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### **III. RADIO FREQUENCY SPECTRUM MANAGEMENT**

The gradually increasing need of an access to the radio frequency spectrum, limited by its nature, imposes its optimal and efficient management. The global development and the introduction of new technologies, making possible the satisfaction of the business requirements and the needs of the population of state-of-the-art, technologically efficient and high quality communication and information services at affordable prices, demand the provision of the relevant harmonized frequency resource.

In compliance with its authorities, the CRC manages the radio frequency spectrum for civil needs and controls its efficient use and/or the sources of the interference, on the bases of its Principles of management and distribution of the radio frequency spectrum for civil needs. This is a complex process of analyzing and taking into account the interconnection of the following more important aspects:

- The accession of the Republic of Bulgaria to the European structures and the NATO;
- The development of a competitive telecommunication sector and the provision of conditions for the business development;
- The international development of the radio services, the radio equipment and the telecommunication network;
- The convergence between the telecommunication services, the media and the information services;
- The protection of the interests of the end users;
- The market of technologies and services.

#### **1. DISTRIBUTION OF THE RADIO FREQUENCY SPECTRUM**

The distribution of the radio frequency spectrum by radio-services and users is performed by the National Radio Frequency Spectrum Council (NRFSC), which elaborates the National Plan for allocation of the radio frequency spectrum to radio frequencies and radio frequency bands for civil needs, for the needs of the national security and the defense as well as for shared use between them (NP). In 2004 the representatives of CRC in NRFSC actively participated in the development of a project of a consolidated NP, adopted by Resolution No 545/28.06.2004 of the Council of Ministers, by which the compliance is achieved with the decisions adopted by the World Radio-Communication Conference in 2003 (WRC-03) and the European table of the distribution of the radio frequency spectrum ERC REPORT 25 of the Committee of Electronic Communications to the European conference on posts and telecommunications.

The updating of the NP resulted in and protected a radio frequency resource for civil needs and the conditions were specified for the shared use of the same frequency bands by different radio services and the re-distribution and differentiation were performed of frequency bands for new applications. New notes were made and the formulation of certain notes was corrected. The radio frequencies and the radio frequency bands for the small range equipment for civil needs were updated in compliance with the recommendations of ERC/REC 70-03 of the Committee of electronic communications.

#### **2. EFFICIENT USE OF THE RADIO FREQUENCY SPECTRUM**

Aiming at the efficient use of the radio frequency spectrum, CRC:

- Continued the study and the identification of the current and future needs of the radio frequency spectrum: used, poorly used and not used radio frequencies and radio frequency bands, future use and adoption of new radio frequency resources, new technologies and international trends;
- Determined the radio frequency resource and prepared the technical characteristics and parameters for the introduction of new digital technologies;
- Continued the study for the adoption of surface digital radio and TV distribution;

- Determined the radio frequency spectrum for general use for the telecommunications on the basis of the registration by a general license by its Resolution No 717 dated February 12, 2004;
- Performed the analysis of the technical possibilities for telecommunications by long-distance communication networks with individually determined scarce resource – radio frequency spectrum for each individual case with respect to the electromagnetic compatibility and the biological protection;
- Performed the frequency planning of the radio frequency spectrum, determined for civil needs, to be used by different long-distance communication networks, in compliance with the recommendations of the International Telecommunications Union and the Committee of Electronic Communications;
- Prepared the technical parameters and the requirements for the realization of the telecommunications by separate and public telecommunication networks with individually determined and granted scarce resource – radio frequency spectrum for civil needs;
- Performed preliminary national coordination and harmonization with all relevant state authorities and administrations of radio frequencies and radio frequency bands for civil needs, which require individual licenses of public operators and also performed the national coordination of the radio frequencies and radio frequency bands for civil needs and the equipment, which make use of them, with all interested administrations;
- Performed the analysis of the level and the possibility of the integration of the Republic of Bulgaria to the resolutions of the Committee of Electronic Communications, concerning the use of the radio frequency spectrum.

### **3. PLANNING AND PROVISION FOR USE OF THE RADIO FREQUENCY SPECTRUM**

#### **Mobile radio service**

In 2004 radio frequency bands of the ranges of 900 MHz and 1800 MHz were planned, determined, coordinated and provided for the telecommunications by public telecommunication mobile cellular networks in conformity with the GSM standard with national coverage to a third telecommunication operator, observing the principles of equality and the requirements of efficient use of the radio frequency spectrum.

The radio frequency ranges 411 - 414 MHz and 421 - 424 MHz, determined for the telecommunications by public telecommunication mobile cellular network in conformity with the TETRA standard, were planned, distributed and coordinated with the relevant authorities and after a tender procedure the radio frequency bands 411.0 - 412.5 MHz and 421.0 - 422.5 MHz were provided to one operator for telecommunications by a public mobile telecommunication network by the TETRA standard with national coverage.

After the relevant frequency planning and distribution, CRC determined the radio frequency resource 2 x 10 MHz in the frequency bands 1920 - 1930 MHz and 2110 - 2120 MHz + 1 x 5 MHz in the frequency band 2010 - 2015 MHz, 2 x 5 MHz in the frequency bands 1930 - 1935 MHz and 2120 - 2125 MHz + 1 x 5 MHz in the frequency band 2015 - 2020 MHz and 2 x 5 MHz in the frequency bands 1935 - 1940 MHz and 2125 - 2130 MHz + 1 x 5 MHz in the frequency band 2020 - 2025 MHz for the telecommunications by public telecommunication cellular networks in conformity with the UMTS standard with national coverage.

Frequency planning was performed of the radio frequency spectrum with the purpose of providing individually scarce resources to different administrations and companies for telecommunications by a separate mobile telecommunication network PMR with national and local coverage and by a separate mobile telecommunication network for personal calls. As a result of the planning 852 frequencies were provided to different telecommunication operators.

### **Fixed radio service**

The past year was exceptionally efficient concerning the regulation of the networks from the fixed radio service. There is a significant growth of the traditional for the radio service radio relay networks. Frequency planning and coordination were performed of 2073 radio relay sectors and 1734 radio relay sectors were licensed of 60 operators, which is an increase by 90% compared to 2003.

The issue of the Ordinance on Procedural Rules and Technical Parameters for Operation of Telecommunication Networks from the Fixed Radio Service (promulgated in the State gazette, issue 75 of 2004) created the regulatory basis for the efficient use of the radio frequency spectrum distributed or civil needs in the fixed radio service. The frequency resource of the radio service was divided among the networks of the type "point to point" and "point-to-multipoint" in the different frequency ranges. The permissible frequency distributions were regulated, which could be used for both types of networks and the minimum lengths of the sectors were standardized depending on the used frequency range. The requirements to the operational projects– part "Technology" and to the records of the measurements for the networks of the fixed radio service were formulated.

The distribution of the radio frequency spectrum among the civil users and the national security and defense in certain frequency ranges was rationalized.

A profound analysis was performed of the loading of the radio frequency spectrum and the spectrum for the priority of non-exclusive use of the third GSM operator was determined for providing the traffic transmission.

The frequency planning of the radio relay networks of the "Marine Administration" Executive agency and of the state company "Air Traffic Control" was performed. These are the basis respectively of the telecommunication network of the sea search and rescue and the distribution of current information, thus ensuring the safe navigation, and of the telecommunication network of search and rescue and distribution of current information, ensuring the safety of the flights.

In 2004 a national coordination and harmonization was performed including all the relevant authorities and administrations in compliance with article 28, par. 1, item 3 of the Telecommunications Act (promulgated in the State Gazette, issue 88 of 2003) of 1740 radio relay sectors of public operators, without any objection and remarks. CRC approved other 100 projects of operators of telecommunication networks and of the fixed radio service – radio relay lines.

The year was crucial for the introduction of new technologies in the ranges of the fixed radio service. Besides the activities concerning the radio relay networks, other activities were initiated on the regulation of networks of the type "point-to-multipoint". The frequency range 3.4 - 3.6 GHz planned to be used for telecommunications by public telecommunication networks of the type "point-to-multipoint". Radio frequency resource was provided in the range 3.6 - 3.8 GHz for the telecommunications by an independent telecommunication network from the fixed radio service of the type "point-to-multipoint" for one telecommunication operator. Part of the radio frequency resource, allocated to the fixed radio service in the range about 26 GHz, was determined for long-distance communications by networks of the type "point-to-multipoint".

### **Fixed satellite radio service**

In 2004 an ascending development was registered in the regulation of the networks from a fixed satellite radio service by providing radio frequency resource to 8 new operators and the technical parameters of the telecommunication networks from the fixed satellite radio service were changed. Sixteen new projects were approved for networks from the fixed satellite radio service.

### **Analogue radio distribution**

By issuing the Ordinance on the definition of the rules, the procedures and the technical parameters of the operation of the radio-radio service (promulgated in SG, issue 76 from 2004) the conditions were set up for the efficient management of the distributed to this radio service radio frequency spectrum.

During the past year CRC determined 26 frequency channels and the basic parameters of the TV broadcasting with local coverage and free frequency channels for the

construction of new TV retransmission stations for the networks of BNT and bTV, for which purpose 26 frequency allocations were made. In the VHF FM range of 87.5 - 108 MHz 96 frequencies were determined as well as the main parameters of the broadcasting with local coverage and 17 allocations for the national networks BNR and "DARIK Radio" AD. 78 projects were approved for the construction of broadcasting stations of licensed operators for radio broadcasting, 32 for TV broadcasting and a project for the first TV network – terrestrial digital broadcasting in Sofia, as well as methods for measuring the quality of the services and the operation parameters of the digital network. After the BNT masters the 56<sup>th</sup> TV channel determined for the town of Shoumen and the release of the 5<sup>th</sup> TV channel it will be possible to plan the new radio stations in North-East Bulgaria.

A joint coordination was performed of 207 frequency allocations for radio- and TV-broadcasting and expert reports were prepared on the international coordination, as well as documents for registration in international organizations of 20 radio frequencies and 300 TV channels of other countries and 40 Bulgarian TV channels. The international coordination for 1700 foreign TV channels was rejected.

### **Digital radio distribution**

The development of the new technologies in the field of the radio and TV broadcasting and in the first place, the trends of switching from analogue to digital systems was the main reason for the organization of the Regional Radio Conference - RRC 04/06 of the International Telecommunications Union. The main purpose of the conference was the achievement of compliance with the requirements to introduce digital terrestrial radio broadcasting, in the meantime achieving maximum versatility in the future use of the spectrum resource left free after the introduction of the efficient digital technologies.

The first session of the conference approved the principles, the methods, the parameters and the criteria for planning, as well as the configurations of the radio networks that will be used in the development of the Plan of Introducing Terrestrial Digital Radio Broadcasting. The technical parameters were determined for ensuring the collaboration with the other radio services and radio broadcasting networks in the frequency ranges 174 - 230 MHz and 470 - 862 MHz and a report was elaborated and approved on the further operation in the period between the sessions and the second session of the conference.

The work in the time period between the sessions was connected with the collecting and checking of the incoming data and the planning performed. The main task, related to the national preparation for taking part in the second session of the regional radio conference RRC 04/06, was the performance of the frequency planning of the digital terrestrial TV. In this respect the first stage of the frequency planning of the telecommunication networks for terrestrial digital broadcasting started in Bulgaria. In planning the networks for the terrestrial digital TV the existing in the Stockholm plan from 1961 analogue allocations for Bulgaria and the neighboring countries were taken into account. A database was prepared for the terrestrial digital radio broadcasting of TV signals in compliance with RRC 04/06.

As a part of the preparation for participation in the second session of the conference, it is necessary to organize meetings on bilateral and multilateral bases between the Republic of Bulgaria and the neighboring countries. At the initiative of the representatives of the CRC in the European group of preparation of the Regional Radio Conference RRC 04/06 the so called Balkan East-European group was set up, including Bulgaria, Serbia and Montenegro, Macedonia, Greece, Rumania, Turkey and Albania, with the purpose of preliminary coordination of the frequency plans of the Balkan countries for the introduction of the digital broadcasting.

In 2004 a study was performed on the technical possibilities, 8 radio frequency channels were planned and the technical parameters were determined for the telecommunications by a telecommunication network for terrestrial digital TV broadcasting on the territory of the towns of Bourgas, Varna, Gabrovo, Dobrich, Plovdiv, Rousse, Sliven and Stara Zagora. It will be possible to make changes in the determined channels and the technical parameters for the terrestrial digital TV broadcasting after 2006, due to the fact that the process of international frequency planning and coordination of the digital networks is not over yet. The introduction of the digital TV broadcasting will result in a more efficient use of the radio frequency spectrum.

BTC PLC holds an individual license for the construction, maintenance and operation of telecommunication network for terrestrial digital TV broadcasting in the region of Sofia and

last year the broadcasting of the program of the BNT "Channel 1" on TV channel 64 started there, and the multiplex is not yet busy enough with other programs.

#### **4. ELECTROMAGNETIC COMPATIBILITY**

In 2004 CRC performed 156 studies of the electromagnetic compatibility between the Bulgarian and the foreign VHF FM radio broadcasting stations and aeronautical systems ILS, VOR and COM.

A database is being maintained with the technical and the geographic parameters of the aeronautical systems and the Bulgarian and the foreign VHF FM radio broadcasting stations.

CRC is intensively working on establishing the sources of the trans-border interferences in operation of the VHF and the TV broadcasting stations and is undertaking actions for their elimination.

78 operational projects were inspected on the construction of broadcasting stations of licensed operators for radio broadcasting, 32 for TV broadcasting, 1 project of the first TV network for terrestrial digital radio broadcasting for Sofia, 100 projects of operators of telecommunication networks from fixed radio service - radio relay lines and 16 projects on telecommunication networks from the fixed satellite radio service.