



Ministry for Telecommunications  
and Information Society

# **Basic Principles of the Strategy for Switchover from Analogue to Digital Broadcasting of Radio and Television Programmes in the Republic of Serbia**

**Belgrade, January 2009**

## **1.2. Benefits of Digital Broadcasting**

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

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

The business sector will benefit from digitalization by gaining potential for creating new jobs, which will, in turn, result in opening of new posts.

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

## **1.3. Digital Broadcasting Chain Architecture**

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

Distribution systems can be: broadcasting for terrestrial transmission, cable and satellite systems.

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 programme broadcasting participants (*content provider, multiplex provider, transmission provider, broadcast provider*) is presented in Figure 1.2.

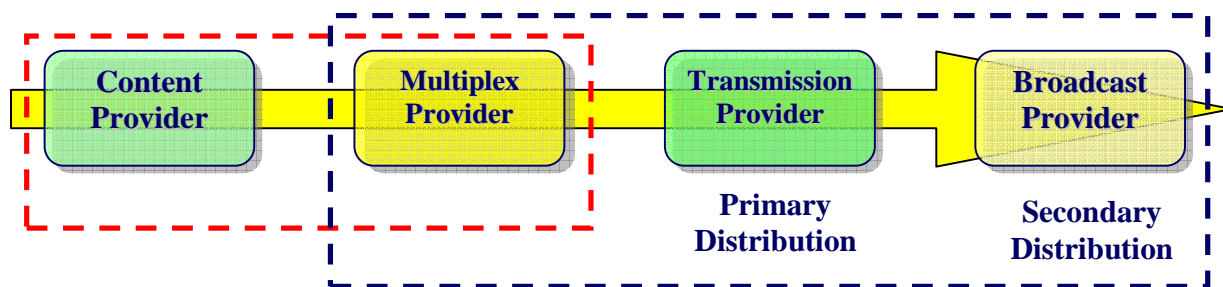


Figure 1.2. Chain of digital broadcasting process participants

According to the Broadcasting Act and following the positive experiences of the majority of European countries, it has been planned to establish, at the very beginning of the transition period, an enterprise which will manage the transmission infrastructure that will be taken away from the Broadcasting Company of the Radio Television of Serbia in order to make up the broadcasting system of the Republic of Serbia.

#### 1.4. Standardization in the Digital Broadcasting Sector

Digital Video Broadcasting Project (DVB)<sup>1</sup>, 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, compression, 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 to be standardized later on within the European Telecommunications Standards Institute, *ETSI*<sup>2</sup>. ETSI decides on European Norms (EN) that are then introduced 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.

Even a large number of non-European countries have adopted the DVB standards during their respective procedures for adopting digital broadcasting standards.

The first digital standard adopted by the DVB Project (in December 1993) pertains to the satellite transmission of DVB-S<sup>3</sup> and was defined by the ETSI standard No. EN 300 421. In all European countries, and in Serbia as well, this type of service has been made available for many years now. On the other hand, the existing distributors of cable television gather a large number of programmes from satellites. This fact alone served as an incentive for development of the first digital cable standard, DVB-C<sup>4</sup>, which was adopted back in 1994.

<sup>1</sup> DVB - Digital Video Broadcasting

<sup>2</sup> ETSI - European Telecommunications Standards Institute

<sup>3</sup> DVB-S - Digital Video Broadcasting -Satellite

<sup>4</sup> DVB-C - Digital Video Broadcasting-Cable

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 has been developed, and the technical solution which enables it is called COFDM<sup>5</sup>. Owing to this, it is possible to design either a single frequency network, *SFN*<sup>6</sup>, or a multi-frequency network, *MFN*<sup>7</sup>. The SFN network type enables a 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*<sup>8</sup>. The MFN network type is normally 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<sup>9</sup> 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, providing that the hierarchy modulation is applied.

The DVB Project has adopted a number of key principles for development of digital systems for transmission of television signals, among which one of the most important pertains to the manner of compression of video and audio signals. It was thus decided to use the MPEG-2<sup>10</sup> 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<sup>11</sup>. The development of new techniques brought in a compression type dedicated to multimedia services, the MPEG-4, but 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 the 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 half the bitrate. This standard was adopted in 2003. It was later on further supported by the development of high resolution High Definition Television (HDTV), which, coupled with the MPEG-4 standard, demanded reasonably low transmission bitrates. The potential for scalable coding was also developed within the 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.

Today, there are coders with ports for selecting one of the two compression standards, MPEG-2 or MPEG-4 version 10.

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 was how the second generation of DVB standards came about.

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<sup>5</sup> COFDM - *Coded Orthogonal Frequency Division Multiplex*

<sup>6</sup> SFN - *Single Frequency Network*

<sup>7</sup> MFN-*Multi Frequency Network*

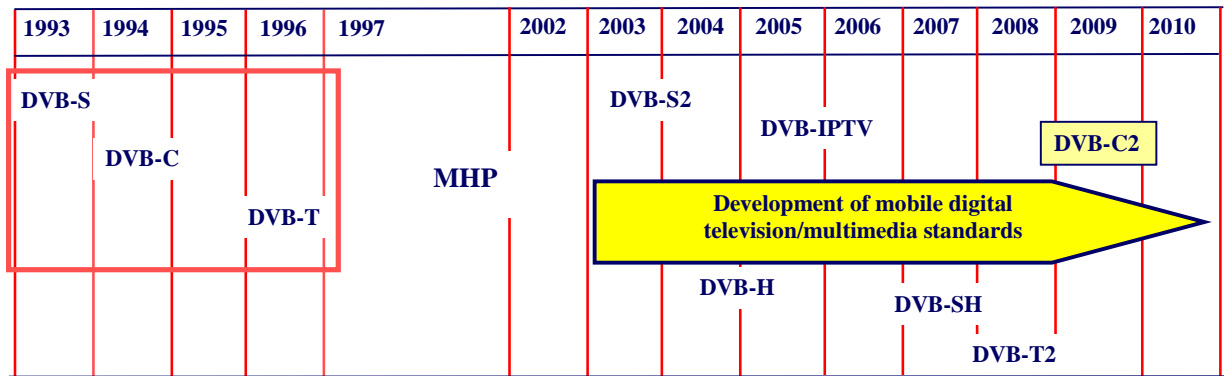
<sup>8</sup> GPS-*Global Positioning System*

<sup>9</sup> DVB H- *Digital Video Broadcasting -Handheld*

<sup>10</sup> MPEG-2 - *Motion Picture Expert Group*

<sup>11</sup> ITU-T - *International Telecommunication Union – The Telecommunication Standardization Sector*

On the tenth anniversary of the DVB-S standard emergence, the DVB-S2 standard was adopted (EN 302 307). The DVB-SH<sup>12</sup> standard was proposed to replace the DVB-H standard, and it was developed in two forms: one following the principle of classic satellite programme broadcasting, and the other as a DVB-H standard based on COFDM modulation. The chronological sequence of DVB standard development is presented in Figure 1.1.



**Figure 1.1.** Chronological sequence of the most important DVB standards development

In June 2008, a specification of the DVB-T2 standard was published (adoption of the relevant ETSI standard has been scheduled for April 2009). All second generation DVB standards are very complex, but at the same time enable 30 to 50 percents bitrate increase, as compared to the first generation standards. Thus, it is possible to apply either the DVB-T, or the DVB-T2 standard for digital terrestrial transmission to fixed receivers.

DAB<sup>13</sup> 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, gives a high compression ratio. 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.

<sup>12</sup> DVB-SH - *Satellite-Handheld*

<sup>13</sup> DAB - *Digital Audio Broadcasting*

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## 2. Regulatory Framework

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### ***General Objective***

To change the regulations related to the digitalization process in order to achieve harmonization with the international and European standards, including the necessary adjustments to the specific needs of the Republic of Serbia, by means of defining legislative activities aimed at creating the legal framework for digital broadcasting development that will facilitate market development, diversity and pluralism in the media scene.

### ***2.1. Regulatory Framework of the Republic of Serbia***

The regulatory framework for migrating from analogue to digital broadcasting of radio and television programmes in the Republic of Serbia consists of the following legal acts:

- **Strategy for Development of Broadcasting Sector in the Republic of Serbia by the Year 2013** (“Official Gazette of the Republic of Serbia”, No. 115/2005), which states that the future development of the broadcasting sector, be it the 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. As regards the 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 amendment, based on the fact that digital broadcasting, unlike analogue broadcasting, “is a system with a substantial number of chain participants, from programme production to broadcasting (content provider, multiplex provider, transmission provider, broadcast provider)”.

The Strategy especially notes that the Republic Broadcasting Agency has suggested to the Telecommunication Agency and the Ministry for 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 are to be allocated through public competitions for analogue terrestrial broadcasting.

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

- **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.
- **Telecommunications Act** (“Official Gazette of the Republic of Serbia”, No. 44/2003, 36/2006) regulates, in accordance with international legal standards, the conditions and means of running of 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 of conditions for development of telecommunications in the Republic of Serbia;
  - Protection of interests of the users of telecommunication services;
  - Creating conditions for meeting the users’ needs for telecommunication services;
  - Encouraging 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; and
  - Harmonization of operations in the telecommunications sector with the international standards, practices and technical norms.
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- **Broadcasting Act** (“Official Gazette of the Republic of Serbia”, No. 42/2002, 97/2004, 76/2005, 79/2005, 62/2006, 85/2006, 86/2006) regulates conditions and means of running of 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 to speech and pluralism of thoughts;
- Application of internationally recognized norms and principles related to the broadcasting sector, and especially those that pertain to the 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 for the utilization and development of modern technical and technological standards in programme production and broadcasting and also to prepare and implement, within a designated timeframe, all the plans for switchover to the new digital technologies.

- **Public Information Act** ("Official Gazette of the Republic of Serbia", No. 43/2003, 61/2005) 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 programmes, the freedom to receive ideas, information and thoughts, as well as the freedom to found legal entities dealing in public information. This Act 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 thoughts.



## **2.2. Relevant International Documents**

It is necessary for the relevant bodies of the Republic of Serbia to ratify the following international documents that pertain to the broadcasting sector:

- European Convention on Cross Border Television;
- The final Acts of the Regional Radiocommunication Conference for planning of digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (ITU RRC-06);
- European Agreement on programme exchange by means of television films' exchange;
- European Convention on the Protection of Audiovisual Heritage;
- European Agreement on prevention of programme broadcasting from a territory outside of the state territory;
- European Agreement on the Protection of Television Programmes;
- European Agreement on Programme Exchange by means of Television Films;
- European Directive on legal protection of conditional access services;
- Agreement on facilitation of international traffic of visual and audio materials of the educational, scientific and cultural character.

The EU regulatory framework that should be taken into consideration during the process of designing the Strategy for Analogue to Digital Switchover in the Republic of Serbia is as follows:

- Directive on Audiovisual Media Services;
- European Commission Recommendation, which states the year 2012 as the deadline for the complete switchover to digital TV broadcasting for the European Union members, and the year 2015 for the transition countries;
- Conclusions of the Council and representatives of the Member States governments, drawn at the Council meeting of June 26<sup>th</sup>, 2000, related to the Commission official statement on the principles and guidelines for the Community audiovisual sector strategy;
- Council Decision of May 6<sup>th</sup>, 2003, on the availability of cultural infrastructure and cultural activities to the persons with disabilities;
- Council Conclusion of December 17<sup>th</sup>, 1995, on the protection of minors in the light of development of digital audio and visual services;
- Council Decision of January 21<sup>st</sup>, 2002, on the development of the audiovisual sector;
- The European Parliament and Council Recommendation of December 20<sup>th</sup>, 2006, on the protection of minors.

### **2.3. Regulatory Priorities**

The aforementioned regulatory framework should particularly define the following:

- The means and procedure for selection of network operators (who and in what way can be issued a licence for operating a digital broadcasting network),
- The means and procedure for multiplex managing,
- The means and procedure of issuing licences for different programme contents,
- The programme broadcasting fees.

## 3. Technical and Technological Framework for Analogue to Digital Transition

### ***General Objective***

The choice of the structure of the digital radio and television programme 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 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 stations and up to 390 local radio stations.

Strategy for the switchover from analogue to digital broadcasting of radio and television programmes 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.

### ***3.2. Digital Broadcasting in the Republic of Serbia***

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

An international plan GE06 for allocation of radio frequencies for the needs of digital terrestrial transmission of radio and television programmes was adopted at the RRC06 Regional Conference. This Plan stipulated the switchover to digital terrestrial broadcasting in VHF band III and UHF bands IV and V, as presented in Table 3.1. 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 programmes.

According to the Regional agreement, GE06 will be completely available as of June 17, 2015, (after the *ASO-E – Analogue Switch Off-Europe*). By that date, it is necessary to continuously harmonize planning processes of frequency bands with neighbouring countries, which could additionally make *simulcast*, or 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 interference on certain channels. Digital

transmitters are less susceptible to analogue interferences, which leaves space for the possibility of using digital channels within the analogue broadcasting environment.

After 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 programmes broadcasting networks.

**Table 3.1.** 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	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:

- Multi channel – MFN<sup>14</sup>
- Single channel – SFN<sup>15</sup>
- a combination of the above configurations,

while the types of signal reception can be:

- fixed
- portable (interior and exterior)
- mobile.

On the basis of the GE06 Agreement, Serbia was allocated seven coverages (networks) for digital broadcasting of television programme 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 3.2.

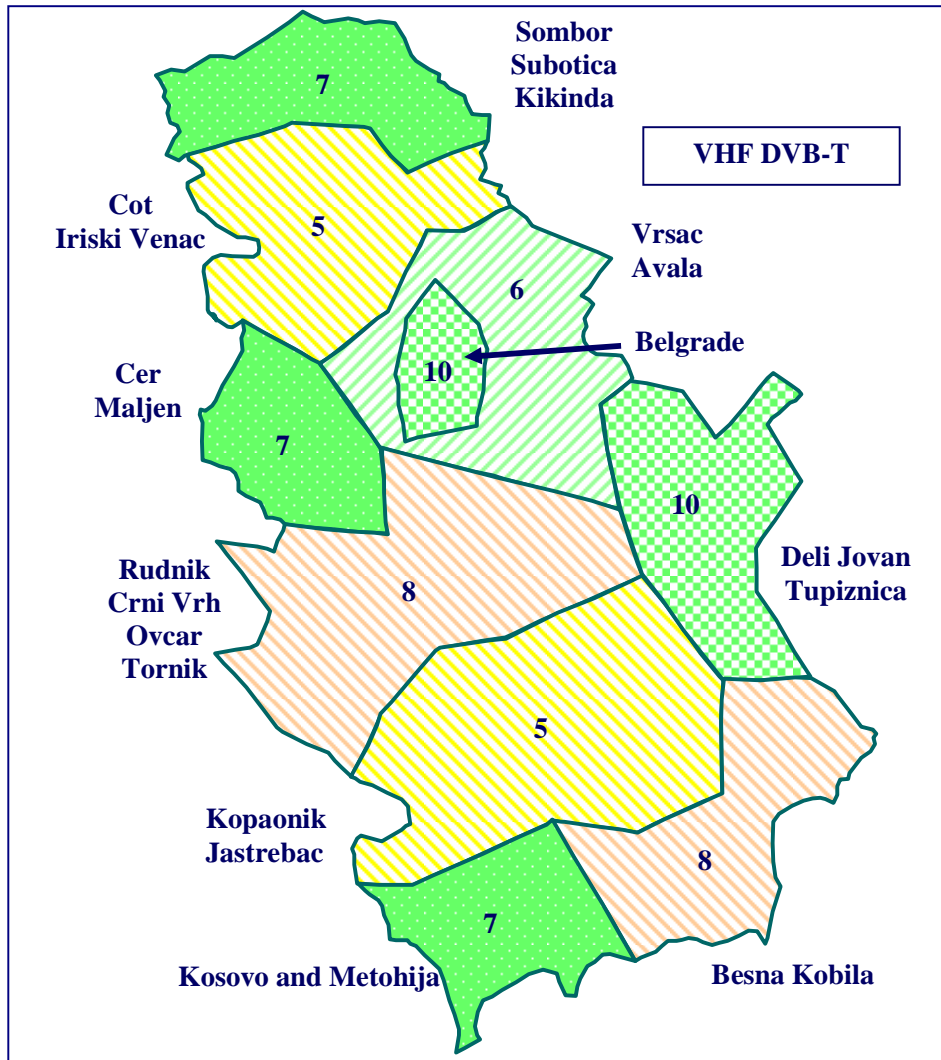
**Table 3.2.** The overview of the distribution zones with allocated channels for DVB-T (Source: RATEL)

Band	Number of distribution zones	Number of channels per zone	Possible number of networks
VHF band	9	one channel	1
	The City of Belgrade zone	1 additional channel	1
UHF band	15 (Deli Jovan, Tupiznica, Kopaonik, Jastrebac and Besna Kobila)	7 channels (2 additional channels)	7
	The City of Belgrade Zone	6 additional channels	

<sup>14</sup> MFN - Multi Frequency Networks

<sup>15</sup> SFN - Single Frequency Networks

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



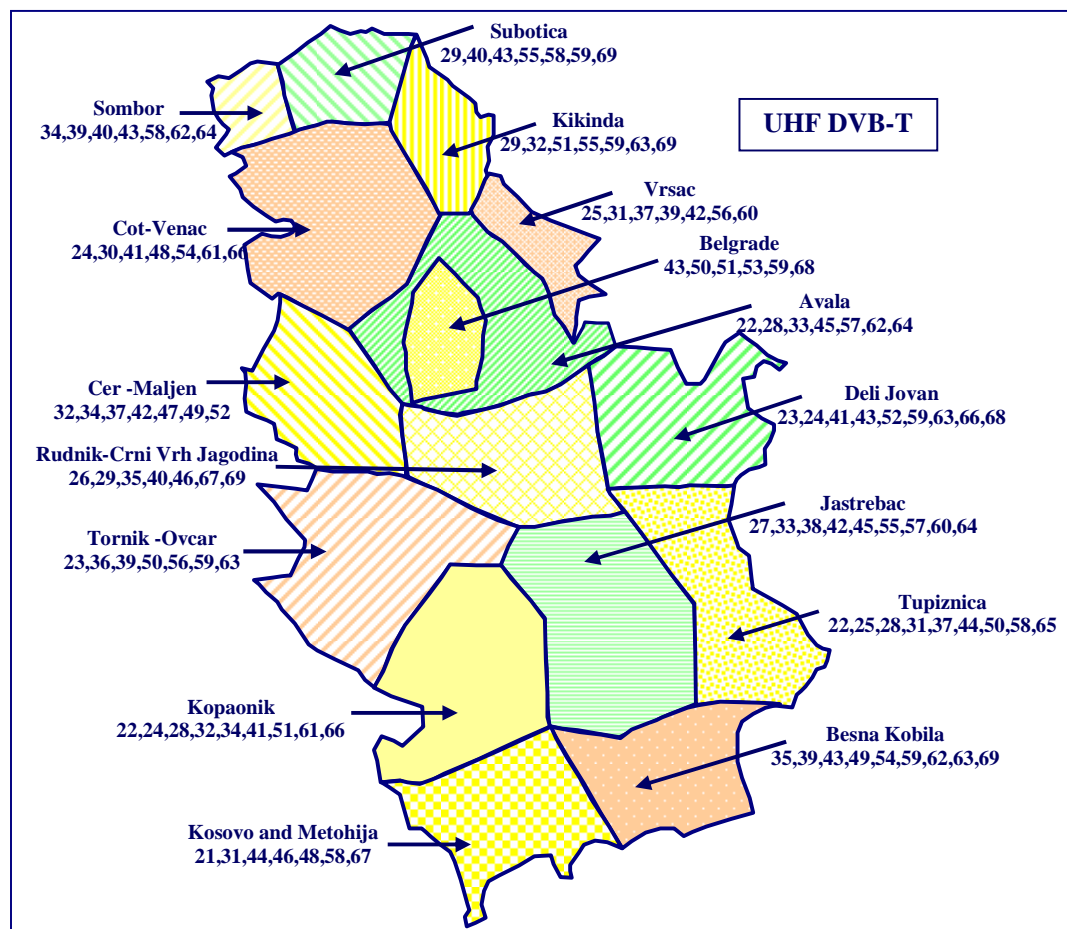
**Figure 3.1.** Distribution zones with allocated channels for DVB-T in the VHF band (Source: RATEL)

Serbia was allocated fifteen distribution zones in the UHF band for its entire territory, while the distribution zone for the wider territory of the City of Belgrade was allocated six additional channels. The distribution zones with the allocated channels for DVB-T in the UHF band are presented in the Table 3.3. and shown 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 document, which will be adopted by the Government of the Republic of Serbia, as an integral part of this Strategy.

**Table 3.3.** Distribution zones with allocated channels for DVB-T in the UHF band (Source: RATEL)

Serial number	Distribution zone	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

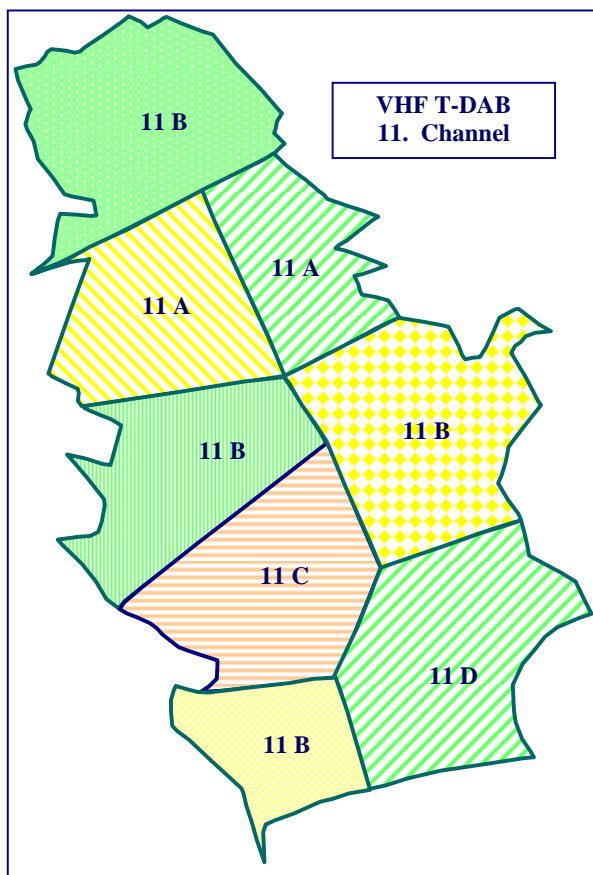


**Figure 3.2.** Distribution zones with allocated channels for the DVB-T in the UHF band (Source: RATEL)

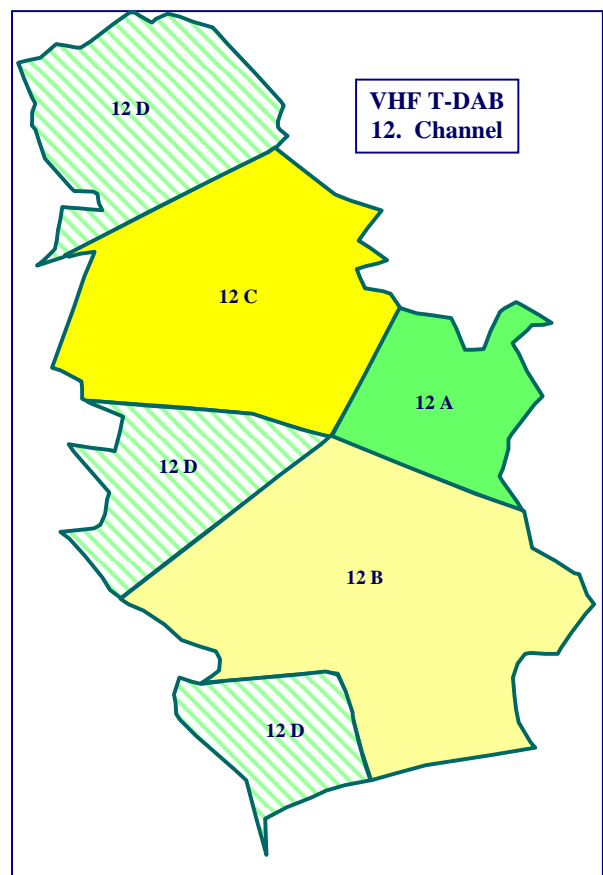
The entire territory of the Republic of Serbia was allocated two coverages in the VHF range (11<sup>th</sup> and 12<sup>th</sup> TV channel) for T-DAB, i.e. radio signal broadcasting, which is shown in Table 3.4 and Figures 3.3 and 3.4.

**Table 3.4.** 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.** Distribution zones with allocated frequency blocks for T-DAB for the 11<sup>th</sup> channel.  
(Source: RATEL)



**Figure 3.4.** Distribution zones with allocated frequency blocks for T-DAB for the 12<sup>th</sup> channel.  
(Source: RATEL)

### ***3.3. Potential Approaches to Digital Transition***

According to the distribution zones configuration described in the previous chapter, digital broadcasting networks design will be executed 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.

The analogue switch-off process in the Republic of Serbia will be executed in accordance with the RRC06 Decisions, and in accordance with the dynamics of transition from analogue to digital broadcasting of radio and television programmes that is to be set out in more detail by the Strategy and Action Plan documents, which are to be adopted by the Government of the Republic of Serbia.



## 4. Programme Contents

### ***General Objective***

To create conditions for development of the freedom of 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 Programme Contents***

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

#### **4.1.1. Broadcasting Act**

The Broadcasting Act prescribes general obligations of the broadcasters in relation to programme contents, according to which all broadcasters have an obligation to respect international and national standards for programme content. The broadcasters should provide for production and broadcasting of quality programmes, both from the technical point of view, and from the programme content point of view.

The Broadcasting Act also defines the obligations of the main public broadcasting sector stakeholders, above all with the aim of achieving general interest.

#### **4.1.2. European Standards in Content Regulation**

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

The general programme contents have been defined by the following acts:

- **European Convention on Cross-Border Television** (Council of Europe)
- **Directive on Audiovisual Media Services** (European Commission)

**1. European Convention on Cross-Border Television** was the first international agreement that prescribed a legal framework for free distribution of programmes in Europe, and general rules both for programme standards and for advertising, sponsorships and protection of individual rights.

European convention on cross border television guarantees free transmission of programme-related services regardless of the distribution method. The convention establishes certain obligations for the signatory countries with respect to programme contents, such as:

- reserving programmes for broadcasting of European achievements,
- ban on pornography, inappropriate displaying of violence and stimulating racial intolerance, as well as special protection of minors from the programme contents that can harmfully influence on their physical, mental or ethical development;
- the right to respond;
- obligation to present facts and events in an impartial manner in the news programmes and to foster free forming of opinions;
- the right to short reporting on events of substantial interest for the general public;
- 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, and so on);
- duration of teleshopping, commercials and other forms of advertising;
- rules for programme sponsoring.

**2. Directive on Audiovisual Media Services** succeeded the Directive on Cross-Border Television. It regulates the free distribution of programmes for broadcasting within the territory of European Union, which is the European Union's response to the technological development that enabled the emergence of new audiovisual media services. This Directive takes a different approach to the regulation of the so-called traditional television programme services<sup>16</sup> from the regulation of the audiovisual media services 'on demand'<sup>17</sup>, thus providing a much more detailed regulation of television broadcasting while leaving the 'on demand' services regulated with the less strict rules.

Regarding the programme content, the Directive prescribes the following:

- promotion of production and distribution of the European audiovisual works;
- quotas for broadcasters' own production;
- quotas for European independent production;
- standards aimed at protecting minors;
- the right to respond;
- public access to events of importance;
- standards for advertising and product placement within programmes.

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<sup>16</sup> *Linear audiovisual media service*

<sup>17</sup> *Non-linear audiovisual media service*

## **4.2. New Services within the Digital Dividend**

Digital dividend is a frequency range that will be released once the process of digital switchover is completed (owing to the better use of the frequency spectrum). The aforementioned frequency range can be used, among other things, for the realization of converged services, that is the services which bundle broadcasting, information technology and telecommunication services.

The digital dividend realization will create the preconditions for:

- a larger number of digital terrestrial television channels (compared with analogue television) on national, provincial, regional and local levels, both in standard resolution - SDTV<sup>18</sup> and high resolution - HDTV<sup>19</sup>,
- Stereo and surround sound,
- More audio channels accompanying one video recording,
- Possibility of sending more than one video content at the same time (multicasting)
- Programme Guide - EPG<sup>20</sup>

Services to be provided through the digital dividend can be divided in three categories:

### **Communications Services**

- Wireless broadband services,
- DVB-H<sup>21</sup>: digital television service adjusted to the reception by handheld devices (mobile telephones, laptop computers, palmtop computers)
- Public safety services, such as wireless emergency services
- Communications services for military purposes.

### **Information Services**

- Better choice of programme contents in specialized areas (politics, history, children programmes, sports...)
- EPG, the electronic programme guide, much faster and more interactive than the regular teletext guide.

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<sup>18</sup> SDTV – Standard Definition TV

<sup>19</sup> HDTV – High Definition TV

<sup>20</sup> EPG - Electronic Programme Guide

<sup>21</sup> DVB-H - Digital Video Broadcasting – Handheld

## **Interactive Services**

Interactive television is a two-way flow of information, which enables communication between viewers and broadcasters, as well as the following group of digital services:

- Electronic commerce (Home Shopping)
- Electronic banking (Telebanking)
- Interactive games and quiz shows (Game Shows)
- Information on demand
- Video on demand
- Internet Services
- Voting

The provision of interactive services will be enabled after the process of digitalization of terrestrial television is completed in the entire territory of the Republic of Serbia. The scope and content of interactive services that are to be offered to users/viewers will depend on the preferences of television stations and their programme plans and business objectives.

## 5. Economic Issues

### *General Objective*

To establish a successful and sustainable means for planning of funds and monitoring of expenses over the period of transition from analogue to digital broadcasting of radio and television programmes.

### *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 to be provided by means of the new services.

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

Digitalization will contribute to better (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 programmes, and the availability of interactive services.

However, the analogue to digital switchover of terrestrial television broadcasting, which is the principal of receiving television programmes for the majority of service users or viewers in the Republic of Serbia, cannot be implemented successfully without precise identification of the necessary financial means and sources of funds for these purposes.

Several aspects must be considered:

Bearing 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 programmes, derived from the following:

- Necessary technical, financial and other means, needed for realizing the network of digital broadcasting systems of 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 to digital broadcasting of radio and television programmes;
- The promotion plan aimed at informing the general public and preparing 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 managing and implementing this Strategy document (analyses, opinions, public perception polls, etc.).

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

The Strategy for Switchover from Analogue to Digital Programme Broadcasting and the Action Plan for its implementation will propose a method and dynamics for the switchover process, bearing in mind the interdependency of technical, regulatory, social and economic elements, as well as the interdependency between the programme contents and the bringing of the digitalization process closer to the citizens of the Republic of Serbia.

## **6. Promotion of the Digitalization Process**

### ***General Objective***

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

### ***6.1. Promotion of the Digitalization Process***

The success of the switchover from analogue to digital broadcasting of television programme largely depends on the general public participation in the digitalization process, that is, on a comprehensive promotional campaign that will be primarily directed towards the general public, with the aim to:

- Inform the citizens about the definition and nature of digital television and about the reasons for the switchover from analogue to digital broadcasting of television programmes;
- Educate the citizens about the benefits of digital television and potential ways of using new possibilities offered by new technologies;
- Provide all citizens of the Republic of Serbia with right to information on dynamics and other details of the switchover from analogue to digital broadcasting of television programme, and to offer assistance to citizens in the process of digital switchover.

Promotional activities will include organization of informative meetings with key participants in this process, press conferences, public discussions, round tables and symposia, radio and TV programme production, publishing of articles in newspapers, and also informational Web site setup and Internet promotion, printing of brochures and promotions on billboard advertisements, establishing of a call centre that will provide information for citizens, and so forth.

The process of broadcasting sector digitalization, and especially the period of transition from analogue to digital programme broadcasting, is a very complex process that entails cooperation and coordination of all its participants, which are indirectly or directly involved in that process.

It is the responsibility of the Inter-departmental Workgroup for switchover from analogue to digital broadcasting to coordinate the work of all the participants in this process who are the principal holders of the promotional campaign and their key partners, in order to successfully carry out all the information and educational activities set up by the Strategy document.

## 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
EN	European Norm
EPG	Electronic Programme 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 programmes 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 transmission 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 trade, 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 Programme Guide)** – electronic programme 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 programmes, adopted at RRC–06 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)** – a 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 telecommunication;

**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 programmes, 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;

**Programme Contents 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 (Regional Radiocommunication Conference 2006)** – a Regional Conference on radio communications;

**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.