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REPUBLIC OF SERBIA
REPUBLIC TELECOMMUNICATION AGENCY

AN OVERVIEW

OF TELECOM MARKET IN THE REPUBLIC OF SERBIA IN 2009

Republic of Serbia
RATEL
Republic Telecommunication Agency

AN OVERVIEW OF TELECOM MARKET IN THE REPUBLIC OF SERBIA IN 2009

Belgrade, 2010

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A WORD OF INTRODUCTION

Pursuant to the Telecommunications Law, the Republic Telecommunication Agency (RATEL) was established as a national regulatory authority (NRA) and an autonomous legal entity with the task of ensuring the efficient enforcement and promotion of the policy set within the telecommunications sector in the Republic of Serbia, aiming at providing the conditions for the implementation of information society and further development of the aforementioned sector.

The establishment of RATEL created the regulatory framework which served as a basis for the upcoming reforms in this sector. From the very beginning of its work, and with the aim of introducing new and quality enhanced services as well as consumer protection, RATEL has directed its activities primarily towards the accomplishment of provisions set out in the Telecommunications Law, regulating the sector based on the principles which would create a free and open market, prevent monopolistic behaviour and ensure equal treatment and non-discriminatory status of all market participants.

Regardless of the fact that RATEL had been faced with numerous spatial, financial, technical and staff-related issues, it continued to perform its duties in rather aggravating circumstances and with many frequent obstructions. The previous period was marked with enviable results in creating the conditions for the development and regulation of the telecom sector, ensuring competition, introducing new services and contemporary information and communication technologies.

The results of such RATEL's endeavour may be observed within the area of mobile and fixed-line networks development, in the creation of conditions for the development and usage of Internet and cable distribution systems, in raising the level of competitiveness of the telecommunications services market as well as in the area of introducing digital television broadcasting.

Within the mobile telecommunications sector, the adoption and application of regulatory provisions has led to the opening of that market segment. Three mobile telephony operators provide new and modern services targeted at increasingly demanding users. All three operators provide data transmission services, i.e. Internet service, by means of the newly built UMTS network (3G). Competition has led to the enhancement of service quality as well as to the reduction in prices of

such services. In view of boosting competition on this market, RATEL has adopted the Rules on number portability which would enable mobile telephony users to switch between operators while retaining their assigned numbers.

By adopting bylaws related to individual segments of fixed telecommunications systems, the conditions for the equal usage of all available technologies and the emergence of new fixed-line telephony market entrants have been created. The public bidding procedure was carried out in mid 2009 and two licences for public fixed wireless telecommunications network (FWA) in the 411.875-418.125/421.875-428.125 MHz frequency band, with the application of CDMA technology for the provision of voice service and data transmission service (lower bit rate Internet), were issued. Since the licences were issued for the whole territory of the Republic of Serbia, it will most likely enable the provision of the abovementioned services in underdeveloped areas, as well as resolve the issue of party-lines.

Towards the end of 2008 and the beginning of 2009, RATEL adopted numerous bylaws which regulate the conditions for the issuance of authorizations for the provision of Internet and other data transmission services. Moreover, the commercial provision of lower bit rate Internet service in the licence-free band was enabled as well. At the same time, the issue of wholesale Internet was regulated as well. The conditions and the procedure for the issuance of authorizations for international interconnection, as well as the authorizations for public telecommunications networks were defined. Furthermore, the issuance of authorizations for the provision of voice transmission services over the Internet was regulated, thus enabling international telephone service at particularly lower prices.

With the aim of resolving the problem of technical monopoly present in the market segment of cable distribution systems, RATEL adopted regulatory provisions that created the conditions for the usage of new technologies which, by means of satellite transmission, enable this type of services directly to the homes of end-users (DTH). A set of technical provisions aimed at modernizing these networks was adopted as well.

A particularly important result of RATEL's endeavours in 2009 was the adoption of bylaws which provided the possibility for the initiation of yet another licence issuance procedure, this time for the provision of fixed broadband network services with national coverage. This created the condi-

tions for the continuation of the telecom market liberalization process. Two eminent operators will, from now on, be able to provide packages of unified services in a manner set under the Strategy for the Development of Broadband Access: bit rate of at least 4Mbps for fixed, and 512kbps for mobile access. In the following years, we may expect operators to provide bundled services which would lead to lower prices for the end-users.

In the field of broadcasting, by taking part in the activities within international coordination and by adopting the appropriate bylaws, RATEL created the conditions for the initialization of the digital TV service with the possibility of broadcasting 48 different TV programs with national coverage.

RATEL's upcoming activities, defined by the Framework Business Plan for 2010, are mostly directed towards the further improvement of the telecom sector, the continuous market monitoring and analysis, the organization and the development of RATEL and cooperation with other institutions and organizations. Given the abovementioned guidelines for future activities, the following year will most likely be the year when RATEL will dedicate special attention to the activities which should contribute to the further telecom sector development in the Republic of Serbia, to the creation of adequate conditions for potential investors and investments in this field, as well as to the process of enhancing the quality of services which are to be provided to end-users at affordable prices.

Chairman of the Managing Board

Prof. dr Jovan Radunović

1. RATEL'S ACTIVITIES IN 2009

The process of further liberalization and elimination of monopolistic behaviour within the telecom sector in the Republic of Serbia continued in 2009. Given the competencies stipulated in the Telecommunications Law (*Official Gazette of RS*, nos. 44/03, 36/06 and 50/09-CC, hereinafter: the Law) as well as the strategic documents and provisions which regulate this sector, the Republic Telecommunication Agency (hereinafter: RATEL) focused its activities on providing the conditions for the further opening of the market, encouraging competition and protection of users' interests.

Every year, with the intention of making available the data that reflect the situation in the telecom sector of the Republic of Serbia, RATEL publishes an edition of market overview for the previous year. Thus, in mid 2009, "*An Overview of Telecom Market in the Republic of Serbia in 2008*" was published. Just like all other previous publications, the purpose of this document was to provide a useful source of information for telecom operators, relevant public authorities, scientific institutions, investors and users.

RATEL's activities accomplished in the period from 1 January to 31 December 2009, which were the result of duties and tasks defined under the regulations pertinent to the telecom sector and under the 2009 Framework Business Plan, are presented below.

REGULATORY ACTIVITY

In performing its regulatory activity during 2009, RATEL adopted and published the following bylaws:

- Rules on radio frequency usage fees (*Official Gazette of RS*, no. 06/09);
- Decision on the amount of the annual fee for the usage of assigned numbers 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);
- Instruction on the public bidding procedure for licence issuance (*Official Gazette of RS*, no. 12/09);
- 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).

Furthermore, amendments to the Numbering Plan for telecommunications networks of the Republic of Serbia (*Official Gazette of RS*, nos. 57/08, 77/08, 105/08, 107/08-corr. and 85/09) were made in the part pertinent to International Signalling Point Codes (ISPC).

In accordance with Article 62 of the Law, RATEL prepared Draft Amendments to the Radio Frequency Bands Allocation Plan (*Official Gazette of RS*, nos. 112/04 and 86/08) which was forwarded to the Ministry of Telecommunications and Information Society (MTIS) for further procedures.

In addition, pursuant to Article 63 of the Law, RATEL prepared and forwarded to the Ministry of Telecommunications and Information Society (MTIS), for further procedures, the proposal for Radio Frequency Assignment Plan for radio systems in the 410-420/420-430 MHz frequency band which was published on 3 February, 2009 (*Official Gazette of RS*, no. 8/09).

Within the scope of competencies set out in the Law and pertinent to the regulation of conditions related to the use of radio frequency spectrum, RATEL prepared Draft Amendments to Frequency/Location Assignment Plan for terrestrial analogue FM and AM broadcasting stations for the Republic of Serbia, as well as the revision of Frequency Bands Assignment Plan for the needs of the Serbian Electric Power Company, Serbian Railways and the Republic Hydrometeorological Service of Serbia.

During 2009, RATEL adopted, published and made publicly available on its website, the following instructions and technical requirements:

- Instruction on cable distribution systems designing;
- Technical requirements for cable distribution systems;
- Instruction on base station designing in mobile telephony systems;

- Instruction on measuring technical and other parameters of analogue TV broadcasting stations;
- Instruction on measuring technical and other parameters of FM radio stations;
- Instruction on measuring technical and other parameters of FM radio stations in private telecommunications networks;
- Instruction on drafting project documentation for GSM/UMTS base stations in public mobile telecommunications networks;
- Instructions on drafting project documentation for cable distribution systems;

In 2009, RATEL's Managing Board also adopted a number of separate enactments within the scope of the powers stipulated under the Law, with the purpose of regulating the telecom market.

TELECOMMUNICATIONS NETWORKS AND SERVICES

During 2009, RATEL continued with the activities fostering further liberalization of the telecom market and creation of a free and open market, striving to provide equal opportunities for all market participants. Based on the prepared regulatory provisions, procedures for the introduction of new technologies and services were initiated, thus promoting competition in those market areas where it had been absent, i.e. leaving room for further development of competition in the competitive areas.

In view of the fact that the necessary provisions regulating the mobile telephony sector had been adopted, appropriate licences issued and the introduction of competition enabled, in 2009, RATEL focused its activities on mobile market analysis, monitoring the compliance of the three mobile operators with the terms and conditions stipulated in the licences.

In 2009, two important procedures related to the liberalization of the fixed-line market were undertaken:

1. The public bidding procedure for the issuance of two licences for public fixed wireless telecommunications network (FWA) in the 411.875-418.125/421.875-428.125 MHz

frequency band and voice services, data package transmission and simultaneous voice and data transmission, was carried out. The Ministry of Telecommunications and Information Society (MTIS) adopted the *Rules on the number of licences for public fixed telecommunications network and the period for which the licence is issued, minimum conditions for licence issuance and minimum amount of the one-off licence issuance fee for the public fixed telecommunications network in the 411.875-418.125/421.875-428.125 MHz frequency band* (*Official Gazette of RS*, no. 15/09). RATEL prepared the necessary documentation and carried out the public bidding procedure in accordance with the Law. Four companies had submitted the necessary documentation in a timely manner: KDS-NS Novi Sad, DIGI SAT, Telekom Srbija and Media Works. The winners of the public auction were Telekom Srbija and Media Works, with the licence issuance fee amounting to 540.000,00 euros respectively. The total amount of 1,080,000.00 euros was paid into the Treasury of the Republic of Serbia. The licences, issued for the period of 10 years, were officially awarded on 17 May 2009.

2 Another public bidding procedure, this time for the issuance of one licence for public fixed telecommunications networks and services for the Republic of Serbia, was carried out as well. Given the importance of the presence of several operators in the fixed-line telephony market segment, RATEL had undertaken the initiative for the issuance of yet another licence for the public fixed telecommunications networks and services. In accordance with the Action Plan for the realization of the Strategy for the Development Telecommunications in the Republic of Serbia until 2010, the Ministry of Telecommunications and Information Society (MTIS) adopted the *Rules on the number of licences for public fixed telecommunications network and the period for which the licence is issued, minimum conditions for licence issuance and minimum amount of the one-off licence issuance fee* on 23 October 2009. Based on competencies stipulated under the Law and the conditions set out in the Rules, RATEL initiated the public bidding procedure and published a public invitation for bidders. Four companies purchased the bidding documentation: Telenor, VIP mobile, Kerseyco Trading Limited (Cyprus) and Konsing Group.

With the aim of encouraging competition, and given the fact that the liberalization of this service represents a request imposed by some countries for the benefit of the World Trade Organization

membership, RATEL's Managing Board adopted the Decision on the provision of call-back service without the issuance of a special authorization (*Official Gazette of RS*, no. 27/09).

Given the fact that the provision of radio and television program distribution services by means of satellite distribution systems and wireless systems had not been regulated by a special bylaw so far, RATEL adopted the 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), thereby creating the conditions for the issuance of authorizations to public telecommunications operators which provide radio and television program distribution services regardless of the type of telecommunications network used.

Apart from the abovementioned, the following activities were undertaken as well:

- The Rules on number portability in public mobile telecommunications networks were adopted and forwarded to the Ministry of Telecommunications and Information Society (MTIS) for further procedures on 29 December 2009, in line with Article 57 of the Law on State Administration (*Official Gazette of RS*, nos. 79/05 and 101/07);
- Provisions regulating value added services and the universal service obligation were drafted and forwarded for public discussion, after which all objections were considered and comments and suggestions thoroughly revised;
- Working material for the Rules on general conditions for unbundled local loop access and additional contents was drafted;
- A Study on carrier selection and carrier pre-selection was drafted;
- The Instruction on filing a complaint and operator code of conduct in case of user harassment was drafted and made publicly available on RATEL's website in cooperation with the representatives of public telecommunications operators which provide public voice services;
- Mediation and arbitration between operators in dispute resolution regarding shared facilities, Internet access and leased lines, in accordance with the Principles on the shared use of cable ducts;

- **The analysis of the elements and activities necessary for the establishment of the national Internet exchange point (*Internet eXchange Point-IXP*) was completed, especially in regard to the possible location and infrastructure available for accessing the IXP additional infrastructure, organization and necessary equipment.**

In 2009, RATEL issued 18 Internet service provision (ISP) authorizations, 5 radio and television program distribution service provision authorizations, 3 DHT (*Direct to Home*) authorizations, 28 public telecommunications networks authorizations and 31 authorizations for voice transmission over Internet protocol (VoIP) service provision without the use the numbers from the Numbering Plan and 1 authorization for data transmission service. Furthermore, RATEL issued 11 authorizations for the international interconnection with the telecommunications networks of operators from the neighbouring countries.

In 2009, 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/or authorizations with the aim of undertaking measures against entities providing telecommunications services without the adequate permit.

With regard to RATEL's authority to grant technical permits – certificates it should be noted that there were 3,693 technical permits – certificates and 2,790 approvals for the import of goods issued during 2009.

RADIOCOMMUNICATIONS

The intensive 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 program broadcasting, continued in 2009.

Moreover, during 2009, the following documents related to RF spectrum management were prepared:

- Draft proposal for the new Rules on radio frequency usage fees with the aim of improving the status of radio and TV broadcasters, telecommunications operators as well as other radio frequency spectrum users;
- Drawing-up of Draft Rules on costs for radio station licence issuance;
- Draft amendments to the Radio Frequency Bands Allocation Plan;
- Draft amendments to Frequency/Location Assignment Plan for terrestrial analogue FM and AM broadcasting stations for the Republic of Serbia;
- Revisions of Radio Frequency Assignment Plans for the needs of the Serbian Electric Power Company, Serbian Railways and the hailstorm protection service of the Republic Hydrometeorogical service of Serbia;
- Drawing-up of Draft Frequency Assignment Plans for Fixed Wireless Access Systems (FWA) in the 26 GHz and 28 GHz frequency bands.

With regard to RF spectrum management and the drafting of regulatory provisions, RATEL conducted over 35 analyses.

In addition to this, the 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:

- 8,294 radio station licences and 370 amateur radio station licences were issued,
- 1,570 user requests were resolved;
- 611 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 measurings throughout the territory of the Republic of Serbia. The total number of cases processed by radio-emission controllers reached 1,901;
- 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 7,030 radio station technical inspections were performed.

In the procedure of banning the operation of radio stations which had been using radio frequencies unlawfully in 2009, 79 offence proceedings were instigated, 129 decisions and 47 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. The analysis of the number of user complaints according to the type of services was prepared. RATEL processed 380 cases from 2009 and 36 cases from the previous years which were all accompanied by relevant written documents, verbal communication and e-mail correspondence with the users of telecommunication services.

The following equipment, devices and software for the assessment of the quality of services provided by operators was procured:

a Instrument for monitoring and service quality control over the IP - *„Agilent J6803B DNA Pro, J6900A Triple Play Analyzer“*;

b Handheld measuring device for bit rate measurement and service quality control– *„JDSU HST-3000 & Smart Class Ethernet“*;

c Handheld measuring device for cable systems – *„JDSU DSAM-3500 Digital Service Analyzer Module“*;

RATEL's employees attended numerous training sessions with the aim of acquiring the skills needed for the use of the abovementioned instruments.

RATEL was a direct mediator in solving some of the more complex requests related to the quality of delivered services as well as the issues concerning the effects of the EM radiation on the environment.

During 2009, activities related to the universal service implementation continued. Pursuant to Article 49 of the Law, and upon RATEL's proposal, the Ministry of Telecommunications and Information Society (MTIS) adopted the Rules on determining the initial set of services for universal service obligation (*Official Gazette of RS*, no. 55/09). In line with Article 2 of the abovementioned Rules, the initial set of services for universal service obligation includes the following:

1. access to a public fixed telephone service, including the service of data transmission using voice telephony which enables quality Internet access;
2. special measures to ensure equivalent access to the public voice service for the disabled and socially disadvantaged users;
3. free access to emergency services;
4. public payphone service; and
5. access to telephone operator and directory services.

Having in mind the abovementioned, RATEL prepared and forwarded, for further procedures, the Draft Decision on designating operators with universal service obligation to the Ministry of Telecommunications and Information Society (MTIS) in late December 2009.

MONITORING AND ANALYSIS OF THE TELECOMMUNICATIONS MARKET

In accordance with the 2009 Framework Plan, RATEL carried on with the activities pertinent to the analysis and regulation of the telecommunications market. Since Article 9, point 17 of the Law, 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 2008*" represents one of the results of such market analysis.

Telecom market analysis was conducted by coordinated effort of several organizational units or RATEL. The conducted analyses include the following relevant retail and wholesale markets: fixed telephony, mobile

telephony, interconnection, leased lines, Internet and cable systems. Such an activity implied the gathering of data from more than 300 operators (mobile, fixed, Internet, CATV, VoIP, CDMA), storing, processing, comparative analysis and finally the presentation of such data in the form of an annual publication. Data were used for the purpose of drawing-up the annual report which is forwarded to the International Telecommunication Union (ITU) as well as for the half-year reports for Cullen International. Special attention was paid to the analyses of cause and effect for certain movements on the market, especially in light of the strategic questions related to the estimation of the future telecommunications market development.

Since 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) were adopted, service prices regulated by RATEL have been calculated primarily in accordance with these Rules. Activities related to the introduction of the *Current Cost Accounting* (CCA) model for operators with significant market power (hereinafter: SMP operators) have been initiated as well.

The application of these Rules currently involves the market of fixed-line public voice services and CATV service market. Having identified the characteristic parameters of the monopolistic market, RATEL designated Telekom Srbija as an SMP for public voice service in 2006, and the company Serbia Broadband - Srpske kablovske mreže (hereinafter: SBB) as an SMP for CATV services in 2007.

Comparative overview of the number of main lines of the public fixed telecom network, the penetration rate of the public mobile telecom network as well as the number of Internet and CATV subscribers for 2007, 2008 and 2009, is given in Table 1 below.

Table 1. Comparative Overview of the Number of Telecom Service Subscribers in the Last 3 Years
Source: RATEL

	2007		2008		2009	
	Number (thousands)	Penetration (%)	Number (thousands)	Penetration (%)	Number (thousands)	Penetration (%)
Fixed – lines	2,854.50	38.00	3,084.9	41.14	3,105.7	41.42
Mobile – users	8,452.60	112.70	9,618.8	128.27	9,912.3	132.20
Internet – subscribers	1,268.50	16.90	1,619.7	21.60	1,705.7	22.75
CATV – subscribers	694.6	9.3	922.3	12	1,080.9	14.42

ORGANIZATION AND DEVELOPMENT OF RATEL

With the purpose of establishing conditions for the efficient implementation and promotion of the telecommunications policy in the Republic of Serbia, RATEL was established as an autonomous and independent legal entity, a national regulatory authority exercising its authorities in accordance with the Law and provisions adopted on the basis of that Law. As a *sui generis* organization, RATEL is functionally independent from any other state authority as well as from all other organizations and entities engaged in the provision of telecommunications networks, facilities of services (Article 7 of the Law and point 4.1.1. of the Strategy for the development of the telecommunications sector in the Republic of Serbia from 2006 to 2010). All decisions within RATEL's competencies are adopted by the Managing Board.

On the day of 31 December 2009, RATEL had 98 employees.

RATEL is located in rented business premises in Višnjićeva 8 in Belgrade. The spectrum monitoring centres are located in Dobanovci and Niš.

In 2009, particular attention was paid to the upgrade of the existing ICT systems within RATEL:

- server virtualization and the connection of most of the internal servers within the server room to the data storage system was completed, strengthening resistance to failure and reducing the time of recovery in case of failure;
- data migration from the old system as well as the technical installation and implementation of the new document management system was performed, providing electronic categorization and scanning of paper documents to the benefit of all RATEL's employees who are now able to have insight into documents and bylaws of interest by using this system in everyday office work;
- improvements related to the system for tracking the payment of radio frequency usage fees;
- the technical implementation of RATEL's call center service;

- the installation of technical cabinets in spectrum monitoring centres and the improvement of the hardware within the server room.

During 2009, 25 sessions of the Managing Board were held. They involved the preparation of 407 items of the agenda, adoption of 16 bylaws (rules, instructions, etc.) and 1,502 separate enactments (decisions, decrees, conclusions, etc.). There were 68 additional bylaws within the appropriate general or separate enactments addressed to the National Assembly of the Republic of Serbia, the Government, the Supreme Court of Serbia, the Constitutional Court, the competent ministries, the Commissioner for Information of Public Importance and Personal Data Protection, public telecommunications operators, etc.

In 2009, RATEL published two issues of the professional-scientific magazine TELEKOMUNIKACIJE. The third issue was printed and published in June and the fourth in November of 2009. They were distributed, free of charge, to over 150 addresses in the country and as well as to numerous international institutions. The authors are established national and foreign experts in the area of telecommunications, information technologies, economy 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 activities from 2005 to 2009**, held on 24 April 2009,
- **Overview of the telecom market in 2008**, held on 16 August 2009, on the occasion of RATEL's yearly publication issuance.

In 2009, pursuant to the Instructions on public consultations procedure and with the purpose of ensuring transparency of its work and providing the public with the possibility to participate in the procedure of adopting bylaws relevant for telecom sector regulation, RATEL organized public discussions, consultations, advisory sessions, seminars, expert workshops, meetings, etc.
During 2009, RATEL's total revenues amounted to approximately 1, 810 million dinars, with the total expenditures of 546 million dinars. Pursuant to Article 18, paragraph 8 of the Law, the surplus of 1, 246 million dinars was paid into the Treasury of the Republic of Serbia and the Autonomous Province of Vojvodina, once the financial reports had been audited.

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. In carrying out the joint activities, each institution acts within its authority.

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. With the aim of ensuring the 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 Serbia and Montenegro Air Traffic Services Agency.

During 2009, RATEL participated in the activities of work groups, commissions and activities of the Government of Serbia dealing with the following issues:

- National Programme for Integration of the Republic of Serbia in the EU (NPI), with the insertion of RATEL's bylaws in the joint database. RATEL's employees had taken part in the five-day training practice "*Strengthening the Capacities of Serbian Administration for the integration of the Republic of Serbia into the EU – EU Policy in the field of information and communications technologies*, organized by the Belgrade Open School and sponsored by the Kingdom of Norway;
- An overall reform of regulatory provisions (SRP), with the insertion of RATEL's bylaws into the joint database;
- Regional Cooperation Council;
- cooperation with the Serbian Competition Authority;
- accession of the Republic of Serbia to the World Trade Organization;
- Strategy for the regulatory reform in the Republic of Serbia for the period from 2008 to 2011;

- Sectorial meetings European Commission – Republic of Serbia;
- Preparing documents for the European Commission (*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 (NPI), through its activities within Information Society and Media Group and Competition Group. This is a document containing a plan of gradual harmonization of the legislation with the *acquis communautaire*, stipulated under the Stabilization and Association Agreement (SAA). 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, RATEL's experts took an active part in the meetings of several international organizations, among which particularly with the ITU, CEPT and ETSI:

- the visit of the delegation of the Republic of Serbia, guided by the Serbian Telecommunications Minister Jasna Matić, to the International Telecommunication Union – ITU in Geneva on 27- 28 January 2009;
- ITU TELECOM WORLD 2009 conference held in Geneva from 5 to 10 October 2009. On this occasion, RATEL's Executive Director and the Chairman of the Managing Board attended the meeting with dr Hamadoun Touré, International Telecommunication Union (ITU) Secretary General;
- the 9th Global Symposium for Regulators – (GSR), held from 10 to 12 November 2009 in Beirut (Lebanon) and organized by the International Telecommunication Union (ITU). The meeting was attended by more than 648 participants from 89 countries;
- International Telecommunication Union ITU-T sector (Standardization Sector) Study

Group: SG17, SG12, SG2, SG15, ITU-R sector (Radiocommunications sector): SG5, 5D – Working Party – Dresden;

- participation in the work of the European Telecommunications Standards Institute (ETSI): ETSI General Assembly, EE group on alternative energy sources in the telecommunications sector, the meeting of ETSI EE 34th Study Group;
- participation in the work of the ITU Study Group 1;
- participation in the work of WG RA and WG SA study groups and CEPT PT RA1 and PT FM22 project teams;
- participation in the ITU – SG6 (Study Group 6), JTG5-6 (Joint Task Group 5-6), WP 5C (Working Party – Fixed Wireless systems), WP 6A, WP 5A, WP 5B;
- participation in CEPT –ECC (Electronic Communications Committee), WGFM (Working Group Frequency Management),WGSE (Working Group Spectrum Engineering), ECC TG4 (Digital Dividend).

RATEL's Advisory Council held one session in 2009, on the occasion of which issues related to the Strategy and the Action Plan for the Development of Broadband Access in the Republic of Serbia until 2012, were discussed.

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

- The 5th SEE Telekom Arena 2009, held in Zagreb on 19 March 2009. The presentation of the ***Telecommunications Sector in the Republic of Serbia - Regulatory and Market Overview***;
- The Regional seminar and the ministerial round table on the digital switchover held from 27 to 29 April at the National Assembly of the Republic of Serbia. More than 19 high representatives from the Central and Eastern Europe attended, and the seminar was officially opened the International Telecommunication Union (ITU) Secretary General dr Hamadoun Touré and the Minister of Telecommunica-

tions and Information Society Jasna Matić. During his stay in Belgrade, dr Hamadoun Touré paid an official visit to RATEL;

- Telecommunications Forum TELFOR 2009, held from 24 to 26 November 2009 in Sava Centar, during which RATEL, in cooperation with Telenor, took part in the round table "***Economic and Social Development Potential***";
- The 16th Information Technology Festival – INFOFEST 2009, held in Budva from 27 September to 3 October 2009; the presentation of the ***Strategy and Action Plan for the Development of Broadband Access in the Republic of Serbia until Year 2012***;
- Participation in more than 18 round tables upon invitation, among which were the public discussions about the Draft Law on Electronic Communications, the Proposal for the set of initial services for the universal service obligation, Draft Strategy and Action Plan for the Switchover from Analogue to Digital radio and television Broadcasting and Draft Strategy and Action Plan for the Development of Broadband Access in the Republic of Serbia until 2012.

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

- Conference "Internet Economy" held on 3 March 2009 in the Hyatt Regency Hotel and organized by Danas Conference Center on the topic: ***Economic Potential of the Internet- regulatory and market aspects***;
- Kopaonik School of Natural Law;
- Budva Legal Days;
- World Telecommunication Policy Forum 2009 (WTPF) in Portugal;
- EuroDIG Internet Governance in Geneva;
- European Microwave Week 2009, Rome, Italy;
- YUINFO Conference – Kopaonik;
- PosTel Conference held at the Faculty of Transport and Traffic Engineering in Belgrade;
- JISA Conference in Herceg Novi, Montenegro.

Since RATEL cooperates with the national regulatory authorities from the region, in 2009, with the aim of communicating experience and establishing an even closer cooperation, there were numerous meetings held with the Regulatory Agency from Greece, Croatian Post and Electronic Communications Agency, Montenegro Agency for Electronic Communications and Postal Services, Communications Regulatory Agency from Bosnia and Herzegovina and the Post and Electronic Communications Agency of the Republic of Slovenia. The representatives from RATEL had also visited the Norwegian Post and Telecommunications Authority. Within the cooperation with other regulatory authorities, RATEL had also taken part in the 7th Regulatory Brainstorming Session of the SEE regulatory bodies titled "Broadband and Communication Convergence" which was held on 7 April 2009 in Thessaloniki and organized by INA Academy. The following six countries took an active part in the session: Greece, Cyprus, Serbia, Montenegro, Bosnia and Herzegovina and Macedonia. As part of the national *Internet eXchange Point-IXP* project, RATEL's representatives went on a study tour to Budapest and Prague.

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.

Executive Director

dr Milan Janković

2. TELECOM MARKET ANALYSIS

In compliance with the Action Plan for the implementation of the Strategy for the Development of Telecommunications in the Republic of Serbia from 2006 until 2010 adopted by the Ministry of Telecommunications and Information Society (MTIS) and pursuant to Articles 9 and 10 of the Law, in 2009 RATEL conducted the first round of the analysis of the following markets:

- fixed telephony ;
- mobile telephony;
- interconnection;
- leased lines;
- Internet;
- radio and TV program distribution.

The processes of defining and analyzing relevant markets were based on the application of the methodology in line with the internationally recognized guidelines and the national regulatory framework. By applying the prescribed criteria, namely the criteria for the assessment of dominance (market share, overall size of the undertaking, control of infrastructure not easily duplicated, technological advantages and superiority, the lack of countervailing buyer power, product/services diversification, etc.) it had been established that the existing operators still had significant market power and that they should continue to be subjected to adequate obligations pursuant to applicable legal provisions, such as the application of special tariff regime in calculation of the costing and selling prices of regulated services.

A special tariff regime for SMP operators is applied in accordance with 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, calculation of costing and selling price of the SMP operators services. These Rules prescribe the “cost-plus” method, i.e. price calculation by means of adding an appropriate rate of return

on the capital engaged in the product production or sales to the unit cost of services, 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, preparatory activities related to the implementation of the *Current Cost Accounting* (CCA) model were initiated as well. The beginning of the application of the *Long Run Incremental Cost* (LRIC) model is scheduled for 1 July 2012.

In line with its competencies and the abovementioned Rules, RATEL authorized price modifications of telecom services for the following SMP operators:

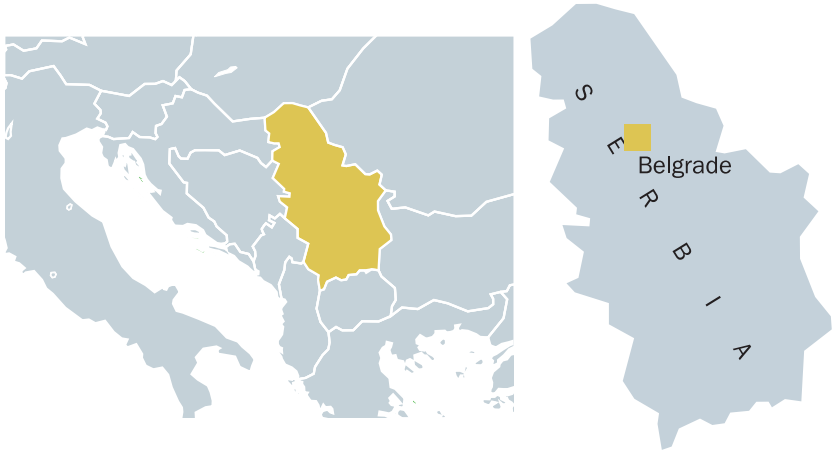
- upon the request of SBB from 1 December 2008 to modify the monthly maintenance charges, the increase in the maintenance charges was authorized starting from 1 March 2009;
- upon the request of Telekom Srbija from 3 November 2009, price modifications in subscription fees were authorized starting from 1 April 2010;
- upon the request of SBB from 18 December 2009 for the modification of monthly maintenance charges, the price modification was authorized starting from 1 March 2010.

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

Revenues from telecom services 1.5 billion euros (4.76% GDP)

According to RATEL's data, the revenues from telecom services in 2009 amounted to 1.51 billion euros. Since the average annual growth rate of the telecom sector revenues in the period from 2005 to 2009 was 13%, this sector is considered to be the most profitable one. The share of telecom sector rev-

Figure 1. Republic of Serbia – Basic Facts



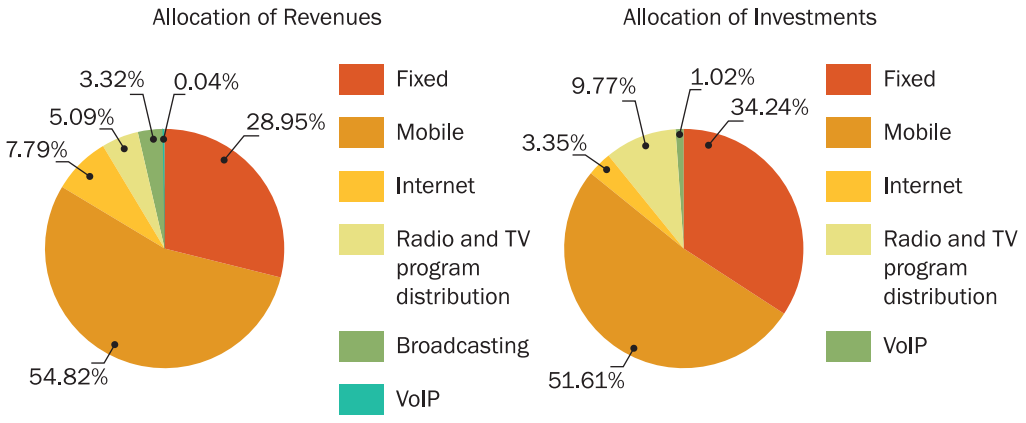
Basic Facts	Source: Statistical Office of the Republic of Serbia and RATEL
Name	Republic of Serbia
Capital	Belgrade
Area	88,361 km^2
Population (without AP Kosovo and Metohija), 2002 data.	7,498,001
Country code:	+381
Internet domain:	.rs
GDP for 2009	2,953.5 billion RSD (estimate) Real annual growth -3% (estimate)
Average net income in 2009	31,733 dinars (337.16 euros) Annual growth 0.2%
Fixed penetration:	41.42
Mobile penetration:	132.20
ISPs:	199
Network digitalization rate:	96.95%

enues in GDP was around 4.76% (cf. 4.87% in 2008). The total investments in the telecom sector in 2009 amounted to 288 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 Security Council Resolution temporarily regulating, *inter alia*, the competencies of the international civil mission in this territory.

In terms of different services, in 2009, the largest share in the total revenues, approximately 55%, goes to the mobile market, whereas VoIP services with 0.04% represent the smallest share. Accordingly, investments in the mobile market have the largest share in the total revenues, 52% in 2009, whereas investments in VoIP only 1%. The structure of telecommunications sector revenues is given below (Figure 2).

Figure 2. Allocation of Revenues and Investments by Services in 2009 Source: RATEL



It is estimated that the rate of return on investments in the telecom sector amounts to 1.4. The acquisition of Mobi63 by the Norwegian operator Telenor along with the procedure for the mobile telephony licence issuance, which was completed by means of an auction (the value of the transaction including additional investments amounted to 1,602 million euros), proved to be the

best financial investment, whereas the issuance of the third licence to Mobilkom Austria mobile operator (the value of the transaction and the investments in infrastructure amounted to 570 million euros) represents the largest greenfield investment in Serbia so far. There are 600,000 employees in the telecom sector and the total value of the sector is estimated to 10 billion euros.

Tables 2 and 3 illustrate telecom service baskets representing monthly expenditure per subscriber of telecom services in Serbia in 2009 compared with the data retrieved in 2007 and

Table 2. Low Usage Basket — Source: RATEL

Low Usage Basket	2007		2008		2009	
	Average bill	% monthly salary	Average bill	% monthly salary	Average bill	% monthly salary
Fixed	928.88	2.69%	725.00	1.88%	877.27	2.3%
Mobile (prepaid)	351.92	1.02%	364.50	0.94%	349.91	0.9%
TV (national TV subscription)	350.00	1.02%	387.00	1.00%	387.00	1.0%
Total	1,630.80	4.73%	1,476.50	3.82%	1,614.18	4.2%
Average net salary (in December)	34,471		38,626		36,789	

Table 3. High Usage Basket — Source: RATEL

High Usage Basket	2007		2008		2009	
	Average bill	% monthly salary	Average bill	% monthly salary	Average bill	% monthly salary
Fixed	928.88	2.69%	725.00	1.88%	877.27	2.3%
Mobile(postpaid)	1,257.15	3.65%	1,333.12	3.45%	1,107.96	2.9%
TV (national TV subscription)	350.00	1.02%	387.00	1.00%	387.00	1.0%
ADSL	1,309.89	3.80%	1,178.00	3.05%	1,021.62	2.6%
CATV	563.04	1.63%	392.61	1.02%	456.31	1.2%
Total	4,408.96	12.79%	4,015.73	10.40%	3,850.16	10.0%
Average net salary (in December)	34,471		38,626		36,789	

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 shows how much the population spends monthly using Internet and CATV in addition to the basic package. In 2009, the cost of the basic package equaled 4.2% of the average monthly salary, and that of the extended package amounted to 10%. Within the basic package, the largest amount goes to fixed-line services (2.3%), whereas in the extended package, the biggest expenditure is the mobile (postpaid) bill (2.9%).

2.2. COMPARATIVE ANALYSIS WITH THE SEE COUNTRIES

The countries of the South East Europe include three EU candidate countries - Croatia, Macedonia and Turkey, in addition to four Stabilization and Accession Agreement (SAA) signatory countries – Serbia, Montenegro, Bosnia and Herzegovina and Albania. These countries make up for almost 20% of EU-27 population.

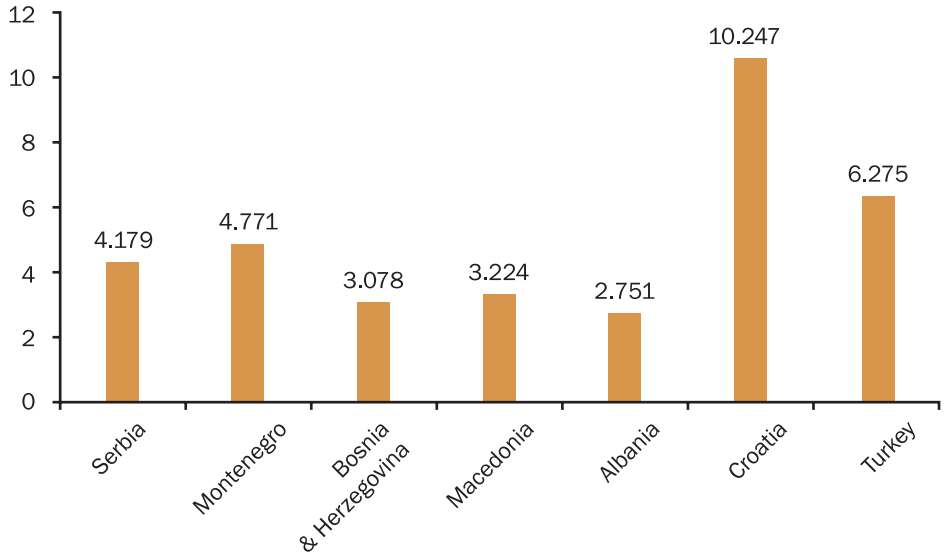
Table 4. Population and GDP in 2009

Source: Enlargement Country Monitoring Report 3 Annex 1 (Cullen International) for population rate
International Monetary Fund (IMF) for GDP

International Monetary Fund (IMF) for GDP	Population (mn)	GDP (in bn of euros)
Albania	3.17	8.77
Bosnia & Herzegovina	3.84	12.33
Montenegro	0.62	2.96
Croatia	4.43	45.46
Macedonia	2.05	6.65
Serbia	7.36	30.85
Turkey	70.59	442.68

Croatia has the biggest GDP per capita (Figure 3) which amounts to 43% of the average EU-27 GDP, followed by Turkey with the GDP of 30%. The GDP per capita in Serbia and Montenegro amounts to 20% of the EU-27 average.

Figure 3. GDP Per Capita in 2009 (in thousands of euros)
Source: International Monetary Fund (IMF)



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

The total telecommunications market value in these countries is estimated to 16.4 billion euros, which is an increase of 4% in comparison with 2008. A particular increase was observed within the market segments of Internet, CATV and mobile services. The comparative data on the SEE countries' telecom sector revenues in 2007 and 2008 are given in Table 5 below.

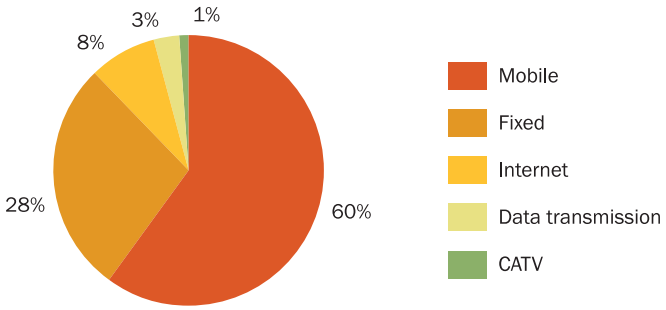
The largest share, or as much as 60% of the total telecom market revenues, goes to revenues from mobile telephony, after which follow revenues from fixed telephony, Internet and other services as shown in Figure 4.

The comparative overview of mobile and fixed penetration in the Republic of Serbia (Figure 5), shows that the number of mobile subscribers in most of the observed countries increased in respect to 2008,

Table 5. Telecom Market Revenues (€)
Source: Enlargement Country Monitoring Report 3 Annex 1 (Cullen International)

	2007	2008	Sector Growth Rate
Fixed-line telephony	5,411,329,183	4,709,815,446	-13%
Internet services	965,443,338	1,390,673,088	44%
Mobile telephony	9,013,465,423	9,950,739,378	10%
Data communica-tions	384,632,703	437,568,897	14%
CATV (cable Internet services excluded)	113,333,302	144,899,460	28%
Total	15,888,203,949	16,429,656,268	4%

Figure 4. Telecom Market in the South East Europe in 2008
Source: Enlargement Country Monitoring Report 3 Annex 1 (Cullen International)



with the exception of Bosnia and Herzegovina, where penetration was slightly lower than the previous year, and Macedonia, where mobile penetration was marked with a significant decrease, from 123.70 in 2008 to 92.00 in 2009. Fixed penetration, on the other hand, increased in Albania, Croatia and Serbia, whereas a slight decrease was recorded in Bosnia and Herzegovina and Macedonia.

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 and 8. The monthly subscription charge, call-unit price and the local call tariffs are still the lowest in the Republic of Serbia, whereas Croatia has the highest monthly subscription charge and local call tariff in the region,

Figure 5. Number of Mobile and Fixed Network Subscribers per 100 inhabitants (Countries in the Region) Source: Enlargement Country Monitoring Report 3 Annex 1 (Cullen International)

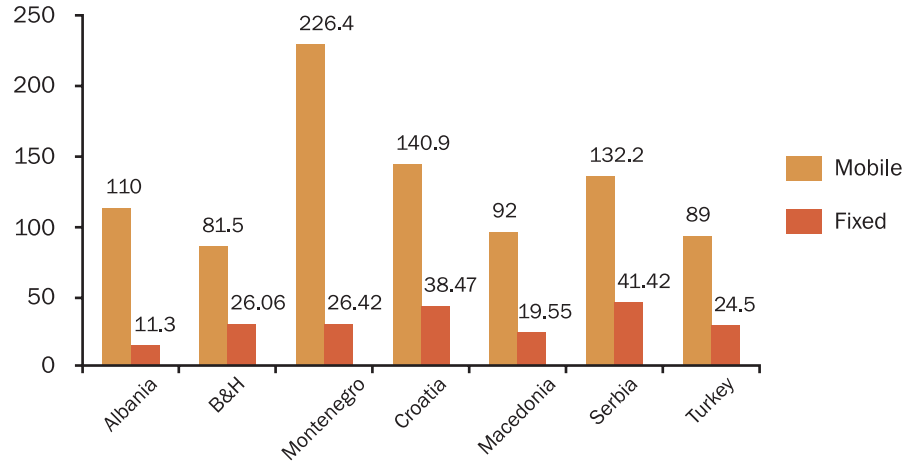


Figure 6. Standard Monthly Subscription for Residential Users (€) (VAT included) Source: Enlargement Country Monitoring Report 1 (Cullen International)

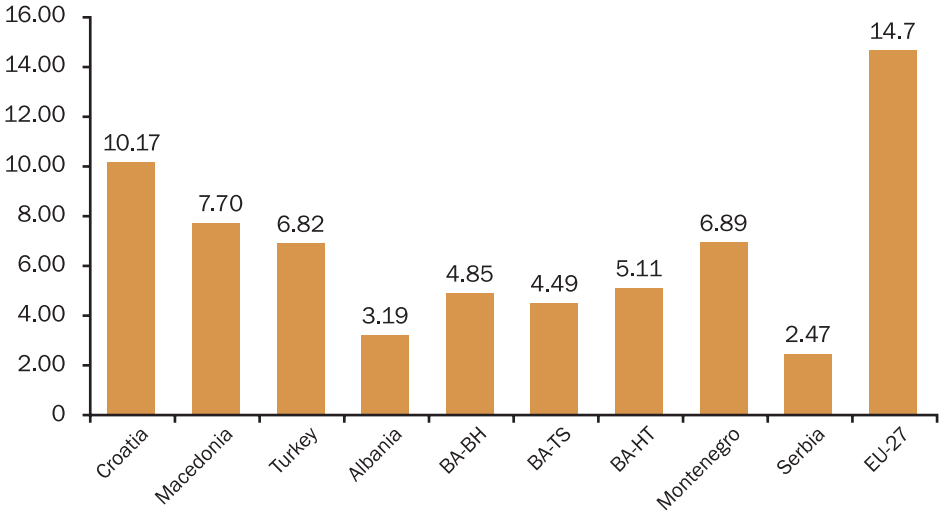


Figure 7. Price of a 3-minute and a 10-minute Local Call (€) (VAT included)
Source: Enlargement Country Monitoring Report 1 (Cullen International)

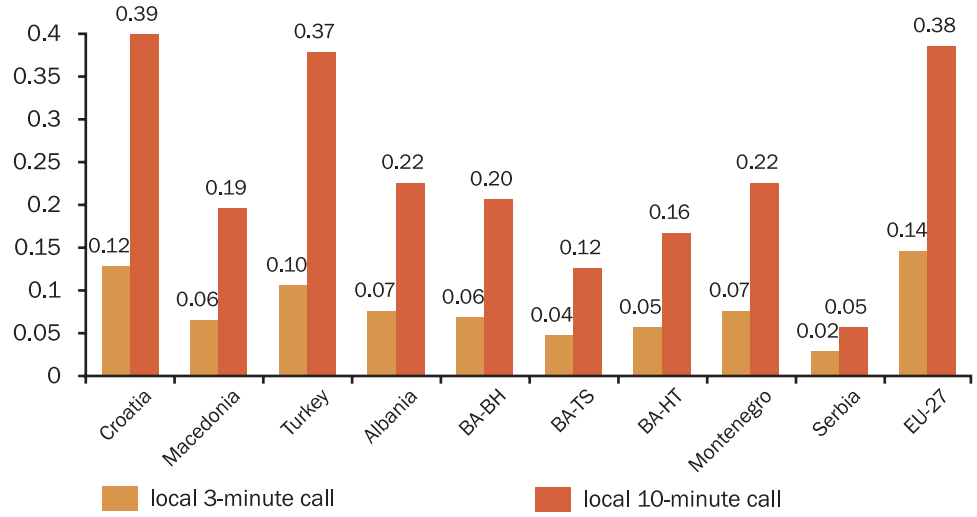


Figure 8. Annual Charges for 2 km National 64 kbit/s Leased Lines (€)
Source: Enlargement Country Monitoring Report 1 (Cullen International)

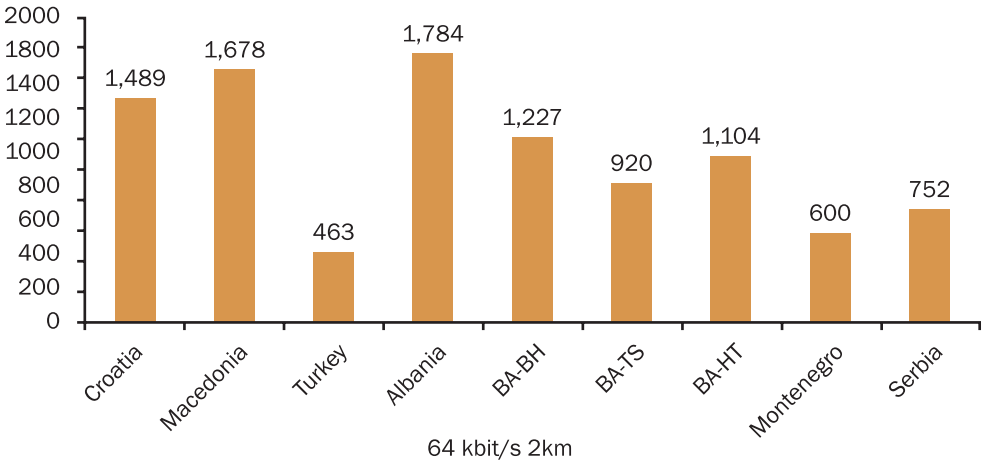
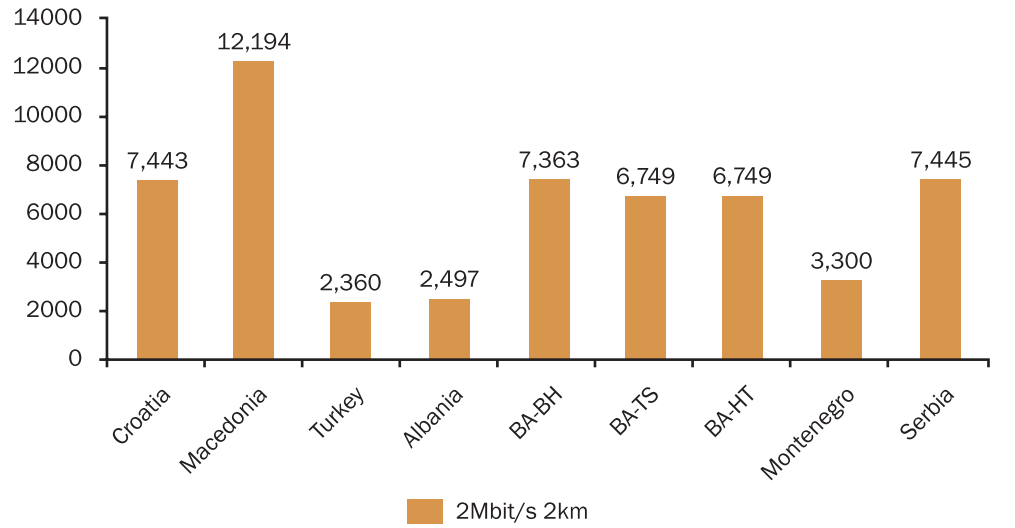


Figure 9. Annual Charges for 2 km National 2 Mbit/s Leased Lines (€)
Source: Enlargement Country Monitoring Report 1 (Cullen International)



with prices at the same level as the EU-27 average. The highest annual charges for 2km of national 64kbit/s leased lines are observed in Albania (1,784 euros), whereas charges for 2 km of 2Mb/s leased lines are the highest in Macedonia (12,194 euros).

Due to the ongoing telecommunications development in the field of broadband Internet access, the number of broadband users in Serbia is on the increase as well. Additionally, the number of broadband access 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 an exception to this trend.

Figure 11 illustrates competition on the retail ADSL access 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 93% of shares. The incumbent operator had the least share in Serbia (61.29%) and Albania (65%).

Figure 10. Total Number of Fixed Internet Connections According to the Type of Connection
Source: Enlargement Country Monitoring Report 3 Annex 1 (Cullen International)

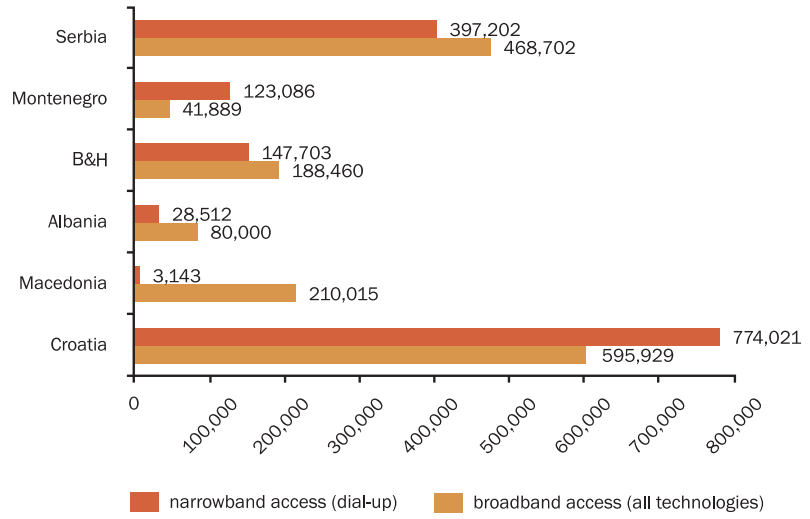
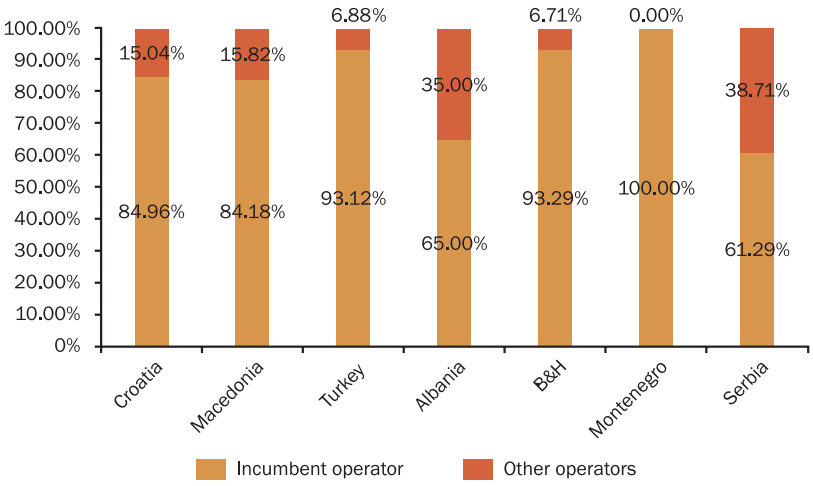


Figure 11. Retail ADSL Access Competition
Source: Enlargement Country Monitoring Report 3 Annex 1 (Cullen International)



2.3 INDICATORS OF ICT DEVELOPMENT

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 publication "*Manual for Measuring ICT Access and Use by Households and Individuals*", 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, and an additional, reference indicator HHR1. Having initiated the collection of ICT indicators of relevance for monitoring the development of telecommunications in the Republic of Serbia, RATEL, in cooperation with the Statistical Office of the Republic of Serbia, obtained the following results:

Table 6. Indicators of ICT Development Source: Statistical Office of the Republic of Serbia

	Indicator	Definitions and notes	2009
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.	68.9 %
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.	98.6 %
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.	80.1 %
	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.	46.8 %
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.	49.3 %*
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.	36.7 %

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	38.1%*
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		81 %
	Work	Where a person's workplace is located at his/her home, then he/she would answer yes to the home category only.	28.5 %
	Place of education	For students. Teachers (and others who work at a place of education) would report 'work' as the place of Internet use.	14 %
	Another person's home	The home of a friend, relative or neighbour.	15.9 %
	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.	0.9 %
	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).	6.9 %
	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).	29.8%
	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.	9.9 %

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		56.6 %
	Getting information related to health or health services	Includes information on injury, disease, nutrition and improving health generally.	21.9 %
	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.	21.3 %
	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.	19.5 %
	Sending or receiving e-mail		79.2 %
	Telephoning over the Internet/VoIP	The use of Skype, iTalk, etc. Includes video calls (via webcam).	27 %
	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.	42.3 %
	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.	10.5 %

	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.	12 %
	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.)	27 %
	Playing or downloading video games of computer games	Includes file sharing games and playing games on line, either paid or free of charge.	64 %
	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.	64 %
	Downloading software	Includes the downloading of patches and upgrades, either paid or free of charge.	23.5 %
	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.	42.1 %
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.	82.3 %

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.	29.3 %
	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.*	22.9 %
	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	65.7 %*
	At least once a week but not every day		25.4 %*

	Less than once a week		8.9 %*
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 based on a three month period*			

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

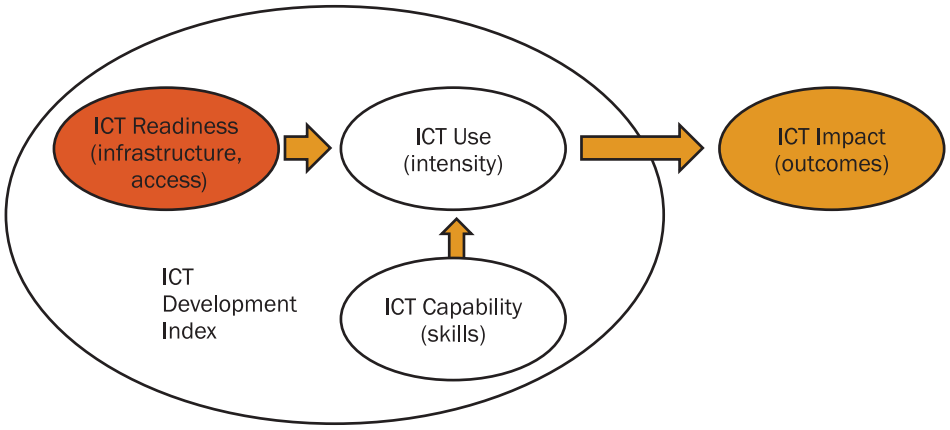
This Index combines 11 indicators divided into three sub-groups:

1. ICT infrastructure and access
2. ICT use (primarily by individuals, but also households and undertakings) and the intensity of use
3. ICT skills (or capacity 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 monitor-

ing 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).

Figure 12. Structure of IDI Index
Source: ITU, Manual for Measuring ICT Access and Use by Households and Individuals, 2009 Edition



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.

Table 7. IDI Index for the Republic of Serbia in 2009 Source: RATEL

	Indicator	ITU ideal value	Value for Serbia in 2009
ICT Access			
a	Fixed telephone lines per 100 inhabitants	60	41.42
b	Mobile cellular telephone subscriptions per 100 inhabitants	170	132.20

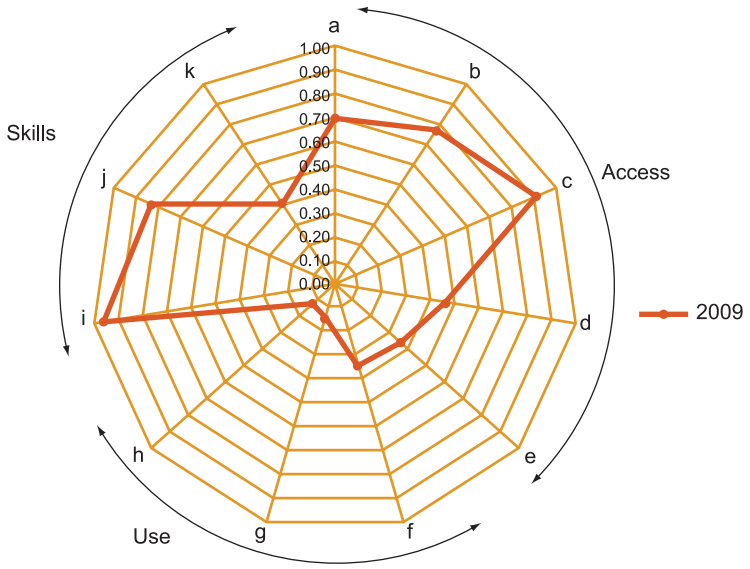
c	International Internet bandwidth per Internet user	100,000	36,731
d	Proportion of households with a computer	100	46.80
e	Proportion of households with Internet access at home	100	36.70
ICT Use			
f	Internet users per 100 inhabitants	100	33.65
g	Fixed broadband Internet subscriptions per 100 inhabitants	60	7.88
h	Mobile broadband subscriptions per 100 inhabitants	100	11.51
ICT Skills			
i	Adult literary rate	100	96.6
j	Secondary gross enrolment ratio	100	83.7
k	Tertiary gross enrolment ratio	100	40.4
ICT Access – Normalized values		**Formula**	
z1	Fixed telephone lines per 100 inhabitants	a/60	0.69
z2	Mobile cellular telephone subscriptions per 100 inhabitants	b/170	0.78
z3	International Internet bandwidth per Internet user	log(c)/5	0.91
z4	Proportion of households with a computer	d/100	0.47
z5	Proportion of households with Internet access at home	e/100	0.37
ICT Use – Normalized values		**Formula**	
z6	Internet users per 100 inhabitants	f/100	0.34
z7	Fixed broadband Internet subscriptions per 100 inhabitants	g/60	0.13
z8	Mobile broadband subscriptions per 100 inhabitants	h/100	0.12
ICT Skills – Normalized values		**Formula**	
z9	Adult literary rate	i/100	0.97
z10	Secondary gross enrolment ratio	j/100	0.837
z11	Tertiary gross enrolment ratio	k/100	0.404
L	**ICT Access – Sub-index**	**y1+y2+y3+y4+y5**	**0.643**
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	0.18
y4	Proportion of households with a computer	z4*0.2	0.09
y5	Proportion of households with Internet access at home	z5*0.2	0.07
M	**ICT Use – Sub-index**	**y6+y7+y8**	**0.192**
y6	Internet users per 100 inhabitants	z6*0.33	0.11
y7	Fixed broadband Internet subscriptions per 100 inhabitants	z7*0.33	0.04
y8	Mobile broadband subscriptions per 100 inhabitants	z8*0.33	0.04
N	**ICT Skills – Sub-index**	**y9+y10+y11**	**0.728**
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	0.13
IDI	**ICT DEVELOPMENT INDEX**	**((L*0.4)+(M*0.4)+(N*0.2))*10**	**4.80**

The value of IDI Index for the Republic of Serbia in 2009 amounts to 4.80. According to the data of the International Telecommunication Union, this value amounted to 4.23 in 2008, ranking our country as 53rd on the list of 159 countries. Given the fact that data on the IDI Index value of other countries for 2009 have not been available up to the moment of the publication of this Overview, the ranking of the Republic of Serbia in 2009 cannot be defined with precision, although we may anticipate that, based on the IDI Index value, it will secure a place among the first 50 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, as is the case with the use of broadband Internet access 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

Until May 2009, telecommunications company Telekom Srbija had been the sole operator holding the licence for public voice telecommunications services. In May 2009, in accordance with the Rules adopted by the Ministry of Telecommunications and Information Society (MTIS), RATEL initiated the public procedure for the issuance of two licences for fixed wireless access (FWA) for the public telecommunications network and voice services, data package transmission and simultaneous voice and data transmission in the 411.875-418.125/ 421.875-428.125 MHz frequency band for the territory of the Republic of Serbia. Bids were collected from the following four companies: K.D.S. Novi Sad, DIGI SAT, Telekom Srbija and Media Works.

Following the successful completion of the public bidding procedure, Telekom Srbija and Media Works were officially pronounced winners of the auction, with the one-off licence issuance fee amounting to 540,000.00 euros respectively. The two operators were officially awarded the licences in June and put under the obligation to commence with the commercial service provision within the next six months. Telekom Srbija effected revenues from this type of services in the amount of 305 million dinars and gained 53,000 new subscribers. Operator Media Works was technically prepared to commence with this service provision in December 2009.

Apart from the aforementioned, in October 2009, the Ministry of Telecommunications and Information Society (MTIS) adopted the Rules on the number of licences for public fixed telecommunications network and the period for which the licence is issued, minimum conditions for licence issuance and minimum amount of the one-off licence issuance fee. In line with the provisions set out in the Rules, RATEL initiated the public bidding procedure for the issuance of one licence for public fixed telecommunications networks and services for the Republic of Serbia. Within the set deadline, in the period between 30 November and 4 December of 2009, four potential bidders had applied for purchasing the bidding documentation: Telenor, VIP mobile, Kerseyco Trading Limited (Cyprus) and Konsing Group. The public bidding procedure was completed in January 2010, when the licence for public fixed telecommunications networks and services was awarded to Telenor.

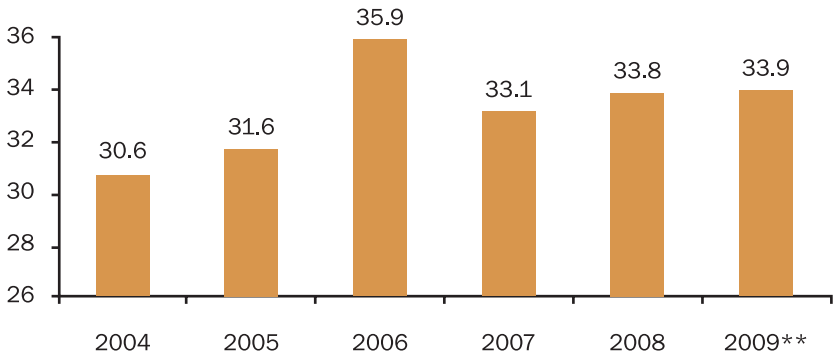
Since Telekom Srbija was the only public fixed telecommunications service operator in 2009, its operation represented the most important segment of the fixed telephony market in both financial and technical terms. Telekom Srbija is in the ownership of two shareholders, Public Company of PTT traffic "Srbija" (80%) and OTE from Greece (20%) and as such, it has maintained the status of an SMP operator. Accordingly, this operator is under the obligation to apply a special tariff regime to public switched telecommunications services as well as to apply the cost-based model in telecom service pricing. Moreover, Telekom Srbija is under the obligation to observe the regulations and terms and conditions stipulated 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 Telecommunications Law.

The total revenue from fixed telephone services in the territory of the Republic of Serbia in 2009 amounted to 33.9 billion dinars, which is a marginal increase compared with the revenues of 33.8 billion dinars effected in the previous year (Figure 14). The revenues from the international traffic in 2009 amounted to 7.2 billion dinars, making the total revenue 41.1 billion dinars. The largest share in the total revenues still goes to revenues from national traffic, amounting to 20.6 billion dinars or 50% of the total fixed network revenues, which is less in comparison with the previous year when this share amounted to 59%. The revenues from interconnection maintained a similar share in the total revenues in respect to 2008 and amounted to 2.5%.

The investments made in the fixed telephony in 2009 amounted to 9.3 billion dinars, with 4.8 billion dinars invested in fixed telephone service.

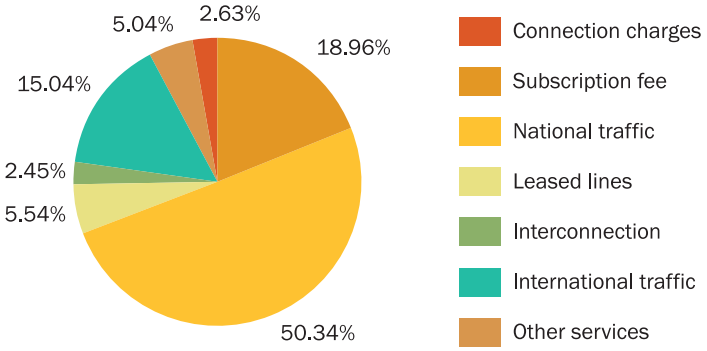
As for the structure of fixed-line revenues in 2009, revenues from subscription fees marked the highest growth of 79% in respect to the previous year and amounted to 7.7 billion dinars. The increase in this type of revenues in 2009 is a direct reflection of the fact that an increase in the amount of subscription fee was authorized in November 2008. Revenues from the connection charge reflect a decrease of about 20%. Even though the price of call-units increased in 2009, it did not result in the increase in revenues from traffic, yet in the decrease of 12%, which was the result of small fixed telephony traffic volume. Revenues from leased lines were approximately at the same level as the year before, whereas revenues from interconnection as well as other revenues (data transmission L2 and L3 VPN), increased by 26% and 34% respectively.

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 Internet Services chapter and are therefore excluded from revenues from fixed telephone services

Figure 15. Distribution of Revenues from Fixed Telephone Services in 2009 Source: RATEL



The cost of subscriber contract activation remained the same as well, amounting to 5,000.00 dinars for residential or 10,000.00 dinars for business users, VAT excluded.

In October 2008, RATEL adopted the Decision on authorizing the request of Telekom Srbija for tariff rebalance within the price of monthly telephone subscription fee for fixed-line network calls starting

from 1 November 2008, and calls within telephone directory services starting from 1 December 2008. RATEL's Managing Board adopted the abovementioned decision, given the necessity for providing conditions for the unhindered liberalization of the fixed telephony market segment (in this case, by providing the so-called price attractiveness for potential investors) and bearing in mind the results of the comparative analysis of countries and fixed telephony operators in the region. However, Telekom Srbija, upon consultation with the Government of the Republic of Serbia, postponed the application of the part the adopted Decision which refers to the process of leveling the prices of call-units for residential and business users at 0.6074 dinars (VAT excluded) and increasing tariffs for special service calls in the upcoming period. The prices of call-units for residential and business users in 2009 are illustrated in Figure 16. The price increased by 30% for local and by 65% for long-distance calls for residential users. The change in the price of local and long-distance calls for business users was marginal. The price of international calls remained the same except in case of calls towards Montenegro and the Republic of Srpska where the price of calls towards fixed network for residential users increased from 9.11 to 12.13 dinars per minute. The fact that the prices had not been increased to the extent which had been previously suggested by RATEL, resulted in limited fixed telephony investments, 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. Service prices per minute, as well as subscription fees, are still among the lowest in Europe.

Figure16. Prices of Local and Long-Distance Telephone Services (VAT Excluded)(RSD/min)
Source: Telekom Srbija (annual report)

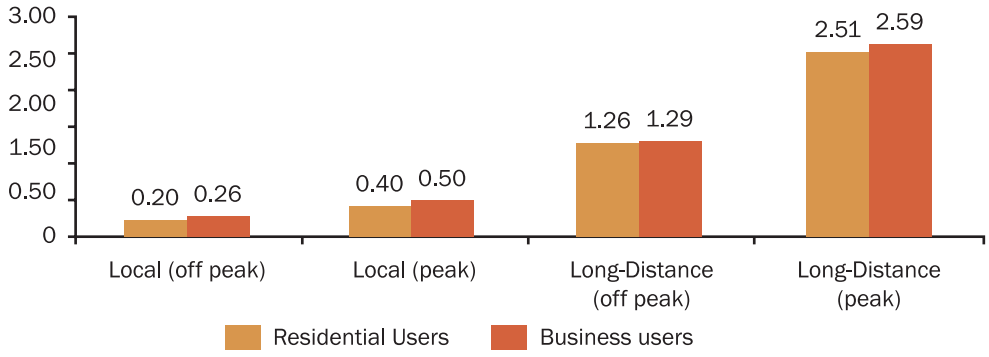
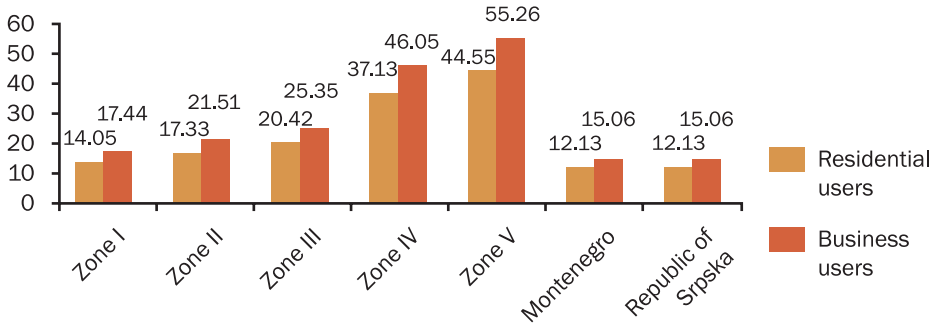


Figure 17. Prices of International Telephone Services in 2009 * (VAT Excluded) (RSD/min)
Source: RATEL



*List of countries categorized by zones is available at: www.telekom.nadlanu.com

The number of residential users paying only the subscription fee makes 16.8% of the total number of subscribers which is, in comparison with the previous year, a decrease of about 5%. The highest number of residential users (around 33.1%) had monthly bills for fixed-line services ranging between 500 and 1,000 dinars (Figure 18). As for business users, as many as 58.8% of subscribers paid up to 2,000 dinars monthly for fixed-line services, whereas 18.8% paid only the subscription fee (Figure 19). The percentage of business users whose monthly bills exceeded 10,000 dinars was approximately the same as in the previous year.

Figure 18. Distribution of Residential Subscribers According to Monthly Bills in 2009 (RSD)
Source: RATEL

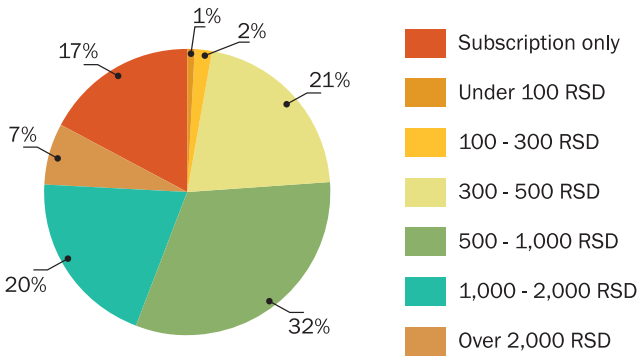
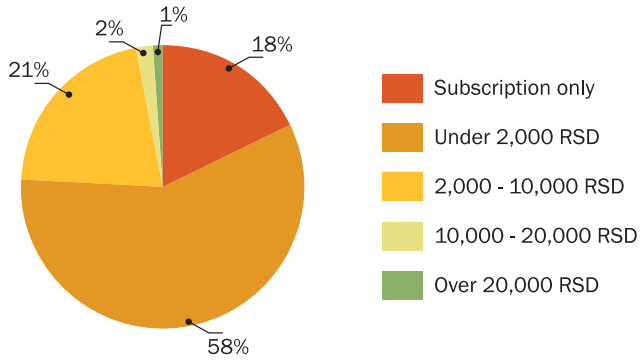


Figure 19. Distribution of Business Subscribers According to Monthly Bills in 2009 (RSD)
Source: RATEL



The number of main lines is growing every year, reaching 3.1 million in 2009, which an increase of 20,856 lines in respect to 2008. Residential users still prevail with a 90% share in the total number of users, whereas the number of party-lines was reduced by approximately 20%, or 40% in respect to 2007. The digitalization rate rose to 96.95% in 2009.

Fixed penetration increased in respect to the previous year, amounting to 39.3% in terms of the number of subscribers or 41.42% in terms of the number of main lines, which is above average in the region.

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

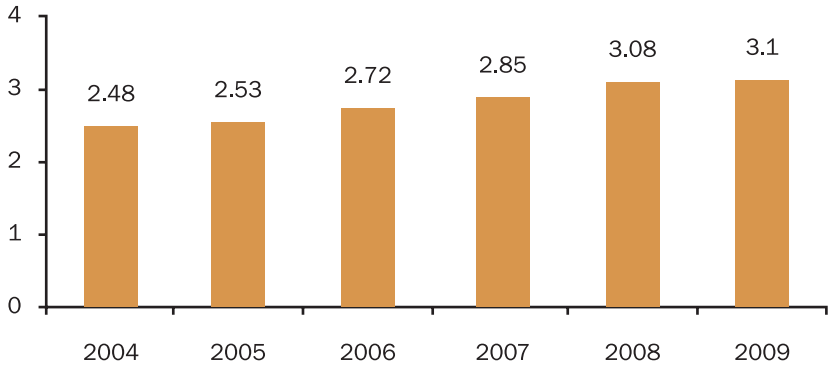


Figure 21. Share of Residential Users in the Total Number of Fixed-Line Subscribers Source: RATEL

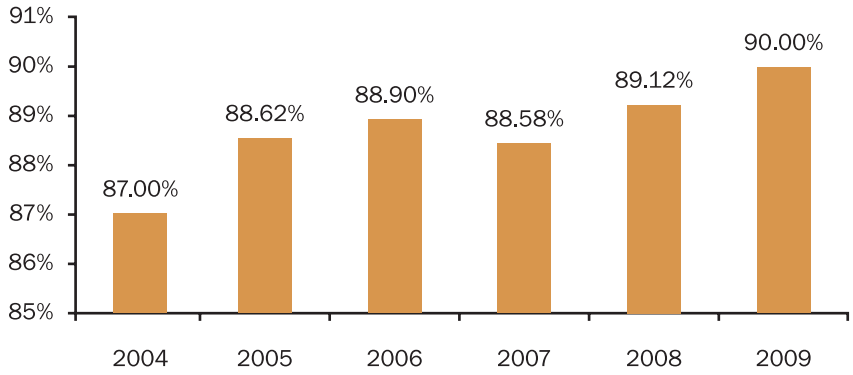
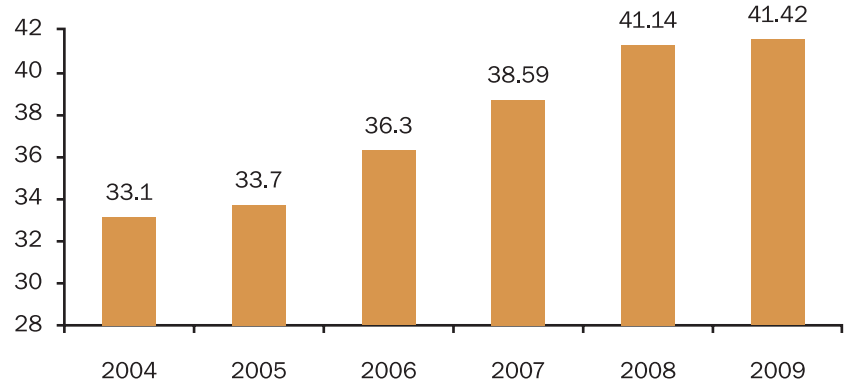


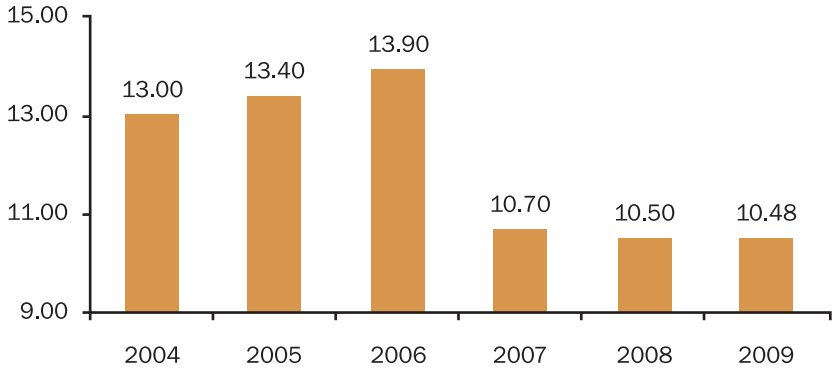
Figure 22. Fixed Penetration (%) Source: RATEL



Even though the number of public payphones dropped by 80 in 2009, the previously mentioned increase in the call-unit price nonetheless reflected a 67% increase in the relevant revenues.

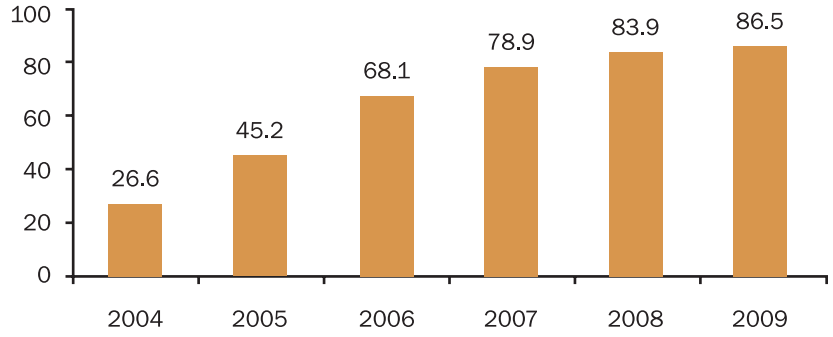
The breakdown of the number of ISDN connections in the period from 2004 to 2008 is given in Figure 24 below. The number of ISDN subscribers in 2009 was 86.5 thousand or 3% of the total number of subscribers. More than 97% of subscribers have a basic rate access, whereas other users have primary rate access. Even though this technology was well advanced in comparison

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



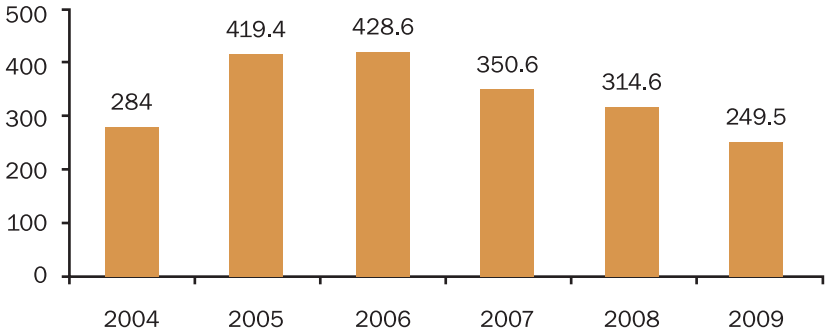
with the dial-up connection at the time it had been first introduced, current modern technologies as well as ADSL connections are likely to limit the further growth of ISDN connections, preventing further rise in the number of users.

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



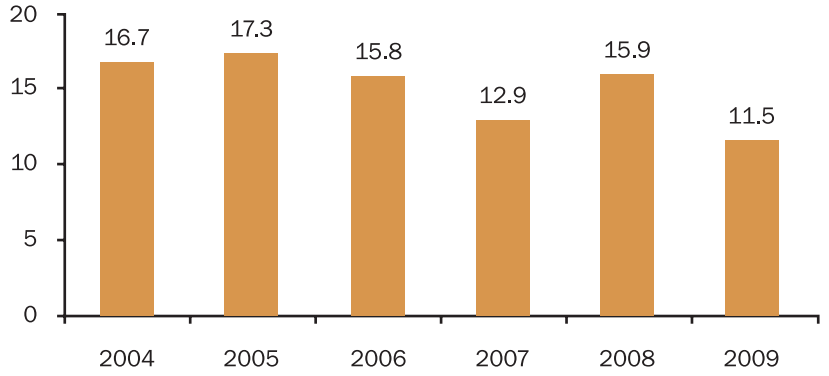
In 2009, the number of unmet requests for new fixed-line connections was around 250 thousand, this being a decrease of 20% compared with 2008. The number of malfunctions was also cut down to 25 per 100 lines in comparison with 31.19 per 100 lines recorded in 2008. The percentage of malfunctions repaired within 24 hours was 63.17%, which is a slight increase in respect to the previous year.

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



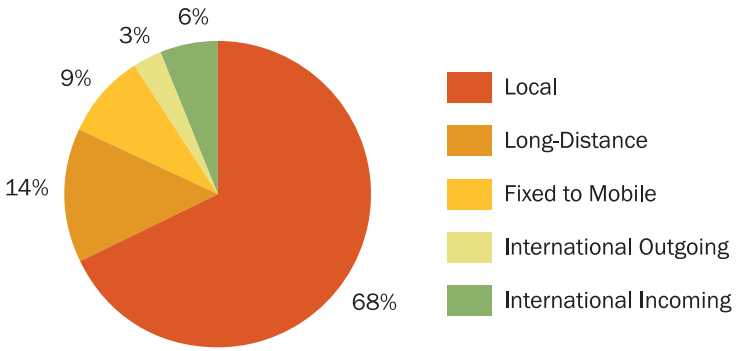
The total fixed network traffic in 2009 is estimated to 11.5 billion minutes of national traffic and 1.1 billion minutes of international traffic. As shown in Figure 26, the traffic volume varied considerably in the observed period, showing a decreasing tendency, primarily due to other types of services being offered (such as mobile network, electronic messages or VoIP) as well as to the effects of the economic crisis in 2009.

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



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, 68% was local traffic, and only 2.6% international outgoing traffic.

Figure 27. Distribution of Fixed Network Traffic in 2009 Source: RATEL



Compared with the previous year, the share of local traffic increased from 56% to 68%, the share of long-distance traffic dropped from 29% to 14.1%, whereas fixed-to-mobile traffic, even though it decreased in volume, still maintained a 9% share in the total traffic.

International traffic makes 9% of the total fixed network traffic. In 2009, international outgoing traffic dropped by 11% in respect to 2008, this being a direct result of a more frequent IP connection use for this type of calls.

In late December of 2008, the first 9 authorizations for provision of voice transmission services over the Internet were granted to VoIP operators. On 31 December 2009, 39 operators held this type of authorization. There were 72,654 registered users and 3,178,969 minutes of traffic, where a 95% share goes to international outgoing traffic. Outgoing international traffic realized by VoIP operators was 90 times less in volume than outgoing international traffic realized through the capacities of Telekom Srbija.

With the aim of further opening of the telecom market, RATEL initiated the issuance of authorizations for public fixed telecommunications networks in late 2008 and continued the process during 2009. The number of network operators amounted to 31 towards the end of 2009. Most of the operators were in charge of providing radio and television program distribution services. Out of the total of 31 operators, 6 operators held the authorization for the network in the territory of

the Republic of Serbia and 25 operators have applied for building the network within the area of individual cities or within individual regions.

The issuance of network authorization provided the potential operators with the opportunity to interconnect with foreign operators, which, in turn, enabled Internet connection to be realized by more operators. The following operators were granted the authorization for interconnection of a national telecommunications network with a telecommunications network of another country: TELEKOM, YUBC SYSTEM A.D, SBB, VERAT, SAT-TRAKT, INVEST INZENJERING, TELENOR and VIP MOBILE.

4. PUBLIC MOBILE TELECOMMUNICATIONS NETWORKS AND SERVICES

Mobile market in the Republic of Serbia continues with a positive growth trend in 2009 and marks the presence of the following market participants:

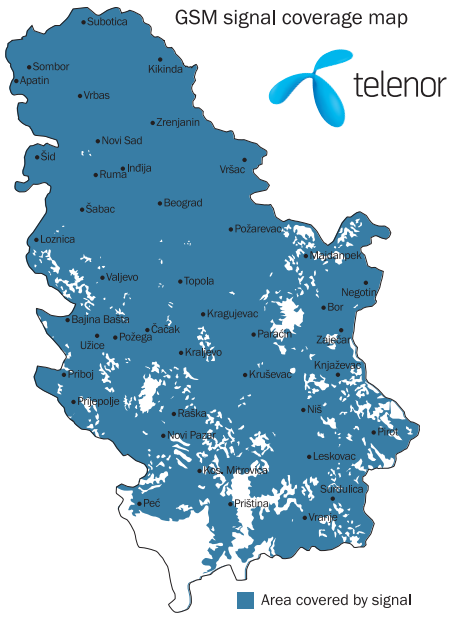
- **Telecommunications company Telekom Srbija - Mobilna telefonija Srbije MTS**, owned by Public company for PTT traffic Srbija (80%) and OTE, Greece (20%) (licence replaced on 01.08.2006)
- **Telenor Belgrade**, 100% owned by Sonofon A/S, Denmark, owned by Telenor ASA, Norway (licence issued on 01.09.2006)
- **Vip mobile** (member of Mobilkom Austria Group), owned by Telekom Austria Group, Austria (licence issued on 01.12.2006).

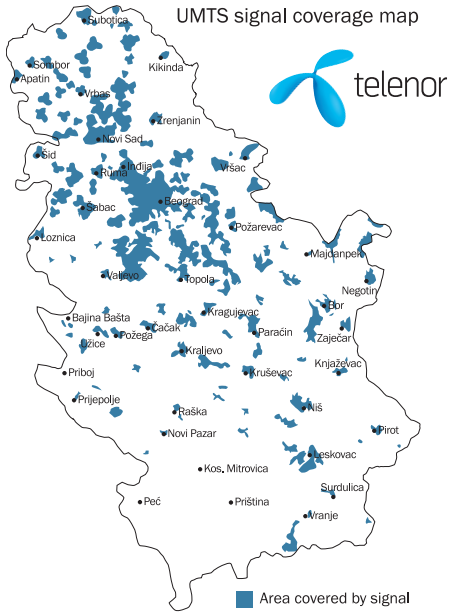
All three operators were granted licences for public mobile telecommunications networks and public mobile telecommunications network services in accordance with GSM/GSM1800 and UMTS/IMT-2000 standards, issued by RATEL. The licences were issued for the territory of the Republic of Serbia, for a period 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 ownership in thirteen mobile operators, and over 164 million users worldwide. Mobile operators in our neighbouring countries, Panon in Hungary and Promonte in Montenegro, are part of this group as well. In

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





Official data	
Name	**Telenor Limited Liability Co.**
Head office	Belgrade
Ownership	100% Sonofon A/S
Number of employees	1,211
Percentage of territory covered by GSM network signal	85.2
Percentage of population covered by GSM network signal	93.66%
Percentage of territory covered by UMTS network signal	17.77%
Percentage of population covered by UMTS network signal	53.14%
Number of base stations	2,703

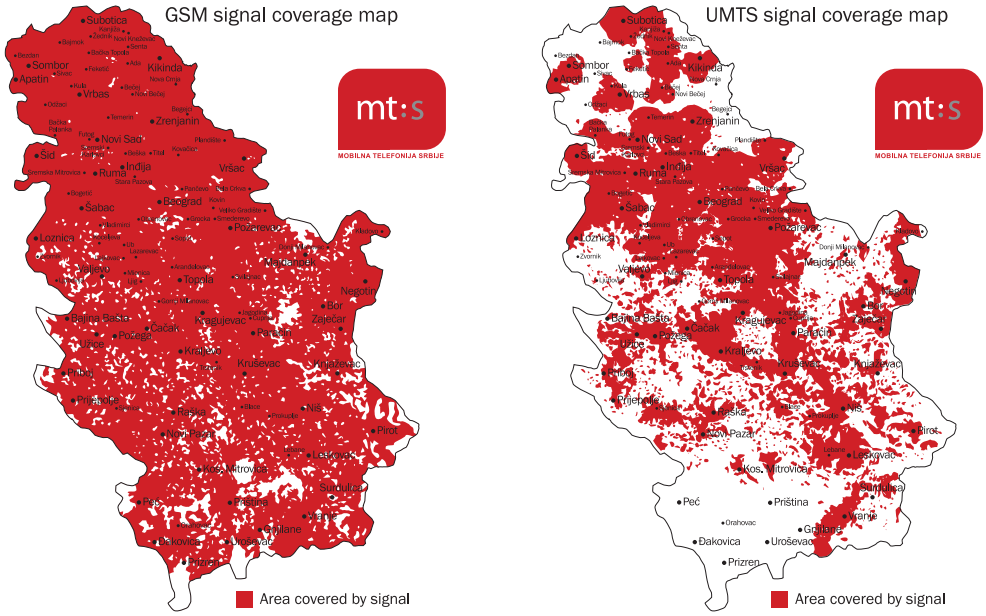
2007 Telenor began with the commercial use of UMTS network enabling video calls and additional services based on high-speed data transmission. In 2009, Telenor built 883 new base stations.

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. The number of 3G network subscribers rose significantly, from 490 thousand in 2008 to approximately 780 thousand in 2009.

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

Figure 29. Mobile operator – Telekom Srbija Source: Telekom Srbija



Official data *	
Name	**Telekom Srbija Joint Stock Co.**
Head office	Belgrade
Ownership	80% JP PTT "Srbija", 20% OTE, Greece
Number of employees	1,583
Percentage of territory covered by GSM network signal	83.17
Percentage of population covered by GSM network signal	88.7
Percentage of territory covered by UMTS network signal	46.66
Percentage of population covered by UMTS network signal	63.15
Number of base stations	2,041
* percentage of GSM and UMTS signal coverage includes the whole territory of the Republic of Serbia (including Kosovo and Metohija)	

In 2009, Telekom Srbija built 243 new base stations.

The third licence for mobile operator was granted to Vip mobile, a member of the Mobilkom Austria Group present in eight European countries, including the following countries in the region: Croatia, Bulgaria and Macedonia.

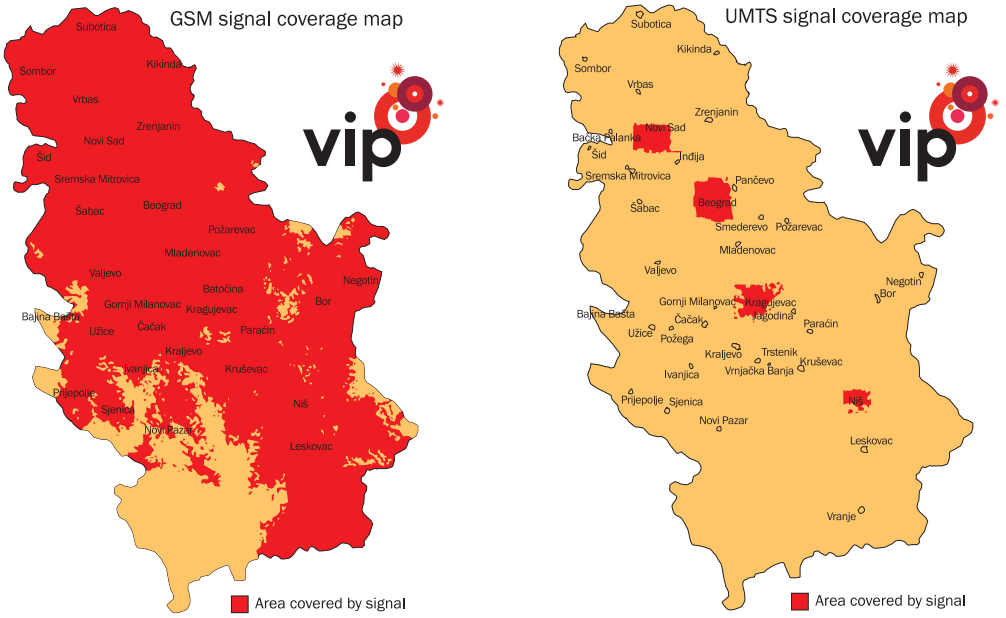
In 2009, VIP mobile significantly increased the percentage of area and population coverage with both GSM and UMTS network signal, having built 535 new base stations.

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 2009 decreased in respect to the previous year and amount to 826.74 million euros (Figure 31). Total investments in the mobile market also exhibit a downward trend in comparison with the previous year and amount to 13.9 billion euros.

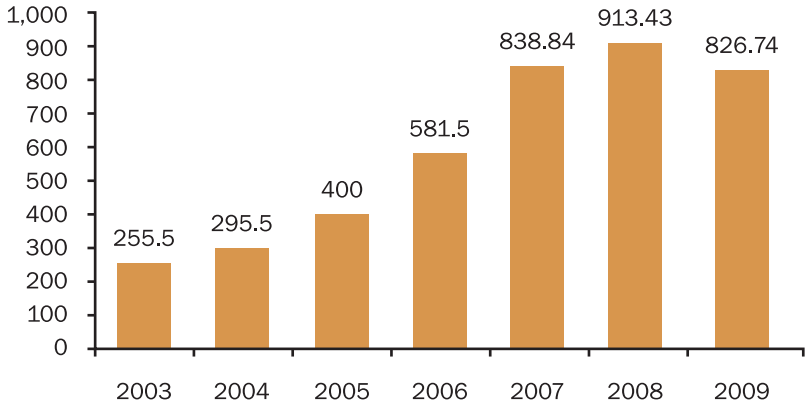
However, one should note that the decrease in the revenues from the mobile telephony is, to a certain extent, a consequence of calculation, i.e. the difference in exchange rates. In 2009, euro

Figure 30. Mobile operator – Vip mobile Source: VIP



Official data	
Name	**Vip mobile Limited Liability Co.**
Head office	Belgrade
Ownership	100% Mobilkom Austria
Number of employees	772
Percentage of territory covered by GSM network signal	74.56
Percentage of population covered by GSM network signal	79.16
Percentage of territory covered by UMTS network signal	2.42
Percentage of population covered by UMTS network signal	25.83
Number of base stations	1,262

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



had average annual value of approximately 94 dinars, whereas this value was 82 dinars in 2008. In RSD currency, the total revenues from mobile telephony service amounted to 77.8 billion dinars, which in an increase of about 4% in respect to the previous year.

9.9 million users

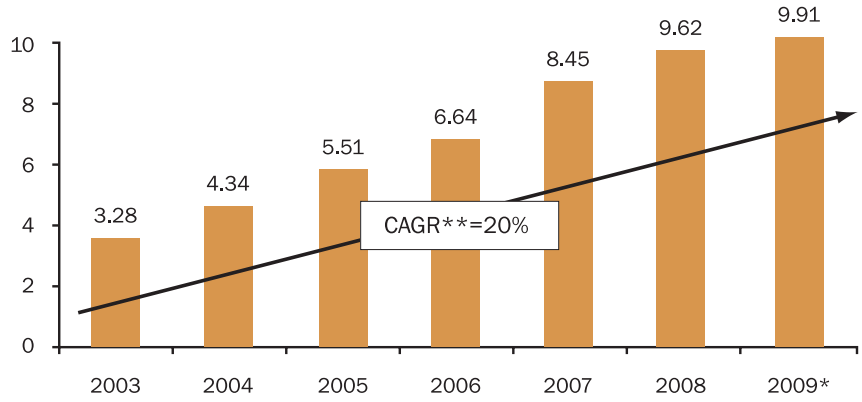
The total number of mobile users in 2009 maintained an upward trend, as well as the penetration rate which, for the last three years, exceeded 100%.

In comparison with 9,618,767 mobile users in the previous year, the total number of users in 2009 grew by 3%, amounting to 9,912.339. In terms of the number of users, the average annual growth rate in the period from 2003 to 2009 is as high as 20%.

The number of mobile network users exceeded the number of inhabitants for three years in a row, the penetration rate in 2009 being 132.2%.

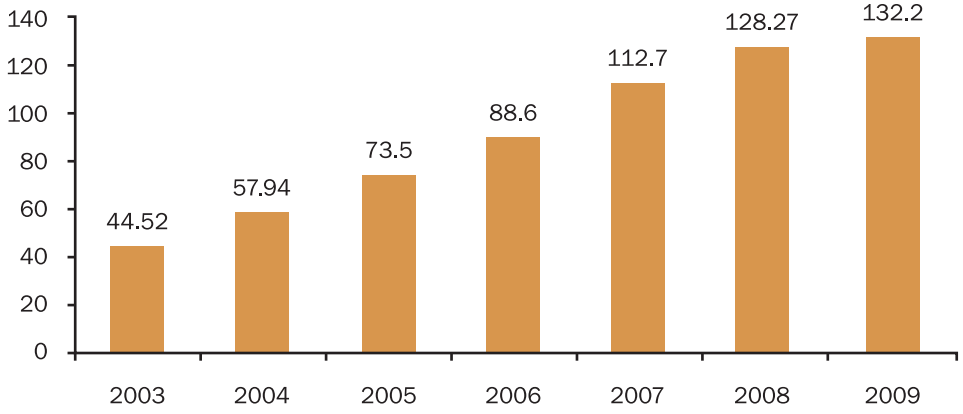
Along with the number of users, the total traffic in 2009 grew as well, amounting to approximately 8.2 billion minutes of calls, which is an increase

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



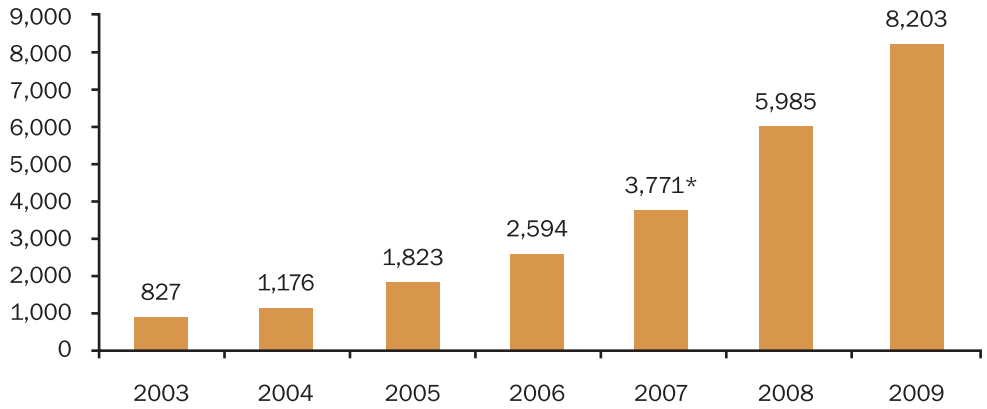
*data obtained from Telenor include the number of prepaid users active in the last 90 days
** Compound Annual Growth Rate

Figure 33. Mobile Penetration Source: RATEL



of approximately 37% compared with the previous year. Annual average of traffic per user in 2009 was 828 minutes or approximately 2 minutes and 15 seconds daily, this being an increase of 33% in respect to 2008, when each user annually spent an average of 622 minutes talking on the cell phone.

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



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

The number of sent SMS and MMS messages continues to grow. During 2009, each user sent 937 SMSs on average, or 2.5 SMSs per day, whereas the total number of SMSs amounted to 9.3 billion. This resulted in an increase of 18% in respect to 2008, when the total of 7.8 billion messages or 820 messages per user were sent. In 2009, there were 33.2 million MMSs sent, which is an increase of 54% in respect to 2008.

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

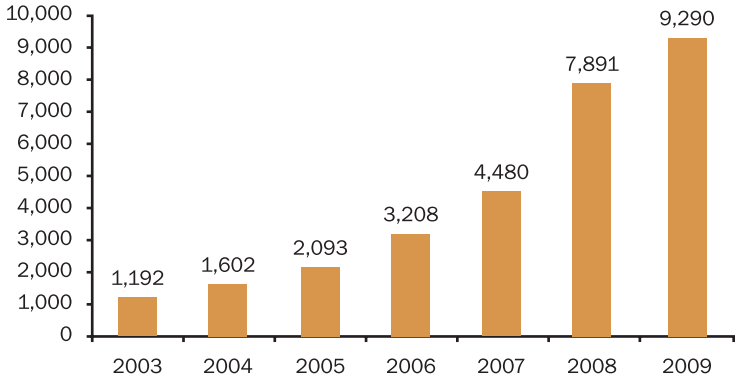


Figure 36. Number of MMS messages sent (millions) Source: RATEL

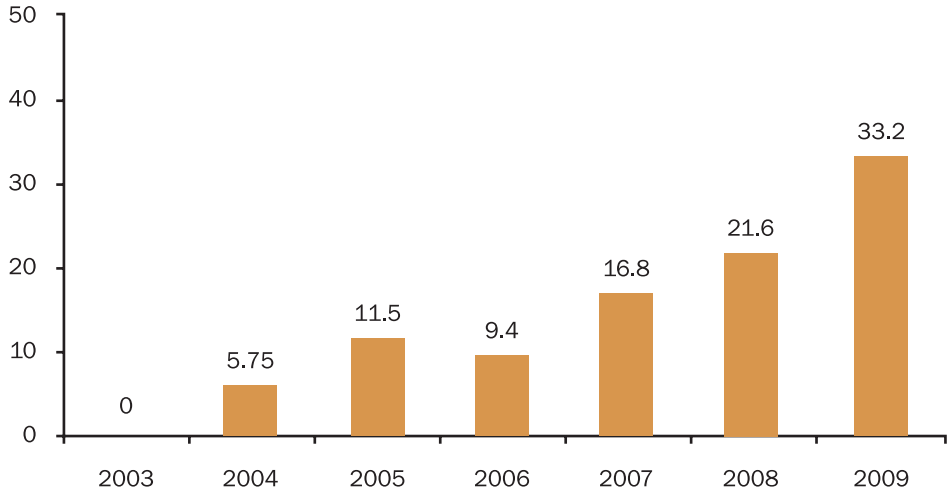
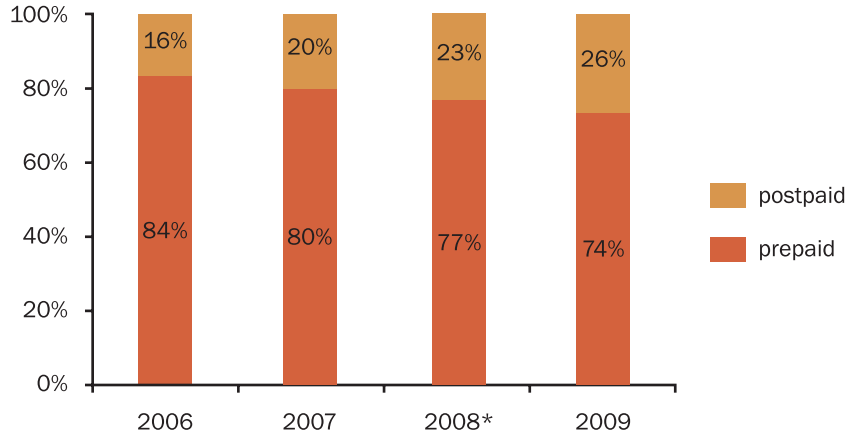


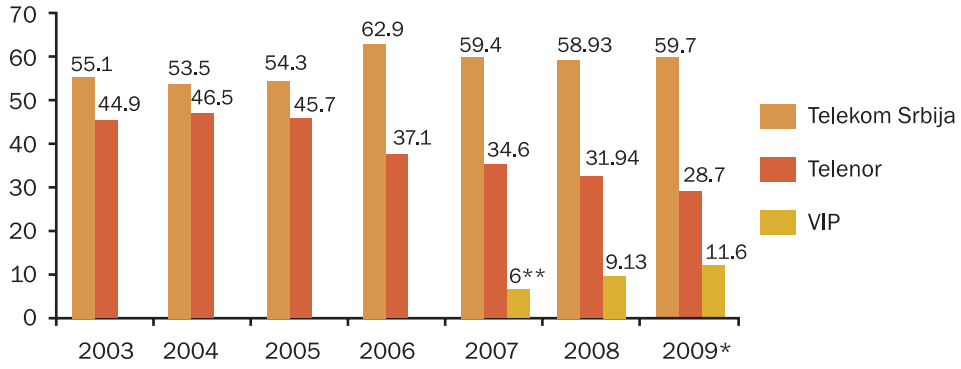
Figure 37. Prepaid/Postpaid Users Source: RATEL



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

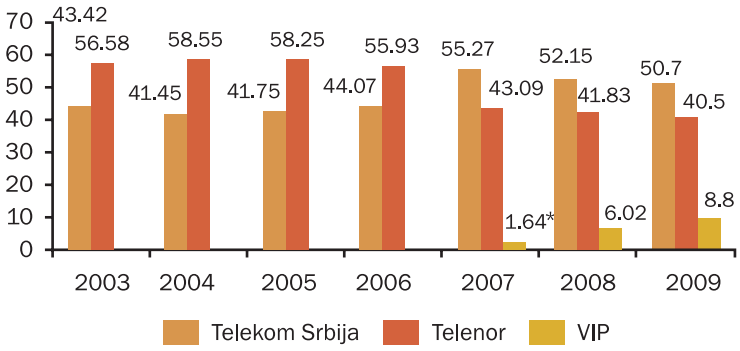
Figures 38 to 41 show the market share of mobile operators in terms of the number of users, share of each operator in the total mobile telephony revenues and share in the total traffic.

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



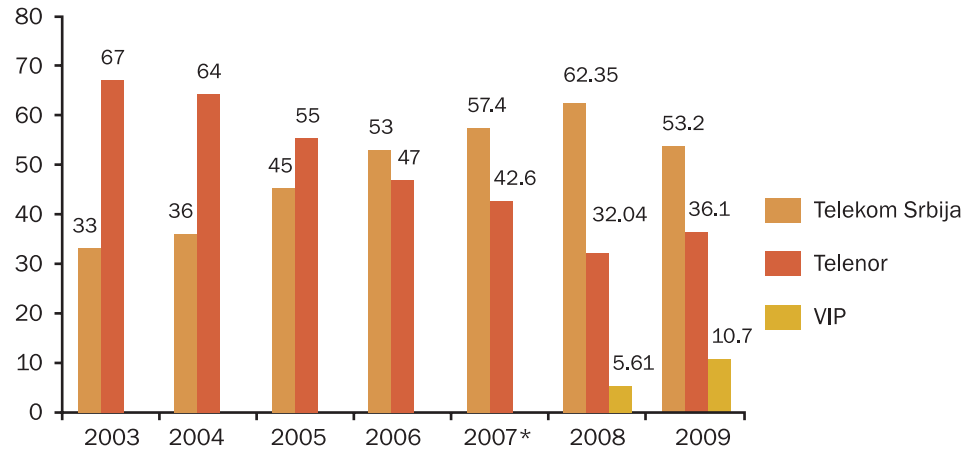
*data on Telenor include the number of prepaid users active in the last 90 days
** Vip mobile began operating in June 2007.

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



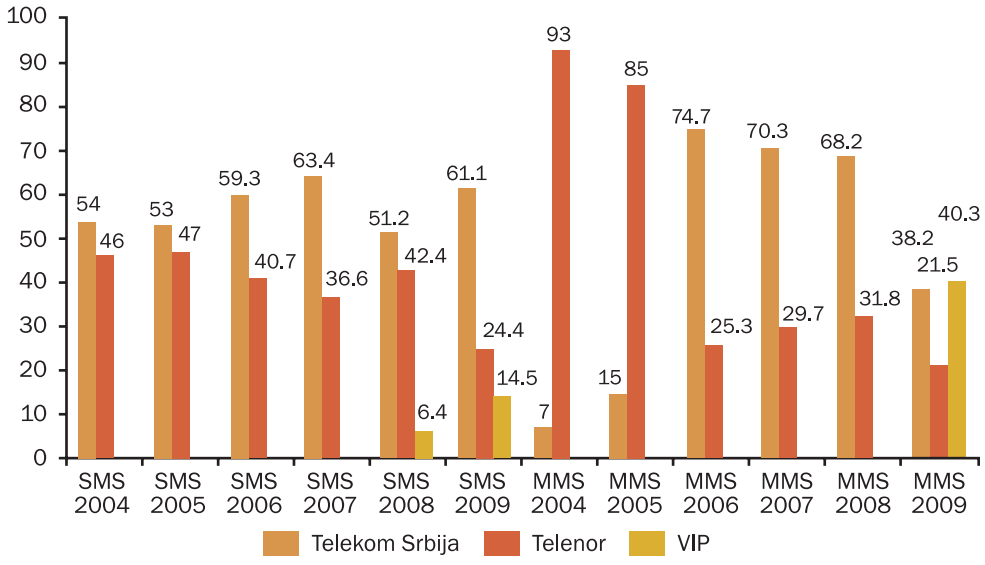
* Vip mobile began operating in June 2007

Figure 40. Share in the 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

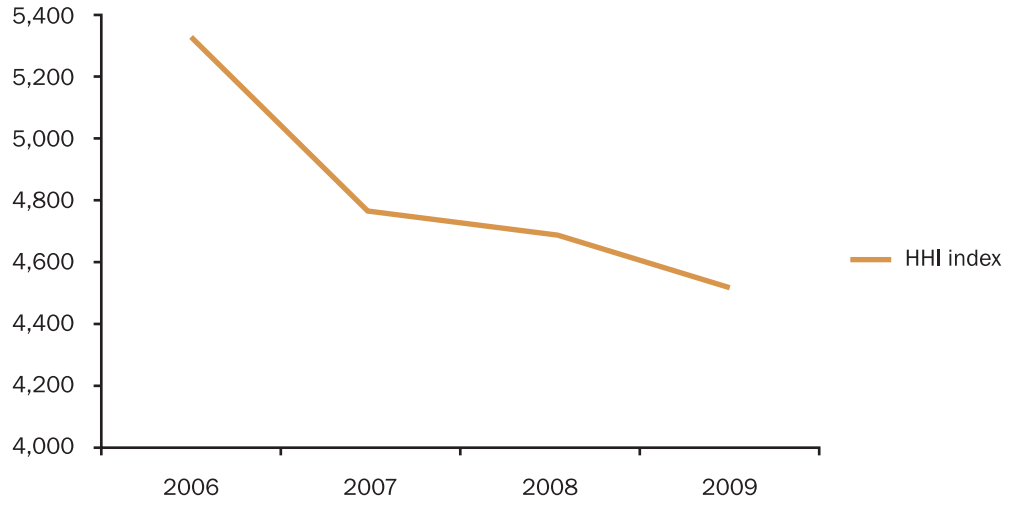
The competition in the Serbian mobile market was measured by the Herfindahl – Hirschman- Index (HHI).

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. Pursuant to the Law, the market share of the operators is identified by the number of users.

Table 8. HHI Index Values in the period from 2006 to 2009

	2006	2007	2008	2009
HHI index	5,332	4,759	4,684	4,520

Figure 42. HHI Index Values in the period from 2006 to 2009



As illustrated in Figure 42 above, the value of the index is decreasing every year, a fact which indicates that the competition in the mobile market is boosting. The entry of the third operator, Vip mobile, contributed to the enhancement of competition between operators and further liberalization of the Serbian mobile market.

As one of the temporary measures aimed at diminishing the effects of the World Economic Crisis, the Government of the Republic of Serbia introduced an additional tax rate within the mobile

telephony sector on 1 June 2009. The 10% tax applies to all calls, standard SMS and MMS messages, transmission of data and additional services in the country and abroad, whereby this tax is not included in the calculation of VAT. Such a measure resulted in the decelerated the growth of the mobile market, even though the operators continued with the effort of trying to win over the users by cutting down on prices and introducing a wide range of new services, such as SMS directory, favourite numbers, money transfer services, services which enable users to buy tickets via mobile phone, downloading music from WAP portals, combination of prepaid and postpaid packages, Facebook profile SMS notification, etc. The introduction of the 3G network also meant the launch of new services: real time video calls, video streaming, video clips, high- speed Internet, etc.

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 RS, 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 stipulate the rights and obligations of users and operators, as well as the process of number porting, which is to be carried out upon the request of the user wishing to retain his assigned number while switching between operators. In terms of the number portability service, users are obliged to pay a fee in the amount of 200.00 dinars to the receiving operator, whereas the receiving operator is under the obligation to pay a fee in the amount of 1,000.00 dinars to the donor operator. The service of number portability is due to commence on 1 January 2011, when these Rules shall come into force. The realization of such a service is expected to contribute to the process of strengthening the competition in this sector.

Mobile market was fully liberalized in 2006 through relevant licence issuance procedures. The sector is fully competitive, high quality services are offered, and the prices are among the lowest in Europe.

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 such as 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.

In the period from 2006 to 2009, the Internet market in the Republic of Serbia had taken the course of significant expansion. Such expansion was primarily due to the number and the structure of Internet connections towards end-users as well as to the amount of the total Internet service provision revenues. This trend began in 2008 and continued in 2009, when the number of broadband connections exceeded the number of dial-up connections. Moreover, in 2009, dial-up connections, in relation to other Internet connections, were not the dominant type of Internet connections, as ADSL connections had taken over their place. However, such allocation of Internet connections was expected, given the increase in volume of data which was being exchanged via Internet and increasingly demanding users who required high-speed and easy Internet access. In line with these conclusions, the fact that the total number of broadband Internet connections recorded in 2009 amounted to 691,000 and made 73% of the total number of Internet connections in Serbia, was not surprising, especially when ADSL access represented the dominant type of Internet access. Apart from the access technologies mentioned, Internet access was enabled by means of a cable modem, wireless access in the 2.4 GHz and 5.8 GHz licence- free frequency bands, the less used 3.4-3.6 GHz frequency band, as well as by UMTS (3G) network of mobile operators.

In December of 2009, there were 199 Internet service providers (ISPs) in Serbia registered within the Authorization Register, which is approximately the same number of ISPs recorded in the previous year. However, it should be noted that while the number of dial-up providers is still decreasing, the number of ADSL providers is increasing gradually. ADSL access service (bitstream) was

provided by 27, cable modem access by 21, wireless access was offered by 78 and dial-up by 39 providers. In comparison with the previous year, Internet access was introduced by means of an optical cable as well.

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

	2006	2007	2008	2009
Dial-up	51	60	48	39
Cable modem	9	14	22	21
Optical cable	-	-	-	3
Wireless access	75	118	82	78
ADSL	16	23	21	27

Table 10. Total Number of ISPs — Source: RATEL

	2006	2007	2008	2009
Number of ISPs	109	159	197	199

As a result of the constant expansion of the Serbian Internet market, there has been an evident increase in the revenues from Internet services, a fact which is worthy of attention given the general economic crisis and global recession. Another fact worth mentioning is that the telecommunications sector represents one of the few sectors in Serbia a positive growth rate in 2009 (Figure 43). Total revenues in 2009 increased by 27% in respect to 2008 or approximately five times in respect to 2006 when the statistical data gathering process began.

The total number of Internet subscribers in 2009 amounted to approximately 943 thousand. However, if we consider the availability of Internet access via 3G mobile network, the total number of potential subscribers amounts to 1.7 million. The total number of 3G mobile network subscribers amounted to approximately 760 thousand in 2009, which is an increase of 3% in the number of such subscribers in respect to 2008.

The total number of broadband connections in Serbia in 2009 was over 691 thousand (73% of the total number of the Internet connections, 3G mobile network users excluded), which is

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

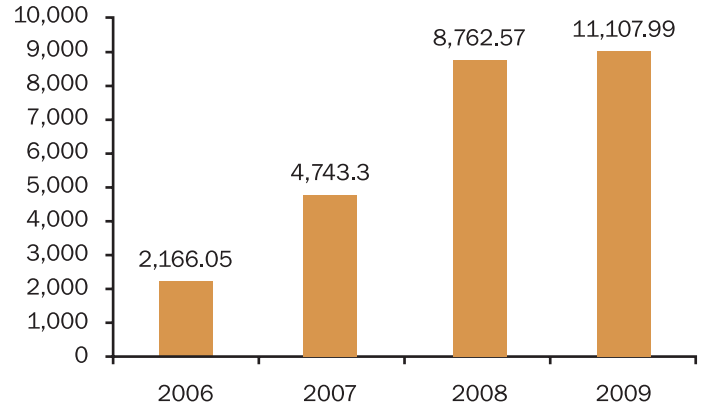
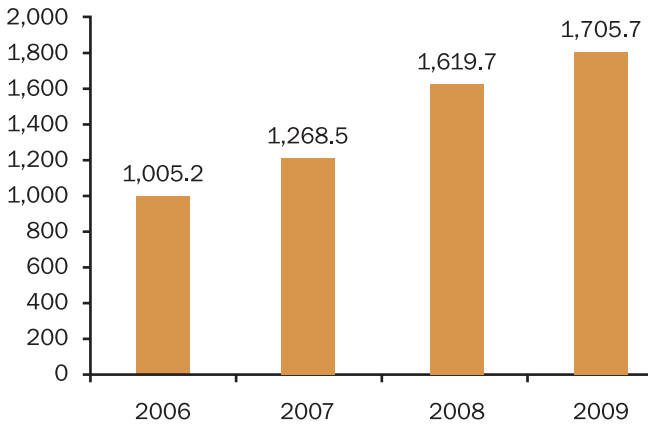


Figure 44. Total Number of Internet Subscribers* (thousands) Source: RATEL

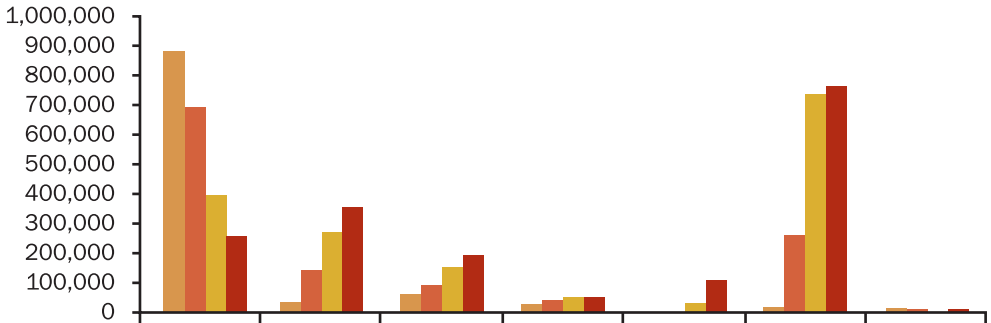


* The total number of subscribers excludes 3G mobile network subscribers.

approximately 40% more than in 2008. There was a significant increase in the number of subscribers who accessed the Internet using ADSL modem (30%) while the number of subscribers accessing the Internet through cable modem amounted to 24%. As far as broadband Internet access via mobile 3G network modem is concerned, the number of subscribers quadrupled, having almost a 15% share in the number of broadband Internet access users (3G network subscrib-

ers excluded). This represents a significant increase, given the fact that this type of access was enabled for the users in the Republic of Serbia in 2008, when the share of this type of Internet access accounted for only 5% of the number of broadband Internet access users.

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



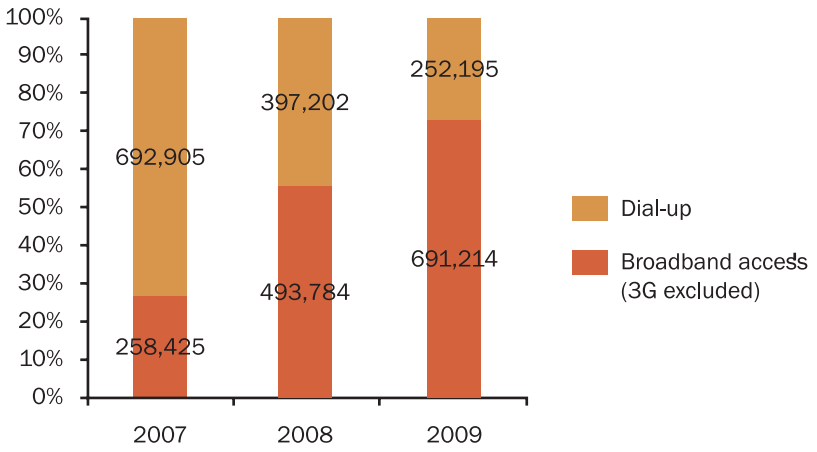
	Dial-up	ADSL	Cable modem	Wireless access	Mobile Internet	3G network subscribers*	Other
2006	882,611	26,126	54,598	21,968	0	9,687	10,210
2007	692,905	132,359	87,731	36,059	0	257,379	2,276
2008	397,202	267,876	151,154	48,130	25,489	738,401	1,135
2009	252,195	351,252	187,923	45,864	100,628	762,307	5,547

*3G network subscribers without Mobile Internet subscribers

Once again, it should be noted that, since RATEL began monitoring the telecommunications market in 2005, dial-up connections did not represent the dominant type of access technology for the first time in 2009. Namely, the number of ADSL connections amounted to 350 thousand, as opposed to the number of dial-up connections which amounted to approximately 250 thousand. The average annual growth rate of ADSL connections in the period from 2005 to 2009 amounts to 147%, whereas that of dial-up connections was as low as -23% in the same period.

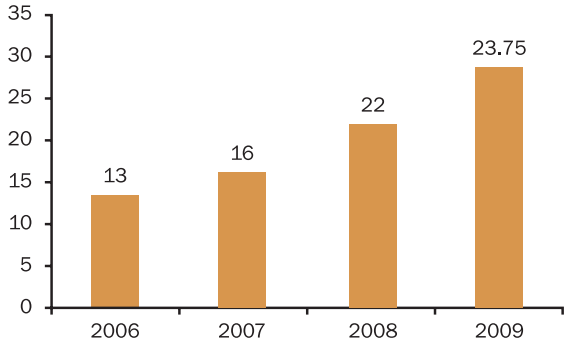
The number of Internet connections per 100 inhabitants was approximately 23, whereas the number of broadband Internet connections per 100 inhabitants amounted to 19. However, if the 3G mobile network subscribers are excluded from the total number of broadband subscribers,

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



broadband penetration amounts to 9.2%, which is above the average of both the SEE countries (8.01%), and the European Union (24%).

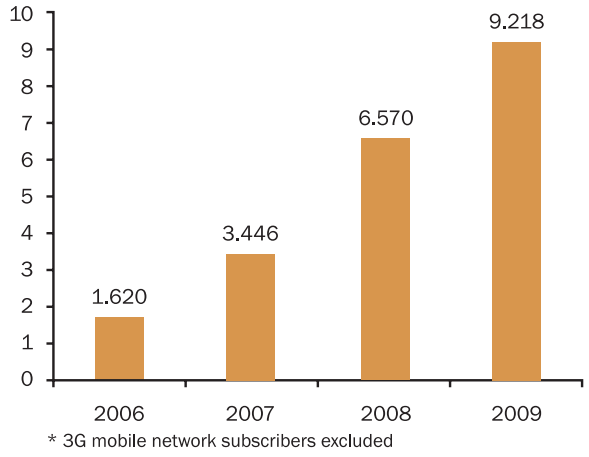
Figure 47. Internet Penetration Rate* Source: RATEL



* 3G mobile network subscribers included.

Given the constant growth of the Serbian Internet service market in the past four years, a significant rise in the number of broadband connections is expected to be seen in the years ahead, reaching the level of development maintained by Europe's developed countries by the end of 2013.

Figure 48. Broadband Internet Penetration Rate* Source: RATEL



* 3G mobile network subscribers excluded

The growth of the Internet sector in Serbia is evident in terms of the total revenues, cumulative number of users (especially broadband access users) and market penetration. 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. The number of mobile Internet access users had quadrupled in respect to 2008, whereas the number of dial-up users in the 2006-2009 period decreased by 70%.

Within the services provided to end-users, ISPs offered a variety of bundled services among which the best selling one included permanent Internet connection and upload/download speeds of 1024/128 kbps, accounting for approximately 300,000 connections or about 50% of all broadband connections.

Comparing the amounts of the monthly subscription fees of various Internet packages as well as the structure of Internet connections in 2009 with the ones recorded during previous years, we may observe significant changes. Namely, 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 2006, the monthly subscription fee for permanent Internet access for 512/128 kbps speeds amounted to approximately 5,500.00 dinars. Moreover, it should be noted that 768/192 kbps was the highest Internet access speed offered by Internet service operators in 2006.

Competition in the field of access technologies, illustrated in one of the previous figures above, had had a significant impact on the increased competition on the Internet market as well. This had affected the pricing policies of companies which were striving to offer services at approximately equal prices but by means of completely different technologies. Table 11 illustrates service prices within the best selling packages offered by several operators, i.e. similar service quality at approximately similar prices.

Table 11. Monthly Subscription Fees for Permanent Internet Access

Access bit rate	Access Technology	Amount of monthly subscription fee for permanent Internet access (VAT included)
1024/128 kbps	ADSL	1,425.44 RSD
1536/128 kbps	cable access	1,390.00 RSD
up to 1 Mbps / 128 kbps	wireless access at 3.4 GHz	1,690.00 RSD
1024/256 kbps	wireless access at 2.4 GHz	1,299.00 RSD
5 GB free of charge, and 3.84 RSD for every next MB	mobile network access	1,480.00 RSD

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

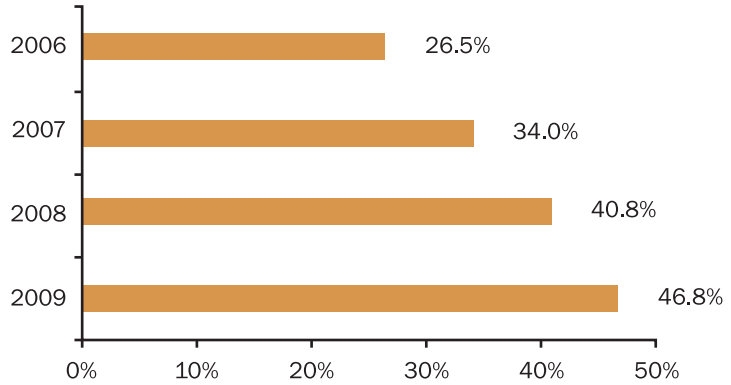
6. USAGE OF ICTs IN SERBIA

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 (with answering rate of 96.6 %) on the sample of 2,400 individuals, 2,400 households and 1,152 companies.

In 2009, in the Republic of Serbia there were 46.80% of the households which owned a computer which is an increase of 6.0% in respect to 2008 and 12.8% in respect to 2007.

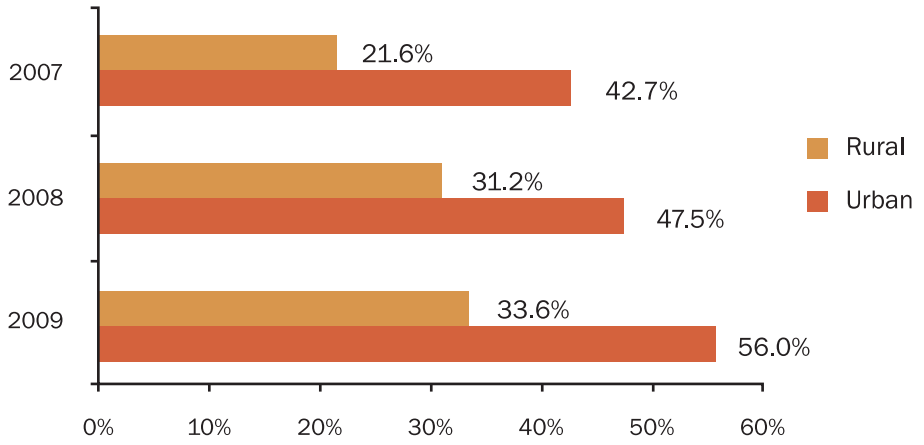
Since the incidence of computers in households varies according to different territorial areas, in Belgrade it amounted to 59.80%, 46.10% in Vojvodina and 41.30% in the area of central Serbia.

Figure 49. Number of Computers per Household Source: Statistical Office of the Republic of Serbia



Having conducted the comparative analysis of the incidence of computers according to the development level of areas in Serbia, we may observe that in urban areas in 2009 it amounted to 56%, whereas rural areas marked the amount of 33.60%. In comparison with 2008, a rise of 8.5% was noted in urban areas and the total of just 2.4% in rural areas (Figure 50).

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



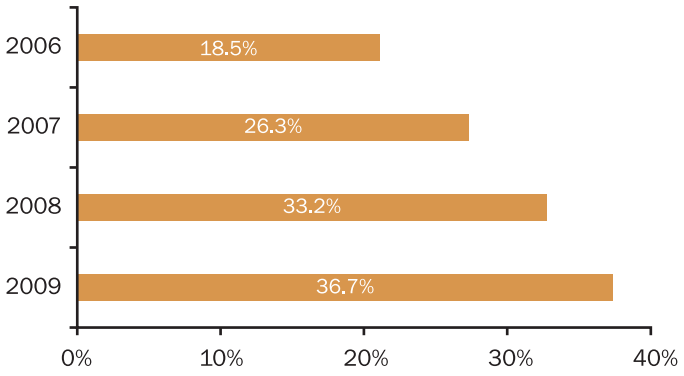
In the Republic of Serbia there were 36.7% of the households using the Internet connection, this being an increase of 3.5% in respect to 2008, or a 10.4% increase in respect to 2007. According to RATEL's data, the number of households with Internet connections amounted to 34.2%, which corresponds to the data of the Statistical Office obtained through the poll.

Once again, if we compare the number of households with Internet connection with the type of area, we may observe significant discrepancies. While in urban areas of Serbia the number of households with Internet connection amounts to 46.9%, which is an increase of 5.7% in respect to the previous year, in rural areas only 22.0% of households have Internet connection, this being an increase of just 0.3% in respect to 2008.

The uneven diffusion of computers in households and the gap in using Internet access is related to the structure of households according to the amount of monthly income. Internet access is mainly used by the households with the monthly income of over 600 euros (82.0% in 2009), while the share of households with the income of under 300 euros is rather low (only 17.9% in 2009).

One of the main indicators of ICT development in the EU is the percentage of households with broadband Internet connection type which in Serbia amounts to 22.9%, this being an evident

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



increase of 7.4% in respect to 2008 and 15.6% compared to 2007. According to RATEL's data, the number of households with broadband Internet access was 24.9%, which corresponds to the data of the Statistical Office of the Republic of Serbia obtained through the poll.

The incidence of this type of connection is the highest in Belgrade (37.6%) and Vojvodina (23%), while in central Serbia it is at a rather low level, amounting to only 16.1%.

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

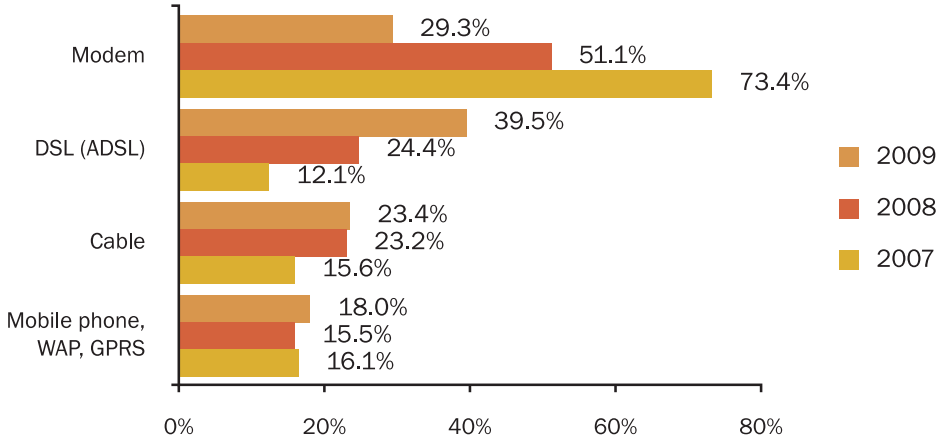
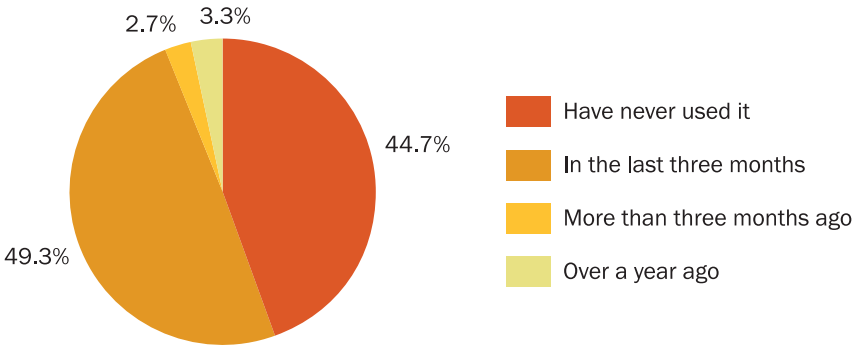


Figure 53 shows the usage of computers by individuals. The survey revealed an alarming result - 44.7% of the respondents (48.0% in 2008) who participated in the poll have never used the computer. The percentage of people who used the computer in the last three months amounted to 49.30% in 2009 (45.50% in 2008).

In 2009, the number of computer users increased by 3.3% in respect to 2008 and by 7.6% compared to 2007.

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



In the Republic of Serbia, only 38.1% of people used the Internet in the last three months, 3.6% of the respondents used the Internet more than three months ago and 1.9% of them over a year ago. As many as 56.4% of the respondents have never used the Internet.

The number of Internet users in 2009 increased by 2.8% in respect to 2008 or by 9.0% in respect to 2007.

In 2009, more than 285,000 individuals used the electronic services of the public administration which is, compared to 2008, an increase of some 25,000 users. An especially alarming result is that as much as 36% 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

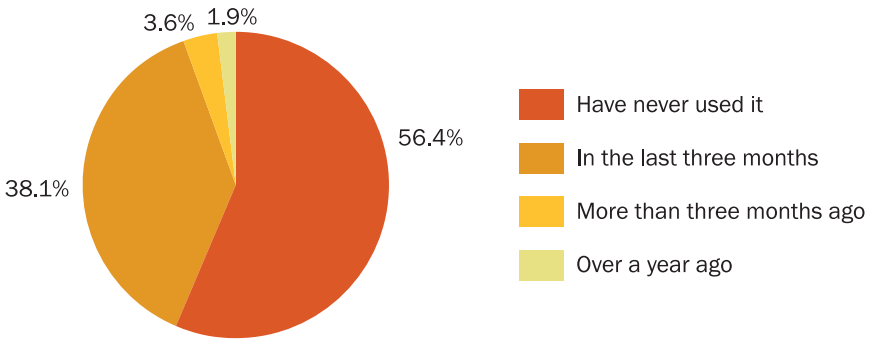
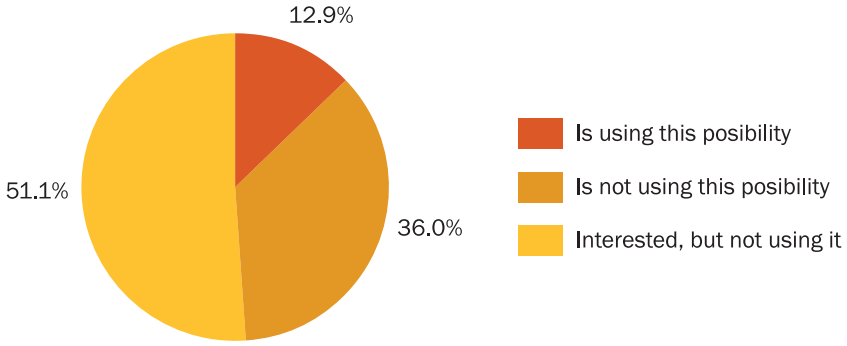


Figure 55. Public Administration Internet Use as opposed to Personal Contact
Source: Statistical Office of the Republic of Serbia

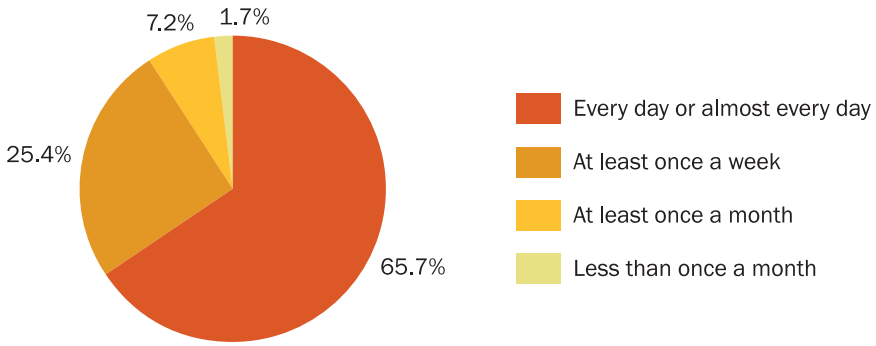


Of the total number of respondents, 65.70% of them used the Internet every day, 25.40% used the Internet at least once a week, the remaining 7.20% of the respondents used the Internet once a month and only 1.70% at least once a year.

Over 1,450,000 people use the Internet every day or almost every day, which is an increase of 200,000 users in respect to 2008.

The same as last year, during 2009 the Internet was mostly used for the following purposes: e-mail activities (79.20% of users), followed by the use of Internet for playing or downloading games, mu-

Figure 56. Frequency of the Individual Internet Use Source: Statistical Office of the Republic of Serbia



sic and images (64.0%)- which is an increase in respect to 2008 when 51.45% of users used this service; for obtaining information on various products and services (56.60% of users), for sending messages to newspaper groups in chat rooms (42.30% of users), and reading or downloading on-line newspapers/magazines (42.10% of users). There was a slight decrease in the number of users who used Internet for the purpose of obtaining information related to education (26.40% in 2009) compared to 29.40% in 2008, as well as in the number of respondents searching study-related information (27.00% in 2009). The service of Internet banking was used by 12.00% of users, while the Internet was least used for selling goods and services (4.40%) and taking on-line courses (1.30%).

Figure 58 illustrates the use of mobile devices for Internet access with the highest number of users (29.80%) using a mobile phone (via WAP or GPRS) for this type of Internet access, followed by laptop wireless link (3.90%) and palmtop (3.80%), whereas as much as 65.60% of users have never used any of the options given above.

Figure 59 illustrates the share of Internet users according to their employment status:

- 94.8% of students
- 63.3% of employed individuals
- 23.2 of unemployed individuals
- 23.5% of other people (retired people, people doing army service, etc.)

Figure 57. Private Internet Use (in the last 3 months)
Source: Statistical Office of the Republic of Serbia

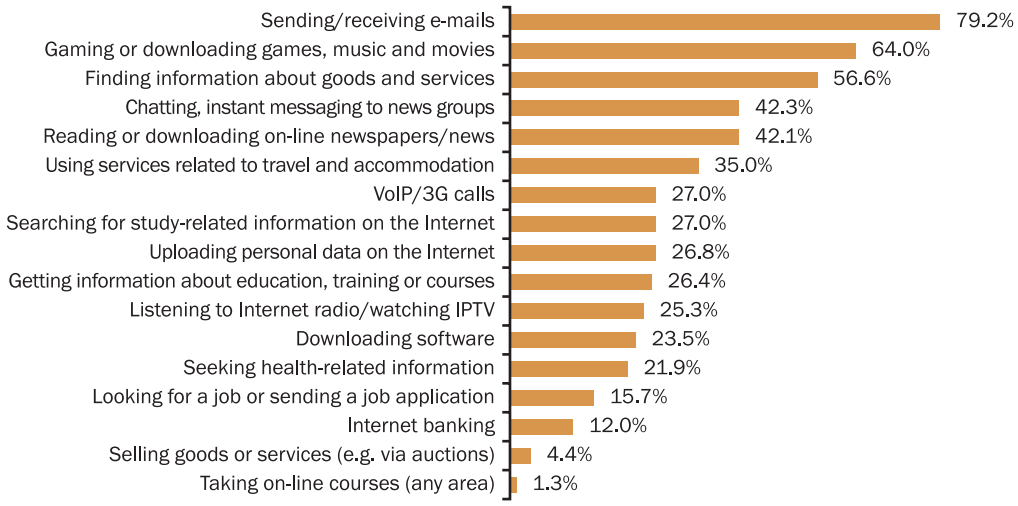


Figure 58. The Use of Mobile Devices for Internet Access
Source: Statistical Office of the Republic of Serbia

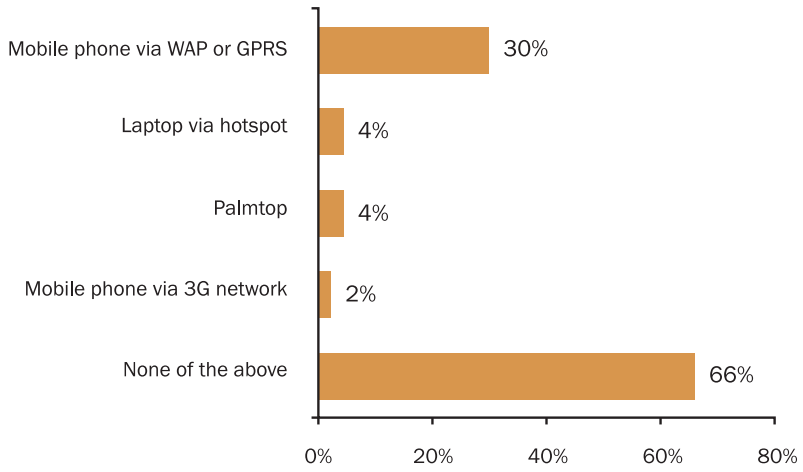


Figure 59. Share of Internet Users according to Employment Status
Source: Statistical Office of the Republic of Serbia

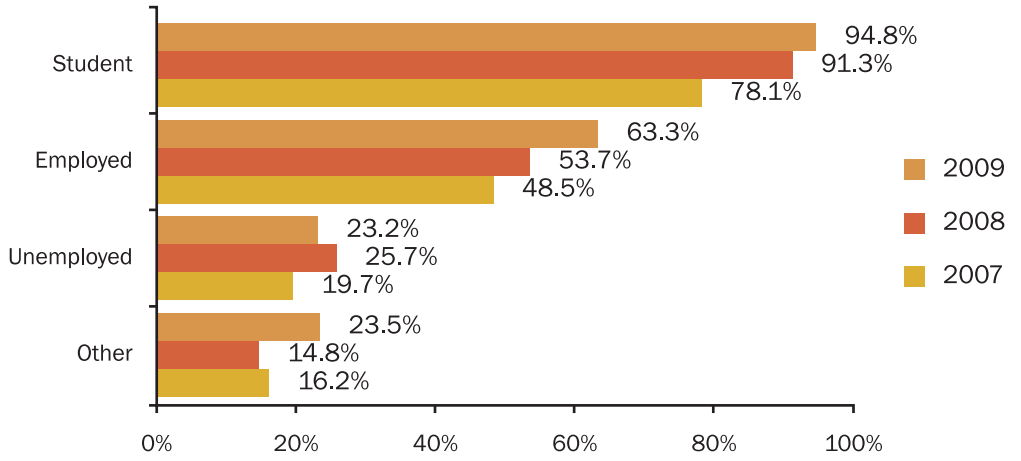
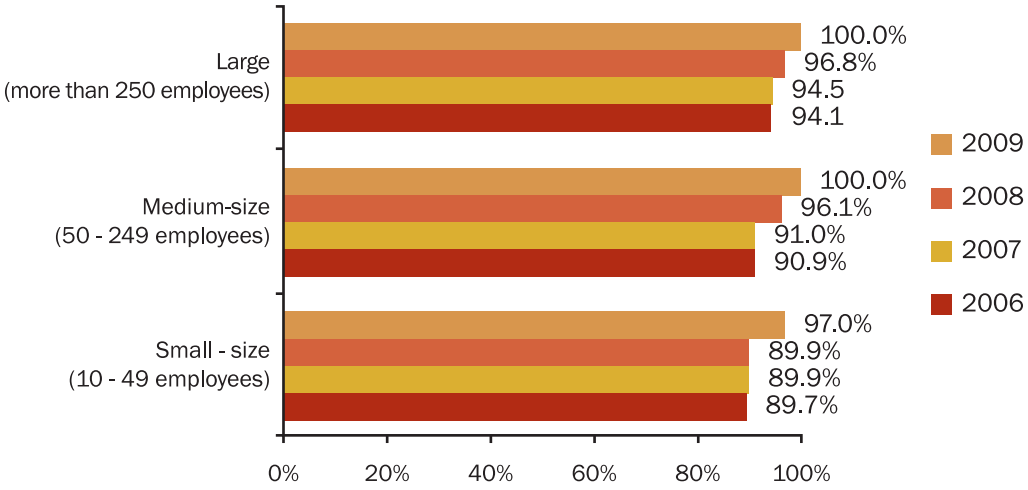


Figure 60. Use of Computer by Number and Company Size
Source: Statistical Office of the Republic of Serbia



As illustrated in Figure 60, there were 100% of large and medium-size enterprises and 97% of small-size companies which used the computer in 2009.

In comparison with 2008, we may observe an increase of 3.20% with large enterprises, 3.90% with medium-size and 7.10% with small-size enterprises. Therefore, we may conclude that the percentage of enterprises which use the computer amounted to approximately 100%.

The analysis of companies according to their size (Figure 61), revealed that 100% of large enterprises, 97.7% of medium-size enterprises and 93.40% of small-size enterprises have Internet connection.

Figure 61. Internet Use by Company Size
Source: Statistical Office of the Republic of Serbia

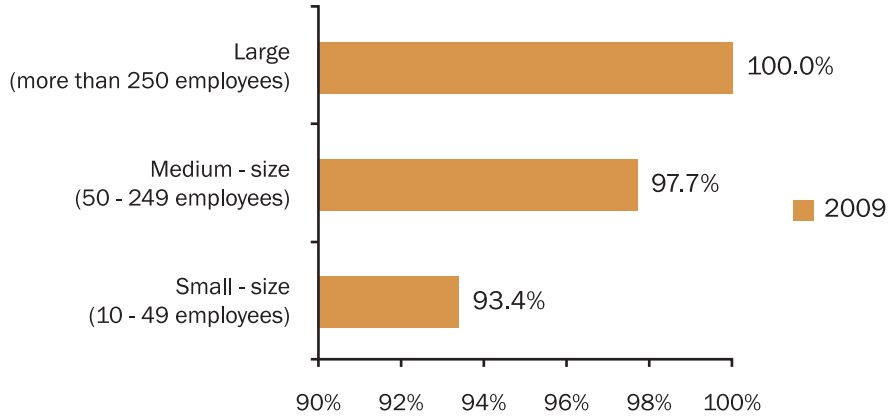
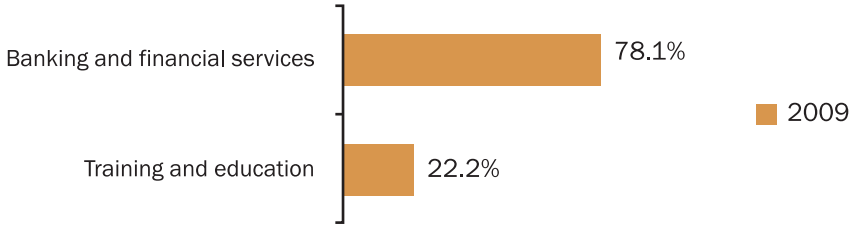


Figure 62 shows the purposes for which companies use the Internet. In 2009, the companies were primarily using the Internet to make financial transactions with banks (78.10%) and for the purpose of training and further education of employees (22.20%).

Figure 62. Purpose of Internet Use in Companies
Source: Statistical Office of the Republic of Serbia



7. RADIO AND TELEVISION PROGRAM DISTRIBUTION

Pursuant to the Rules on terms and conditions for radio and television program distribution service (*Official Gazette of RS*, no. 26/09), on the radio and TV program distribution market in the Republic of Serbia, the service may be provided via the following public telecommunications networks:

- radio and TV program distribution via cable network (coaxial, hybrid and optical) - CATV which includes analogue and digital CATV and IPTV
- radio and TV program distribution via satellite (Direct to Home – DTH)
- radio and TV program distribution via MMDS (Multichannel Multipoint Distribution System) and LMDS (Local Multipoint Distribution System)

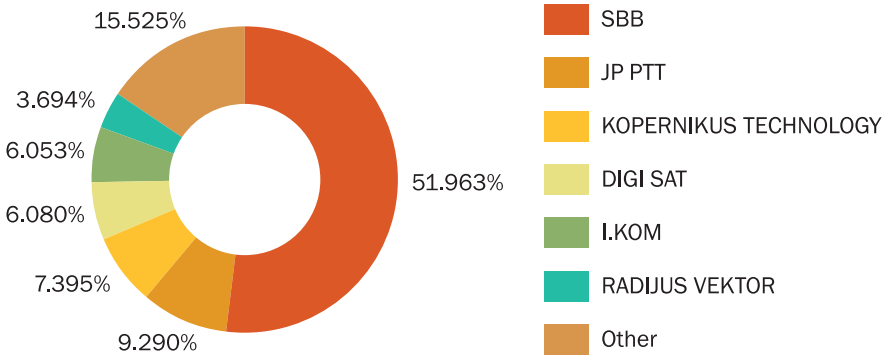
For the provision of radio and TV program distribution service, RATEL issues an authorization in line with the abovementioned Rules, whereby an additional licence for radio frequency usage is issued for the MMDS and LMDS platforms in compliance with the Rules on determining the types of public telecommunications services within the licensing regime (*Official Gazette of RS*, no. 29/06) and based upon the Action Plan for the implementation of the Strategy for the Development of Telecommunications in the Republic of Serbia from 2006 until 2010 (*Official Gazette of RS*, nos. 99/06 and4/09). The complete procedure for the licence issuance is carried out in compliance with the Law and the general bylaw adopted by the Ministry for Telecommunications and Information Society (MTIS) which stipulates the number of licences, the period for which the licence is issued, minimal conditions for licence issuance and the minimal amount of the one-off licence issuance fee.

There were 78 operators registered for providing these services in 2009, whereby 75 operators had the authorization for radio and TV program distribution service via cable distribution network (including 2 operators which provide IPTV service), and 3 operators with the authorization for providing the service via satellite distribution network (DTH).

According to the number of subscribers, Serbia Broadband – Srpske kablovske mreže (SBB) still represents the leading operator within radio and TV program distribution services, with a 52% market share. Consequently, in accordance with the Law, RATEL's Managing Board, in its session of 16 February 2007, passed the Decision on Designating the Public Telecommunication Operator with Significant Market Power for the Radio and Television Program Distribution via Cable Distribution Network, declaring the company SBB as the operator with significant market power. Accordingly, the regulation of an SMP operator's services requires the application of a special tariff regime for radio and TV program distribution services along with the obligation to apply the cost-based model in forming the prices of telecommunications services. Hence, SBB is required to observe the rules and conditions set out 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) and the Law.

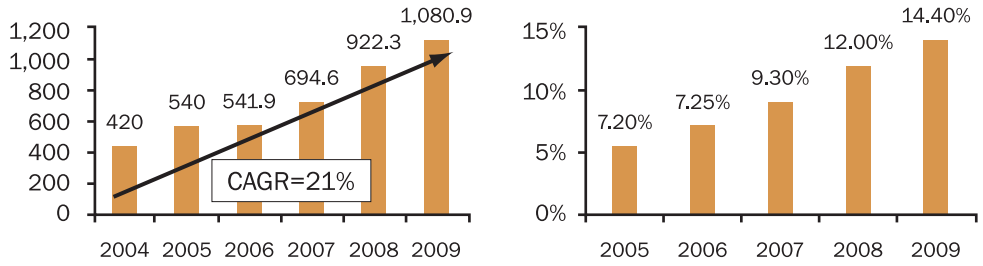
Beside SBB, significant players in the radio and television distribution market are companies Public Enterprise PTT – RJ KDS, Kopernikus tehnology, Digi SAT, IKOM and Radijus vektor. In terms of the number of subscribers, the total share of these operators in 2009 amounted to approximately 85%.

Figure 63. Market Share of Leading Operators in 2009 Source: RATEL



The total number of subscribers continues to grow, exceeding one million in 2009, which is by 17% more compared with 2008. The average growth rate of the number of radio and TV program distribution service subscribers in the period from 2004 to 2009 was 21%. Penetration rate amounted to 14.4%, or 42.9% in terms of the number of households.

Figure 64. Total Number of Users (thousands)/Number of Users per 100 Inhabitants
Source: RATEL



The highest number of subscribers (84%) in 2009 used radio and television program distribution service via cable distribution network. Despite the small market share of IPTV service, the number of IPTV subscribers is not marginal, given the fact that this service was first introduced in 2008. In terms of the network type, most subscribers are still connected to the hybrid (HFC) network, which, in addition to radio and TV program distribution service, enables VoD (*Video on Demand*), broadband Internet access and VoIP services as well.

Even though analogue CATV subscribers dominate the structure of the total number of CATV subscribers with the share of 95%, in the next couple of years we may expect this number to decrease on behalf of digital CATV subscribers, since the final analogue TV broadcasting switch-off is scheduled for 2012.

In 2009, the total revenues from radio and television program distribution increased by 28%, amounting to approximately 7.2 billion dinars. This increase was partly the result of the increase in the number of users and the introduction of new platforms, and partly the result of the rise in the price of radio and TV program distribution service by some providers.

Figure 65. Allocation of Subscribers according to Network Type Source: RATEL

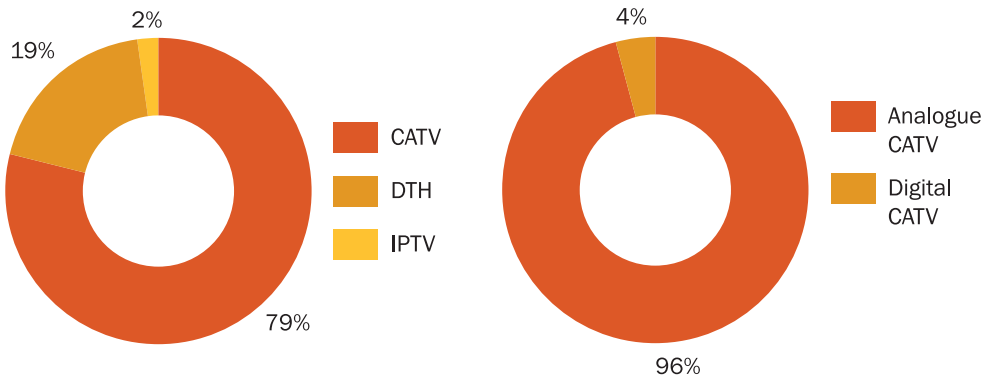
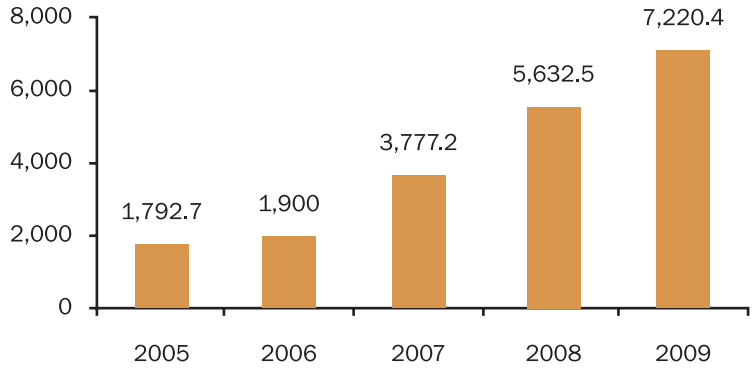
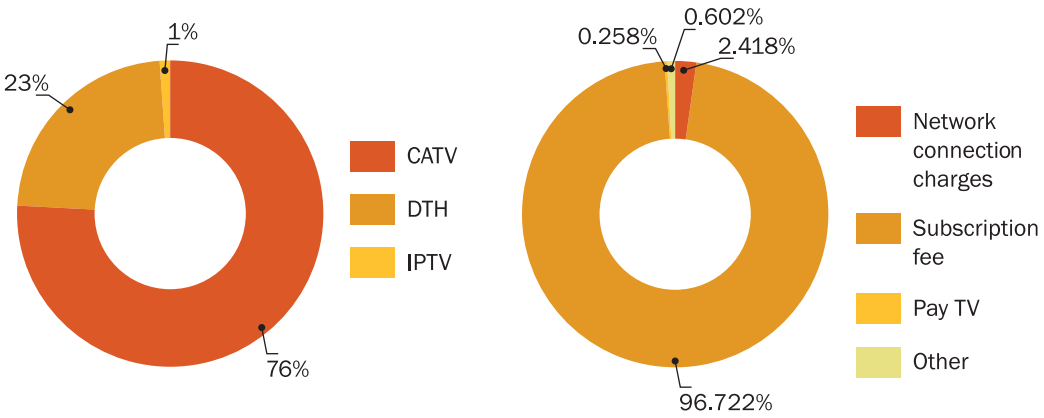


Figure 66. Growth of Revenues on the Radio and TV Program Distribution Market (in millions of RDS) Source: RATEL



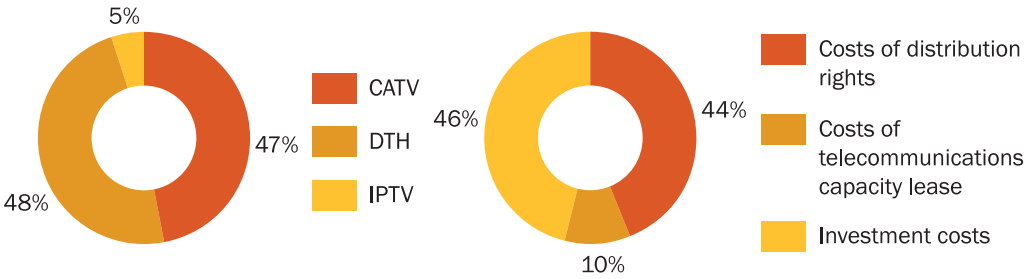
The biggest share in the revenues from the distribution service provision goes to CATV services (76%), followed by DTH (23%) and IPTV services with the total share of just 1%. Revenues from monthly maintenance – subscription fees, participate in the total revenues with the share of approximately 97%, network connection charges with around 2%, whereas Pay TV services and other revenues make less than 1% of the total revenues.

Figure 67. Allocation of Revenues in 2009 Source: RATEL



In 2009, the total costs of copyright and related rights and redistribution rights amounted to approximately 2.5 billion euros, which is an increase of 67% compared with the previous year. The costs of telecommunications capacity lease amount to 558 million dinars, whereas the total investments in the radio and TV program distribution services amount to approximately 2.6 million euros. In terms of services, DTH service had the biggest share in expenditures (42%), whereas the smallest share of just 5% went to IPTV service.

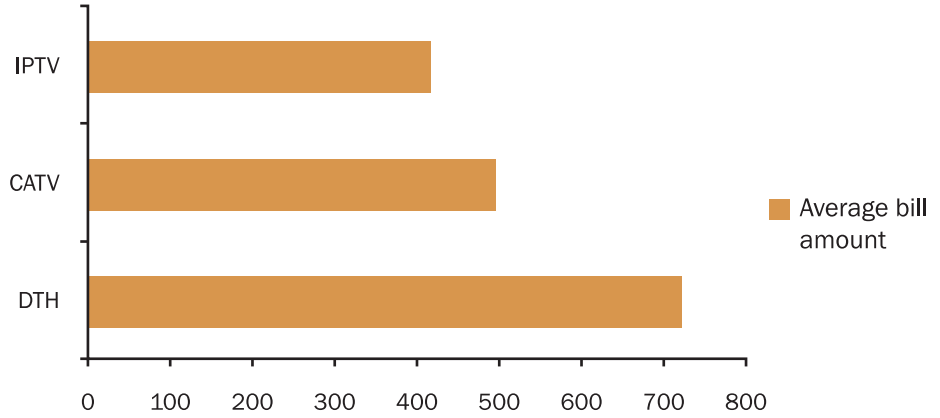
Figure 68. Cost Allocation (%) Source: RATEL



DTH service subscribers paid an average of 726 dinars for the basic service package while CATV services amounted to an average of 501 dinars on a monthly basis. Given the fact that operators

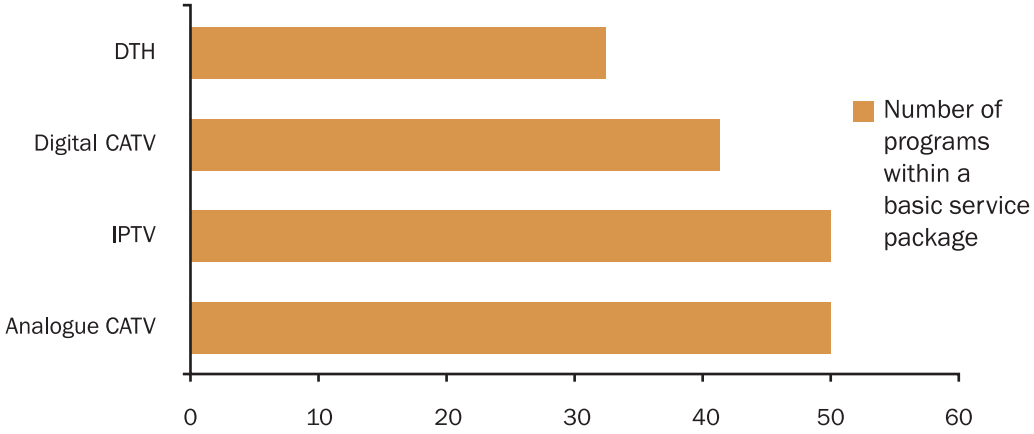
offered this service at promotional prices, the average monthly bill for IPTV subscribers in 2009 amounted to 420 dinars.

Figure 69. Average Basic Package Subscription Fees in 2009 (in RSD) Source: RATEL



In terms of the number of TV programs offered, basic IPTV and CATV service packages were almost identical, offering an average of 50 TV programs in 2009. The basic digital CATV package

Figure 70. Average Number of TV Programs within the Basic Service Package in 2009 Source: RATEL



included around 42 TV programs, whereas basic DTH service package subscribers were able to choose from an average of 32 TV programs.

One of the basic characteristics of the given market in the observed period was the absolute dominance of cable network radio and TV program distribution service, both analogue and digital TV. Since CATV operators have already positioned themselves according to geographical areas, it is likely that the acquisition of small operators may lead to a change in the market structure.

Since the IPTV platform was first introduced towards the end of 2008, it has not yet accomplished significant market power in terms of the number of subscribers and effected revenues. Given the fact that the fixed-line subscribers, 3 million of them in Serbia at this time, may be considered as potential IPTV users, the expansion of this platform seems likely in the following years.

Unlike the cable network radio and TV program distribution service, structure barriers are non-existent 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 aforementioned services, radio and TV program distribution service 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– public broadcasting service for the area of province:			
Ord. Number	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued broadcasting station licences for radio/TV signal transmission
1.	Radiodifuzna ustanova Vojvodine „RADIO-TELEVIZIJA VOJVODINE“, Novi Sad	20	6

For radio signal coverage – public broadcasting service for the area of province:			
Ord. Number	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued broadcasting station licences for radio/TV signal transmission
1.	Radiodifuzna ustanova Vojvodine „RADIO-TELEVIZIJA VOJVODINE“, Novi Sad	15	0

For TV signal coverage– commercial broadcasting service for regional area:			
Ord. Number	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued broadcasting station licences for radio/TV signal transmission
1.	Privredno društvo za telekomunikacije „TV METROPOLIS“ DOO, Beograd	3	4
2.	Javno preduzeće RADIO TELEVIZIJA VRANJE PO, Vranje	2	0
3.	„TV BANAT“ D.O.O. za proizvodnju i emitovanje radio i televizijskog programa, Vršac	1	0

For radio signal coverage– commercial broadcasting service for regional area:			
Ord. Number	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued broadcasting station licences for radio/TV signal transmission
1.	„ELEKTROMETAL ELECTRONIC“ DOO proizvodnja, spoljna i unutrašnja trgovina i usluge, Knjaževac	1	0
2.	Društvo za proizvodnju, promet i usluge „MARTEKS TMT“ D.O.O., Ljubovija	3	0
3.	Javno preduzeće za informisanje „VRBAS“, Vrbas	1	0
4.	Javno preduzeće „Radio Zrenjanin“, Zrenjanin	1	2
5.	„RADIO JAT“ društvo sa ograničenom odgovornošću za radiodifuziju, Begorad	1	0
6.	BUM BUM 2007 D.O.O., Beograd	1	0
7.	Društvo za radiotelevizijsku delatnost, marketing i konsalting „RTV CENTAR“ D.O.O., Beograd	1	2
8.	Srpska pravoslavna crkva – Arhiepiskopija Beogradsko-Karlovačka, Beograd	1	2
9.	UNIVERZIJADA BEOGRAD 2009 D.O.O., Beograd	1	0

For TV signal coverage– commercial broadcasting service for local area:			
Ord. Number	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued broadcasting station licences for radio/TV signal transmission
1.	RTV GOLIJA D.O.O., Ivanjica	1	0
2.	Asocijacija udruženja i nevladinih organizacija „RTV NIŠAVA“, Niš	1	2
3.	RADIO TELEVIZIJA „ČETIRI S“ D.O.O., Bojnik	1	0
4.	Privredno društvo za proizvodnju i usluge „RENOAR“ D.O.O., Požarevac	1	0
5.	Društvo sa ograničenom odgovornošću za marketing i usluge „RADIO LAV“, Vršac	1	0
6.	Društvo sa ograničenom odgovornošću „FOLK DISK“, Salaš	1	0
7.	Radio televizija „Rubin“, Kruševac, ortačko društvo-ogranak	1	0
8.	Radio difuzno preduzeće „SPEKTRI JETON ISMAILI I ORTACI“, O.D., Bujanovac	1	0
9.	Javno preduzeće za radio televizijsku delatnost „TELEVIZIJA BAČKA PALANKA“, Bačka Palanka	1	0
10.	Društvo ljubitelja rumunske muzike i kulture „VICTORIA“, Vršac	1	2
11.	„LOTEL PLUS“ D.O.O., Loznica	1	2
12.	Radio-difuzno preduzeće „RTV DEVIĆ PLUS“ D.O.O., Smederevska Palanka	1	0
13.	TELEVIZIJA „S“ D.O.O., Beograd	1	0
14.	Društvo za posredovanje, trgovinu i usluge „R-24“ D.O.O., Beograd	1	0
15.	Ortačko društvo radio i televizijske delatnosti Petrović Branislav i ortak MLAVA-MEDIJA, Petrovac na Mlavi	1	0

16.	Preduzeće za propagandu marketing i eksport-import „TOP-3“ D.O.O., Prokuplje	1	2
17.	Javno preduzeće „TV SMEDEREVO“, Smederevo	1	0
18.	„TELEVIZIJA JERINA“ ortačko društvo, Smederevo	1	0
19.	Javno preduzeće „Radio i televizije Trstenik“ sa P.O., Trstenik	1	0
20.	Društvo sa ograničenom odgovornošću „KRALJEVAČKA TELEVIZIJA“, Kraljevo	1	2
21.	Privredno društvo za radio i televizijske aktivnosti „DUGA-SKY“ radio televizija DUGA DOO, Požarevac	1	0
22.	Društvo za radio i televizijske aktivnosti „KOPERNIKUS CABLE NETWORK“ društvo sa ograničenom odgovornošću, Niš	1	0

For radio signal coverage– commercial broadcasting service for local area:

Ord. Number	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued broadcasting station licences for radio/TV signal transmission
1.	D.O.O. RTV EKOS-LE, Leskovac	2	0
2.	O.D. za emitovanje radio i televizijskog programa Aleksić Dušan i dr. „KOMETA 030“, Bor	1	0
3.	O.D. za emitovanje radio i televizijskog programa Timotijević Žarko I dr „SEZAM“, Bor	1	0
4.	Društvo za radio–difuziju „TIM RADIO“ D.O.O., Prnjavor	1	0
5.	Javno informativno preduzeće „BC INFO“, Bela Crkva	1	0
6.	RADIO PRAVOSLAVNE EPARHIJE NIŠKE „GLAS“, Niš	1	0

7.	Ortačko društvo za proizvodnju, radio–difuziju i trgovinu „SPEKTAR PLUS“ O.D., Trgovište	1	0
8.	Društvo ljubitelja rumunske muzike i kulture „VICTORIA“, Vršac	1	2
9.	Asocijacija udruženja i nevladinih organizacija „RTV NIŠAVA“, Niš	1	0
10.	Radio televizijska ustanova „RESAVA SVITEL“ D.O.O., Svilajnac	1	0
11.	Privredno društvo za radio-televizijske aktivnosti „RADIO DEDAL“ D.O.O., Leštane	1	0
12.	EPARHIJA VRANJSKA SRPSKE PRAVOSLAVNE CRKVE, Vranje	1	0
13.	Agencija „DŽOKER – ILIĆ I DRUGI“ OD, Velika Plana	1	0
14.	Privredno društvo za proizvodnju, promet i usluge „BUBONJA JUNIOR“ D.O.O., Ljig	1	2
15.	Privredno društvo za proizvodnju, promet i usluge „DELFIN MARKETING“ D.O.O., Užice	1	0
16.	PREDUZEĆE KONZUM LAV D.O.O., Užice	1	0
17.	Udruženje građana „FORMA PLUS“, Bajina Bašta	1	0
18.	„RADIO BISER“ D.O.O., Požarevac	1	0
19.	Radio- stanica „RADIO ANTENA“ Gordana Radakov PR, Vršac	1	2
20.	Preduzeće za radio i televizijske aktivnosti „RTV SVRLJIG“ D.O.O., Svrljig	1	0
21.	Javno preduzeće „RADIO MEDVEĐA“, Medveđa	1	2
22.	Radio televizija „KURŠUM“ D.O.O., Kuršumlija	1	0
23.	Preduzeće „AGRO-PRESS“ D.O.O. , Svrljig	1	0

24.	Novinsko izdavačko preduzeće „REKA NOVA JASENICA“ D.O.O., Smederevska Palanka	1	0
25.	Radnja za poslovne, radio i televizijske aktivnosti „SALDO“ Lidija Stanković PR, Niš	1	2

For Sava Centar TV signal coverage in Belgrade – temporary DVB-T2 standard transmitter permit (presentation during the 17th TELFOR conference):			
Ord. Number	Name and seat of the radio station owner	Number of issued broadcasting station licences	Number of issued broadcasting station licences for radio/TV signal transmission
1.	Preduzeće za proizvodnju i emitovanje programa »FOX TELEVIZIJA« DOO, Beograd	1	0

8.1. BROADCATING STATION CONTROL

In 2009, RATEL continued with the activity of banning broadcasting stations which had been operating without the licence. For certain regions or local areas, the abovementioned action had been postponed until the additional tenders for regional and local areas were conducted. A certain number of broadcasting stations had their operation terminated after the adoption of decisions on banning the work of such stations, whereas some of the stations operating without a licence were sealed in accordance with the provisions regulating the telecommunications sector and standard administrative proceedings.

By the end of 2009, approximately 60 broadcasting stations, registered in the period from after 1 September 2008 to the end of 2009, were working without the licence and were identified through controls and detection of illegal broadcasting.

In 2009, we were able to observe the continuation of the illegal work of certain broadcasting stations which had managed to obtain the radio station licence but used additional receivers without the appropriate licence with the aim of enhancing the area of coverage,

thereby breaching the terms and conditions stipulated in the licence. Against such radio station owners, RATEL undertakes measures prescribed by the Law with the purpose of ensuring the lawful application of provisions stipulated by the licence.

8.2. TECHNICAL INSPECTION

During 2009, the activities related to performing the 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.

The number of technical inspections of radio stations carried out in 2009 is given in Table 12.

Table 12. Number of Radio Station Technical Inspections in 2009

Total number of reported technical inspections	Total number of performed technical inspections	Total number of technical inspections of radio stations which comply with the terms and conditions of the issued licences	Total number of approved technical inspection postponements	Number of radio stations with expired technical inspection deadlines
8975	7680	6603	999	976

Table 13. Overview of Successfully Performed Technical Inspections According to the Type of Radio Station

Type of radio station	Number of technical inspections
Base radio station or repeater (FB)	858

Fixed radio station (FX)	1,676
Mobile radio station (MO)	1,988
Handheld radio station (ML)	1,725
Television broadcasting station (BT)	44
Sound broadcasting station (BC)	130
Aircraft radio station (FA)	174
Satellite service radio station (TC)	8

9. TELECOMMUNICATIONS NETWORKS OF PUBLIC ENTERPRISES

9.1. ELECTRIC POWER INDUSTRY OF SERBIA (EPS)[1], 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, 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. The test phase of their deployment will soon commence, though certain segments of the optical network have been operational for a long time. All current measurements show that a high quality level was attained for the components in use. Therefore, apart from the significant increase in network quality, a large financial gain is manifest as well.

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 as it stands now spans the length of 3,700 km, with the

[1] Excerpt obtained from the Electric Power Industry of Serbia (EPS), public enterprise

length of over 4,000 km to be achieved by end 2009. Inadequate conditions were noted on the secondary protective cable during construction on certain segments of the 400 kV power level network, thus, replacements were installed utilising the same equipment already deployed in the field and using new AWG cables, to the length of approximately 500 km. Therefore, indirectly, the power supply state of all power lines where optical equipment was introduced was likewise significantly improved.

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. A 24 fibre cable was also used in certain segments where the state of the network required extremely thin and light OPGW cables, comprised of 12 G.652 type fibres and 12 G.655 type fibres.

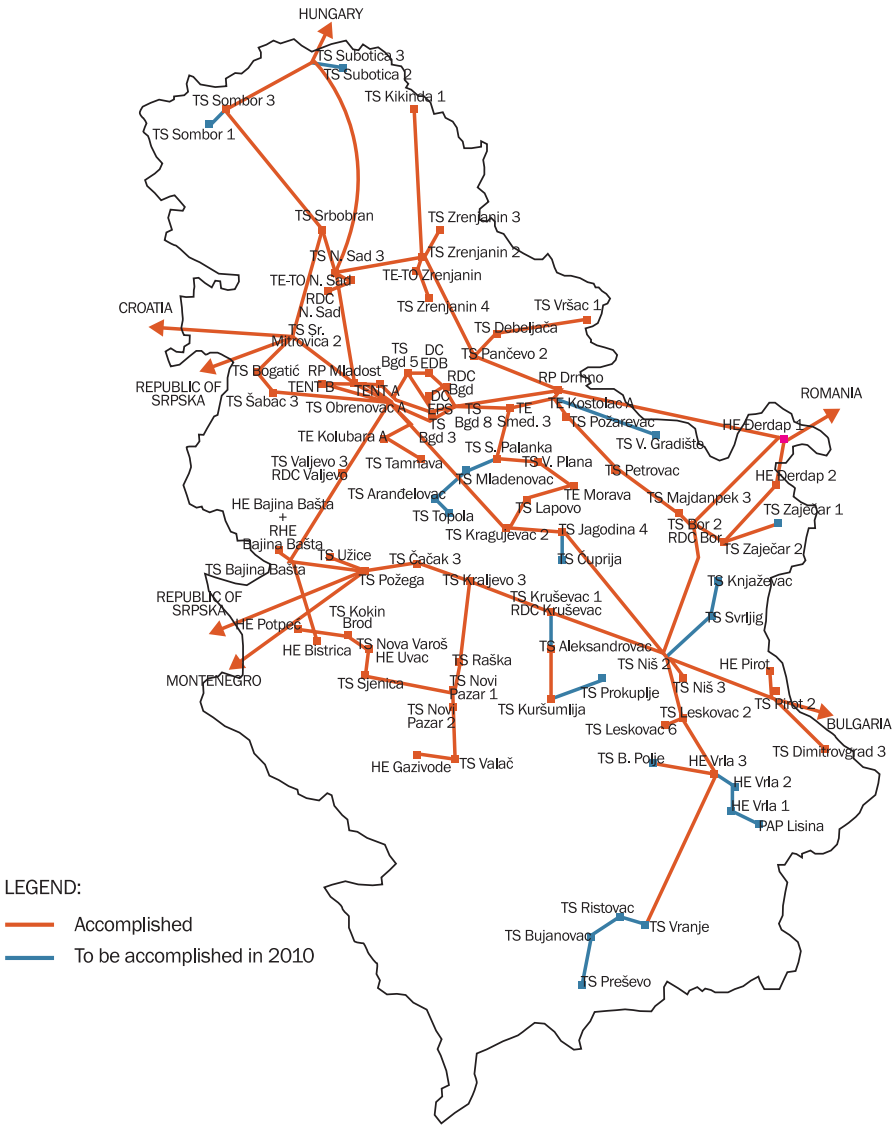
The state of the optical network is regularly monitored by measuring losses, chromatic dispersion and polarization mode dispersion (PMD), twice per year. The quality is very good thus far, remaining within the prescribed margins. Regular monitoring has uncovered undesired effects in several segments on power lines under extreme weather conditions. These cables were returned within the warranty period and said segments were replaced by the cable provider.

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 71) 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 a power supply, as well as a 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 utilizing new telecommunications capacities was ever present and increasing, the usage started before the full completion and deployment. This is especially true of the inter-

Figure 71. Optical Network of the Electric Power Industry of Serbia — Source: EPS



connection routes with neighbouring countries during the process of connecting to the UCTE. Part of the optical network has been in use for years with temporary terminal equipment of a lower capacity. After deploying the designated terminal equipment, the temporary equipment should be moved towards lower layers. Temporary partial use covers nearly half of the routes installed, initially taking up very modest telecommunications capacities.

9.1.2. TERMINAL EQUIPMENT

Pursuant to the design, the new top level optical telecommunications network was to contain 60 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.

The plan is completely fulfilled. Locations were replaced in only two cases where the planned optical link was not implemented for objective reasons, thus the installation of the envisaged devices would make no sense. These devices were allocated to other locations at the distribution level, where a large need for their use arose.

With the aim of transmitting business, technical and voice data priority was given to SDH technology, 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 utilizing the 64 kbit/s channel, comprising the network providing channel transfer in dedicated TC 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 ba-

sis, 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 are 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 synchronization devices. The control and monitoring system is a centralized, redundant system with high capacities enabling the remote control of all network elements, SDH and FMUX devices, as well as synchronization devices.

Figure 72 shows all of the nodes with terminal equipment installed and their telecommunications capacities for adequate routes. In accordance with the previously prepared Forwarding Plan, all terminal equipment must perform the transfer of all business and technical data within the power supply system in a satisfactory manner.

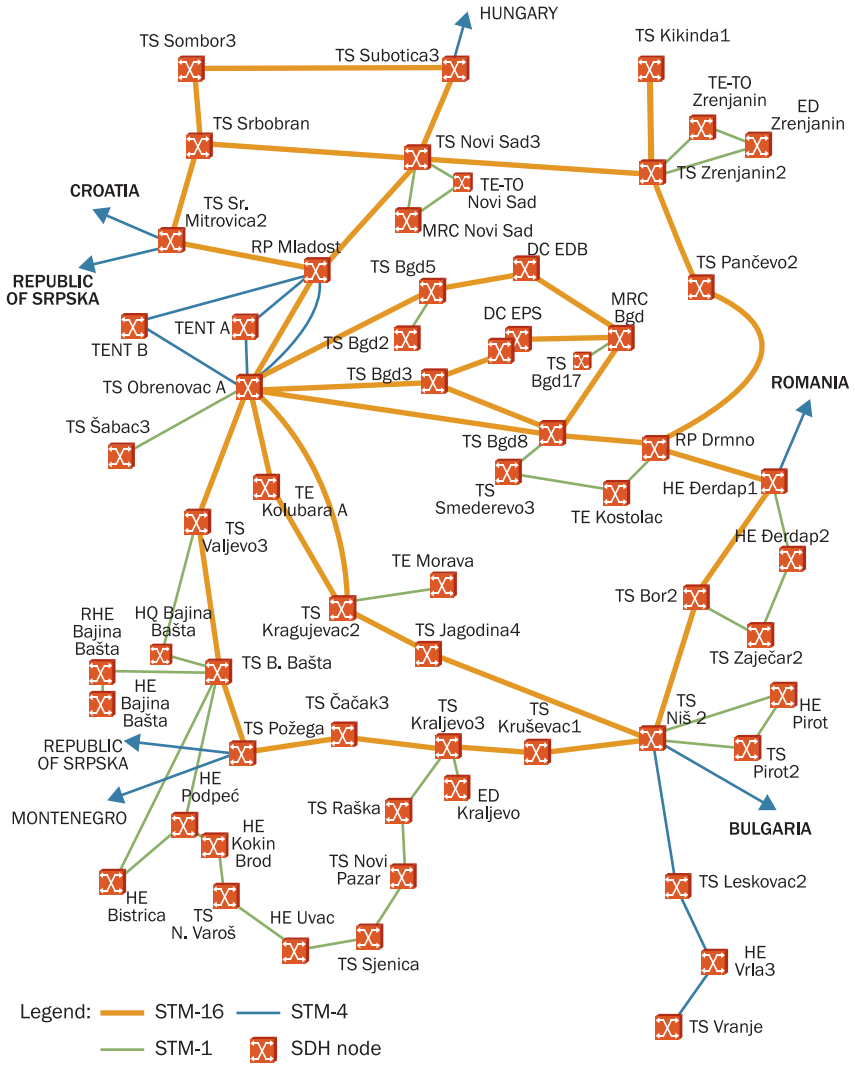
9.1.3. IP TELEPHONE NETWORK

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. After multiple rounds of consultations, round tables and discussions, an update of the existing Project Idea for the electrical power system telephone network was performed, now based on IP technologies, as agreed upon by the Board of Experts, thereby making the decision to introduce this technology in the telephone network of the electrical power system.

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 EMS 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 utilizing MPLS technologies, installed in five locations connected in a full-

Figure 72. Schematic Outline of the Locations and Capacities of the New Telecommunications Network
Source: EPS



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 signalization .

The plan is to construct the new network and have it in test deployment by end 2009. Its implementation will significantly improve the telephone communications in a large segment of the power supply system and will create the conditions for the gradual introduction of IP technology on the remaining segments as well.

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 NETWORKS OF SERBIA (ENS)[2], PUBLIC ENTERPRISE

Telecommunications system of the public enterprise Electric Networks of Serbia (ENS) 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 transmitted over this telecommunications system covers the needs of the ENS public enterprise which is in charge of maintaining, monitoring and managing its resources.

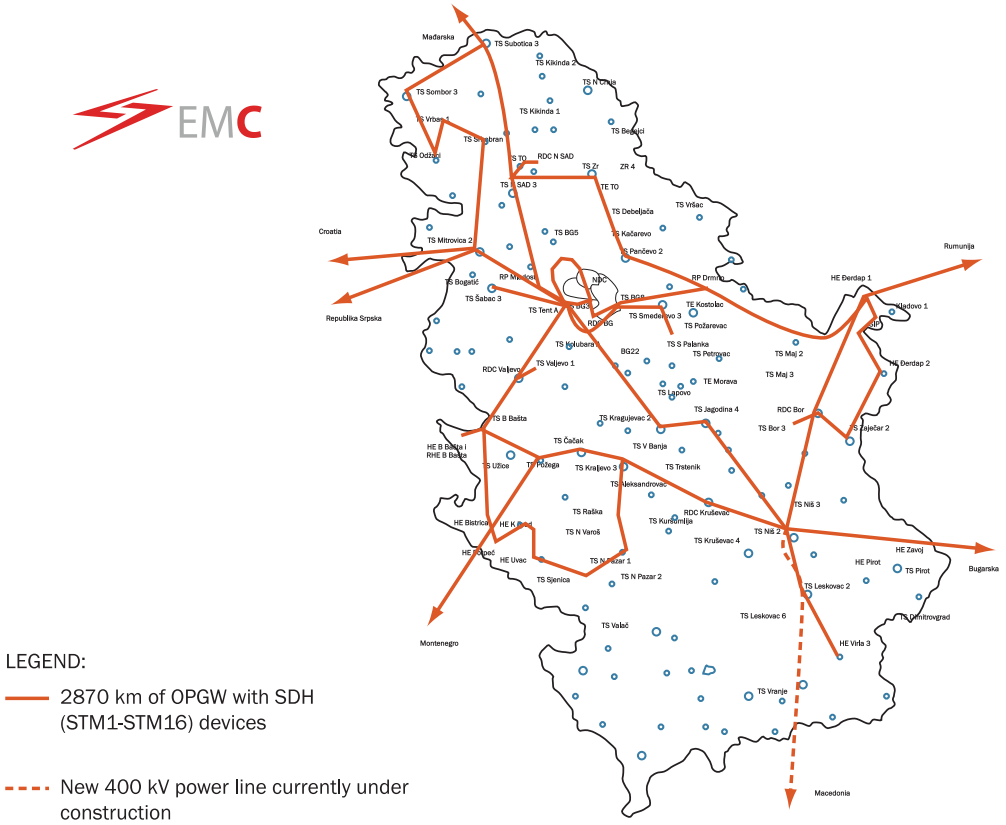
Due to the requirements of technological processes pertinent to the electrical power transmission system management, this telecommunications system enables a higher level of information transmission reliability and security, with lower transmission speed and capacity requirements as opposed to public 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 ENS SCADA (*Supervisory Control and Data Acquisition*) signal, Electric Power Industry of Serbia (EPS) and ENS business data transmission, signal transmission for distant ENS power line protection as well as monitoring and managing the telecommunications system. For the purpose of information transmission, ENS uses several networks of different technologies.

[2] Excerpt obtained from the Electric Networks of Serbia (ENS), public enterprise

The basis of the ENS telecommunications network is the optical network realized by OPGW (*Optical Ground Wire*) cables and optical SDH (*Synchronous Digital Hierarchy*) terminal equipment. The OPGW network of cables is an integral part of ENS power lines (since the power line protection is the basic power function). OPWG network illustration is given by EPS.

At the end of 2009, there were approximately 4000 kilometers of OPGW cables installed. ENS optical terminal devices are installed along 2,870 kilometers. These devices are in function in 47 nodes. The speed levels are STM-1 (155 Mbps) and STM-2 (2.5 Gbps). Figure 73 illustrates the ENS telecommunications system.

Figure 73. Optical ENS Telecommunications System (November 2009) Source: ENS



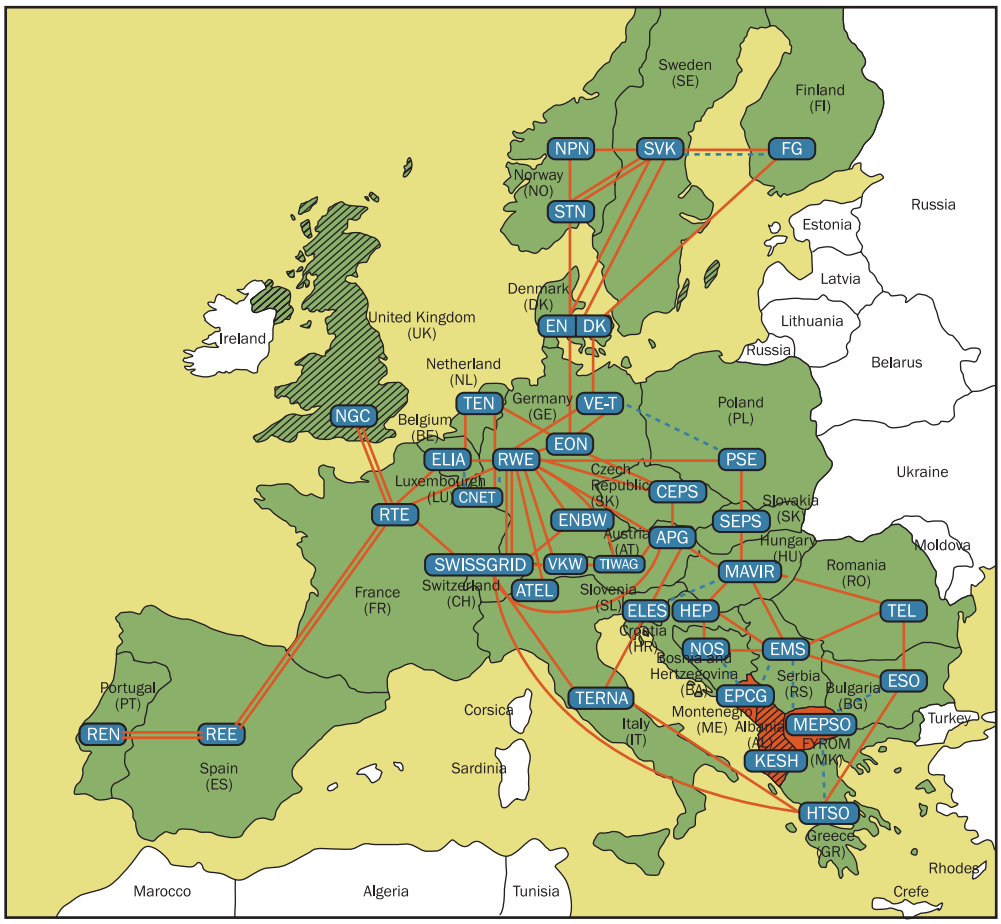
The necessary path redundancy was achieved through 4 STM-16 and 5 STM-1 optical loops: both SDH and PDH (*Plesiochronous Digital Hierarchy*) links have been in operation incessantly, whereby the exceptional availability was achieved. If we do not take into consideration the disconnections of devices for the purposes of reconfiguration or optical cable interventions, there were no disconnections related to the work of SDH terminal equipment during 2009. 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 ENS Telecommunications Centre.

With the use of optics, and in accordance with the UCTE (ENTSO-E) recommendations, ENS 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, ENS is linked to the European Energy Network (Electronic Highway). 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 74 illustrates the above-mentioned international links, with ENS 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 network via automatic telephone exchanges in certain telecommunications centers. 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, 18 packet telephone exchanges were installed within the single ENS and EPS telephone network.

Figure 74. Electronic Highway (Backbone Connections)



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 being discussed. ENS 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.

With the enhancement and modernization of ENS telecommunications system, significantly higher transmission capacities, availability and reliability of telecommunications transmission were achieved as well, along with considerable savings during 2009. With the transfer of traffic into its own system, ENS has cancelled most of its lines leased from Telekom Srbija. The amount of savings has exceeded the value of the active equipment which has been built in. By building and exploiting the modern telecommunications system, the ENS personnel gained new skills necessary for the activities of operational management, monitoring, as well as maintenance of the ENS 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.

Since the active equipment provides unused capacities as well, one of the existing telecommunications systems (ENS, 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) should be of highest importance. The unused capacity is mostly evident in the part pertinent to OPGW cable fibres. In taking this matter into consideration, one should note that ENS power lines (with OPGW cables) end in transformer stations with highly restrictive security access. The abovementioned transformer stations are located outside urban areas.

9.3. SERBIAN RAILWAYS3, PUBLIC ENTERPRISE

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.

[3] Excerpt obtained from Serbian Railways, public enterprise

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.

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 and Požega – Čačak. The total length of optical cables laid is 55 km. The above-mentioned optical cables have the capacity of 8, 10 and 12 fibres.

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.

HF transfer along main routes is achieved by using 300-channel systems. HF transfer alongside routes is achieved by twelve-channel systems, whereas along non-electrified railroads it is achieved using twelve-channel systems for operation along with aerial lines and three-channel systems.

The Serbian Railways PE makes use of 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,
- 167.250-167.375 MHz band paired with 171.750-171.875 MHz reserved for the ZGOP radio networks,
- 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.

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.

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.

The transfer system network architecture consists of three layers:

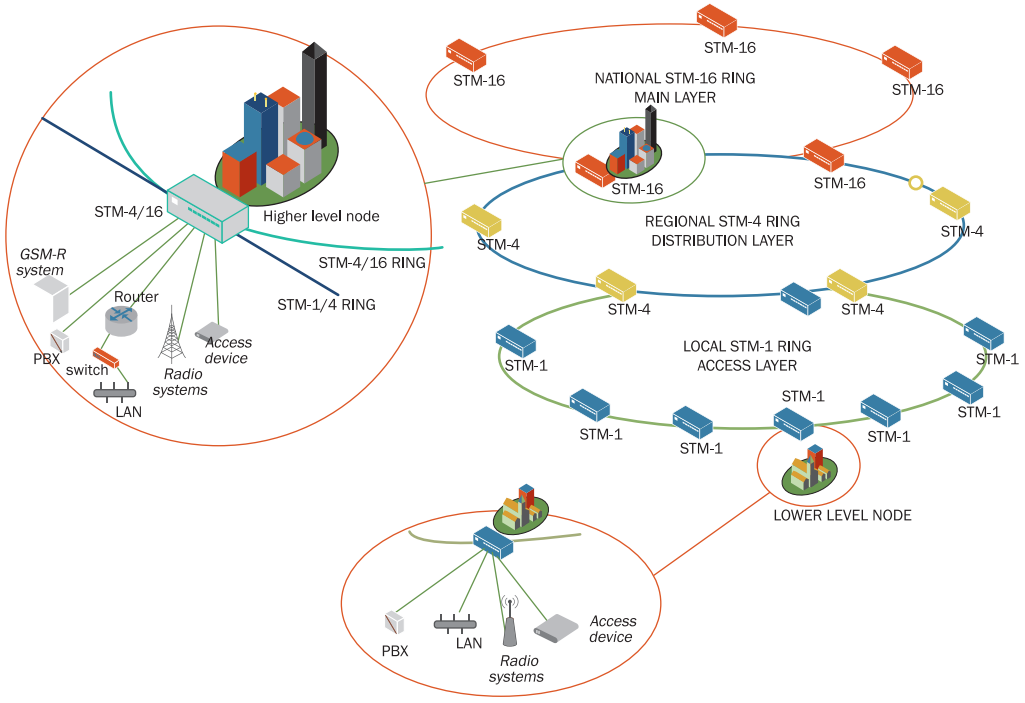
- Main
- Distribution
- Access

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.);
- 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.

Figure 75. Telecommunication Transmission System

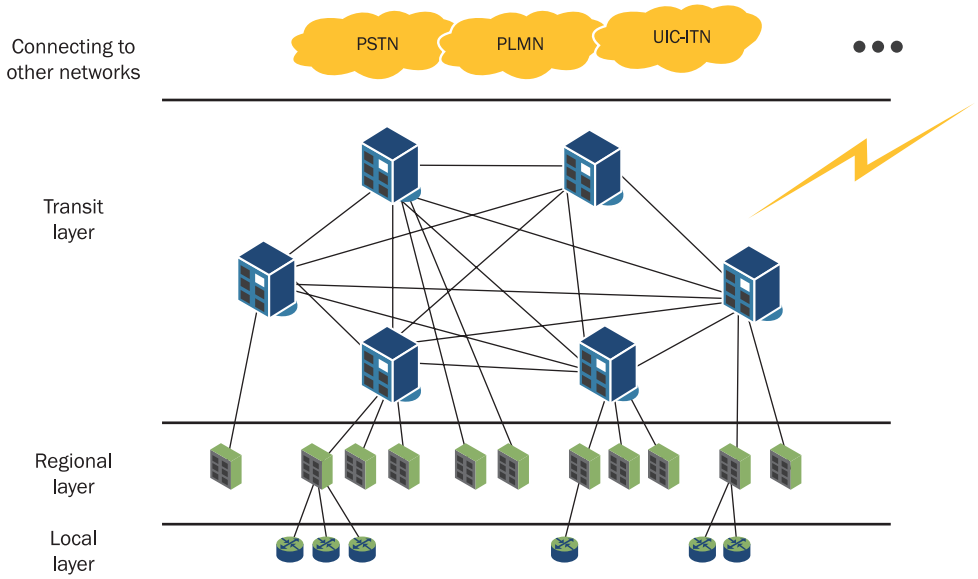


The telephone network in Figure 76 would operate as a three-tiered network. It would be comprised of the transit, regional and local layer.

Nodes in the transit layer are mutually partially networked and are mostly located in the headquarters of the railroad organizational units. Each regional node contains local software enabling full autonomous control and full call processing for all its users. Local layer nodes would most

frequently be located along the railroad in smaller official facilities. Connection to other railroad office networks would only be possible through the Belgrade transit switch. Connection to the public network would, most likely, be achieved through the transit layer, although the option of connecting from some of the regional nodes should also be planned for.

Figure 76. Switching Network



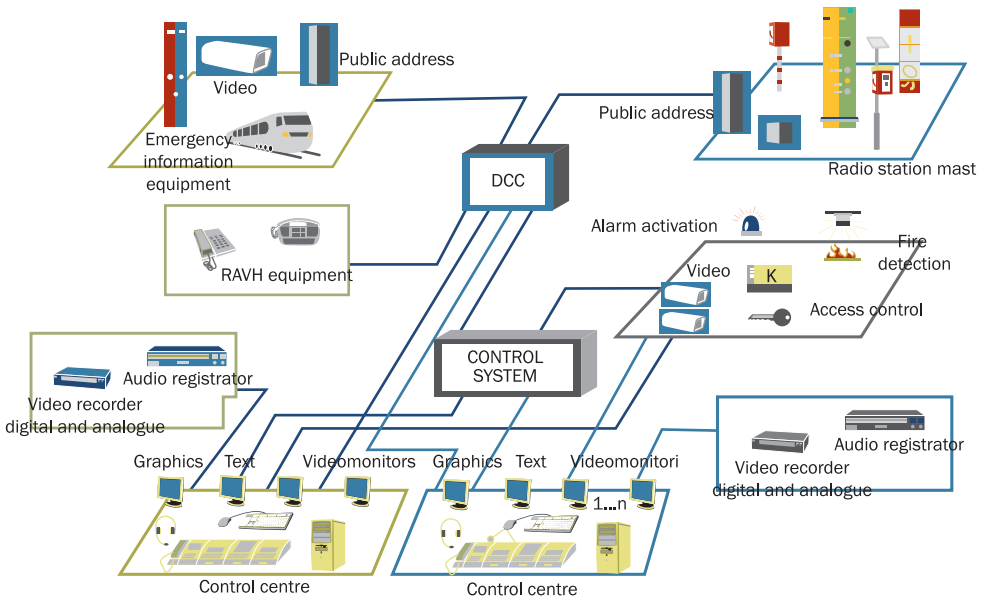
The investment works envisage the setup of modern railroad telephony systems manufactured using digital integrated technologies.

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 10 following the completion of the construction of optical infrastructure.

Figure 77 shows the systems that can be integrated within the DCN nodes and the dispatcher centres of the Dispatcher Systems of Traffic and Electrical Traction.

Figure 77. Digital Integrated Railroad Telephony Systems



DCC – Digital communication centre

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 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 an access bandwidth of 2Mbit- 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.

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.

10. THE LIST OF BYLAWS

- Rules on procedure for radio-station licence issuance and on data and documentation to be submitted together with radio-station licence request (*Official Gazette of RS*, no. 100/05)
- 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. 06/07 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 Administering the Numbering Plan for Telecommunications Networks (*Official Gazette of RS*, no. 87/07)
- Rules on general terms and conditions for interconnection of public telecommunications networks (*Official Gazette of RS* , no. 53/08)
- Numbering Plan of the Republic of Serbia for Telecommunications Networks (*Official Gazette of RS*, nos. 57/08, 77/08, 105/08,107/08-corr. and 85/09)
- 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)
- Rules on forms for radio-station licences (*Official Gazette of RS*, no. 111/08)
- 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 numbers 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)

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