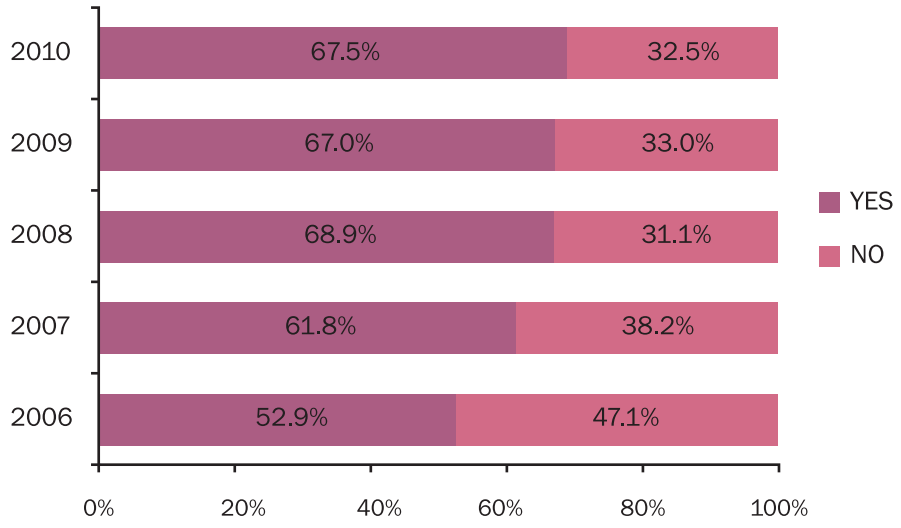


Figure 64. Reasons for Using e-Administration services by enterprizes
Source: Statistical Office of the Republic of Serbia



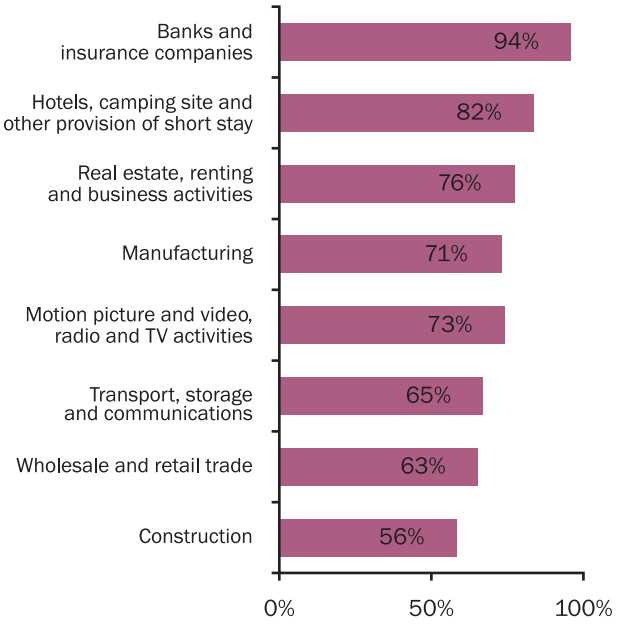
In 2010, 67.5% of the enterprises with the Internet connection had their own website.

Figure 65. Number of Enterprizes with Website Source: Statistical Office of the Republic of Serbia



The number of enterprises with website depends on the territory, since the share of enterprises with website in 2010 was the following: 80.6% of enterprises in Belgrade, 61.2% of enterprises in Vojvodina and 58.1% in Central Serbia.

Figure 66. Number of Enterprizes with Website according to Business
Source: Statistical Office of the Republic of Serbia



7. MEDIA CONTENTS DISTRIBUTION

In the market of media contents distribution in the Republic of Serbia, the services are provided via the following public telecommunications networks:

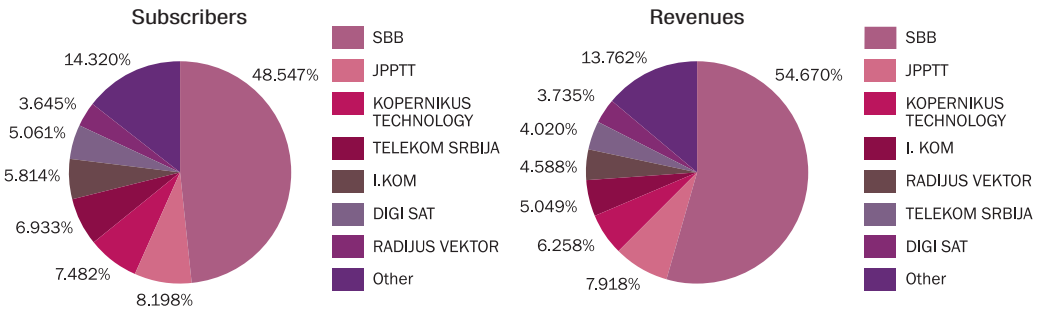
- **cable distribution networks (coaxial, hybrid and optical) – CATV, which include analogue and digital CATV,**
- **public fixed telephone network– IPTV,**
- **satellite distribution network– DTH (Direct to Home).**

There were 80 operators registered for the provision of this service in 2010, 74 of them providing the service via cable distribution network, 3 via public fixed telephone network and 3 via satellite distribution network (DTH). The leading operator of the media contents distribution, in terms of the number of users and the revenues made, was once more the company Serbia Broadband – Srpske kablovske mreže Ltd. (SBB), with approximately 50% of the market share. In the session of 16 February 2007, RATEL's Managing Board passed the Decision on designating a public telecommunications operator with significant market power for the radio and television programme distribution via cable distribution network, pursuant to the Law on telecommunications in force at the time. The Decision declared SBB an operator with significant market power with the obligation to apply cost-oriented pricing model for the services of radio and television programme distribution via cable distribution network, which means that SBB is required to observe the terms and conditions laid down in the *Rules on the application of the cost-accounting principle, separate accounts and reporting of a telecommunications operator with significant market power* (Official Gazette of RS, no. 103/08).

In 2010, important market players in the media contents distribution, other than SBB, were Public Enterprise PTT – RJ KDS, Kopernikus tehnology Ltd., Telekom Srbija Joint Stock Co., I.KOM Ltd., Digi SAT Ltd. and Radijus vektor Ltd. In terms of the number of subscribers, these operators had a joint market share of around 85%.

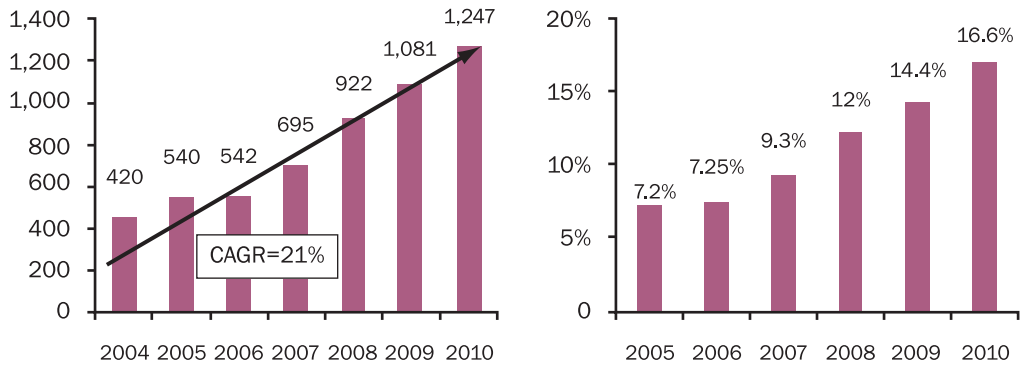
The total number of subscribers continues to grow, amounting to around 1.2 million in 2010, which is by 15% more compared with 2009. The average growth rate of the number of media

Figure 67. Market Share of the Leading Operators in 2010 Source: RATEL



contents distribution subscribers in the period from 2004 to 2010 was around 20%. Penetration rate amounted to 16.6%, or 49.5% in terms of the number of households.

Figure 68. Total Number of Users (thousands)/Number of Users per 100 Inhabitants Source: RATEL



In 2010, the majority of subscribers (76%) used the services of media contents distribution via cable distribution network, however the number of IPTV and DTH subscribers is growing.

Analogue CATV subscribers are still dominant among the total CATV subscribers with 91%, however, in view of the gradual analogue-to-digital switchover, the number of analogue CATV subscribers is expected to drop to the advantage of digital CATV subscribers.

Figure 69. Allocation of Subscribers According to Network Type

Source: RATEL

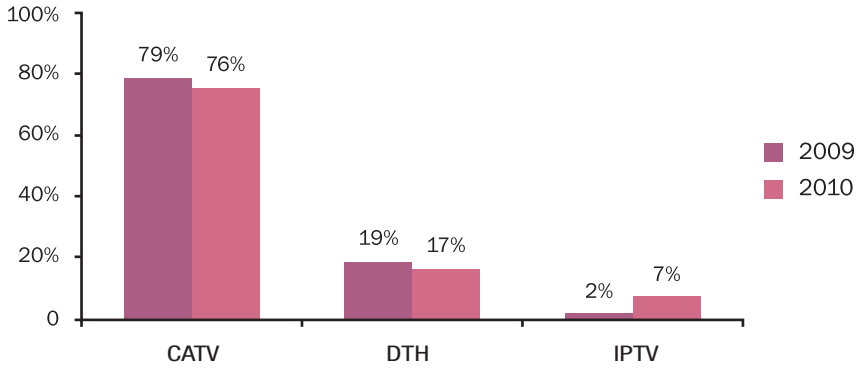
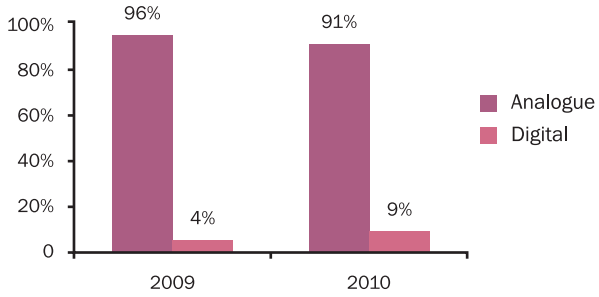


Figure 70. Analogue/Digital CATV Subsribers Ratio

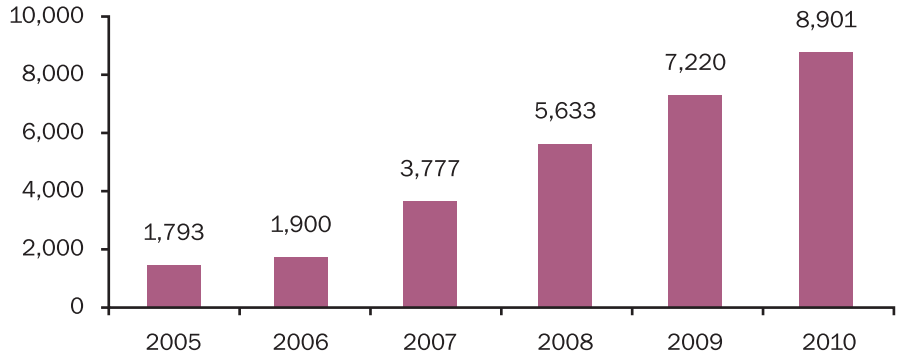
Source: RATEL



In 2009, the total revenues from media contents distribution increased by 23% year-on-year, amounting to approximately 8.9 billion dinars. This increase was mainly the result of the increase in the number of users, introduction of new platforms and rise in the media contents distribution tariffs by some providers.

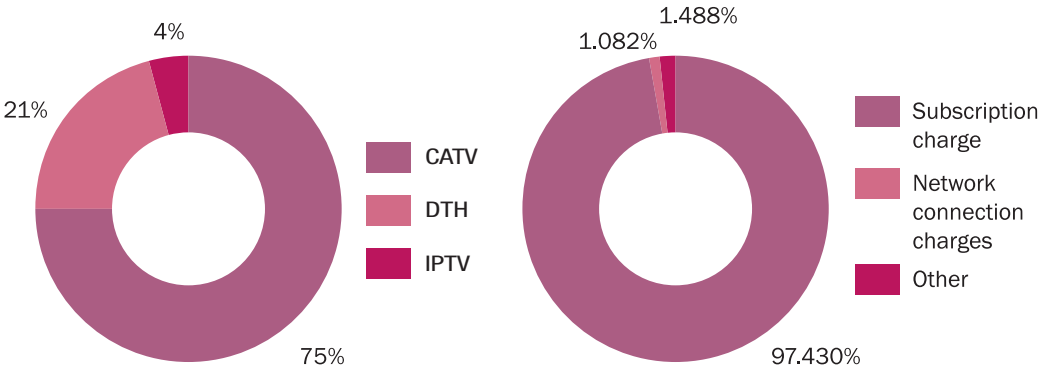
The biggest share in the revenues from the media contents distribution service provision went to CATV services (75%), followed by DTH (21%) and IPTV (4%). The revenues from monthly maintenance – subscription

Figure 71. Growth of Revenues in the Media Contents Distribution Market (in millions of RDS)
Source: RATEL



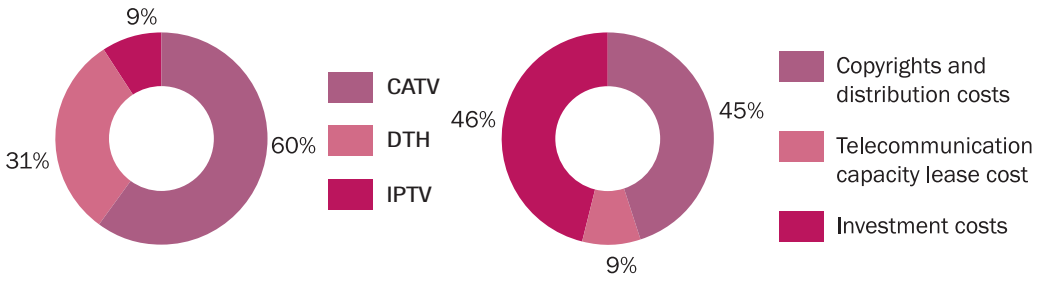
charges, participate in the total revenues with the share of 97.4%, network connection charges with around 1.1%, whereas revenues from Pay TV and other services make up around 1.5% of the total revenues.

Figure 72. Allocation of Revenues in 2010 Source: RATEL



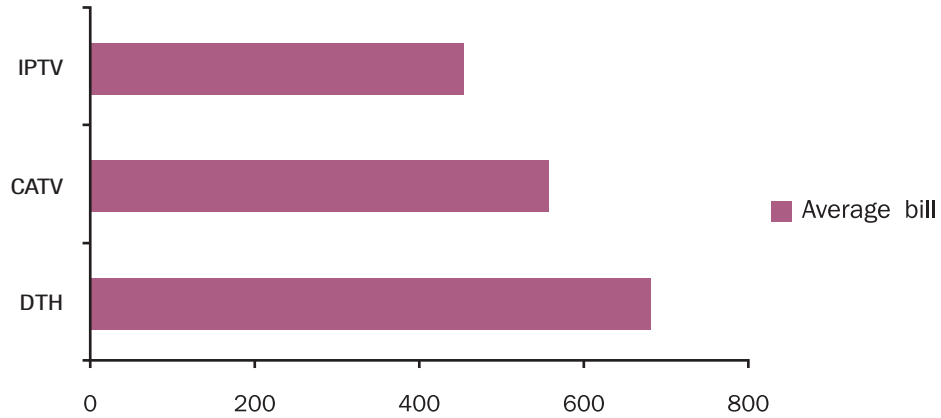
In 2010, the total costs of copyright and related rights and redistribution rights amounted to approximately 3.6 billion dinars, which is an increase of 44% compared with 2009. The costs of telecommunications capacity lease amounted to 692 million dinars, whereas the total investments in the media contents distribution amounted to approximately 3.6 billion dinars. In terms of network type, in 2010, the biggest share in expenditures went to CATV (60%), and the least to IPTV (9%).

Figure 73. Cost Allocation (%) Source: RATEL



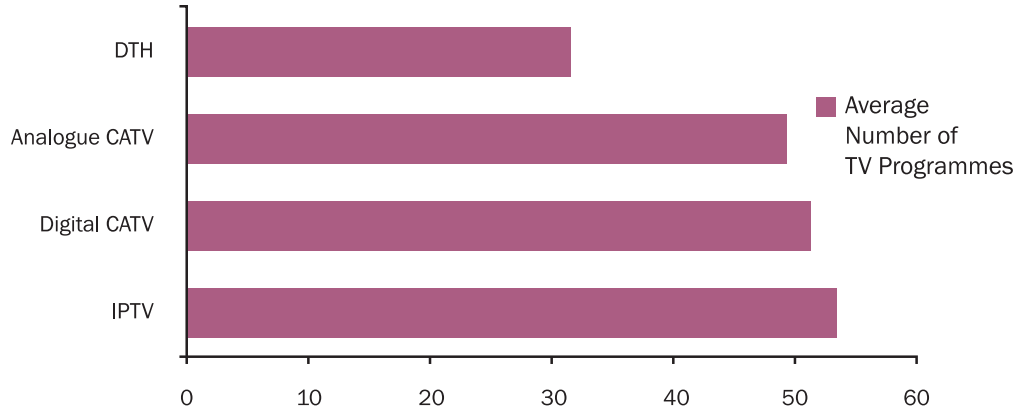
DTH service subscribers paid an average of 681 dinars for the basic service package while CATV services amounted to an average of 559 dinars on a monthly basis. Given the fact that operators offered this service at promotional prices, the average monthly bill for IPTV subscribers in 2010 amounted to 455 dinars.

Figure 74. Average Basic Package Subscription Charge in 2010 (in RSD) Source: RATEL



As for the number of TV programmes offered, basic IPTV package consisted of 54 and analogue CATV packages an average of 50 TV programmes in 2010. The basic digital CATV package included an average of 52 TV programmes, whereas basic DTH service package subscribers were able to choose from an average of 32 TV programmes.

Figure 75. Average Number of TV Programmes within the Basic Service Package in 2010
Source: RATEL



One of the basic characteristics of the given market in the observed period was the absolute dominance of cable network in the media contents distribution. Since the IPTV platform was first introduced in late 2008, so far it does not account for a significant market power in terms of the number of subscribers or effected revenues. Given the fact that the fixed-line subscribers, over 3 million of them in Serbia at the time, may be considered as potential IPTV users, the expansion of this platform seems likely in the following years.

Unlike media contents distribution via cable distribution network, there are no structure barriers for the DTH service provision, since satellite distribution network may cover the whole territory of the Republic of Serbia.

In terms of the prices and the quality of the media contents distribution services, the subscribers are given the possibility to choose between various distribution networks, thus making a contribution to the process of strengthening the market competition.

8. BROADCASTING

The Government of the Republic of Serbia, in its session held on 2 July 2009, adopted the Strategy for Switchover from Analogue to Digital Broadcasting in the Republic of Serbia which aims at defining the framework and providing fundamental strategic guidelines for the introduction of digital radio and TV program broadcasting in the Republic of Serbia. The Strategy enumerates, *inter alia*, the basic advantages of the digitalization for the users (better sound and picture quality (audio and image resolution, content variety, more radio and TV programs, new services for the disabled and elderly, etc.), for service providers (the possibility of adapting the content to suit the needs of different target groups, interactivity, etc.) as well as for the state itself primarily by enabling the more efficient radio frequency spectrum usage (digital dividend). The date set as the final deadline for the digital switchover for terrestrial TV broadcasting in the Republic of Serbia is 4 April 2012.

Based upon users' requests, public tenders as well as decisions made by the Council of the Republic Broadcasting Agency regarding the licence issuance for television and radio program broadcasting, RATEL issued the broadcasting station licences to the following broadcasters:

For TV signal coverage – commercial service – national coverage			
Ord. No.	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued microwave station licences
1.	Preduzeće za proizvodnju i emitovanje programa „FOX TELEVIZIJA“, Beograd	36	0
2.	„PINK INTERNATIONAL COMPANY“, Beograd	0	78

For radio signal coverage – commercial service – national coverage			
Ord. No.	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued microwave station licences
1.	„RADIO S“, Beograd	0	2

For radio signal coverage – commercial service – the area of province			
Ord. No.	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued microwave station licences
1.	„NS – AS“ D.O.O., proizvodnja, trgovina i usluge, Novi Sad	1	0

For TV signal coverage – commercial service – regional coverage			
Ord. No.	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued microwave station licences
1.	Javno preduzeće RADIO-TELEVIZIJA VRANJE P.O, Vranje	2	0
2.	„TV MOST“ D.O.O. za informativno izdavačku delatnost, Novi Sad	3	4
3.	Akcionarsko društvo „RADIO-TELEVIZIJA ZAJEČAR“, Zaječar	1	0
4.	Akcionarsko društvo „TV ČAČAK“, Čačak	7	0
5.	Akcionarsko društvo za grafičke usluge „JEDINSTVO“, Novi Pazar	1	0
6.	D.O.O. „SAT-TV COMMUNICATIONS“ P.O., Požarevac	1	0
7.	Javno preduzeće „RADIO-TELEVIZIJA KRAGUJEVAC“, Kragujevac	4	4
8.	Privredno društvo „RADIO TELEVIZIJA KRALJEVO I IBARSKE NOVOSTI“ D.O.O., Kraljevo	4	10
9.	Radio televizija „BELLE AMIE“ D.O.O., Niš	2	0
10.	Društvo sa ograničenom odgovornošću „RTV 5“ TPC „Kalča“, Niš	4	2
11.	Radio televizija ZONA d.o.o., Niš	8	20
12.	TV METROPOLIS, Beograd	0	2
13.	TIMOČKA TELEVIZIJA i RADIO, Zaječar	0	4
14.	TV BANAT, Vršac	0	2

For radio signal coverage – commercial service – regional coverage			
Ord. No.	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued microwave station licences
1.	Preduzeće za radio-difuziju, marketing i usluge „RADIO TOP FM“ DOO, Beograd	1	2
2.	„RADIO JAT“ društvo sa ograničenom odgovornošću za radiodifuziju, Beograd	1	0
3.	Akcionarsko društvo „RADIO-TELEVIZIJA ZAJEČAR“, Zaječar	1	0
4.	„RTD“ D.O.O. preduzeće za proizvodnju i usluge, Novi Sad	1	0
5.	D.O.O. za proizvodnju, trgovinu i usluge „MATRIX D“, Čačak	3	2
6.	Društvo sa ograničenom odgovornošću „RADIO SREM“, Ruma	1	2
7.	Javno preduzeće „RADIO LESKOVAC“, Leskovac	3	6
8.	Javno preduzeće „RADIO-TELEVIZIJA KRAGUJEVAC“, Kragujevac	3	0
9.	Javno radio-difuzno preduzeće „RADIO POŽAREVAC“, Požarevac	2	6
10.	JP za radiodifuznu, novinsku i izdavačku delatnost „RADIO ŠID“, Šid	1	2
11.	Preduzeće za trgovinu, usluge i posredovanje „MIPOS“ DOO, Beograd	1	2
12.	„NAXI“ Preduzeće za špediciju, saobraćaj i inženjering DOO, Beograd	1	2
13.	Privredno društvo „BETA RADIO“ D.O.O., Beograd	3	2
14.	Radio difuzno društvo „Radio-Televizija AS“ D.O.O., Šabac	2	2
15.	Radio difuzno preduzeće „STUDIO M“ D.O.O., Čačak	3	0
16.	Radio televizija „BELLE AMIE“ D.O.O., Niš	1	0

For TV signal coverage – commercial service – local coverage			
Ord. No.	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued microwave station licences
1.	TELEVIZIJA GRM D.O.O., Gornji Milanovac	1	0
2.	EPARHIJA BAČKA SRPSKE PRAVOSLAVNE CRKVE RADIO TELEVIZIJA BESEDA, Novi Sad	1	0
3.	Privredno društvo za proizvodnju i usluge „RENOAR“ D.O.O., Požarevac	1	0
4.	RTD D.O.O. Preduzeće za proizvodnju i usluge, NOVI SAD/ MOZAIK FONDACIJA, Novi Sad	1	0
5.	Televizija „GALAKSIJA 32“ D.O.O., Čačak	1	0
6.	Javno preduzeće „RADIO TELEVIZIJA BRUS“, Brus	1	0
7.	Društvo sa ograničenom odgovornošću „FOLK – DISK“, Salaš	1	0
8.	Javno preduzeće gradski informativni centar „APOLO“, Novi Sad	1	0
9.	Društvo za radio i televizijske aktivnosti „TELEVIZIJA EVROPA“, Ćuprija	1	0
10.	Preduzeće „TV – 5“ D.O.O., Užice	1	2
11.	Javno preduzeće radio televizija „ĆUPRIJA“, Ćuprija	1	0
12.	Akcionarsko društvo „RADIO TV PODRINJE“, Loznica	2	2
13.	Udruženje građana „RAZUM“, Niš	1	2
14.	Trgovinsko uslužno preduzeće „RITAM“ Aleksić Božidar i ortaci O.D., Vranjska Banja	1	2
15.	Specijalizovano preduzeće za radio-difuzne, video i audio usluge „TV-STUDIO SPECTRUM“ D.O.O., Lazarevac	1	2
16.	D.O.O. STUDIO Milana, Leskovac	1	0
17.	PROTOKOL K-1 D.O.O., Leskovac	1	0
18.	KANAL-M, Paraćin	0	2
19.	GMC-TRADE, Lazarevac	0	2
20.	Radio-televizija AS, Šabac	0	2
21.	Televizija Bačka Palanka, Bačka Palanka	0	2

For radio signal coverage – commercial service – local coverage			
Ord. No.	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued microwave station licences
1.	Društvo sa ograničenom odgovornošću „RTV 5“ TPC „Kalča“, Niš	1	0
2.	„RADIO DONJI SREM“ D.O.O., Pećinci	1	0
3.	Javno informativno preduzeće „IVANJIČKI RADIO“, Ivanjica	1	2
4.	Preduzeće za radio-televiziju i druge delatnosti „DAK“ D.O.O., Ćuprija	1	0
5.	Privredno društvo „ELEK GARIĆ“ D.O.O., Jagodina	1	0
6.	Informativno javno preduzeće „PREŠEVO“, Preševo	1	2
7.	Radio stanica „DESPOTOVAC“ D.O.O., Despotovac	1	0
8.	Privredno društvo „RADIO TELEVIZIJA KRALJEVO I IBARSKE NOVOSTI“ D.O.O., Kraljevo	1	2
9.	Društvo sa ograničenom odgovornošću „FOLK – DISK“, Salaš	1	0
10.	Društvo za emitovanje radio i televizijskog programa „KOMETA“ D.O.O., Bor	1	0
11.	Javno preduzeće za informisanje, izdavaštvo i marketing „RTV PRUGA“, Lajkovac	1	0
12.	Preduzeće za proizvodnju, promet, usluge i eksport-import „GOGY“ D.O.O., Gornji Milanovac	1	0
13.	„VAŠ KLAS“ D.O.O. društvo za radio aktivnosti, proizvodnju, trgovinu i usluge DRLUPA ROGAČA, Sopot	1	2
14.	SURDULIČKA RADIO TELEVIZIJA D.O.O., Surdulica	1	0
15.	„PLANETA 21000“ DOO za proizvodnju i emitovanje radio i TV programa, eksport-import i usluge, Novi Sad	1	0
16.	Društvo za telekomunikacije, trgovinu i usluge „ASTERIAS“ D.O.O., Novi Kneževac	1	0
17.	Privatno preduzeće za proizvodnju, promet i usluge „BUKOVACA COMPANY“ D.O.O., Nova Varoš	1	0
18.	Radiodifuzno društvo „OK RADIO“ D.O.O., Vranje	1	2
19.	Javno preduzeće „Radio i televizije Trstenik“ sa P.O., Trstenik	1	0

20.	Društvo sa ograničenom odgovornošću „RADIO 014“, Valjevo	1	0
21.	Preduzeće za radiodifuziju i marketing „RADIO SAN“ D.O.O., Užice	1	2
22.	Privredno društvo „BRAVO“ D.O.O., Požarevac	1	0
23.	EPARHIJA BAČKA SRPSKE PRAVOSLAVNE CRKVE RADIO TELEVIZIJA BESEDA, Novi Sad	1	0
24.	Društvo sa ograničenom odgovornošću „RADIO ČAČAK“, Čačak	1	0
25.	Javno preduzeće „RADIO TELEVIZIJA VRNJAČKA BANJA“, Vrnjačka Banja	1	0
26.	TELEVIZIJA „LOGOS“ EPARHIJE ŽIČKE SRPSKE PRAVOSLAVNE CRKVE, Trstenik	1	0
27.	Preduzeće za promet, usluge i telekomunikacije i marketing „RADIO-VLADIMIRCI“ D.O.O., Vladimirci	1	0
28.	Radio-difuzno društvo „PETICA“ O.D., Koceljeva	1	0
29.	Preduzeće za radio i televiziju „RADIO ANTENA 037“ OD Dejan Milenković i dr, Kruševac	1	0
30.	GOLD AM KOMUNIKACIJE D.O.O., Veliko Gradište	1	2
31.	Radio televizija „TURISTIČKI RADIO“ Nebojša Ristić PR, Knić	1	0
32.	„SANTOS-COMERCE“ D.O.O. za radio-televizijske aktivnosti uvoz-izvoz i usluge marketinga, Zrenjanin	1	0
33.	Radio stanica „SONI RADIO“ Zoran Čolić PR, Mihajlovac /Kod Smedereva/	1	0
34.	Udruženje građana „HELPH“, Mladenovac	1	0
35.	Radio-televizija i produkcija „SVILAJNAC“ D.O.O., Svilajnac	1	0
36.	Javno preduzeće „INFORMATIVNI CENTAR KIKINDA“, Kikinda	1	0
37.	Radnja za poslovne, radio i televizijske aktivnosti „SALDO“ Lidija Stanković PR, Niš	1	0
38.	Radio-televizija i produkcija „SVILAJNAC“ D.O.O., Svilajnac	1	0
39.	Preduzeće „Media System“ za telekom., market. i usluge OD, vlasništvo Ljubiše Bogdanovića i dr., Pojate	1	0
40.	Radnja za usluge reklame i propagande „MEGA“, Tomislav Jevtić PR, Varvarin	1	0

41.	D.O.O. za proizvodnju, usluge i trgovinu „JELIMIK“ eksport-import, Jagodina	1	0
42.	PRIMA INTERNACIONAL, Bajina Bašta	0	2
43.	Kulturni centar opštine Beočin, Beočin	0	2
44.	CIP Centar za informatički inženjering i projektovanje, Kraljevo	0	2
45.	„ANI PRESS“, Pirot	0	2
46.	„Bulat M. Press“, Ub	0	2
47.	JP Radio Novi Bečej, Novi Bečej	0	2
48.	JP Radio Stara Pazova, Stara Pazova	0	2
49.	Bravo plus, Kragujevac	0	2
50.	Radio ljubav, Jagodina	0	2
51.	Media Press, Vrnjačka Banja	0	2
52.	Eparhija bačka, crkvena opština Sombor, Sombor	0	2
53.	Kulturni informativni centar „Kisač“, Kisač	0	2

BROADCASTING STATION CONTROL

In 2010, there was stagnation in the number of broadcasting stations owners broadcasting without the licence, while some of them held two or more stations under the same registration or programme. The number of illegal stations was around 60. Some stations tended to change the location or broadcasting frequency. It should be noted that RATEL undertook measures pursuant to the relevant legal provisions in order to prevent further illegal broadcasting of these stations.

A number of broadcasting stations with a radio frequency licence were broadcasting contrary to the parameters from the relevant licence. These stations were usually broadcasting from other more favourable locations or with higher radiated power in order to achieve a wider coverage area.

With the entry into force of the *Law on Electronic Communications* RATEL's competence was modified in regard to the procedure for closing-down of illegal radio stations, pursuant to Art. 132 of the Law, the responsible ministry shall be in charge of part of the inspecting activities through its elec-

tronic communications inspectors. In particular, according to Art. 132 of the Law, the Ministry shall be in charge of inspecting the implementation of this Law, by-laws that govern electronic communications activity, and international agreements within the electronic communications sector, through its electronic communications inspectors, whereas the inspection surveillance on the territory of the autonomous province shall be conducted by the autonomous province through its authorities. Since the inspection had not been formed yet, the closing-down of the radio stations broadcasting without a relevant licence remained only within the competence of the Republic Broadcasting Agency.

TECHNICAL INSPECTION

During 2010, the activity related to performing technical inspection of all types of radio stations continued. Given the large number of issued radio station licences as well as the legal deadline within which the radio stations should begin working on the one hand, and the limited capacity of undertakings which perform the measuring and control activities within the technical inspection procedure on behalf of RATEL on the other hand, a large number of radio station owners' requests for technical inspection postponement were recorded. Most of the valid and timely requests for postponement were solved with a positive outcome by issuing appropriate decisions on technical inspection postponement.

The status of radio stations technical inspections carried out in 2010 is given in Table 12 on a monthly basis.

Table 13 provides an overview of completed technical inspections by type of radio stations complying with the terms and conditions from the licence.

Table 12. Number of Radio Station Technical Inspections in 2010 by Month

Month	Number of technical inspections
January	577
February	571
March	1053
April	775
May	537

June	860
July	450
August	128
September	429
October	430
November	683
December	817
Total:	7310

Table 13. Overview of Completed Technical Inspections by Type of Radio Stations Complying with the Terms and Conditions from the Licence

Type of rado station	Number of technical inspections
Base radio station or repeater (FB)	2933
Fixed radio station (FX)	2212
Mobile radio station (MO)	1520
Handheld radio station (ML)	502
Television broadcasting station (BT)	50
Sound broadcasting station (BC)	85
Aircraft radio station (FA)	1
Satellite service radio station (TC)	2
Portable radio station (PR)	5
Total:	7310

9. TELECOMMUNICATIONS NETWORKS OF PUBLIC ENTERPRISES

9.1. ELECTRIC POWER INDUSTRY OF SERBIA (EPS), PUBLIC ENTERPRISE

The efficient operation of the electrical power system of our country, comprised of the public enterprises Electric Power Industry of Serbia (EPS) and Electric Networks of Serbia (ENS), is entirely dependent on the existence of a modern telecommunications system for relaying technical and business data. The construction of a new telecommunications system for the electrical power companies in our country started several years ago, and is now drawing to a close. All of the planned top-level networks are either completed or nearing completion.

9.1.1. OPTICAL CABLE NETWORK

The optical cable network is increasingly similar in appearance to the high-voltage electrical power transmission network. As regards power lines with a voltage level of 400 kV and 220 kV, it could be said that the cables were fully replaced by installing lines with built-in optical cables. This type of replacement was completed in a large number of power lines with a voltage level of 110 kV and several lines of 35 kV.

The project of installing optical cables at the top network layer has largely been completed and, due to a clear need for new telecommunications connections in lower layers, both regional and local, the network is currently expanding in this direction. Thus current implementation and immediate plans are focused on covering the entire 110 kV power transmission network.

Taking all of this into account, it could be said that optical cables connect all important power supply facilities in Serbia. The network, built towards the end of 2010, spans the length of 5,000 km of OPGW (Optical Ground Wire), ADSS (All Dielectric Self-Supporting) and connecting underground optical cable.

The new optical network was mostly built using OPGW cables with 48 fibres, of those 24 G.652 type fibres and 24 G.655 type fibres. Only the initial construction line from Belgrade to Bajina Bašta utilized a total of 24 fibres of the G.652 type.

Figure 76. "Electric Power Industry of Serbia" Optical Network Source: EPS

The state of the optical network is regularly monitored by measuring losses, chromatic dispersion and polarization mode dispersion (PMD), twice per year. The quality is very good thus far, remaining within the prescribed margins.

By installing terminal devices and deploying the monitoring system, the fibres in use are automatically under constant control, while the free fibres will still need to be controlled by occasional measurements or special systems.

The optical network built thus far (Figure 76) shows that the network covers nearly the entire territory of the Republic of Serbia, reaching all important facilities in the power supply system and that, with further

development, it will practically cover all significant points in the country, both from the power supply, as well as the telecommunications aspect. Further development towards regional and local layers will surely make it the most widely distributed optical transfer medium on this territory with multiple usage capabilities.

Since the need for utilising new telecommunications capacities was ever present and increasing, the usage started before the full completion and deployment. This is especially true of the interconnection routes with neighbouring countries during the process of connecting to the UCTE.

9.1.2. TERMINAL EQUIPMENT

The new top level optical telecommunications network was to contain 75 nodes where the installation of adequate terminal equipment was envisaged. These nodes represented the key facilities in the power supply system of the country, i.e. all hydro and thermal power plants, all mines and all important transformer stations, as well as facilities wherefrom electrical power connectivity with neighbouring countries is established. The entire system is connected to two command centres, the main centre and the backup (Disaster Recovery Centre). The main TC centre is located in the Dispatch Centre.

With the aim of transmitting business, technical and voice data priority was given to SDH technology (Synchronous Digital Hierarchy), since it is dominant for these types of uses worldwide. The capacities on all major routes are of an STM-16 level, on minor routes they are of STM-4, while certain peripheral and antenna routes are of an STM-1 level. All those points have adequate flexible multiplexers installed to receive various user interfaces utilising the 64 kbit/s channel, comprising the network providing channel transfer in dedicated telecommunications networks.

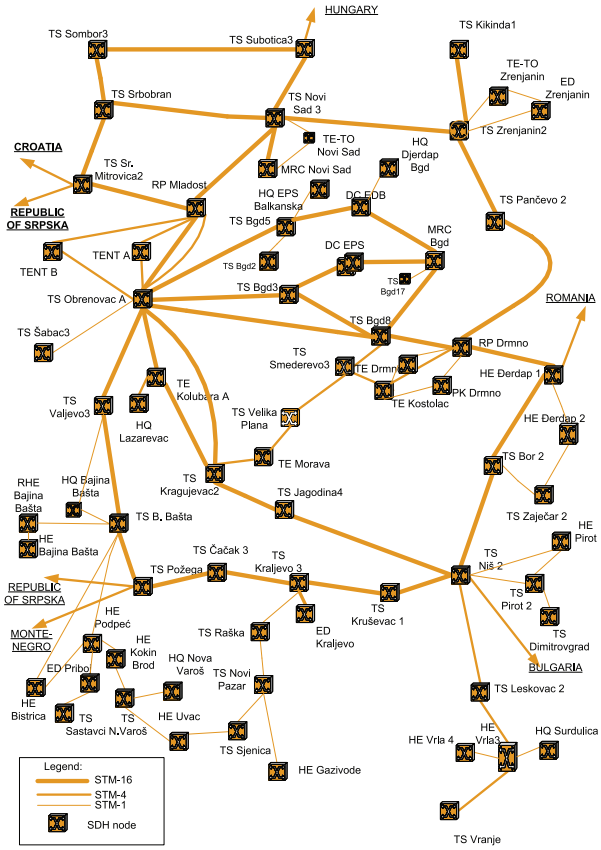
All of the devices were installed, tested and deployed as planned. Since the topology of an SDH network is of a mesh type, this means that the security systems need to be adequate. Since there are no classical rings in the network, traffic security in an SDH mesh network uses SNCP (Sub Network Connection Protection) systems. They provide security for the traffic on a point-point basis, i.e. between the entry and exit node in an SDH network. The LCAS (Link Capacity Adjustment Scheme) protocol is used for transmitting business traffic and route traffic along various routes.

The control and monitoring systems, as well as the synchronization systems, were implemented and became operational. The control and monitoring system is comprised of three independent subsystems:

the system for the control and monitoring of the SDH network, the system for the control and monitoring of the FMUX network and the system for the control and monitoring of the synchronisation devices. The control and monitoring system is a centralised, redundant system with high capacities enabling the remote control of all network elements, SDH and FMUX devices, as well as synchronisation devices.

Figure 77 shows all of the nodes with terminal equipment installed and their telecommunications capacities for adequate routes.

Figure 77. New Telecommunication Network Locations and Capacities Source: EPS



9.1.3. IP TELEPHONE NETWORK

Due to long standing problems with the switching equipment within the power supply system, the telephone network being outdated, the modernization of this network was initiated. An update of the existing Project Idea for the electrical power system telephone network was performed, and is now based on IP technologies.

This technology allows for the introduction of many other services, but here, its primary purpose will be to solve the problems of telephone communications within the EPS and ENS companies.

New switching devices (voice routers) will be installed at nineteen locations, with IP-TDM telephone switches in 6 locations and purely packet switches in 13 locations. The introduction of IP telephone systems in the electrical power system also includes the construction of a backbone packet network, in this case comprised of five core routers utilising MPLS technologies, installed in five locations connected in a full-mesh structure through the STM-4 interface of the SDH devices. Control over the telephone communications within the network is implemented by two soft switches, in two locations, connected to the core routers in those facilities. All existing switches of a modern type will be incorporated into the new telephone network, with adequate network interfaces for connections to a packet network, along with older switches to be connected through E1 Qsig interfaces or a four-wire transmitter with E&M signalisation.

It bears noting that the introduction of IP technology will place the Electric Power Industry of Serbia among the first electrical power companies to make this transition.

9.2. ELECTRIC ENERGY TRANSMISSION AND TRANSMISSION SYSTEM CONTROL (EMS), PUBLIC ENTERPRISE

Telecommunications system of the Electric Energy Transmission and Transmission System Control (EMS), Public Enterprise represents the backbone of the closed functional system which covers the territory of the Republic of Serbia and is used for the purposes of the electrical power sector. More than 90% of traffic in the electric energy sector transmitted over OPGW (Optical Ground Wire) covers the needs of the EMS, Public Enterprise, which is in charge of maintaining, monitoring and managing its resources.

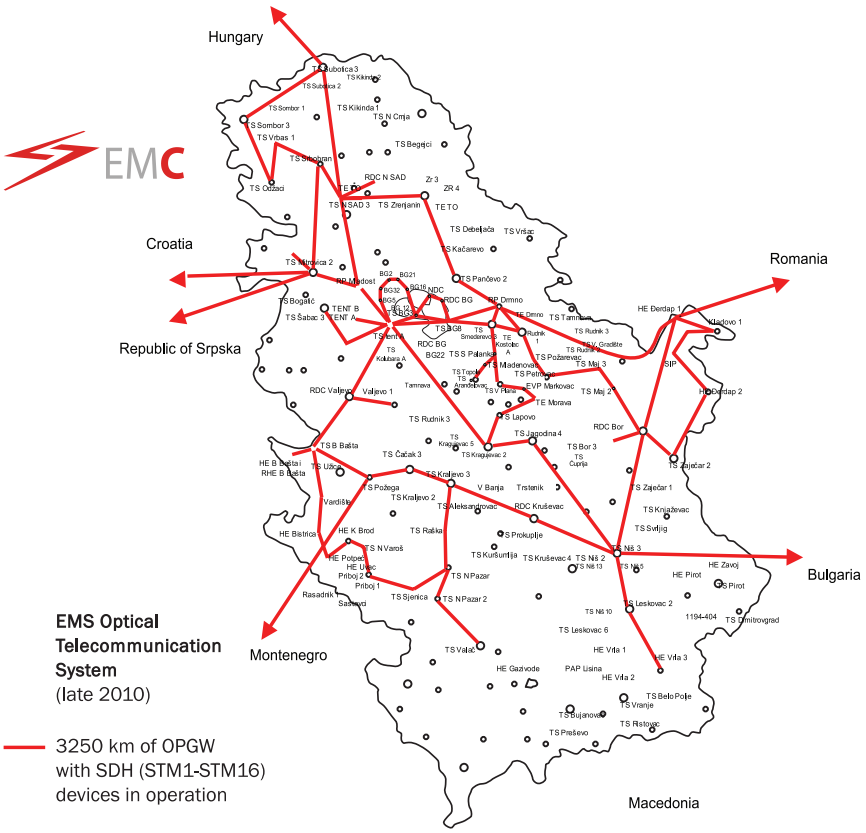
Due to the requirements of technological processes pertinent to the electrical power transmission system management, this telecommunications system enables a higher level of information transmission reliability and security, with lower transmission speed and capacity requirements as opposed to public telecommunications networks. Such a concept originates from the rules defined by the UCTE/ENTSO-E (Union for the Coordination of Transmission of Electricity /European Network of Transmission System Operators for Electricity - Operational handbook). Several types of services are supported: telephony (operational, business), the transmission of the technical control system EMS SCADA (Supervisory Control and Data Acquisition) signal, Electric Power Industry of Serbia (EPS) and EMS business data transmission, SRAAMD (System for Remote Acquisition and Accounting of Metering Data) meter reading, signal transmission for EMS power line protection as well as monitoring and managing the telecommunications system. For the purpose of information transmission, EMS uses several networks of different technologies.

The basis of the EMS telecommunications network is the optical network realized by OPGW cables and optical SDH (Synchronous Digital Hierarchy) terminal equipment. The OPGW network of cables is an integral part of EMS power lines (since the power line protection is the basic power function). OPWG network illustration is given by EPS. Both telecommunications systems are used by EPS and EMS for the same OPGW cable network.

At the end of 2010, there were approximately 4000 kilometers of OPGW cables installed. EMS optical terminal devices are installed along 3250 kilometers. These devices are in function in 58 nodes. The speed levels are STM-1 (155 Mbps) and STM-2 (2.5 Gbps). Figure 78 illustrates the EMS telecommunications system.

The necessary path redundancy was achieved through 7 STM-16 and 6 STM-1 optical loops: both SDH and PDH (Plesiochronous Digital Hierarchy) links have been in operation incessantly, whereby the exceptional availability was achieved. If we do not take into consideration the disconnections of devices for the purposes of reconfiguration or optical cable interventions, there were no disconnections related to the work of SDH terminal equipment during 2010. Moreover, traffic protection functions are continuously being improved. Monitoring, management, configuration and the maintenance of the built-in optical equipment, is conducted, in real time, from the operational room of the EMS Telecommunications Centre.

Figure 78. EMS Optical Telecommunications System (end of 2010) Source:EMS

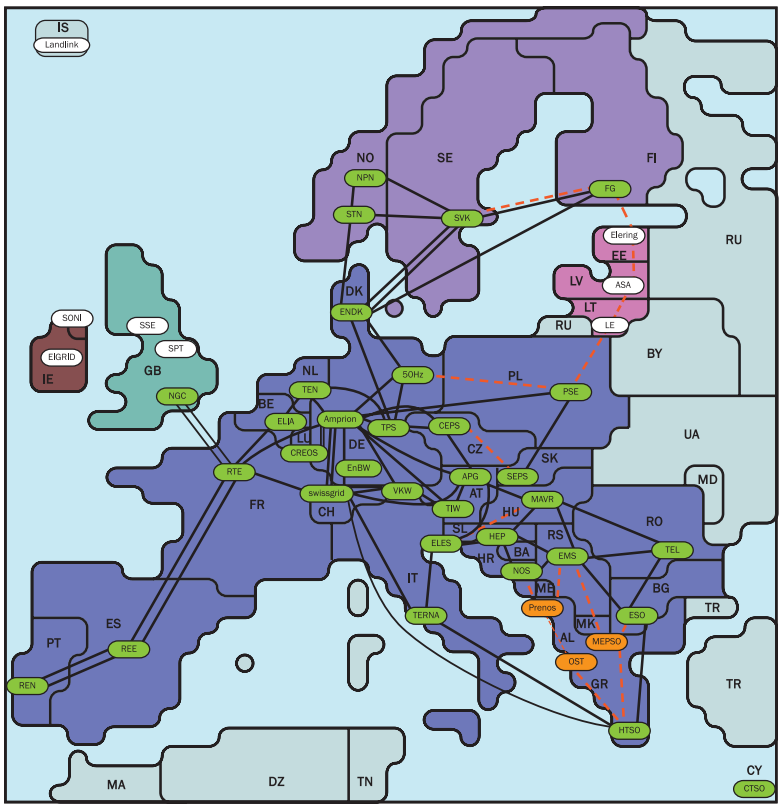


With the use of optics, and in accordance with the UCTE (ENTSO-E) recommendations, EMS is connected with electrical power industries of Hungary, Bosnia and Herzegovina, Croatia, Romania and Bulgaria. Connections are enabled by means of STM-1 links, whereas devices support links up to STM-16. In this way, EMS is linked to the European Energy Network (Electronic Highway - EH). This network is used for the exchange of data on the electrical power systems of European countries in real time, with the aim of ensuring the security of the European electrical power sector. The connection with Montenegro is secured by STM-1 link, but the electrical power industry of Montenegro

still lacks the telecommunications resources necessary for the Electronic Highway. Figure 79 illustrates the abovementioned international links, with EMS having a considerably higher number of interconnections in relation to the number of links of most of the other countries.

The network of very high (VH) frequency links consists of sections realized along high-voltage lines. These sections are mainly analogue, with few channels, and connected into the single net-

Figure 79. Electronic Highway (Backbone Connections)



Electronic Highway Backbone connections
NB: Montenegro and Macedonia are not connected to EN
Albania is not a member of UCTE/ENTSO E

work via automatic telephone exchanges of the electric power. In terms of percentages, a rather small portion of voice and telemeasuring data are transmitted over VF connections. VF network, although technically obsolete, has maintained its functionality during 2009 and fulfilled the basic implemented technical requirements. With the development of telecommunications systems, VF links are becoming obsolete and will most likely be used for securing alternative paths.

Automatic telephone exchanges are in the process of gradual replacement and migration towards the use of IP technology (out of the 32 existing exchanges, only 16 have satisfactory characteristics). Within the 15/08/PT project for the realization of packet telephone network, 19 packet telephone exchanges were installed within the single EMS and EPS telephone network.

Mobile links, which include base stations, appropriate repeaters and terminal stations of various types, provide efficient operation of fieldwork teams, particularly in rural areas. These mobile links cover most of the territory of the Republic of Serbia. Further development of the mobile network is currently in stagnation. EMS uses 5 radio-relay links in the 7.8 and 23 GHz bands. Digital links with STM-1 and 34 Mbps capacity are integrated into the telecommunications system.

By using own telecommunications system enabled the availability and information security necessary for the real-time operation of the electric energy system and the functioning of the overall electric energy sector. The amount of savings has exceeded the value of the active equipment built in. By building and exploiting the modern telecommunications system, the EMS personnel gained new skills necessary for the activities of operational management, monitoring, as well as maintenance of the EMS telecommunications system. In retrospect, the increasing usage of the optical transmission system can be regarded as one of the main characteristics of the previous period.

The unused capacity is mostly evident in the part pertinent to OPGW cable fibres. In taking this matter into consideration, one should note that EMS power lines (with OPGW cables) end in transformer stations. The abovementioned transformer stations are located outside urban areas. Since the active equipment provides unused capacities as well, one of the existing telecommunications systems (EMS, EPS) may partially be used for the needs of other entities apart from those within electrical power industry. Within such use, the security of operational data related to the technological process of managing the electrical power system in real time (SCADA and SRAAMD) should be of highest importance.

9.3. SERBIAN RAILWAYS, PUBLIC ENTERPRISE

9.3.1. CURRENT STATE OF TELECOMMUNICATION SYSTEM

The telecommunications networks of the Serbian Railways, PE utilize the following types of transfer media:

- transfer along aerial cables,
- transfer along ground cables and
- radio transfer.

Aerial cables are still in use as one of the transfer media on the Serbian Railways railroads, even though their use has significantly tapered off. Transfer through aerial lines is present only along non-electrified railroads.

The transfer of telecommunications, signals and stable electric traction facility information along electrified railroads is mostly conducted through STA (with no coaxial tube) and STKA (with coaxial tube) railroad signals-telecommunications cables. The purpose and construction of signal-telecommunications cables is determined by massage type and frequency band required by the above systems.

Optical cables were laid down within the Belgrade railroad junctions (the business facilities at Nemanjina 6 – Belgrade Passenger – Belgrade Centre) and along the sections Belgrade Centre – Pančevo Main, in the total length of 21 km. Optical cables laid along Požega – Kraljevo route in the total length of 65.7 km. The abovementioned optical cables have the capacity of 8 (Pančevo most-Pančevo glavna), 10 (Požega-Čačak), 12 (Beograd Centar-Pančevo most), 24 (Beograd Nemanjina 6-Beograd Centar) i 36 (Čačak-Kraljevo) fibres.

HF transmission along main railroads is realized via 300-channel systems, along side railroads via 12-channel systems and along non-electrified railroads via 12-channel systems for operation on air-lines and three-channel systems. All transmission systems are realized in analogue technique with electronic pipes and transistor as basic components.

The SDH transfer system at the STM-1 level is used within the Belgrade Railroad Junction (business facilities Nemanjina 6 – Belgrade Passenger – Belgrade Centre), as well as along the sections Belgrade Centre - Pančevo Main where optical cables were laid down.

Radio link systems are a single technical and technological unity in terms of operation and usage. Radio links are increasingly being employed in the railway system due to their flexibility, availability and quality of service, which is of great importance for the operation of railways.

The Serbian Railways PE uses the following frequency bands:

- 147.775-148.300 MHz band paired with 152.275-152.800 MHz for radio networks for communication in traffic control along non-electrified railroads (Zrenjanin-Kikinda, Subotica-Banatsko Miloševo, Crveni Krst-Zaječar, Lapovo-Kraljevo);
- 167.250-167.375 MHz band paired with 171.750-171.875 MHz reserved for the ZGOP radio networks (in the Serbian Railways network);
- 444.450-445.625 MHz band paired with 454.450-455.625 MHz for local radio networks in larger classification yards and sorting stations, as well as maintenance services,
- 457.450-458.300 MHz band paired with 467.450-468.300 MHz for the locomotive radio dispatch system enabling communication between dispatchers and engine drivers, in use along all major routes (Beograd-Mladenovac-Lapovo-Niš-Preševo, Beograd-Mala Krsna-Velika Plana, Batajnica-Šid, Inđija-Subotica-state borderline, Resnik-Požega, Beograd node rails – cargo and passenger traffic).

A vast array of devices is in use in the radio-systems currently operating on the railroads, from the earliest generation of devices manufactured using transistor components, up to modern microprocessor-based radio devices.

9.3.2. INVESTMENT DEVELOPMENT PLAN

The investment development plan takes into consideration only main railroads. Side railroads the continuity of the telecommunication system will be established on certain routes, according

to the technical requirements of the Traffic Department and financial assets, by installing free-standing cable, radio stations at important official sites or partial calibration.

9.3.2.1. CABLES

The plans for the investment works for main routes where no copper cables have been laid down (Niš – Dimitrovgrad and Belgrade – Vršac) envisage the laying of copper STA-PV1 4x4x1,2NF+12x4x0,9NF and optical cables, mostly with 48 optical fibres, into the ground, whereas along other main routes where railroad copper signals-telecommunications cables of the STKA and STA types are in use (Belgrade-Bar, Belgrade -Šid, Belgrade -Niš-Preševo, Inđija-Subotica, Belgrade - Mala Krsna-Velika Plana) either pylon contact networks or 48 fibre optical cables will be laid into the ground.

In late 2010 an agreement was signed with PTT on building optical infrastructure along corridor X rails. The project documentation preparation is underway, which will be followed by a bidding procedure. The works are expected to commence in 4Q11.

9.3.2.2. TRANSMISSION SYSTEMS

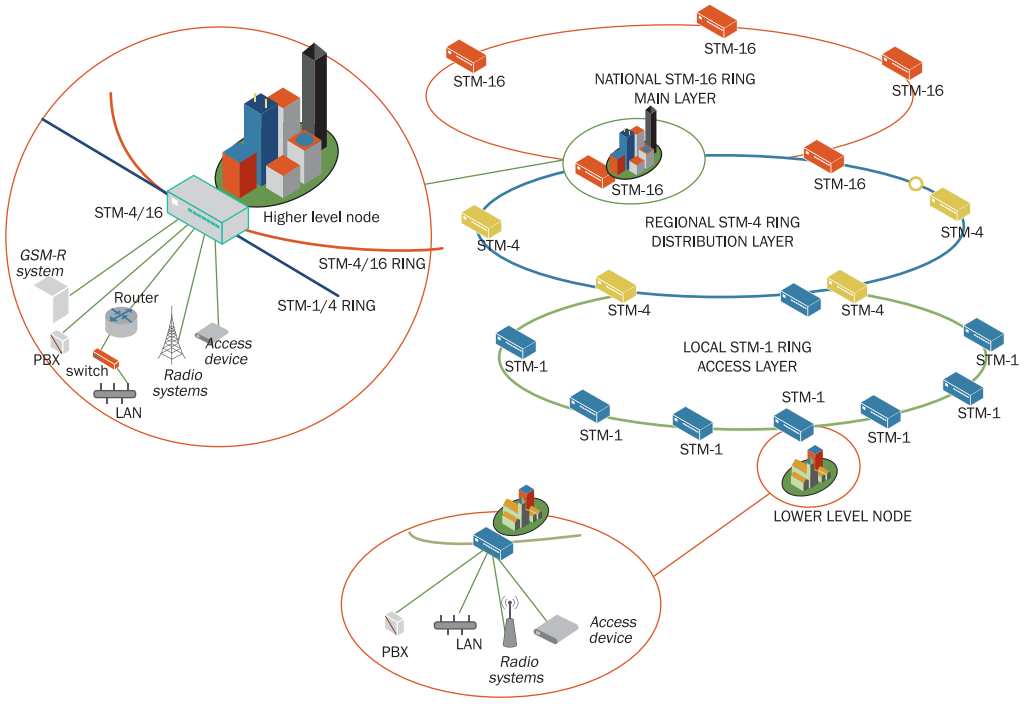
The transfer system network architecture consists of three layers:

- Main
- Distribution
- Access

The following total capacities were planned for the main routes on the territory of Serbian Railways:

- STM-1 (Subotica-Sombor, Subotica-Horgoš, Novi Sad-Sombor, Šid-S.Rača, Ruma-Šabac-Zvornik, Prahovo-Zaječar);
- STM-4 (Belgrade-Prijepolje, Niš-Dimitrovgrad, Belgrade.C-Mala Krsna-Velika Plana, Niš-Preševo, Novi Sad-Subotica, Subotica-Kikinda, Subotica-Zrenjanin, Stalać-Kraljevo-Požega, Lapovo-Kraljevo, Kraljevo-Lešak, Beograd-Pančevo-Vršac, Inđija-Šid, etc.);

Figure 80. Telecommunication Transmission System



- STM-16 (Belgrade -Niš, Belgrade - Inđija-Novi Sad, Belgrade C.- Belgrade -Nemanjina);
- Mid-range radio links were envisaged for redundancy, enabling the closure of the ring structures in the transport network.

Based on individual user concentration, applications in use, as well as the service they require, the nodes were divided into higher and lower level nodes.

Higher level nodes belong to the transport or distribution layer.

Lower level nodes mostly belong to the distribution or access layer.

9.3.3. CIRCUIT-SWITCHING NETWORK

The telephone network in Figure 81 would operate as a three-tiered network. It would be comprised of the transit, regional and local layer.

Nodes in the transit layer are mutually partially networked and are mostly located in the headquarters of the railroad organizational units. All calls are routed according to non-hierarchic alternative principle. Transit nodes are equipped with necessary hardware and software modules which are in charge of the system monitoring and maintenance and where the system backup is located.

Each regional node contains local software enabling autonomous control and complete call processing for all its users.

Local layer nodes would be located mainly along the railway and in smaller official sites. They would be realized as remote stages, concentrators or LAN.

Only transit centre Belgrade would be connected to the networks of other railway administrations.

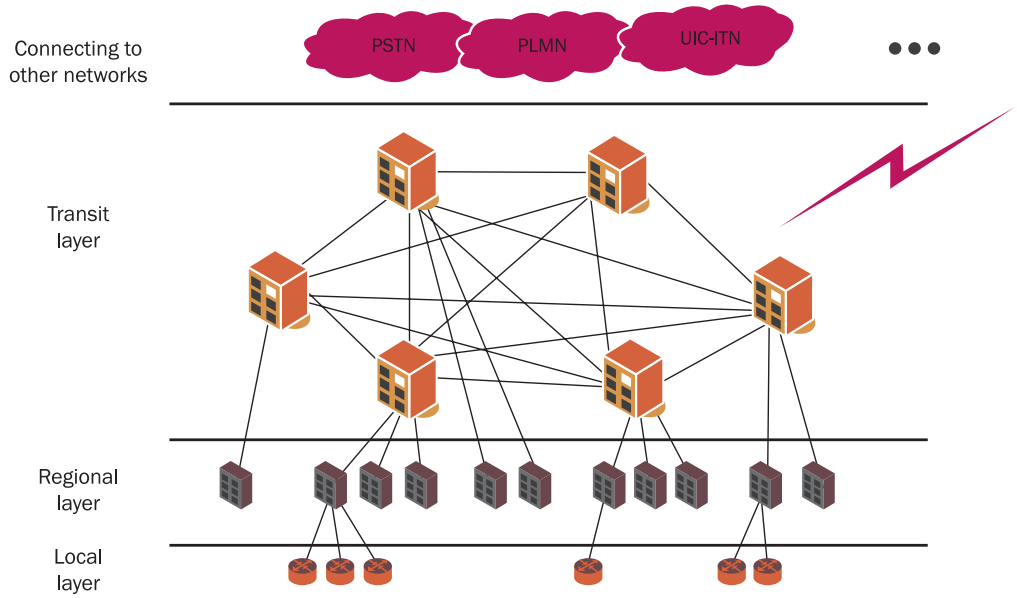
The connection to the public network would probably be realized through transit layer although there some regional nodes should also be able to realize the connection.

The network should have an open numbering system. Each transit node has a code and each user within the exchange can be reached directly by dialling a user number. The numbering of each regional node is an integral part of the relevant transit exchange numbering.

9.3.4. RAILWAY DEVICES

The investment works envisage the setup of modern railroad telephony systems manufactured using digital integrated technologies.

Figure 81. Circuit-Switching Network



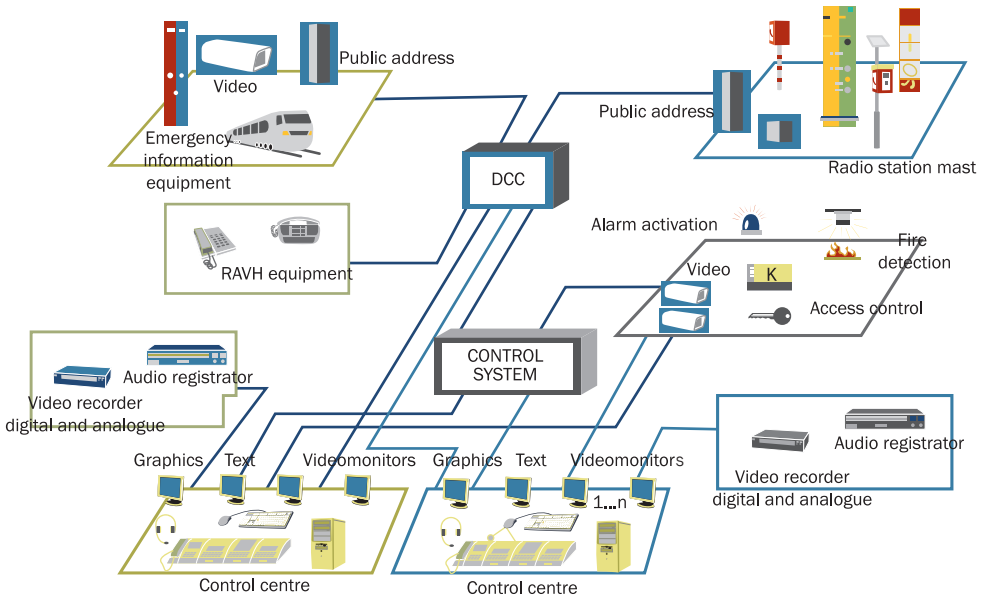
New systems with digital communication nodes (DCN) will be used along electrified international corridor railroads. The installation of a new generation of railroad telephony systems includes changes to current rulebooks and manuals.

New integrated digital systems of railroad telephony will be implemented along the international Corridor X following the completion of the construction of optical infrastructure.

Figure 82 shows the systems that can be integrated within the DCN nodes and the dispatcher centres of the Dispatcher Systems of Traffic and Electrical Traction.

This solution provides for the traffic and electrical traction dispatchers to communicate with traffic and driving personnel in stations and along the railroad in order to regulate railroad traffic

Figure 82. Digital Integrated Railroad Telephony Systems



DCC – Digital communication centre

along a dispatcher section and provide for infrastructure maintenance. The system enables selective connections with call identification between nodes and the dispatcher centre.

The main DCN would be located in the dispatcher centre, whereas first-level digital switching nodes would be installed along the railroad in most stations. Communication between the main DCN in the dispatcher centre with nodes along the railroad is established through first-level DCNs. Other, smaller stations would house station and railroad connection concentrators connected to first-level DCNs by multiplexers on copper cables. The main DCN and the first-level DCNs are to be connected by optical cables, while communication will be conducted along a digital transfer system where a 2Mbit-access should be planned for at each node and for mutual communication. The input and output signals, road crossings and railroad telephones should be fitted with intercom-style telephones.

9.3.5. RADIO SYSTEMS

Further choices for integrated mobile communications are digital radio based on the GSM-R networks and bands within the designation of allocated bands were reserved to this end.

As for migration routes, the choice for the mobile segment is to equip the entire pool of vehicles with locomotive radio stations, noting that dual-mode stations shall be procured, supporting both analogue operation at 450 MHz and the GSM-R network.

A stable infrastructure migration model will depend on financial resources.

Local networks should meet the requirements of the relevant traffic volume and the complexity of technological processes of equipping larger stations and expending the existing networks in 450 MHz frequency range.

9.4. ACADEMIC NETWORK OF THE REPUBLIC OF SERBIA - AMRES

The telecommunication infrastructure used by AMRES consists of the following three groups:

1. Optical infrastructure leased from Telekom Srbija, both for network backbone and for individual links within towns. The details of this infrastructure are given below.

2. The links between AMRES institutions are realized through Telekom Srbija's L2VPN service.

3. Optical infrastructure for AMRES needs has been leased on a 15-year period through the agreement closed between the Ministry of Telecommunications and Information Society and Telekom Srbija as part of SEELight project. The realization of the links is expected to be fully completed by the end of 2011.

9.4.1. CURRENT STATE OF THE LEASED OPTICAL LINKS

The total length of the leased optical fibres is 2230 km. These are G.652 single-mode optical fibres and they include links between towns (Fig. 83) and those between institutions within the towns. The capacity of all links is 1 Gbps and the technology deployed is Ethernet.

Figure 83. Leased Intercity Optical Links – Current State

Furthermore, there is a digital link between Belgrade (Belgrade University Computer Centre - RCUB) and Nis (Unified scientific-educational information system of University in Nis - JUNIS) passing through the transport system of Telekom Srbija. The capacity of this link is 155 Mbps.

9.4.2. LINKS BETWEEN AMRES AND INSTITUTIONS THROUGH TELEKOM SRBIJA'S L2VPN SERVICE

Telekoma Srbija's L2VPN service (SHDSL/ADSL technology) links 27 academic and scientific and research institutions (25 in Belgrade, one in Kragujevac and one in Jagodina). All traffic of these institutions is delivered through VPN tunnel to the concentration point in the Belgrade University Computer Centre (RCUB).

9.4.3. EXPANSION OF OPTICAL INFRASTRUCTURE UNDER SEELIGHT PROJECT

SEELight project involves a 15-year lease of optical infrastructure from Telekom Srbija. Since a large number of new links is yet to be implemented, according to the information of Telekom Srbija, the total length of all leased fibres is expected to be 4072 km. The exact total length will be known once all links are implemented. These are G.652 and G.655 single-mode optical fibres. The optical infrastructure will interlink the total of 50 Serbian towns into AMRES backbone (Figure 84), thereby connecting a large number of new institutions.

Figure 84. Optical Intercity Links Infrastructure – SEELight Project

10. LIST OF BYLAWS ADOPTED BY RATEL

- Rules on form for telecommunications and radio-broadcasting controllers' identification cards (*Official Gazette of RS*, no. 111/05)
- Rules on form contents for radio-broadcasting controllers' report (adopted by RATEL Managing Board on 10.02.2006, available on website www.ratel.rs)
- Rules on determining types of public telecommunications services for which licence is required (*Official Gazette of RS*, no. 29/06)
- Rules on compliance control of telecommunications networks, systems and facilities with prescribed standards and regulations (*Official Gazette of RS*, no. 29/06)
- Rules on procedures for the issuance of licence for public telecommunications networks and public telecommunications services and on register keeping (Official Gazette of the RS, no. 29/06)
- Rules on form and contents of the form for the report on radio-station technical inspection and of the form for the report on telecom networks, systems and facilities technical inspection (*Official Gazette of RS*, no. 34/06)
- Rules on technical permits – certificate issuance (*Official Gazette of RS*, no. 34/06)
- Rules on technical inspection procedure in the field of telecommunications (*Official Gazette of RS*, no. 34/06)
- Rules on costs for technical permits – certificate issuance and for technical inspection of radio stations, telecom networks, systems and facilities (*Official Gazette of RS*, no. 41/06)
- Rules on fees and costs for licence and authorization issuance (*Official Gazette of RS*, no. 58/06)

- Rules on public telecommunications networks and public telecommunications services for which authorization is required (*Official Gazette of RS*, no. 60/06)
- Rules on conditions for the work of amateur radio -stations (*Official Gazette of RS* , nos. 6/07 and 20/09)
- Rules on classes of radio-stations for which radio-station licence is not required (*Official Gazette of RS*, no. 26/07)
- Rules on general terms and conditions for interconnection of public telecommunications networks (*Official Gazette of RS* , no. 53/08)
- Rules on terms and conditions and the procedure for the issuance of authorization to a public telecommunications operator for interconnection of a national telecommunications network with a telecommunications network of another country (*Official Gazette of RS*, no. 94/08)
- Rules on terms and conditions for the issuance of authorization for public telecommunication networks and contents of authorization (*Official Gazette of RS*, no. 94/08)
- Rules on terms and conditions for provision of voice transmission services over the Internet and the contents of authorization (*Official Gazette of RS*, no. 94/08)
- Rules on terms and conditions for the Internet services and other data transmission services provision and on contents of authorization (*Official Gazette of RS*, no. 100/08)
- Rules on the application of the cost-accounting principle, separate accounts and reporting of a telecommunications operator with significant market power (*Official Gazette of RS*, no. 103/08)
- Instructions on the public bidding procedure for licence issuance (*Official Gazette of RS*, no. 12/09)
- Decision on the amount of the annual fee for using the assigned num-

bers and addresses from the Numbering Plan (*Official Gazette of RS*, nos. 16/09 and 23/09)

- Rules on terms and conditions for radio and television program distribution service provision and contents of the authorization (*Official Gazette of RS*, no. 26/09)
- Decision on the provision of call-back service without a special authorization issued by the Republic Telecommunication Agency (*Official Gazette of RS*, no. 27/09)
- Rules on costs for radio-station licence issuance (*Official Gazette of RS*, no. 04/10)
- Rules on radio-frequency usage fees (*Official Gazette of RS*, no. 04/10)
- Rules on number portability in public mobile telecommunications networks (*Official Gazette of RS*, no. 05/10)
- Decision on designating operators with universal service obligation (*Official Gazette of RS*, no. 15/10)
- Rules on fees for the performance of electronic communications activities (*Official Gazette of RS*, no. 93/10)
- Rules on radio-frequency usage fees (*Official Gazette of RS*, no. 93/10)
- Rules on request forms for the issuance of individual licence for radio-frequency usage (*Official Gazette of RS*, no. 8/11)
- Rules on application form for the issuance of licence for the use of numbering (*Official Gazette of RS*, no. 32/11)