State Agency for Information Technology and Communications

Digital Video Broadcasting - Terrestrial (DVB-T) implementation plan for the Republic of Bulgaria

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1. INTRODUCTION

The evolution of the television system for the 75 years of its existence marks certain significant events, such as the switchover from monochrome (black and white) television to color television, introduction of television with format 16:9 and high definition television . The introduction of the digital technologies predominantly changed the methods for video broadcasting and reception.

The attractiveness of the few programs nowadays broadcasted through the terrestrial video broadcasting networks compared to the cable and satellite networks broadcasting not less than 35 programs, is the reason of the withdrawal of the audience from the terrestrial broadcast programs. The costs for broadcasting and support of the terrestrial analog television radio-broadcasting networks are constantly increasing due to energy and technologically related reasons.

Regardless of the progressive development in the alternative video broadcasting media, the terrestrial video broadcasting implies certain significant advantages, such as:

- Simple access to a broad scope of television programs and services without requiring installation costs;
- Defined good quality achievable through standard receiving antennas;
- Reception through receivers with built in antennas as a second and third receiver in each section of the home/building and outside, providing a variety of programs;
- Portable and mobile reception – DVB-T and/or DVB-H;
- The investments for the STBs shall be covered for a short term from the saved installation and cable fees;
- The new digital media shall offer not only television programs, but can transfer almost everything – from arbitrarily vast multimedia content to varied and new interactive services;
- The terrestrial digital television shall be a social competitive system with options for additional mass-accessible information services on a 24-hour basis of the users and through the interactive channel of easily accessible information and services for people with disabilities and disadvantaged people.

The switchover to terrestrial digital broadcasting is not as flawless as the digital broadcasting through cable and satellite networks. The main problem is the limited radio-frequency resource. A response to this issue is the utilization of SFN (*Single Frequency Networks*), enabled by using the DVB-T (and DVB-H) system.

The Regional Radiocommunication Conference RRC-06 (May 2006) adopted the new radio-frequency plan in the bands 174-230 and 470-862 MHz for terrestrial digital video broadcasting. Thereby the effective plan *ST61* for terrestrial analog video broadcast in these frequencies shall cease to operate. In compliance with the new radio-frequency plan *(GE-06)* of the Republic of Bulgaria, frequency resource has been approved in bands III VHF, IV and V UHF for 13 allotment areas (+ 2 urban) **(Annex No. 1)** with options for development of 10 to 14 SFN (single frequency networks) therein, having the respective number of program and information multiplexes. With the validation of the resolutions from the conference GE-06, the new digital radio-frequency plan shall become obligatory for all further radiofrequency assignments and shall be a basis for the switchover from terrestrial analog video broadcasting to terrestrial digital video broadcasting.

A complex data and program package – multiplex. In case more programs shall be broadcasted in a specified territorial zone, more multiplexes shall be needed, meaning more television channels

will be provided. A number of programs ranging from 20 to 25 are being currently broadcasted through five networks.

For the development of a realistic switchover scenario, a diversity of options is available, based on economical, program and policy, regional, commercial and advertising, and information and technology factors. A feasible solution is considered the "*island*" oriented switchover with "*mixed approach*" (short "*simulcast"* phase – simultaneous broadcasting of a single program through analog and digital video broadcasting network for the same region or "island"). The advantages of this "island" strategy are, on one hand, the trimming of network investments within realistic limits and on the other hand – solution of logistic issues, related to set top boxes (STB). This is the only opportunity for trade program operators due to business considerations.

The terrestrial digital video broadcasting implementation plan for the Republic of Bulgaria shall put the strategic DVB-T network development basis and the schedule for switching-off of the analog transmitters. The first steps for country-wide coverage with DVB-T have been taken. The Plan stipulates the building and commissioning of the first multiplex platforms under the new radio-frequency schedule to start in 2008.

The state administration shall implement preparation of the regulatory and financial framework of the DVB-T switchover. In the beginning, the terrestrial digital video broadcasting shall need supporting financing and DVB-T shall not require constant state support.

Digitalization of terrestrial video broadcasting places huge challenges before media policy, regulation of frequency resources and financing and the end goal can be achieved only through common efforts, openly and fluently and with the constructive participation of all stakeholders involved in this project, regardless of being the regulation bodies of the media subjects.

2. DVB-T Implementation and Development Status

The digitalization process of terrestrial video broadcasting in the EU member states has started in Great Britain in the autumn of 1998 and has been successfully developed in Germany, France, Finland, Spain, Italy, the Netherlands, Sweden, etc. with a tendency of large-scale implementation in the following 3 – 5 years.

2.1 EU and ITU DVB-T Implementation Policy

The EU governing bodies – the European Parliament, the EU Council and the European Commission, in coordination with the International Telecommunication Union (ITU) conduct targeted policy toward global implementation of terrestrial digital video broadcasting in the EU member states. The planned terms for actual coverage of the territories of the countries with terrestrial digital video broadcasting shall be within the period 2009–2012 and the switchover shall end at the time of termination of terrestrial analog video broadcasting.

The European Commission has reviewed in detail the switchover to terrestrial digital video broadcasting from economical, social and ecological point of view. The major factors and the affected parties (users, industry and society representatives), also risks implied in the initial stages of the switchover shall be assessed. A final political goal shall be set – national switchover policy and market development in each EU member state. The main approach for implementation of the

switchover shall be orientation toward political non-interference for the state framework conditions and the European actions.

2.2. ITU, EU, ETSI and EBU documents

ITU, EU, the European Telecommunication Standard Institute (ETSI) and the European Broadcasting Union (EBU) shall have a large number of documents published (standards, terms of references, recommendations, etc.), considering the parameters and methods of use of the appliance and technical resources for terrestrial digital video broadcasting.

Main documents determining the policy of the European Union in the field of electronic communication networks and services shall be a series of directives and other documents of the European parliament, the Council of Ministers of the European Union and the European Commission, as well as documents of the European Council **(Annex No. 2).**
The group of standards, guides, manuals, reports and terms of references of ETSI, ITU and EBU, as well as ISO/IEC, relevant to the terrestrial digital video broadcasting shall include a large amount of general documents **(Annex No. 3).**

2.3. Overview of DVB-T Implementation in European Countries

At the regional telecommunication conference RRC-06 of ITU it has been stated that over 100 countries shall accept the standard DVB–T for implementation of terrestrial digital video broadcasting, using the new frequency plan III, IV and V video bands, by confirming their interest to HDTV (High-Resolution Digital Terrestrial Video-Broadcasting) and mobile DVB–H.

Currently terrestrial digital television broadcasting is being implemented in Great Britain, Germany, France, Finland, Italy, Belgium, Spain, Russia, the Czech Republic, Croatia, the Netherlands, Sweden, Switzerland, Ireland, Austria, Denmark, Norway, Albania, etc.

In Bulgaria, on the grounds of the license issued to BTC AD, terrestrial digital video broadcasting is being implemented for the territory of the city of Sofia since 2004.

Pilot broadcastings of terrestrial digital television are being performed in Belarus, Israel, Estonia, Moldavia, Hungary, Cyprus, Latvia, Poland, Portugal, Macedonia, Serbia, Slovenia, Slovakia, Turkey and Greece.

In the future terrestrial digital television shall be implemented in most African countries, Ukraine, Armenia, Azerbaijan, Lebanon, Saudi Arabia, etc.

The development of DVB-T in the European countries shall be performed according to several successful scenarios, in compliance with the three general types of market conditions:

- Markets with strong positions of analog cable TV services – Benelux, Germany, Austria, the Scandinavian countries;
- Markets with strong positions of AVB-T, but not offering paid terrestrial analog TV – Great Britain, Greece, Portugal;
- Markets with strong positions of AVB-T and offering paid terrestrial analog TV – France, Spain, Italy

For 2007 over 80 million households in the European countries are expected to adopt digital television programs, 41% being satellite and the remaining share being terrestrial and cable, having total STB sales of 6.9 STB in 2006.

Leaders in implementation of interactive television services utilizing the DVB standard of the MHP platform shall be Finland (2001), Sweden (2004), Germany (2003), Spain (2002), Italy (2002), France and Denmark (2005).

In a document of the European Commission COM (2004)–541 (updated as of July 2, 2006), having regard to the interoperability of the digital video interactive services, a chart containing data as of June 30, 2005 is applied regarding the development of digital video broadcasting (cable, satellite and terrestrial, as well as DSL) in the EU member states **(Annex No. 4).**

3. Status of the market of terrestrial and cable video broadcasting (coverage, users, demand development) in the Republic of Bulgaria

203 television programs are being broadcast in the Republic of Bulgaria, including **7 programs** - terrestrial, and **198 programs** by cable and satellite networks (198 registered operators for establishment of television programs)**.** Three television programs, **Channel 1 of the BNT, bTV** and **Nova** have been licensed for the territory of the country. Four regional programs of the BNT are also broadcasted terrestrially, respectively for the following cities: **Varna, Ruse, Plovdiv and Blagoevgrad**.

169 television programs are being broadcasted by *commercial operators* and 17 television programs – by *public operators*. The operators having temporary individual licenses under paragraph 9a for terrestrial broadcasting shall be 42 (**according to data of the EMC).**
Defining the market niche for the DVB-T is of high importance for its successful implementation. Due to the multi-programmability, the reception utility and the better quality, the cable and satellite video broadcasting have developed in recent years and to a great extent have displaced the AVB-T from the market. Moreover, the mountainous relief of our country hinders the terrestrial video broadcasting. Nevertheless, our national television program BNT has more than 98 % nation-wide coverage.

The limitation and the contingent decline of terrestrial video digital broadcasting at the expense of the cable and the satellite video broadcasting shall lead to market monopoly of the cable and satellite television programs reception and respectively to uncontrolled increase of their monthly subscription fees**.**

The main percentage of the households in the Republic of Bulgaria shall receive their programs through cable networks – over 70%. The reception through satellite networks has a small share – over 3%. **In conclusion – less than 30% of the population receive television programs through terrestrial digital video broadcasting.**

Any and all towns in the country shall have cable networks whereas only 28% of the villages shall be covered by the cable networks. Because the villages host about 15% of the population **(Annex No. 5)** it turns out that 10–11% of the population (out of a total of 30%) receives only **DVB-T**. As a rule, those are only small settlements, supplied through relay stations.

The cable networks shall reach a level of saturation probably with the coverage of about 75% of the population.

3.1. Terminal Equipment for DVB-T
Status of the STBs for the DVB-T market

The successful implementation of DVB-T to a great extent depends on the availability of cheap STBs for DVB-T in the retail network. The mass adoption of DVB-T in Western Europe, Japan and Korea shall lead to sufficient output of appliances and significant reduction of their price. Currently over 150 types of STBs for DVB-T are available for sale in the Western European retail network. Their end-user price shall vary from 30 Euro to about 600 Euro. The average price of the STBs varies from 100 to 150 Euro. The following types of STBs are available:

- STB for reception of free programs – the most common and cheapest;
- STBs having options for decoding of encrypted programs – more expensive;
- STBs with built-in HDD, allowing program recording – as a rule the STBs at price exceeding 250 Euro have a built-in HDD, however cheaper STBs are also available (for example having a price of 160 Euro);
- Double-system STBs – for reception of DVB-S and DVB-T – comparatively small number of STBs have this option – not more than 5–6 types and for reception of DVB-C and DVB-T – only a single company is manufacturing such STBs currently.

As a conclusion, the existence of a large range of STBs for DVB-T having accessible prices (lower than 100 BGN for STB) or higher prices and more options is confirmed. The STBs cannot be a serious hindrance for the switchover from AVB-T to DVB-T.

4. Targets and Goals of the Switchover from AVB-T to DVB-T in the Republic of Bulgaria

The main purpose in the implementation of DVB-T shall be the efficient use of the radio-frequency spectrum, the improved quality and the provision of additional services.

The plan for implementation of DVB-T shall have two goals – on one hand, to keep the audience currently having terrestrial reception, but also having the option to switch over to cable or satellite reception and on the other hand, to attract new audience, thus not permitting monopoly of the cable and satellite broadcasting. In both cases, the reception through DVB-T shall be competitive to the reception through satellite and cable networks under the following parameters:

- Price – in order to retain the audience and specifically to attract new audience, the programs broadcasted by transmitters for terrestrial digital video broadcasting shall be free (non-encrypted) and respectively free to receive. If certain programs shall be encrypted, their number shall be severely limited – not more than one program per multiplex;
- Multi-programmability – in the separate islands the number of programs during initial start-up shall not be less than 15;
- Program attractiveness – recommended by the European countries already switched over to DVB-T, numerous local programs and programs of high audience rating shall be broadcasted except for the national programs;

- Better quality and additional services – on this parameter the DVB-T shall have a difficulty competing with the satellite and cable networks, especially in case of digitalization of the cable networks;
- Mobile reception and portable reception in buildings – the field where the terrestrial video broadcasting has no competition. However, the mobile reception is a new service, privilege of the new car receivers. The portable reception in buildings as a practice shall be used for the second and third television sets of a given household.

The switchover targets

1. Public service using programs through DVB-T.
2. Selection of island service points.
3. Determining the optimal number of multiplexes in the islands.
4. Determining the date up to which permits for terrestrial analog video broadcasting (AVB) shall be issued.
5. Drawing-up criteria for determining the date for termination of AVB-T.
6. Solutions for providing the population with STBs for DVB-T.

5. Status of the Radio-Frequency Spectrum for the Needs of Video Broadcasting - Terrestrial

5.1. Analog Video Broadcasting - Terrestrial

For the needs of the AVB-T currently the following frequencies are being used in II, III, IV and V frequency bands.

- The BNT network has been built mainly of transmission and re-transmission stations in II, III, IV and V television bands. The powerful transmission stations have been built strategically at a great terrain elevation and highest possible radio coverage zone. This provides opportunities for supplying a high number of low-capacity relay stations and provides coverage of large areas. The existing analog network consists of a total of 677 transmitters and relay stations allowing the coverage of 98.3% of the population of the Republic of Bulgaria;
- The bTV network has been built mainly by transmission and re-transmission stations in video bands III, IV and V. The powerful transmission stations have been built strategically at a great terrain elevation and highest possible radio coverage zones. The existing analog network consists of a total of 676 transmitters and relay stations allowing the coverage of 97% of the population of the Republic of Bulgaria;
- The network of television Nova has been built by transmission and re-transmission stations in video bands IV and V. The powerful transmission stations are much less in number and the re-transmission network is undergoing development. The built analog network consists of a total of 143 transmitters and relay stations, allowing the coverage of over 70% of the population of the Republic of Bulgaria;
- 41 television stations have been licensed, servicing separate populated areas;

- The predominant share of the available band, intended for terrestrial video broadcasting shall be used by the Ministry of Defense (MD). **Annex No. 6** indicates the schedule of use of video channels by the MD.

5.2. Digital Video Broadcasting - Terrestrial

According to the Geneva 2006 Plan, for the needs of terrestrial digital video broadcasting frequencies in video bands III, IV and V shall be used.
Radio-frequency resource has been provided for the Republic of Bulgaria, having the option of building 10 terrestrial digital broadcast networks of video signals with nation-wide coverage, 34 networks with regional coverage and 23 networks with regional coverage for the territory of Sofia and Varna.

6. Action Plan for Implementation of Digital Video Broadcasting – Terrestrial (DVB-T) in the Republic of Bulgaria

The priority target of the Republic of Bulgaria shall be the establishment of conditions for start-up of stage digitalization of terrestrial video broadcasting as of 2008 in view of completion of the switchover by the end of 2012. This implies the duly execution of action plan regarding the implementation of DVB-T, performance of switchover from terrestrial analog to terrestrial digital video broadcasting and termination of terrestrial analog video broadcasting. Due to the complex nature of the digitalization and the influence of a series of time variable factors, this plan shall be periodically updated.

6.1. Switchover Scenario

Several possible scenarios for switchover from terrestrial analog to terrestrial digital video broadcasting exist. As a result of a detailed analysis and studying the experience of the advanced countries in the process of terrestrial digital video broadcasting it turned out that the so-called "*island*" principle is the most appropriate for the Republic of Bulgaria. The *"Island"* principle shall be based on the initial implementation of digital transmission stations, operating on a single frequency (*SFN* network) in densely populated cities and regions in the respective service area (*allotment* area). The next step is the gradual building of additional transmission stations until full coverage of the respective service zone is achieved. The network realization on this principle assumes significant reliefs for the operator in the financial aspect, as the full infrastructural deployment is implemented gradually. The relatively longer period of joint operation of the transmitters for analog and terrestrial digital video broadcasting (*simulcast*) could be indicated as the weakness of this principle. The maximum recommendable term for joint operation shall be one year. With the expiry of this term, the transmitters of terrestrial analog video broadcasting shall be switched off.

6.1.1. Network Technological Parameters

Depending on the selected technological parameters, the digital technology for terrestrial video broadcasting provides the option to apply 120 different configurations. The Regional Radiocommunication Conference RRC-06 for planning of the terrestrial digital broadcasting sets the following three standard configurations *RPC* depending on the reception mode:

- *RPC 1*: fixed reception, roof antenna – 10 m height;
- *RPC 2*: portable outdoor reception, mobile reception and portable indoor reception having a narrower coverage area;
- *RPC 3*: portable indoor reception having a broader coverage area.

The fixed reception with directional antenna is the simplest in terms of intensity value of the electromagnetic field within the service field. For this reason it is permissible to use relieved technical parameters as modulating techniques having higher data intensity and lower degree of protection and error correction. As a result of application of various technical parameters, the typical possible capacities for data transfer of various standard configurations shall be as follows: 20-27 Mbit/s for *RPC 1*, 18-24 Mbit/s for *RPC 2* and 13-16 Mbit/s for *RPC 3*.
The selection of the system configuration can be performed in compliance with the specific application and the technical parameters may vary substantially from the values set in the standard configuration. The table below specifies two sample configurations:

Parameters	Option 1	Option 2 (RPC 2)
Bandwidth	8 MHz	8 MHz
Mode	8 k	8 k
Protection ratio	1/8	1/8
Code rate	2/3	3/4
Modulation	64 QAM	16 QAM
Local coverage probability	95%	95%
Transmission flow rate	22.12 Mbit/s	16.59 Mbit/s

The selection of vertical broadcasting polarization for the transmission stations shall be appropriate for the three standard configurations, but shall prove problematic for the public during the period of simultaneous operation of the analog and digital transmission stations due to the fact of having to use two varied receiving antennas.

6.2. Switchover to DVB-T

The switchover shall be performed in two stages.

FIRST STAGE – Switchover startup

National networks

- By June 2008 – issuing permits for use of radio-frequency spectrum to enterprises for the building of **three nationwide *MFN (SFN)* networks** (multi-frequency for the territory of the Republic of Bulgaria and Single Frequency for every service zone under the Geneva 2006 Plan) for service zones Burgas, Varna, Vidin, Plovdiv, Ruse, Sofia and Stara Zagora;

- By January 2009 – the enterprises having received permits shall start the broadcasting by an "*island*" principle in the following towns and cities: Burgas, Varna, Vidin, Plovdiv, Ruse, Sofia and Stara Zagora;
- By June 2009 – providing additional radio-frequency spectrum for service zones Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen;
- By January 2010 – the enterprises shall commence the broadcasting according to "*island*" principle in the towns of Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen;
- By December 2010 – the enterprises shall provide coverage for minimum of 75% of the population of service zones Burgas, Varna, Vidin, Plovdiv, Ruse, Sofia and Stara Zagora;
- By December 2011 – the enterprises shall provide coverage for minimum 75% of the population for service zones Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen;
- By December 2012 – the enterprises shall provide full coverage of the population for all service zones.

Regional networks

- By June 2008 – issuing permits for use of radio-frequency specter for enterprises for the building of **twelve regional *SFN* networks,** three networks for each of the territories of the cities of Burgas, Varna, Plovdiv and Sofia;
- By January 2009 – the enterprises shall start the broadcasting according to "island" principle in the respective service zones;
- By January 2010 – the enterprises shall provide full coverage for the population of the service zones.

SECOND STAGE OF SWITCHOVER

National networks

- By July 2010 – issuing permits for use of radio-frequency specter to enterprises for building of **three national *MFN (SFN*) networks** (one of which according to the DVB-H technology) for service zones Burgas, Varna, Vidin, Plovdiv, Ruse, Sofia and Stara Zagora;
- By January 2011 – the enterprises shall start broadcasting on an "*island*" principle in the following towns and cities: Burgas, Varna, Vidin , Plovdiv, Ruse, Sofia and Stara Zagora;
- By July 2011 – provision of additional radio-frequency specter for service zones Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen;
- By January 2012 – the enterprises shall commence the broadcasting according to "island" principle in the towns of Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen;
- By December 2013 – the enterprises shall provide coverage for a minimum 75% of the population of service zones Burgas, Varna, Vidin, Plovdiv, Ruse, Sofia and Stara Zagora;
- By July 2014 – the enterprises shall provide coverage for a minimum 75% of the population of service zones Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen;
- By June 2015 – the enterprises shall provide full coverage for the population of the service zones.

Regional networks

- By July 2010 – issuing permits for use of radio-frequency spectrum for enterprises and building **fifteen regional *SFN* networks** for service zones Blagoevgrad, Burgas, Varna, Varna-city, Vidin, Kardzhali, Pleven, Plovdiv, Ruse, Smolyan, Sofia, Sofia-city, Stara Zagora, Strandzha and Shumen;

- By January 2011 – the enterprises shall start the broadcasting according to "*island*" principle in the respective service zones;
- By December 2012 – the enterprises shall provide coverage for the population ranging about 90-95% in the service zones.

Annex No. 7 shall indicate the specified radio-frequency DVB-T resource to be utilized during the two switchover stages.

Having regard to the available free radio-frequency resource, the planned second stage of the switchover can be implemented only under the condition of releasing spectrum to enterprises for terrestrial analog video broadcasting with nation-wide coverage. Having regard to this, in the first switchover stage such enterprises shall be granted the right to use the radio-frequency spectrum for digital video broadcasting or shall be bound with a *"must-carry"* obligation to broadcast their programs for the enterprises of the first three national networks for terrestrial digital video broadcasting.

The period of joint operation of transmitters for terrestrial analog and terrestrial digital video broadcasting shall be limited to one year from the moment of start-up of the digital broadcasting in the respective *"island"*. Following the expiry of this term, the transmitters for terrestrial analog video broadcasting in the territorial coverage scope of the "*island*" shall be switched off.
In view of the practical feasibility of the transition from terrestrial analog to terrestrial digital broadcasting and guaranteeing the joint operation of the analog and digital transmitters during the "*simulcast"* period, radio-frequency resource shall be reallocated for broadcasting by the terrestrial analog video broadcasting facilities, operating in the respective service zones.

By December 2011, in case of expressed interest or on the initiative of the competent regulatory body, a right of use of radio-frequency spectrum shall be granted for the purpose of building terrestrial digital video broadcasting networks with high resolution – *HDTV*.

By December 2012 all transmitters for terrestrial analog video broadcasting shall terminate their broadcasting ***(Switch-off)***.

Following the final termination of terrestrial analog broadcasting, depending on a declared interest or on the initiative of the competent regulatory body, a right for use shall be granted for the free radio-frequency resource protected in compliance with the Geneva 2006 Plan for mobile application, expansion of the scope of the *MHP*-based services or the pan-European services in compliance with the EU policy for utilization of the so-called *"digital dividend"*.

The radio-frequency resource stipulated in this plan shall strongly limit the option for issuing permits for terrestrial analog video broadcasting.

6.3. Release of the Radio-Frequency Band for the DVB-T Needs of the Ministry of Defense

The terms for the release of the respective channels, specified in **Annex No. 6** shall comply with the updated National plan for allocation of the radio-frequency spectrum, adopted by Resolution No. 545 of the Council of Ministers dated 2004 (updated in SG, issue 60, dated 2004; supplemented SG, issue 69 dated 2004, amended and supplemented in SG, issue 31, dated 2005; amended and supplemented in SG, issue 16 dated 2006). The process of harmonization of the bandwidth used by the MD and the related amendments to National frequency allocation plan, the

respective terms in the notes, including terms relevant to video bands IV and V shall be determined in compliance with the plans for modernization of the communication and navigation systems of the Bulgarian army. Due to the limited financial resource of MD, this modernization is constantly being deferred.

It is evident that the scenario described in **Annex 6**, article 5.1 is overoptimistic in view of terms specified therein.

With this regard, the contingency scenario for release of the occupied video channels in case of availability of sufficient financial resources shall be as follows:

6.3.1. Release of channels No. 22, 23, 25, 36, 37 and 38

The release of these channels by the Ministry of Defense shall be possible through the phased replacement of the radio equipment operating within the band with such equipment, operating within the radio-frequency bands harmonized with the European frequency table.

This process can be implemented in two stages:

Stage I – For the purpose of establishing the option for start-up of the process of issuing permits for use of radio-frequency spectrum for enterprises for building national networks for DVB-T – to provide a minimum number of free channels only for separate regions as of January 1st, 2008;

Stage II – For the territory of the whole country – within the period 2009-2012, reception targeted financing – replacement of the operating stationary and field communication equipment of the Bulgarian Army.

6.3.2. Release of channels No. 43-47

The systems operating within the frequency band of channels 43 -47 can be replaced stage by stage until 2012 with equipment operating within the range and in compliance with the NATO standards and complying with the requirements of ICAO.

6.3.3. Release of channels No. 53, 54, 55, 56, 58, 59 and 60

Radio equipment of the MD operates in the radio-frequency range of channels 53 -60. For separate regions (cities), the use of channels 53, 55, 58 and 60 have been coordinated.

Outside of this, due to the specifics of the equipment, currently the replacement of such systems with systems operating within radio-frequency bands harmonized with European standards **is not being considered**.

6.3.4. Release of channels No. 61-63

Radio systems of the MD operate within the radio-frequency spectrum of channels 61-63. The systems may be replaced stage by stage with system operating within radio-frequency bands harmonized with European standards in the period till 2012.

6.3.5. Release of channels No. 65-69

Radiolocation systems operate in the radio-frequency band of channels 65-69, planned to be used till 2015. The systems may be replaced stage by stage with radiolocation systems GCA-2000.

Conclusions:

1. Currently the full release of channels No. 53, 54, 55, 56, 58, 59 and 60 is not being considered.
2. Channels No. 22, 23, 25, 36, 37 and 38 may be fully released in the period 2008-2012 in case the required funds shall be available.
3. Channels 43-47, 61-63 and 65-69 may be fully released in the period until 2012 in case of available funds.

Annex No. 8 specifies the release of channels by years, territorial locations and settlements.

6.4. Requirements for Provision of Interactive Services

Directive 2002/21/EC, article 18 determines the obligations of the member states with regard to the interactive video services.

Interaction of digital interactive video services

1. In order to aid the free dissemination of information, media pluralism and cultural diversity, the member states shall stimulate the following actions as set forth in article 17 (2):

   (a) Enterprises for digital interactive video services shall use open API for dissemination through digital interactive video platforms regardless of the transfer type to the public in the Community;

   (b) enterprises for updated digital video equipment for reception of digital interactive video services through digital interactive video platforms shall keep to the open API in compliance with the minimum requirements of the respective standards and/or specifications.

2. In compliance with the provisions of article 5,(1),(b) of Directive 2002/19/EC (Access Directive), the member states shall stimulate the owners of API to provide, under honest, justified and non-discrimination conditions such information necessary for the enterprises providing digital interactive video services in order to provide the services, supported through API in fully functional form.

3. Within a year following the application of the provisions of article 28, (1), sub-paragraph two, the Commission shall inspect the results of the validity of this article. In case the interaction and freedom of choice for the users have not been adequately achieved in one or more member states, the Commission shall undertake actions in compliance with the procedure stipulated in article 17, (3) and (4).

In compliance with the Electronic Communication Act:

- Placing on the market and putting into service of the terminal communication equipment and digital television services equipment, having their compliance assessed under the provisions of the Technical Requirements Act, shall be free.

- Placing on the market of equipment having their compliance assessed under the provisions of the Technical Requirements Act shall be free.
- Parties placing digital video equipment designated to receive digital video services on interactive digital video platforms on the market shall provide the availability of open interfaces for application program interfaces (API), complying with the minimal requirements of the respective standards and specifications.

6.5. Risk Analysis for the Implementation of DVB-T

The possible risks for the implementation of terrestrial digital radio-broadcasting shall be divided for clarity in the following four groups:

A. Technical risks;
B. Organizational, administrative and regulatory risks;
C. Risks related to the business conditions;
D. Risks related to the users.

The following possible risks may be noted in the groups specified above:

- The large selection of options having regard to the broadcasting sources and the contents shall result in insufficiently focused management (organization);
- It is possible to reach a standstill of the further development due to lack of free radio-frequency resource in compliance with the resource planned for the respective stage (administrative and technical);
- The new technological resources and methods for planning and implementation of the networks, as well as the new media and technological "grammar" shall require special training which could prove insufficient or lacking (organizational);
- The numerous content options may meet insufficient availability of new valuable programs and new services (administrative and regulatory);
- Possible delay of the process of introduction of the new type of television, accompanied by extension of the simulcast stage shall lead to abrupt increase of costs (related to the business conditions);
- Introduction of terrestrial digital video broadcasting is a complex process related to coordination of varied operative processes of various time cycles and insufficient coordination could result in serious problems (organizational);
- It is possible, especially at the end of the switchover period, that changes in the technological status and the standardization base occur, affecting the future viability of the video systems; this requires special attention by the bodies coordinating the switchover (technical);
- In case of insufficient provision of STBs under conditions favorable for the users and insufficient timely mass awareness campaign, an inevitable negative reaction of the users shall be expected (user related).

6.6. Quality Requirements for DVB-T

The requirements for the quality of the broadcasted digital television signals shall differ significantly from the ones for the traditional analog systems. They are mainly set to achieve the following goals:

- Support for determining specific technical parameters prior to the commissioning of DVB-T networks;
- Assessment of the most appropriate video system for digital coverage of the respective coverage zone;
- Empirical determination of technical criteria, providing joint functioning of the analog and digital systems for the duration of the switchover period;
- Inspection of the technical compatibility of the broadcasted digital signals in relation to the conditions of the issued permit for use of the radio-frequency spectrum;
- Research of the origin and reasons for the occurred interferences;
- Identification and termination of the non-regulated broadcasts;
- Research of trans-border interferences.

The measuring of video signals broadcasted through the DVB-T system in the Republic of Bulgaria shall be performed in compliance with the requirements of ITU and ETSI standard EN 300 744. The objective assessment of the quality of the broadcasted digital signal shall be determined by measuring and analyzing the following technical parameters:

- values of field strength in points located at the limit of the theoretically allotted service zone with the purpose of analysis of the actual coverage with normal digital signal;
- BER (bit error ratio): ratio bit/error – assessment of the quality of the demodulated signal;
- MER (modulation error ratio): modulation errors – assessment of the quality of each carrier frequency of the complex OFDM signal, modulated by QAM;
- Delay in distribution of the signal between two transmitters, part of SFN network in the respective reception point – optimization of configuration of the transmitters in the single frequency network;
- Monitoring of television transmitters: continued real-time monitoring of synchronization of the complex OFDM signal, modulator errors – MER, correlation bit/error and transport MPEG-2 stream.

7. State Commitment

Clear, due and consistent public awareness activity

The state shall mark steps and adopt measures to disseminate and advertise the terrestrial digital video broadcasting.

Their execution can be:

- Awareness campaign explaining and pointing out the advantages of DVB-T, viz.: image and sound quality, program variety and options for auxiliary services. The campaign shall start immediately with the adoption of the plan for implementation of DVB-T in order to prepare the public;
- Issuing appropriate advertising and training materials explaining the options for adoption of DVB-T and explain and train in the methods of use;
- Establishment of call service center for public assistance and mostly for the assistance of disadvantaged members of the public for whom it will be difficult to deal with the installation and use of the required technology for reception of terrestrial digital video broadcasting;
- Engagement in the advertising process of all press and electronic media.

The introduction of terrestrial digital video broadcasting in the Republic of Bulgaria is related to the use of STBs for reception of digital television and provision of subsidy in compliance with the "Community Laws" – digital television sets, digital set top boxes or set top boxes integrated in the television sets, as well as making efforts to conclude the switchover until 2012.

User Equipment

The DVB-T user equipment shall be accessible at an affordable price.

National coverage with DVB-T video signal

The switch-off of terrestrial analog video broadcasting shall be executed only if over 95% of the population in the respective region ("island") shall have the option to receive the national operator programs. In view of this:

- The state bodies shall duly release frequency resource, currently used for the needs of national security and defense;
- An agreement has to be reached between the state administration, the regulators and the television operators for the terms and states of digital coverage and for the duration of the *simulcast* period;
- The development of measures for stimulation of DVB-T signal coverage is required, especially for the border regions;
- Stimulation of the enterprises rejecting the radio-frequency spectrum in favor of terrestrial analog video broadcasting before the expiry of their licenses shall be provided through adequate pricing o the radio-frequency spectrum for DVB-T and special policy for the *simulcast* period;
- Compensation for additional costs during the *simulcast* period shall be provided;
- Measures or stimulation of the enterprises for introduction of new digital services such as EGP, electronic trade, e-government and mobile applications shall be provided.

Provision of conditions or the operation of the national enterprises for terrestrial analog video broadcasting through licensing (re-licensing) under the new legal framework and providing the option of using multiplex.

8. Legal Framework and Other Relevant Documents.

Amendment and supplement of the existing legal provisions and other documents is required:

- RTA;
- Updated sector telecommunication policy of the Republic of Bulgaria (published, SG, issue 104, dated 2004)
- National plan for radio-frequency spectrum allocation;
- Standardization.

Radio and Television Act

At present the RTA does not affect specific issues relevant for the implementation of DVB-T in the Republic of Bulgaria. In compliance with article 9 of the Transitional and Final Provisions of the ECA, the license conditions and requirements for performance of telecommunication

activities and services issued in compliance with the Telecommunication Act (revoked) shall remain valid for the operators until their entry in a specific registry or issuing permit under the ECA. The conditions for performance of electronic communication under the ECA can be preserved and further developed with the adoption of the full strategy and development plan for DVB-T.
The provisions of the RTA shall be relevant only for licensing and registration of television operators, broadcasting analog programs and following the adoption of the strategy and the plan shall also be amended and/or supplemented in compliance with the adopted documents.

For the DVB-T in the RTA and the ECA, a single program shall be licensed for single radio-frequency channels. The license includes additional service /data/ programs, such as the videotext program. For the digital methods of video broadcasting, the frequency channel transmits multiplex, broadcasting more than one program as data. The transmission network for this multiplex shall comply with the provisions of ECA.

The statute and relations of the parties shall be specified – an enterprise securing the electronic communication network providing the radio-frequency channel and program/service operators undertaking the implementation. Various actions can be performed by the same party.

For the specifics of DVB-T in RTA it is required to introduce the following terms, definitions and control.

The ECA – Chapter 16, "Radio Equipment and Terminal Electronic Communication Devices, Devices for Interactive Digital Television Services in the Field of Electronic Communication Networks and/or Services", the issues for utilization of devices for interactive digital television services shall be reviewed, as well as the need for the devices of having open application program interfaces (API).
Chapter four "Electronic Communication Regulation" settles the issues related to interaction with EMC, the procedure for selection of enterprise permitted to use individually assigned scarce resource – radio-frequency spectrum for providing electronic communication through DVB-T networks.

Electronic communication policy

The update of the telecommunication policy (published in SG, issue 104 dated 2004) shall be related to amendment of the terms, stages and measures for introduction of terrestrial digital television in relation to this plan.

National plan for radio-frequency spectrum allocation

The switchover from terrestrial analog to terrestrial digital video broadcasting shall be related to the release of radio-frequency resource, used currently for the needs of the national security and defense, which will lead to amendment of the National Plan for radio-frequency spectrum allocation, together with the terms approved herein.

The amendments and supplements shall also result from the adopted plan by the Regional Radiocommunication Conference RRC-06, plan Geneva 2006 for DVB-T in region 1 and 3 in bands 174-230 MHz and 470-862 MHz.

Standardization

The standards coordinated between the stakeholders shall be secured and thereby accessible. In the group of standards, handbooks, reports and terms of reference for introduction by the BSI, referring to DVB-T the following standards shall be specified:

- EMC;
- Terms of references and requirements for transmission equipment;
- Main multimedia platform;
- Terms of references and requirements for DVB;
- Service terms of references.

The BSI shall harmonize the BSS with the European standards through translation or adoption and general European DVD standards have already been approved of requirements and terms of reference, other undergo adoption process. In the DVB field the following general European standards have been adopted as BSS:

- BSS EN 300 421 – Digital video broadcasting (DVB); Framework structure, channel coding and modulation for 11/12 GHz satellite radio services;
- BSS EN 300 429 – Digital video broadcasting (DVB); Framework structure, channel coding and cable system modulation;
- BSS EN 300 744 – Digital video broadcasting (DVB); Framework structure, channel coding and modulation of digital terrestrial television;
- BSS EN 300 468 – Digital video broadcasting (DVB); Terms of reference for official information (OI) in the DVB systems.

The introduction of new and additional European standards shall be continued in the Republic of Bulgaria by the Bulgarian Standardization Institute in the field of DVB-T (**Annex No. 3).**

9. Definition of Task and Departmental Work Groups

The following work groups responsible for the implementation of switchover from terrestrial analog video broadcasting to terrestrial digital video broadcasting in the Republic of Bulgaria and terms of their setting-up specified below:

- **State Agency for Information Technology and Communication** – Sector policy in the electronic communication – July 2008;
- **Ministry of Culture, EMC, CRC and SAITC** – amendment and supplement to the Radio and Television Act – May 2008;
- **National Radio-Frequency Spectrum Council at the Council of Ministers** – amendment of the National Plan for Radio-Frequency Spectrum Allocation;

The setting up of a permanent work group shall be required (for the duration of the switchover), having the task of coordinating the actions for implementation of DVB-T and its update.

10. Final Observations. Conclusions and Proposals.

The process of digitalization of terrestrial video broadcasting and establishing the options for providing DVB-T services in the Republic of Bulgaria shall be accelerated. This will grant options for using good quality, diverse and interactive digital video broadcasting services.

Prerequisites for the accelerated and careful implementation of DVB-T:

- Optimal planning of radio-frequency allotment in the zones;
- Release of the required radio-frequency spectrum by the Ministry of Defense;
- Establishing appropriate legal framework and amendment and supplement of documents important for this activity;
- The involvement of the state and its political and governmental mechanisms;
- The support of the serious investment load by the companies providing DVB-T; and
- Establishing diverse and valuable content.

The priority goal of the Republic of Bulgaria shall be the establishing of conditions for start-up of the staged digitalization of terrestrial video broadcasting in 2008 in view of completion of the switchover in June 2015.

According to the Geneva 2006 Plan, the Republic of Bulgaria has radio-frequency resource adequate for building 10 DVB-T networks of nation-wide coverage, 34 networks of regional coverage and 23 networks with regional coverage for the territory of the cities Sofia and Varna.

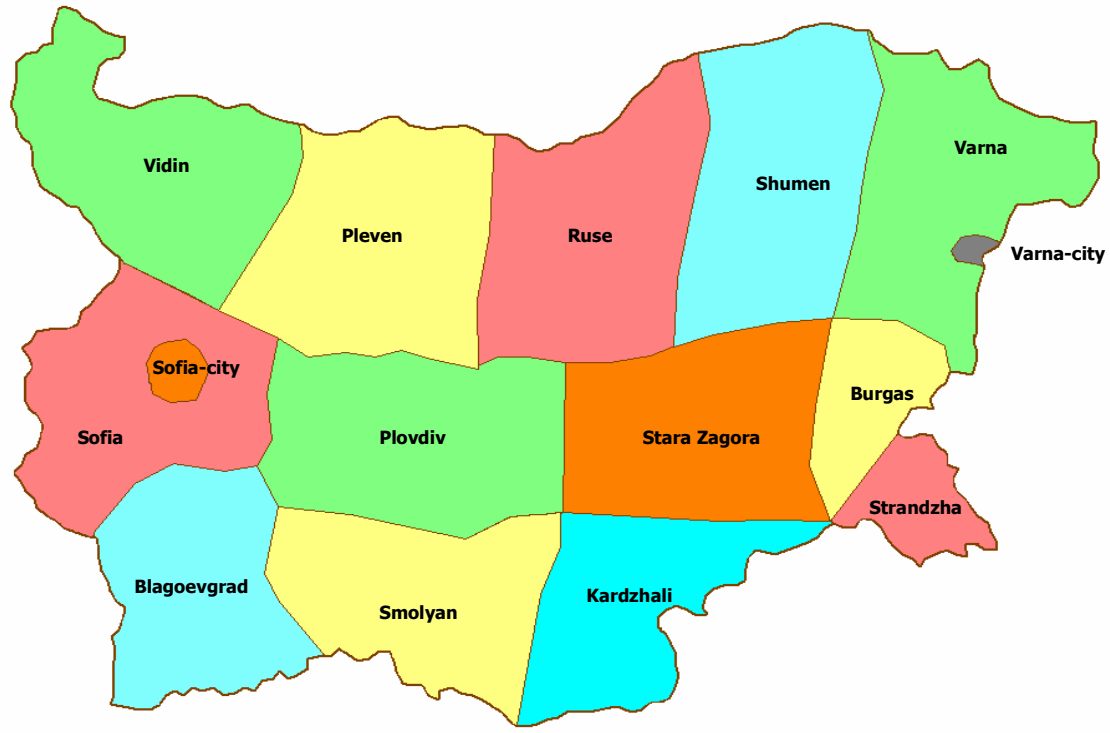
As a result of a detailed analysis and consideration of the experience of the advanced states in the process of implementation of DVB-T it has been concluded it is the so-called "*island*" principle that is the most appropriate for our country. The switchover to DVB-T shall be implemented in two stages. The initial state shall start in 2008.

The State Agency for Information Technology and Communication shall manage the organization and financing of the advertising and awareness campaign related to the implementation of DVB-T in the Republic of Bulgaria. For the switchover implementation a set of regulative measures shall be required; amendment and supplement of the legal framework, thereby providing the digitalization switchover.

A broad range of STBs for DVB-T exists, having price ranges from 60 to 1000 BGN, depending in their technical capacity. The trends in increasing the production of new television receivers for combined reception of digital and analog signals are intensifying.

Annex No. 1

Allotment Areas in the Republic of Bulgaria in Compliance with the Geneva Radiofrequency Plan 2006



Annex No. 2

EU, Council of Europe and ITU DVB-T switchover documents

1. Decision of the European Parliament dated September 26 2002 regarding the Action Plan of the European Union for introduction of digital television in Europe:

- Appeals to the commission and the member states to turn the development of digital television and the option for access to digital television on behalf of the general public in the most important political priority, set by the Council of Europe in Lisbon.

2. Resolution of the Council dated June 27, 1994 regarding a framework of the policy of the Community with regard to the digital video broadcasting:

- Proposes a special Commission to monitor closely every development related to the digital video broadcasting and report it to the Council, as well as any and all solutions for undertaking appropriate measures whenever necessary and useful in all cases before July 1, 1995.

3. Explanatory notes regarding interim issue of the list of standards and/or specifications for electronic communication networks, services and related services and equipment:

- In compliance with article 5 (1) of Directive 90/387/EEC, amended by Directive 97/51/EC and article 17 of the Framework Directive 2002/21/EC, the Commission shall either publish in the Official Gazette of the *European Commission* a list of standards and/or specifications, serving as a basis for stimulation of harmonized provision of electronic communication services and related equipment and services (the first paragraph of article 17), in order to provide interoperability of services and improve the freedom of choice for the users (second paragraph of article 17);
- In compliance with article 2(a) of the VS Directive, all television services transmitted for viewers in the Community by cable, satellite or broadcasting, if they are fully digital, shall use transmission system standardized by a recognized European Standardization Body;
- Terrestrial digital video broadcasting standards:
ETSI EN 300 744 (Frame structure, channel encoding and modulation for digital terrestrial television DVB-T);
ETSI TR 101 190 (Instructions for introduction of DVB terrestrial services: aspects of transmission).

4. Recommendation No. (2003) 9 regarding the measures for strengthening of the democratic and public effect of the digital, radio and television broadcasting.
Adopted by the Commission of Ministers in the Council of Europe on May 28th, 2003 on the 840th meeting of the deputy-ministers.

- Within the context of the new technologies, without a reliable and appropriate financing framework, the scope of the public operators and the scope of their contribution to the society can be decreased. Facing the increased costs for acquisition, production and storage of programs and sometimes costs for broadcasting, the member states shall provide the public operators option to receive access to the required funds for the performance of their mission.

5. Final Acts of the Regional Radiocommunication Conference RRC-06 for planning of terrestrial digital broadcasting services in parts of Regions 1 and 3, in frequency bands 174-230 MHz and 470-862 MHz.

- The conference has adopted the Regional Agreement regarding the planning of terrestrial digital broadcasting in Region 1 (parts of Region 1, located to the west of meridian 170° east longitude and north of parallel 40° south latitude, with the exception of the territory of Mongolia) and in Islam Republic of Iran, in radio-frequency bands 174-230 MHz and 470-862 MHz, also related resolutions, contained in the Conclusive Acts;
- This *Agreement* shall be effective as at June 17, 2007, 0001 UTC;
- The regulations of this Agreement shall be applied temporarily since June 17th 2006, 0001 UTC;
- As at the date quoted in article 12.2 above, the broadcasting stations operating with radio-frequency allotments not registered in the *Plans* or not compliant with this *Agreement and the Plans* related to this Agreement (section 5.1.2 of article 5), may continue to operate in case they shall not create unacceptable electromagnetic disturbances of any of the allotments, compliant to this *Agreement* and the *Plans* related thereto and shall not claim protection from them;
- This Agreement shall be valid until its review in compliance with article 11 of this Agreement;
- The *switchover period* shall commence June 17th 2006, 0001 UTC. For the duration of the *Switchover period* the allotments in the Analog Plan (as specified in section 3.1.2 of article3) shall be protected;
- The *switchover period* shall end June 17th, 2015, 0001 UTC. But for the states listed in the footnotes in article 1, for radio-frequency band 174-230 MHz, the *switchover period* shall end June 17th, 2020, 0001 UTC. Following the conclusion of the *switchover period* applied for each country, the respective entries in the analog Plan shall be annulled by the *Bureau*, and
- the provisions of section 4.1 of article 4, relevant to the amendment of the analog Plan; and
- the notes with regard to analog allotments shall no longer be applied for the analog allotments in the respective countries.

6. Recommendation to the European Commission as at May 2005

In an address published in May 2005 the European Commission (EC) has recommended the member states to terminate the analog radio broadcasting until 2012 By recommending the coordinated approach for analog switch-off, the EC admits that the full advantage of the digital switchover cannot be obtained until all countries in a given region suspend their analog signals. As a guarantor of the European Legislation, the EC has insistently confirmed the rules for regulation of the competition and the state support have been approved. In Berlin – Brandenburg the EC has determined the financial compensation given to the trade companies providing broadcasting by the media regulatory bodies with the purpose of support of unified approach for digital switchover as illegal. The compensation has been evaluated as supporting deviation of competition. The European Commission has also directed requests regarding state financing given to the Swedish network operator Teracom and the governmental subsidies given to the Italian households to buy the interactive STBs for the television sets. However, financing of digital switchover is not fully forbidden. The European Commission has noted the political intervention shall be possible only in case of specific circumstances and only for the purpose of support of goals being of general interest. Despite of this, however, a further clarification of "goals of general interest" shall be required.

The first analog switch off is expected to occur in three stages in Western Europe. The first group of countries shall finish the analog switch off between 2006 and 2008. Finland and Sweden are

one of the countries being characterized with a large number of households relying on terrestrial platform, but starting to offer terrestrial digital video services in the last 6 years. In Germany and the Netherlands a very small number of households relying on a ground platform are available. The second group of countries shall perform analog switch off between 2009 and 2011. The number of households using terrestrial platform is relatively low, although certain exceptions are available, such as Austria and Norway. Finally the members of the third group are countries with large population and a large number of households, using terrestrial platform. These states shall have to be attentive.

7. Communication from the Commission to the Council, European Parliament, European Social and Economical Committee and the Committee of regions for review of interrelation of digital interactive video services in compliance with Communication COM (2004) dated June 30, 2004.

The priorities of the Commission are to operate successfully with the member states to provide successful switchover to digital television, which is a preposition for availability of interactive digital services and support of the open standards and current coordination regarding the mutual relation and the exchange of best practices between the member states and the stakeholders.

8. 2695th Meeting of the Board of Ministers of Transport, Telecommunication and Energy, Brussels, December 1-5, 2005
Acceleration of the transition from analog to digital video broadcasting – Conclusions of the Council.

Most member-states expect to finish the switchover from analog video broadcasting to terrestrial digital broadcasting until 2012 and some of them shall perform this switchover on a regional or nation-wide level. The margin between the schedules reflects the differences in the development of the television market, availability of the appropriate radio-frequency spectrum and the use of various platforms in the member-states;

The additional resources from the radio-frequency specter, resulting from the process of switchover from terrestrial analog television broadcasting to terrestrial digital broadcasting shall be used repeatedly in a way contributing in the best way possible to the society and the economics on a national and European level, having regard to the respective political goals and interests;

As a result of the Regional Radiocommunication Conference RRC-06 and in view of the future Global Radio Conferences, it is required to provide support for the option of flexible use of the released radio-frequency spectrum and adoption of unified end date for protection of services provided by the terrestrial analog video broadcasting as soon as possible – until 2012 – for regarding the general European proposals.

Annex No. 3

ETSI, ITU, EBU, ISO/IEC Documents

- ETSI EN 300 421 – DVB–S – Digital satellite video broadcasting;
- ETSI EN 300429 – DVB–C – Digital cable video broadcasting;
- ETSI EN 300 744 – DVB–T – Digital terrestrial video broadcasting;
- ETSI EN 102 154 – Instructions for implementation of MPEG to utilize the MPEG-2 system, video and audio satellite, cable and terrestrial broadcasting;
- ETSI EN 301 958 – Feedback channel for DVB – T;
- ETSI EN 300 468 – Terms of reference for official information (OI) in DVB;
- ETSI TS 102 812 – Terms of reference for multimedia internal (home) platform MHP;
- ETSI TR 101 190 – Instructions for implementation of DVB – T;
- ETSI TS 101 197, ETSI TS 103 197 – DVB – SimulCrypt – synchronization and implementation of local architecture;
- ETSI ETR 289 – Support of usage of coding and conditional access to DVB–CS.
- The fundamental standards for the digital video broadcasting shall be the ISO/IEC 13818/1-10 standards – General encoding of moving images and accompanying audio information.
- EBU Tech. 3312 – Digital Terrestrial HDTV Broadcasting in Europe;
- EBU Tech. 3307 – Service Requirements for Free–to–air HDTV Receivers;
- EBU Tech. 3291 – Primary distribution of TV signals using MPEG-2 technologies – 2001;
- EBU Tech. 3299 – HD Image Formats for TV production – 2004;
- EBU Tech. 3308 – Broadband TV – opportunities and challenges – 2005;
- EBU Tech. 3312 – Digital Terrestrial HDTV Broadcasting in Europe – 2006.

International and European Standards for DVB-T feasible to implement in the Republic of Bulgaria:

- ETSI EN 301 958 Digital Video Broadcasting (DVB); Interaction channel for Digital Terrestrial Television (DTT) incorporating Multiple Access OFDM;
- ETSI EN 102 154 Digital Video Broadcasting (DVB); Implementation guidelines for use the MPEG-2 Systems, Video and Audio in satellite, cable and terrestrial contribution broadcasting applications;
- TR 101 190 Digital Video Broadcasting (DVB); Implementation guidelines for DVB terrestrial services; Transmission aspects;
- ETS 102 201 Digital Video Broadcasting (DVB); Interfaces for DVB Integrated Receiver Decoder (DVB - IRD);
- EN 301 701 Digital Video Broadcasting (DVB); OFDM modulation for microwave digital terrestrial television;
- ETR 289 Digital Video Broadcasting (DVB); Support for use of scrambling and Conditional Access (CA) within digital broadcasting systems;
- ETSI TS 102 812 Digital Video Broadcasting (DVB); Specification for Multimedia Home Platform (MHP);

- ETSI EN 302 304 Digital Video Broadcasting (DVB); Transmission system for Handheld Terminals (DVB–H);
- ISO/IEC 13 818 – 2 Information Technology – Generic coding of moving pictures and associated audio information: Video.

Annex No. 4

Digital Video Broadcasting Development in the EU Member States

Country	Digital television					
	Subscribers (000)					Penetration
	Cable	Satellite	Terrestrial	DSL	Total	%
Austria	60	228	0	0	288	8,8
Belgium	146	0	10	3	159	3,7
Great Britain	2600	7913	5178	26	15713	63,5
Germany	2038	2440	2200	0	6678	17,1
Greece	0	218	0	0	218	5,6
Denmark	140	337	0	0	477	19,2
Ireland	170	363	0	0	533	38,3
Spain	665	1776	0	57	2498	17,3
Italy	0	3318	2500	221	6039	26,9
Poland	45	1230	0	0	1275	9,3
Portugal	380	389	0	0	769	15,1
Slovenia	2	0	0	5	7	1,0
Hungary	0	150	4	0	154	3,9
Finland	129	48	516	0	693	28,6
France	1022	4402	490	750	6664	25,3
The Netherlands	190	555	128	0	873	12,4
Czech Republic	0	90	0	0	90	2,2
Sweden	230	608	450	12	1300	28,9
EU total	**7826**	**24116**	**11477**	**982**	**44497**	**23,7**

Implementation of DVB-T in EU member states and other countries

Austria

The digital platform in Austria (DPA) has started in 2002

In 2003 a DVB-T strategy has been implemented.

The DVB-T channels and the private channels (over 60) undergo coordination process. A short period of simulcast is stipulated.

April – July 2004 – transmitters and private interactive MHP applications have been tested in Graz.

More than 150 MHP boxes have been given to households who agreed to participate in the testing period.

February 2006 – approved license for 2 multiplexes by the Telecommunication Regulator of the Austrian Broadcast Suppliers (ORS).

October 2006 –1 multiplex starts in the main cities with 75% population coverage, using fixed receivers.

The analog switch off is scheduled to begin in 2007 after six-month simultaneous radio and video broadcasting of analog and terrestrial digital services. ORF has submitted application for licensing of DTT multiplex, issued by the government.

2010 – end of switchover.

Belgium
In Belgium DVB-T is currently being implemented.
Used parameters:

- SFN networks, 8K modulation

Determining the back channels for portable receivers is still being researched.

- 2002 – in the Antwerp region 4 DVB-T transmitters (aerial) have been used, (ADSL channels), new interactive services and applications.
- July 2003 – regular DVB-T transmissions in Antwerp with 1 multiplex.
- May 2004 – DVB-T network covers the full region of Flanders with 1 multiplex for external reception.
- The end of the switchover is scheduled for 2010.
- 2 DVB transmitters operate in the French community in Brussels. The full French community shall be covered by the end of 2007.
- A factor for the development of DVB-T in Belgium shall be the utilization of cheap receivers for the SFN networks.

Great Britain
Five national terrestrial digital television programs are being broadcasted in Great Britain, using over 80 main transmitters, operating in SFN networks.

Croatia
DVB-T in Croatia has started (trial) in 2002. Six transmitters are situated in the Croatia National Television (HTP). One transmitter operates in Zagreb covering a range of 1 000 000 citizens.
The idea is the lower neighboring channels operating in the DVB-T network to have 23 dB ERP.
2005 –DVB-T implementation regions – Istria, Rijeka, Split, Zadar, Dubrovnik and Osijek.
Various transmission methods have been used having a maximum number of programs uploaded on a single multiplex (internal).
The goal is by the end of 2006 to reach 75 % coverage in the country by a single multiplex.
For the future the digital networks shall operate with MFN/SFN networks.
The government has not published official charter regarding the implementation of DVB-T, date of switch off of analog services and licensing policy at present.

Czech Republic
The regular DVB-T service of a single MPX (sign A, Czech Television and TVNOVA) has been commissioned October 21st, 2005 in Prague. Now this service is being offered in the regions Brno and Ostrava. Steps for commissioning of two other MPXs (sign Band C) shall be taken upon the completion of the licensing process by the Broadcasting Council. By that time the experimental projects in Prague and Brno shall commence.

Denmark
The start-up of transmission by two powerful stations (equivalent emission power – 50kW), operating in SFN, starts operation in November 1999.
SFN networks are being placed in Copenhagen in 2000.
In October 2002 two powerful stations in North Jutland start operation.

The resolution of the Parliament is to initiate international coordination of 4 DVB-T multiplexes. One of the four multiplexes shall provide the regional structure in equality with the analog network, used by TV2/DANMARK.

Two national public operators have received permit to implement network for transmission of the first multiplex to be used jointly.
On March 31st, 2006 the first national coverage multiplex has started. This multiplex shall transfer programs and interactive services from the public operators – DR and TV2. All programs shall be transmitted non-coded.

Finland
The Ministry of Transport and Communication of Finland issued licenses for three multiplexes on June 23rd, 1999. The licenses have a term of 10 years and they become effective as at September 1, 2000. At the same time it has been decided in advance that the analog video services shall be switched off at the end of 2006. In 2004 the switchover has been officially confirmed as at August 31, 2007.
Operation broadcasts (8K, 64 QAM, code level 2/3, protected interval 1/8) have started according to schedule on September 1, 2000 with 39% population coverage.
MHP is the standard selected in Finland.
In 2005 a pilot test for DVB-H has been started in Helsinki. The same year the Ministry of Transport takes steps toward applying for licenses of broadband nation-wide network for DVB-H transmission. The license has been issued to Digita Oy on March 21st, 2006.
Currently the country is undergoing a license application period for fifth broadband nation-wide digital network in Finland. The deadline for application submission shall be May 2, 2006.

France
Terrestrial digital service (TNT) has started in France on March 31st, 2005. Until March 2006 the population coverage reaches 50 %. 2.5 million decoders have been sold for a single year. In September 2005 CSA is experimenting with T-DMB and DVB-H networks in Paris for a period of 9 months.
The purpose is to achieve full coverage until 2007. The analog switch-off shall be performed in 2012.

Germany
The introduction of DVB-T shall be performed at the so-called “starting islands”.
The long-term period stipulates DVB-T provided by portable indoor reception, as well as mobile reception for national, regional and local coverage.
The population coverage is designed to reach 95% in urban areas and 70% in the rural areas.
The most important is the regular DVB-T transmission starting with 3-4 multiplexes in the big cities and the densely populated areas, using frequencies in band IV and V, including over 60 channels.
The transition shall continue for the whole country step by step and the number of multiplexes shall increase in compliance with the user needs.

The full digital scenario shall be mainly based on SFN planning having parameters 8K modulation, 16QAM, 2/3 error protection.
October 31st, 2002 a pilot project has started in several regions in Germany (Berlin and the nearby regions). Broadcasting stations used for two multiplexes have been tested.
In 2003 12 national programs and 14 commercial programs have been uploaded to 7 multiplexes.
In 2004 in Cologne/Bohn, Bremen and Hannover/Brunswick 16-20 TV programs have been uploaded to four multiplexes.
On May 30th, 2005 six multiplexes have been commissioned in Bavaria – the regions around Munich/South Bavaria and Nurnberg.

In December 2005 three multiplexes have been commissioned having uploaded 11 TV programs in the regions Erfurt/Weimar and Hale/Leipzig.
Nowadays 55% of the population (49 million) receives DVB-T terrestrially through external antennas, 23% of the population (19 million.) receives DVB-T through portable receiver.
At the end of 2008 all analog transmitters for digital television shall be stopped and the switchover from terrestrial analog to terrestrial digital video broadcasting shall be finalized.
The end of the switchover is expected in 2010.

Greece
In Greece the DVB-T planning begins in 2002. The priority of the company ATTIKI is the capital of Greece – Athens – and the coverage shall include 50% of the population. Greece has the intention of using SFN and MFN due to the geographical features of the region.

Hungary
In Hungary the preparation of the DVB-T plan has commenced in 2000. The plan stipulates three multiplexes using 17 existing and three new stations. The channels of three MFN networks shall be within the frequency band 478-862 MHz.
For the future seven DVB-T multiplexes in the UHF band and one DVB-T multiplex in the VHF band shall be required. In 2007 a preliminary overview of the DVB-T service is expected. Analog switch-off deadline has been set at latest for 2012.

Ireland
In 1998 the initial research of the options for providing television services in the digitalization era has been initiated.
In Ireland 30% of the households use digital satellite TV and 42% of the total households use digital video services. The planning of DVB-T has started in 2006.
The analog switch-off is expected to inconvenience the public to a minimum extent.

Italy
The first stage of the terrestrial digital video broadcasting has started in February, 2003.
Second stage has started in January, 2004.
140 DVB-T transmitters operate in the big cities in Italy, out of which 30 operate in III band and 110 operate in IV and V band, having two multiplexes with 70% population coverage.

Latvia
The network planning begins in 1998 based on 8k 64QAM 2/3 modulation for antenna reception in rural areas and portable reception in urban areas. The frequency planning is based on SFN – 100 by 100 km for nation-wide and local coverage.
In August 2002 Latvia has signed an agreement for DVB-T in TV channels 61-69 and started trial broadcasts with 4 programs with transmitter in the V band.
Approval by the Government of the concept for implementation of digital broadcasting is expected.

Lithuania
For the duration of the transition period, 4 multiplexes have been planned, operating simultaneously with the analog networks and shall broadcast the same programs. For the switchover period fixed reception by using SFN and MFN networks with 8k systems is stipulated.
Several years ago license has been issued to the Lithuanian national operator to start broadcasting using channel 53.

On March 31, 2004 licenses for three companies have been issued, which shall broadcast their own programs. At latest September 1st, 2004 the transmitters shall start broadcasting said programs and stop the test broadcasting. At that time 5 programs (3 commercial and 2 national) shall be available.
Currently commercial broadcast of 4 channels are stipulated, including 20 programs until the end of 2005. In the next two years the full territory of the country shall be covered by 4 multiplexes.

Luxembourg
In 2002 3 test transmitters have been commissioned in channel 41 in SFN network, covering the city of Luxembourg and the surrounding areas, as well as south-east Luxembourg. The planned network has a portable indoor reception. Field tests have been conducted with fixed, portable and indoor reception in configuration SFN, 16 QAM, 2/3 code level, 1/8 protection interval and 8k.
The analog channel 7 has been switched off at the end of 2004 and is now in test stage in digital format, broadcasting 1 test program.
Luxembourg has the purpose of coordinating 7 national multiplexes, including 3 switched over from analog to digital transmitters with high transmission capacity.
Luxembourg does not have a precise plan for transition to digital radio broadcasting and the decision shall be taken according to the market.

Malta
In 2004 the Telecommunication Regulation Body of Malta, together with the Ministry of Competition and Communication has initiated a research regarding introduction of terrestrial digital services.
In March 2005 two licenses have been issued to two operators.
In July 2005 one of the licensed operators has started the provision of services having unlimited coverage.
The two networks shall be SFN, based on 8k and fixed reception type.

Moldova
In September 2003 test broadcasts begin with a single DVB-T transmitter. In October 2003 a second transmitter has started test broadcasts with 4 programs.

The Netherlands
On January 31st, 2002 licenses for a 15-year period for use of radio-frequency specter for digital terrestrial television have been granted to an organization, using currently analog public television (1 multiplex) and another having commercial purposes (4 multiplexes).
The two operators start regular commercial digital broadcasts in April 2003 in Rundstedt, the territory of which is currently covered by 5 multiplexes.
In order to accomplish the switchover to digital television until 2007, there have been suggestions for lack of switchover period, instead switchover from region to region and this process shall end at the beginning of 2007."

Cable Telecommunication Networks for Radio and Video Programs Broadcast

(Source – TRC)

In 2005 52 new operators of public cable telecommunication networks have been registered, which is half the amount compared to 2004. Simultaneously during the year 104 supplements to the existing registrations for expansion of the territorial coverage have been issued. At the end of the year the total number of cable operators reached 642 and the number of cable networks reached 2512. 49 registrations have been deleted during the year. It could be summarized that intensification and restructuring of this segment of the telecommunication market to the benefit of the big operators has been observed.

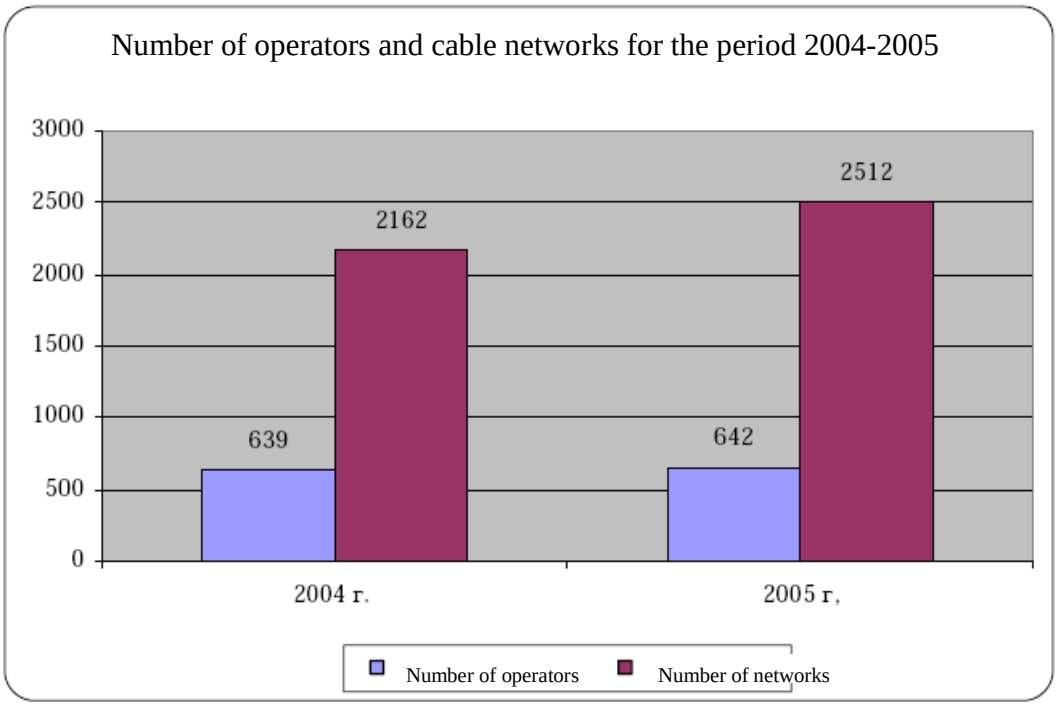


Figure 1. Number of operators and cable networks for the period 2004-2005.

Source*:* Data submitted to TRC

The schedule indicates that the number of cable operators is almost identical to the number in 2004, but the quantity of the network is increasing, which means the big operators have strengthened their positions.

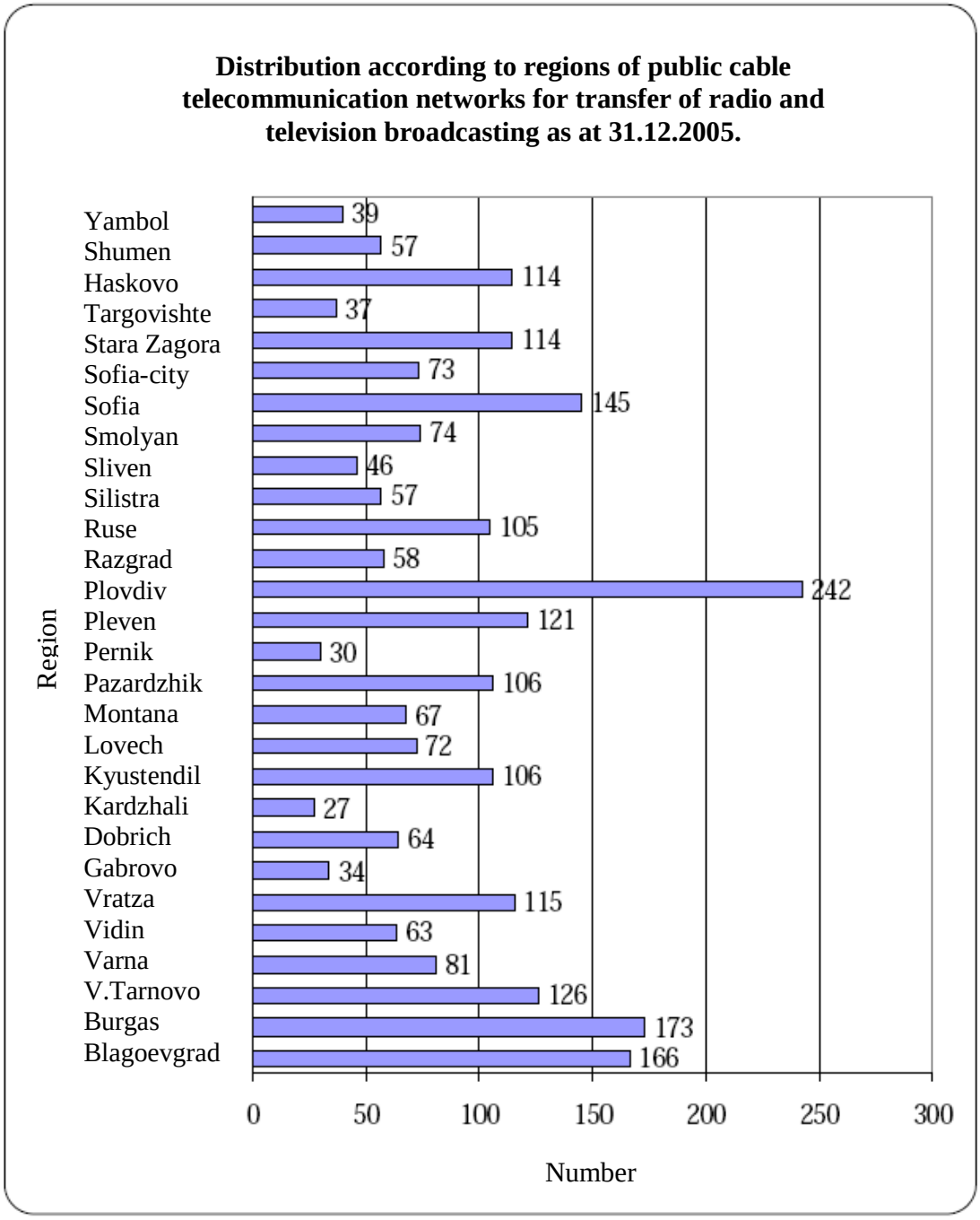
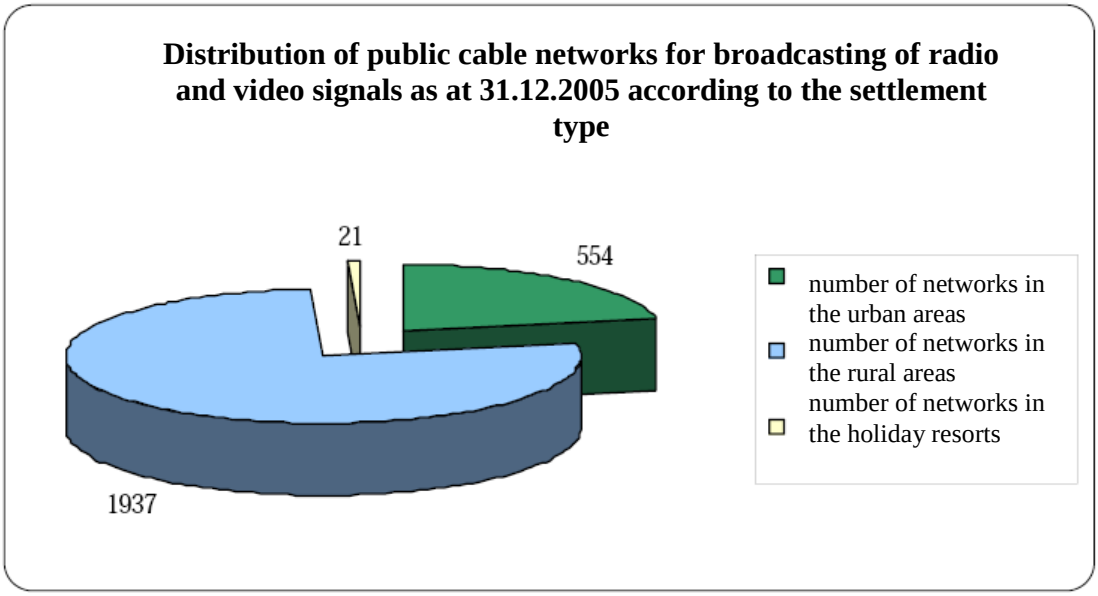


Figure 2. Distribution according to regions of public cable telecommunication networks for transfer of radio and television broadcasting as at 31.12.2005.

Source*:* Data submitted to TRC

The distribution of the issued registration certificates for the region is irregular – more than half the networks have been built in twelve of the twenty-eight regions in the country (figure 2), the most being in Plovdiv, Burgas, Blagoevgrad and Sofia.



- number of networks in the urban areas
- number of networks in the rural areas
- number of networks in the holiday resorts

Figure 3. Distribution of public cable networks for broadcasting of radio and video signals as at 31.12.2005 according to the settlement type

Source*:* Data submitted to TRC

Figure 3 indicates the distribution of cable telecommunication networks according to the type of settlement where they have been built. 1937 (or 77% of the registered cable networks) have territorial range in the rural areas and 554 – in the urban areas. Compared to the previous year the cable networks in the rural areas have increased by 302 and in the urban areas – by 43.

Cable telecommunication networks for broadcasting of radio and video signals have already been built in all urban areas, as well as 28% of the rural areas in the Republic of Bulgaria. For a single year, the number of villages having cable infrastructure has increased by 11%.

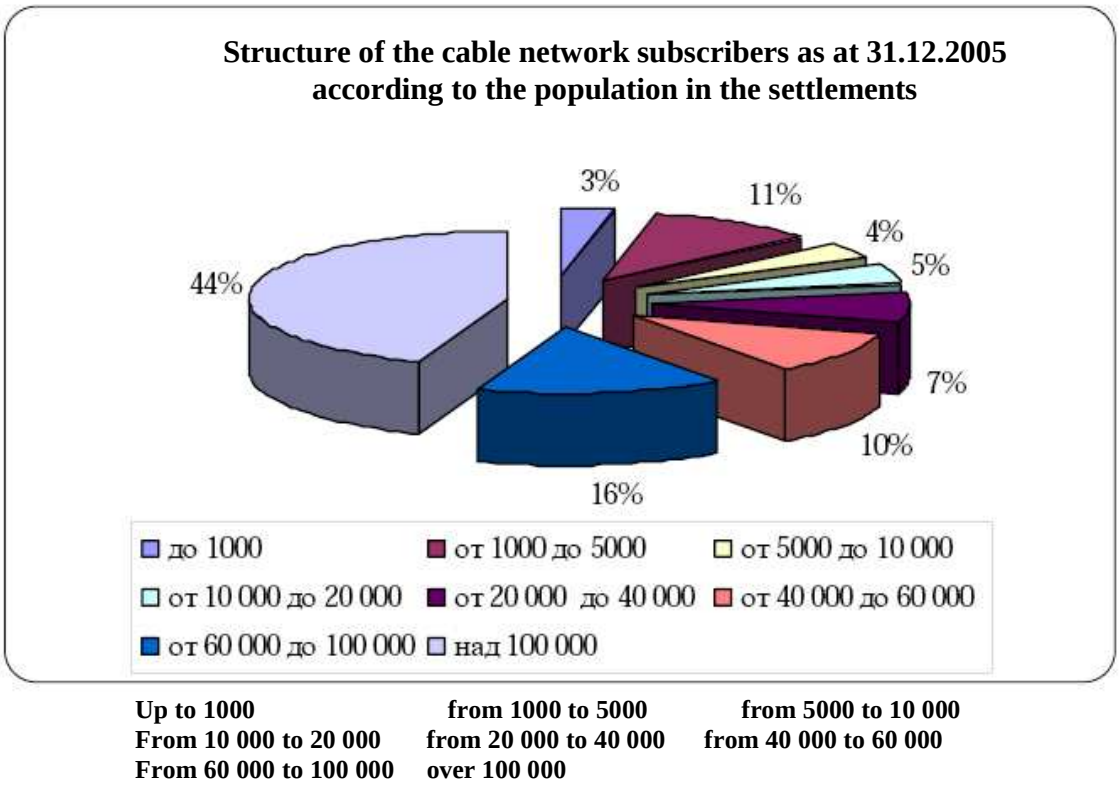


Figure. 6. Structure of the cable network subscribers as at 31.12.2005 according to the population in the settlements

Source*:* Data submitted to TRC

Figure 7 presents the structure of the revenue of cable telecommunication activity. Considering more than half of the subscribers live in settlements with population over 60 000, the revenue from public cable telecommunication activity in such settlements shall be formed with a more significant share of the market income - 68%. For settlements with population up to 5000 citizens this percent is only 11%.

According to the expert opinion of TRC, the amount of general revenue from this market segment for 2005 shall amount of about 151.5 million BGN, which is 30% more than the amount in 2004. The main share continues to origin from the distribution of radio and television signals (76%). The share of encoded programs is increasing (almost 6%).

Some of the big operators (“EUROTUR SAT TV” AD, “EVROKOM CABLE” EAD, “TELECABLE” AD) offer their subscribers digital television, providing broadcasting, transmission and reception video signal fully in DVB-S format. The advantage of this technology is that it grants options for interactivity, i.e. the subscriber is actively determining the content and time according to his preferences. One of the most popular services of this type of “video on demand”, in which the subscriber may watch desired movies or programs against additional payment. The digital program package is usually used together with the main package of analog programs by paying additional subscription fee for their reception. The service is offered with a package of encoded programs.

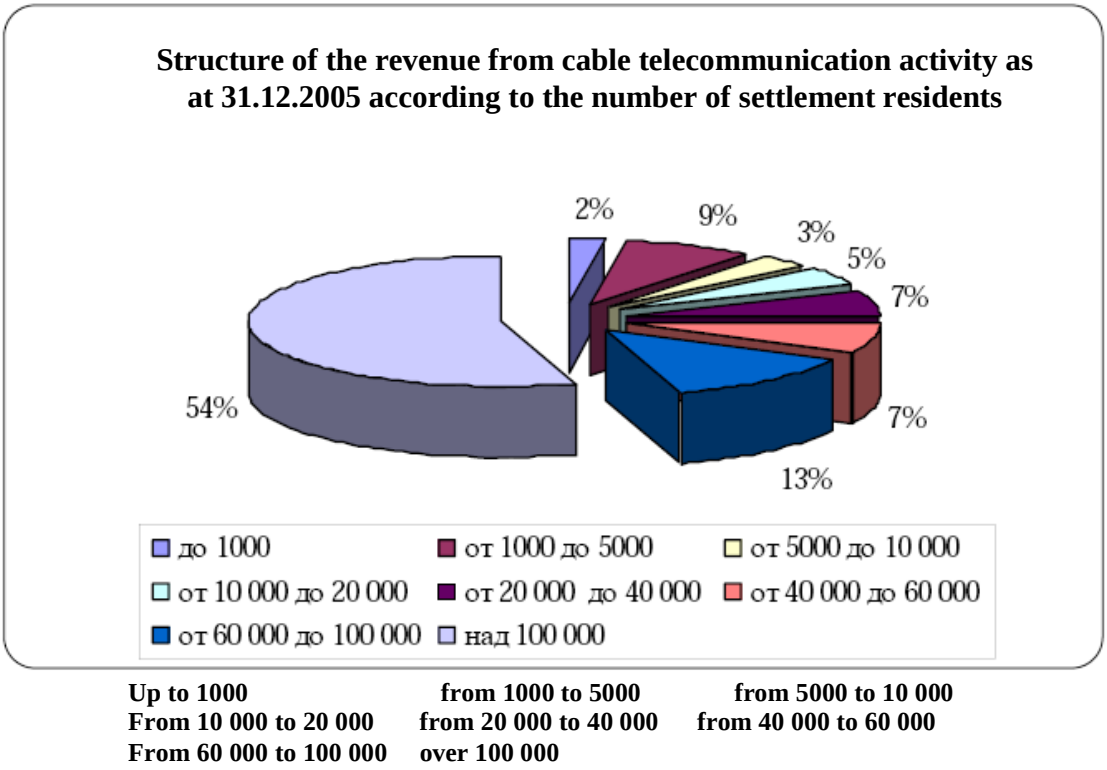


Figure 7. Structure of the revenue from cable telecommunication activity as at 31.12.2005 according to the number of settlement residents

Source*:* Data submitted to TRC

According to data from a research performed by an order of the TRC ("Research and analysis of user demand of telecommunication services in Bulgaria", 2006, research performed by the Faculty of Economics of Sofia University, commissioned by TRC) for the period between November 2005 and March 2006, in Bulgaria 69.1% of the citizens use cable television and 31.3% have Internet connection. The cable television is most popular among population aged 26-45: 71% of the representatives of this age group use the service. Availability of cable television is typical for households having monthly income from 601 to 900 BGN. (77% of such households).

Annex No. 6

Operation Load of the Video Channels by the Ministry of Defense

Frequency range [MHz]	Frequency band [MHz]	Channel	Release
478-494	478-486	22	until the end of 2007
	486-494	23	
502-510	502-510	25	until the end of 2007
590-614	590-598	36	until the end of 2007
	598-606	37	
	606-614	38	
646-686	646-654	43	until the end of 2008
	654-662	44	
	662-670	45	
	670-678	46	
	678-686	47	
726-758	726-734	53	until the end of 2008
	734-742	54	
	742-750	55	
	750-758	56	
766-814	766-774	58	until the end of 2008
	774-782	59	
	782-790	60	
	790-798	61	
	798-806	62	
	806-814	63	
822-862	822-830	65	until the end of 2010
	830-838	66	
	838-846	67	
	846-854	68	
	854-862	69	

The listed terms for release of the respective channels shall comply with the currently updated National Plan for Allotment of the Radio Frequency Band.

Annex No. 7

FIRST STAGE

Radio-frequency resource for *three national networks* for terrestrial digital broadcasting for service zones Burgas, Varna, Vidin, Plovdiv, Ruse, Sofia and Stara Zagora		
Service Area	**Channel**	**Broadband /MHz/**
Burgas	42	638-646
Burgas	49	694-702
Burgas	55	742-750
Varna	22	478-486
Varna	29	534-542
Varna	64	814-822
Vidin	32	558-566
Vidin	49	694-702
Vidin	53	726-734
Plovdiv	25	502-510
Plovdiv	35	582-590
Plovdiv	41	630-638
Ruse	26	510-518
Ruse	49	694-702
Ruse	64	814-822
Sofia	23	486-494
Sofia	40	622-630
Sofia	52	718-726
Stara Zagora	22	478-486
Stara Zagora	37	598-606
Stara Zagora	64	814-822

Additional radio-frequency resource for the *three national networks* for terrestrial digital video broadcasting for service zones Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen		
Service zone	**Channel**	**Frequency band /MHz/**
Blagoevgrad	25	502-510
Blagoevgrad	29	534-542
Blagoevgrad	33	566-574
Kardzhali	26	510-518
Kardzhali	42	638-646
Kardzhali	48	686-694
Pleven	41	630-638
Pleven	51	710-718
Pleven	57	758-766
Smolyan	34	574-582
Smolyan	49	694-702
Smolyan	58	766-774
Shumen	28	526-534
Shumen	40	622-630
Shumen	51	710-718

Radio-frequency resource for *twelve regional networks* for terrestrial digital video broadcasting		
Service zone	**Channel**	**Frequency band /MHz/**
Burgas-city	21	470-478
Burgas-city	27	518-526
Burgas-city	29	534-542
Varna-city	32	558-566
Varna-city	39	614-622
Varna-city	53	726-734
Plovdiv-city	27	518-526
Plovdiv-city	33	566-574
Plovdiv-city	51	710-718

Sofia-city	41	630-638
Sofia-city	43	646-654
Sofia-city	55	742-750

SECOND STAGE

Radiofrequency resource for *three national networks* for terrestrial digital video broadcasting (one of which under the DVB-H technology) for service zones Burgas, Varna, Vidin, Plovdiv, Ruse, Sofia and Stara Zagora		
Service zone	**Channel**	**Frequency band /MHz/**
Burgas	25	502-510
Burgas	30	542-550
Burgas	48	686-694
Varna	33	566-574
Varna	35	582-590
Varna	50	702-710
Vidin	26	510-518
Vidin	30	542-550
Vidin	45	662-670
Plovdiv	30	542-550
Plovdiv	32	558-566
Plovdiv	39	614-622
Ruse	21	470-478
Ruse	27	518-526
Ruse	45	662-670
Sofia	34	574-582
Sofia	48	686-694
Sofia	53	726-734
Stara Zagora	31	550-558
Stara Zagora	34	574-582
Stara Zagora	50	702-710
Additional frequency resource for the *three national networks* for terrestrial digital video broadcasting for service zones Blagoevgrad, Kardzhali, Pleven, Smolyan and Shumen		

Service zone	Channel	Frequency band/MHz/
Blagoevgrad	31	550-558
Blagoevgrad	42	638-646
Blagoevgrad	45	662-670
Kardzhali	21	470-478
Kardzhali	45	662-670
Kardzhali	60	782-790
Pleven	29	534-542
Pleven	38	606-614
Pleven	40	622-630
Smolyan	28	526-534
Smolyan	38	606-614
Smolyan	55	742-750
Shumen	24	494-502
Shumen	39	614-622
Shumen	52	718-726

Radio-frequency resource for *fifteen regional networks* for terrestrial digital broadcasting		
Service zone	**Channel**	**Frequency band/MHz/**
Blagoevgrad	28	526-534
Burgas	44	654-662
Varna	27	518-526
Varna-city	57	758-766
Vidin	46	670-678
Kardzhali	29	534-542
Pleven	22	478-486
Plovdiv	43	646-654
Ruse	58	766-774
Smolyan	57	758-766
Sofia	36	590-598
Sofia-city	35	582-590
Stara Zagora	23	486-494

Strandzha	32	558-566
Shumen	41	630-638

Annex No. 8.

Release of the Radio-Frequency Band by the Ministry of Defense

Channel	Frequency band [MHz]	Service zone (Allotment)	Status in compliance with the National Plan for Allocation of the Radio Frequency Band				
			as at 01.01.2006	as at 01.01.2007	as at 01.01.2008	as at 01.01.2009	as at 01.01.2010
21	470-478	Kardzhali	yes				
		Ruse	yes				
		Strandzha	yes				
22	478-486	Pleven	no		yes		
		Stara Zagora	yes				
		Varna	yes				
23	486-494	Pleven	no		yes		
		Sofia	yes				
		Stara Zagora	no		yes		
24	494-502	Pleven	yes				
		Plovdiv	yes				
		Shumen	yes				
		Sofia-city	yes				
25	502-510	Blagoevgrad	yes				
		Burgas	yes				
		Plovdiv	yes				
26	510-518	Kardzhali	yes				
		Ruse	yes				
		Sofia	yes				
		Varna-city	yes				
		Vidin	yes				
27	518-526	Ruse	yes				
		Strandzha	yes				
		Varna	yes				
28	526-534	Blagoevgrad	yes				
		Shumen	yes				
		Smolyan	yes				
29	534-542	Blagoevgrad	yes				
		Kardzhali	yes				
		Pleven	yes				
		Strandzha	yes				
		Varna	yes				
30	542-550	Burgas	yes				
		Plovdiv	yes				
		Vidin	yes				
31	550-558	Blagoevgrad	yes				
		Stara Zagora	yes				

32	558-566	Burgas	yes				
		Plovdiv	yes				
		Sofia-city	yes				
		Strandzha	yes				
		Varna-city	yes				
		Vidin	yes				
33	566-574	Blagoevgrad	yes				
		Varna	yes				
34	574-582	Smolyan	yes				
		Sofia	yes				
		Stara Zagora	yes				
35	582-590	Plovdiv	yes				
		Sofia-city	yes				
		Varna	yes				
36	590-598	Pleven	no		yes		
		Sofia	yes				
37	598-606	Stara Zagora	yes				
38	606-614	Pleven	no		yes		
		Shumen	no		yes		
		Smolyan	yes				
39	614-622	Plovdiv	yes				
		Shumen	yes				
		Sofia-city	yes				
		Varna-city	yes				
40	622-630	Pleven	yes				
		Shumen	yes				
		Sofia	yes				
41	630-638	Pleven	yes				
		Plovdiv	yes				
		Shumen	yes				
		Sofia-city	yes				
42	638-646	Blagoevgrad	yes				
		Burgas	yes				
		Kardzhali	yes				
43	646-654	Plovdiv	no			yes	
		Sofia-city	yes				
		Varna	no			yes	
44	654-662	Burgas	no			yes	
		Kardzhali	no			yes	
45	662-670	Blagoevgrad	no			yes	
		Burgas	no			yes	
		Kardzhali	no			yes	
		Ruse	no			yes	
		Varna-city	no			yes	
		Vidin	no			yes	
46	670-678	Blagoevgrad	no			yes	

		Varna-city	no			yes	
		Vidin	no			yes	
47	678-686	Sofia	no			yes	
		Stara Zagora	no			yes	
48	686-694	Burgas	yes				
		Kardzhali	yes				
		Sofia	yes				
49	694-702	Burgas	yes				
		Ruse	yes				
		Smolyan	yes				
		Vidin	yes				
50	702-710	Smolyan	yes				
		Stara Zagora	yes				
		Varna	yes				
51	710-718	Pleven	yes				
		Shumen	yes				
		Sofia	yes				
52	718-726	Shumen	yes				
		Sofia	yes				
53	726-734	Plovdiv	no			yes	
		Sofia	yes				
		Varna-city	yes				
		Vidin	yes				
54	734-742	Stara Zagora	no			yes	
		Varna-city	no			yes	
		Vidin	no			yes	
55	742-750	Burgas	yes				
		Pleven	no			yes	
		Smolyan	yes				
		Sofia-city	yes				
56	750-758	Shumen	yes				
		Smolyan	no			yes	
		Sofia-city	no			yes	
57	758-766	Pleven	yes				
		Smolyan	yes				
		Varna-city	yes				
58	766-774	Ruse	no			yes	
		Smolyan	yes				
		Varna	no			yes	
59	774-782	Plovdiv	no			yes	
		Sofia-city	no			yes	
		Varna-city	no			yes	
60	782-790	Kardzhali	no			yes	
		Strandzha	no			yes	
		Varna	yes				
61	790-798	Plovdiv	no			yes	

62	798-806	Burgas	no			yes	
		Ruse	no			yes	
		Smolyan	no			yes	
		Strandzha	no			yes	
		Varna-city	no			yes	
		Vidin	no			yes	
63	806-814	Burgas	no			yes	
		Pleven	no			yes	
		Shumen	no			yes	
64	814-822	Ruse	yes				
		Sofia-city	yes				
		Stara Zagora	yes				
		Varna	yes				
65	822-830	Kardzhali	no				yes
		Pleven	no				yes
66	830-838	Plovdiv	no				yes
		Sofia-city	no				yes
		Varna	no				yes
67	838-846	Blagoevgrad	no				yes
		Kardzhali	no				yes
68	846-854	Ruse	no				yes
		Smolyan	no				yes
		Sofia	no				yes
		Strandzha	no				yes
		Varna	no				yes
69	854-862	Smolyan	no				yes
		Strandzha	no				yes

Annex No. 9

Risk analysis for the implementation of DVB-T

The implementation of terrestrial digital video broadcasting determines a possible market risk having relevance for the expected and actual development of implementation of reception video technology depending on the success of the suggested digital television programs and telecommunication services.

Certain political actions however imply economical and social risks for separate countries (for example market distortions, discrimination toward certain operators). The lack of transparency in the national switchover policy may result in insecurity in the manufacturers and users of digital video equipment. The political intervention shall be technologically neutral.

A periodic review of the development of the switchover shall be feasible – mainly with regard to the market.

It is important to comply with and to apply the recommendations of the Commission of Ministers of the European Union member states with regard to the measures for strengthening the democratic and public effect of the terrestrial digital television and radio broadcasting by assessing the potential of the terrestrial digital television for access to the information society by every household through providing universal access to the suggested programs. Special attention shall be paid to avoid the so-called "digital divide" on the grounds of the required "digital literacy" of the users. With regard to this the degree of interoperability and the compatibility of the reception, decoding and deciphering equipment and systems, providing access to terrestrial digital television services and interactive services shall be improved.

The influence of digitalization of the video broadcasting on the new type of modeling of the media environment is substantial. It is expressed with the entry of source coding through MPEG-2 and formation of multiplex of signals, data compression and digital access technology (hardware and software) of the users, used of open interface API, implemented through MHP.

The introduction of terrestrial digital television shall lead to supply advantages (more channels, interactive television programs, Internet access) and used advantages (access to digital services, use of EPG, acquisition of digital reception equipment at accessible price, etc.) The issue of the level of channels multiplexing and interactivity of services in view of the utilized digital platforms – satellite, cable or terrestrial – remains problematic. In view of the number of channels and interactive services the latter has the least number of advantages. Problems related to the use of interactivity by the mass audience are also at hand, as users are not experienced in the so-called "television screen surfing" by using a keypad, as well as guaranteeing the pluralism in using the various digital platforms.

The implementation of the switchover from terrestrial analog broadcasting to terrestrial digital broadcasting is a complex process, including various risk factors such as underestimating the consequences that could result from their occurrence that could lead to serious compromising of the transition.

Annex No. 10

Terminology

API - [Application Programming Interface]
ATM - [Asynchronous Transfer Mode]
BER - [Bit Error Ratio]
C/N - [Carrier to Noise Ratio]
CATV - [Community Antenna Tele-Vision]
DAB - [Digital Audio Broadcasting]
DVB - [Digital Video Broadcasting]
DVB-C - [DVB Cable]
DVB-S - [DVB Satellite]
DVB-T - [Digital Video Broadcasting - Terrestrial]
EBU - [European Broadcasting Union]
EPG - [Electronic Programme Guide]
ETSI - [European Telecommunication Standards Institute]
ITU - [International Telecommunication Union]
MFN - [Multi Frequency Network]
STB - [Set Top Box]
SFN - [Single Frequency Network]