Based on the Article 45 paragraph 1 of the Law on Government ("Official Gazette" of the Republic of Serbia, No. 55/05, 71/05 – correction 101/07), the Government of the Republic of Serbia on July 2nd 2009 has adopted

Strategy for Switchover from Analogue to Digital Broadcasting of Radio and Television Programs in the Republic of Serbia

I. Introduction

The Strategy defines the framework for switchover from analogue to digital broadcasting of radio and television programs based on modern achievements in digital broadcasting as well as in the related areas, in order to provide better quality and efficient broadcasting of television, radio, multimedia and other contents of great value for end users.

The Strategy sets basic strategic guidelines for introducing digital television and radio programs in the Republic of Serbia in order to introduce and develop digital electronic communications, as a primary national interest. The Strategy was drafted in accordance with the Conclusions of Regional Radiocommunication Conference (RRC06), organized by International Telecommunication Union (ITU) and held in Geneva in May and June 2006, that set the date for the switchover from analogue to digital broadcasting in Europe to be at the latest on the 17th of June 2015. The Recommendation of European Commission to Member States COM (2005) 204 suggested that the analogue switch-off and switchover to digital broadcasting should be at the beginning of 2012.

4th of April 2012 is set to be the date of analogue switch-off and switchover to digital broadcasting of television programs in the Republic of Serbia.

The Ministry of Telecommunications and Information Society has drafted the Action Plan as an integral part of the Strategy that determines the competences of the responsible institutions and important deadlines for the process of digitalization.

1.1. Benefits of Digital Broadcasting

Digitalization will provide the citizens with better sound and picture quality, variety of contents, more radio and television programs, new services for users with disabilities and for senior citizens, enhanced additional services, portable and mobile program reception, as well as convergence of services.

Digitalization will ensure the options for service providers to adjust the program content to the needs of different target groups, interactivity, potential to provide services on demand, lower broadcasting costs and convergence of services.

The State will benefit from more efficient utilization of radio frequency spectrum, exploitation of the newly free part of the spectrum for implementing new services, promotion of technology development and new job positions, improved competition and more opportunities for enhanced creativity and preservation of cultural identity. Switchover

to digital broadcasting will ensure lawful spectrum usage, since only broadcasters with valid licenses will have their place in the multiplex.

1.2. Digital Broadcasting Chain Architecture

Key components of digital broadcasting can be categorized in three basic sectors: content producers, network operators and users. Alongside the program digital broadcasting systems enable a whole series of new services, irrespective of whether these are already included in the basic program, or they are offered individually.

The category of end users consists of digital receivers and receivers with Set Top Boxes (STB) for different types of broadcasting.

The chain of digital program broadcasting participants (*content provider, multiplex provider, transmission provider, broadcast provider*) is presented in Figure 1.1.

Content providers are broadcasters as well as the providers of television, radio and multimedia content that can be transferred along with the basic program content or within the new services provided by digital dividend.

Multiplex services will be provided within the distribution systems. When the content providers form a digital signal and digital stream, distribution systems accept it in that form and multiplex it along with other multiplex streams.

Distribution systems are composed of primary (that send the signal to transmitter) and secondary systems (that send the signal to the end-user-viewer). Primary distribution can be performed over the radio systems (radio links), over telecom network operator, cable systems or satellite. Secondary distribution, along with cable, satellite or Internet broadcasting, can be performed terrestrially, by using the broadcasting equipment of broadcasting service providers. The Strategy analyses the terrestrial signal broadcasting in the process of switchover from analogue to digital broadcasting. Therefore, the owner of secondary distribution systems is also multiplex owner.

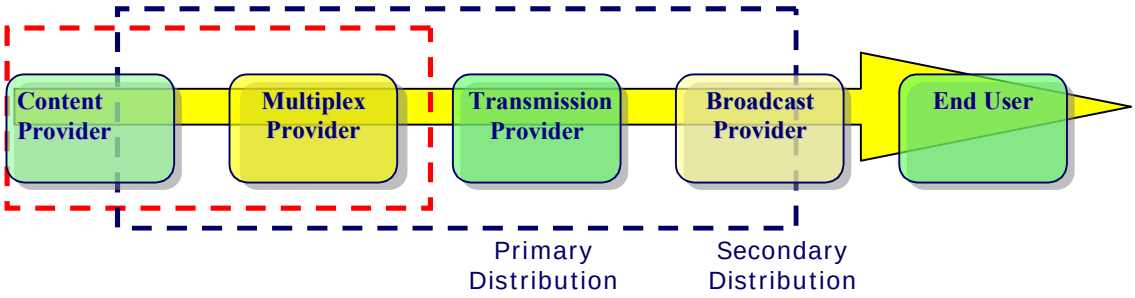

Figure 1.1. Chain of digital broadcasting process participants

At the beginning of the transition period in Serbia, it is planned to establish an enterprise which will operate the transmission infrastructure. This enterprise will be extracted from the Broadcasting Company of the Radio Television of Serbia and it will be obliged to apply equal, non-discriminatory conditions regarding the quality, availability and fees towards all broadcasters. Fees for broadcasting services will be cost-based. The role of enterprise will be

purely technical, without the possibility of influencing on program selection and broadcasted program content.

1.3. Standardization in the Digital Broadcasting Sector

Digital Video Broadcasting Project (DVB), an international sector-oriented consortium with more than 270 members among which are the principal regulators, broadcasters and representatives of consumer equipment manufacturers, has been handling the standardization in the field of digital broadcasting in Europe since 1993.

DVB Project carries out studies of processing techniques, compressions, protection and transmission of information. Based on these studies, demands for the adoption of new technologies that are applied in the transmission of radio, television and multimedia contents are being specified. A series of DVB specifications are thus being defined and later standardized by the European Telecommunications Standards Institute (ETSI*).* ETSI decides on European Norms (EN) that are afterwards included into the European and national legal documents. The Republic Agency for Telecommunications (RATEL) was admitted as a new ETSI member in 2007, which enabled direct application of ETSI standards in RATEL's scope of work.

The first digital standard adopted by the DVB Project (in December 1993) for satellite transmission is DVB-S, defined by the ETSI standard No. EN 300 421. In all European countries, and in Serbia as well, this type of service is available for many years now. On the other hand, the existing distributors of cable television obtain a large number of programs by satellites. This fact was an incentive for development of the first digital cable standard, DVB-C, which was adopted back in 1994.

Later on in the process of the DVB Project development, the problem of television signal broadcasting by means of terrestrial links in open space was considered, since it can be subject to various disturbances, and especially to multiple propagation. This is why a complex system of digital terrestrial television broadcasting by means of the DVB-T standard (EN 300 744) has been developed, and the technical solution which enables it is called COFDM. The standard is based on multiplexing with great number of orthogonal carriers that lessen the problem of multiple propagation and delays. In this way the signal is protected from destructive interferences by echo signals, making it possible to design the broadcasting network as one-frequency, SFN or multi-frequency network, MFN. The SFN network type enables more efficient frequency spectrum utilization, but at the same time requires precise synchronization of transmitters, which is achieved by using the Global Positioning System – *GPS*. The MFN network type is commonly used for analogue systems for terrestrial transmission. In the digital network design process, a combination of SFN and MFN networks is most frequently used.

The DVB-H standard, based on the same principles as the DVB-T standard, has been adopted for the reception of digital television signal by mobile receivers. These two systems can function simultaneously within the same multiplex, if the hierarchy modulation is applied.

DVB Project has adopted a number of key principles for development of digital systems for television signal broadcasting among which one of the most important pertains to the manner of compression of video and audio signals. Thus, it was decided to use the MPEG-2 standard for the video signal, since it is identical to the Recommendation No. H.262 of the Telecommunication Standardization Sector of the International Telecommunication Union

(ITU-T). The development of new techniques brought in a compression type for multimedia services MPEG-4, and further improvements developed a new compression type which enabled better video signal quality at somewhat higher data rates. This is how the first compression standard that was an equal match to the already indisputable MPEG-2 standard emerged. It was the MPEG-4 standard, version 10 (which was adopted by ITU as the Recommendation No. H.264/AVC, *Advanced Video Coding*). By a series of compression improvements, the H.264 managed to achieve approximately the same subjective quality of decoded video signal as MPEG-2 at twice lower bitrates. This standard was adopted in 2003. Later on it was supported by the development of High Definition Television (HDTV), which, combined with the MPEG-4 standard, demands reasonably low bitrates. The potential for scalable coding was also developed within MPEG-4 standard, thus enabling efficient and simultaneous broadcasting of different quality signals, that is, simultaneous broadcasting of the signals dedicated to different monitor sizes or different numbers of pictures per second.

Nowadays, there are coders with ports for selecting one of the two compression standards, MPEG-2 or MPEG-4 version 10 (H.364/AVC).

Development of technologies that television broadcasting equipment and software solutions are based on, as well as a relatively long time period since the first standards for testing innovative solutions were established, jointly resulted in defining the state-of-the-art, more efficient and, for the present moment, more adequate solutions within the DVB Project. This is how the second generation of DVB standards was created.

On the tenth anniversary of the DVB-S standard emergence, the DVB-S2 standard was adopted (EN 302 307). The DVB-SH standard was proposed to replace the DVB-H standard, and it was developed in two forms: one following the principle of classic satellite broadcasting, and the other as a DVB-H standard based on COFDM modulation. The chronological sequence of DVB standard development is presented in Figure 1.2.

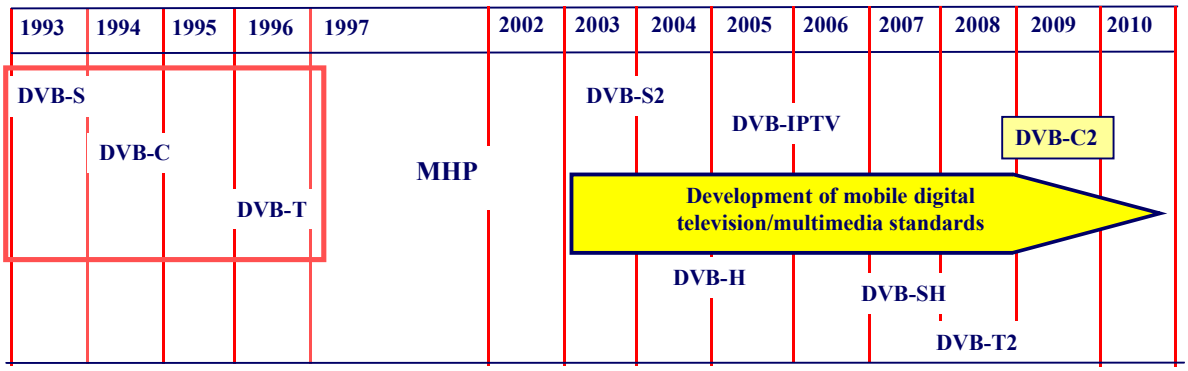

Figure 1.2. Chronological sequence of the most important DVB standards development

In June 2008, a specification of the DVB-T2 standard was published. All second generation DVB standards are very complex, but at the same time they enable 30-50% bitrate increase, in comparison with the first generation standards. It is necessary to emphasize that the additional improvement of the second generation DVB standard will be achieved if the MPEG-4 version 10 for the compression is adopted.

Thus, it is possible to apply either the DVB-T or the DVB-T2 standard for digital terrestrial transmission for fixed receivers.

DAB is a system for digital radio transmission conceived within the European Eureka Project. Signal redundancy reduction, based on the characteristics of the human auditory system, achieves high compression of audio signals. It should be noted that the development of DAB, and especially the way it overcame the multiple propagation problem, served as an idea for the development of the DVB-T standard. First DAB systems were experimentally used for several years. Noticing the weaknesses in the audio signal protection while transmitting, as well as developing of more efficient and modern coding ways, ETSI has suggested more advanced version called DAB^{+} in 2007.

1.4. Selection of the Standards for digital broadcasting

While making the decision on the standards for digital broadcasting in the Republic of Serbia the development and improvements of DVB/DAB systems were taken into consideration, as well as the experiences of the European countries that have digital broadcasting already for almost ten years.

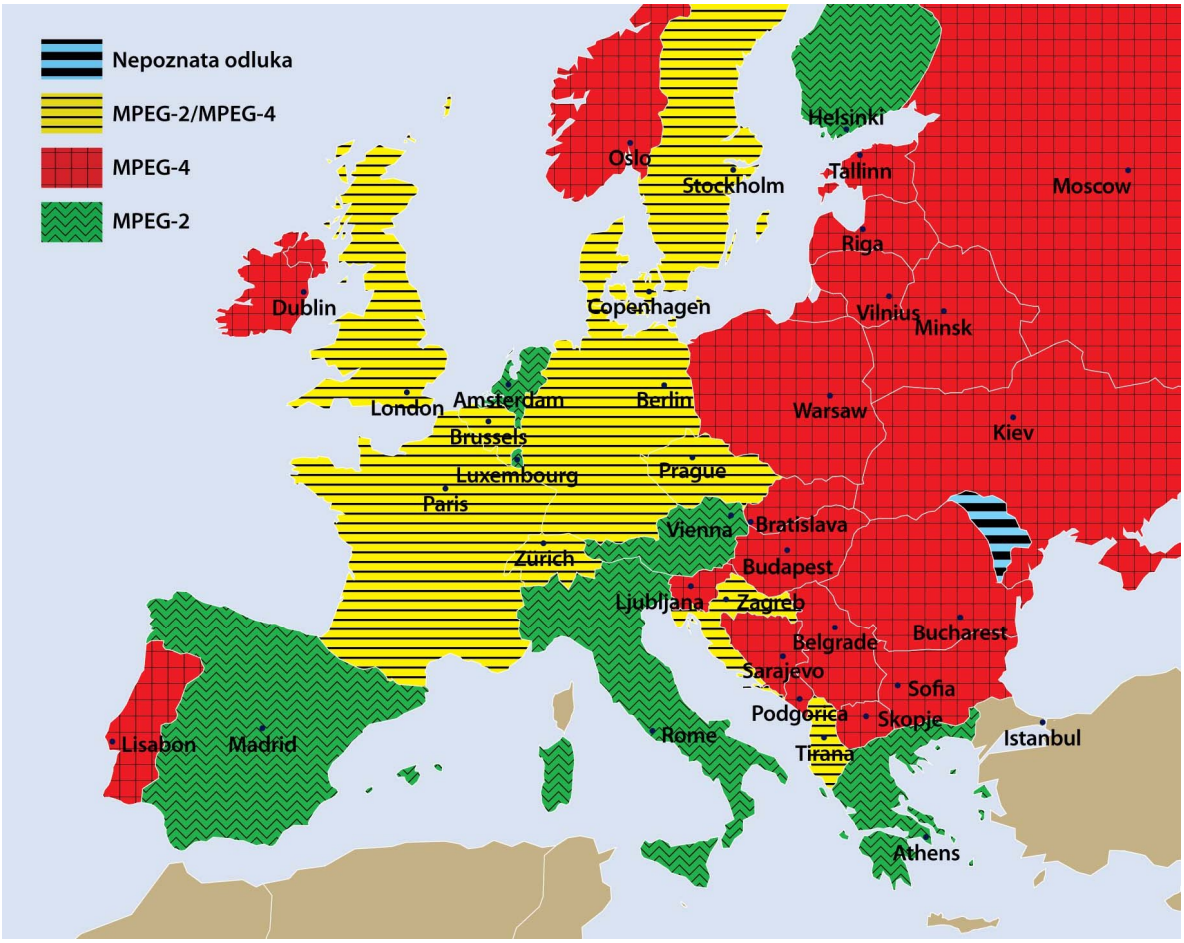

Figure 1.3. Compression standards in Europe

A. Compression standard

Experiences of the European countries regarding the standards for each country in the process of digitalization are taken into consideration while selecting the standard but they are not the decisive ones. It is also important to have in mind the time of the beginning of digital broadcasting in the European countries (figure 1.3.). Countries that first started with digital broadcasting had only MPEG-2 standard and by introducing the high definition television, they added the MPEG-4 version 10 standard (further: MPEG-4) for HDTV.

Selection of MPEG-4 version 10 (H.264/AVC) compression standard is based on the following facts:

- Coders based on MPEG-4 standard demand twice lower bitrate for the same quality of reconstructed video signal in comparison with MPEG-2;
- There is a great demand for introducing High Definition Television (HDTV) in Europe and MPEG-4 is the best choice. The video footage of the major sport and cultural events are transmitted in this standard;
- The opinion of leading international television associations is that MPEG-4 standard is equally good for low and high bitrates (meaning for SDTV and HDTV);
- MPEG-4 standard is compatible with IPTV;
- MPEG-4 standard used for DVB-H and for all DVB standards suitable for portable devices;
- Compatibility of the compression standards is important for lowering the transcoding (every pair coder/decoder lowers the signal/noise ratio in reconstructed signal for 3-5 dB);
- In the time of ASO (Analogue Switch-Off), completion of analogue broadcasting, the price of coders and decoders for MPEG-4 will be decreased (having in mind the level of its demand in 2012.)
- MPEG-4 supports all new multimedia services;
- For Content providers it is important to rent the capacities for lower bitrate and this is provided by MPEG-4.

B. Standard for digital broadcasting of television signal

Selection of DVB-T2 for digital terrestrial broadcasting of television program is based on the following facts:

- DVB-T2 offers very good signal protection, suitable for transmitting in the surroundings with lots of noise and interferences such as terrestrial system;
- DVB-T2 enables better conditions of transmitting (in comparison with DVB-T) that provides higher bitrate within the same band of television channels of 8MHz/7MHz;
- DVB-T2 has lower sensitivity on interferences (in comparison with DVB-T) and facilitates the designing of SFN networks;

- DVB-T2 accepts the transport stream with flexibility as well as the protocol for generic stream encapsulation which is very important for compatibility with IPTV;
- Experiments with the combination of MPEG-4/DVB-T2 showed good results (bitrate 45Mbit/s in television channel of 8MHz) on the great number of modulators and demodulators of worldwide producers;
- Countries that were using DVB-T have started reorganizing multiplex and switching to DVB-T2 standard;
- Investments in the digitalization process in the Republic of Serbia demand a great deal of financial means. Switch to a different standard (meaning switch from DVB-T to DVB-T2) would demand new investments for transmitting and receiving equipment;
- In the future, DVB-T2 devices will decrease in its price. On the other hand, in a few years, maintenance costs of MPEG-2/DVB-T will increase.
- It is necessary to choose the solution that will, from the broadcasters point of view, secure the fastest and the most economic transfer to digital broadcasting. Number of necessary mulitplex will decrease with the use of modern standards, and that will lead to the decrease of the total equipment price;
- The owners of broadcasting equipment that use DVB-T2 standard will benefit because DVB-T2 supports the great number of programs content within one multiplex, which also influences the cost level;
- DVB-T2 secures sufficient bitrate for the needs of great deal of HDTV programs;
- The application of DVB-T2 standard significantly increases digital dividend;
- Within DVB-T2 standard, great number of coding parameters and modulations are being defined, meaning that it provides a very flexible surroundings. DVB-T2 standard secures the transmitting in the same allotments that were planned before for DVB-T.

C. Standard for compression and digital broadcasting of audio signal

Selection of DAB$^+$ standard for digital terrestrial broadcasting of audio signal is based on the following facts:

- DAB+ implies the same conditions of signal transfer as DAB, but it has more efficient audio coder. Efficiency of audio coder in DAB+ can be seen in the same quality of reproduced audio signal with considerably lower bitrate;
- DAB$^+$ enables various audio effects, stereo sound, etc.;
- In DAB$^+$ surroundings, DMB can be transmitted (standard used for digital transfer of multimedia data to mobile devices, e.g. mobile phones);

If we take into consideration the price of digital audio decoders and the fact that in the developed European countries its introducing is planned after 2017, one can see that the selection of DAB+ standard is based on present quality assessment. However, it is highly unlikely that that the new audio standard for broadcasting in VHF band will be adopted in the foreseeable future.

II. Regulatory Framework

General Objective:

Defining the legal activities in order to ensure the creation of the regulatory framework for digital broadcasting in accordance with International and European standards, stimulating the market development, diversity and pluralism on media scene. While drafting the new regulatory framework, it is necessary to bear in mind the specific conditions in the Republic of Serbia as well as the market position of broadcasters that have valid licenses for broadcasting also after the switch-off.

2.1. Regulatory Framework of the Republic of Serbia

The regulatory framework of the Republic of Serbia consists of the following legal acts:

1. **Strategy for Development of Broadcasting Sector in the Republic of Serbia by the Year 2013** ("Official Gazette of the Republic of Serbia", No. 115/05), which states that the future development of the broadcasting sector, whether by satellite, terrestrial or cable transmission or broadcasting, will primarily be based on digital technologies, since the digital technologies for terrestrial broadcasting enable better utilization of the existing frequency resources and better resilience against reception quality degradation. Regarding digital terrestrial broadcasting, the Strategy determines that Serbia has already opted for the T-DAB and DVB-T standards.

   The Strategy establishes the need for comprehensive regulation of the digital broadcasting sector by a new law or by its amendments, based on the fact that digital broadcasting, unlike analogue broadcasting, "is a system with a substantial number of chain participants (content provider, multiplex provider, transmission provider, broadcast provider)".

   The Strategy notes that the Republic Broadcasting Agency has suggested to the Republic Telecommunication Agency and to the Ministry of Telecommunications and Information Society to reserve special TV channels designated for experimental digital broadcasting in its Allocation Plan, in a way which would not decrease the maximum number of available frequencies and locations that will be allocated by public competitions for analogue terrestrial broadcasting.

   The Strategy further stipulates that the official documents issued by the Republic Broadcasting Agency should provide all interested broadcasters with the possibility, of gaining access to these experimental digital channels.

2. **Strategy for Development of Telecommunications in the Republic of Serbia, from 2006 to 2010** ("Official Gazette of the Republic of Serbia", No. 99/06), encompasses legal, institutional, economic and technical aspects of development in the telecommunications sector in the Republic of Serbia, and mentions the switchover to digital broadcasting as one of the important strategic aims.

3. **Law on Telecommunications** ("Official Gazette of the Republic of Serbia", No. 44/03, 36/06) regulates, in accordance with international legal standards, the conditions and

means of running business operations in the telecommunications sector, establishing of the Republic Agency for Telecommunications, defining authorizations for regulating business relationships among actors in the telecommunications sector, and handling issues pertaining to the following: dominant market position and significant market power prevention, guiding principles and procedures for operation licences issuance, regulation and control of tariffs for telecommunication services under the circumstances of a limited market size, interconnection of telecommunication networks and operators, leased lines, scope, content and enhancement of the universal service, as well as the rights and obligations of telecommunications operators in that sector, broadcasting and international telecommunications.

Principles on which regulation of business relationships among actors in the telecommunications sector are based have also been defined, and these principles are as follows:

- Provision on conditions for development of telecommunications in the Republic of Serbia;
- Consumer protection in the area of telecommunications services;
- Creating conditions for meeting the users' needs for telecommunication services;
- Boosting the competition, economical and efficient behaviours in business operations within the telecommunications sector;
- Ensuring maximum quality of telecommunication services;
- Providing interconnection of telecommunications networks, that is, of telecommunications operators under the non-discriminatory and mutually acceptable conditions;
- Providing rational and economical utilization of radio frequency spectrum;
- Harmonization of operations in the telecommunications sector with the international standards, practices and technical norms.

4. **Broadcasting Law** ("Official Gazette of the Republic of Serbia", No. 42/02, 97/04, 76/05, 79/05, 62/06, 85/06, 86/06) regulates conditions and means of running business operations in the broadcasting sector, in accordance with international conventions and standards, establishing of the Republic Broadcasting Agency and the public broadcasting service institution, conditions and procedures for issuing radio and television broadcasting licences, editorial policies and other issues relevant for the broadcasting sector.

   Regulatory framework in the broadcasting sector has been based upon the following principles:

   - Freedom, professionalism and independence of public broadcasters, as a guarantee for the overall development of democracy and social harmony;
   - Reasonable and efficient utilization of the broadcasting spectrum as a limited natural resource;
   - Prohibition of any kind of censorship and/or influence on the work of public broadcasters, which guarantees their independence, independence of their editorial boards and of their journalists;
   - Complete affirmation of citizens' rights and freedoms, and especially of the freedom of speech and pluralism of opinions;

- Application of internationally recognized norms and principles related to the broadcasting sector, and especially the ones related to respecting of human rights in this sector;

- Objectivity, non-discrimination and free availability of the broadcasting licence issuing procedure;

- Encouraging the development of broadcasting and creativity in radio and television sector in the Republic of Serbia.

Additionally, it has been stipulated that the principal stakeholders in the public broadcasting sector are obliged to provide the utilization and development of modern technical and technological standards in program production and broadcasting, and also to prepare and implement, within a designated timeframe, all the plans for switchover to new digital technologies.

5. **Law on Public Information** ("Official Gazette of the Republic of Serbia", No. 43/03, 61/05) regulates the right to public information as the right to free expression of thoughts, as well as the rights and obligations of the participants in the public information process. Namely, the right to public information specifically comprises of the freedom of expression of thoughts, the freedom to collect, investigate, publish and disseminate ideas, information and thoughts, the freedom to print and distribute newspapers and other public media, the freedom to produce and broadcast radio and television programs, the freedom to receive ideas, information and opinions, as well as the freedom to found legal entities dealing in public information. This Law has recognized the need for protecting the interests of people with disabilities, and has also stipulated that the Republic, the Autonomous Province, and local self-governments provide one part of the means or other conditions for unobstructed exercising of their rights within the public information process, and especially the right of freedom to receive ideas, information and opinions.

2.2. Relevant International Documents

It is necessary for the competent authorities of the Republic of Serbia to ratify the following international documents related to the broadcasting sector:

1) Final Acts of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (RRC-06);
2) European Convention on Transfrontier Television (ETS no.132);
3) European Convention for the Protection of the Audiovisual Heritage (ETS no.183);

EU regulatory framework taken into consideration while drafting the Strategy for switchover from analogue to digital broadcasting of radio and television programs in the Republic of Serbia is as follows:

1) Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on accelerating the transition from analogue to digital broadcasting (COM(2005) 204);

2) European Convention on Transfrontier Television (ETS no.132);

3) Directive 2007/65/EC of the European Parliament and of the Council of 11 December 2007 amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities (Text with EEA relevance)**;**

4) Conclusions of the Council and of the Representatives of the Governments of the Member States, Meeting within the Council of 26 June 2000 concerning the Communication from the Commission on Principles and guidelines for the Community's audiovisual policy in the digital age (2000/C 196/01);

5) Council Resolution of 6 May 2003 on accessibility of cultural infrastructure and cultural activities for people with disabilities (2003/C 134/05);

6) Council Conclusions of 17 December 1999 on the protection of minors in the light of the development of digital audiovisual services (2000/C 8/06);

7) Council Resolution of 21 January 2002 on the development of the audiovisual sector (2002/C 32/04);

8) Recommendation 2006/952/EC of the European Parliament and of the Council of 20 December 2006 on the protection of minors and human dignity and on the right of reply in relation to the competitiveness of the European audiovisual and on-line information services industry;

9) Recommendation No. R (99) 1 of the Committee of Ministers to Member States on Measures to Promote Media Pluralism;

10) Recommendation Rec(2003)9 of the Committee of Ministers to member states on measures to promote the democratic and social contribution of digital broadcasting;

11) Recommendation Rec(2007)3 on the remit of public service media in the information society.

2.3. Regulatory Priorities

Regulatory framework should define the following:

- The means and procedure for selection of network operators (terms and conditions for issuing the licenses for operating a digital broadcasting network);

- The means and procedure for operating the multiplex and defining the conditions for the selection procedure for multiplex operator (multiplex carrier and the selection procedure);

- The means and the procedure of issuing the licences for program contents;

- The amount of broadcasting program fee.

- Promotion campaign in order to achieve better informing the public and raising the awareness about the necessity and advantages of digitalization as a mean of technology progress, harmonisation of standards and coordination with the region and EU.

- Promotion of new functions and services of digital television adjusted to certain groups of citizens (e.g. persons with special needs) as well as the lower costs of broadcasting. These measures greatly contribute for speeding up the process of complete switchover to digital broadcasting;

- Enhancement of the consumer protection;

- Terms and conditions for purchasing of the equipment that citizens need in order to have digital television programs. Equipment has to be available under rational conditions so the consumer protection will be ensured;

- Amending the regulation in order to achieve protection of the competition on the new market for digital broadcasting. It is necessary to suggest the model which will protect from causing the negative influence on the market position of the broadcasters that have valid licenses for analogue terrestrial broadcasting. This model should also include the cost-based analysis of switchover from analogue to digital broadcasting for commercial broadcasters and define the conditions for the new entrance for boosting the competition.

- There is a need for a model that will ensure the coordination among all participants of the process of digitalization, define the conditions of the simulcast and final switchover from analogue to digital broadcasting in order to make the process of digitalization more transparent and more efficient in the Republic of Serbia.

- The rights and obligations of National Broadcasting Company in the process of digitalization;

- Competent authorities need to enhance the work on harmonisation and ratification with International and EU legal documents relevant for the process of digitalization;

- The means and procedure of allotment and usage of digital dividend.

III. Technical and Technological Framework of Digital Transition

General Objective:

The choice of the structure of the digital radio and television programs broadcasting network and its realization dynamics, based on the principles of rational and efficient utilization of the radio frequency spectrum.

3.1. Present Situation in the Broadcasting Sector

Regarding analogue broadcasting in Serbia, Broadcasting development strategy until 2013. (Official Gazette of Republic of Serbia, No 115/05) has stipulated up to 5 commercial television broadcasters with national coverage, up to 40 regional and up to 160 local television broadcasters. As for the radio, 4 to 5 broadcasters with national coverage have been stipulated, together with up to 50 regional radio programs and up to 390 local radio programs.

Table 3.1. Number of radio and TV programs in the Republic of Serbia (Source: RATEL, June 12th 2009)

	Number of radio programs	Number of TV programs
National coverage	5+2	5+2
Belgrade	14	6
Vojvodina	1	1
Regional coverage	21	24
Local coverage	234	91
Total	277	129

Strategy for the switchover from analogue to digital broadcasting of radio and television programs in the Republic of Serbia is to be adopted in a situation where a large number of broadcasting licences were issued for analogue broadcasting, with only a small number of free channels remaining on some locations. Therefore, there is no network that will enable simultaneous broadcasting of digital and analogue television signal with national coverage. However, in certain areas it is possible to have such a network.

3.2. Basis for introducing digital broadcasting

Frequency planning for digital broadcasting services is being carried out according to the internationally agreed plan that was adopted at the Regional Radiocommunication Conference of the International Telecommunication Union (RRC06), held in Geneva in May and June 2006.

An international plan GE06 for allocation of radio frequencies for the needs of digital terrestrial transmission of radio and television programs was adopted at the RRC06 Regional

Radiocommunication Conference. This Plan stipulated the switchover to digital terrestrial broadcasting in VHF band III and UHF bands IV and V, as presented in Table 3.2. This will replace the international frequency plan for spectrum utilization concluded in Stockholm in 1961, which defined band allocation for analogue terrestrial broadcasting of television programs.

According to the Regional agreement, GE06-D will be completely available as of June 17 2015, (after the *ASO-E – Analogue Switch Off-Europe*). Until then, it is necessary to continuously harmonize planning processes of frequency bands with neighbouring countries, which could additionally make simulcast (simultaneous broadcasting of analogue and digital television signal) difficult to achieve. It should be noted that it is not possible to use the full transmitter power during the simulcast period, in order to prevent interferences on certain channels. Digital transmitters are less sensitive to analogue interferences, which leave space for the possibility of using digital channels within the analogue broadcasting environment.

After 17th of June 2015, the obligation to harmonize analogue broadcasting plans with other countries in the region with analogue broadcasting shall end. This is exactly why the Strategy document and the accompanying Action Plan must provide good plans for the new, digital radio and television broadcasting networks.

Table 3.2. Layout of channels in VHF/ UHF bands for digital broadcasting, according to GE06

Band	Range [MHz]	Number of channels within the band	Serial number of the first channel	Serial number of the last channel	Channel width [MHz]	Channel allocation
III (VHF)	174 - 230	8	5.	12.	7	DVB-T&T-DAB
IV and V (UHF)	470 - 862	49	21.	69.	8	DVB-T
IV	470-582	14	21.	34	8	
V	582-862	35	35.	69.	8	

According to GE06, the network configuration can be:

1. Multi-frequency – MFN;
2. Single-frequency – SFN;
3. combination of MFN and SFN networks.

The types of signal reception can be:

1. fixed;
2. portable (interior and exterior);
3. mobile.

On the basis of the GE06 Agreement, Serbia was allocated seven networks coverage for digital broadcasting of television programs in the UHF and one coverage in the VHF band. Additional channels were also allocated in the wider territory of the City of Belgrade and in the South-East part of Serbia, as shown in the Table 3.3.

Table 3.3. The overview of the allotments with allocated channels for DVB-T (Source: RATEL)

Band	Number of allotments	Number of channels per zone	Possible number of networks
VHF band	9	with one channel	1
	The City of Belgrade zone	one channel	1
UHF band	15 (Deli Jovan, Tupiznica, Kopaonik, Jastrebac and Besna Kobila)	seven channels (plus two channels)	7
	The City of Belgrade Zone	six channels	6

In the Figure 3.1. allotments for DVB-T with allocated channels in VHF band are presented.

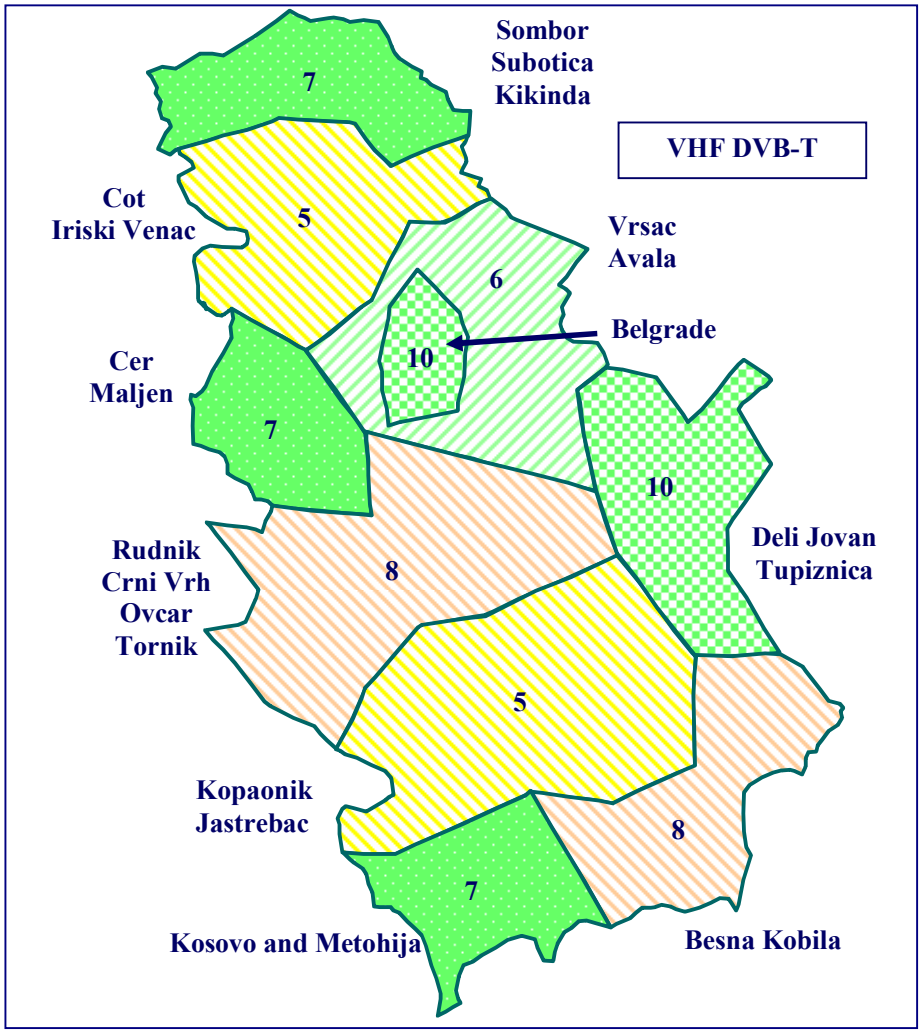

Figure 3.1. Allotments with allocated channels for DVB-T in the VHF band (Source:RATEL)

Republic of Serbia is divided into 15 allotments in UHF band. Wider territory of the City of Belgrade is regarded as a separate allotment. The allotments with the allocated channels for DVB-T in the UHF band are presented in the Table 3.4. and in the Figure 3.2.

The design of networks for digital broadcasting will be performed on the basis of the final act of GE06, and in line with the Action Plan, which will be adopted by the Government of the Republic of Serbia, as an integral part of this Strategy.

Table 3.4. Allotments with allocated channels for DVB-T in the UHF band (Source:RATEL)

Serial number	Allotment	Channels
1.	Avala	22,28,33,45,57,62,64
2.	Belgrade	43,50,51,53,59,68
3.	Besna Kobila	35,39,43,49,54,59,62,63,69
4.	Vrsac	25,31,37,39,42,56,60
5.	Deli Jovan	23,24,41,43,52,59,63,66,68
6.	Jastrebac	27,33,38,42,45,55,57,60,64
7.	Kikinda	29,32,51,55,59,63,69
8.	Kopaonik	22,24,28,32,34,41,51,61,66
9.	Kosovo and Metohija	21,31,44,46,48,58,67
10.	Tornik-Ovcar	23,36,39,50,56,59,63
11.	Rudnik-Crni Vrh Jagodina	26,29,35,40,46,67,69
12.	Sombor	34,39,40,43,58,62,64
13.	Subotica	29,40,43,55,58,59,69
14.	Tupiznica	22,25,28,31,37,44,50,58,65
15.	Cer-Maljen	32,34,37,42,47,49,52
16.	Cot -Venac	24,30,41,48,54,61,66

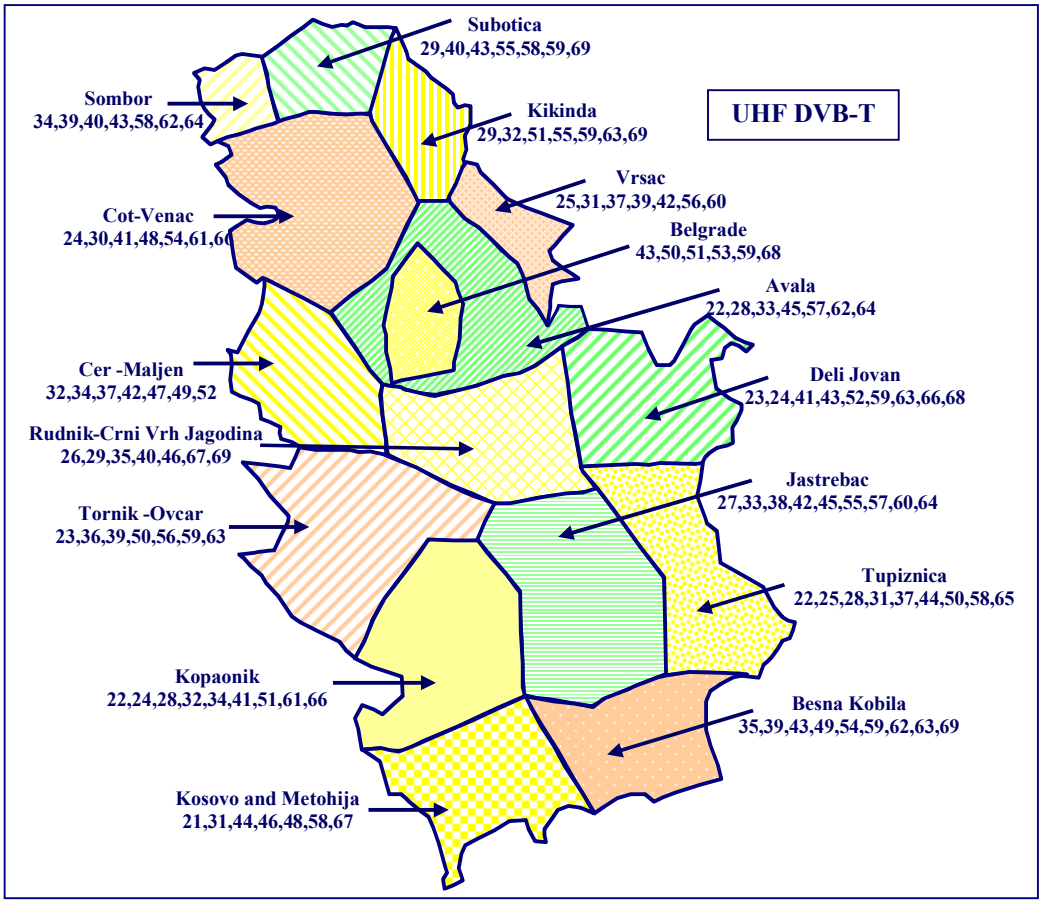

Figure 3.2. Allotments with allocated channels for the DVB-T in the UHF band (Source: RATEL)

The entire territory of the Republic of Serbia was allocated two network coverage in the VHF range (11th and 12th TV channel) for T-DAB, i.e. radio signal broadcasting, which is shown in Table 3.5 and Figures 3.3 and 3.4.

Table 3.5. GE06 based frequency blocks for T-DAB

Band	Range [MHz]	Number of channels in a band	Serial number of the first channel	Serial number of the last channel	Channel width [MHz]	Channel allocation
VHF	216-230	2	11.	12.	7	T-DAB

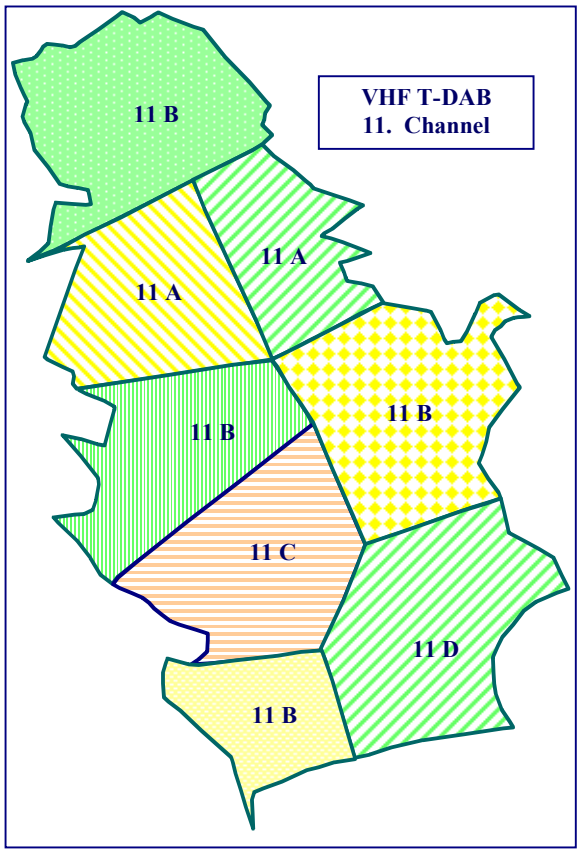

Figure 3.3. Allotments with allocated frequency blocks for T-DAB for the 11th channel. (Source: RATEL)

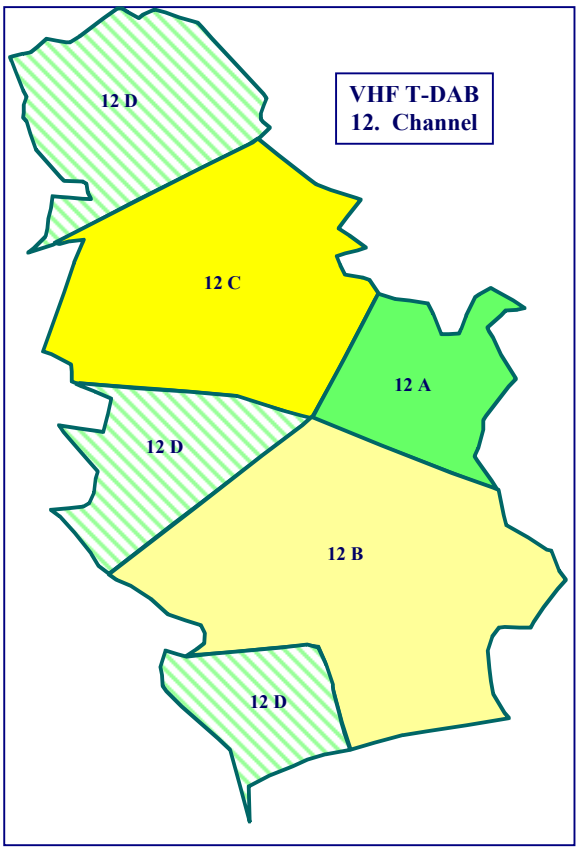

Figure 3.4. Allotments with allocated frequency blocks for T-DAB for the 12th channel. (Source: RATEL)

Regional agreement GE06 regulates frequency distribution in VHF/UHF bands for digital radio and television broadcasting (T-DAB and DVB-T standards). VHF band (174-230MHz) can be used for both types of broadcasting, while UHF band (470-862MHz) is reserved for digital television broadcasting (DVB-T). New standard for digital terrestrial broadcasting, DVB-T2, requires the same conditions regarding the channel bands needed for multiplex.

Middle part of UHF band can be used for services such as mobile television. Devices that support DVB-H (or the future, second generation of this standard) will be available only for

470-750 MHz band. DVB-H(2) can function parallel with DVB-T2 even in the same multiplex.

3.3. Digital transition

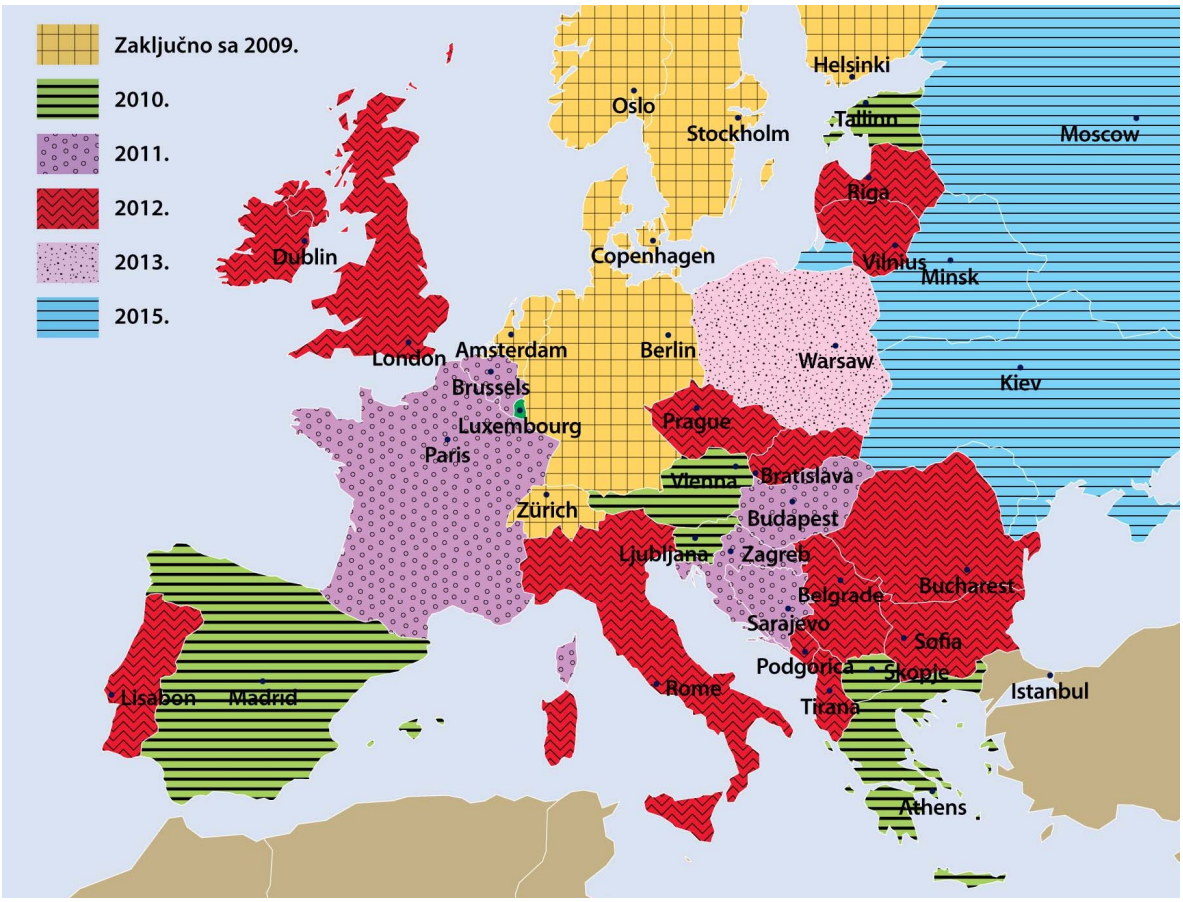

Figure 3.5. Dates for analogue switch-off in Europe

Having in mind the dates for switchover to digital television broadcasting in the region (Figure 3.5) as well as possible interferences for which analogue signal is specially sensitive, it is necessary for Serbia to be in accordance with the neighboring countries. Therefore, year 2012 is the best choice.

4th of April 2012 is set to be the date of analogue switch-off and switchover to digital broadcasting of television programs in the Republic of Serbia.

Basic presumption of digital transition is based on the configuration of the allotments described in the previous chapter. Network design for digital broadcasting will be performed as a combination of MFN and SFN networks.

Generally speaking, the process of digital switchover can be approached in one of the following manners:

- digitalization according to the “digital islands” principle;

- digitalization with an obligation for all the broadcasters to operate in the simulcast environment;

- by combining the above listed methods.

If we take into consideration the level of availability of the networks with national coverage, switchover will begin on the small digital islands where there are suitable conditions for digital broadcasting (free channels), on the north and the south of the Republic of Serbia. The broadcasters will be able to perform necessary measurements and verifications of the quality of the part of the designed network before running it. The islands will be the part of the bigger network with national coverage. Since there is no backup network, simulcast will not be possible on the whole territory and it is necessary to be preformed in the short time period. Simulcast is planned for the first half of 2012. Possible diminish of the preoccupancy of the spectrum in the existing network can provide, before the analogue switch-off, conditions for the simulcast for national television broadcasters on the whole territory of the Republic of Serbia. The means and procedure of simulcast will be defined by the Network concept design. Simulcast represents trial broadcasting for which additional fees will not be charged.

Due to the territory configuration and allocated channels in certain allotments, simulcast will be performed in several zones on the far north and south of Serbia. Zone allocation will be defined by Network concept design that is planned to be finished by the end of 2009.

In accordance with the Figure 3.3, on the territory of the Republic of Serbia there will be several networks with national coverage that should cover 95% of the whole territory. Every network will have a suitable multiplex. In the moment of switchover to digital broadcasting, multiplex A, B, C and D will be formed. Multiplex A is for the allotments in VHF band and it will not be filled during the transition period. The rest of the multiplexes (B, C and D) are assigned for UHF band and they will be filled in accordance with the principles stated below in the text.

Until the date scheduled for the switchover from analogue to digital broadcasting, it is necessary to secure that 90% of the population has the reception of digital signal from National Broadcasting Company that is being broadcasted through multiplex. Multiplexes will broadcast the programs in accordance with Broadcasting Law or based on the licenses for terrestrial broadcasting issued by Republic Broadcasting Agency, following the principles:

- Programs that are being broadcasted in accordance with the Broadcasting Law or based on the licenses for terrestrial broadcasting for the Republic of Serbia (public service and national broadcasters) will be placed in the same multiplex.
- Service zones from existing licences for analogue broadcasting will remain the same.
- The same bitrate will be offered for all programs, at least 3 Mbps in MPEG-4 version 10 or proportionally higher in case of more available free space in the multiplex.

Multiplex content and total bitrate will be determined by the Distribution network concept design. It will also specify all parameters of DVB-T2 standard.

Network planning in UHF band will be based on the channel selection in the lowest frequency bands, from 21. to 60. channels. Channels 61-69 will be exempted because of the need to remain free since this band will probably be used for digital dividend after 4th of April 2012.

According to the experiences of European countries, switchover to digital broadcasting of radio signal in DAB+ standard is scheduled for 2017. Therefore, once more before 2015 (having in mind technology development) the chosen standard will be reconsidered. Digital broadcasting under 30MHz band and suitable standard for this band should be analysed.

3. 4. Digital dividend

Digital dividend is the part of the spectrum that has a potential for being used for other broadband services. Distribution of the digital dividend band gives various possibilities for economic growth. It boosts the employment by opening new job vacancies and it stimulates equal and sustainable regional development because mobile broadband communication services connect people that live in remote areas with more developed regions in order to use the advantages of broadband access.

Digital dividend will be available after the switchover to digital broadcasting (after 4th of April 2012). On the World Radio conference (WRC-07) it has been decided that the distribution of mobile services in the frequency band 790-862 MHz will begin on the 17th of June 2015. It is important for the Republic of Serbia to, as soon as possible and at the latest on the 4th of April 2012, consider the availability of the frequency band for digital dividend and make the neccessary decision in the period from 2012 till 2015 .

Evaluation of the digital dividend capacity will include the number of required television channels in standard and high definition resolution at the end of transition period. In the time of the adoption of the Strategy, television and multimedia services experience expansion and growth, meaning that the real evaluation of the spectrum is not possible at the moment.

Frequency spectrum does not belong to the broadcasters, nor the mobile phone operators or the spectrum regulators or the state. As a public domain, it belongs to citizens, therefore, planning of the network has to be guided by this principle, so the digital dividend would not turn to digital deficit.

IV. Program Content

Program Content comprises different types of multimedia contents (audio, video, text, interactive services, combination of these) that will be available in the digital surroundings.

General Objective:

To create conditions for development of the freedom of expression, information and media pluralism, to introduce new services in the audiovisual sector, to develop interactive services and other contents, with preservation and promotion of cultural differences and realization of rights of the persons with disabilities.

4.1. Regulatory Framework for Program Content

Regulatory framework for program content has been defined by the existing legislation of the Republic of Serbia and by the European standards for program content.

4.1.1. Broadcasting Law

The Broadcasting Law prescribes general obligations of the broadcasters regarding program content, according to which all broadcasters have an obligation to respect international and national standards for program content. The broadcasters should provide production and broadcasting of high quality programs, both from the technical and program content point of view. As well, broadcasters need to provide free, complete and timely information to citizens, specially regarding the important emergency notions that relate to threats to life, health, security and property.

Broadcasters are obliged not to broadcast the programs that contain the scenes that can harm physical, mental and moral development of children and youth, as well as not to broadcast the programs that contain the pornographic scenes or the content that shows violence, drug addiction or other forms of criminal behaviour and to respect the ban on advertising the political parties in non-election period.

Broadcasting Law also regulates the issue of broadcasting on mother tongue. Broadcasters are obliged to broadcast the program on Serbian language or to provide the translation for the programs that are in foreign language.

The Law regulates the area of independent production that consists of programs and shows whose original audio and video material makes more than 50% of television, or 20% of radio program, also applicable for coproduction.

The Law regulates the quotas of independent production and defines the obligations of National Broadcasting company. National Broadcasting company has to broadcast the programs that are not influenced by the Government, political organisations or centres of economic power, to produce and broadcast the programs for all society segments, without discrimination, to fulfil the language standards, to satisfy the citizens' need for culture

identity, to provide suitable time for broadcasting the content related to citizens' associations and non-governmental organisations, as well as the religious communities.

4.1.2. European Standards in Content Regulation

Safeguarding of standards related to program content in Europe has been provided by legal instruments in the form of legally binding provisions and self-regulation.

The general program content have been defined by the following acts:

1. European Convention on Transfrontier Television (Council of Europe);
2. Directive on Audiovisual Media Services (European Commission);

European Convention on Transfrontier Television was the first international agreement that prescribed a legal framework for free distribution of programs in Europe, and general rules both for program standards and for advertising, sponsorships and protection of individual rights.

European Convention on Transfrontier Television guarantees free transmission of program related services regardless of the distribution method. The convention establishes certain obligations for the signatory countries with respect to program content, such as:

1. Reserving programs for broadcasting of European achievements;
2. Ban on pornography, inappropriate displaying of violence and stimulating racial intolerance, as well as special protection of minors from the program contents that can harmfully influence on their physical, mental or ethical development;
3. The right to reply;
4. Obligation to present facts and events in an impartial manner in the news and to foster freedom of opinion;
5. The right on short reporting on events of substantial interest for the general public;
6. Advertising standards (the prohibition to advertise tobacco products, special conditions for advertising alcoholic drinks, the ban on advertising drugs and medical treatments available on prescription, etc.);
7. Duration of teleshopping, commercials and other forms of advertising;
8. Rules on program sponsoring.

Directive on Audiovisual Media Services succeeded the Directive on Transfrontier Television. It regulates the free distribution of programs for broadcasting within the territory of European Union, which is the European Union's response to the technological development and convergence of services, that enabled the emergence of new audiovisual media services. This Directive takes a different approach to the regulation of the so-called traditional television program services from the regulation of the audiovisual media services "on demand", thus providing a much more detailed regulation of television broadcasting while leaving "on demand" services to be regulated with the less strict rules.

Regarding the program content, the Directive prescribes the following:

1. Promotion of production and distribution of the European audiovisual works;

2. Quotas for broadcasters' independent production;
3. Quotas for European independent production;
4. Standards aimed at protecting minors;
5. The right to respond;
6. Public access to events of importance;
7. Standards for advertising and product placement within programs.

4.2. New Services that will be available within the Digital Dividend

Due to better usage of radio-frequency spectrum while broadcasting the television signal in digital form comparing to analogue form, part of the spectrum will remain free. That frequency band is called digital dividend and it will be used for convergent services, the services that integrate broadcasting, information technology and telecommunications.

New services that will be available upon introduction of digital television, as well as through digital dividend are:

1. Communication services:
   - Wireless broadband services;
   - Transmitting of multimedia and video applications to mobile or fixed devices ;
   - Public safety services, such as wireless emergency services.

2. Information services:

- Better choice of program content in specialized areas (politics, history, children programs, sports);

- Upgraded Electronic Program Guide (EPG), faster and more interactive than the regular teletext guide. Electronic Program Guide ensures access to all digital television services and it will be the main instrument for the citizens to navigate through the whole service offer.

3. Interactive services

Interactive television is two way information flow that enables the communication among the viewer and broadcaster as well as following digital services:

- E-commerce;
- E-banking;
- Interactive games and quizzes;
- Information on demand;
- Video on demand;
- Internet, reading and sending of e-mails;
- Betting;
- Voting.

Two way communication of viewers and content providers is possible through retrace channel. Digitalization is a prerequisite for introducing interactive services on the territory of the Republic of Serbia. The scope and the content of interactive services that the television will provide to service users – viewers will depend on the preferences of the television stations and their program plans and business goals.

Digitalization introduces new features such as:

1. Bigger number of terrestrial television channels (in comparison to analogue) in standard and high definition resolution.

   Standard definition resolution is the resolution that old analogue television sets have, and it is 768x576 pixels, while the proportion of length and width of the screen is 4:3. High definition resolution brings better quality by having more pixels and 16:9 screen size. Maximum number of pixels with High Definition TV is 1920x1080 while television sets with the mark HD ready have definition of 1366x768 pixels. High definition resolution demands higher capacities for transfer in comparison with the standard picture quality. Advanced methods of compression and techniques of data transfer in digital surroundings successfully enable this.

2. Stereo and high quality surround tone;
3. More audio channels within one video;
4. Translations (subtitles) on demand;

   Digital television enables translation to be the additional application that will be shown with the picture, but it is not an integral part of the picture.

5. Enables the sending of one or more video content simultaneously;
6. Provides special services for disabled persons.

V. Economic Issues

General Objective:

To establish a successful and sustainable means for planning of funds and monitoring of costs over the period of switchover from analogue to digital broadcasting of radio and television programs.

5.1. Economic Issues in the Transition Period

The Strategy for the switchover to digital broadcasting systems and its implementation must take into consideration the advantages and drawbacks for all participants and interested parties involved in the transition process, and also define the packages that will be provided by means of the new services.

The process of switchover from analogue to digital broadcasting of radio and television programs has been planned as a market oriented process, based on the principles of transparency, non-discrimination, market equality and technical neutrality, with clearly defined objectives and procedures for the existing operators of broadcasting services and program content providers.

Digitalization will contribute to better and more profitable utilization of the limited public resource of broadcasting frequencies in the Republic of Serbia, and at the same time provide users with access to a larger number of different radio and television programs and the possibility of interactive services.

However, the process of switchover from analogue to digital terrestrial television broadcasting as one of the main principle for receiving television programs for the majority of service users-viewers in the Republic of Serbia, cannot be implemented successfully without precise identification of the necessary financial means and funds for these purposes.

Having in mind everything aforesaid, the Strategy for Switchover from Analogue to Digital Broadcasting will be used to establish the costs of the process of introducing digital broadcasting of radio and television programs, derived from the following:

- Necessary technical, financial and other means, needed for the realization of digital broadcasting network in the Republic of Serbia, and the entire investment implementation dynamics, with due diligence to the chosen standard for compression and transmission of television and radio signals.
- The scope, criteria and costs of subsidizing the acquisition of digital receivers (that is, of STBs) for end users, in order to ensure the inclusion of all social groups in the process of switchover.
- The promotion plan aimed to inform and prepare the general public for digital broadcasting, including adequate training courses for the use of digital equipment and new services, in cooperation with broadcasters.
- Instruments for implementing the Strategy (analyses, opinions, public perception polls).

Economic impacts and effects are very important for individual participants and stakeholders in the digitalization process, above all for the producers of program content, network operators, equipment manufacturers and state institutions.

The Strategy and the Action Plan for its implementation will propose a method and dynamics for the switchover process, bearing in mind the dependency of technical, regulatory, social and economic elements, as well as the dependency between the program contents and the bringing of the digitalization process closer to the citizens of the Republic of Serbia.

5.2. Financial means and funds for financing the digitalization in the Republic of Serbia

The costs for the equipment needed for digital broadcasting of radio and television programs will be planned in the budget of Ministry of Telecommunications and Information Society.

The value of the acquisition of the equipment for the enterprise "Broadcasting equipment" is 75 000 000 Euros and there is a possibility that it will be provided with the bank guarantee of the Republic of Serbia. Purchase of the equipment will be performed by the loan of the Republic of Serbia from International financial institutions. It is expected that the loans will be offered under the conditions that are more favourable than the ones on the market. There is a possibility of starting domestic production for certain equipment parts. The acquisition of the equipment is scheduled from the fourth quarter of 2010 until the fourth quarter of 2011 which will include the grace period from 3 till 5 years and the payment of the annuity will be in 2015.

In accordance with economic conditions in the time of the switchover from analogue transmitters to digital broadcasting in Republic of Serbia, following scenarios of subvention for subscribers will be:

- Subsidised costs for acquisition of one STB per household for all users that receive television programs solely by terrestrial reception. The subvention will amount to 25 Euros (~25x1 500 000=37 500 000 Euros);
- Subsidised costs for acquiring one STB per household for all users that pay subscription fee will be reimbursed to 25 Euros (~25x1 600 000 =40 000 000 Euros);
- Subsidised costs for acquiring STBs for the socially endangered persons (~ 50x300 000 =15 000 000 Euros). Dynamics of spending these financial means is set for the fourth quarter of 2011 (12 000 000 Euros) and the first quarter of 2012 (3 000 000 Euros).

Republic of Serbia will provide these financial means from the budget because it has an obligation to provide the reception of the television programs to the citizens. If the effects of the economic crises mitigate, there is a possibility for increasing the subvention for subscribers to the extent that it would cover all subscribers of National Broadcasting Company that pay subscription fee, which would lead to the increase to 40 000 000 Euros until the end of first quarter of 2012 (32 000 000 Euros for 2011 and 8 000 000 Euros for the first quarter of 2012).

The Ministry of Telecommunications and Information Society applied for the project financed by the pre-accession funds of European Union of 13 500 000 Euros. This project will finance the equipment for the enterprise "Broadcasting equipment" (transmitters and some parts of distribution network). Project is on the A project list that has highest priority meaning that the realization of the project is very high.

Process of switchover from analogue to digital broadcasting of radio and television programs in the Republic of Serbia will be conducted by all available budget means.

VI. Information and promotion of the process of digitalization

General Objective:

To inform the citizens, broadcasters, equipment manufacturers and other interested parties about the digitalization process regarding the importance, benefits, manner of switchover and use of new possibilities of digital broadcasting it the Republic of Serbia.

6.1. Information on the process of digitalization

Citizens, as the end users and the most important element of the chain of participants in digital broadcasting, have to obtain all necessary information about digital television and the process of switchover from analogue to digital broadcasting. Therefore, informing the public and all interested parties about the process of digitalization have to be carefully planned and applied in order to:

- Inform the citizens about the reasons for switchover from analogue to digital broadcasting of television programs;
- Inform the citizens about the definition and nature of digital television, about the advantages and the use of new possibilities that this technology has;
- Provide all citizens of the Republic of Serbia with right to correct, on time and clear information on dynamics and other details of the switchover from analogue to digital broadcasting of television programs, and to offer assistance to citizens in the process of digital switchover.

The citizens will effectively use all possibilities of digital television only if they are well informed about all aspects of the process of digitalization. Activities related to information of public will include:

- Round tables about digitalization;
- Creation of internet portal regarding digitalization;
- Call-centre (free number) which citizens can use to get all necessary information about digitalization;

6.2. Promotion of the digitalization

In order to achieve successful and time due switchover from analogue to digital broadcasting of radio and television programs in the Republic of Serbia it is necessary to prepare well structured promotion campaign.

National Broadcasting Company will be the carrier of the promotion campaign

According to the Law on Advertisements, promotion of the digitalization process will not be included into 12 minutes that broadcasters have for commercial purposes during one hour of program.

VII. Action plan

Action plan is printed with this Strategy and it is regarded as its integral part.

VIII. Concluding remarks

This Strategy will be published in the "Official Gazette of the Republic of Serbia".

Annex A: List of Abbreviations

Abbreviation	Meaning
ASO	Analogue Switch-Off
COFDM	Coded OFDM
DAB	Digital Audio Broadcasting
DVB	Digital Video Broadcasting
DVB-C	DVB-Cable
DVB-H	DVB-Handheld
DVB-S	DVB-Satellite
DVB-S2	DVB-Satellite, version 2
DVB-SH	DVB-Satellite services to Handhelds
DVB-T	DVB-Terrestrial
DVB-T2	DVB-Terrestrial, version 2
DMB	Digital Multimedia Broadcasting
EN	European Norm
EPG	Electronic Program Guide
ETSI	European Telecommunications Standards Institute
HDTV	High Definition Television
ITU	International Telecommunication Union
ITU-T	International Telecommunication Union - Telecommunication Sector
Mbps	Mega Bits per Second
MFN	Multi-Frequency Network
MHP	Multimedia Home Platform
MPEG	Moving Picture Expert Group
RRC06	Regional Radiocommunication Conference 2006
SDTV	Standard Definition Television
SFN	Single Frequency Network
STB	Set Top Box
T-DAB	Terrestrial- Digital Audio Broadcasting
TV	Television
UHF	Ultra High Frequency
VHF	Very High Frequency

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Annex C. Definitions

ASO (Analogue Switch-Off) – switching off of the transmitters for analogue signal broadcasting;
ASO-E – switching off of the transmitters for analogue signal broadcasting in Europe;
Analogue broadcasting systems – systems used for transmission and broadcasting of analogue radio and/or television programs and other telecommunication signals in an encoded or uncoded form over a terrestrial network of transmitters, cable or satellite, aimed at direct reception by the public;
COFDM (Coded Orthogonal Frequency Division Multiplexing) – a digital signal modulation technique that uses a large number of orthogonal carriers, each of which has been modulated by a conventional modulation technique (such as quadrature amplitude modulation);
DAB (Digital Audio Broadcasting) – digital broadcasting systems for audio signal broadcasting in different frequency bandwidths up to 3 GHz by means of terrestrial, satellite, hybrid (satellite and terrestrial), as well as cable networks;
Digital Dividend – an amount of the frequency spectrum that will be freed once the switch-off of all the analogue stations is completed and that can be used for implementation of services, such as: electronic commerce, electronic banking, interactive games and quizzes, information-on-demand, etc.;
DVB-C (Digital Video Broadcasting–Cable) – a DVB standard for transmission and broadcasting of digital television signal over a cable network;
DVB-H (Digital Video Broadcasting–Handheld) – a DVB standard for transmission and broadcasting of digital television signal over a terrestrial network of transmitters where the signal is received by means of handheld devices, such as mobile phones, palmtop computers or laptop computers;
DVB–S (Digital Video Broadcasting–Satellite) – a DVB standard where the transmission and broadcasting of digital television signal is performed over a satellite;
DVB–S2 – the next generation of the DVB –S standard;
DVB-SH – a DVB standard for satellite delivery of signal to handheld terminals;
DVB-T (Digital Video Broadcasting-Terrestrial) – a DVB standard for transmission and broadcasting of digital television signal over a terrestrial network of transmitters;
DVB–T2 – the next generation of DVB–T standard;
EPG (Electronic Program Guide) – electronic program guide is an application (including service content) that enables direct access to broadcasting and additional contents (for example, teletext with additional contents);
Frequency Spectrum (Radio Frequency Spectrum) – a bandwidth of radio frequencies which is defined by its range;
GE06 – an international radio frequency allocation plan for the needs of digital terrestrial transmission of radio and television programs, adopted at RRC06 in Geneva in 2006. According to this plan, the switchover to digital terrestrial broadcasting in VHF band III and in UHF bandwidths IV and V was stipulated**.**
GPS (Global Positioning System) – a system for global positioning using controlled satellite navigation;
H.262 – an **ITU-T** recommendation that defines the video coding standard, identical to the **MPEG-2** standard;
H.264 AVC (H.264 Advanced Video Coding) – an **ITU-T** recommendation that defines the improved video coding standard, which is identical to the **MPEG-4 v10** standard;
HDTV (High Definition Television) – a television standard with high resolution of video and audio signals;
Hierarchy-based modulation – a modulation type where a lower priority signal with a larger number of states and with closer constellation points is inserted in a higher priority signal;
ITU - International Telecommunication Union;
ITU-T (**International Telecommunication Union – The Telecommunication Standardization Sector**) – ITU sector for standardization in the field of telecommunications;

MHP (Multimedia Home Platform) – a digital television standard that enables processing of digital applications from various sources;
MPEG – Moving Picture Expert Group;
Multiplex – a standardized signal flow applied for digital broadcasting services, which comprises radio and television programs, services with additional digital contents, electronic communication services and other added identification signals and data;
Multiplexer (MUX) – a device, a part of equipment in digital broadcasting systems that combines different input signals in one common signal, for the needs of transmission and broadcasting;
Program Content Provider – a legal or physical entity that has been issued a licence for broadcasting radio and/or television signal and that has editorial responsibility for the broadcast contents;
RRC06 – a Regional Radiocommunication Conference held in Geneva in 2006;
SDTV (Standard Definition Television) – digital television transmission with standard resolution of video and audio signal, with 4: 3 picture frame sides ratio, and, in the case of Europe, with 625 lines;
SFN (Single Frequency Network) – a broadcast network where all transmitters simultaneously send the same signal over the same frequency channel;
Simulcast – simultaneous transmission and broadcasting of analogue and digital signals during the transition period;
STB (digital Set Top Box) – a device that, coupled with an antenna, enables an analogue television set to receive and decode digital television broadcasts;
UHF (Ultra High Frequency) – Ultra high frequency spectrum within the 300MHz to 3GHz band;
VHF (Very High Frequency) – Very High Frequency spectrum within the 30MHz to 300MHz band.

ACTION PLAN – PROCESS OF DIGITALIZATION FOR BROADCASTING

REGULATORY FRAMEWORK									
	ACTIVITY	**PROPOSER**	**DEAD LINE**	**ADOPTION**	**DEAD LINE**	**EXECUTIVE BODY**	**DEAD LINE**	**SUPERVISION**	**RESULT**
1.	Final Acts of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (RRC06)	MTIS	III quarter 2009.	National Assembly of Republic of Serbia	I quarter 2010.	MTIS	I quarter 2010.	MTIS	The Law on Ratification
2.	Defining the rights and obligations of commercial broadcasters in the process of switchover to digital broadcasting respecting their rights in accordance with the licenses that are valid after scheduled ASO	MTIS	I quarter 2010.	MTIS	II quarter 2010.	MTIS	II quarter 2010.	MTIS	Rules on switchover from analogue to digital broadcasting of radio and television programs and multiplex access in digital terrestrial broadcasting
3.	Adjusting the valid licenses for broadcasting to the conditions for digital terrestrial broadcasting in the way that does not alter the program aspect, does not change the Service zone and does not shorten the license validation period , in accordance with the Rules on switchover from analogue to digital broadcasting of radio and television programs and multiplex access in digital terrestrial broadcasting	RATEL	II quarter 2010.	RATEL	III quarter 2010.	RATEL, RBA	IV quarter 2010.	MTIS	Decision on amendments and supplements for valid existing licenses
4.	European Convention for the Protection of the Audiovisual Heritage	MC	IV quarter 2010.	National Assembly of the Republic of Serbia	I quarter 2011.	RBA	II quarter 2011.	MC	The Law on ratification, amendments/supplement of existing laws
5.	Directive 2007/65/EC of the European Parliament and of the Council of 11 December 2007 amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law,	MC	III quarter 2011.	National Assembly of the Republic of Serbia	IV quarter 2011.	RBA	I quarter 2012.	MC	New Law on Electronic Media

	regulation or administrative action in Member States concerning the pursuit of television broadcasting activities								

TECHNICAL ISSUES									
ACTIVITY		**PROPOSER**	**DEAD LINE**	**ADOPTION**	**DEAD LINE**	**EXECUTIVE BODY**	**DEAD LINE**	**SUPERVISION**	**RESULT**
6.	Drafting of the distribution network concept design – selection of the channels in accordance with allotments	RATEL	IV quarter 2009.	MTIS	I quarter 2010.	RATEL	I quarter 2010.	MTIS, RATEL	Concept design
7.	Distribution Network design (primary and secondary) – design of MFN/SFN networks	RATEL	I quarter 2010.	MTIS	III quarter 2010.	RATEL, Network operator	III quarter 2010.	MTIS, RATEL	Network project
8.	Decision on the allocation of digital dividend	MTIS	I quarter 2010.	Government of the Republic of Serbia	II quarter 2010.	MTIS, RATEL	I quarter 2012.	MTIS, RATEL	Conclusion of the Government
9.	Allocation plan and Allotment plan of radio-frequencies for the period after 4. April 2012.	RATEL	I quarter 2012.	MTIS	II quarter 2012.	RATEL, MTIS, RBA	III quarter 2012.	MTIS	Allocation plan and Allotment plan
10.	Realization of distribution network	RATEL	I quarter 2011.	MTIS	II quarter 2011.	RATEL, MTIS, Network operator	III quarter 2011.	RATEL, MTIS, Network operator	Distribution network
11.	Preparation of infrastructure for the period after the switchover to digital broadcasting	Network operator	By the end of 2011.	MTIS	By the end of 2011.	Network operator	Until April 4th 2012.	MTIS, RATEL	Infrastructure for digital broadcasting
12.	Switch-off of analogue transmitters and the beginning of digital broadcasting	Network operator	April 4th 2012.	MTIS	April 4th 2012.	Network operator	April 4th 2012.	MTIS, RATEL, RBA	Switchover from analogue to digital broadcasting

ECONOMIC ISSUES									
ACTIVITY		**PROPOSER**	**DEAD LINE**	**ADOPTION**	**DEAD LINE**	**EXECUTIVE BODY**	**DEAD LINE**	**SUPERVISION**	**RESULT**
13.	Financial plan for acquisition and distribution of STBs	MTIS	IV quarter 2009.	Government of the Republic of Serbia	IV quarter 2009.	MTIS	I quarter 2010. – April 4th 2012.	MTIS	Financial plan
14.	Adoption of the measures for motivating the domestic producers of STBs and equipment producers for distribution network	MTIS	I quarter 2010.	Government of the Republic of Serbia	I quarter 2010.	MTIS	II quarter 2010.	MTIS	Decision on the measures for motivating the domestic producers of STBs and equipment producers for distribution network
15.	Financial plan for realization of digital broadcasting network of the Republic of Serbia and the implementation dynamics of the investments	Public enterprise "Broadcasting equipment"	I quarter 2010.	Public enterprise "Broadcasting equipment" with the consent of the Government of the Republic of Serbia	II quarter 2010.	Public enterprise "Broadcasting equipment"	III quarter 2010.	MTIS	Financial plan

INFORMATION AND PROMOTION									
ACTIVITY		**PROPOSER**	**DEAD LINE**	**ADOPTION**	**DEAD LINE**	**EXECUTIVE BODY**	**DEAD LINE**	**SUPERVISION**	**RESULT**
16.	Creation of the Internet portal on the digitalization process	MTIS	III quarter 2009.	MTIS	III quarter 2009.	MTIS	III quarter 2009.	MTIS	Internet portal
17.	Creation of the plan for campaign for information and promotion of the switchover from analogue to digital broadcasting	MTIS	I quarter 2010.	MTIS	I quarter 2010.	MTIS	I quarter 2010. – April 4th 2012.	MTIS	Campaign for information and promotion of the switchover from analogue to digital broadcasting
18.	Promotion campaign	National Broadcasting Company	I quarter 2010	National Broadcasting Company	I quarter 2010.	National Broadcasting Company	I quarter 2010. – April 4th 2012.	RBA	Promotion campaign on digitalization
19.	Posters and booklets with important information about digitalization process	MTIS	II quarter 2010.	MTIS	II quarter 2010.	MTIS	II quarter 2010. – April 4th 2012.	MTIS	Posters and booklets
20.	Call centre – free number that citizens can use to get information about digitalization	MTIS	I quarter 2011.	MTIS	I quarter 2011.	"Telecom Serbia"	II quarter 2011. – April 4th 2012.	MTIS	Free number